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Role of Earnings Management and Digitalization in Explaining the Relationship Between Audit Quality and Value Addition: Insights from China

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ABSTRACT

This study examines the complex relationship of audit quality and value addition, considering the mediating roles of access to finance and ESG performance, and moderating roles of digitalization and earnings management in Chinese non-financial firms. Seemingly Unrelated Regression (SUR) system is used for unbalanced panel data to test the parallel mediation and double moderation proposed. Our findings show that the relationship between audit quality and value addition is in fact quite complex. Where ESG performance and capital constraints show a full, parallel, and negative mediating role between audit fees and value addition. Similarly, digitization positively moderates the association of audit fees and capital constraints, and earnings management negatively moderates the association between audit fees and both mediators. Given China's unique institutional environment, characterized by state-influenced financing structures and rapid digital transformation, these findings offer valuable insights into how audit quality interacts with technology and sustainability in adding value for firms. Our findings suggest that Chinese firms need to integrate digitalization with ESG metrices, to ensure stakeholder engagement and quality reporting. Finally, policymakers in China also need to consider the consequence of improved audit quality on capital access of firms and promote transparency in ESG reporting that may help support firms in value addition without being penalized by overly conservative investor reactions.

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Introduction

Making financial information useful for investors and other stakeholders is the role of an accountant, and to ensure that this presented information is in fact true and fair is the job of an auditor (Hunt, Hunt, Richardson, & Rosser, 2022). This link helps in understanding the importance of audits in ensuring that the investors and stakeholders receive 'decision useful' information, promoting transparency and accountability. Further, Jensen & Meckling (1976)

identify audit costs as monitoring costs that are incurred by the management to develop trust and transparency in the reported financial information for the investors. This provides a business case for the audit. This is because audit costs, from the firm's perspective, are mere 'costs', and to be justified, these costs should be creating value for the investors. Although, the direct association between audit quality and value addition of firms is marginally tested, literature rigorously tests the impact of audit quality on other firm specific variables like firm value, performance, and risk (Abu Afifa, Saleh, & Taqatqah, 2023; Indarti & Widiatmoko, 2021). Additionally, literature advocates that audit quality leads to value addition through stakeholders' intervention. For example, a qualified audit opinion would hinder the access to finance for the firms, as debt and equity providers would refrain from investing in such firms. On the other hand, an unqualified audit opinion would cause no such obstacles in raising finance for the firms.

The agency perspective argues that investors are interested in their wealth maximization and will invest where they are confident that their investment value will increase. Additionally, Freeman's (2010) stakeholder perspective argues it is not just the investors that are interested in the affairs of the firm. Other stakeholders also use this provided financial information to take decisions. Following the ESG perspective, it can be argued that these decisions also impact on the value of the firms (Siddiqui, Khan, & Sohail, 2024). As such, the agency and stakeholder perspective argue for two channels through which audit quality can lead to value addition for firms. These channels include: (1) access to finance (investor perspective); and (2) sustainability (ESG aspects). The audit reports are used by both investors and other relevant stakeholders (for example, customers, regulators, etc.) to make decisions that may impact value creation/addition of firms.

Additionally, the association of audit quality and value addition is further complicated by technological disruption in the digital era and complex constructs like earnings management. Theoretically speaking, agency perspective of Jensen & Meckling (1976) would suggest that earnings management would increase information asymmetry, rendering markets inefficient. However, Schipper (1989) argues that as the objective of financial reporting is linked with decision usefulness, therefore, judgement in the financial reporting framework may not necessarily lead to asymmetry of information. Therefore, provided the accruals are as per the guidelines of the financial reporting framework, they would not be identified or highlighted by the auditors. Nonetheless, literature provides ample evidence that earnings management can adversely impact firm specific aspects like performance, value, and risk. However, the direct association between earnings management and audit equality remains an enigma, even in recent literature (Alyaarubi, Alkindi, & Ahmed, 2021; Indarti & Widiatmoko, 2021).

Therefore, considering these factors, it is important to re-examine the business case of audit in the modern business environment, considering the channels through which audit, a cost, may lead to value addition for firms. Similarly, it is also important to consider the role of technological disruption and earnings management when examining the business case for audit. Despite the growing attention to audit quality, digitalization, and earnings management, limited studies have examined their impact on value addition of firms together. Although scholars like Abu Afifa, Saleh, & Taqatqah (2023); Alrashidi et al. (2021); Alyaarubi et al. (2021) do examine these areas, however, these studies fail to consider the 'audit ecosystem' in a holistic manner. Furthermore, current study chooses Chinese market to examine this complex association due to its unique institutional, regulatory, and economic environment. More specifically, China has a state-controlled financial system, where capital allocation is not purely market-driven, unlike the Western markets or other prominent emerging markets (Alkebsee, Tian, Usman, Siddique, & Alhebry, 2021). This makes the Chinese market an interesting studying ground for business case for audit quality. Further, Fan et al. (2011); Siddiqui, Khan, et al. (2024); and Siddiqui, Sohail, et al. (2024) prefer region- or country-specific studies over international samples, as this accounts for institutional factors when performing assessments.

Our findings show that the relationship of audit quality with value addition is in fact quite complicated, when considering the intervening role of capital constraints and ESG performance and interactive role of digitalization and earnings management. Our study provides evidence that capital constraints and ESG performance play a negative and full mediating role when explaining the impact of audit fees in value addition. The mediating role of capital constraints shows a significant negative, double moderation through the interaction of earnings management and digitalization, and the mediating role of ESG performance shows a significant positive moderation through earnings management.

The rest of the study is arranged as follows: **Section 2** provides a detailed review of literature, **Section 3** lists down the methodology, **Section 4** shows the findings, **Section 5** provides discussion, and finally **Section 6** concludes the study.

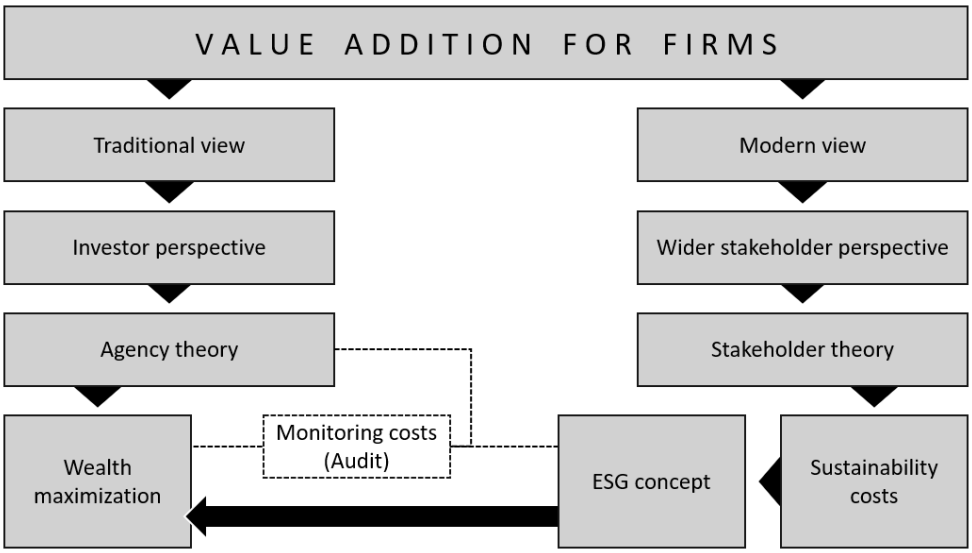
Review of the literature

Theoretical foundations

The primary purpose of conducting businesses is to generate profit, or to put it more directly, maximize wealth. As the businesses get incorporated and expand in size, the separation of ownership and management complicates this process. This separation leads to a possibility of conflict of interest between the principals (owners) and agents (management), referred to as the agency problem (Jensen & Meckling, 1976). Businesses incur monitoring costs as one of the tools to reduce agency problem, and audit can be seen as one of its crucial components. As such, considering Agency Theory, it can be argued that a business can justify incurring auditing costs if it leads to value addition for the firms. Moreover, the evolving business environment further complicates the association of audit and value addition. As such, value addition can be seen from the distinct lenses of conservative view (or traditional view) that only considers the perspective of investors, or a broader view (or modern view) that considers wider stakeholder perspective.

Windsor (2017) highlights that for long-term (or sustainable) value creation, it is important to consider the modern perspective. The concept of sustainability becomes relevant here, that states that resources are needed to be utilized in a manner so that they are available for future generations. This concept discourages waste of natural or manmade resources and makes a case for reduced environmental and social footprints (Harrington, 2016). However, as highlighted by Signori et al. (2021), this concept complicates the meaning and measurement of 'value', as different stakeholders would perceive value differently. Additionally, the importance of traditional views should not be underestimated. This is because, even in the modern economic environment, the purpose of existence of a business is to generate wealth in traditional economic terms for the investors, as highlighted by Zumente & Bistrova (2021). From this perspective, sustainability will be classified as a cost incurred by the entity and would only be justified if it helps add value for the investors from a traditional (or conservative) perspective. Therefore, to tackle these two problems, modern literature develops a business case for sustainability, by introducing the concept of ESG. Signori et al. (2021) further elaborates that this concept argues that a firm must identify its ESG related risks (also referred to as the three pillars of sustainability) to ensure better management of these risks. Doing so should improve its value creation/addition through effective risk management. A summary of the theory of value addition is graphically presented below for clarity.

Figure 1
Theoretical perspectives of value addition



Note: This figure shows the modern value addition concept, linking sustainability to wealth maximization of firms via ESG concept.
Source: Author

Prior literature and hypotheses development

Linking the theoretical notions of Agency Theory with Limited Attention Theory, an association between audit quality, access to finance, and value creation can be established. Although marginally and indirectly, this association is corroborated through empirical evidence in literature as well (for example, Alrashidi et al. (2021); Lim et al. (2022)). Furthermore, literature looks at access to finance as a mechanism, that is, a process (Buchdadi, Sholeha, & Ahmad, 2020), therefore, access to finance should demonstrate an intervening role between the audit quality and value addition. Moving on to the second group of stakeholders identified (that is, the sustainability aspect), Freeman's (2010) Stakeholder Theory provides the fundamental grounds to link the preferences of wider stakeholder group, not just the investors, with firm's affairs. This concept claims that ESG related risks and rewards are just as real as other economic and financial risks and rewards that an entity considers in its risk management philosophy. For example, work of Bax et al. (2023); Capelli et al. (2023), all empirically support this notion of integrating ESG risks and objectives into the strategies of entities to add or create value (at least in the long-term). Audit reports, although addressed to the shareholders, are used by a wider audience. For example, firms report their ESG related risks in integrated reports, ESG reports, CSR reports, sustainability reports, etc. Therefore, as audit quality plays a role in impacting the decisions of such stakeholders, the study argues that the ESG factors of a firm become a channel in mediating the impact of audit quality in value addition for firms. Further, Siddiqui, Khan, et al. (2024); and Siddiqui, Sohail, et al. (2024) show that integrating ESG risk management within overall business strategy does impact firm specific factors like firm performance, risk, and value. The authors further show that the impact of ESG is rather complex on firm specific factors and depends on many institutional and market factors.

Further, literature prefers to measure audit quality using audit fees charged by the auditor (Alrashidi et al., 2021; Chen, Elemes, Hope, & Yoon, 2023). The primary reason is that this measure is easily available and understood by the users of the financial statements. Audit fee is simply the total audit fee charged by the auditors for the current period's audit engagement. This figure is disclosed in the financial statements of the reporting entity in the notes or disclosures to the financial statements. Similarly, for value addition, literature argues for using market-based measures (like Market Value Added (or MVA)) over accounting-based measures (like Economic Value Added (or EVA)) (Șerban, Mihaiu, & Țichindelean, 2022). For capital constraints, Alrashidi et al. (2021) theoretically links this concept to access to finance for firms,

when considering audit quality. Authors use weighted Kaplan & Zingales (1997) Index (KZ Index) to represent access to finance from investors' perspective.

Considering the findings of prior literature, and conceptual framework developed in **Section 2.1.** of the study, we hypothesize the following relationships:

H1: Audit quality leads to value addition of Chinese non-financial firms.

H2: Access to finance plays a mediating role between audit quality and value addition for Chinese non-financial firms.

H3: Sustainability plays a mediating role between audit quality and value addition for Chinese non-financial firms.

Additionally, considering the role of technology with value addition, literature shows contrasting empirical findings, advocating that this relationship between technology, value addition, and audit quality, is more complex in nature. For example, numerous experimental studies conducted to examine the impact of technology on audit quality show that this vastly depends on the preference of stakeholders like practitioners or regulators (Austin, Carpenter, Christ, & Nielson, 2021; Brazel, Ehimwenma, & Koreff, 2022; Sihombing, Narsa, & Harymawan, 2023). Similarly, literature covering the impact of technology on value addition of firms also shows a lack of consensus (Achim, Văidean, Popa, & Safta, 2022; Denner, Püschel, & Röglinger, 2018; Gebauer, Fleisch, Lamprecht, & Wortmann, 2020). Konurbaeva (2022) argues that intangible assets are important in digitalization of firms, further, Achim et al. (2022) state that firms that are digitally savvy integrate technology into their business models, which can help add value for such firms. As such, literature shows preference for measuring impact of technology via digitalization of firms (that is, their investment in intangible assets). Further, considiering the findings of prior literature, we hypothesize the following:

H4: Use of technology moderates the relationship between audit quality and value addition of Chinese non-financial firms.

Finally, another enigma identified from literature is the association of earnings management and audit quality. This association is documented in literature with contrasting findings. Literature mostly has a consensus that earnings management, even if it creates or adds value for firms in the short term, causes concerns for the management in long term. For example, work of Abu Afifa et al. (2023); and Indarti & Widiatmoko (2021) provide empirical evidence of this association. However, the impact of audit quality and earnings management is not so clear in literature. For example, Abu Afifa et al. (2023) show that audit quality and earnings management are not associated directly with one another. However, work of Alyaarubi et al. (2021) shows a positive association and Le & Moore (2023) demonstrates a negative association among these variables. Theoretically speaking, earnings management causes information asymmetry and thus is adversely associated with firm-specific factors in the long run. However, if the judgement applied by the management in the financial reporting process is per the appliable financial reporting framework, as discussed by Schipper (1989), this issue shifts outside the scope of the auditor. This argument makes audit quality and earnings management independent of one another. However, as both independently have a theoretical association with value addition, earnings management should moderate the impact of audit quality on value addition, as such, we hypothesize the following:

H5: Earnings management moderates the relationship between audit quality and value addition of Chinese non-financial firms.

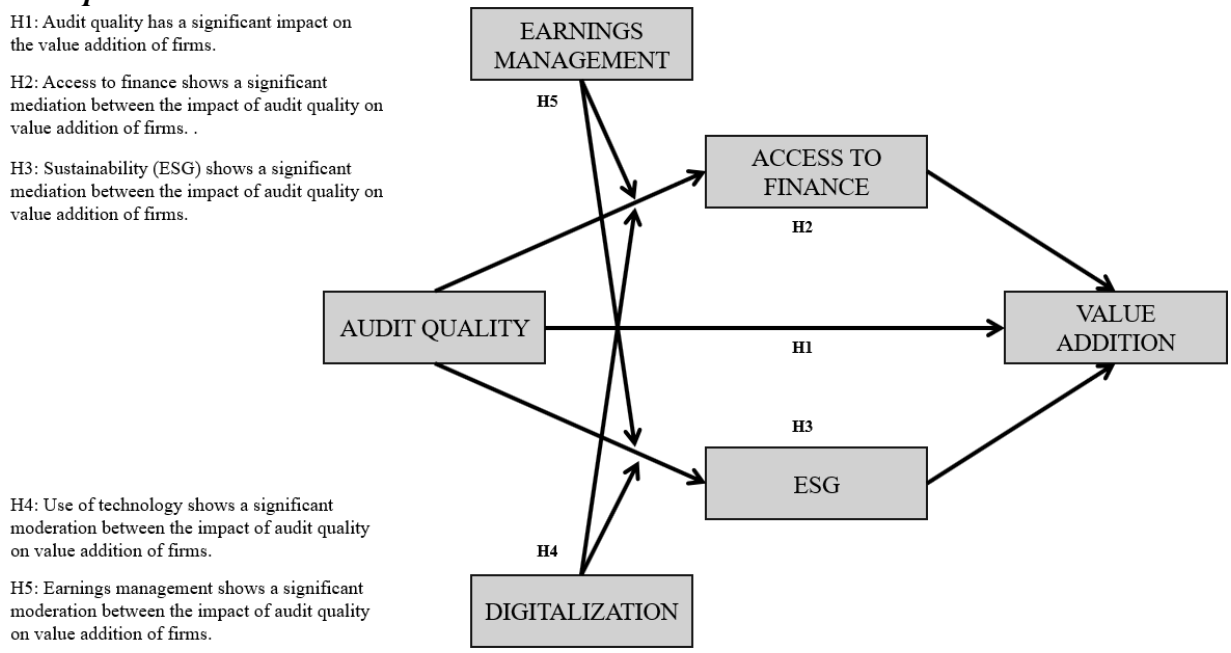
Summary of the conceptual model

To summarize, although literature examines the determinants of audit quality in quite detail, the role audit plays in adding value for the firms is only marginally examined. Most of the studies examining value addition capabilities of audit include studies using primary data and

mainly focus on internal audit (Faiteh & Aasri, 2022; Omer, Aljaaidi, & Habtoor, 2020). As such, there is a dire need to examine the impact of audit quality in value addition for firms, specifically considering factors like access to finance, sustainability, technological preferences, and earnings management, that literature currently overlooks.

The conceptual model for the study is summarized as follows:

Figure 2
Conceptual Model



Note: This figure summarizes the conceptual model of the study.
Source: Author

Methodology

Overall approach, sample, and data

A quantitative research design is used to perform empirical examinations to test the hypotheses of the study. Considering the varying nature of financial and non-financial firms (Siddiqui, Khan, et al., 2024; Siddiqui, Sohail, et al., 2024), to enable a focused analytical framework, the scope of the study is restricted to listed non-financial firms. The study selects Shanghai Composite Index, as it is quite popular proxy used in recent literature to represent Chinese stock market (Fei & Zhou, 2023). Firm level secondary data is collected from the Thomson Reuters Datastream for the period of 2014 to 2023, whereas country level data for macroeconomic variable for these years is collected from the World Bank DataBank[1]. After removing financial firms and non-financial firms with missing data from the Shanghai Composite Index, we end up with a total of 206 non-financial firms and 2,234 unbalanced panel observations to perform estimations.

Variables used in the study

Total variables of the study are divided into five main groups: (1) dependent variable; (2) independent variable; (3) moderating variables; (4) mediating variables; and (5) control variables. The selected variables in each category are explained in **Table 1** for easy reference.

Empirical model and estimation approach

For moderation to exist, the interactive term of the moderator and the independent variable must show statistically significant association with the dependent variable. However, for a mediating variable, the empirical analysis is not so simple. Baron & Kenny (1986) recommend

[1] https://data.worldbank.org/

three-step regression approach to test for a mediating effect. According to the authors, three conditions must exist for a mediating relationship: (1) the independent variable must show a statistically significant association with the dependent variable without the presence of the mediating variable; (2) the independent variable must show a statistically significant association with the mediating variable; and (3) the mediating variable must show a statistically significant association with the dependent variable in presence of the independent variable. Additionally, to be classified as full-mediation, the association of independent variable with the dependent variable must turn statistically insignificant in the third step (otherwise, the association is referred to as partial-mediation) (Abu Afifa et al., 2023). To empirically demonstrate these steps of moderations and mediations, the three equations are referred as below, where: 'IV' is the independent variable; 'DV' is the dependent variable; 'MO' is the moderating variable; 'ME' is the mediating variable; 'X' represents vector of control variables, α, β, and γ are respective coefficients; and δ, ε, ϵ are the respective error term.

$$\mathrm{DV} = \alpha_0 + \alpha_1 \mathrm{IV} + \alpha_2(\mathrm{IV} \times \mathrm{MO}) + \alpha \mathrm{X} + \delta \ldots (\mathbf{EQ1})$$

$$\mathrm{ME} = \beta_0 + \beta_1 \mathrm{IV} + \beta \mathrm{X} + \varepsilon \ldots (\mathbf{EQ2})$$

$$\mathrm{DV} = \gamma_0 + \gamma_1 \mathrm{IV} + \gamma_2(\mathrm{IV} \times \mathrm{MO}) + \gamma_3 \mathrm{ME} + \gamma \mathrm{X} + \epsilon \ldots (\mathbf{EQ3})$$

However, Hayes & Rockwood (2020) argue that the traditional understanding developed by Baron & Kenny (1986) is incorrect. This is because the indirect effect of the independent variable is different from the statistically significant association of IV and ME in **EQ2** and **EQ3**, respectively. Reconsidering these equations, we can notice that β_1 is the association of IV with ME, and γ_3 is the association of ME with DV. In the presence of ME in the model, the γ_1 shows the direct impact of IV on DV, whereas the product of β_1 and γ_3 shows the indirect impact of IV on DV. Therefore, the inference based on β_1 and γ_3 separately is incorrect, as the indirect impact of IV on DV is captured by of $\beta_1\gamma_3$. Therefore, based on the notion of Hayes & Rockwood (2020) above, we can derive:

$$\alpha_1 = \gamma_1 + (\beta_1\gamma_3) \ldots (\mathbf{EQ4})$$

Using this understanding, the conceptual model of parallel mediation with double moderation of the study can be empirically expressed as follows:

$$\mathrm{KZ_{it}} = \pi_0 + \pi_1 \mathrm{AQ_{it-1}} + \pi_2 \mathrm{DIG_{it}} + \pi_3 \mathrm{EM_{it}} + \pi_4(\mathrm{AQ} \times \mathrm{DIG})_{\mathrm{it}} + \pi_5(\mathrm{AQ} \times \mathrm{EM})_{\mathrm{it}} + \sum \mathrm{X_{it}} + \sum \mathrm{Y_{jt}} + \varphi_{\mathrm{it}} \ldots (\mathbf{EQ5})$$

$$\mathrm{ESG_{it}} = \varpi_0 + \varpi_1 \mathrm{AQ_{it-1}} + \varpi_2 \mathrm{DIG_{it}} + \varpi_3 \mathrm{EM_{it}} + \varpi_4(\mathrm{AQ} \times \mathrm{DIG})_{\mathrm{it}} + \varpi_5(\mathrm{AQ} \times \mathrm{EM})_{\mathrm{it}} + \sum \mathrm{X_{it}} + \sum \mathrm{Y_{jt}} + \phi_{\mathrm{it}} \ldots (\mathbf{EQ6})$$

$$\mathrm{V_{it}} = \rho_0 + \rho_1 \mathrm{AQ_{it-1}} + \rho_2 \mathrm{KZ_{it}} + \rho_2 \mathrm{ESG_{it}} + \sum \mathrm{X_{it}} + \sum \mathrm{Y_{jt}} + \chi_{\mathrm{it}} \ldots (\mathbf{EQ7})$$

Where, 'i' represents non-financial firm, 't' represents year, 't-1' represents value in its first lag, 'j' represents country, ∑X represents the matrix for firm-specific control variables, and ∑Y represents the matrix for country-specific control variables. From **EQ5-7** the conditional indirect effects of audit quality on value addition are expressed in **Table 2**.

However, for panel data, there is an added complication to estimating **EQ5-7**. Latif et al. (2017) argue that for panel data it is important to consider firm-specific characteristics. As such, it would be inappropriate to perform estimations by pooling the data and assuming 'common effects' in the sample selected. Latif et al. (2017) suggest using Seemingly Unrelated Regression (SUR) system as proposed by Biørn (2004). Considering this suggestion, we estimate **EQ5-7** using SUR by first selecting the estimation approach between Fixed Effects or Random Effects using Hausman Test. There are two main motivations for using SUR to

estimate outputs. First, the SUR follows GLS (Generalized Lest Square) approach and uses MLE (Maximum Likelihood Estimation) to estimate the coefficients. SUR-GLS system can be estimated using robust covariance matrix (which is robust to heteroscedasticity and serial correlation issues, which are common when dealing with panel data). Second, this approach can be used to estimate the coefficient estimates, their p-values, and confidence intervals, using bootstrapping. Both these factors help limit or reduce the impact of issues like heteroscedasticity and autocorrelation on estimation outputs (Biørn, 2014). Considering this, we also use heteroskedastic (robust) covariance and bootstrapping when estimating SUR-GLS system and assessing the magnitude and significance indirect effects.

Further, to comment if including mediators in **EQ7** lead to no, partial, or full mediation, we also estimate the following equation:

$$V_{it} = \varrho_0 + \varrho_1 AQ_{it-1} + \sum X_{it} + \sum Y_{jt} + \varsigma_{it} \ldots (\mathbf{EQ8})$$

For the robustness check, we use a different measure for value addition for firms, referred to as enterprise or company value added (CVA), where the value addition is seen from overall firm's perspective. Here, the argument is made that total market capitalization only sees value from the shareholders' perspective. To compute the total value of the firm, total long-term debt should be added to the market capitalization. Secondly, the cash and cash equivalents should be subtracted from the total value, as they represent the most liquid form of assets (Abba, Hamidu, Kakanda, & Hanga, 2023; Abu Afifa et al., 2023). This computation results in the total enterprise or company value. To compute CVA for the period, the current study subtracts the total enterprise value of the current period from the previous period, and scales it using the value of total assets:

$$\text{CVA} = \Delta[\text{Market capitalization} + \text{Long term Debt} - \text{Cash and Cash Equivalents}]$$

Table 1
Variable definition and measurement

Nature	Variable	Symbol	Definition and measurement	References
Dependent	Market value added	MVA	Natural log of [(Issued Shared Capital x Market Price per Share) – Book Value of Total Assets]	Silitonga et al. (2019)
Independent	Audit quality	FEE	Natural log of the audit fee charged for a particular year, this variable is taken on its first lag.	Chen et al. (2023)
Mediating	Access to finance	KZ	Weighted Kaplan & Zingales (1997) index (five variables) – a capital constraints proxy used to represent access to finance from firm-investor perspective, calculated as: $KZ_{it} = \left[(1/5) \times (-1.0019(\frac{CF_{it}}{PPE_{i(t-1)}})\right] - \left[(1/5) \times \left(39.3678\ (\frac{DIV_{it}}{PPE_{i(t-1)}})\right)\right] - \left[(1/5) \times \left(1.3148(\frac{C_{it}}{PPE_{i(t-1)}})\right)\right] + \left[(1/5) \times \left(3.1392\ \left(\frac{D_{it}}{E_{it}}\right)\right)\right] + \left[(1/5) \times \left(0.2826\ \left(\frac{M_{it}}{E_{it}}\right)\right)\right]$ Where: 'i' represents firm, 't' represents time, 't-1' represents lag value, 'CF' is cash flows (appearing in the statement of cash flows), 'PPE' is net value of the property, plant, and equipment, 'DIV' is total cash dividend paid, 'C' is cash balance, 'D' is total long-term debt, 'E' is total book value of equity, and 'M' is market capitalization of the firm.	Alrashidi et al. (2021)
	Sustainability	ESG	ESG index – a score representing the three pillars of sustainability (environmental, social, and governance).	Kartikasary et al. (2023)
Moderating	Digitalization	DIG	Ratio of total intangible assets appearing in the statement of financial position of the firm by total assets.	Achim et al. (2022)
	Earnings management	EM	Extension of the Modified Jones model by Kothari et al. (2005), details appear in **Appendix 1**.	Costa & Soares (2022)
Control (firm level)	Reporting entity (firm) size	SIZE	Size of the reporting entity represented by the natural log of total net revenue reported in the statement of profit or loss for relevant year.	Choi et al. (2023); Fedyk et al. (2022)
	Reporting entity (firm) performance	ROA	Financial performance of the reporting entity measured through return on assets (ROA) – calculated as net income reported in the statement of profit or loss divided by total assets appearing in the statement of financial position.	
	Reporting entity (firm) growth	GRW	Growth in revenue computed as current net revenue less lagged net revenue divided by lagged net revenue appearing in the statement of profit or loss.	
Control (country level)	Gross domestic product	GDP	Year on year growth in the GDP, where GDP is computed as the total of gross value added by all resident producers in the economy plus any product taxes less any subsidies not included in the value of the products.	Diaye et al. (2022)

Note: This table shows the definitions and measurements of the variables of the study.
Source: Compiled by author, specific references stated in the final column of the table.

Table 2
Conditional indirect effects of audit quality

Mediation	Access to finance (KZ)	Sustainability (ESG)

Coefficient	$(\pi_1 + \pi_4\overline{DIG} + \pi_5\overline{EM}) \times \rho_2$	$(\varpi_1 + \varpi_4\overline{DIG} + \varpi_5\overline{EM}) \times \rho_3$
Standard Error (SE)	$\sqrt{\left(\rho_2{}^2 \times SE_{\pi_1}{}^2\right) + \left((\rho_2 \times \overline{DIG})^2 \times SE_{\pi_4}{}^2\right) + \left((\rho_2 \times \overline{EM})^2 \times SE_{\pi_5}{}^2\right) + (\pi_1{}^2 \times SE_{\rho_2}{}^2)}$	$\sqrt{\left(\rho_3{}^2 \times SE_{\varpi_1}{}^2\right) + \left((\rho_3 \times \overline{DIG})^2 \times SE_{\varpi_4}{}^2\right) + \left((\rho_3 \times \overline{EM})^2 \times SE_{\varpi_5}{}^2\right) + (\varpi_1{}^2 \times SE_{\rho_3}{}^2)}$

Note: This table shows how the coefficients and standard errors are measured for the indirect effects to assess their magnitude and significance.
Source: Author

Results and findings

Descriptive statistics and correlation

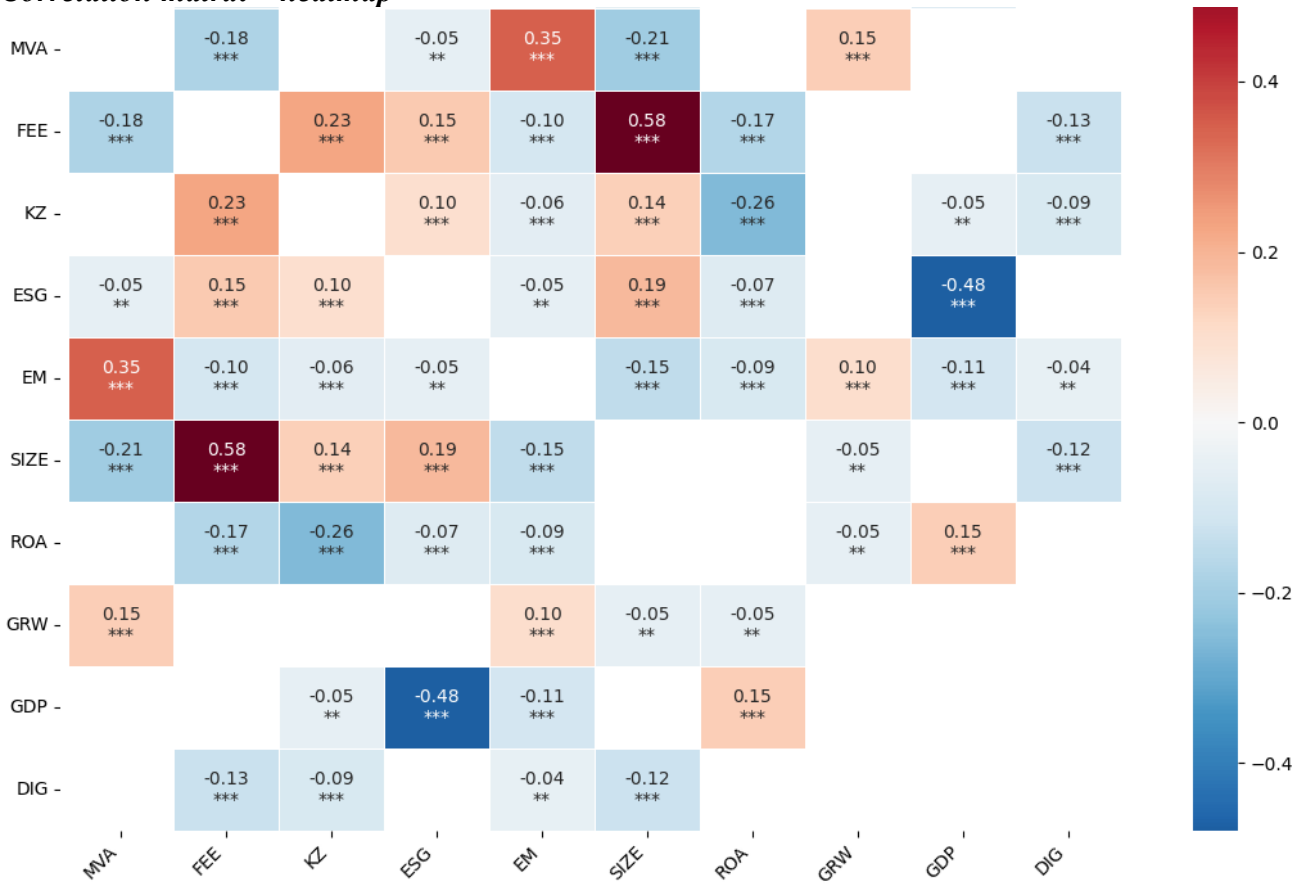
Table 3 shows the summary of descriptive statistics for the selected variables of the study. All the variables show a problem of non-normality when looking at excess kurtosis and skewness. Additionally, all absolute variables (MVA, FEE, etc.) are transformed by either scaling or taking natural log. Therefore, all variables show low variations (standard deviation, and range). Nonetheless, relatively higher standard deviations are shown by the two mediating variables and growth of firms (KZ, ESG, and GRW), showing that the Chinese companies included in the sample show highest variation in sustainable performance. The sample firms show an average audit fee of around USD 1.9 million, whereas the average MVA has a negative value of around USD 10.6 billion, indicating that on average the book value of total assets of Chinese firms are higher than their market capitalization. Furthermore, **Figure 3** shows the correlation matrix of the variables in the form of a heatmap, where red color shows positive correlation and blue color shows negative correlation. SIZE and FEE show the strongest positive correlation (+0.58), whereas ESG and GDP show the strongest negative correlation (-0.48). When considering the dependent variable, EM and SIZE show the strongest positive and negative correlation with MVA, respectively. Additionally, KZ does not show a significant correlation, and FEE shows a moderate negative correlation with MVA. However, none of the variables show a correlation stronger than +/-0.8, showing evidence of lack of multicollinearity among the variables.

Table 3
Descriptive statistics of the variables

Variable	Mean	Median	St.Dev	Max	Min	Range	Kurt.Exc	Skew
MVA	-0.5500	-0.5832	1.2608	3.8025	-5.6441	9.4466	0.7882	-0.0390
MVA*	-10650(M)	-2913(M)	45255(M)	506407(M)	-283041(M)	789448(M)	32.0025	0.9291
FEE	14.0260	13.9639	0.8722	16.9639	11.6055	5.3585	0.3618	0.4879
FEE*	1.911(M)	1.160(M)	2.467(M)	23.299(M)	0.110(M)	23.190(M)	20.9262	3.9884
KZ	0.5421	0.3465	1.0421	17.8290	-4.7054	22.5345	56.0494	5.1862
ESG	42.4684	43.3433	17.7204	89.6157	0.8457	88.7700	-0.7226	0.0457
EM	0.0705	0.0391	0.1484	3.2095	0.0000	3.2095	199.6758	11.9838
DIG	0.0438	0.0116	0.0840	0.7320	-0.0046	0.7366	18.4086	3.7732
SIZE	22.4630	22.3653	1.3429	26.9007	-6.9078	33.8084	101.9934	-4.1676
SIZE*	14481(M)	4518(M)	44276(M)	481089(M)	-648(M)	481737(M)	62.1260(M)	7.4808
LEV	0.9552	0.5727	1.4370	26.7851	0.0000	26.7851	76.5599	6.5747
ROA	0.0525	0.0463	0.0821	0.9106	-1.1306	2.0413	35.2903	-1.6146
GRW	1.3886	1.1157	5.9290	238.1761	-1.0205	239.1966	1222.1052	33.3011
GDP	0.2919	0.2259	0.2512	1.7378	0.0006	1.7372	0.4511	0.9810

Note: This table shows the selected descriptive statistics of the variables of the study, where 'St.Dev' shows the standard deviation, 'Max' shows the maximum value, 'Min' shows the minimum value, 'Kurt.Exc' shows value for the excess kurtosis, and 'Skew' shows the value of skewness. Figures having (M) at the end are presented in millions of USD. Variables MVA, FEE, and SIZE are presented in their natural log form to improve normality and linearity, variables having (*) at the end represents their original values in USD.
Source: Author

Figure 3
Correlation matrix – heatmap



Note: This figure displays the correlation coefficients of the variables of the study as a heatmap. Where (***), (**), and (*) show significance at 1%, 5%, and 10%, respectively.
Source: Author

Diagnostic tests

The study performs four main diagnostic tests of the variables before estimating the empirical models. **Table 4** shows the summary of the results of these diagnostic tests.

Results show that all variables are non-linear (tested through Broock, Dechert, and Scheinkman (BDS) (1996) Test) and non-normal (tested through Jarque-Bera (1980) Test), which is usual when dealing with panel data. As elaborated in **Section 3**, we use SUR-GLS estimation technique with robust covariances and bootstrapping to tackle these issues. To test stationarity, the study uses two tests, Augmented Dickey-Fuller (ADF) (1981) Test and Phillips–Perron (PP) (1988) Test, both these tests show that all variables are stationary at level. Finally, VIF is computed to test multicollinearity, results do not show evidence of multicollinearity problem among the variables.

We also estimate **EQ8** using Random Effects Panel Model (**Table 5**), where Hausman Test is used to examine the preference of Random Effects over Fixed Effects model. This estimation is performed to run two additional diagnostic tests, heteroskedasticity (Breusch-Pagan Heteroskedasticity (1979) Test) and autocorrelation (Durbin-Watson (1950) Test). The results show that the estimation suffers from both these problems. However, as explained in **Section 3**, SUR-GLS with robust covariances and bootstrapping helps us tackle these problems as well.

Table 4
Preliminary diagnostic test results for the variables

	Linearity	Normality	Stationarity		Multicollinearity
Variable	**BDS Test Statistic**	**JB Statistic**	**ADF Test Statistic**	**PP Test Statistic**	**VIF**
MVA	**74.13** ***	**57.74** ***	**-10.29** ***	**-15.08** ***	N/A
FEE	**92.37** ***	**100.59** ***	**-13.31** ***	**-11.69** ***	1.6243
KZ	**44.62** ***	**301104.89** ***	**-13.15** ***	**-22.27** ***	1.1258
ESG	**101.24** ***	**49.53** ***	**-10.74** ***	**-16.48** ***	1.3734
EM	**10.25** ***	**3748061.57** ***	**-18.67** ***	**-41.83** ***	1.0712
DIG	**47.31** ***	**36694.55** ***	**-9.76** ***	**-12.75** ***	1.0323
SIZE	**98.33** ***	**970402.37** ***	**-13.38** ***	**-21.29** ***	1.5749
ROA	**33.81** ***	**116361.67** ***	**-16.80** ***	**-28.29** ***	1.1360
GRW	**16.29** ***	**138814857.43** ***	**-31.07** ***	**-44.76** ***	1.0167
GDP	**-12.73** ***	**21.39** ***	**-9.17** ***	**-44.04** ***	1.3642

Note: This table shows the results for the diagnostic tests for the variables. Where (***), (**), and (*) show significance at 1%, 5%, and 10%, respectively.
Source: Author

Table 5
Preliminary regression for model diagnostic testing

R-squared	0.2676	F-statistic	**105.43** ***
Adj. R-squared	0.2650	Hausman-statistic (Chi2)	-2.9191
Durbin-Watson Test	1.0434	Model	Random

Variable	**Parameter**	**Std. Err.**	**T-stat**
C	**6.2903** ***	0.5965	10.55
FEE	**-0.3175** ***	0.0385	-8.24
KZ	**-0.0959** ***	0.0205	-4.69
ESG	**-0.0142** ***	0.0010	-13.66
SIZE	**-0.0794** ***	0.0175	-4.54
ROA	**2.2943** ***	0.2576	8.91
GRW	0.0032	0.0024	1.32
GDP	0.0014	0.0066	0.21

Breusch-Pagan Heteroskedasticity Test		
Lagrange multiplier statistic	**254.6**	***
F-value	**41.4**	***

Note: This table shows the preliminary estimation results for the panel regression performed for model diagnostic testing for heteroskedasticity (Breusch-Pagan Heteroskedasticity Test) and autocorrelation (Durbin-Watson Test). Where (***), (**), and (*) show significance at 1%, 5%, and 10%, respectively.
Source: Author

Estimation outputs

Table 6 shows the results of our baseline estimations. Before commenting on the indirect effects, we consider the impact of FEE on MVA (**EQ8**). The results show that in absence of mediating and moderating variables, audit fee shows a negative and statistically significant relationship with value addition of non-financial firms, these findings contradict with available literature (for example, Lari Dasht Bayaz & Hassanpour, 2019; Omer et al., 2020), at least in the Chinese market.

Interestingly, results of **EQ5** show that higher audit fee increases capital constraints of Chinses non-financial firms. These findings contradict the work of Alrashidi et al. (2021), who show that audit fee shows negative association with capital constraints for Indian non-financial firms. Another interesting finding from **EQ5** is the interactive term of earnings management and audit fee. This interactive term shows a negative association with KZ Index. These findings contradict with Abu Afifa et al. (2023), which show that earnings management practices increase capital constraints on firms. Our findings show that the audit fee reduces the impact of information asymmetry with earnings management by decreasing the capital constraints of firms. Similarly, the interactive term of digitalization of firms and audit fees shows a negative association with capital constraints as well. This indicates that, inconsistent with the findings of Austin et al. (2021), the Chinese non-financial firms are effectively able to integrate technology into their operational strategy. This, together with the higher audit fees, leads to improved performance, lowering the capital constraints.

Moving on to **EQ6**, audit fee also shows a significant and positive association with ESG performance of Chinese non-financial firms. Similarly, interactive term of earnings management and audit fees also shows a positive and statistically significant association with ESG performance. However, digitalization level of Chinese non-financial firms does not show a statistically significant association with their ESG performance. These findings are consistent with the findings of Fang et al. (2023) but disagree with the work of Lugli & Bertacchini (2023).

Finally, considering **EQ7**, the association of audit fee with value addition becomes statistically insignificant on value addition after the inclusion of both mediating variables (KZ and ESG). Additionally, both KZ and ESG scores show a statistically significant and negative impact on the value addition of Chinese non-financial firms. We test the indirect effects of both mediating variables using bootstrapping, and **Table 6** confirms the results. Both capital constraints and ESG performance of Chinese non-financial firms show a negative but full mediation between audit fee and value addition.

Table 6
Estimation Outputs for Seemingly Unrelated Regressions (SUR) – Baseline estimation

Equation	**8**		**5**		**6**		**7**	
Estimation	**GLS**		**SUR**					
Dependent variable	**MVA**		**KZ**		**ESG**		**MVA**	
C	**7.9561**	***	**-2.3732**	***	2.4224		**3.8922**	***
FEE	**-0.4313**	***	**0.1988**	***	**2.0724**	***	-0.0758	
KZ							**-0.4020**	***
ESG							**-0.0035**	**
FEE*EM			**-0.0403**	***	**0.4504**	***		
FEE*DIG			**-0.0493**	***	0.2449			

SIZE	**-0.1262**	***	0.0179		**1.5202**	**	**-0.1446**	**
ROA	**2.7541**	***	**-3.7081**	***	3.9741		**2.8567**	***
GRW	0.0025		**0.0042**	*	0.0169		0.0134	
GDP	**0.0432**	***	-0.0019		**-3.6121**	***	0.0028	
R-squared:	0.1943		0.1259		0.2411		0.2537	
Adj. R-squared:	0.1919		0.1229		0.2385		0.2511	
F-statistic:	**97.53**	***	**155.78**	***	**681.95**	***	**298.27**	***
Model	Random Effects		Fixed Effects		Fixed Effects		Fixed Effects	
Hausman statistic	1.5307		**32.628**	***	**70.1582**	***	**33.8021**	***
Observations	2028		2028		2028		2028	
Indirect effects							Coefficient	
KZ							**-0.0782**	***
ESG							**-0.0064**	*

Note: This table shows the output for the baseline estimations testing the parallel mediation of KZ and ESG and double moderation of DIG and EM. (***), (**), and (*) show significance at 1%, 5%, and 10%, respectively. The final section of the table shows the indirect effects of the two medications.
Source: Author

Robustness

As a robustness check, we re-estimate **EQ5-8** by changing the proxy for the value addition to CVA, **Table 7** shows the results of the robustness check. Considering **EQ7**, the findings do not significantly differ from the baseline estimation in **Table 6**, where the full mediation of KZ and ESG scores is again confirmed. However, here the mediation of KZ score changes to a positive one. Additionally, the impact of the interaction term of digitalization and audit fee turns insignificant for KZ index (capital constraints) in **EQ5**. Nonetheless, the findings confirm a full mediation of KZ an ESG scores between audit fees and value addition of non-financial Chinese firms.

Table 7
Estimation Outputs for Seemingly Unrelated Regressions (SUR) – Robustness check

Equation	**8**		**5**		**6**		**7**	
Estimation	**GLS**		**SUR**					
Dependent variable	**CVA**		**KZ**		**ESG**		**CVA**	
C	**2.4788**	***	**-2.1272**	***	**-11.481**	*	-0.0601	
FEE	**-0.1517**	**	**0.1696**	***	**1.906**	***	-0.0301	
KZ							**0.2041**	***
ESG							**0.0078**	***
FEE*EM			**-0.0338**	***	0.1531			
FEE*DIG			-0.0212		0.3677			
SIZE	-0.0166		0.0239		**2.2633**	***	0.0195	
ROA	**-1.3341**	**	**-3.3995**	***	-0.6604		**1.8409**	*
GRW	**0.0406**	***	-0.0038		**-0.1555**	***	**0.3213**	***
GDP	0.025		-0.0012		**-3.5724**	***	-0.0155	
R-squared:	0.0294		0.0950		0.2594		0.1748	

Adj. R-squared:	0.0266		0.0919		0.2568		0.1719	
F-statistic:	**12.269**	***	**166.25**	***	**803.07**	***	**277.5**	***
Model	Random Effects		Fixed Effects		Fixed Effects		Random Effects	
Hausman statistic	1.2473		**32.628**	***	**70.1582**	***	3.3931	
Observations	2028		2028		2028		2028	
Indirect effects							Coefficient	
KZ							**0.0432**	***
ESG							**-0.0116**	**

Note: This table shows the output for re-estimating the baseline equations for robustness check, with MVA as the dependent variable. (***), (**), and (*) show significance at 1%, 5%, and 10%, respectively. The final section of the table shows the indirect effects of the two medications.
Source: Author

Discussions

Our findings show evidence that the relationship between audit quality and firm value addition is quite complicated. If looked in isolation, audit fee and firm value addition show a negative and significant association with one another, indicating that higher audit fees reduce value addition for firms. However, when we consider the impact of mediators (capital constraints and ESG) and moderators (earnings management and digitalization of firms), the estimation outputs show rather complex results.

Audit fee shows a positive association with capital constraints, signaling that improved audit quality increases capital constraints of Chinese non-financial firms. One possible reason for this, as explained by Bae et al. (2021), is that higher audit fee depicts higher audit risk, which signals weak internal controls of firms to the investors. As such, a higher audit fee shows a positive association with capital constraints of firms, showing reduced access to finance. Similarly, as explained by Baatwah et al. (2024), higher audit fees result in better quality disclosures of firms and better communication from auditors. This improved transparency may lead to conservative lending practices for investors, increasing capital constraints and restricting access to finance for firms. Similarly, audit fees show a strong positive impact on ESG performance, indicating that higher quality audits encourage firms to ensure ESG compliant practices. Our findings support the notions of IIA (2021); and PwC (2021) who argue that the role of auditors in ensuring ESG compliance is increasing. Additionally, consistent with the work of Asif et al. (2023) and Lugli & Bertacchini (2023), higher audit fees advocate higher transparency to wider stakeholders.

Considering the moderating impact of earnings management between audit fees and capital constraints of Chinese non-financial firms, our findings show that higher earnings management negatively moderates the association between audit fees and capital constraints of firms. These findings are consistent with the work of Alrashidi et al. (2021). When firms pay higher audit fees, this signals credibility and improves lenders' trust in the reported earnings of the firms engaged in earnings management practices, reducing the capital of firms. Although these a negative contradict Hussain et al. (2022), but in essence, agree with the notion of Schipper (1989) that accruals on their own should not be seen as negative aspect of financial reporting. On the other hand, the earnings management practices show a positive moderation between audit fees and ESG performance. This shows that firms that control their reported earnings and pay higher audit fees are able to improve their ESG performance. This may also indicate that firms engaged in earnings

management practices prefer to invest in ESG performance to maintain their public reputation, indicating concerns of green washing, as highlighted by Todaro & Torelli (2024).

Similarly, the moderation of digitalization of Chinese non-financial firms between audit fee and the two mediators (KZ and ESG) also show insightful relationship. Focusing on the interaction of digitalization and audit fee on capital constraints, consistent with the findings of Alrashidi et al. (2021), our findings show evidence that as level of digitalization increases, perceived audit risk reduces. This decreases the conservatism of lenders or investors, thus increasing the access to finance for the non-financial firms. Additionally, our findings show that digitalization does not significantly moderate the relationship of audit fees and ESG performance of Chinese non-financial firms. This shows an ineffective integration of digital technology with ESG metrices by the non-financial Chinses firms, something advocated by Tan et al. (2024) as well.

Finally, our results show a full, parallel, and negative mediation of capital constraints and ESG performance between audit fees and value addition of non-financial Chinese firms. Literature argues that capital constraints hinder firm growth and firm value, and as higher audit fee is perceived as higher risk, access to finance negatively mediates the association between audit fees and value addition. Our findings are inconsistent with the work of Alrashidi et al. (2021) for China, where we show that investors show concerns regarding firm's ability to meet its debts if the firm pays higher audit fees. Therefore. we show that in China, higher audit fees signal higher audit risk, which causes concerns for the investors. However, the direct impact of capital constraints demonstrated on value addition is negative, consistent with prior literature. Firms lacking adequate access to finance fails to take up attractive opportunities, as highlighted by Cornaggia & Li (2019), further, paying higher audit fees does not help in such a scenario in China. Additionally, ESG performance shows a negative association with value addition, showing that in Chinese market firms are not rewarded for ESG performance. Overall, these findings are consistent with studies focusing on emerging markets like Niazi & Siddiqui (2024); and Siddiqui, Khan, et al. (2024), who argue that in emerging markets, the investors are more concerned regarding economic aspects, rather than environmental and social aspects. As such, ESG investments may divert the firm's resources from investing in economic activities, having a negative impact on its value addition from a market's perspective. Further, this negative association of ESG and value addition creates negative mediation between audit fees and value addition. Audit fees show positive association with both capital constraints and ESG score, and both capital constraints and ESG score show negative association with value addition of Chinese non-financial firms, creating a negative parallel mediation between audit fees and value addition.

Conclusion

Current study examines the mediating role of access to finance and ESG performance and moderating role of earnings management and digitalization of Chinese non-financial firms in explaining the relationship between audit fee and value addition. Our findings show evidence of a complex relationship between these variables, where audit fees and firm value addition show a negative relationship in isolation. However, introducing the moderators and mediators to the equation show investing findings. We show that higher audit fee is associated with higher capital constraints for Chinese non-financial firms, most likely due to higher perceived audit risk by the investors. This shows that improved audit quality may restrict financing opportunities for firms. Our results also indicate that earnings management practices negative moderate the relationship between audit fees and capital constraints for non-financial Chinese firms. That is, higher audit

fees enhances investors' confidence in such cases, showing that controlled earnings management within a strong audit framework may improve financial credibility of the non-financial firms. Additionally, the findings also highlight that digitalization of non-financial firms negatively moderates the relationship between audit fees and capital constraints. Finally, our results show evidence of negative and full parallel mediation of capital constraints and ESG performance between audit fees and value addition of firms. Where financial constraints and lack of effective integration of ESG risk matrices with firm's operations (or lack of ESG awareness among investors) both hinder growth for Chinese non-financial firms.

From a practical perspective, our findings have implications for managers, investors, and regulators. Managers need to balance enhancing audit quality with ensuring financial flexibility. Additionally, the integration of digitalization with ESG matrices is critical in ensuring that technology plays a positive role in value addition for firms from a wider stakeholder perspective. From an investor's perspective, higher audit fees are translated to higher audit risk, increasing capital constraints for the firms, depicting that higher audit fee is not always viewed as a compliance cost, but as a governance-enhancing mechanism by the investors. Finally, from the perspective of regulators and policymakers, our findings highlight the need to take note of unintended consequences of increased audit scrutiny on capital constraints of firms. Additionally, our findings show a balance between transparency ensured through audit quality and ESG reporting can help maximize value addition abilities of firms.

From a theoretical perspective, our study links audit quality with value addition through a modern lens. Unlike Stakeholder Theory predictions, our findings show preference for Agency Theory, demonstrating their relatively higher relevance in the emerging economy of China.

Although our study provides valuable insights, it is not free from limitations. First, our study only focuses on Chinese non-financial firms, a focus on other economies may improve the generalizability of the results. Similarly, an industry-wise analysis may reveal deeper insights into the complex association of audit quality and value addition. Second, our study uses audit fee as the proxy for audit quality, using other proxies may reveal interesting insights into this complex relationship. Third, current study measures digitalization at firm-level, future research may examine specific digital investments (like blockchain or artificial intelligence), to examine their differential moderations with ESG performance and value addition.

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Appendix 1: Calculating discretionary accruals (earnings management)

The current study uses cross sectional earnings management model as proposed by Kothari et al. (2005). More specifically, we calculate the discretionary accruals following three steps as explained below:

Step 1: Calculating total accruals

As the first step, total accruals of the entity are computed. This can be done through two approaches, the balance sheet approach (or statement of financial approach), and the cash flow approach. The current study uses the cash flow approach as it automatically accounts for numerous adjustments that must be made in the balance sheet approach. Under this approach total accruals are computed as follows:

$$\mathrm{TA_{it}} = \mathrm{NI_{it}} - \mathrm{NCF_{it}}$$

Here, TA is the total accruals, NI represents net income or profit after tax, and NCF represents net cash flows for the period.

Step 2: Estimating non-discretionary accruals

Estimation of non-discretionary accruals is a two-stage process. First, we perform a cross-sectional regression analysis to estimate the values of the coefficients for variables appearing as under:

$$\frac{\mathrm{TA_{it}}}{\mathrm{A_{it-1}}} = \mu_0 + \mu_1\left[\frac{(\Delta\mathrm{REV_{it}} - \Delta\mathrm{REC_{it}})}{\mathrm{A_{it-1}}}\right] + \mu_2\left[\frac{\mathrm{PPE_{it}}}{\mathrm{A_{it-1}}}\right] + \mu_3\mathrm{ROA_{it-1}} + \theta_{\mathrm{it}}$$

Second, these coefficient values are then used to estimate the non-discretionary accruals for each observation. Both equations are stated below:

$$\mathrm{NDA_{it}} = \mu_0 + \mu_1\left[\frac{(\Delta\mathrm{REV_{it}} - \Delta\mathrm{REC_{it}})}{\mathrm{A_{it-1}}}\right] + \mu_2\left[\frac{\mathrm{PPE_{it}}}{\mathrm{A_{it-1}}}\right] + \mu_3\mathrm{ROA_{it-1}}$$

Here, Δ represents change from the earlier period (t-1), REV is total revenue, REC are trade receivables, PPE is the carrying value of property, plant and equipment, ROA is the return on assets, A represents total assets value, and NDA represents non-discretionary accruals.

Step 3: Estimating discretionary accruals

The θ_{it} computed from equation having dependent variable $\frac{\mathrm{TA_{it}}}{\mathrm{A_{it-1}}}$ represents discretionary accruals (DA), however, the study computes these as:

$$\mathrm{DA_{it}} = \frac{\mathrm{TA_{it}}}{\mathrm{A_{it-1}}} - \mathrm{NDA_{it}}$$