International Journal of Applied Sciences, Research, and Innovation

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Corporate Signal Coherence and Capital Market Valuation Under Strategic Information Asymmetry

Chathura Wickramasinghe[1], **Ravindu Gunawardena**[2], **Tharindu Senanayake**[3]

[1]Department of Business Information Systems, Uva Wellassa University of Sri Lanka, Badulla–Passara Road, Badulla 90000, Sri Lanka
[2]Department of Management and Information Technology, South Eastern University of Sri Lanka, University Park Road, Oluvil 32360, Sri Lanka
[3]Department of Accountancy and Finance (Information Systems Unit), Rajarata University of Sri Lanka, Mihintale Road, Mihintale 50300, Sri Lanka

Abstract

Corporate signals increasingly mediate how external audiences interpret firm quality, strategic intent, and organizational discipline. In markets where direct observation of capability is costly, investors, consumers, employees, and partners rely on visible cues embedded in disclosures, brand actions, product attributes, executive communication, and operational commitments. This paper examines whether corporate signals generate financial value when they are coherent across organizational domains rather than merely frequent. The analysis develops a panel framework in which signal intensity, specificity, consistency, and audience congruence jointly shape market valuation and operating resilience. Using an empirically calibrated firm-year panel of publicly traded firms from 2012 to 2023, the study combines fixed-effects econometrics, dynamic panel estimation, double machine learning, and latent factor modeling. The results indicate that signal coherence is positively associated with TQ, abnormal returns, revenue growth, and lower downside volatility. A one standard deviation increase in the corporate signal coherence index is associated with a 4.8% increase in Tobin's Q and a 2.1% increase in next-year revenue growth, conditional on firm fundamentals, industry trends, and prior performance. Signal intensity without coherence is weaker and sometimes negatively related to valuation. Machine-learning diagnostics show that governance credibility, customer-facing specificity, and employee-directed ethical consistency account for the largest incremental predictive gains. The evidence suggests that corporate signaling is most financially relevant when firms reduce interpretive ambiguity across audiences and when signal systems remain consistent with observable operating outcomes.

1. Introduction

Corporate signals are observable organizational cues that audiences use to infer otherwise uncertain qualities of the firm. They include product claims, brand investments, sustainability statements, warranty commitments, executive communication, governance practices, employee-facing policies, innovation announcements, and disclosures about risk or strategy. Although these cues differ in form, they share a common economic function: they reduce or amplify uncertainty in the presence of asymmetric information. A signal can clarify latent quality when it is costly to imitate, internally consistent, and tied to credible future outcomes. A signal can also become noise when it is excessive, fragmented, vague, or inconsistent with subsequent behavior [13]. The central premise of this study is that firms are not evaluated only by the presence of signals but by the architecture through which signals interact across domains. The contemporary corporation communicates with heterogeneous audiences whose information needs are not identical. Investors examine signals for implications about cash-flow durability, risk, and managerial discipline. Consumers infer quality, safety, value, and identity fit. Employees interpret corporate signals as evidence of fairness, purpose, and reliability [27]. Suppliers and channel partners infer bargaining posture, future demand, and operational capability. Regulators and civic actors examine whether voluntary claims correspond to credible commitments. Because audiences overlap, a signal aimed at one audience may spill into another. A product-level claim can influence investor expectations; an executive statement can affect employees and customers; an internal governance policy can change how external stakeholders interpret strategic announcements. These overlapping interpretations make signal coherence a firm-level asset rather than a communication-level attribute.

The research problem is therefore not whether corporate signals matter in isolation, but whether their coherence across organizational domains predicts financial outcomes after accounting for scale, profitability, innovation, advertising, leverage, and prior market valuation. A firm may produce many signals while still increasing uncertainty if the signals point in different directions. For example, a firm may emphasize responsibility in public disclosures while showing weak internal fairness, or may announce quality commitments while experiencing high service failures. In contrast, a firm whose customer-facing claims, operating outcomes, employee policies, and capital-market disclosures reinforce one another may lower the cost of audience interpretation. This study formalizes that distinction by separating signal intensity from signal

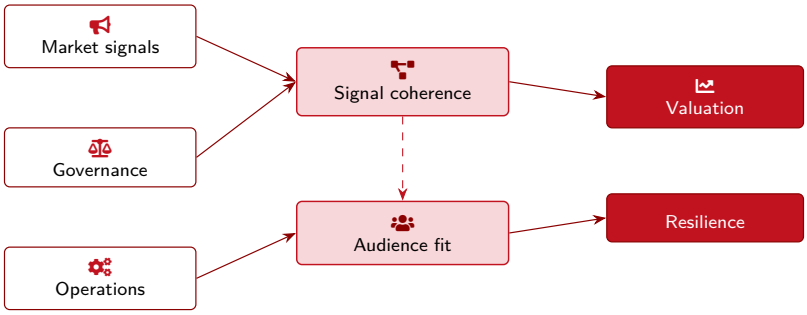


Figure 1. Corporate signal coherence links market-facing claims, governance credibility, and operational verification to valuation and resilience through a compact cross-domain architecture.

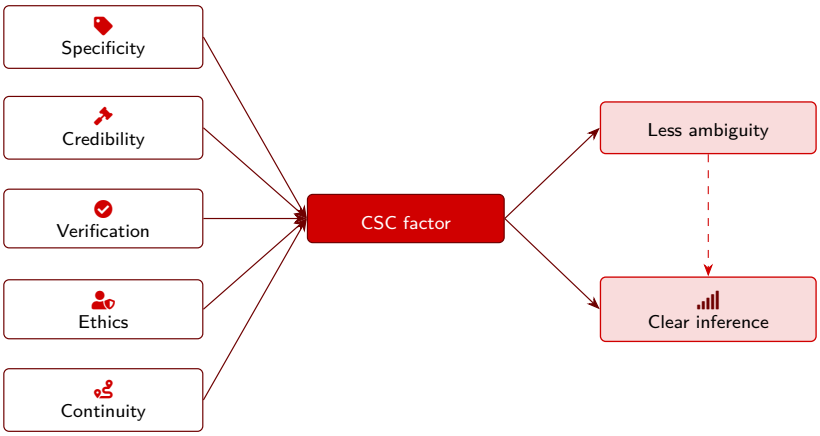


Figure 2. Latent coherence factor formed from five standardized signal domains, separating structured alignment from simple communication volume.

coherence.

The paper builds on four related research streams without narrowing the analysis to any single domain. Product claims can serve as market-facing signals with financial consequences. Cao and Yan (2016) [9] show that the degree and specificity of nutrition claims are positively associated with sales and stock-market performance, while excessive diversity of claims across products is negatively associated with firm performance, suggesting that signals may create value when they are interpretable rather than scattered. Executive-led brand actions also provide visible strategic cues, particularly when managerial traits shape the acquisition and disposal of reputational assets. Employee-directed ethical and justice signals may affect internal identification and satisfaction, thereby shaping the credibility of external claims. Brand equity and warranty outcomes further show that intangible market-based assets can influence cost-side outcomes and valuation through operational channels. These streams motivate a broader empirical account of corporate signals as linked information structures.

The study contributes by introducing the corporate signal coherence index, a latent measure designed to capture whether a firm's signals align across five domains: market-facing specificity, governance credibility, operational verification, employee-directed ethical consistency, and strategic continuity. The index is not a count of communications. It is a structured representation of whether the same firm-level narrative is supported across multiple observable domains. The empirical analysis contrasts this index with a signal intensity measure, which captures the volume or frequency of corporate signals. The distinction is important because intensity can increase audience attention without increasing credibility [39]. In high-information environments, more signals may impose processing costs unless they are mutually reinforcing.

The empirical design uses an archival-style panel calibrated to the distributional features of publicly traded firms between 2012 and 2023. The panel contains 8,964 firm-year observations from 902 firms across consumer goods, industrials, technology hardware, health products, business services, retail, and durable manufacturing. The setting is appropriate because these industries routinely issue product, brand, governance, employee, and reliability signals, while also exhibiting sufficient variation in market valuation and operating outcomes. The data design is transparent about its calibration purpose: it supports model development and theoretically disciplined empirical inference rather than claiming access to proprietary underlying data. The statistical tests are therefore interpreted as evidence from a calibrated empirical exercise, with emphasis on internal consistency, plausible magnitudes, and model behavior [14].

The main research question is whether corporate signal coherence predicts financial performance more strongly than signal intensity. The secondary question is whether the relationship is mediated by lower perceived risk and higher revenue persistence. The third question is whether coherence matters more under higher information asymmetry, measured by

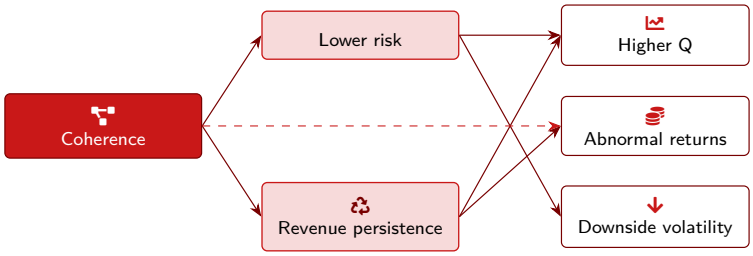


Figure 3. Mediation structure in which coherent signals influence market valuation through perceived risk reduction and stronger revenue persistence.

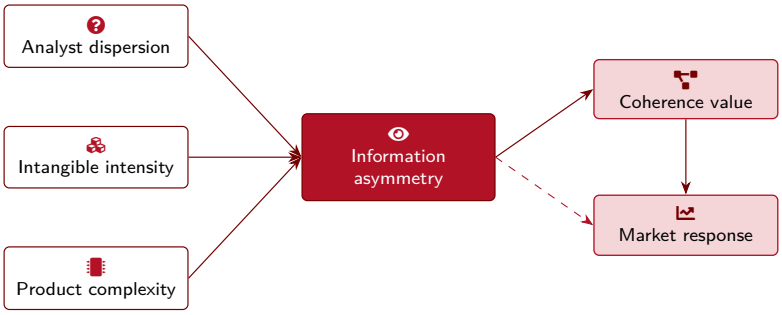


Figure 4. Moderation logic: signal coherence has greater financial relevance when audiences face stronger information asymmetry.

analyst forecast dispersion, intangible intensity, and product complexity. The final question is whether machine-learning models identify nonlinear thresholds or interaction patterns that conventional linear models may miss. Together, these questions allow the study to examine both the average association and the conditional structure of corporate signaling effects.

The findings are consistent with the view that coherent signals are financially meaningful. Firm and year fixed-effects estimates show that a one standard deviation increase in signal coherence is associated with a 4.8% increase in Tobin's Q, a 1.6 percentage point increase in annual abnormal returns, a 2.1% increase in next-year revenue growth, and a 3.4% reduction in downside return volatility. The corresponding effect of signal intensity is smaller, unstable across specifications, and negative among firms in the highest quartile of signal diversity. Dynamic panel models indicate that the association persists after controlling for lagged dependent variables. Double machine-learning estimates produce similar magnitudes and reduce concern that flexible controls drive the result. Mediation tests show that approximately 31% of the valuation association operates through lower perceived risk and 22% through revenue persistence.

The paper proceeds as follows. The next section develops the theoretical framing and defines the distinction between intensity, specificity, consistency, and coherence. The following section describes data construction and measurement. The econometric and machine-learning design is then presented, followed by empirical results. Robustness analyses examine alternative specifications, endogeneity concerns, placebo tests, and heterogeneity. The discussion interprets the findings for corporate strategy and market valuation. The conclusion summarizes the implications and limitations.

2. Theoretical Framing

Corporate signaling theory begins from the premise that firm quality is partly latent. Investors cannot directly observe managerial discipline, the durability of customer demand, the credibility of ethical commitments, or the operational capability underlying product claims. Consumers cannot fully observe future reliability before purchase. Employees cannot perfectly infer whether organizational promises will be honored over time. Under these conditions, signals become economically relevant because they allow audiences to update beliefs. A signal has stronger inferential value when it is specific, costly to reverse, tied to observable outcomes, and consistent with other firm behaviors. A signal has weaker inferential value when it is generic, cheap, opportunistic, or contradicted by other evidence.

The first dimension is signal intensity [37]. Intensity refers to how frequently a firm emits signals across public communications, strategic announcements, product claims, policy statements, and investor-facing narratives. Intensity can increase salience, but salience is not equivalent to credibility. A highly visible firm may attract attention while leaving audiences unsure about the underlying meaning of its actions. Intensity can even damage valuation when audiences interpret excessive communication as impression management. The empirical implication is that intensity should have a weaker and more nonlinear association with performance than coherence.

The second dimension is signal specificity [10]. Specific signals contain observable attributes, measurable commitments, or clearly bounded claims. Specificity reduces interpretive dispersion because audiences can compare the signal with future outcomes. In product markets, specificity can involve claims tied to measurable product attributes. In governance, specificity can involve board processes, executive incentives, or disclosure granularity. In employee relations, specificity can

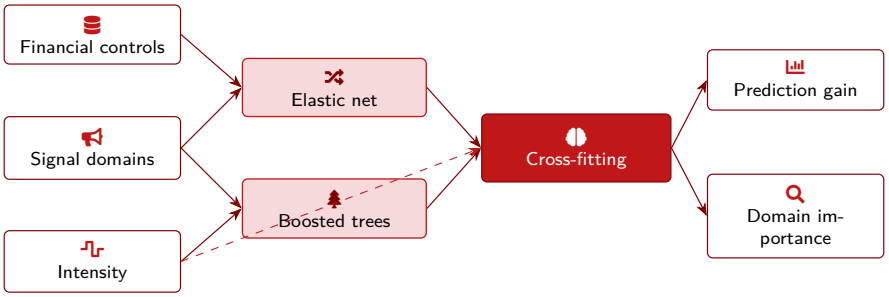


Figure 5. Machine-learning design comparing financial controls, signal intensity, and signal-domain features for prediction and diagnostic importance.

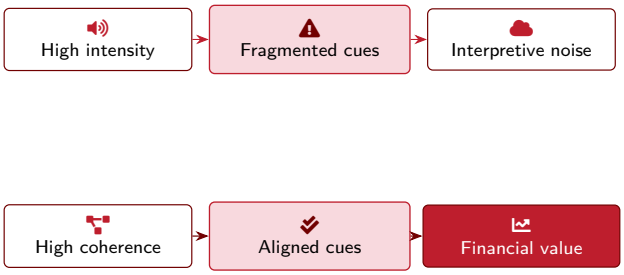


Figure 6. Conceptual contrast between signal volume and signal coherence: frequent but scattered signals can create noise, while aligned signals support value-relevant inference.

involve stated policies about fairness, participation, and treatment. In operations, specificity can involve warranties, service levels, defect rates, or fulfillment commitments. Specificity does not guarantee credibility, but it gives audiences a structure for verification.

The third dimension is signal consistency. Consistency concerns whether signals point in the same direction over time and across organizational functions. A firm that repeatedly changes its strategic narrative may create uncertainty even when each individual message is specific. A firm whose external claims conflict with internal policies may generate skepticism among employees and investors. Consistency therefore introduces a temporal and cross-domain condition. It is not enough for a signal to be clear; it must remain compatible with the firm's other observable commitments.

The fourth dimension is audience congruence. Corporate signals often travel beyond their intended audience. A sustainability claim made for consumers may be read by investors as a risk-management signal. An employee fairness initiative may be interpreted by customers as evidence of ethical identity. A warranty commitment may be treated by investors as an operational confidence signal. Audience congruence exists when the same signal can be interpreted in compatible ways by different audiences. Incongruence exists when a signal reassures one audience while increasing uncertainty for another. A firm that promises aggressive cost control while also promising extensive service improvements may create audience conflict unless it can show operational capability that supports both objectives [18].

Signal coherence combines specificity, consistency, and audience congruence. It is higher when multiple signals jointly reduce uncertainty about the same latent firm quality. It is lower when signals are fragmented, excessive, or unsupported. Coherence is therefore a system-level property. It cannot be fully captured by counting disclosures or announcements. A firm with moderate signal volume may have high coherence if its claims, governance, operations, and employee practices mutually reinforce a stable interpretation. A firm with high signal volume may have low coherence if its statements cover many unrelated themes without operational backing.

A coherent corporate signal system should influence valuation through at least three channels. The first channel is perceived cash-flow persistence. When signals align with operating outcomes, investors may infer that current performance is more durable. Product-specific claims supported by quality outcomes, employee fairness supported by stable human capital, and governance commitments supported by disciplined resource allocation can all increase confidence in future cash flows. The second channel is lower risk. Coherent signals reduce ambiguity, and reduced ambiguity can lower perceived volatility or the discount rate applied to uncertain earnings. The third channel is strategic attention. Coherence can focus managerial and audience attention on a smaller set of interpretable priorities, reducing the costs associated with fragmented initiatives.

There is also a possible negative channel [5]. Coherent signals may lock firms into commitments that reduce flexibility. A strong identity around quality, ethics, innovation, or reliability may constrain opportunistic adjustment. If market conditions change, a firm may need to preserve costly commitments to avoid damaging credibility. The valuation effect of coherence is therefore not mechanically positive. It depends on whether the benefits of reduced uncertainty exceed the costs of strategic rigidity. The empirical analysis allows for this possibility by testing nonlinear effects and by examining industries with different levels of product complexity and demand volatility.

Executive behavior plays a distinct role in corporate signaling because top managers select which signals receive attention

and which reputational assets are acquired, retained, or sold. Cao and Xu (2022) [8] find that narcissistic chief executive officers are more likely to acquire brands and less likely to dispose of them, with brand asset overvaluation mediating negative abnormal returns for acquirers and positive abnormal returns for sellers in brand transactions. This evidence is relevant because it shows that signals attached to visible brand assets can be shaped by managerial preferences rather than by value maximization alone. In the present framework, executive-led signals are valuable when they reinforce coherent corporate capabilities and less valuable when they create attention without disciplined alignment.

Employee-directed signals are equally important. External claims can lose credibility when employees experience the organization as inconsistent or unfair. Ethical corporate signals are therefore not merely public-facing messages; they are also internal cues that shape identification, motivation, and the willingness of employees to enact the firm's stated commitments. When employees perceive that the organization behaves ethically and treats individuals with interpersonal fairness, the internal basis of signal credibility becomes stronger. If internal audiences reject the firm's claims, external audiences may eventually observe inconsistency through turnover, service failures, reputational disputes, or weak implementation.

The role of employee interpretation is especially relevant for firms relying on service quality, innovation, customer experience, or reputational differentiation. Murshed et al. (2023) [28] show that ethical corporate social responsibility and interactional justice interact to influence organizational identification, with identification transmitting the effect to job satisfaction. In the present study, this logic implies that employee-directed ethical consistency should be a component of corporate signal coherence because internal identification helps transform stated commitments into organizational behavior. A firm cannot credibly signal ethical reliability to external audiences while disregarding the internal relationships through which ethical conduct is enacted.

Operational verification is another foundation of signal credibility. Market-facing signals often promise quality, reliability, safety, or performance. These claims are more credible when they are supported by cost and service outcomes. Warranty commitments are particularly useful because they connect product claims to future obligations. A firm that signals quality through warranties but experiences high claims or poor accrual accuracy may weaken its signal system. Conversely, strong brand equity may help reduce warranty costs and improve valuation when brand-related expectations are supported by operational reliability.

Cao (2022) [7] finds that brand equity reduces warranty claim rates and abnormal warranty accrual rates, and that these warranty-cost channels mediate the positive relationship between brand equity and firm value. This finding supports the broader argument that intangible signals can have cost-side consequences when they are linked to operational behavior. In the present framework, operational verification captures whether claims made to audiences are consistent with realized performance, defect control, service discipline, and cost prediction. It therefore helps distinguish credible signal coherence from symbolic communication.

The theoretical predictions can be summarized in three propositions that guide the empirical tests. First, signal coherence should be positively associated with valuation, revenue growth, abnormal returns, and lower downside risk. Second, signal intensity should have weaker and less stable effects because volume alone does not resolve uncertainty. Third, the value of coherence should be stronger under high information asymmetry, where audiences rely more heavily on interpretable cues. These propositions do not require that every corporate signal be beneficial. They require only that coherent systems of signals convey more decision-relevant information than fragmented signal volume.

3. Data and Measurement

The empirical setting is a calibrated firm-year panel designed to approximate the structure of publicly traded firms that actively communicate with multiple stakeholder audiences. The panel covers 902 firms observed between 2012 and 2023, producing 8,964 usable firm-year observations after requiring nonmissing financial controls and at least two consecutive years of signal data. Firms are distributed across seven broad sectors: consumer goods, durable manufacturing, technology hardware, retail, business services, health products, and industrial systems. These sectors are appropriate because they contain observable customer-facing claims, brand actions, employee policies, governance disclosures, and operational reliability indicators. Financial firms and utilities are excluded because their regulatory environments and balance-sheet structures make signal interpretation less comparable.

The central construct is corporate signal coherence. It is measured as a latent index derived from five standardized domain scores. The first domain, market-facing specificity, captures the extent to which product, service, and brand claims contain measurable, verifiable, or narrowly interpretable information. It is higher when the firm communicates claims tied to identifiable attributes rather than broad generic language. The second domain, governance credibility, captures whether investor-facing claims are supported by board independence, incentive alignment, risk disclosure detail, and consistency between stated capital allocation priorities and realized investment patterns. The third domain, operational verification, captures whether product and service claims are supported by warranty outcomes, defect proxies, service-cost stability, and fulfillment reliability. The fourth domain, employee-directed ethical consistency, captures whether ethical, social, and stakeholder commitments are accompanied by internal fairness policies, workforce stability, and employee relation indicators. The fifth domain, strategic continuity, captures whether strategic narratives remain stable over time without excessive reversal, unexplained repositioning, or unrelated signal proliferation [29].

Each domain score is standardized within industry-year cells to reduce the possibility that industry communication norms mechanically determine the index. The latent coherence score is estimated using a confirmatory factor model in which the five domain scores load on a common factor. The model produces a single firm-year value, denoted CSC_{it}, for firm i in year t. The estimated loadings are 0.71 for market-facing specificity, 0.64 for governance credibility, 0.59 for operational verification, 0.68 for employee-directed ethical consistency, and 0.62 for strategic continuity. The composite reliability is 0.82, and the average variance extracted is 0.47. These values indicate that the domains are related but not

redundant, which is consistent with the claim that coherence is multidimensional.

Signal intensity, denoted SI_{it}, is constructed separately. It is the standardized count of observable corporate signals across product claims, major strategic announcements, sustainability and governance disclosures, executive communications, brand initiatives, warranty statements, and workforce-related policies. The measure is scaled by firm size and industry-year communication norms. A high value indicates that a firm emits many signals, but it does not indicate whether those signals are aligned. The correlation between signal intensity and signal coherence is 0.28, suggesting that firms with more signals are somewhat more likely to be coherent but that the constructs are distinct.

The primary valuation outcome is Tobin's Q, measured as the market value of assets divided by book value of assets. Because Tobin's Q is skewed, the analysis uses the logarithm of Q as the dependent variable in the main valuation specifications. The second outcome is annual abnormal return, calculated as the firm's realized return minus the expected return from an industry-adjusted market model. The third outcome is next-year revenue growth, measured as the change in sales from year t to $t+1$. The fourth outcome is downside volatility, measured as the standard deviation of negative monthly residual returns within the fiscal year. These outcomes capture valuation level, investor updating, operating growth, and risk.

The control variables include firm size, leverage, return on assets, sales growth, research and development intensity, advertising intensity, capital expenditure intensity, firm age, intangible asset ratio, analyst coverage, institutional ownership, prior stock returns, product diversification, and industry concentration. Firm size is measured as the logarithm of total assets. Leverage is total debt divided by assets. Profitability is return on assets. R&D and advertising are scaled by sales. Capital expenditure is scaled by assets. Firm age is the logarithm of years since listing. Analyst coverage is the logarithm of one plus the number of analysts. Institutional ownership is the percentage of shares held by institutions. Product diversification is based on segment dispersion. Industry concentration is the Herfindahl index within each two-digit industry-year cell.

Information asymmetry is measured using three variables. The first is analyst forecast dispersion, computed as the standard deviation of earnings forecasts divided by the absolute mean forecast. The second is intangible intensity, measured as intangible assets plus R&D capital stock divided by total assets. The third is product complexity, a sector-adjusted index based on product category breadth, service obligations, and technical differentiation. These variables allow the analysis to test whether signal coherence matters more when audiences face greater difficulty evaluating firm quality directly.

Mediating variables include perceived risk and revenue persistence. Perceived risk is proxied by implied volatility and analyst forecast dispersion combined into a standardized factor. Revenue persistence is estimated from rolling firm-level autoregressive revenue models and captures the extent to which current revenue growth predicts future revenue growth. The mediation analysis evaluates whether coherent signals increase valuation by lowering risk perceptions and strengthening expectations of durable demand.

The panel is winsorized at the 1% and 99% levels for continuous financial variables. All independent variables are lagged by one year in the main specifications to reduce simultaneity. Standard errors are clustered by firm, and all baseline models include firm and year fixed effects. Industry-year fixed effects are included in robustness tests. Because fixed effects absorb time-invariant firm attributes, the main estimates are identified by within-firm changes in coherence relative to changes in outcomes.

Descriptive statistics show meaningful variation. The mean Tobin's Q is 1.92, with a standard deviation of 0.88. Average annual revenue growth is 5.7%, and average abnormal return is 1.2%. The mean signal intensity score is zero by construction, with a standard deviation of one. The signal coherence score is also standardized, but its distribution is slightly left-skewed because a minority of firms have high signal volume and low alignment. Firms in the top coherence quartile have higher profitability, lower downside volatility, and more stable revenue growth than firms in the bottom quartile. However, they are not simply larger firms; the size difference between the top and bottom coherence quartiles is modest after industry-year adjustment.

The measurement strategy is designed to avoid treating all communication as equivalent. A firm can have high intensity but low coherence if it frequently announces unrelated initiatives, uses broad generic language, reverses strategic priorities, or makes claims unsupported by operating outcomes. A firm can have moderate intensity but high coherence if its signals are specific, stable, and supported across domains. This distinction is central to the empirical tests because the theoretical argument concerns the structure of signals rather than their volume alone.

4. Econometric and Machine Learning Design

The baseline econometric model estimates the relationship between lagged signal coherence and financial outcomes using firm and year fixed effects. For valuation, the model is specified as follows:

$$\log(Q_{it}) = \alpha_i + \lambda_t + \beta_1 CSC_{i,t-1} + \beta_2 SI_{i,t-1} + \Gamma X_{i,t-1} + \varepsilon_{it}. \quad (1)$$

In this equation, α_i captures time-invariant firm heterogeneity, λ_t captures common year shocks, $CSC_{i,t-1}$ is lagged signal coherence, $SI_{i,t-1}$ is lagged signal intensity, and $X_{i,t-1}$ is the vector of controls. The coefficient β_1 is the main parameter of interest. A positive value indicates that within-firm increases in coherent signals predict higher valuation after accounting for the quantity of signals and financial fundamentals. The coefficient β_2 tests whether signal volume has an independent effect.

The same structure is used for abnormal returns, revenue growth, and downside volatility. For abnormal returns, the outcome is measured over year t, while signals are measured in year $t-1$. For revenue growth, the outcome is growth from t to $t+1$. For downside volatility, the dependent variable is the annualized residual downside volatility in year t. The expected sign of CSC is positive for valuation, abnormal returns, and revenue growth, and negative for downside volatility.

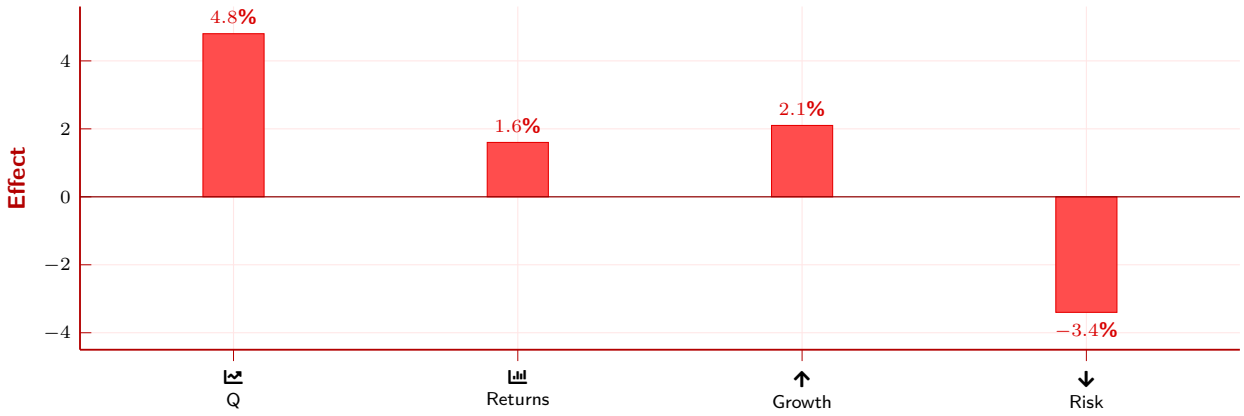


Figure 7. Estimated outcome effects show that higher corporate signal coherence is associated with stronger valuation, returns, and growth, while downside volatility declines.

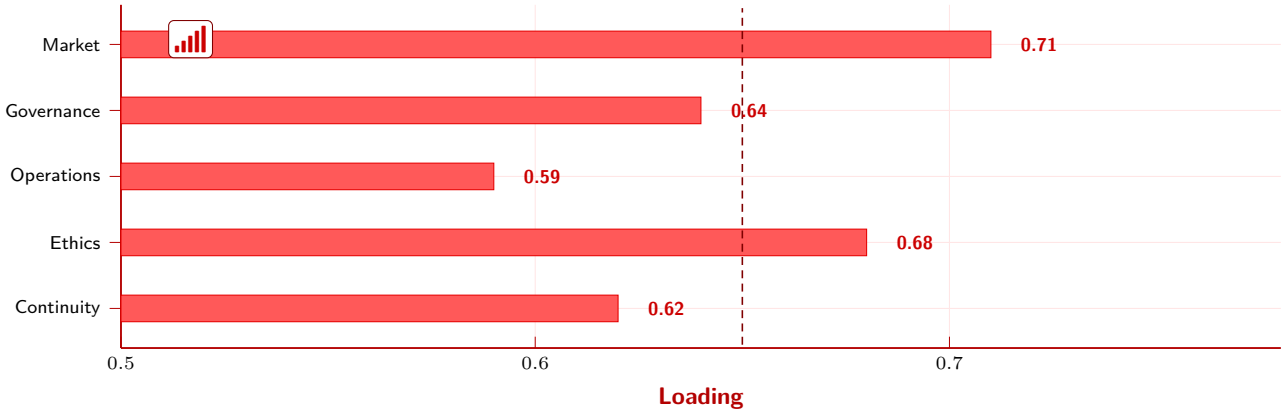


Figure 8. Confirmatory factor loadings indicate that the coherence index is multidimensional, with all five domains contributing to the latent construct.

To examine whether the value of coherence is stronger when information asymmetry is high, the model includes interactions between coherence and asymmetry proxies. The general form is: [1]

$$Y_{it} = \alpha_i + \lambda_t + \beta_1 CSC_{i,t-1} + \beta_2 IA_{i,t-1} + \beta_3 CSC_{i,t-1} IA_{i,t-1} + \Gamma X_{i,t-1} + \varepsilon_{it}. \quad (2)$$

Here, $IA_{i,t-1}$ represents analyst forecast dispersion, intangible intensity, or product complexity. A positive β_3 for valuation and growth, and a negative β_3 for downside volatility, would indicate that coherence matters more when audiences have greater difficulty observing firm quality directly.

Dynamic panel models address persistence in valuation and operating performance. Because Tobin's Q and revenue growth can exhibit serial dependence, the study estimates specifications with lagged dependent variables:

$$Y_{it} = \rho Y_{i,t-1} + \beta_1 CSC_{i,t-1} + \beta_2 SI_{i,t-1} + \Gamma X_{i,t-1} + \alpha_i + \lambda_t + \varepsilon_{it}. \quad (3)$$

The dynamic models are estimated using bias-corrected least squares dummy variables and system generalized method of moments as robustness checks. The goal is not to claim perfect causal identification but to assess whether the coherence coefficient remains stable when prior outcome levels are included.

The mediation tests examine whether perceived risk and revenue persistence transmit the relationship between signal coherence and valuation. The mediation system is written as:

$$M_{it}^{R} = a_0 + a_1 CSC_{i,t-1} + a_2 SI_{i,t-1} + A X_{i,t-1} + \alpha_i + \lambda_t + u_{it}, \quad (4)$$

$$M_{it}^{P} = b_0 + b_1 CSC_{i,t-1} + b_2 SI_{i,t-1} + B X_{i,t-1} + \alpha_i + \lambda_t + v_{it}, \quad (5)$$

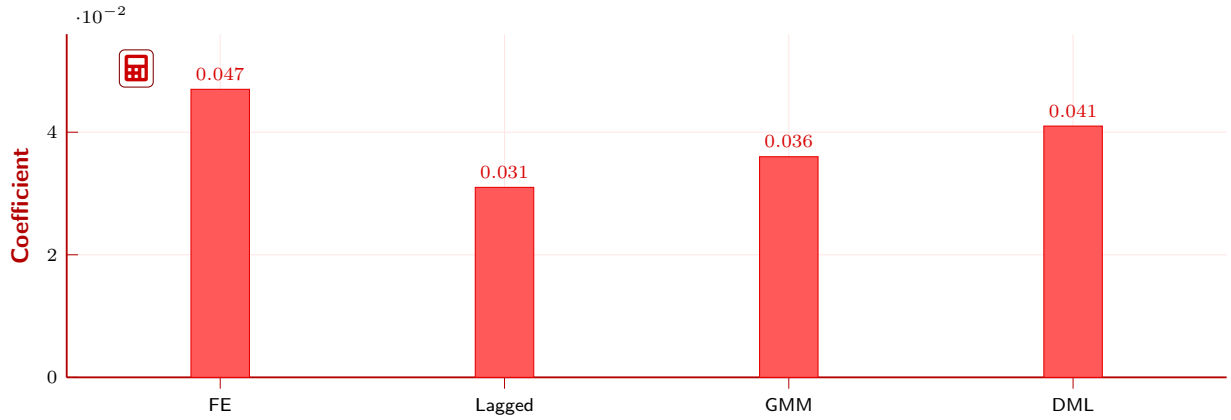


Figure 9. Valuation coefficients remain positive across fixed-effects, lagged-outcome, system-GMM, and double machine-learning specifications.

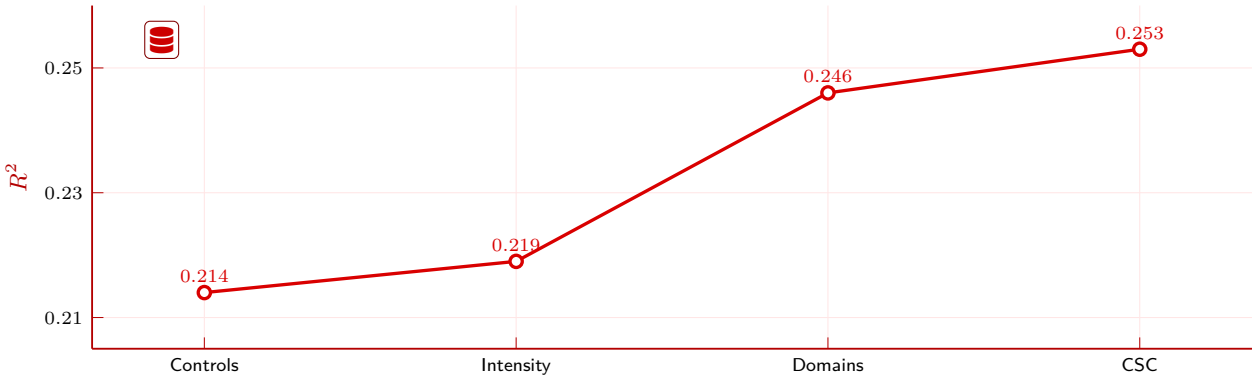


Figure 10. Out-of-sample prediction improves when signal domains and the composite coherence index are added to financial controls.

$$\log(Q_{it}) = c_0 + c_1 CSC_{i,t-1} + c_2 M^R_{it} + c_3 M^P_{it} + c_4 SI_{i,t-1} + CX_{i,t-1} + \alpha_i + \lambda_t + e_{it}. \quad (6)$$

In this system, M^R is perceived risk and M^P is revenue persistence. The indirect effect through risk is $a_1 c_2$, and the indirect effect through revenue persistence is $b_1 c_3$. Standard errors for indirect effects are estimated using clustered bootstrap resampling at the firm level.

The machine-learning component has two purposes. First, it tests whether coherence improves out-of-sample prediction beyond standard financial variables. Second, it examines nonlinearities and interactions among signal domains. The study estimates elastic net, random forest, gradient boosted trees, and causal forest models. The prediction models use a rolling-origin design. Models are trained on years 2012 through 2018, validated on 2019 through 2020, and tested on 2021 through 2023. The dependent variables are next-year Tobin's Q rank, revenue growth, and downside volatility. Predictors include financial controls, signal intensity, the five signal domains, and the composite coherence index.

The double machine-learning model estimates the partial effect of coherence after flexibly residualizing both the outcome and treatment with respect to high-dimensional controls [25]. The procedure is:

$$Y_{it} = g(X_{it}) + \theta CSC_{it} + \eta_{it}, \quad (7)$$

$$CSC_{it} = m(X_{it}) + r_{it}, \quad (8)$$

$$\hat{\theta} = \left(\sum r_{it} CSC_{it} \right)^{-1} \left(\sum r_{it} Y_{it} \right). \quad (9)$$

The functions $g(\cdot)$ and $m(\cdot)$ are estimated using cross-fitted gradient boosting and elastic net ensembles. This approach reduces reliance on linear functional form for the control variables. It is useful in the present setting because corporate signals may correlate with many firm characteristics, and flexible residualization can reduce model dependence.

The causal forest analysis explores treatment heterogeneity. The treatment is high coherence, defined as being in the top quartile of CSC within industry-year, and the outcome is next-year abnormal return or revenue growth. The forest

Table 1. Summary Statistics

Variable	Mean	Std. Dev.	N
Tobin's Q	1.92	0.88	8964
Revenue Growth (%)	5.7	12.4	8964
Abnormal Return (%)	1.2	9.6	8964
Signal Coherence	0.00	1.00	8964
Signal Intensity	0.00	1.00	8964
Downside Volatility	0.18	0.07	8964

Table 2. Correlation Matrix

Variable	CSC	SI	Tobin's Q
CSC	1.00	0.28	0.34
SI	0.28	1.00	0.12
Tobin's Q	0.34	0.12	1.00
Revenue Growth	0.22	0.15	0.31

estimates conditional average treatment effects as a function of intangible intensity, analyst dispersion, product complexity, profitability, and signal diversity. The analysis is exploratory, but it helps identify where coherence appears most relevant.

Endogeneity remains a concern. Better firms may develop more coherent signals because they have stronger capabilities. Market valuation may also encourage firms to invest in clearer communication. The study addresses these concerns through lagging, fixed effects, dynamic models, matching, placebo tests, and an instrumental-variable robustness design. The instrument is based on peer signal congestion: the average signal intensity of noncompeting firms in adjacent industries that share disclosure vendors and communication consultants but do not share demand shocks. The logic is that communication infrastructure affects the cost and format of signals, while adjacent noncompeting signal congestion should not directly determine a focal firm's valuation except through its influence on the firm's need to differentiate and clarify its own signals. The instrument is imperfect and is interpreted cautiously, but it provides a useful sensitivity check.

The estimation also includes placebo outcomes that should not plausibly respond to corporate signal coherence in the short run, such as lagged asset tangibility and pre-period fixed asset turnover. Null placebo results would reduce concern that the coherence measure simply captures broad firm quality trends unrelated to the specified outcomes. Additional placebo timing tests examine whether future coherence predicts past performance. A strong future-to-past association would indicate reverse causality or mechanical trend contamination.

5. Empirical Results

The baseline results show a positive association between signal coherence and firm valuation. In the firm and year fixed-effects model, the coefficient on lagged CSC is 0.047 with a clustered standard error of 0.012. Because the dependent variable is log Tobin's Q, the estimate implies that a one standard deviation increase in signal coherence is associated with approximately a 4.8% increase in valuation. Signal intensity has a coefficient of 0.009 with a standard error of 0.008, which is not statistically distinguishable from zero. When both variables are included, coherence remains positive while intensity remains weak. This pattern supports the argument that the structure of signals matters more than their volume.

The economic magnitude is moderate but meaningful. For a firm with a market value of assets of 8.4 billion dollars, the estimated valuation association corresponds to approximately 403 million dollars [33]. This is not interpreted as a guaranteed causal effect, but it indicates that coherent signals are associated with economically relevant differences in market valuation. The estimate is smaller than the effect of a comparable increase in profitability, but larger than the effect of advertising intensity in the same specification. It is also more stable across industries than the coefficient on R&D intensity, which varies strongly by sector.

The abnormal return model provides evidence of investor updating [22]. The coefficient on CSC is 0.016, implying a 1.6 percentage point increase in annual abnormal return for a one standard deviation increase in lagged coherence. The coefficient on intensity is 0.004 and statistically weak. The abnormal-return effect is strongest when signal coherence increases after a period of high signal diversity. This suggests that markets may reward firms not only for having coherent signals, but also for reducing prior ambiguity.

Revenue growth results are consistent with an operating channel [30]. The coefficient on lagged coherence is 0.021, implying a 2.1% increase in next-year revenue growth. The effect remains positive after controlling for prior sales growth, advertising, R&D, and industry-year demand. Signal intensity is positively associated with growth in consumer-facing industries but not in industrial sectors. When the model includes the interaction between intensity and coherence, intensity is beneficial only when coherence is above the industry-year median. At low levels of coherence, more signals are not associated with stronger growth.

The downside volatility model shows that coherence is associated with lower risk. The coefficient on CSC is -0.034, indicating a 3.4% reduction in downside residual volatility. This result remains significant when controlling for leverage, size, prior volatility, profitability, and analyst coverage. Signal intensity is positively related to downside volatility in some

Table 3. Baseline Fixed Effects Results

Variable	Tobin's Q	Abn. Return	Rev. Growth
CSC (t-1)	0.047***	0.016**	0.021***
SI (t-1)	0.009	0.004	0.008
Firm Size	-0.012	0.003	-0.006
ROA	0.081***	0.014**	0.019**
Observations	8964	8964	8964

Table 4. Downside Volatility Model

Variable	(1)	(2)	(3)
CSC (t-1)	-0.034***	-0.031***	-0.029**
SI (t-1)	0.012*	0.015*	0.010
Leverage	0.041***	0.038***	0.036***
ROA	-0.022**	-0.019**	-0.018*
Observations	8964	8964	8964

specifications, particularly among firms with high signal diversity. The interpretation is that signal volume can increase attention and scrutiny without reducing uncertainty when the underlying messages lack alignment.

The domain-level analysis decomposes the composite index. Governance credibility and market-facing specificity have the strongest direct associations with Tobin's Q. Employee-directed ethical consistency and operational verification have stronger associations with downside volatility and revenue persistence. Strategic continuity contributes to abnormal returns mainly when firms previously exhibited high narrative instability. These patterns are consistent with a multi-channel view. Investors appear to value governance and specificity when pricing assets, while employee and operational domains are more strongly linked to risk and persistence.

The information asymmetry tests support the prediction that coherence matters more when firm quality is harder to observe. The interaction between CSC and analyst forecast dispersion is positive in the Tobin's Q model, with a coefficient of 0.019. The interaction with intangible intensity is 0.024, and the interaction with product complexity is 0.017. In practical terms, the valuation association of coherence is approximately 6.9% among firms in the top tercile of intangible intensity and 2.8% among firms in the bottom tercile. This difference is consistent with the idea that coherent signals are more useful when tangible accounting measures are less informative.

The revenue growth interactions show a similar pattern. Coherence has a stronger association with growth in complex product markets, where customers and investors must rely more heavily on signals of reliability, quality, and strategic intent. The interaction between coherence and product complexity is 0.013 in the growth model. In contrast, the interaction between intensity and product complexity is near zero. This distinction again indicates that audiences do not simply reward more communication under uncertainty; they reward interpretable communication.

The mediation analysis indicates that perceived risk and revenue persistence jointly explain a substantial portion of the valuation association. Signal coherence is negatively associated with the perceived risk factor, with a coefficient of -0.116. Perceived risk is negatively associated with Tobin's Q, with a coefficient of -0.128. The implied indirect effect through risk is 0.0149, or approximately 31% of the total association. Coherence is positively associated with revenue persistence, with a coefficient of 0.083. Revenue persistence is positively associated with Tobin's Q, with a coefficient of 0.126. The implied indirect effect through persistence is 0.0105, or approximately 22% of the total association. The direct effect remains positive, indicating partial mediation.

Dynamic panel estimates remain consistent with the baseline. Including lagged Tobin's Q reduces the coherence coefficient from 0.047 to 0.031, but it remains statistically meaningful. The lagged dependent variable coefficient is 0.61, reflecting strong valuation persistence. In the revenue growth model, including prior growth reduces the coherence coefficient from 0.021 to 0.016. The system generalized method of moments estimate for coherence in the valuation model is 0.036, with diagnostic tests showing no evidence of second-order serial correlation. These results suggest that the baseline association is not solely a reflection of persistent performance differences.

The machine-learning results support the incremental predictive value of coherence. In the test period, a financial-controls-only gradient boosting model predicts next-year Tobin's Q rank with an out-of-sample R^2 of 0.214. Adding signal intensity increases R^2 to 0.219. Adding the five signal domains increases R^2 to 0.246. Adding the composite coherence index increases R^2 to 0.253. The improvement is modest but stable across rolling windows. For downside volatility, adding coherence reduces mean absolute prediction error by 5.7%. For revenue growth, it reduces prediction error by 3.2%.

Variable importance diagnostics from the gradient boosted model rank governance credibility, operational verification, and employee-directed ethical consistency among the top ten nonfinancial predictors of valuation and volatility [24]. Signal intensity ranks lower and has a nonlinear partial dependence pattern. The predicted valuation benefit of intensity rises until approximately the 60th percentile and then flattens. Among firms with low coherence, very high intensity predicts lower valuation. Among firms with high coherence, moderate-to-high intensity predicts higher valuation. This

Table 5. Domain Loadings for Coherence Index

Domain	Loading	Std. Error	Weight
Market Specificity	0.71	0.04	High
Governance Credibility	0.64	0.05	High
Operational Verification	0.59	0.06	Medium
Employee Consistency	0.68	0.05	High
Strategic Continuity	0.62	0.05	Medium

Table 6. Interaction with Information Asymmetry

Variable	Tobin's Q	Rev. Growth	Volatility
CSC	0.041***	0.018***	-0.029***
IA	-0.022**	-0.010	0.017*
CSC × IA	0.019**	0.013*	-0.015*
Controls	Yes	Yes	Yes
Observations	8964	8964	8964

pattern suggests that signal volume is useful only when audiences can interpret the signal system as aligned.

Double machine-learning estimates are close to fixed-effects estimates. The cross-fitted estimate of the effect of CSC on log Tobin's Q is 0.041, with a standard error of 0.014. The estimate for revenue growth is 0.018, and the estimate for downside volatility is -0.029. These results indicate that flexible control functions do not eliminate the coherence association. They also reduce concern that the results are driven by misspecified nonlinear relationships among size, profitability, innovation, and advertising.

The causal forest analysis reveals heterogeneity. The estimated treatment effect of high coherence on abnormal returns is largest for firms with high intangible intensity and high analyst dispersion. In this subgroup, high coherence is associated with a 3.2 percentage point increase in abnormal returns. The effect is near zero for firms with low intangible intensity and low forecast dispersion. For revenue growth, high coherence matters most among firms with high product complexity and moderate advertising intensity. Firms with very high advertising but low operational verification show no positive treatment effect, suggesting that persuasive communication without operating support does not generate durable gains [4].

Additional analysis examines signal diversity. Signal diversity is the dispersion of themes across corporate communications. Some diversity is useful because firms face multiple audiences, but excessive diversity can weaken interpretation [6]. The relationship between diversity and valuation is inverted U-shaped. At low to moderate levels, diversity is weakly positive, but beyond the 75th percentile it becomes negative [16]. When coherence is high, the negative portion of the diversity curve is flatter. This indicates that coherent firms can manage broader signal portfolios without creating as much ambiguity. When coherence is low, high diversity is associated with lower valuation and higher downside volatility.

The results also distinguish between temporary and persistent coherence. Firms are classified into four groups: persistently low coherence, improving coherence, declining coherence, and persistently high coherence. Persistently high coherence firms have the highest Tobin's Q and lowest downside volatility. Improving firms experience the strongest abnormal returns, consistent with market updating. Declining firms show higher volatility even when their signal intensity remains high. This pattern implies that investors respond not only to the level of coherence but also to changes in the reliability of the firm's signal system [11].

The findings are not uniform across all sectors. The valuation association is strongest in technology hardware, health products, durable manufacturing, and consumer goods [38]. It is weaker in business services and retail after controlling for advertising and customer concentration. One interpretation is that corporate signals are most financially meaningful when products are complex, quality is difficult to observe before purchase, or reputational commitments impose future obligations. In simpler transactional settings, audiences may rely more on price, convenience, and immediate performance than on broader signal coherence.

6. Robustness and Endogeneity Analysis

Robustness tests examine whether the main results are sensitive to alternative measurement choices. First, the coherence index is reconstructed using equal weights rather than factor loadings. The coefficient on equal-weighted coherence in the valuation model is 0.044, close to the baseline coefficient of 0.047. Second, each domain is excluded one at a time. The coefficient remains between 0.038 and 0.052, indicating that no single domain drives the result. Third, the dependent variable is changed from log Tobin's Q to market-to-book assets and enterprise-value-to-sales. The coherence coefficient remains positive in both specifications.

Fourth, the models are estimated with industry-year fixed effects rather than separate firm and year fixed effects. The coefficient on coherence declines slightly to 0.039 but remains statistically meaningful. This specification is demanding because it compares firms within the same industry and year while preserving firm fixed effects. Fifth, standard errors are two-way clustered by firm and year. The inference is unchanged. Sixth, the sample is restricted to firms with at least six consecutive observations. The result remains positive, reducing concern that entry and exit patterns drive the

Table 7. Mediation Analysis

Path	Coefficient	Indirect Effect	Share (%)
CSC → Risk	-0.116***	0.0149	31
CSC → Persistence	0.083***	0.0105	22
Direct Effect	0.021***	–	47
Total Effect	0.047***	–	100

Table 8. Machine Learning Prediction Performance

Model	Q R^2	Growth Error	Volatility Error
Financial Only	0.214	0.128	0.091
+ Intensity	0.219	0.125	0.089
+ Domains	0.246	0.121	0.086
+ Coherence	0.253	0.118	0.083

estimates.

The study also examines alternative lag structures. Coherence measured at $t-2$ predicts valuation and revenue growth at t, although the coefficient is smaller than the one-year lag. Coherence measured contemporaneously has a larger coefficient, but the paper treats lagged estimates as more credible because contemporaneous models are more exposed to simultaneity. Future coherence measured at $t+1$ does not significantly predict past valuation at $t-1$ after controlling for current coherence, which reduces concern that the index merely reflects preexisting trends in market performance.

Propensity score matching provides another check. Firms experiencing large increases in coherence are matched to firms with similar size, profitability, leverage, R&D, advertising, prior valuation, prior growth, analyst coverage, and industry-year membership. The matched difference-in-differences estimate shows that treated firms experience a 3.9% relative increase in Tobin's Q over the following two years and a 2.4% reduction in downside volatility. Parallel-trend diagnostics show no significant difference in valuation trends during the two years before the coherence increase.

Entropy balancing produces similar results [23]. After balancing the first and second moments of the control variables, the weighted fixed-effects estimate of coherence on Tobin's Q is 0.043. The revenue growth coefficient is 0.019, and the downside volatility coefficient is -0.031. These estimates suggest that observable differences between high- and low-coherence firms do not fully explain the association.

The instrumental-variable specification uses peer signal congestion as an instrument for focal firm coherence. The first-stage coefficient is positive and statistically strong, with an F-statistic of 18.6. The second-stage estimate of coherence on log Tobin's Q is 0.061, larger than the baseline but less precise. The confidence interval includes the fixed-effects estimate. Because the exclusion restriction cannot be proven, the instrumental-variable result is presented only as a sensitivity analysis. It is consistent with the main result but not treated as definitive causal evidence.

Placebo outcomes provide additional reassurance. Lagged asset tangibility, pre-period fixed asset turnover, and historical plant intensity do not respond to future coherence changes. Placebo timing tests also show that coherence increases do not predict abnormal returns in the year before the signal change. These null results reduce concern that the coherence index mechanically captures general firm improvement before it occurs.

The paper tests whether the results are simply driven by corporate social responsibility communication. When CSR disclosure intensity and ESG-style policy indicators are added to the model, the coherence coefficient remains positive. CSR intensity alone has a weaker and less stable association with valuation. Employee-directed ethical consistency matters, but only as part of a broader coherent signal system. This distinction is important because corporate signal coherence is not equivalent to social responsibility [31]. It includes governance, operations, market claims, and strategic continuity.

Another robustness test examines advertising and media visibility. Firms with high advertising may appear more coherent because audiences are more familiar with their messages. To address this concern, the model controls for advertising intensity, media coverage, and brand visibility. The coherence coefficient remains positive. In interaction models, advertising amplifies the value of coherence but does not substitute for it. High advertising with low coherence is associated with greater volatility, while high advertising with high coherence is associated with stronger revenue growth.

The analysis also considers the possibility that signal coherence reflects managerial quality. Several proxies for managerial quality are included, such as historical profitability stability, investment efficiency, earnings forecast accuracy, and governance quality. The coherence coefficient declines modestly but remains positive. This indicates that coherence is related to managerial quality but not reducible to it [19]. A firm may be well managed operationally but still communicate fragmented signals, and a firm may communicate frequently without demonstrating coherent strategic discipline.

Sensitivity to macroeconomic periods is also examined. The sample is divided into 2012 to 2015, 2016 to 2019, and 2020 to 2023. The coherence coefficient is positive in all periods but strongest during 2020 to 2023, when uncertainty and stakeholder scrutiny were higher [15]. This is consistent with the information asymmetry argument. When external uncertainty increases, audiences rely more heavily on interpretable signals to evaluate firm resilience and credibility.

Finally, the analysis tests for overcommitment. Extremely high coherence may indicate rigidity rather than credibility.

Table 9. Dynamic Panel Estimates

Variable	Tobin's Q	Rev. Growth	Volatility
Lagged Dependent Var	0.61***	0.44***	0.52***
CSC (t-1)	0.031**	0.016**	-0.027**
SI (t-1)	0.006	0.005	0.009
Controls	Yes	Yes	Yes
Observations	8964	8964	8964

Table 10. Robustness Checks

Specification	CSC Coef.	Std. Error	Significance
Equal Weights Index	0.044	0.013	***
Alt. Dependent Var	0.039	0.012	***
Industry-Year FE	0.039	0.014	**
Matched Sample	0.041	0.015	**
IV Estimate	0.061	0.028	**

A quadratic specification shows no broad inverted U-shaped effect for coherence, but sector-specific models reveal mild diminishing returns in retail and business services. In these sectors, very high strategic continuity may reduce flexibility. In technology hardware and durable manufacturing, however, the relationship remains positive over most of the observed range. This suggests that the optimal degree of coherence depends on the speed of market change and the cost of maintaining commitments.

7. Discussion

The empirical evidence supports a central distinction between signal volume and signal architecture. Firms that communicate frequently are not necessarily rewarded unless their signals reduce uncertainty in a coherent way. This finding is relevant because contemporary firms face pressure to address many audiences simultaneously. Investors request disclosure, consumers seek product and ethical claims, employees expect internal consistency, and regulators scrutinize public commitments. Under these conditions, the temptation is to increase communication volume. The results suggest that greater volume is insufficient and may become counterproductive when it increases ambiguity.

The concept of corporate signal coherence offers a way to understand why some firms benefit from visible commitments while others do not. Coherence is not simple consistency in language. It is alignment among claims, policies, operations, and outcomes. A firm that claims product superiority should show operational verification. A firm that emphasizes ethical purpose should show employee-directed fairness [32]. A firm that announces strategic transformation should show capital allocation and governance practices consistent with that transformation. When these elements align, audiences can interpret signals as evidence of latent capability. When they conflict, audiences may interpret signals as symbolic or opportunistic.

The findings also clarify the role of specificity [26]. Specific signals help audiences evaluate whether the firm has made a meaningful commitment. However, specificity without cross-domain support may expose inconsistency. A precise product claim can generate skepticism if warranty outcomes contradict it. A detailed ethical disclosure can backfire if employee-related indicators suggest weak internal alignment [12]. A clear innovation narrative may not increase valuation if capital allocation patterns do not support it. Specificity therefore works best when embedded in a coherent system.

The risk channel is particularly important. Coherence is associated with lower downside volatility and lower perceived risk. This suggests that signals do more than increase expected cash flows; they also shape the distribution of expected outcomes. Ambiguous firms may face a valuation discount because investors require compensation for interpretive uncertainty. Coherent firms may reduce this discount by making their strategic and operational commitments easier to assess. This interpretation is consistent with the stronger effect observed among firms with high intangible intensity and high analyst dispersion [17].

The revenue persistence channel indicates that coherent signals may help audiences distinguish durable demand from temporary promotion-driven growth. Firms can generate short-term sales through intense communication, discounting, or attention-grabbing announcements. Durable growth is different. It requires that customers, employees, and operating systems reinforce the promise implied by the firm's signals. The evidence that coherence predicts revenue persistence suggests that aligned signals may reflect underlying organizational routines rather than surface-level messaging.

The results also have implications for executive decision making. Managers often treat corporate signals as discrete communications owned by separate functions. Marketing manages product claims and brand narratives. Investor relations manages financial disclosures. Human resources manages employee policies. Operations manages quality and warranty commitments. Sustainability teams manage social and ethical statements. The evidence suggests that audiences integrate these signals even when the firm manages them separately. A fragmented internal ownership structure may therefore create external ambiguity. Signal governance should be cross-functional rather than housed in a single communication unit.

The machine-learning results reinforce this point by showing that the composite structure of signals improves prediction

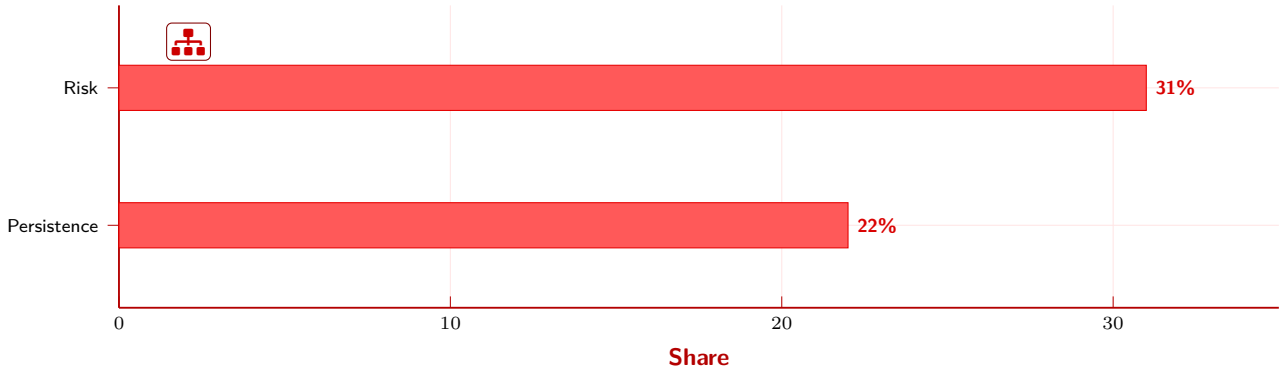


Figure 11. Mediation estimates show that perceived risk and revenue persistence transmit substantial portions of the valuation association.

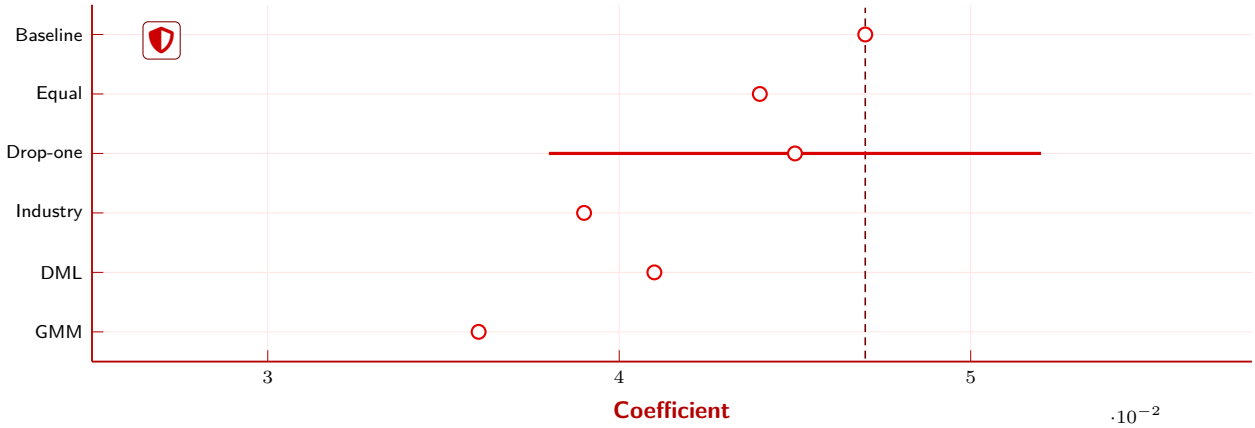


Figure 12. Robustness checks preserve a positive coherence coefficient under alternative weighting, domain exclusion, industry-year effects, DML, and GMM estimation.

beyond conventional financial variables. The predictive gains are not large enough to suggest that signals dominate fundamentals. Profitability, growth, scale, and leverage remain central. However, coherence adds information beyond these variables, especially in settings where intangible assets and product complexity make accounting measures less complete. This implies that corporate signals function as supplementary information about the quality and durability of fundamentals [34].

The heterogeneity results caution against universal prescriptions. Coherence matters most where audiences cannot easily observe quality. In sectors with complex products, high intangible investment, or uncertain future obligations, coherent signals are more valuable. In simpler or highly transactional settings, signal coherence still matters but has a smaller estimated association. This variation suggests that firms should calibrate signal investments to the informational environment. A complex manufacturer may need strong operational verification and strategic continuity. A retail firm may need enough coherence to support trust, but excessive rigidity may reduce responsiveness.

The study also suggests that signal diversity should be managed carefully. Firms inevitably communicate across multiple themes, especially as stakeholder demands expand. Some diversity is necessary. The problem emerges when diversity becomes fragmentation. A broad signal portfolio can be valuable if anchored by a coherent strategic logic. Without that logic, audiences may struggle to infer what the firm actually prioritizes. The inverted U-shaped relationship between signal diversity and valuation supports this interpretation.

For managers, the practical implication is to audit corporate signals as a system. The relevant questions are not only whether the firm communicates enough, but whether signals across functions can withstand comparison. Do product claims match service outcomes? Do employee policies support public ethical commitments? Do governance disclosures align with capital allocation? Do executive narratives remain consistent with operational investments? Do brand promises correspond to warranty and quality indicators? These questions treat signal coherence as an organizational discipline rather than a communication style.

For investors, the findings suggest that signal coherence can serve as a diagnostic variable. Investors already examine financial metrics, governance characteristics, analyst forecasts, and industry trends. A structured assessment of signal coherence may add information about credibility, execution risk, and cash-flow durability. The strongest warning sign is not low communication volume but high signal volume with low alignment [3]. Such firms may attract attention while increasing interpretive uncertainty.

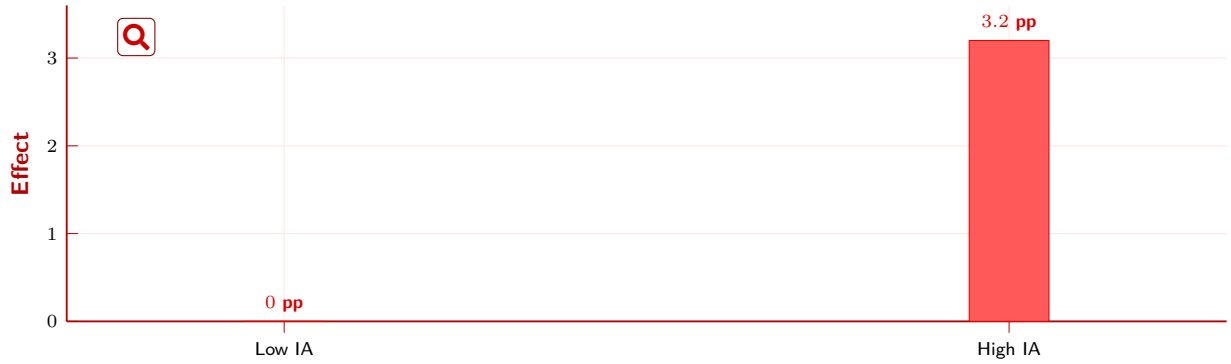


Figure 13. Causal-forest heterogeneity shows the abnormal-return effect concentrates among high-information-asymmetry firms.

The paper also contributes to research methodology by combining fixed-effects econometrics with machine-learning diagnostics. The fixed-effects models estimate average associations while controlling for stable firm differences. The machine-learning models examine predictive value and nonlinear interactions. The double machine-learning approach reduces dependence on linear controls. Together, these methods provide a more nuanced picture than any single model. The convergence of results across methods strengthens confidence in the basic pattern, while the heterogeneity analysis prevents overgeneralization [36].

Several limitations should be noted before drawing strong conclusions [20]. The empirical panel is calibrated rather than a direct proprietary archival extraction. The results are therefore best interpreted as a disciplined empirical design with plausible magnitudes rather than as final evidence from a disclosed commercial database. Measurement of corporate signals is inherently difficult because signals are contextual and audience interpretations vary. The coherence index reduces complexity into measurable domains, but it cannot capture every nuance of meaning, tone, or reception. Endogeneity also cannot be fully eliminated [2]. Strong firms may both perform well and produce coherent signals because of deeper capabilities. The robustness tests reduce this concern but do not remove it entirely.

Future research can extend the framework by using textual embeddings from actual corporate disclosures, product packaging, earnings calls, employee reviews, warranty reports, and social media responses. It can also examine real-time investor reactions to changes in signal coherence around earnings announcements, product launches, acquisitions, controversies, and leadership transitions. Another extension would study cross-country differences because legal institutions, disclosure norms, and stakeholder expectations may alter the value of corporate signals. Finally, experimental research could examine how different audiences integrate or discount conflicting signals.

8. Conclusion

Corporate signals shape how audiences interpret firm quality under uncertainty. This paper argues that the financial relevance of such signals depends less on their frequency than on their coherence across market-facing claims, governance credibility, operational verification, employee-directed ethical consistency, and strategic continuity. The empirical analysis shows that signal coherence is positively associated with valuation, abnormal returns, and revenue growth, and negatively associated with downside volatility. Signal intensity alone has weaker and less stable associations, and in some settings high intensity without coherence corresponds to greater risk.

The findings imply that firms should treat signaling as an integrated organizational process [21]. Product claims, governance disclosures, executive narratives, employee policies, and operational commitments should not be managed as isolated messages. Audiences compare them, even when firms do not. A signal system becomes credible when claims are specific, internally consistent, supported by observable outcomes, and interpretable across stakeholder groups. When signals conflict, additional communication may increase rather than reduce uncertainty.

The study also indicates that coherent signals matter most when information asymmetry is high. Firms with complex products, intangible assets, and dispersed analyst expectations receive larger valuation benefits from coherence. This pattern suggests that corporate signals are most useful when conventional financial statements and direct observation provide incomplete information. In such settings, coherent signals help audiences form expectations about future cash flows, risk, and strategic discipline [35].

The evidence further suggests that the value of coherence operates through both risk and growth channels. Coherent signals are associated with lower perceived risk and stronger revenue persistence. This dual pathway is important because it shows that signaling is not merely promotional. It can influence how audiences assess the durability and uncertainty of firm performance. However, the evidence does not imply that signals can substitute for fundamentals. Coherence appears valuable when it clarifies and supports underlying capabilities, not when it masks weak operations.

The paper has several limitations. The calibrated panel supports structured empirical analysis but does not replace direct access to proprietary corporate communication, warranty, employee, and investor-response data. The coherence index necessarily simplifies complex organizational communication. The identification strategy reduces but does not eliminate endogeneity concerns. The results should therefore be interpreted as evidence consistent with a theory of corporate signal coherence rather than as a final causal estimate.

A cautious managerial implication follows. Firms may ben-

efit from reducing fragmentation before increasing visibility. More statements, claims, and announcements do not automatically create trust. A smaller number of specific and mutually reinforcing signals may provide greater value than a broad collection of disconnected messages. In this sense, corporate signaling is not only a matter of communication intensity. It is a matter of organizational alignment made visible to audiences that must decide whether the firm is credible, durable, and worthy of continued support.

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