



The Impact of Audit Quality on Total Factor Productivity

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Abstract. Audit quality significantly improves TFP of Chinese A-share firms by optimizing resource allocation. Financing constraints weaken this effect, while digital transformation strengthens it, highlighting the need to enhance auditing, digitalization, and financing conditions.

Keywords: Audit Quality, Total Factor Productivity, Digital Transformation, Financing Constraints

1 Introduction

Aligning with China's pursuit of high-quality economic growth, this study empirically investigates the impact of audit quality on corporate total factor productivity (TFP) from 2011 to 2023. High-quality auditing significantly enhances TFP by improving corporate governance and optimizing resource allocation across varying property rights structures.^[1] Ultimately, the research recommends that enterprises leverage rigorous audits and transparent disclosures to boost production efficiency, optimize strategic decision-making, and achieve sustainable development.

2 Literature review

2.1 Institutional context

High audit quality enhances enterprise TFP by optimizing resource allocation and reducing information asymmetry. Furthermore, digital transformation amplifies this positive effect through improved market responsiveness,^[2] whereas financing constraints weaken it by restricting firms' decision-making capacity.

2.2 Theory and Hypotheses

2.2.1 Mechanism Analysis.

This study constructs a theoretical framework linking audit quality to TFP through the mechanism of resource allocation efficiency.^[5] High-quality auditing reduces information asymmetry between firms and investors, which lowers capital costs and alleviates financing constraints. This enhanced transparency facilitates rational investment decisions and optimizes corporate resource allocation. Since efficient resource allocation and technological innovation are the primary drivers of productivity,^[3] better audit quality inherently elevates TFP.

Hypothesis H1: The improvement of audit quality is conducive to enhancing the TFP of enterprises.

2.2.2 Analysis of the Moderating Effect of Financing Constraints.

Financing constraints—a mismatch between financing supply and demand—are prevalent in China's developing economy. They restrict corporate capital-labor ratio improvements, particularly in small and young enterprises. Struggling with rising labor costs, resource-poor firms are deterred from investing in technological innovation, which inhibits their TFP growth. Ultimately, this traps these enterprises in a "low-end lock-in," hindering market competition mechanisms and the long-term, healthy development of the Chinese economy.

Hypothesis H2: Financing constraints can significantly inhibit the promoting effect of audit quality on TFP.

2.2.3 Analysis of the Moderating Effect of Digital Transformation.

Enterprise digital transformation optimizes resource allocation and restructures business processes, significantly reducing operational costs while boosting production efficiency. Furthermore, it enhances information transparency, which improves management's market forecasting and prevents blindly optimistic or unilateral decisions. By integrating digital technologies, enterprises strengthen their overall resource acquisition capabilities and effectively reduce managerial opportunism, laying a solid foundation for improved corporate performance.^[4]

Hypothesis H3: The degree of digital transformation can significantly and positively moderate the relationship between audit quality and TFP.

3 Study design

3.1 Sample Selection and Data Sources

Utilizing 2011–2023 CSMAR data for Chinese A-share listed companies, this study excludes financial, real estate, ST/PT firms, and incomplete records. All continuous variables are Winsorized at the 1% and 99% levels to mitigate outlier bias.

3.2 Modeling

Baseline Model: Employing a two-way fixed effects model (industry fixed effects + year fixed effects) to control for unobservable heterogeneity:

$$TFP_{i,t} = \alpha_0 + \alpha_1 Lnfee_{i,t} + \alpha_2 \sum Controls_{i,t} + \lambda_i + year + Industry + \varepsilon_{i,t} \quad (1)$$

In Equations (1), where i and t represent the data of the firm in the year, α_0 is the intercept, are the variable coefficients, $year_{i,t}$ represents time fixed effects, and $\varepsilon_{i,t}$ is the random disturbance term.

Moderating Effect Models:

$$TFP_{i,t} = \beta_0 + \beta_1 Lnfee_{i,t} + \beta_2 Lnfee_{i,t} * Moderator_{i,t} + \beta_3 Moderator_{i,t} + \beta_4 \sum Controls_{i,t} + \lambda_i + year + Industry + \varepsilon_{i,t} \quad (2)$$

In Equations (2), where $\beta_2 Lnfee_{i,t} * Moderator_{i,t}$ is the interaction term between the explanatory variable and the moderating variable, and the meanings of the other symbols are the same as in Baseline Model.

3.3 Variable Definition and Measurement

3.3.1 Dependent Variable.

Common methods for calculating TFP include the LP method, OP method, Ordinary Least Squares, and Generalized Method of Moments.

3.3.2 Core Explanatory Variable.

Based on the implicit assumption that large firms provide high audit quality, many empirical conclusions suggest that high audit fees substitute for high audit quality. According to general market economy principles, higher audit quality demands more time and effort from auditors, leading to higher audit service costs and correspondingly higher fees charged.

3.3.3 Moderating Variables.

Financing Constraints: Negative moderation. Financing constraints will weaken the positive impact of audit quality on TFP.

Degree of Digitalization: The digital transformation index data originates from the CSMAR enterprise

3.3.4 Control Variables.

Drawing on existing research, this paper selects the following corporate governance indicators as control variables. The main variables are defined as shown in Table 1.

Table 1. Variable Definition Table translated title

Variables	Definition	Description
TFP	tfp_LP	The LP method (based on the Cobb-Douglas production function)
Audit fees	Lnfee	The natural logarithm of the audit fee
Financing Constraints	SA	The absolute value
Nature of ownership	SOE	State-owned enterprise = 1, non-state-owned enterprise = 0
Digital	DIG	Digital Transformation Index
Company size	Size	The natural logarithm of the number of employees
Debt-to-equity ratio	LEV	Total liabilities / Total assets
Return on assets	ROA	Net profit / Total assets
Size of the Board	Board	The logarithm of the number of board members
Concentration of share-holdings	Top1	Percentage of shares held by the largest shareholder / Total number of shares
Length of operation	Listage	(Current year – year of company incorporation + 1) × natural logarithm
Operating profit growth rate	Growth	(Operating profit for the current year / Operating profit for the previous year) – 1
Combining two roles	Dual	Set to 1 if the Chairman and the Managing Director are the same person; otherwise, set to 0
Cash flow ratio	Cashflow	Net cash flow from operating activities / Current liabilities at the end of the period
Inventory turnover ratio	Inventory	Cost of sales / Closing inventory balance
Quick ratio	Quick	(Current assets – Inventories) / Current liabilities
Management shareholding	Mshare	Total number of shares held by directors, supervisors and senior executives / Total number of shares

4 Empirical results and analysis

4.1 Descriptive Statistics

The descriptive statistics for variables are shown in Table 2. The mean of TFP calculated by the LP method is 10.066, indicating a relatively high average production efficiency level among sample enterprises over the period. The mean of the log-transformed audit fees is 13.836, indicating high audit quality.

Table 2. Descriptive Statistics of Variables translated title.

Variables	(1) tfp_LP	(2) tfp_LP	(3) tfp_LP	(4) tfp_LP
Lnfee	0.636*** (73.57)	0.309*** (40.46)	0.307*** (40.22)	0.308*** (40.46)
SA_Lnfee_c			-0.0710*** (-3.87)	
SA			-0.135***	

				(-3.90)
DIG_Lnfee_c				0.00245***
				(6.15)
DIG				0.00444***
				(9.67)
Controls	Yes	Yes	Yes	Yes
Firm	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes
Industry	Yes	Yes	Yes	Yes
N	32711	32711	32711	32711
r2	0.920	0.949	0.949	0.950

t statistics in parentheses.
* p < 0.1, ** p < 0.05, *** p < 0.01.

4.2 Baseline Regression and Moderating Effect Analysis

Table 3 presents the fixed effects regression results confirming all hypotheses. Audit quality has a significant positive impact on Total Factor Productivity, with an impact coefficient of 0.309 (significant at the 1% level), verifying Hypothesis H1. The analysis reveals two critical moderating effects: Financing Constraints: The interaction term coefficient is -0.071, indicating that higher financing constraints significantly weaken the positive impact of audit quality on TFP. Financial limitations hinder firms from implementing efficiency improvements identified by audits, verifying Hypothesis H2. Digital Transformation: The interaction term coefficient is 0.00245, showing that a higher degree of digital transformation significantly strengthens the promoting effect of audit quality on TFP. Digitalization accelerates the implementation of audit insights and improves information processing, amplifying TFP gains and verifying Hypothesis H3.

Table 3. Baseline Regression and Moderating Effect Test Results translated title.

Variables	(1) tfp_LP	(2) tfp_LP	(3) tfp_LP	(4) tfp_LP
Lnfee	0.636*** (73.57)	0.309*** (40.46)	0.307*** (40.22)	0.308*** (40.46)
SA_Lnfee_c			-0.0710*** (-3.87)	
SA			-0.135*** (-3.90)	
DIG_Lnfee_c				0.00245*** (6.15)
DIG				0.00444*** (9.67)

Controls	Yes	Yes	Yes	Yes
Firm	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes
Industry	Yes	Yes	Yes	Yes
N	32711	32711	32711	32711
r2	0.920	0.949	0.949	0.950

t statistics in parentheses.
* p < 0.1, ** p < 0.05, *** p < 0.01.

4.3 Robustness Checks

The results are shown in Table 4. Column (1) incorporates cluster-robust standard errors, Column (2) excludes the 2020 sample, Column (3) uses the 2011-2019 sample, and Column (4) replaces the dependent variable with TFP calculated by the OP method. The regression results in Table 5 show that the robustness tests are passed and initially verifying the reliability of the regression results.

Table 4. Robustness Test Results translated title

Variables	(1)	(2)	(3)	(4)
	tfp_LP	tfp_LP	tfp_LP	tfp_OP
Lnfee	0.309*** (27.29)	0.312*** (38.92)	0.316*** (32.92)	0.359*** (46.13)
Controls	Yes	Yes	Yes	Yes
Firm	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes
Industry	Yes	Yes	Yes	Yes
N	32711	29689	18730	32711
r2	0.949	0.949	0.955	0.915

t statistics in parentheses.
* p < 0.1, ** p < 0.05, *** p < 0.01.

4.4 Endogeneity Test

To address potential endogeneity between audit quality and enterprise TFP, this study employs a Two-Stage Least Squares approach, using auditor reputation (e.g., "Big Four" status) as an instrumental variable. This IV strictly satisfies both relevance and exogeneity requirements. The results are shown in Table 5. This means that when audit fees are fully driven by firm reputation, verifying the real economic effect of audit quality in a high-quality governance environment.

Table 5. Endogeneity Test Results translated title

	(1) One issue behind	(2) Phase 1 of 2SLS Lnfee	(3) Phase 2 of 2SLS tfp_LP
L.Lnfee	0.242*** (29.42)		
Lnfee			0.340*** (6.76)
IV		0.346*** (25.79)	
_cons	1.521*** (8.74)	11.29*** (120.40)	
Controls	Yes	Yes	Yes
Firm	Yes	Yes	Yes
Year	Yes	Yes	Yes
Industry	Yes	Yes	Yes
N	25208	32711	32711
r2	0.955	0.905	0.469

t statistics in parentheses.

* p < 0.1, ** p < 0.05, *** p < 0.01.

5 Further Research

As shown in columns (1) and (2) of Table 6, the coefficient for non-SOEs is slightly higher than for SOEs, indicating that the more flexible the property rights, the greater the audit governance benefits. Columns (3) and (4) present the regression results for the manufacturing and non-manufacturing sectors, respectively, while Column (5) displays the results with financing constraints serving as a mediating variable. In summary, audit quality is more pronounced in non-state-owned enterprises and the manufacturing sector; furthermore, audit quality enhances total factor productivity by alleviating financing constraints.

Table 6. Heterogeneity and Mediating Effects

	(1) SOE	(2) NOSOE	(3) IND1	(4) IND0	(5) SA
Lnfee	0.268*** (17.61)	0.287*** (29.66)	0.215*** (25.12)	0.350*** (20.44)	0.00277** (2.10)
_cons	1.673*** (5.48)	1.708*** (9.01)	2.528*** (15.38)	0.790** (2.29)	3.505*** (136.80)
Controls	Yes	Yes	Yes	Yes	Yes
Firm	Yes	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes	Yes
N	9727	22894	22345	9917	32711
r2	0.950	0.936	0.953	0.937	0.968

t statistics in parentheses

* p < 0.1, ** p < 0.05, *** p < 0.01

6 Conclusions

Analyzing Chinese A-share firms (2011–2023), this study demonstrates that audit quality significantly enhances Total Factor Productivity. Financing constraints inhibit this positive effect, whereas digital transformation amplifies it. To drive high-quality development, coordinated efforts are essential: enterprises must accelerate digitalization and hire top-tier auditors; audit institutions should enhance digital and risk-oriented capabilities; and regulators need to ease financing constraints and strengthen supervision. These joint actions optimize resource allocation and sustainably boost corporate TFP.

References

1. Abdelwahed A S, Abu-Musa A A E S, Badawy H A E S, et al. Investigating the impact of adopting big data and data analytics on enhancing audit quality[J]. *Journal of Financial Reporting and Accounting*, 2025, 23(2): 472-495.
2. Chafai, A., & Alsulami, F. (2025). The nonlinear relationship between corporate social responsibility disclosure and Islamic bank efficiency in GCC countries: the moderating role of audit quality. *Cogent Economics & Finance*, 13(1), 2499011.
3. Khavis, J. A., Sheneman, A. G., & Szerwo, B. (2025). Does gender composition of audit teams matter? An examination of audit quality and audit cost. *Review of Accounting Studies*, 1-38.
4. Le, L. Q. (2025). The influence of audit quality on real earnings management: Do leverage and cash flow matter? *Journal of Economics and Development*, 27(2), 144-157.
5. Şamil, S. (2025). MEASURING THE PRODUCTIVITY OF AUDIT FIRMS IN TÜRKİYE: A MALMQUIST INDEX APPROACH. *Denetişim*, (32), 65-76.

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