

When Does Audit Quality Pay Off? Institutional Development and the Shift from Signaling to Compliance in Auditor Choice

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ABSTRACT

This study examines how institutional development shapes auditor choice by altering the relative importance of cost minimization and signaling. Using panel data on microfinance institutions across 46 countries from 2000–2019 and correlated random-effects probit models with Mundlak adjustment, we test whether Big Four audits substitute for weak market governance. We find that institutional quality increases Big Four adoption and moderates the role of firm characteristics in auditor choice. Associations between Big Four choice and profitability, credit risk, and nonprofit legal form are strongest in weak institutional environments and attenuate as institutions strengthen. These findings suggest that Big Four audits function as adaptive governance mechanisms whose role shifts from credibility signaling toward compliance-oriented assurance as institutional quality improves. Results are robust to alternative estimators and institutional measures.

Keywords: auditor choice; audit demand; institutional quality; institutional development; Big Four.

I. INTRODUCTION

This study examines how the institutional environment moderates auditor choice by shaping the relative importance of cost-minimization and signaling logics. Rational choice theory predicts that firms economize on costly governance mechanisms, such as Big Four audits, when institutional reliability is low and the expected compliance payoff is limited (Becker, 1968; Williamson, 1985). Prior research shows that audit demand is sensitive to fees and that the use of high-quality auditors weakens when litigation risk and external monitoring are limited (Francis and Wilson, 1988; Choi, Kim, Liu, and Simunic, 2008; Hope, Kang, Thomas, and Yoo, 2008). In contrast, signaling and legitimacy perspectives predict that firms may adopt costly audits precisely when institutions are weak, using reputable auditors to reassure stakeholders who cannot rely on local governance systems (Spence, 1973; Meyer and Rowan, 1977; Suchman, 1995).

This tension is particularly pronounced in hybrid organizations such as microfinance institutions (MFIs). MFIs pursue both financial sustainability and social objectives (Cull, Demirgüç-Kunt, and Morduch, 2007). These organizations serve heterogeneous audiences with divergent expectations (Ebrahim, Battilana, and Mair, 2014) and operate in environments characterized by limited institutional reliability and weak market governance (Hartarska, 2005; Mersland and Strøm, 2009). In this context, audits may function either as costs to be minimized or as credibility signals demanded by external stakeholders, reflecting a firm-specific cost–benefit trade-off that depends on institutional context (Vanstraelen and Schnelleman, 2017). This makes MFIs a useful setting for observing competing interpretations of audit demand.

We test these competing interpretations of audit demand by examining how changes in the institutional environment moderate the association between firm characteristics and Big Four

auditor choice. The key idea is that cost-minimization and signaling theories offer conflicting predictions about when firm characteristics should be associated with the use of high-quality auditors. We focus on firm size, profitability, credit risk, and nonprofit legal form: attributes that capture the core tradeoff between audit costs and credibility (Simunic, 1980; Francis and Wilson, 1988; Francis and Wang, 2008; Hansmann, 1980; Mersland and Strøm, 2009). If audits mainly serve as compliance inputs, these traits matter most when institutional reliability makes transparency economically valuable. If audits act as credibility signals, they should best predict Big Four engagement when institutions are weak and stakeholders lack reliable verification options.

To test this, we exploit within-country variation in institutional quality using a global panel of MFIs. We measure institutional quality with the Economic Freedom Index as a time-varying indicator of market governance (Beisland, Mersland, and Strøm, 2018; Ott, 2018) and estimate a correlated random-effects probit model with Mundlak adjustment (Mundlak, 1978; Wooldridge, 2010). We find that when institutional quality is low, Big Four audits are more likely to be adopted as credibility signals. As institutional reliability improves, the compliance value of high-quality audits increases, and their signaling role diminishes, shifting audit demand from substitution toward complementarity with formal institutions.

This study contributes to the auditor choice literature in three ways. First, it shows that cost-minimization and signaling are not competing explanations but context-dependent logics whose relative importance varies with institutional development. Second, it demonstrates that institutional environments condition how firm characteristics translate into audit demand, rather than exerting a uniform effect on auditor choice. Third, by using a dynamic measure of institutional quality rather than fixed legal-origin classifications, the study reconceptualizes Big

Four audits as adaptive governance tools whose function shifts as institutional reliability changes. This perspective helps reconcile mixed findings in prior research and clarifies when traditional audit-demand theories apply.

II. PRIOR RESEARCH AND HYPOTHESIS DEVELOPMENT

Prior research conceptualizes auditor choice as an economically rational decision in which firms select the audit provider that maximizes expected net benefits (Simunic, 1980; DeAngelo, 1981; Francis, Khurana, and Pereira, 2003). High-quality auditors charge fee premiums, but can generate economic gains through reduced agency costs, improved reporting credibility, and lower expected costs of external scrutiny (Watts and Zimmerman, 1986; Francis and Wilson, 1988). Recent work supports this logic by modeling auditor choice as a utility-maximizing matching problem that explicitly accounts for audit risk, reporting credibility, client–auditor fit, and strategic tradeoffs such as information spillovers and litigation exposure (Guo et al. 2022, 2024; Li et al. 2025; Bills et al. 2020; Brown and Knechel 2016).

The magnitude of these benefits depends on the institutional environment. Where institutional quality is high, credible financial reporting is more valuable, monitoring is more effective, and the economic payoff to assurance increases. Consistent with this view, cross-country evidence shows that audit fees and Big Four premiums rise with stronger institutional frameworks (Choi, Kim, Liu, and Simunic, 2008), that Big Four audits are associated with higher reporting quality primarily where investor protection is strong (Francis and Wang, 2008), and that firms are more likely to engage reputable auditors when institutional monitoring is reliable (Hope, Kang, Thomas, and Yoo, 2008). For MFIs, which operate in informationally opaque markets and rely

heavily on external funding, institutional conditions are particularly consequential (Hermes and Lensink, 2011; D’Espallier, Hudon, and Szafarz, 2013). Accordingly, stronger institutional environments increase the expected payoff of credible auditing, making Big Four engagements more attractive. This leads to the following hypothesis:

H1: The likelihood that an MFI engages a Big Four auditor increases with the strength of the institutional environment.

Signaling Perspective

Standard cost-based logic predicts limited demand for costly audits in weak institutional environments. Yet many MFIs still appoint Big Four auditors (Beisland, Mersland, and Strøm, 2015). Signaling theory explains how organizations use governance to convey unobservable quality amid severe information asymmetry (Spence, 1973; Morris, 1987). High-quality audits serve as credible signals of governance because they are visible, costly to imitate, and distinguish high-quality firms from lower ones (Wei, Xiao, and Zhou, 2015; Hardis et al. 2025). Empirical evidence from weak-governance contexts shows firms hire reputable auditors to reassure stakeholders when institutional verification is unreliable (Fan and Wong, 2005; Michas, 2011). This is especially salient for MFIs, whose access to funding depends more on perceived trustworthiness than enforceable investor protections (Ebrahim et al., 2014). Thus, a Big Four audit signals credibility and replaces missing institutional safeguards (Holm and Zaman, 2012). Accordingly, signaling perspectives suggest that high-quality audits are most valuable when formal institutions provide limited monitoring.

Institutional Moderation of Audit Demand

The two perspectives predict opposite audit demand patterns. Cost-minimization suggests firm traits influence Big Four auditor choice most when institutional quality increases the economic payoff to credible reporting. Signaling suggests these should matter most when institutional quality is low, as high-quality audits substitute for weak market governance. We exploit this contrast by examining how institutional quality moderates the relationship between Big Four engagement and a set of firm characteristics that capture the tradeoff between audit costs and credibility. We focus on organizational scale, observable performance, credit risk, and nonprofit legal structure—factors linked to audit demand that likely affect audit costs and signaling benefits of high-quality audits (Simunic, 1980; Francis and Wilson, 1988; Fan and Wong, 2005; Simunic and Stein, 1996; Beisland et al., 2015). Patterns of institutional moderation across these characteristics, allow us to assess whether cost-minimization or credibility-seeking logic predominates, providing the basis for hypotheses H2–H5.

Organizational scale

Organizational scale drives audit demand by affecting visibility and capacity to bear audit costs. Larger MFIs engage in complex activities, attract more scrutiny, and face higher reputational risks, increasing the need for credible assurance (Francis and Wilson, 1988; Hay, Knechel, and Wong, 2006; DeFond, Wong, and Li, 2000). When institutional quality is low, the activities and credibility of large MFIs are harder to assess, making Big Four audits a valuable signal of disciplined governance. As institutional quality improves, the compliance value of credible assurance rises, further strengthening the association between organizational scale and Big Four auditor choice. We therefore expect the effect to intensify as institutional quality increases.

H2: Larger MFIs are more likely to engage a Big Four auditor, and this positive association strengthens with institutional quality.

Financial performance

Higher profitability reduces financing frictions and attracts external attention, increasing reputational stakes of reported results (Fazzari, Hubbard, and Petersen, 1988; Lang and Lundholm, 1996). Consequently, successful MFIs have stronger incentives to prove their performance credibility. When institutional quality is low, it is harder to assess profitability because accounting numbers are not easily validated through local market-governance mechanisms (Fan and Wong, 2005; Michas, 2011). In such settings, a Big Four audit validates reported performance and signals reliability to stakeholders. As institutional quality improves, monitoring capacity and economic consequences of misreporting increase, strengthening the compliance value of credible verification. This suggests that the link between profitability and Big Four auditor choice strengthens with institutional quality.

H3: More profitable MFIs are more likely to engage a Big Four auditor, and this positive association strengthens with institutional quality.

Credit risk

Credit risk captures the volatility and quality of an MFI's loan portfolio (Zamore, Beisland and Mersland, 2019). Prior research shows that higher client risk increases required audit effort and fee premiums (Simunic and Stein, 1996) and raises the likelihood that rigorous audits uncover reporting problems or result in modified audit opinions (Knechel, Vanstraelen, and Zerni, 2015). In weak institutional environments, adverse audit outcomes are less likely to trigger strong regulatory or legal responses (Ghattas, Soobaroyen, and Marnet, 2025), but audit effort and fees

remain elevated (Mottinger, 2024). In contrast, low-risk MFIs with disciplined lending practices face lower audit exposure and can credibly engage a Big Four auditor to signal reliability. As institutional quality improves, the economic impact of audit outcomes grows, boosting the value of credible assurance. This reduces the relative advantage low-risk MFIs have in weak institutional environments and attenuates the negative association between credit risk and Big Four engagement. This leads to the following hypothesis:

H4: MFIs with higher credit risk are less likely to engage a Big Four auditor, and this negative association weakens with institutional quality.

Legal form

Nonprofit MFIs operate under a nondistribution constraint signaling integrity and responsible resource stewardship (Hansmann, 1980; Mersland and Strøm, 2009). In hybrid organizations like MFIs, this is crucial because social goals coexist with financial activities, increasing information asymmetry and stakeholder concerns about mission adherence and resource management (Mersland and Strøm, 2009; Ebrahim, Battilana, and Mair, 2014). The credibility of this constraint varies with institutional quality and is limited where enforceability and verifiability are weak (Valentinov, 2008). When formal institutions are weak, organizations can increase their attractiveness to external partners by adopting private governance to replace missing institutional safeguards (Rossmannek, 2022).

Audit research on nonprofits shows high-quality audits reinforce stakeholder perceptions of responsible stewardship and reliable reporting (Kitching, 2009). They are especially effective credibility devices when other verification mechanisms are limited. As institutional quality improves and nondistribution constraints are enforced, the signaling value of a Big Four audit

declines, reducing the nonprofit–for-profit difference in audit demand. This leads to the following hypothesis:

H5: *Nonprofit MFIs are more likely than for-profit MFIs to engage a Big Four auditor when institutional quality is low, but this nonprofit–for-profit gap narrows as institutional quality improves.*

III. DATA AND METHODOLOGY

Sample

The sample consists of MFIs with available rating data from 2000 to 2019. The data are obtained from reports issued by five recognized independent microfinance rating agencies accredited by the Consultative Group to Assist the Poor (CGAP)’s Rating Fund: MicroRate, Microfinanza, Planet Rating, Crisil, and M-CRIL. The reports provide structured information on MFIs’ financial statements, governance structures, and auditor identity. We exclude observations without identifiable external auditors or without available country-level institutional data. The final estimation sample comprises 1,663 MFI-year observations for 340 MFIs across 46 countries. All continuous variables are winsorized at the 1st and 99th percentiles¹ (one-tailed at the 99th for right-skewed variables) (Leone, Minutti-Meza and Weasley, 2019; Choi, Kim, Kim and Zang, 2010). Size, profitability, and credit risk are expressed in natural logarithms, and risk and performance measures are lagged by one year to limit simultaneity² (Lennox, Francis & Wang, 2012; Francis, Michas & Yu, 2013).

¹ Results are robust to alternative winsorization thresholds (e.g., 2nd and 98th percentiles).

² Results are robust to contemporaneous values.

Estimating Institutional quality

We use the Heritage Foundation's Economic Freedom Index (EFI) to proxy for institutional quality and test whether Big Four adoption reflects cost-minimizing compliance behavior or a strategic response to institutional voids. EFI captures market-governance capacity and is a composite indicator of legal and regulatory strength, incorporating property-rights protection, enforcement reliability, regulatory efficiency, and market openness (Heritage Foundation, 2023).

The index is published annually for more than 180 countries and ranges from 0 to 100, with higher values indicating stronger institutional environments. Unlike static investor-protection indices such as La Porta et al. (1998), EFI captures annual institutional changes that reflect reforms and deterioration in governance conditions. The measure correlates strongly with alternative measures of institutional quality, including the Worldwide Governance Indicators (WGI) and the Fraser Institute's Economic Freedom of the World index (IEF) (Bjørnskov, 2016). By emphasizing property rights and regulatory efficiency (Ott, 2018), EFI measures market-governance capacity influencing Big Four audits as compliance tools or credibility signals. Because the index originates from an institution with a stated ideological orientation, we replicate key analyses using the Fraser Institute's Economic Freedom of the World index (Gwartney et al., 2023), since the original index originates from an institution with a specific ideological stance. Results, reported in Appendix A, are directionally consistent with minor differences in significance. Consistent with prior research that links institutional strength and investor protection to the credibility and economic consequences of auditing (Beisland et al., 2018; Bushman, Piotroski, & Smith, 2004), we treat EFI as a dynamic institutional condition that influences audit relevance. Each MFI-year observation is matched to its corresponding country-level EFI score to capture within-country institutional change over time.

Estimation Strategy and Identification Logic

Since the dependent variable is binary (Big Four auditor = 1), a natural starting point is the conditional fixed-effects logit estimator. This method, widely used in archival auditing studies (Lennox, Francis and Wang, 2012; DeFond and Zhang, 2014) identifies within-MFI changes but omits all non-switching entities and excludes time-invariant regressors. Auditor changes are infrequent, and identification mainly results from institutional variation, i.e., how changes in the institutional environment influence the relationship between firm characteristics and auditor choice. Fixed-effects logit would eliminate most informative MFIs and conceal this institutional aspect.

To address these limitations, we adopt correlated random-effects (CRE) probit with Mundlak adjustment (Mundlak, 1978; Wooldridge, 2010) as our main specification. CRE allows arbitrary correlation between regressors and unobserved heterogeneity, exploits the full panel for efficiency, and retains time-invariant covariates while delivering within-effects consistent with the fixed-effects logic. The identifying assumption is sequential exogeneity of the error term, conditional on contemporaneous regressors, their unit-level means, and year and country fixed effects. This assumption is plausible in our setting because the primary institutional variable, EFI, changes slowly and reflects country-level reforms beyond the control of individual MFIs (Heritage Foundation, 2023; Bjørnskov 2016)

We present the FE-logit results as a robustness check, alongside a linear probability model with MFI and year fixed effects (e.g., Comelli, 2014). These additional estimators reassure inference-minded readers that our results are not driven by functional-form assumptions or by the CRE structure itself.

Model specification and estimation approach

To empirically assess these dynamics, we estimate the following CRE Probit model:

$$\Pr(BIG4_{it} = 1) = \Phi(\alpha_0 + \beta_1 INT_t + \beta_2 EFI_{ct} + \beta_3 SIZE_{it} + \beta_4 ROA_{i,t-1} + \beta_5 PAR30_{i,t-1} + \beta_6 NONPROFIT_{it} + \gamma CONTROL_{it} + \lambda_t + \delta_c + \mu_i + \varepsilon_{it}) \quad (1)$$

where:

INT = interaction term between the EFI and the organizational traits relevant for auditor demand (i.e. SIZE, ROA, PAR30 and NONPROFIT).

EFI = Economic Freedom Index;

SIZE = natural logarithm of total assets;

ROA = return on assets (multiplied by 100);

PAR30 = natural logarithm of portfolio at risk greater than 30 days;

NONPROFIT = indicator variable equal to 1 for not-for-profit MFIs, and 0 otherwise;

CONTROL = a vector of additional financial and operational variables at the MFI and country levels.³

We include year fixed effects, λ_t , to control for unobserved time-specific shocks, and country

fixed effects, δ_c , to account for time-invariant country-level heterogeneity. Because the

institutional variable (EFI) varies within countries, its coefficient is identified from within-

country changes. As δ_c captures all between-country differences, we omit the Mundlak mean of

EFI, which would be collinear with country effects⁴. To avoid over-controlling the institutional

channel, we exclude broad institutional proxies, such as the Corruption Perceptions Index and

regulation status, and omit the between-component of GDP per capita⁵. All macro controls are

³ Controls include:

AVGLOAN = natural logarithm of average loan size;

AGE = age of the firm;

OPEX_P = operating expenses divided by loan portfolio;

INTAUD = indicator variable equal to 1 if the MFI has an internal auditor;

BOAUD = indicator variable equal to 1 if the board includes an audit committee;

INTINIT = indicator variable equal to 1 if the MFI was internationally initiated;

GDP = gross domestic product per capita (×1,000 USD).

⁴ Results are robust to including the between-component.

⁵ Results are robust to including these individually and combined.

thus interpreted as within-country deviations. The term μ_i denotes unobserved firm heterogeneity and ε_{it} the idiosyncratic error. Following Mundlak (1978), we include group means of all other time-varying regressors to decompose within- and between-firm variation and mitigate correlation between regressors and random effects. We first estimate a baseline model including firm- and country-level controls, and then sequentially introduce interaction terms between institutional quality (EFI) and each firm characteristic to test the moderating effects. In all regressions, standard errors are clustered by MFI to account for serial correlation and within-entity dependence (Petersen, 2009)⁶. Following Wooldridge (2019), we include the number of periods observed per MFI (T_i) as a diagnostic for potential attrition bias in unbalanced panels.

IV. RESULTS

Descriptive statistics

Descriptive statistics are reported in Table 1. Approximately 34 percent of firms are audited by Big Four auditors. Mean EFI is approximately 58.4 percent, reflecting moderate institutional diversity across countries. MFIs are of moderate size on average (median total assets around 15.7 in log terms). The mean lagged return on assets (ROA) is 1.7 percent, indicating modest profitability. Average portfolio-at-risk (PAR30) and operating efficiency correspond to roughly 1.5 and 12 percent of the loan portfolio, respectively. Approximately 63.2 percent of MFIs are not-for-profit. Internal and board-level audit functions are present in approximately 56.5 and 42 percent of the observations, respectively. The sample comprises 3,979 MFI-year observations across 60 countries. Country-level variation is substantial: some countries show no presence of

⁶ Results are similar when clustering by country. Since models include year fixed effects that absorb global shocks, further clustering by year would not affect inference.

Big Four auditors, while in others most MFIs are audited by a Big Four firm. The within-country standard deviation of 0.25 indicates marked heterogeneity in auditor choice.

TABLE 1

Descriptive Statistics

Panel A: Descriptive Statistics for All Firms

Variable	n	Mean	Std. Dev.	25 %	Median	75 %
BIG4 _t	3 979	0.341	0.474	0,000	0,000	1,000
EFI _t	10 380	58.38	6.57	54.4	58.4	62.9
SIZE _t	5 956	15.5	3.45	14.54	15.74	17.06
ROA _{t-1}	5 667	1.74	8.28	0,000	2.02	5.47
PAR30 _{t-1}	5 585	-4.19	2.26	-4.93	-3.51	-2.71
NONPROFIT _t	10 491	0.632	0.482	0,000	1,000	1,000
AVGLOAN _t	2 333	6.78	1.300	5.950	6.820	7.560
AGE _t	10 555	12.35	10.97	5	11,000	18,000
OPEX_P _t	5 819	-2.12	2.15	-2.09	-1.63	-1.11
INTAUD _t	6 669	0.565	0.496	0,000	1,000	1,000
BOAUD _t	5 353	0.419	0.493	0,000	0,000	1,000
INTINIT ₀	10 181	0.343	0.475	0,000	0,000	1,000
GDP _t	10 568	3.49	3.22	1.19	2.42	5.04

Panel B: Big Four Usage by Country

Variable	n	Mean	Std. Dev.	25 %	Median	75 %
Overall	60	0.380	0.249	0.163	.0321	0.540
Per country						
Albania	46	0.87	0.341	1	1	1
Argentina	7	1	0	1	1	1
Armenia	35	0.314	0.471	0	0	1
Benin	54	0	0	0	0	0
Bolivia	221	0.525	0.501	0	1	1
Bosnia Herzegovina	113	0.85	0.359	1	1	1
Brazil	130	0.062	0.241	0	0	0
Bulgaria	32	0.313	0.471	0	0	1
Burkina Faso	91	0.099	0.3	0	0	0
Cambodia	156	0.724	0.448	0	1	1
Chile	14	0.714	0.469	0	1	1

Colombia	100	0.19	0.394	0	0	0
Dominican Republic	46	0	0	0	0	0
Ecuador	254	0.067	0.25	0	0	0
Egypt	97	0.216	0.414	0	0	0
El Salvador	52	0.154	0.364	0	0	0
Ethiopia	72	0	0	0	0	0
Georgia	68	0.456	0.502	0	0	1
Guatemala	50	0.14	0.351	0	0	0
Haiti	33	0.091	0.292	0	0	0
Honduras	109	0.431	0.498	0	0	1
India	254	0.177	0.383	0	0	0
Indonesia	34	0.324	0.475	0	0	1
Jordan	54	0.444	0.502	0	0	1
Kazakhstan	35	0.114	0.323	0	0	0
Kenya	85	0.459	0.501	0	0	1
Kyrgyzstan	50	0.18	0.388	0	0	0
Madagascar	18	0.167	0.383	0	0	0
Mali	61	0	0	0	0	0
Mexico	137	0.197	0.399	0	0	0
Moldova	15	1	0	1	1	1
Morocco	98	0.622	0.487	0	1	1
Nicaragua	117	0.521	0.502	0	1	1
Pakistan	23	0.609	0.499	0	1	1
Paraguay	9	1	0	1	1	1
Peru	158	0.089	0.285	0	0	0
Philippines	208	0.394	0.49	0	0	1
Romania	51	0.765	0.428	1	1	1
Russia	97	0.155	0.363	0	0	0
Senegal	49	0.124	0.331	0	0	0
South Africa	11	0.455	0.522	0	0	1
Sri Lanka	21	0.81	0.402	1	1	1
Tanzania	30	0.167	0.379	0	0	0
Togo	31	0	0	0	0	0
Tunisia	18	0.556	0.511	0	1	1
Uganda	110	0.282	0.452	0	0	1
Montenegro	23	0.783	0.422	1	1	1
Cameroun	3	0.212	0.415	0	0	0
Guinee	27	0.593	0.501	0	1	1
Vietnam	54	0.407	0.496	0	0	1
Azerbaijan	95	0.253	0.437	0	0	1

Mongolia	22	0.227	0.429	0	0	0
Nigeria	26	0.423	0.504	0	0	1
Mozambique	18	0.722	0.461	0	1	1
Tajikistan	64	0.203	0.406	0	0	0
Croatia	9	0.111	0.333	0	0	0
Zambia	22	0.318	0.477	0	0	1
China	32	0.125	0.336	0	0	0
Serbia	8	0.125	0.354	0	0	0
Ghana	35	0.457	0.505	0	0	1
Malawi	10	1	0	1	1	1
Kosovo	36	0.889	0.319	1	1	1
Burundi	25	0.16	0.374	0	0	0
Afghanistan	8	0.5	0.535	0	0.5	1
Lebanon	31	0.806	0.402	1	1	1
Turkey	5	1	0	1	1	1
Palestine	54	0.444	0.502	0	0	1
Italy	34	0.029	0.171	0	0	0
Yemen	14	0.714	0.469	0	1	1
Angola	3	1	0	1	1	1
France	6	1	0	1	1	1
Zimbabwe	10	0.5	0.527	0	0.5	1

All continuous variables are winsorized at the 1st and 99th percentiles (one-tailed at the 99th for right-skewed variables). Variables $SIZE_t$, $PAR30_{t-1}$, $AVGLOAN_t$ and $OPEX_P_t$ are expressed in natural logarithms.

Main regression results

Table 2 presents the results from the correlated random-effects (CRE) probit estimations of Big Four auditor choice. Column (1) reports the baseline specification including firm- and country-level controls, while Columns (2)–(5) sequentially introduce interaction terms between institutional quality (EFI) and the firm characteristics hypothesized to affect auditor demand: size, profitability, credit risk, and legal form. Standard errors are clustered at the MFI level to account for within-firm dependence (Petersen, 2009).

TABLE 2
Correlated Random Effects (CRE) probit model with Mundlak adjustment

Panel A: Coefficient Estimates

Variable	(1)	(2)	(3)	(4)	(5)
INT _t (within)		0.039** (0.017)	0.004** (0.002)	0.019** (0.008)	-0.130* (0.072)
EFI _t (within)	0.095** (0.037)	0.073* (0.039)	0.089** (0.037)	0.185*** (0.050)	0.195*** (0.065)
SIZE _t (within)	1.223*** (0.254)	1.289*** (0.260)	1.234*** (0.259)	1.245*** (0.252)	1.335*** (0.252)
SIZE _t (between)	0.060 (0.213)	0.054 (0.213)	0.066 (0.212)	0.060 (0.213)	0.024 (0.219)
ROA _{t-1} (within)	-0.004 (0.010)	-0.006 (0.010)	-0.211** (0.104)	-0.004 (0.010)	-0.005 (0.011)
ROA _{t-1} (between)	-0.056 (0.042)	-0.056 (0.042)	-0.060 (0.041)	-0.053 (0.042)	-0.059 (0.045)
PAR30 _{t-1} (within)	-0.070 (0.055)	-0.070 (0.053)	-0.069 (0.055)	-1.192** (0.489)	-0.074 (0.055)
PAR30 _{t-1} (between)	-0.248 (0.200)	-0.232 (0.204)	-0.234 (0.200)	-0.245 (0.203)	-0.243 (0.211)
NONPROFIT _t	-0.072 (0.593)	-0.214 (0.592)	-0.090 (0.597)	-0.108 (0.587)	7.389* (4.084)
AVGLOAN _t (within)	0.269 (0.259)	0.285 (0.262)	0.300 (0.262)	0.235 (0.258)	0.254 (0.261)
AVGLOAN _t (between)	-0.303 (0.334)	-0.318 (0.340)	-0.322 (0.335)	-0.302 (0.334)	-0.309 (0.353)
AGE _t (within)	-10.974 (9.649)	-10.979 (9.521)	-10.278 (9.432)	-11.583 (9.706)	-12.459 (10.460)
AGE _t (between)	10.997 (9.652)	11.004 (9.524)	10.299 (9.435)	11.607 (9.709)	12.490 (10.464)
OPEX_P _t (within)	0.861*** (0.240)	0.877*** (0.250)	0.890*** (0.242)	0.871*** (0.241)	0.906*** (0.246)
OPEX_P _t (between)	0.849*** (0.327)	0.886*** (0.333)	0.834** (0.327)	0.860*** (0.327)	0.912*** (0.353)
INTAUD _t	-0.180	-0.243	-0.203	-0.202	-0.298

	(0.374)	(0.385)	(0.371)	(0.374)	(0.390)
BOAUD _t	0.326	0.282	0.323	0.316	0.382
	(0.443)	(0.450)	(0.444)	(0.443)	(0.453)
INTINIT ₀	0.684	0.646	0.651	0.670	0.819*
	(0.450)	(0.460)	(0.451)	(0.453)	(0.498)
GDP _t	-0.160	-0.103	-0.166	-0.157	-0.225
	(0.439)	(0.438)	(0.434)	(0.437)	(0.419)
Year FE	Yes	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes	Yes
Observations	1,663	1,663	1,663	1,663	1,663
Groups	340	340	340	340	340
Log pseudo-likelihood	-440.915	-436.361	-438.837	-437.535	-436.549
ρ (Rho)	0.839	0.842	0.839	0.838	0.856
	(0.038)	(0.037)	(0.038)	(0.038)	(0.037)
σ _u (Random intercept SD)	2.282	2.311	2.280	2.274	2.435
	(0.322)	(0.326)	(0.323)	(0.322)	(0.366)
χ ² test	1.20	1.23	1.09	1.32	1.32
(Ti_std = 0)	[p = 0.274]	[p = 0.267]	[p = 0.296]	[p = 0.251]	[p = 0.251]
χ ² test	13.04*	13.40*	12.93*	13.18*	12.60*
(Mundlak means = 0)	[p = 0.042]	[p = 0.037]	[p = 0.044]	[p = 0.040]	[p = 0.050]

Panel B: Marginal effects

Variable	(1)	(2)	(3)	(4)	(5)
INT _t (within)	.	0.0035	0.00032	0.0018	-0.011
EFI _t (within)	0.00856	0.0065	0.0080	0.0167	0.017
SIZE _t (within)	0.11057	0.1137	0.1110	0.1123	0.114
ROA _{t-1} (within)	-0.00038	-0.0005	-0.0189	-0.0003	-0.000
PAR30 _{t-1} (within)	-0.00637	-0.0062	-0.0062	-0.1075	-0.006
NONPROFIT _t	-0.00655	-0.0189	-0.0081	-0.0097	0.632

*, **, *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively (two-tailed).

This table presents the results of correlated random-effects (CRE) probit regressions with Mundlak adjustments. Each column reports estimates from a separate model in which the effect of the specified firm-level characteristic on the likelihood of choosing a Big Four auditor is moderated by the Economic Freedom Index (EFI). Robust standard errors clustered at the firm level are reported in parentheses. In the EFI × TA model, total assets (lnTA) and EFI are mean-centered to reduce multicollinearity between the interaction term and its components and to aid interpretation of the main effects. Centering is applied only in this model, as lnTA and EFI do not interact in the others.

ROA is multiplied by 100 to rescale the variable and improve numerical stability in the interaction with EFI. This transformation does not affect substantive interpretation but improves coefficient readability and model convergence.

The results reveal a systematic institutional reordering of audit demand, directly addressing our overarching question of whether cost-minimization or signaling strategies dominate. Under weak institutional conditions, Big Four audits function as credibility substitutes. Adoption is concentrated among low-risk, low-profit nonprofits that use high-quality audits to offset enforcement gaps and reassure stakeholders. Demand follows a signaling logic, with prudent organizations absorbing audit costs to differentiate themselves. As institutions strengthen, this reverses. Improved market governance increases compliance returns, leading profitable MFIs to engage Big Four auditors. Institutional development shifts the audit from a legitimacy signal to a compliance investment, marking the boundary at which signaling yields to rational cost–benefit analysis.

The baseline results confirm that institutional development itself drives audit upgrading. The within-country coefficient on the institutional environment is positive and statistically significant across specifications, indicating that improvements in regulatory quality and governance reliability increase the likelihood that MFIs engage Big Four auditors. Because country fixed effects absorb cross-sectional differences, this relationship reflects temporal shifts rather than static country traits. The result aligns with the rational-choice perspective: as regulatory efficiency and overall governance reliability improve, the expected costs of weak assurance increase, and the economic payoff to credible compliance rises. Conversely, when institutional capacity is limited, the absence of reliable enforcement and reputational discipline reduces the incentive to bear the high costs of a Big Four audit. Having established this baseline association, the subsequent analyses examine how institutional quality reshapes the influence of firm characteristics: size, profitability, risk, and legal form, on the decision to hire a Big Four auditor.

The interaction effects for profitability and credit risk capture this institutional reordering along the prudential–commercial continuum. In microfinance, profitability and risk reflect alternative strategic orientations rather than opposing dimensions of firm quality, consistent with classical finance theory on the risk–return trade-off (Markowitz, 1952; Sharpe, 1964). Prudent MFIs ensure repayment discipline through labor-intensive monitoring and personalized collection methods. Loan officers frequently visit clients, foster close social ties, and enforce repayment via peer accountability (Armendáriz de Aghion and Morduch, 2010; Mersland and Strøm, 2009). These models keep default rates low but raise operating costs, limiting profit. By contrast, commercially oriented MFIs pursue growth and higher returns through larger average loans, faster disbursement, and reduced client monitoring, which elevate both earnings potential and credit risk (Cull et al., 2007; Hudon and Traca 2011). These orientations imply distinct audit incentives in weak institutions: operationally prudent MFIs invest in Big Four audits to signal discipline and governance reliability, while risk-taking, high-return MFIs economize on assurance that offers little institutional payoff where enforcement and regulatory credibility are weak. As institutional reliability improves, this trade-off diminishes. Stronger governance frameworks raise the expected costs of weak assurance and the incentives for credible compliance, leading to convergence in audit demand across strategies.

The interaction models empirically validate this prudential–commercial continuum. In the $ROA \times EFI$ and $PAR30 \times EFI$ specifications, the coefficients on profitability and credit risk are negative, while the interaction terms with institutional quality are positive and statistically significant. This pattern indicates that both variables exert their strongest influence on auditor choice when EFI is low: under weak institutional conditions, higher profitability or lower credit risk increases the likelihood of selecting a Big Four auditor. As institutional quality rises, these

marginal effects flatten, consistent with a diminished role of signaling and a stronger role of compliance incentives. Marginal-effect calculations (Ai and Norton, 2003) confirm that institutional strengthening reduces the absolute slopes of both profitability and risk, producing the same directional moderation across measures and implying convergence in audit demand as EFI increases.

Extending the prudential–commercial continuum to organizational form, model (5) examines how institutional quality moderates the nonprofit–for-profit gap in audit adoption. In the NONPROFIT×EFI model (5), nonprofit status and EFI are positive and significant, and their interaction is negative and significant. The marginal effect indicates that at low EFI, nonprofits are about 63 percentage points more likely than for-profits to engage a Big Four auditor, but this gap narrows by roughly 1.1 percentage points for each EFI point. The results imply that when enforcement is weak, the non-distribution constraint offers little protection against opportunism, compelling nonprofits to purchase credibility through costly audits. As institutions strengthen and the constraint becomes enforceable, formal oversight restores its credibility, diminishing the need for such costly signaling and closing the nonprofit–for-profit gap.

Robustness tests

We assess robustness to alternative estimators and institutional measures. Table 3 presents a conditional fixed-effects logit which confirms that the main relationships hold when identification relies solely on within-MFI changes, yielding consistent signs and significance relative to the CRE estimates. Because few MFIs change auditors over time, this test uses a smaller sample and provides a deliberately conservative check of within-MFI dynamics. A linear probability model with MFI and year fixed effects (Appendix B) produces results that are directionally similar, indicating that the findings are not driven by the probit functional form.

Results using the Fraser Institute's Economic Freedom Index, reported in Appendix A, show comparable signs and significance levels, supporting the robustness of the moderating effect of institutional quality to alternative measurement and specification choices.

TABLE 3
Fixed Effects Logit Regression

Variable	(1)	(2)	(3)	(4)	(5)
INT _t		0.064 ** (0.027)	0.007 * (0.004)	0.027 * (0.015)	-0.348 *** (0.109)
EFI _t	0.170 *** (0.051)	0.130 ** (0.052)	0.160 *** (0.051)	0.298 ** (0.092)	0.441 *** (0.109)
SIZE _t	1.232 *** (0.325)	1.358 *** (0.336)	1.282 *** (0.328)	1.273 ** (0.330)	1.583 *** (0.381)
ROA _{t-1}	-0.005 (0.020)	-0.009 (0.020)	-0.430 * (0.238)	-0.004 (0.020)	-0.007 (0.021)
PAR30 _{t-1}	-0.242 ** (0.112)	-0.232 ** (0.111)	-0.255 ** (0.113)	-1.774 ** (0.867)	-0.234 ** (0.113)
NONPROFIT _t	0.062 (0.528)	-0.100 (0.550)	-0.016 (0.531)	0.058 (0.529)	19.689 *** (6.161)
AVGLOAN _t	0.385 (0.282)	0.409 (0.294)	0.423 (0.282)	0.346 (0.287)	0.328 (0.297)
AGE _t	(a) *** (0.113)	(a) *** (0.118)	(a) *** (0.113)	(a) ** (0.115)	(a) *** (0.118)
OPEX_P _t	0.964 (0.609)	1.044 * (0.618)	1.048 * (0.616)	1.029 * (0.623)	1.029 (0.630)
INTAUD _t	-0.733 (0.553)	-0.974 * (0.568)	-0.810 (0.552)	-0.835 (0.557)	-1.109 * (0.581)
BOAUD _t	-0.109 (0.599)	-0.193 (0.614)	-0.187 (0.600)	-0.064 (0.602)	0.163 (0.637)
GDP _t	-0.400 (0.456)	-0.301 (0.457)	-0.458 (0.445)	-0.375 (0.463)	-0.574 (0.492)
Year FE	Yes	Yes	Yes	Yes	Yes
Country FE	No	No	No	No	No
Observations	406	406	406	406	406
Groups	55	55	55	55	55

Log Pseudolikelihood	-140.9 7	-138.0 1	-139.4 0	-139.6 0	-134.5 4
Null log likelihood	-173.0 9	-173.0 9	-173.09 9	-173.0 9	-173.0 9
LR χ^2 (df)	64.23 (28)	70.16 (29)	67.37 (29)	66.98 (29)	77.10 (29)
p-value	0.0001	0.0000	0.0001	0.0001	0.0000
McFadden Pseudo R ²	0.186	0.203	0.195	0.193	0.223
AIC	337.9	334.0	336.8	337.2	327.1
BIC	450.1	450.2	453.0	453.4	443.3

*, **, *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively (two-tailed).

This table presents a conditional fixed-effects logit regression. Each column reports estimates from a separate conditional fixed-effects logit regression. A total of 317 groups (1,366 observations) were omitted due to no within-group variation in the dependent variable. Time-invariant variables are dropped automatically by the estimator. Robust standard errors clustered at the firm level are reported in parentheses. Each model includes year fixed effects and omits time-invariant variables. In the $\text{EFI} \times \text{TA}$ model, total assets ($\ln\text{TA}$) and EFI are mean-centered to reduce multicollinearity and aid interpretation. ROA is multiplied by 100 to improve numerical stability; this transformation does not affect substantive interpretation.

(a) The AGE coefficient is extremely large due to collinearity with fixed effects and is not substantively interpretable.

V. CONCLUSION

Institutional quality is conceptualized as a dynamic condition that shapes how firm traits translate into auditor choice. Using a longitudinal measure of market-governance capacity (EFI) rather than static legal-origin categories, we reestablish Big Four audits as adaptive governance tools that evolve with institutional development. This framework clarifies when competing audit-demand logics apply: signaling and legitimacy motives dominate where institutional capacity is weak, while compliance-based efficiency motives prevail as institutions mature.

These dynamics manifest across firm characteristics. Under weak governance, low-profit, low-risk, and nonprofit MFIs use audits to signal prudence and credibility. As governance capacity strengthens, profitable and risk-taking MFIs adopt Big Four audits as rational compliance investments. The results refine hybrid-governance theory by showing that the non-distribution

constraint supports credibility only when credible governance structures exist to uphold it, highlighting the contingent role of audit quality in sustaining trust across legal forms.

By linking organizational incentives to institutional change, the analysis positions signaling and rational-choice theories as sequential rather than competing explanations of audit demand.

Strengthening institutions internalizes the governance role of audits, reducing the need for external signaling through costly certification. For policymakers and funders, this suggests that improving property-rights protection, regulatory reliability, and transparency may be more effective than subsidizing audit adoption. Big Four audits thus operate as adaptive governance mechanisms, responsive to changes in institutional quality, substituting for weak governance and complementing strong governance.

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APPENDIX A

TABLE 4
Correlated Random Effects (CRE) probit model with Mundlak adjustment
Fraser Institute's Economic Freedom Index

Panel A: Coefficient Estimates

Variable	(1)	(2)	(3)	(4)	(5)
INT _t (within)		0.302 ** (0.146)	0.002 (0.014)	0.226 ** * (0.064)	-0.660 ** (0.335)
EFI _t (within)	0.789 * (0.438)	0.903 ** (0.395)	0.794 * (0.427)	2.074 ** * (0.545)	1.221 ** * (0.404)
SIZE _t (within)	1.334 *** (0.261)	1.451 *** (0.276)	1.335 ** * (0.261)	1.386 ** * (0.266)	1.408 ** * (0.173)
SIZE _t (between)	0.046 (0.223)	0.024 (0.219)	0.045 (0.222)	0.029 (0.218)	0.018 (0.193)
ROA _{t-1} (within)	-0.010 (0.011)	-0.009 (0.011)	-0.022 (0.087)	-0.006 (0.011)	-0.010 (0.011)
ROA _{t-1} (between)	-0.054 (0.045)	-0.054 (0.045)	-0.054 (0.044)	-0.049 (0.044)	-0.058 (0.043)
PAR30 _{t-1} (within)	-0.127 ** (0.053)	-0.117 ** (0.053)	-0.126 ** (0.054)	-1.524 ** * (0.406)	-0.116 ** (0.056)
PAR30 _{t-1} (between)	-0.205 (0.211)	-0.173 (0.210)	-0.204 (0.211)	-0.214 (0.214)	-0.198 (0.202)
NONPROFIT _t	0.493 (0.520)	0.439 (0.515)	0.488 (0.506)	0.364 (0.504)	4.651 ** (2.137)
AVGLOAN _t (within)	-0.018 (0.261)	-0.000 (0.252)	-0.017 (0.261)	-0.037 (0.266)	0.020 (0.167)
AVGLOAN _t (between)	-0.019 (0.341)	-0.016 (0.331)	-0.018 (0.340)	-0.041 (0.338)	-0.058 (0.323)
AGE _t (within)	-10.598	-10.436	-10.519	-12.388	-10.496

	(11.149)	(10.783)	(11.121)	(11.307)	(9.917)
AGE _t (between)	10.619 (11.152)	10.456 (10.786)	10.540 (11.125)	12.408 (11.310)	10.517 (9.922)
OPEX_P _t (within)	1.004 *** (0.252)	1.103 *** (0.256)	1.004 ** * (0.252)	1.069 ** * (0.258)	1.029 ** * (0.240)
OPEX_P _t (between)	0.842 * (0.346)	0.841 ** (0.348)	0.841 ** (0.345)	0.819 ** (0.343)	0.851 ** (0.360)
INTAUD _t	-0.051 (0.382)	-0.087 (0.396)	-0.055 (0.382)	0.409 (0.417)	0.436 (0.302)
BOAUD _t	0.429 (0.423)	0.432 (0.433)	0.429 (0.423)	-0.049 (0.379)	-0.143 (0.286)
INTINIT ₀	0.648 (0.485)	0.659 (0.484)	0.646 (0.486)	0.677 (0.479)	0.696 (0.485)
GDP _t	0.368 (0.482)	0.317 (0.453)	0.365 (0.479)	0.210 (0.465)	0.380 (0.257)
Year FE	Yes	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes	Yes
Observations	1,644	1,644	1,644	1,644	1,644
Groups	336	336	336	336	336
Log pseudo-likelihood	-433.01 7	-429.32 8	-433.00 7	-427.19 4	-431.02 6
ρ (Rho)	0.859 (0.034)	0.858 (0.034)	0.859 (0.034)	0.854 (0.035)	0.859 (0.031)
σ _u (Random intercept SD)	2.470 (0.348)	2.462 (0.346)	2.465 (0.346)	2.418 (0.340)	2.470 (0.313)
χ ² test (Ti_std = 0)	0.83 [p = 0.363]	0.86 [p = 0.355]	0.82 [p = 0.366]	1.12 [p = 0.290]	1.03 [p = 0.310]
χ ² test (Mundlak means = 0)	10.16 * [p = 0.118]	9.83 * [p = 0.1322]	10.13 [p = 0.119]	9.92 [p = 0.128]	9.93 [p = 0.128]

Panel B: Marginal effects

Variable	(1)	(2)	(3)	(4)	(5)
INT _t (within)	.	0.026	0.0002	0.019	-0.056
EFI _t (within)	0.067	0.076	0.068	0.178	0.103

SIZE _t					
(within)	0.114	0.122	0.114	0.119	0.119
ROA _{t-1} (within)	-0.001	-0.001	-0.002	-0.001	-0.001
PAR30 _{t-1}					
(within)	-0.011	-0.010	-0.108	-0.131	-0.010
NONPROFI					
T _t	-0.042	-0.037	-0.042	-0.031	0.394

*, **, *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively (two-tailed).

This table presents the results of correlated random-effects (CRE) probit regressions with Mundlak adjustments, estimated from the Fraser Institute's Economic Freedom Index. Each column reports estimates from a separate model in which the effect of the specified firm-level characteristic on the likelihood of choosing a Big Four auditor is moderated by the Economic Freedom Index (EFI).

Robust standard errors clustered at the firm level are reported in parentheses.

In the $EFI \times TA$ model, total assets (lnTA) and EFI are mean-centered to reduce multicollinearity between the interaction term and its components and to aid interpretation of the main effects.

Centering is applied only in this model, as lnTA and EFI do not interact in the others.

ROA is multiplied by 100 to rescale the variable and improve numerical stability in the interaction with EFI. This transformation does not affect substantive interpretation but improves coefficient readability and model convergence.

APPENDIX B

TABLE 5
Linear Probability Model with Fixed Effects

Variable	(1)	(2)	(3)	(4)	(5)
Intercept	-1.541 ** (0.511)	0.138 (0.267)	-1.523 *** (0.510)	-1.825 *** (0.525)	-2.141 *** (0.559)
INT _t		0.003 (0.002)	0.000 (0.000)	0.001 (0.001)	-0.015 * (0.009)
EFI _t	0.013 *** (0.004)	0.011 ** (0.005)	0.012 *** (0.005)	0.018 *** (0.005)	0.024 *** (0.007)
SIZE _t	0.062 ** (0.024)	0.065 *** (0.024)	0.062 ** (0.024)	0.062 ** (0.024)	0.063 *** (0.023)
ROA _{t-1}	-0.001 (0.001)	-0.001 (0.001)	-0.010 (0.013)	-0.001 (0.001)	-0.001 (0.001)
PAR30 _{t-1}	-0.009 * (0.005)	-0.008 * (0.005)	-0.009 * (0.005)	-0.076 (0.047)	-0.009 ** (0.005)
NONPROFIT _t	0.001 (0.117)	-0.004 (0.116)	0.003 (0.117)	-0.004 (0.117)	0.838 * (0.498)
AVGLOAN _t	0.035	0.038	0.036	0.034	0.037

	(0.037)	(0.036)	(0.037)	(0.036)	(0.036)
OPEX _{P_t}	0.004	0.004	0.004	0.004	0.003
	(0.008)	(0.009)	(0.008)	(0.008)	(0.008)
INTAUD _t	−0.024	−0.027	−0.025	−0.025	−0.041
	(0.053)	(0.053)	(0.053)	(0.053)	(0.053)
BOAUD _t	−0.001	−0.004	−0.001	0.002	0.006
	(0.064)	(0.064)	(0.064)	(0.064)	(0.062)
GDP _t	−0.032	−0.000	−0.031	−0.032	−0.043
	(0.044)	(0.000)	(0.045)	(0.044)	(0.042)
Year FE	Yes	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes	Yes
Observations	1,753	1,753	1,753	1,753	1,753
Absorbed cases (MFI)	353	353	353	353	353
Absorbed years	19	19	19	19	19
Clusters (MFI)	353	353	353	353	353
F-statistic	1.91	1.84	1.75	2.23	2.27
	[p = 0.043]	[p = 0.047]	[p = 0.062]	[p = 0.013]	[p = 0.011]
R ² (overall)	0.804	0.805	0.804	0.804	0.806
Adjusted R ²	0.750	0.750	0.750	0.750	0.752
Within R ²	0.045	0.048	0.045	0.047	0.053
Root MSE	0.235	0.234	0.235	0.234	0.234
p-value	0.043	0.047	0.062	0.013	0.011

*, **, *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively (two-tailed).

This table presents linear probability models with MFI and year fixed effects. Each column presents estimates from a separate regression corresponding to the main CRE specifications. Standard errors are clustered at the MFI level. MFI and year effects are absorbed using within transformations; thus, coefficients are identified from within-entity and within-country variation. In the EFI×TA model, total assets (lnTA) and EFI are mean-centered to reduce multicollinearity. ROA is multiplied by 100 for numerical stability; this transformation does not affect interpretation.