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Audit Signals and Firm-Level Instability under Persistent Economic Shocks: Incremental Evidence beyond Market Indicators from Egypt

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Abstract
This study examines whether audit-derived signals provide incremental information for interpreting firm-level instability beyond market indicators during persistent economic shocks. Using an unbalanced panel of 300 non-financial companies listed on the Egyptian Exchange for at least part of 2016–2024, the study combines textual analysis of audit reports with fixed-effects estimation, System GMM, interaction tests and quantile regression. Firm observations are retained only for eligible listing years with available audit, financial and market data. The Stability-Oriented Audit Index separates risk-signal content from auditor-source credibility, while the Domestic Pressure Index captures inflationary, exchange-rate and financing pressures. Audit signals are positively associated with instability, and their relevance increases under persistent shocks, domestic pressures and vulnerability. Adding audit information raises explanatory power from 0.31 to 0.39, while its coefficient increases from 0.112 at Q25 to 0.341 at Q90. The findings establish auditing as a complementary information channel without redefining its assurance purpose.

Keywords: Audit signals; External auditing; Audit reporting; Firm-level instability; Persistent economic shocks; Market indicators; Financial vulnerability; Emerging markets; Egyptian Exchange.

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I. Introduction

1.1 Background and Context

The global economy has shifted from episodic disruption toward persistent economic shocks in which crises overlap and reinforce one another. The COVID-19 pandemic, geopolitical conflict, inflation, monetary tightening, and supply-chain disruption have altered firm risk and decision conditions (Baker et al., 2020; Altig et al., 2020; World Bank, 2022). Rather than temporary deviations from stability, these shocks create continuing uncertainty that makes firm vulnerability harder to observe and assess (Amatyakul et al., 2023).

This problem is especially visible in Egypt, where Egyptian Exchange-listed firms face global disturbances alongside exchange-rate volatility, financing constraints, inflation, and domestic structural pressures (IMF, 2023; Kose & Ohnsorge, 2021). Firm-level instability therefore reflects the cumulative interaction of external shocks, domestic conditions, and firm-specific vulnerabilities (Goel et al., 2022). Market prices, returns, and volatility provide timely signals (Pastor & Veronesi, 2012), but may not reveal latent weaknesses before they are incorporated into prices (Pastor & Veronesi, 2012; Yilmazkuday, 2021). Persistent shocks can widen the gap between observable market reactions and underlying firm conditions (Amatyakul et al., 2023).

1.2 Problem Statement

The research problem arises from a mismatch between increasingly persistent, multidimensional instability and the information commonly used to interpret firm risk. Conventional assessment remains dominated by market indicators and retrospective financial information. Auditing fundamentally enhances financial-reporting credibility through independent assurance (IAASB, 2021), yet audit reports may also contain firm-specific signals concerning uncertainty, liquidity pressure, reporting complexity, and emerging vulnerability.

The question is not whether audit information should replace market signals, but whether it provides a complementary informational layer. Market indicators principally capture investor responses, whereas audit outputs arise from structured professional examination, disclosures, controls, and continuity-related risks. Their

combination may therefore distinguish temporary price turbulence from deeper operating or financial vulnerability. The study accordingly examines whether audit-derived signals explain dimensions of instability not fully reflected in market indicators, whether their relevance increases during persistent shocks and domestic pressure, and whether they become more informative among highly vulnerable firms.

1.3 Research Objectives and Questions

The study aims to determine whether audit-derived signals provide incremental information for interpreting instability among non-financial companies listed on the Egyptian Exchange during persistent economic shocks, without redefining auditing's assurance purpose. It addresses four questions: (1) Are audit signals associated with firm-level instability? (2) Do they add explanatory information beyond market indicators? (3) Do persistent shocks and domestic pressures strengthen this relationship? and (4) Are audit signals more informative at higher levels of firm risk? These questions organize the hypotheses and empirical tests that follow.

1.4 Significance and Contributions of the Study

The study advances a stability-oriented informational perspective on auditing. Theoretically, it extends research that primarily associates auditing with reporting credibility, audit quality, earnings quality, and governance (Camacho-Miñano et al., 2024; Boolaky & Quick, 2016) by examining when audit outputs help interpret evolving vulnerability. This extension preserves assurance as auditing's primary purpose while distinguishing secondary informational consequences. It also clarifies why the usefulness of an audit signal may vary with the surrounding shock environment rather than remaining constant across firms and periods.

Empirically, Egypt provides a consequential setting in which global shocks interact with exchange-rate, inflationary, and financing pressures. The study tests whether audit signals contain information beyond market indicators rather than merely correlating with risk. Its country-specific focus also prevents institutional differences across markets from obscuring the relationships under examination. Methodologically, it integrates panel analysis and audit-report examination with composite audit and domestic-pressure measures, dynamic estimation, contextual interactions, and distributional heterogeneity. This architecture evaluates average, conditional, incremental, and high-risk effects within one framework. Practically, the findings may assist investors, auditors, the Egyptian Exchange, and the Financial Regulatory Authority in combining market reactions with professionally assessed firm-level information.

1.5 Structure of the Study

Chapter 2 reviews the literature and theoretical foundations. Chapter 3 develops the framework and hypotheses. Chapter 4 explains the Egyptian sample, data sources, measures, index construction, and econometric strategy. Chapter 5 reports the main and robustness results. Chapter 6 interprets the findings and their theoretical, practical, and regulatory implications. Chapter 7 presents the conclusions, limitations, and future research directions.

II. Literature Review and Theoretical Foundations

2.1 When Crises Refuse to End

Economic disruption increasingly resembles a continuing condition rather than a sequence of isolated events. The pandemic, geopolitical tension, inflation, and supply-chain disruption have overlapped and reinforced uncertainty (Baker et al., 2020; Altig et al., 2020). This persistence changes the meaning of instability: shocks interact with pre-existing weaknesses, erode buffers, and increase sensitivity to later disturbances (Goodell, 2020; Kaya et al., 2025; Pringpong et al., 2023). Firm risk is therefore path-dependent and potentially nonlinear, reflecting accumulated pressure rather than a temporary departure from equilibrium.

2.2 How Systemic Turbulence Enters the Firm

Macroeconomic shocks do not affect firms uniformly. Their consequences depend on leverage, liquidity, profitability, financing flexibility, and operating capacity. Highly leveraged firms become more exposed when financing tightens, whereas liquidity cushions short-term disruption (Opler & Titman, 1994; Acharya & Steffen, 2020; Campello et al., 2011). This heterogeneity creates a measurement challenge. Return volatility records observable reactions but may combine fundamentals with sentiment, noise, and behavioural adjustment (Pastor & Veronesi, 2012; Zaremba et al., 2021). Interpreting fragility consequently requires attention to underlying operating and financial conditions, not market movement alone.

2.3 When Prices Speak Late

Market prices, returns, and volatility aggregate changing expectations, yet informational completeness becomes harder to assume during prolonged uncertainty (Shiller, 2019; Pastor & Veronesi, 2012). Information overload,

behavioural bias, and market frictions can delay the incorporation of firm-specific developments; volatility may also exceed changes justified by fundamentals (Baker et al., 2020; Goodell, 2020). Market signals thus remain indispensable but may indicate that instability exists without identifying the vulnerabilities producing it. The relevant question is whether another credible information channel can illuminate those conditions beyond their reflection in prices.

2.4 The Audit Report as a Second Window

Auditing primarily strengthens financial-reporting credibility and reduces information asymmetry through independent assurance (IAASB, 2021). Nevertheless, observable audit outputs may carry additional information. Key audit matters, modified opinions, going-concern disclosures, reporting delays, and narrative risk language identify areas involving uncertainty and professional judgement (Camacho-Miñano et al., 2024; Hosseinniakani et al., 2024; Maroun & Duboisée de Ricquebourg, 2024). Expanded auditor reporting can affect investor interpretation, although its signals may also be misunderstood (Gutierrez et al., 2018; Kitiwong et al., 2025; Klevak et al., 2023). An audit signal is not an auditor prediction of future failure; it is evidence generated within an assurance process that may help interpret conditions embedded in values, disclosures, and professional judgements. Its usefulness is therefore evaluated incrementally alongside market information and conditionally across levels of economic stress.

2.5 Two Signals One Vulnerability

Market and audit signals observe the same firm through different windows. Market indicators offer speed but may incorporate sentiment and uneven information processing (Shiller, 2019). Audit signals emerge from structured examination of financial information, controls, and risk exposures; they may therefore reveal recognition, continuity, or disruption concerns not immediately visible in prices (Reid et al., 2020; Zeng et al., 2021). Evidence on expanded audit reporting indicates informational potential but also shows that usefulness depends on report content and users' interpretation (Gutierrez et al., 2018; Cameran & Campa, 2025). Combining distinct channels may consequently explain instability more fully than either alone (Christensen et al., 2012).

2.6 Three Theories Behind One Information Channel

Three perspectives explain this complementarity. Information asymmetry theory predicts greater demand for credible firm-specific information when outsiders cannot observe managerial knowledge directly; auditing mitigates that disadvantage through independent validation (Healy & Palepu, 2001). Signaling theory explains how observable audit outputs communicate latent risk attributes, particularly when direct assessment is difficult (Connelly et al., 2011). Crisis dynamics explain how disruptions propagate through funding pressure, weakness, and feedback effects, exposing firms to new shocks before earlier effects dissipate (Brunnermeier & Oehmke, 2013). Together, the theories predict that audit information becomes more valuable as uncertainty and accumulated vulnerability intensify.

2.7 Egypt as a Stress Test for Informational Frictions

Egypt offers a theoretically consequential emerging-market setting because listed firms encounter global shocks alongside exchange-rate volatility, inflation, financing dependence, institutional constraints, and thinner financial buffers (Kose & Ohnsorge, 2021; IMF, 2023). These conditions intensify shock transmission and complicate interpretation of firm instability (Cerutti et al., 2017; Allen et al., 2012). Where enforcement and information asymmetry are more consequential, independently assessed audit information may acquire greater relevance (Habib et al., 2018; Fernández-Villaverde & Ramírez, 2022). Because prior auditing and capital-market evidence remains concentrated in developed markets (DeFond & Zhang, 2014; Amel-Zadeh & Barth, 2021), Egypt provides a focused context for testing conditional informational value.

2.8 Three Gaps Behind One Unresolved Question

The literature leaves three connected gaps. Conceptually, audit research emphasises assurance, quality, compliance, and investor reaction more than the interpretation of evolving instability (Maroun & Duboisée de Ricquebourg, 2024; Camacho-Miñano et al., 2024). Empirically, developed-market concentration limits evidence from settings with stronger macroeconomic and institutional frictions (DeFond & Zhang, 2014). Contextually, discrete pre-post crisis designs inadequately represent shocks that overlap and accumulate (Kaya et al., 2025). The unresolved question is therefore whether audit-derived signals provide incremental information beyond market indicators, particularly when persistent shocks, domestic pressures, and firm vulnerability intensify.

2.9 From Persistent Shocks to Testable Expectations

The resulting architecture connects persistent shocks, heterogeneous firm vulnerability, and complementary informational mechanisms. Market signals capture timely expectations and observable reactions; audit signals supply structured, professionally evaluated context about firm-specific conditions. The three theoretical lenses predict that audit signals will be associated with instability, become more informative under persistent external and domestic pressure, add explanatory value beyond market indicators, and display stronger relevance at higher risk levels. These expectations preserve the distinction between assurance and secondary informational usefulness while establishing the conceptual bridge to the hypotheses developed in Chapter 3.

III. Conceptual Framework and Hypotheses Development

3.1 When Assurance Encounters Persistent Instability

Persistent shocks alter both firm risk and the environment in which that risk is interpreted. When crises overlap and propagate nonlinearly, historical financial and market information may incompletely represent evolving conditions (Altig et al., 2020; Goodell, 2020; Loughran &McDonald, 2016). This does not redefine auditing's assurance purpose. It asks whether professionally generated audit information also reveals going-concern concerns, reporting complexity, significant risks, or vulnerabilities not immediately observable elsewhere. Recent textual and policy-uncertainty research supports examining how auditors identify and communicate such risks (Ha, 2024; Ma et al., 2024; Sun et al., 2024; Küster et al., 2025). Narrative reporting and professional judgements can therefore provide a complementary interpretive layer under continuing uncertainty (Maroun & Duboisée de Ricquebourg, 2024).

3.2 When Global and Domestic Pressures Collide

The Dual Instability Framework treats firm instability as the product of external persistent shocks and domestic structural pressure. Pandemics, geopolitical disruption, inflation, and supply-chain disturbances are largely external, but their effects vary with firms' financial structures and operating exposure (Baker et al., 2020; Kaya et al., 2025). In Egypt, exchange-rate volatility, interest-rate changes, inflation, and financing constraints form a second stress layer (IMF, 2023; Kose & Ohnsorge, 2021). Their interaction produces a continuing regime in which domestic conditions determine whether firms absorb or amplify external disruption. Figure 3.1 integrates these pressures with audit signals, market signals, instability, and financial risk.

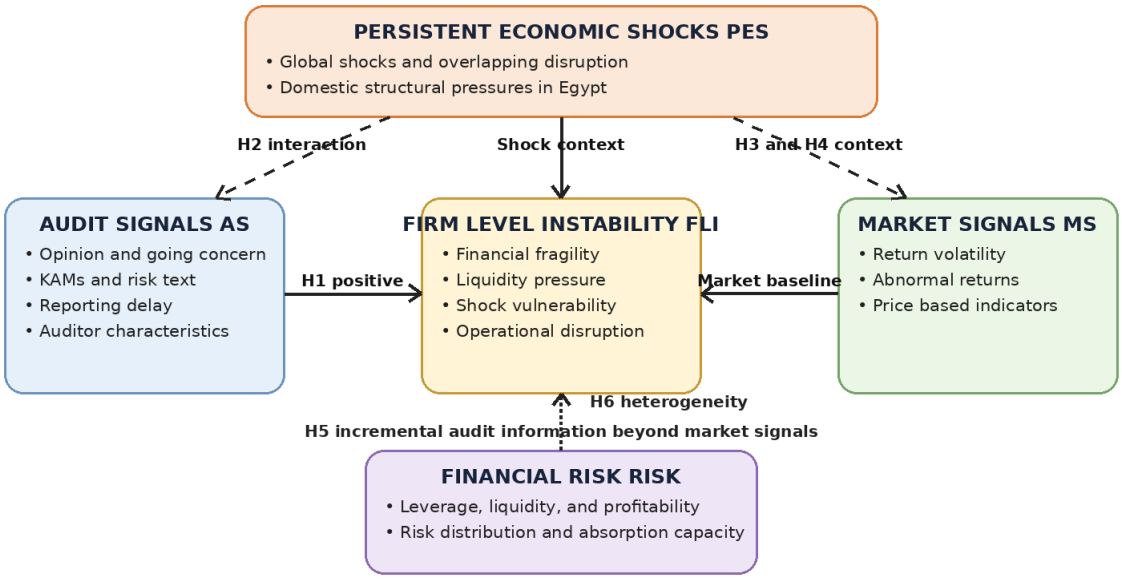

Figure 3.1 Conceptual Model of Audit Signals Market Signals and Firm Level Instability under Persistent Economic Shocks

3.3 Turning Audit Outputs into Stability Signals

The Stability-Oriented Audit Index (SAI) converts observable audit-report attributes into a multidimensional measure of audit-derived risk information. It distinguishes between risk-signal content and signal credibility. Risk-signal content is captured through modified opinions, going-concern indications, audit-report lag, and the frequency of risk-related language. These attributes may reflect reporting uncertainty, continuity concerns, reporting complexity, and professional judgment. Auditor characteristics, including Big Four affiliation, are treated as indicators of signal credibility rather than as direct measures of firm instability.

This distinction prevents auditor quality from being mechanically interpreted as financial distress. Market indicators remain timely measures of investor responses but may also reflect sentiment and information-processing frictions (Pastor & Veronesi, 2012; Shiller, 2019). Audit outputs arise from structured professional evaluation and may provide additional context concerning reporting uncertainty, operational complexity, and sustainability concerns (Habib et al., 2018). Their analytical value therefore lies in complementarity rather than substitution (Christensen et al., 2012).

Table 3.1. Stability-Oriented Audit Signal Architecture

Informational rationale	Measurement	Audit attribute	Signal dimension
Explicit risk signal	Modified = 1	Audit opinion	Risk-signal content
Continuity warning	Present = 1	Going concern	Risk-signal content
Reporting complexity	Number of days	Audit lag	Risk-signal content
Narrative uncertainty	Risk-term frequency	Risk disclosure	Risk-signal content
Signal credibility	Big Four or other attributes	Auditor characteristics	Signal credibility

3.4 The First Signal of Hidden Vulnerability

Auditors examine information, controls, disclosures, and continuity conditions that outsiders may not directly observe. Modified opinions, going-concern disclosures, reporting delays, and narrative risk emphasis may therefore coincide with underlying instability, particularly when market recognition is delayed (Gutierrez et al., 2018; Camacho-Miñano et al., 2024). Prior evidence links going-concern reporting and audit delay to distress, complexity, and uncertainty (Habib et al., 2018; Krishnan & Wang, 2015). H1: Audit signals are positively associated with firm-level instability.

3.5 When Pressure Makes Audit Signals Louder

Signal relevance should vary with economic context. Persistent shocks raise uncertainty and the demand for credible information (Goodell, 2020; Kaya et al., 2025). Consistent with signaling theory, professionally assessed information becomes more valuable when direct evaluation is difficult (Connelly et al., 2011). H2: Persistent economic shocks positively moderate the relationship between audit signals and firm-level instability. Domestic inflation, currency volatility, and financing constraints may create similar amplification in Egypt (IMF, 2023; Allen et al., 2012). H3: Domestic structural pressures positively moderate the audit-signal-instability relationship. Crisis-propagation theory further predicts compounded vulnerability when external and domestic pressures coexist (Brunnermeier & Oehmke, 2013; Cerutti et al., 2017). H4: Their joint presence further strengthens this relationship.

3.6 What Prices Leave Unexplained

Association alone does not establish incremental information. The central test is whether audit signals explain vulnerability after market indicators enter the same model. Because market data capture observable expectations while auditing evaluates firm-specific conditions, accounting and audit information may improve explanatory models beyond price-based measures (Christensen et al., 2012; Gutierrez et al., 2018). H5: Audit signals provide incremental explanatory power beyond market signals in explaining firm-level instability.

3.7 When Risk Changes the Meaning of a Signal

Audit signals may carry different information across the risk distribution. Highly leveraged, illiquid, or weakly profitable firms have less capacity to absorb additional pressure. Informational effects may therefore become nonlinear and more consequential near extreme vulnerability (Acharya & Steffen, 2020). Quantile analysis evaluates this heterogeneity without imposing a constant conditional-mean effect (Koenker, 2005). H6: The association between audit signals and instability is stronger at higher levels of firm risk.

3.8 From Conceptual Paths to Estimable Relations

The hypotheses are integrated in the following general specification: $INST(i,t) = \beta0 + \beta1\ AS(i,t) + \beta2\ MS(i,t) + \beta3\ PES(t) + \beta4\ DPI(t) + \beta5\ Interactions + \varepsilon(i,t)$. The audit coefficient evaluates direct association; interaction terms capture persistent, domestic, joint, and risk-dependent amplification; and simultaneous audit and market measures assess incremental explanatory value. Dynamic and quantile extensions represent persistence and heterogeneous effects rather than treating instability as static.

3.9 From Assurance to Instability Deciphering

The framework connects auditing, markets, and macroeconomic instability without turning audit reports into forecasting instruments. Audit-derived information complements market reactions, becomes more revealing as external and domestic pressures intensify, and matters most where vulnerability is difficult to interpret. By separating signal content, credibility, and context, the model prevents the SAI from being treated as a failure forecast. Its usefulness is instead tested through association, interaction, incremental fit, and distributional variation. The six hypotheses therefore provide a coherent bridge from assurance-based evidence to the methodology that follows.

IV. Research Methodology

4.1 Following Instability Through Time

A dynamic panel tests whether audit-derived signals explain path-dependent firm instability under persistent shocks (Goodell, 2020; Cerutti et al., 2017; Acharya & Steffen, 2020). Firm effects absorb heterogeneity (Wooldridge, 2020). Jointly modeling audit information and market and macroeconomic indicators isolates information not reflected in prices (Gutierrez et al., 2018; Christensen et al., 2012) while representing overlapping disruptions (Kaya et al., 2025).

4.2 Building the Egyptian Evidence Base

The Egyptian non-financial listed-firm panel covers 2016–2024, spanning the baseline period, COVID-19, supply-chain disruption, geopolitical pressure, inflation, and monetary tightening (Altig et al., 2020; IMF, 2023; Arellano & Bond, 1991). It comprises 300 companies that were listed on the Egyptian Exchange for at least part of the study period. Exchange-rate pressure, financing constraints, and institutional frictions may elevate the relevance of audit information (Kose & Ohnsorge, 2021; Allen et al., 2012; Habib et al., 2018). Financial institutions are excluded because their regulatory structures differ (Amel-Zadeh & Barth, 2021; Blundell & Bond, 1998). Observations are retained only for eligible listing years with available audit, financial, and market data. The resulting dataset is therefore an unbalanced panel rather than a mechanically balanced nine-year panel (Baltagi, 2021; Roodman, 2009).

Table 4.1 Panel Construction and Sector Architecture

Panel implication	Observation eligibility	Share of unique firms	Companies	Sample or sector component
Unbalanced longitudinal panel	Listed for at least part of 2016–2024	100.0%	300	Final non-financial sample
Availability varies by company and year	Eligible listed firm-years	36.7%	110	Manufacturing
Availability varies by company and year	Eligible listed firm-years	15.0%	45	Energy and petrochemicals
Availability varies by company and year	Eligible listed firm-years	12.7%	38	Construction
Availability varies by company and year	Eligible listed firm-years	17.3%	52	Consumer goods
Availability varies by company and year	Eligible listed firm-years	18.3%	55	Technology and services

Note: Company counts represent unique firms appearing in the Egyptian Exchange sample during at least one eligible year. Firm-year observations include only years in which the company was listed and the required audit, financial, and market information was available.

4.3 Linking Reports Markets and Macroeconomic Pressure

Financial and market variables are obtained from Egyptian Exchange records, trading data, and corporate disclosures. Audit variables are extracted from published audit reports, while regulatory information is obtained from the Financial Regulatory Authority. World Bank and IMF series provide inflation, exchange-rate, and interest-rate measures (World Bank, 2022; IMF, 2023). These sources are matched by company and eligible listing year, enabling firm-level information to be connected to contemporaneous macroeconomic pressures (World Bank, 2022). Table 4.2 presents the temporal shock architecture without assuming an identical number of observations in every year.

Table 4.2 Persistent Shock Architecture

Shock classification	Dominant event	Empirical phase	Firm-year treatment	Period
Baseline regime	Pre-pandemic period	Baseline	Eligible observations during actual listing years	2016–2019
Persistent-shock regime begins	COVID-19	Initial shock	Eligible observations during the listing year	2020
Persistent-shock regime	Supply-chain disruption	Shock continuation	Eligible observations during the listing year	2021

Shock classification	Dominant event	Empirical phase	Firm-year treatment	Period
Persistent-shock regime	Geopolitical conflict	Compounded shock	Eligible observations during the listing year	2022
Persistent-shock regime	Inflation and exchange-rate pressure	Domestic amplification	Eligible observations during the listing year	2023
Persistent-shock regime	Monetary tightening and financing pressure	Prolonged adjustment	Eligible observations during the listing year	2024

4.4 Converting Audit Evidence into a Comparable Signal

Firm-level instability (INST) is measured using stock-return volatility (Pastor & Veronesi, 2012; Zaremba et al., 2021). The Stability-Oriented Audit Index (SAI) combines four standardised risk-content indicators—modified opinion, going-concern disclosure, audit lag, and risk-related language—with one standardised source-credibility indicator, Big Four affiliation. For transparent construction, the four content indicators are first averaged as an arithmetic sub-index:

$$RCI(i,t) = [ZOpinion(i,t) + ZGC(i,t) + ZLag(i,t) + ZRiskText(i,t)] / 4$$

The aggregate five-component audit index is then calculated as:

$$SAI(i,t) = 0.80\ RCI(i,t) + 0.20\ ZBig4(i,t)$$

Equivalently, each standardised component receives a weight of 0.20. RCI is used only as an intermediate arithmetic step in constructing SAI; Big Four affiliation represents source credibility within the aggregate index and is not interpreted independently as firm instability. Accordingly, all reported coefficients and robustness tests concern the five-component SAI. This transparent specification avoids reliance on a single audit proxy while preserving the distinction between risk content and source credibility (Alawadhi et al., 2026; Camacho-Miñano et al., 2024; Maroun & Duboisée de Ricquebourg, 2024). Size, leverage, and liquidity capture firm scale, financial vulnerability, and shock-absorption capacity (Acharya & Steffen, 2020; Campello et al., 2011).

Table 4.3 Construct Measurement and SAI Architecture

Informational role	SAI weight	Coding or transformation	Code and measure	Construct
Primary instability outcome	—	Continuous	INST: stock-return volatility	Firm instability
Explicit reporting-risk signal	0.20	Modified opinion = 1; otherwise = 0; standardised	Opinion	Audit opinion
Continuity-risk signal	0.20	Going-concern disclosure = 1; otherwise = 0; standardised	GC	Going concern
Reporting complexity and uncertainty	0.20	Continuous and standardised	Lag: reporting delay in days	Audit lag
Narrative risk content	0.20	Textually derived and standardised	RiskText: risk-term frequency	Risk disclosure
Credibility of the information source	0.20	Big Four auditor = 1; otherwise = 0; standardised	Big4	Auditor credibility
Audit-derived risk content excluding auditor type	Embedded at 0.80	Equal-weight average of four content indicators	RCI	Risk-content index
Observable price information	—	Continuous	MKT: market-based indicator	Market signal
Scale, financial vulnerability, and absorption capacity	—	Continuous	SIZE, LEV, LIQ	Firm controls

4.5 Making Time Work Against Reverse Causality

Because contemporaneous instability may intensify audit scrutiny and affect audit-report content, audit variables enter the models with a one-period lag (Gutierrez et al., 2018). Lagged INST captures the persistence of firm-level vulnerability (Acharya & Steffen, 2020). Firm effects control for time-invariant company characteristics, while year effects absorb common changes affecting Egyptian listed companies. System GMM, temporally ordered regressors, and externally dated shock periods provide complementary safeguards against persistence, unobserved heterogeneity, and reverse causality (Baltagi, 2021; Donelson et al., 2022).

4.6 Turning Hypotheses into Estimable Tests

The baseline fixed-effects specification:

$$INST(i,t) = \alpha(i) + \lambda(t) + \beta1\ SAI(i,t-1) + \beta2\ MKT(i,t) + \gamma X(i,t) + \varepsilon(i,t)$$

where $\alpha(i)$ represents firm effects, $\lambda(t)$ represents year effects, and $X(i,t)$ includes SIZE, LEV, and LIQ. This specification tests whether lagged audit-derived signals provide incremental explanatory information beyond contemporaneous market indicators and firm characteristics.

The dynamic specification introduces lagged instability:

$INST(i,t) = \rho\, INST(i,t-1) + \beta 1\, SAI(i,t-1) + \beta 2\, MKT(i,t) + \gamma X(i,t) + \varepsilon(i,t)$

and is using System GMM to address instability persistence and potential endogeneity. Further fixed-effects specifications interact lagged SAI with the persistent-shock regime and the Domestic Pressure Index (DPI) (Goodell, 2020; Kaya et al., 2025; IMF, 2023). Because year effects absorb macroeconomic variables that vary annually but not across firms, inference focuses on the SAI × SHOCK, SAI × DPI, and joint interaction terms rather than the standalone annual effects.

The common timing of the major shocks does not, by itself, establish a valid Difference-in-Differences design because no independently verified treatment and comparison groups are defined (Donelson et al., 2022). Accordingly, the study interprets the shock models as conditional fixed-effects interactions rather than causal treatment. Table 4.4 summarises the fixed-effects (Wooldridge, 2020), System GMM (Baltagi, 2021; Acharya & Steffen, 2020), and quantile-regression procedures (Koenker, 2005).

Table 4.4 Identification Estimation and Validation Matrix

Implementation or diagnostic	Purpose	Method	Analytical layer
SAI(t−1) with MKT, SIZE, LEV, and LIQ	The incremental SAI association	Firm and year fixed effects	Baseline association
INST(t−1) and SAI(t−1); Hansen p = 0.41	Address persistence and potential endogeneity	System GMM	Dynamic estimation
AR(2) not statistically significant	Assess second-order residual correlation	Arellano–Bond AR(2) test	Serial correlation
All VIF values below 5	Assess predictor dependence	Variance inflation factors	Collinearity
SAI(t−1) × SHOCK(t)	Test whether persistent shocks alter SAI relevance	Fixed-effects interaction model	Persistent-shock amplification
SAI(t−1) × DPI(t)	Test whether DPI alters SAI relevance	Fixed-effects interaction model	Domestic-pressure amplification
SAI(t−1) × SHOCK(t) × DPI(t)	Test combined external and domestic pressure	Hierarchical interaction model	Joint amplification
Common shock timing without independently defined treatment and comparison groups	Avoid unsupported causal interpretation	No standalone Difference-in-Differences claim	Causal boundary
Q25, Q50, Q75, and Q90	risk-dependent informational associations	Quantile regression	Distributional heterogeneity
Five standardised components weighted at 0.20 each	Maintain replicable SAI measurement	Transparent equal weighting	Index construction
Earnings volatility and financial-distress measure	Test measurement robustness	Alternative instability proxies	Outcome sensitivity

4.7 Stress Testing the Result Rather Than the Model

The robustness analysis focuses exclusively on tests supported by the retained empirical outputs. It substitutes earnings volatility and financial distress for the primary instability outcome, reducing dependence on a single measure of firm vulnerability (Zaremba et al., 2021; Christensen et al., 2012). Model adequacy is further assessed through collinearity, instrument-validity, serial-correlation, and specification diagnostics. Quantile examine whether the association between the five-component SAI and instability becomes stronger towards the upper tail of the conditional distribution. Audit-report word frequencies provide supplementary descriptive evidence concerning the narrative content underlying the index, but are not treated as an independent validation test.

4.8 Making Every Construct Traceable

Alternative outcomes and the transparent five-component SAI support convergent construct assessment. Temporal ordering, firm and year effects, and sensitivity tests strengthen internal validity (Wooldridge, 2020). Audited statements, official series, documented coding rules, and consistent firm-year eligibility criteria enhance measurement reliability. External validity primarily concerns Egyptian listed non-financial companies and may extend cautiously to comparable shock-exposed emerging markets (Allen et al., 2012).

4.9 Defining What the Design Can Claim

The design identifies conditional associations, moderating relationships, incremental explanatory information, and risk-sensitive heterogeneity. It does not treat audit reports as failure forecasts or claim causality without a separately validated identification structure. Instead, it places professionally derived audit information alongside market signals and persistent macroeconomic pressures within one empirically testable architecture.

V. Empirical Results and Analysis

5.1 Where Instability Clusters

Table 5.1 indicates substantial variation and positive skewness in firm-level instability, consistent with vulnerability being concentrated among a subset of firms rather than distributed uniformly across the sample (Altman & Hotchkiss, 2005; Baker et al., 2020; Zaremba et al., 2021; Allen et al., 2012; Opler & Titman, 1994). SAI is positively correlated with INST at 0.41, providing initial evidence that stronger audit-derived signals accompany greater instability. MKT and liquidity correlate negatively with INST, whereas leverage exhibits a positive correlation. These descriptive relationships do not establish causality but motivate the multivariate and dynamic tests. The distribution of MKT also captures substantial variation across baseline and shock-period firm-years (Altig et al., 2020; Campello et al., 2011).

Table 5.1 Distributional and Correlation Architecture

Panel A Descriptive Statistics

Kurtosis	Skewness	Maximum	Minimum	SD	Mean	Variable
3.85	1.21	0.620	0.050	0.118	0.245	INST
2.94	0.87	0.920	0.100	0.210	0.480	SAI
2.10	−0.65	0.450	−0.210	0.095	0.132	MKT
—	—	18.200	12.100	1.300	14.800	SIZE
—	—	0.890	0.050	0.190	0.420	LEV
—	—	3.900	0.520	0.740	1.670	LIQ

Panel B Correlation Matrix

LIQ	LEV	SIZE	MKT	SAI	INST	Variable
					1.00	INST
				1.00	0.41	SAI
			1.00	−0.22	−0.28	MKT
		1.00	0.09	0.15	−0.12	SIZE
	1.00	0.21	−0.18	0.27	0.36	LEV
1.00	−0.31	−0.08	0.14	−0.19	−0.25	LIQ

Note: Statistics are calculated using eligible firm-year observations for which the required audit, financial, and market data are available. The observations are drawn from 300 companies listed on the Egyptian Exchange for at least part of 2016–2024.

5.2 Two Signals Two Stories

The correlation between SAI and MKT is −0.22, indicating that the two measures are related but not redundant. Audit outputs provide professionally derived information about reporting risk, continuity, complexity, and source credibility, whereas market indicators capture investors' contemporaneous responses. Their modest negative association supports joint estimation rather than treating either channel as a substitute for the other (Habib et al., 2018).

5.3 The Audit Signal Survives Controls

Table 5.2 reports a positive and statistically significant coefficient of 0.287 for lagged SAI ($p < 0.001$), supporting H1 (Gutierrez et al., 2018). The result indicates that stronger audit-derived signals are associated with greater subsequent firm-level instability after controlling for market information and firm characteristics. In the dynamic specification, lagged INST has a coefficient of 0.521, confirming substantial persistence. The lagged SAI coefficient remains positive and significant at 0.214 under System GMM, indicating that its informational association survives dynamic and endogeneity controls (Acharya & Steffen, 2020).

Table 5.2 Fixed Effects and Dynamic Panel Results

Interpretation	p-value or diagnostic	Test statistic	SE	Coefficient	Model and variable
					Panel A Firm and year fixed effects
H1 supported	< 0.001	t = 5.42	0.053	0.287	SAI(t−1)
Negative association	0.004	t = −2.91	0.068	−0.198	MKT
Weak negative association	0.049	t = −1.98	0.021	−0.041	SIZE
Positive vulnerability association	< 0.001	t = 4.11	0.043	0.176	LEV
Liquidity-buffer association	0.015	t = −2.45	0.052	−0.129	LIQ
Model intercept	0.001	t = 3.58	0.087	0.312	Constant
Controls firm heterogeneity	—	—	—	Included	Firm effects

Interpretation	p-value or diagnostic	Test statistic	SE	Coefficient	Model and variable
Controls common annual shocks	—	—	—	Included	Year effects
					Panel B System GMM
Instability persistence	< 0.001	z = 9.33	0.056	0.521	INST(t−1)
Robust audit-signal association	< 0.001	z = 4.76	0.045	0.214	SAI(t−1)
Negative association	0.011	z = −2.54	—	−0.167	MKT
Positive vulnerability association	< 0.001	z = 3.88	—	0.148	LEV
Liquidity-buffer association	0.027	z = −2.21	—	−0.102	LIQ
Overidentifying restrictions not rejected	p = 0.41	—	—	—	Hansen test
No detected second-order serial correlation	Not significant	—	—	—	AR(2) test

Note: Panel A includes firm and year fixed effects. Panel B reports the dynamic System GMM specification. The Hansen result indicates failure to reject the overidentifying restrictions; it does not independently prove instrument validity. For GMM controls whose standard errors are unavailable in the retained output, interpretation relies on the reported test statistics and p-values.

5.4 When Pressure Amplifies the Signal

Table 5.3 supports H2–H4. The interaction between lagged SAI and the persistent-shock regime is positive and significant at 0.145, indicating that the association between audit-derived signals and subsequent instability strengthens during persistent shocks. The interaction between lagged SAI and DPI is also positive and significant at 0.128. Moreover, the positive triple interaction of 0.162 indicates that the informational relevance of audit signals is greatest when persistent external shocks coincide with elevated domestic pressures (Connelly et al., 2011; IMF, 2023; Allen et al., 2012). These coefficients represent contextual amplification rather than standalone causal effects.

Table 5.3 Contextual Amplification Tests

Inference	p-value	t-statistic	Coefficient	term	Hypothesis and model
Positive baseline association	0.004	2.87	0.181	SAI(t−1)	H2 Persistent-shock amplification
H2 supported	< 0.001	3.66	0.145	SAI(t−1) × SHOCK(t)	H2 Persistent-shock amplification
Positive baseline association	0.008	2.65	0.173	SAI(t−1)	H3 Domestic-pressure amplification
H3 supported	0.003	3.02	0.128	SAI(t−1) × DPI(t)	H3 Domestic-pressure amplification
H4 supported	< 0.001	3.95	0.162	SAI(t−1) × SHOCK(t) × DPI(t)	H4 Joint amplification

Note: All specifications include firm and year fixed effects and the firm-level controls reported in the methodology. DPI is mean-centred before constructing the interaction terms. The H4 specification includes the constituent main and lower-order interaction terms required by the hierarchical principle, although only the hypothesis-relevant triple interaction is displayed. Because SHOCK and DPI vary annually but not across firms, their standalone coefficients are absorbed by year fixed effects and are not interpreted separately.

5.5 What Audit Evidence Adds Beyond Prices

Table 5.4 evaluates the incremental explanatory contribution of audit-derived information by comparing two nested fixed-effects models on the same firm-year observations. The market-only specification produces an R^2 of 0.31. Adding lagged SAI, while retaining the same controls and fixed effects, increases R^2 to 0.39. The resulting increase of 0.08 represents a 25.8% improvement relative to the market-only model. The SAI coefficient is positive at 0.198, while the negative MKT coefficient becomes smaller in magnitude. The increase in explanatory fit is consistent with H5 and indicates that audit-derived information explains variation in instability not fully captured by market indicators (Pastor & Veronesi, 2012; Shiller, 2019; Gutierrez et al., 2018).

Table 5.4 Incremental Information Beyond Market Signals

Incremental change	Market plus SAI model	Market-only model	Metric
+0.037	−0.174	−0.211	MKT coefficient
Audit signal introduced	0.198	—	SAI(t−1) coefficient
Unchanged	Included	Included	Firm-level controls
Unchanged	Included	Included	Firm fixed effects
Unchanged	Included	Included	Year fixed effects
No sample change	Same eligible observations	Same eligible observations	Analytical sample
+0.08	0.39	0.31	R^2

Incremental change	Market plus SAI model	Market-only model	Metric
25.8%	—	—	Relative R^2 increase
Consistent with H5 (descriptive fit comparison)	—	—	H5 decision

Note: The comparison uses the same dependent variable, controls, fixed-effects structure, and eligible firm-year observations in both specifications. The change from −0.211 to −0.174 represents attenuation of the negative MKT association after introducing SAI; it does not indicate a positive market effect. The R^2 comparison is interpreted descriptively because the retained output does not include a nested-model test.

5.6 The Signal Strengthens Near the Tail

Table 5.5 shows that the coefficient on lagged SAI increases across the conditional distribution of firm-level instability, from 0.112 at Q25 to 0.341 at Q90. The Q25 coefficient is not statistically significant, whereas the coefficients become significant from the median onwards. At Q90, the coefficient is approximately 3.04 times its Q25 value, indicating that audit-derived signals are most informative among highly unstable firms. The monotonic gradient is consistent with H6 and the proposed risk-sensitive informational mechanism (Koenker, 2005). Because a cross-quantile equality test is unavailable in the retained output, the gradient is interpreted as evidence consistent with H6 rather than definitive proof of coefficient differences.

Table 5.5 Quantile Gradient in Audit Signal Effects

Reported statistical inference	Relative to Q25	Sequential change	SAI(t−1) coefficient	Quantile
Not statistically significant	1.00×	—	0.112	Q25
Statistically significant	1.64×	+0.072	0.184	Q50
Statistically significant	2.35×	+0.079	0.263	Q75
Statistically significant	3.04×	+0.078	0.341	Q90
Consistent with H6	Q90/Q25 = 3.04×	Q90−Q25 = +0.229	Monotonic increase	Cross-quantile pattern

Note: The quantile specifications retain the market indicator and firm-level controls used in the baseline analysis. The reported coefficient gradient is descriptive; without a cross-quantile equality test, relative magnitudes do not establish statistically significant differences between quantiles.

5.7 Testing Whether the Pattern Breaks

Table 5.6 presents the retained evidence on outcome sensitivity, econometric diagnostics, and audit-report narratives. The coefficient on lagged SAI remains positive when earnings volatility replaces the primary outcome and becomes negative when the Z-score is used, consistent with stronger audit signals accompanying lower financial stability. The diagnostic results reveal no serious collinearity or detected second-order serial correlation, while the Hansen and Hausman results support the retained specifications. Audit reports also contain substantial risk, uncertainty, volatility, and going-concern terminology. These frequencies describe the narrative composition of the audit-report corpus but are not treated as independent statistical validation of SAI (Zaremba et al., 2021).

Table 5.6 Robustness Diagnostics and Descriptive Audit Text Evidence

Statistically defensible interpretation	Numerical result	Test or measure	Evidence layer
Positive coefficient under an alternative instability outcome	0.233	SAI(t−1) with earnings volatility	Outcome sensitivity
Higher SAI accompanies a lower financial-stability score	−0.189	SAI(t−1) with Z-score	Outcome sensitivity
No indication of serious predictor collinearity	Below 5	Variance inflation factors	Collinearity diagnostic
Overidentifying restrictions are not rejected	p = 0.41	Hansen test	Instrument diagnostic
No detected second-order serial correlation	Not statistically significant	AR(2) test	Serial-correlation diagnostic
Fixed effects are preferred to random effects	FE preferred	Hausman test	Model-selection diagnostic
Most frequent risk-language category	2,450	Risk-related occurrences	Audit-text corpus
Substantial uncertainty-related language	1,980	Uncertainty-related occurrences	Audit-text corpus
Presence of instability-related terminology	1,120	Volatility-related occurrences	Audit-text corpus
Presence of continuity-related terminology	760	Going-concern occurrences	Audit-text corpus

Note: Alternative-outcome coefficients are interpreted as directional outcome-sensitivity evidence because their precision statistics are not reported in the retained outputs. Textual values represent raw occurrences across the eligible audit-report corpus; they document narrative composition but are not used as standalone hypothesis tests. Hansen, AR(2), and Hausman results provide specification diagnostics rather than definitive proof of model validity.

5.8 From Coefficients to a Coherent Empirical Claim

The reported evidence is consistent with H1–H6: the five-component audit signal is associated with instability, becomes more informative under persistent shocks and domestic pressures, adds explanatory information beyond market indicators, and strengthens towards the upper tail of instability. These findings represent conditional and incremental associations rather than causal effects or predictions of corporate failure.

VI. Discussion and Theoretical Integration

6.1 What the Evidence Changes

Audit-derived signals remain positively associated with subsequent instability after accounting for persistence and potential endogeneity, become more informative under external and domestic pressures, add explanatory information beyond market indicators, and display their strongest coefficients among highly unstable firms (Stiglitz, 2002). The reported results relate exclusively to the aggregate five-component SAI, which combines audit-risk content with auditor-source credibility. Because the retained evidence does not determine the components separately, the aggregate coefficient cannot be attributed independently to risk content or Big Four affiliation. The findings remain consistent with research on expanded audit information under uncertainty (Maroun & Duboisée de Ricquebourg, 2024; DeFond & Zhang, 2014) and distress-relevant reporting (Habib et al., 2018; Reid et al., 2020). The positive lagged-instability coefficient places audit-derived information within a cumulative rather than isolated risk process (Acharya & Steffen, 2020; Cerutti et al., 2017; Spence, 1973).

6.2 Where the Results Confirm and Extend Prior Work

The findings reinforce prior evidence linking going-concern reporting, modified opinions, and audit delay with financial distress and reporting complexity (Habib et al., 2018; Krishnan & Wang, 2015; Krishnan & Wang, 2015). The aggregate SAI extends this evidence by combining four audit-risk-content attributes with an auditor-source credibility component within a single transparent measure. The retained results evaluate only this five-component index and do not determine the separate contribution of any individual component. Persistent shocks and domestic pressures provide the contextual conditions under which the association becomes stronger, extending macro-financial research on cumulative instability (Cerutti et al., 2017; Goodell, 2020). The reported increase in explanatory power after adding SAI to the market model indicates nonredundancy, subject to formal nested-model confirmation, and supports concerns that market-based signals may be incomplete under uncertainty (Pastor & Veronesi, 2012; Shiller, 2019). Auditing therefore retains its assurance identity while providing additional information for interpreting vulnerability beyond conventional compliance and audit-quality perspectives (DeFond & Zhang, 2014).

6.3 Four Theories Converge on One Mechanism

Signaling theory explains why professionally assessed audit signals may become more informative as uncertainty rises (Connelly et al., 2011; Spence, 1973). Information-asymmetry theory explains the incremental content of the aggregate SAI, which combines risk-related audit attributes with source credibility without estimating their separate contributions (Habib et al., 2018). Dynamic-risk and crisis-propagation perspectives interpret the persistence of instability and the amplification associated with overlapping external and domestic pressures (Cerutti et al., 2017; Goodell, 2020). Market-efficiency theory explains informational complementarity: market indicators capture investors' reactions, whereas the aggregate audit signal reflects professionally assessed reporting conditions that may remain incompletely incorporated into prices during prolonged uncertainty (Shiller, 2019; Pastor & Veronesi, 2012).

Table 6.1 Empirical Theoretical and Practical Reconciliation Matrix

Defensible interpretive and practical meaning	Theoretical lens	Reported result	Empirical evidence
Stronger aggregate audit signals are associated with greater subsequent instability	Signaling	SAI(t−1): β = 0.287	Baseline audit-instability association
Firm-level vulnerability displays substantial temporal persistence	Dynamic risk	INST(t−1): β = 0.521	Instability persistence
The aggregate audit association remains under dynamic and potential-endogeneity controls	Information asymmetry	SAI(t−1): β = 0.214	Dynamic audit-signal association
The audit-instability association strengthens during persistent shocks	Signals under uncertainty	SAI(t−1) × SHOCK(t) = 0.145	Persistent-shock amplification
Domestic structural pressure strengthens the relevance of the aggregate audit signal	Context dependence	SAI(t−1) × DPI(t) = 0.128	Domestic-pressure amplification

Defensible interpretive and practical meaning	Theoretical lens	Reported result	Empirical evidence
External and domestic pressures jointly amplify the conditional association	Crisis propagation	SAI(t−1) × SHOCK(t) × DPI(t) = 0.162	Joint-pressure amplification
Adding SAI increases explanatory power beyond the market-only specification	Market efficiency	R^2: 0.31 → 0.39	Incremental explanatory information
The largest audit-signal coefficient occurs among the most unstable firms	Nonlinear risk	Q90 SAI(t−1) = 0.341	Upper-tail heterogeneity

6.4 Markets Price the Reaction Auditing Contextualises the Condition

Market and audit information perform complementary roles. MKT captures timely investor responses to changing expectations, whereas the aggregate SAI summarises professionally derived signals concerning reporting risk, continuity, complexity, narrative uncertainty, and source credibility. This complementarity is particularly relevant in emerging markets, where institutional constraints and information frictions may slow price discovery (Allen et al., 2012). Market indicators show how investors respond to instability, while audit-derived signals provide additional context for interpreting the firm conditions associated with that response.

6.5 When the Audit Signal Becomes Loudest

The interaction identify an important boundary condition: the informational relevance of the aggregate SAI varies with its economic context. Its association with subsequent instability becomes stronger during persistent shocks and elevated domestic pressures, while the positive triple interaction indicates additional amplification when both conditions coincide. This state dependence is consistent with signaling theory because professionally derived information may become more useful as uncertainty rises (Connelly et al., 2011). Quantile determines reinforce this interpretation: SAI(t−1) reaches its largest reported coefficient, 0.341, at Q90, where firm vulnerability is greatest and potentially hardest to interpret (Camacho-Miñano et al., 2024).

6.6 From Firm Signals to Supervisory Intelligence

Investors may interpret aggregate audit outputs alongside market indicators during persistent stress because prices provide immediacy, whereas audit-derived information offers additional firm-specific context (Pastor & Veronesi, 2012). For Egyptian regulators and financial-stability authorities, changes in the aggregate SAI could provide a supplementary input to surveillance where macroeconomic shocks, structural fragility, and information constraints interact (IMF, 2023; Allen et al., 2012). Such use should remain exploratory and should not trigger regulatory action mechanically or replace established financial-stability measures. It connects firm-level audit evidence with system-level monitoring (Cerutti et al., 2017) without converting audit reports into forecasting devices or macroprudential instruments.

6.7 An Architecture for Deciphering Instability

The Audit-Based Instability Decoding Framework links three analytical layers: market indicators capture observable investor reactions; the aggregate SAI provides professionally derived firm-level context; and macroeconomic conditions shape the relevance and interpretation of both information channels. The retained evidence concerns the combined SAI rather than its individual components. Its incremental relevance increases when shocks persist, domestic pressures intensify, and firms approach the upper tail of the instability distribution.

6.8 The Boundary of the Contribution

Three propositions follow. Audit-derived signals complement rather than replace market indicators. Their informational relevance varies with persistent shocks, domestic pressures, and the level of firm instability. The aggregate SAI organises dispersed audit-report attributes into interpretable evidence without isolating the contribution of its individual components. These propositions preserve auditing's assurance identity and do not claim independent forecasting or causal prediction. The contribution therefore lies in forward-relevant interpretation: markets capture observable reactions, SAI provides professionally grounded firm-level context, and economic conditions shape the relevance of both channels. This boundary aligns the theoretical argument with the reported SAI coefficients and the assurance purpose of auditing in Egypt.

VII. Conclusion and Future Research

7.1 What the Evidence Ultimately Reveals

This study examined whether audit-derived signals provide information about firm-level instability beyond market indicators. Evidence from the unbalanced panel of Egyptian listed companies indicates that the aggregate SAI remains positively associated with subsequent instability under dynamic and potential-endogeneity controls, becomes more informative during persistent shocks and domestic pressures, adds explanatory information beyond MKT, and records its largest coefficient at the upper instability quantile. The results concern the five-component SAI and do not isolate its individual components. Markets capture investor reactions, whereas audit outputs provide complementary context concerning firm vulnerability when uncertainty

may weaken the completeness of price signals (Goodell, 2020; Pastor & Veronesi, 2012). This complementarity is particularly relevant in Egypt, where macroeconomic fragility complicates risk interpretation (Allen et al., 2012; Gutierrez et al., 2018).

7.2 Where Auditing Enters the Instability Debate

The contribution positions auditing within the analysis of dynamic instability without redefining its assurance purpose. Observable audit outputs possess stability-relevant interpretive value when their attributes are combined within the aggregate SAI; however, This perspective connects auditing with financial-reporting systems, institutional information environments, and risk interpretation (DeFond & Zhang, 2014; Healy & Palepu, 2001). It extends expanded-reporting research by presenting evidence of nonredundant and state-dependent information whose relevance increases during persistent shocks, elevated domestic pressure, and upper-tail firm instability (Camacho-Miñano et al., 2024; Maroun & Duboisée de Ricquebourg, 2024).

7.3 From Audit Reports to Stability Intelligence

Investors may assess aggregate audit signals alongside market indicators during prolonged stress rather than treating audit reports solely as compliance outputs. For Egyptian regulators, carefully aggregated changes in SAI could provide a supplementary link between firm-level vulnerability and macro-financial conditions (Cerutti et al., 2017), particularly when global and domestic pressures interact (World Bank, 2022). Such use should remain interpretive and non-mechanical. It neither transforms auditing into a macroprudential or predictive function nor substitutes SAI for established supervisory measures. Clearer and more firm-specific risk narratives may nevertheless enhance its secondary analytical value.

7.4 Boundaries of the Evidence

Three limitations bound the conclusions. First, firm-level instability is latent, and each observable proxy captures only part of the underlying condition. Second, the aggregate SAI does not identify the separate contribution of its individual components, while textual measures remain sensitive to reporting style, professional judgement, document length, and coding choices. Third, the unbalanced panel of Egyptian listed non-financial companies strengthens contextual relevance but limits generalisation to private firms, financial institutions, continuously listed populations, and different regulatory regimes. Accordingly, the findings support conditional interpretation and supplementary monitoring rather than causal inference or deterministic prediction.

7.5 The Next Research Frontier

Future research should compare sectors, ownership structures, and emerging and advanced markets to determine when institutional conditions alter the informational relevance of audit-derived signals. Studies with access to complete underlying data could decompose the aggregate SAI into its risk-content and source-credibility components, their separate and interactive associations, and compare equal weighting with principal-component or alternative weighting procedures. Advanced textual analytics and artificial intelligence could distinguish generic audit wording from firm-specific risk narratives and examine their stability across auditors, companies, and years. Extending the framework to private firms, financial institutions, and alternative regulatory regimes would strengthen external-validity assessment. Future studies should also investigate whether particular audit attributes precede market recognition and whether aggregated signals improve genuinely out-of-sample surveillance. Preregistered coding protocols and validation of automated classifications against independent human judgements would improve reproducibility. Cross-country and longer-period panels could separate firm, auditor, exchange, and regulatory influences while distinguishing persistent shocks from temporary disruption. Further research should evaluate whether supervisory applications improve risk interpretation without encouraging mechanical reliance on audit language, thereby preserving professional judgement, proportionality, confidentiality, and the boundary between assurance evidence and prediction. Auditing remains fundamentally an assurance function, but its outputs may also provide a professionally grounded layer for interpreting persistent instability beyond market signals alone.

Declarations

Ethics statement

The study uses publicly available company reports, market records, and official macroeconomic data and does not involve human participants, personal data, or experimental intervention. Institutional ethics approval and informed consent were therefore not applicable.

Conflict of interest

The author declares no conflict of interest.

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