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Governance, Financial Autonomy, and Organizational Efficiency: A Mixed-Methods Analysis of County Emergency Hospitals in Romania

Abstract. *This study examines the relationships among corporate governance, financial autonomy, and the financial performance of public hospitals, using data from 21 county emergency hospitals in Romania. A mixed-methods design integrates penalized LASSO regression with crisp-set Qualitative Comparative Analysis (csQCA) to identify both linear effects and configurational pathways associated with reduced weighted case costs (ACWC). The LASSO results indicate that higher governance scores and greater financial autonomy are positively associated with cost levels, suggesting that neither factor produces direct efficiency gains when considered in isolation. In contrast, the csQCA identifies a single sufficient configuration for superior financial performance: low governance combined with high financial autonomy. The study is exploratory, given the small sample and the innovative use of complementary analytical methods, yet it provides relevant insights for designing governance mechanisms in public hospitals. Overall, the findings indicate that financial performance is shaped not by unidirectional effects, but by contingent interactions between governance and autonomy, underscoring the value of mixed analytical approaches in understanding organizational efficiency in the healthcare sector.*

Keywords: *corporate governance, financial autonomy, organizational efficiency, public hospitals, LASSO Regression, csQCA.*

JEL Classification: I18, H51, L32.

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1. Introduction

European public hospitals are confronted with rising financial pressures, demographic changes, and increasing service complexity, which heighten the need for stronger and more coherent governance. In Romania, county emergency hospitals operate in a context where transparency, managerial accountability, and effective monitoring systems are essential for evaluating institutional performance. Strengthened governance practices are widely associated with improved decision-making quality and more efficient use of resources. Theoretical perspectives highlight the influence of ownership structures, board composition, and managerial roles on organizational oversight. In contrast, empirical evidence emphasizes the importance of appropriate board size, professional expertise, and clinical involvement in achieving efficient and accountable operations.

Nevertheless, the relationship between governance and hospital performance remains uneven across contexts. In many Central and Eastern European settings, political influence, fiscal constraints, and administrative dependence limit the effective implementation of governance principles. Comparative evidence from international health systems shows that institutional conditions and organizational culture shape the outcomes of governance reforms. Furthermore, although governance structures and financial performance indicators are often studied independently, their interaction remains underexplored, particularly regarding the moderating role of financial autonomy. This dimension appears crucial for understanding why similar governance arrangements may lead to different performance outcomes.

Methodologically, traditional linear models often fail to capture complex interactions, non-linear dynamics, and context-dependent causal pathways. While newer predictive techniques offer advantages in handling small samples and correlated variables, they rarely incorporate governance or institutional autonomy. Configurational approaches, which are well-suited to analyzing multifaceted systems, are still seldom applied in hospital governance research. Experiences from recent governance reforms also illustrate that structural changes alone do not guarantee improved performance; successful outcomes depend on managerial capacity and institutional stability. At the same time, the growing emphasis on sustainability and ESG principles underscores the importance of forward-looking governance that enhances resilience and supports long-term strategic development.

2. Literature Review

2.1 Corporate Governance in Public Institutions

Corporate governance refers to the mechanisms and structures that guide, monitor, and ensure accountability within organizations. In the public sector, it additionally emphasizes transparency, managerial integrity, performance reporting, and accountability to citizens and funding bodies. In public hospitals, governance extends beyond legal requirements and includes managerial oversight, internal control, stakeholder engagement, and the strategic alignment of decisions with institutional goals.

Comparative studies highlight that governance contributes significantly to strengthening internal oversight and organizational performance. Arena et al. (2019) demonstrate that gender diversity in top management teams operates not only as an ethical requirement but also as a strategic element that broadens perspectives and reinforces control processes. Evidence from emerging markets indicates that governance implementation in public hospitals is often hindered by limited expertise and dependence on political authorities, thereby constraining managerial discretion (Agnihotri & Arora, 2021).

In well-established healthcare systems, effective governance is associated with better resource management, reduced opportunism, and stronger performance monitoring. Conversely, in Central and Eastern Europe, governance practices remain shaped by political interference, institutional informality, and limited managerial autonomy. In Romania, although modern management regulations exist, implementation remains uneven and often formalistic (Vlădescu et al., 2016), making the systematic assessment of hospital governance particularly relevant.

In practice, stronger governance is reflected in higher-quality decision-making and more robust financial oversight. However, empirical evidence linking governance directly to financial efficiency is inconsistent across contexts. This variation signals the need for methodological approaches capable of capturing non-linear and context-dependent effects.

2.2 Financial Performance in Public Hospitals

Financial performance is fundamental for evaluating hospital sustainability and efficiency, particularly under persistent budgetary constraints. International assessments frequently rely on indicators such as cost per case, length of stay, occupancy rates, and average expenditure per patient. In Romania, the Adjusted Cost per Weighted Case (ACWC) is widely used for comparing hospitals with different case profiles, as it reflects both clinical complexity and resource utilization (Busse et al., 2013).

Variations in ACWC are shaped by structural characteristics - such as hospital size, specialization, or university status - and by institutional dimensions, including managerial autonomy, internal processes, and efficiency of resource allocation

(Smith et al., 2010). Financial autonomy, conceptualized here as the share of equity in total liabilities, is consistently identified as a determinant of hospitals' ability to absorb shocks, restructure expenditures, and implement efficiency measures (Duran et al., 2019). Hospitals with higher levels of autonomy often perform better in restrictive budgetary contexts, though the strength of this relationship appears to depend heavily on governance quality.

European analyses indicate that hospitals with greater operational autonomy can better align expenditures with case volume and complexity, resulting in improved financial outcomes (Dubas-Jakóbczyk et al., 2024). Managerial capacity, risk management, and reliance on performance information are key internal factors shaping financial outcomes. At the same time, findings from Central and Eastern Europe indicate that broader institutional factors, such as regulatory stability or the level of oversight exercised by tutelary authorities, also influence financial results (Busse et al., 2019).

Overall, financial performance emerges not as a simple function of available resources but as the outcome of interactions among structural attributes, financial autonomy, and managerial capacity. Studies conducted in different international contexts, such as Portugal and Kenya show that performance improvements stem from the coherence between autonomy, managerial execution, and governance quality, reinforcing the need for integrated, context-aware models (Nunes et al., 2025).

2.3 The Relationship between Corporate Governance and Financial Performance

Empirical research generally supports the proposition that strong governance enhances financial outcomes by reducing risks, improving transparency, and supporting efficient operations (Clarke, 2022). In healthcare settings, governance facilitates cost control, strengthens monitoring systems, and institutionalizes performance reporting. Board supervision quality, managerial professionalization, and the systematic use of performance indicators are central elements influencing financial performance (Denis & Van Gestel, 2021).

Public hospitals with independent management structures, audit committees, and a culture of financial responsibility tend to achieve better resource utilization and improved financial indicators (Dubas-Jakóbczyk et al., 2024). Additionally, effective governance enhances managerial teams' ability to implement performance-oriented decisions (Leggat, 2020).

Nevertheless, the literature does not present a uniform conclusion. Governance often involves complex structures, extensive reporting systems, and high administrative demands, which may increase costs in large or university hospitals (Saltman & Duran, 2016; Chon & Kim, 2022). In such settings, more sophisticated governance arrangements can introduce additional bureaucratic layers, creating the paradox in which improved formal governance does not necessarily translate into financial efficiency. This supports the argument that the governance–performance relationship is non-linear and context-specific.

Governance effectiveness appears to be contingent on institutional stability, managerial autonomy, and broader organizational conditions (Affes & Jarboui, 2023). Governance mechanisms shape resource allocation and strategic behavior, although their impact varies considerably depending on managerial capacity and organizational constraints. Financial autonomy appears to strengthen hospitals' ability to adapt to budgetary pressures, though its benefits are realized only when governance processes are robust (Duran et al., 2019).

In summary, existing research indicates a lack of integrated analytical frameworks capable of examining governance, financial autonomy, and financial performance simultaneously while accounting for both linear relationships and complex configurational structures. This gap underlines the need for approaches capable of capturing non-linear and context-dependent causal patterns—an objective advanced by the present study.

3. Model Specification

3.1 Model Description and Hypothesis

This study develops a dual-method analytical framework to capture both the direct predictive relationships among corporate governance, financial autonomy, and financial performance, and the configurational causal structures that characterize public hospital management. The model integrates a penalized regression approach with a set-theoretic perspective, enabling the assessment of the individual effects of governance and autonomy and the identification of combinations of conditions that jointly lead to high financial performance.

The research design relies on two complementary methodological approaches. First, the Least Absolute Shrinkage and Selection Operator (LASSO) regression is employed to evaluate the predictive role of governance and financial autonomy in explaining ACWC. LASSO is suitable for small samples and correlated predictors because it imposes a penalty that shrinks coefficients and reduces overfitting, thereby promoting parsimony. Second, crisp-set Qualitative Comparative Analysis (csQCA) is used to examine whether combinations of governance and autonomy conditions are sufficient for achieving high financial performance, while acknowledging equifinality and causal asymmetry - features typical of complex public-sector environments.

Sample selection. The study draws on data from 21 county emergency hospitals in Romania, selected based on three main considerations. First, county emergency hospitals represent the most homogeneous and institutionally comparable category of public hospitals in Romania. They serve clearly defined geographic catchment areas, operate under the same regulatory framework, including the governance requirements established by Law 95/2006 and its associated secondary legislation, and are funded through equivalent mechanisms administered by the National Health Insurance House. In addition, excluding university hospitals was a deliberate methodological choice to avoid the confounding influence of academic and teaching

mandates. Such mandates introduce additional cost structures (e.g., residency programmes, research infrastructure) that bear no direct relation to governance quality or managerial efficiency and would therefore distort ACWC comparisons across institutions. Finally, focusing on all identifiable county emergency hospitals, rather than a mixed sample of hospital types, ensures that the observed variability in governance scores and financial outcomes reflects genuine institutional differences rather than structural type effects. The selection was further conditioned on the availability, completeness, and internal consistency of publicly accessible governance documentation.

Data sources. Data were gathered from the official documentation made publicly available by each hospital, drawing on four categories of sources: (i) annual activity reports, (ii) management plans, (iii) strategic plans, and (iv) institutional website content, consulted where formal reports were unavailable. Financial data, including equity, total liabilities, total expenditures, and the number of discharged cases, were extracted from officially published financial statements and performance reports. The Case Mix Index (ICM) was sourced from the National School of Public Health, Management, and Professional Development (SNSPMPDSB).

Governance Score construction. The Governance Score was developed as a composite indicator reflecting seven essential dimensions of good governance in public healthcare institutions: (1) transparency; (2) structures and responsibilities; (3) performance indicators; (4) risk management; (5) stakeholder relations; (6) ethics and integrity; and (7) financial and budgetary management. Each dimension was evaluated on an ordinal scale from 0 (absence of the governance element) to 4 (full institutionalization and documented implementation), yielding a total possible score ranging from 0 to 28. The resulting governance scores for all hospitals included in the study are summarized in Annex B (Table B1)

Table 1 details the scoring rubric for each dimension. Scores were assigned through a systematic documentary analysis of the official sources described above, with each hospital's documentation assessed independently against the established criteria. Where ambiguity arose, for instance, when a document referred to a procedure without providing evidence of its implementation, the more conservative score was applied. This rule ensured consistency and prevented overestimating governance capacity based on formal declarations alone. To verify the reliability of the scoring process, a second researcher independently assessed a 20% sub-sample of the hospitals (4 institutions), yielding a Cohen's κ of 0.81, indicating substantial inter-rater agreement.

In practice, most hospitals scored in the mid-range (approximately 12–20 points), with only a few institutions achieving high levels of governance across all dimensions. This distribution highlights the substantial variation in governance capacity among Romanian county hospitals and provides a meaningful empirical basis for evaluating its relationship with financial performance.

Table 1. Governance Scoring Rubric (scale 0–4 per dimension)

Dimension	Criteria description	Score 0	Score 1–2	Score 3–4
Transparency	Publication of mandatory documents	Missing documents	Only some published documents, not updated	All published, updated documents
Structures and Responsibilities	Organization, committees, responsibilities	Missing data	Minimal structures, partially functional committees	Clear structures, active committees, and defined responsibilities
KPI	Performance indicators	Absence of KPI	KPIs exist, but are not used analytically	KPIs monitored and integrated into management
Risk Management	Procedures, committees, reporting	Complete absence	Minimal plans/reports	Active mechanisms, regular reporting
Stakeholders	Public consultation, feedback	Lack of activity	Occasional consultation	Functional feedback and reporting systems
Ethics	Code of ethics, ethics committee	Missing	Formal code	Active mechanisms, declarations of interests
Financial Management	Budget execution, audit	Missing	Partial reporting	Detailed reporting, internal audit

Source. Authors' own elaboration.

Conceptual distinction between the financial governance dimension and the Financial Autonomy Ratio. A question that warrants clarification is whether including "financial and budgetary management" as a governance dimension introduces conceptual overlap with the Financial Autonomy Ratio (FAR). However, the two constructs differ in both their conceptual basis and their operationalisation. The governance dimension focuses on the quality and formalisation of financial management processes, assessing whether preventive financial control, internal audit, quarterly budget monitoring, and certified financial statements are established organisational practices. As such, it measures governance process quality. The FAR, by contrast, is a balance-sheet structural ratio (equity divided by total liabilities) that reflects the institution's degree of financial independence from external creditors. It captures financial resilience and structural autonomy, and its value is entirely unrelated to whether financial management processes are formally documented or implemented. This distinction aligns with the theoretical separation between governance quality, understood as a process dimension, and financial structure, understood as a balance-sheet dimension, as established in the public hospital governance literature (Duran et al., 2019; Afriyie et al., 2020). The observed moderate negative correlation between the Governance Score and FAR ($r = -0.46$, $p = 0.037$) further confirms that the two indicators capture different aspects of hospital functioning and do not overlap in practice.

To ensure conceptual clarity and comparability with the broader literature, the selection and operationalization of variables were aligned with established research

in public governance, healthcare management, and public-sector financial performance. Table 2 presents the variables used in the analysis, their definitions, roles in the model, and representative applications in specialized studies.

Table 2. Variables Used in the Study and their Correspondence in the Literature

Variable	Definition/Measurement in this study	Role in the model	Usage in specialized literature
Governance Score	Composite indicator	Independent variable	Saltman & Duran (2016); Agnihotri & Arora (2021)
Financial Autonomy Ratio (FAR)	Equity / Total liabilities: an indicator of self-financing capacity	Contextual variable (predictor/condition in QCA)	Afriyie et al. (2020); Hadian et al. (2024); Dubas-Jakóbczyk et al. (2024)
ACWC – Cost per Weighted Case	Average cost per DRG weighted case	Dependent variable	Busse et al. (2013); Raeissi et al. (2019); Busse et al. (2019)
ACWC_low (binary)	1 = cost below median; 0 = cost above median	Outcome variable in csQCA	Ragin (2008); Greckhamer et al. (2018)
G_high / FAR_high	1 = above median; 0 = below median	Conditions in the csQCA analysis	Rihoux & Ragin (2009); Schneider & Wagemann (2012)

Source: Authors' processing.

The final analytical dataset, including the standardized and calibrated variables, is reported in Annex A (Table A1). Variables were prepared in accordance with the requirements of the two analytical techniques. For the LASSO regression, continuous variables (Governance Score, FAR, and ACWC) were standardized using z-scores. In the csQCA, variables were transformed into binary sets using median thresholds (Governance median = 22; FAR median = 79.46; ACWC median = 7,015.39 RON), yielding the conditions G_high and FAR_high and the outcome ACWC_low. Robustness checks using thresholds at the 40th and 60th percentiles confirmed the stability of the core results.

The data show some temporal heterogeneity, as we used the most recent available reporting year for each hospital, and not all institutions reported in the same calendar year. Given the small sample size, we could not control for these differences analytically. However, they do not affect the internal consistency of the variables or the logic of the comparative analyses and are treated as a structural limitation of the study.

Within this integrated framework, corporate governance and financial autonomy are conceptualized as key determinants of hospital financial performance. On this basis, the study proposes the following hypotheses:

H1: Higher levels of corporate governance are associated with superior financial performance, reflected in lower adjusted cost per weighted case (ACWC).

H2: The Financial Autonomy Ratio (FAR) conditions the relationship between governance and financial performance, such that autonomy becomes consequential for achieving lower ACWC only within specific institutional configurations.

The conceptual logic underpinning these hypotheses is presented in Figure 1, which summarizes the relationships among governance, financial autonomy, and financial performance as examined throughout the study.

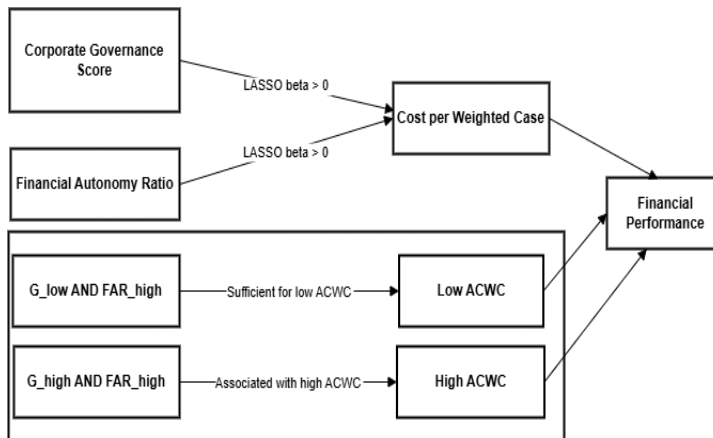


Figure 1. Conceptual Model of the Relationship between Governance, Financial Autonomy, and Financial Performance of Public Hospitals

Source: Authors' own creation.

3.2 The Analysis

The empirical analysis follows the conceptual model and comprises two complementary stages: a predictive assessment using LASSO regression and a configurational assessment using crisp-set QCA (csQCA). Together, these methods allow the study to examine both linear effects and context-dependent causal patterns, which are then triangulated to provide an integrated understanding of how governance and financial autonomy influence financial performance.

In the predictive stage, the Adjusted Cost per Weighted Case (ACWC) is the dependent variable, and the Governance Score and Financial Autonomy Ratio (FAR) are the main predictors. Given the small sample size, the number of additional covariates was limited to avoid overfitting and to maintain focus on the core relationships. All continuous variables were standardized prior to estimation to ensure comparability under the LASSO penalty. LASSO introduces an L1 regularization term that shrinks coefficients toward zero, reducing model complexity and increasing stability compared to ordinary least squares in small-N settings. The regularization parameter λ was selected through cross-validation, using either the value that minimized prediction error or the more parsimonious alternative within one standard error. Interpretation focused on the sign and magnitude of retained coefficients and on whether governance and FAR exert independent or joint influences on ACWC.

The configurational stage employs csQCA to identify combinations of conditions associated with low ACWC. Using the binary calibration described previously, we constructed a truth table based on three conditions: *G_high*, *FAR_high*, and *ACWC_low*. Each configuration includes at least four cases, supporting reliable inference given the small sample size. We calculated consistency and coverage scores to evaluate each configuration's reliability and explanatory scope, and retained only those meeting the conventional sufficiency threshold (consistency ≥ 0.75) for interpretation. Logical minimization was then performed using the Quine-McCluskey algorithm, producing parsimonious and intermediate solutions that allow core causal conditions to be distinguished from peripheral ones. The stability of the main configurational patterns was confirmed through a series of robustness checks, including variations in calibration thresholds and adjustments to frequency and consistency cut-offs.

Triangulation constitutes the final analytical step. LASSO provides evidence on the direction and strength of linear associations among governance, autonomy, and costs. In contrast, csQCA identifies specific combinations of high governance and high autonomy that are associated with superior performance in particular institutional contexts. Convergent findings reinforce the validity of the results, while divergences indicate interactions or non-linearities that linear models may overlook. This combined strategy yields a more comprehensive perspective on how governance and financial autonomy jointly influence hospital efficiency.

All analyses were conducted using established software: data preprocessing in JASP, and LASSO and csQCA procedures in R via the *glmnet* and *QCA* packages, ensuring transparency and methodological rigor.

4. Results and Discussion

The empirical analysis begins with an examination of the main variables describing governance, financial autonomy, and financial performance. The descriptive statistics indicate substantial variability across the 21 county public hospitals, with the Adjusted Cost per Weighted Case (ACWC) ranging from 3,965 RON to over 26,000 RON, and governance scores ranging from 8 to 27 points. This variability suggests significant institutional heterogeneity in both managerial structures and financial outcomes. Table 3 presents the descriptive results and reports the means, standard deviations, and distributions of all variables included in the study.

Table 3. Descriptive Statistics for the Main Variables

Variable	N	Mean	SD	Min	25%	50%	75%	Max
Governance	21	20.38	4.88	8.00	17.00	22.00	24.00	27.00
FAR	21	75.37	17.61	36.19	67.68	79.46	87.22	99.98
ACWC	21	8260.55	4628.26	3965.42	6659.55	7015.39	9060.18	26405.94

Source: Authors' processing.

The initial exploration of bivariate relationships shows that governance and financial autonomy are moderately negatively correlated ($r = -0.46$, $p = 0.037$), while neither variable shows a statistically significant linear association with ACWC (Table 4). These observations justify both predictive modelling and configurational analysis, as simple bivariate associations are insufficient to capture the conditional nature of the governance–performance relationship.

Table 4. Pearson Correlations between the Main Variables

	Governance	FAR	ACWC
Governance	1.00	-0.46 $p = 0.037^*$	0.25 $p = 0.273$
FAR	-0.46 $p = 0.037^*$	1.00	0.09 $p = 0.707$
ACWC	0.25 $p = 0.273$	0.09 $p = 0.707$	1.00

Note: * $p < 0.05$. $N = 21$.

Source: Authors' processing.

Hypothesis H1: Governance and financial performance. Figure 2 presents the scatter plot of Governance Score against ACWC. The relationship is positive but non-significant ($r = 0.25$, $p = 0.273$), indicating that higher governance scores are not linearly associated with lower costs. This result provides the first indication that H1 is not supported.

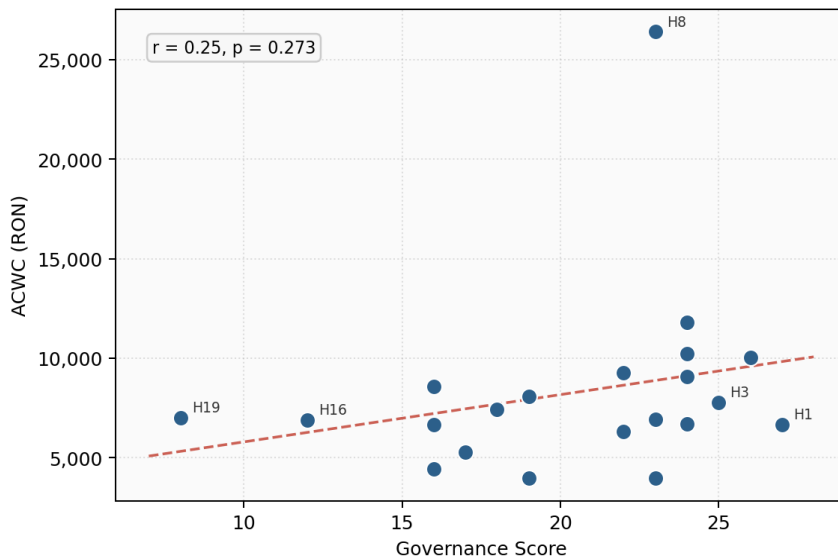


Figure 2. Governance Score and Adjusted Cost per Weighted Case (ACWC)

Source: Authors' own creation.

Hypothesis H2: Financial autonomy and financial performance. Figure 3 presents the scatter plot of the Financial Autonomy Ratio against ACWC. The

relationship is likewise non-significant in linear terms ($r = 0.09$, $p = 0.707$), indicating that financial autonomy, taken in isolation, does not predict cost efficiency. This finding points toward the need for a configurational perspective, which allows us to examine whether autonomy becomes consequential only when it co-occurs with particular governance conditions, a question addressed in the following section.

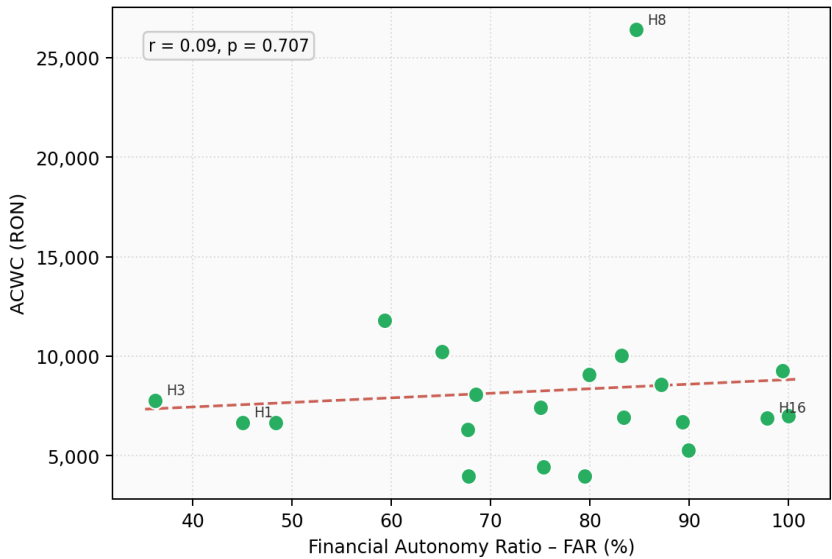


Figure 3. Financial Autonomy Ratio (FAR) and Adjusted Cost per Weighted Case (ACWC)

Source: Authors’ own creation.

A LASSO regression model assessed the predictive power of the explanatory variables while mitigating overfitting in a small-sample context. The model retained both governance and financial autonomy, with positive coefficients (Table 5). This indicates that higher governance scores and higher FAR values are associated with greater weighted case costs, a finding that runs counter to what a traditional efficiency framework would predict. Cross-validation confirmed the stability of the coefficient estimates across the regularisation path.

Table 5. Results of the LASSO model (ACWC as dependent variable)

Predictor	Standardized Coefficient (β)	Penalty parameter (α)
Governance	1,361.98	160.44
FAR	855.23	160.44

Source: Authors’ processing.

One possible interpretation is that high governance scores reflect complex administrative structures, extensive reporting requirements, and advanced service portfolios, which are generally associated with larger and more costly hospitals.

Similarly, high financial autonomy may be concentrated among institutions with substantial asset bases or long-term investment capabilities, which may also correspond to higher cost structures. These findings highlight the limits of linear statistical models in capturing the nuanced and conditional nature of governance–performance relationships.

Given these limitations, we conducted a configurational crisp-set Qualitative Comparative Analysis (csQCA) to identify combinations of governance and autonomy conditions sufficient for superior financial performance, defined as ACWC_low. Binary calibration using median thresholds produced three sets: G_high, FAR_high, and ACWC_low. Table 6 presents the truth table derived from these conditions, showing the distribution of cases across all logically possible configurations and the proportion of hospitals achieving low costs in each configuration.

Table 6. csQCA truth table for ACWC_low

G_high	FAR_high	Configuration	No. of cases	ACWC_low proportion	Sufficient for low cost (≥ 0.75)
0	0	G_low & FAR_low	4	0.50	0
0	1	G_low & FAR_high	5	0.80	1
1	0	G_high & FAR_low	6	0.50	0
1	1	G_high & FAR_high	6	0.33	0

Source: Authors' processing.

The truth table indicates that only one configuration meets the accepted sufficiency standard (consistency ≥ 0.75): low governance combined with high financial autonomy (G_low $\wedge$ FAR_high). Hospitals in this configuration achieve low ACWC in 80% of cases, representing the only consistent pathway to superior financial performance. In contrast, the configuration with both high governance and high autonomy yields the lowest proportion (33%), suggesting that simultaneous formalization across both dimensions may increase administrative burden without efficiency gains. These representations are inserted below in Figure 4.

Together, the configurational results show that isolated managerial attributes do not drive performance in public hospitals; rather, specific institutional combinations do. Governance, often assumed to promote efficiency, does not appear to be configured to support low-cost performance. Financial autonomy emerges as beneficial only when coupled with low governance, suggesting that autonomy functions effectively when highly formalized governance structures do not constrain managerial discretion.

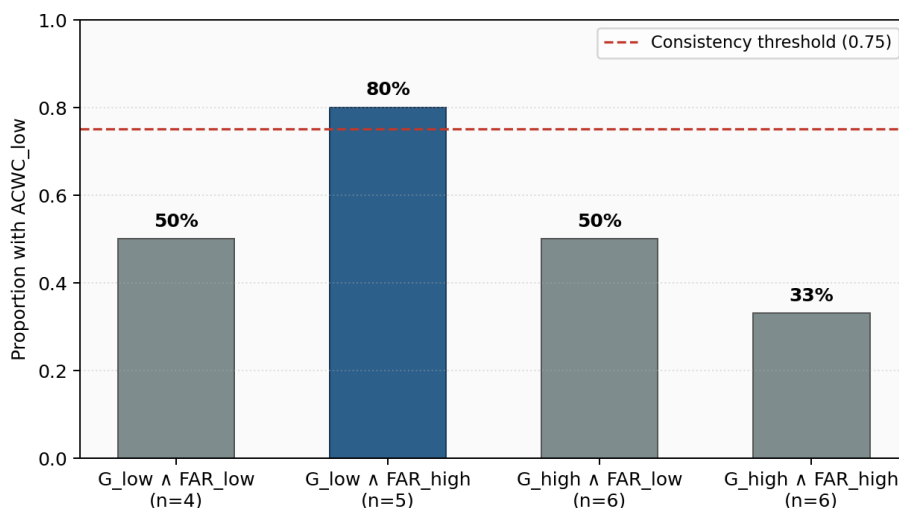


Figure 4. Proportion of Efficient Hospitals by QCA Configuration

Source: Authors' own creation.

Triangulation and hypothesis assessment. The predictive model shows that governance and autonomy are positively associated with ACWC in linear terms, while the configurational model identifies a specific nonlinear conditional pathway linked to improved performance. This complementarity between linear and set-theoretic methods indicates that financial performance depends on particular configurations rather than on individual variable levels.

Assessment of H1: Not supported. Both LASSO and csQCA indicate that hospitals with higher governance scores tend to exhibit higher weighted case costs. Elevated governance scores may reflect greater organizational complexity and administrative burden rather than efficient operational practices. Higher levels of formalization generate additional costs, particularly in institutions with more elaborate decision-making structures.

Assessment of H2: Partially supported, confirmed in configurational terms. The csQCA shows that financial autonomy is positively associated with performance only under low governance conditions ($G_low \wedge FAR_high$). LASSO does not support H2 in linear terms, but the csQCA confirms a conditional role for autonomy, highlighting the importance of accounting for causal asymmetry in complex public-sector environments.

From a theoretical perspective, these results underscore the limitations of models built on direct, additive relationships. Public hospitals operate within complex institutional architectures in which governance and autonomy interact in nonlinear ways. The findings point to the relevance of contingency-based theories and demonstrate the methodological value of combining regularization techniques with configurational logic, an approach that remains rarely applied in health management research.

In managerial terms, the results suggest tailoring governance reforms to each hospital's institutional capacity and complexity. High governance formalization does not guarantee improved performance and may even hinder efficiency when combined with high financial autonomy. Policymakers should therefore avoid uniform governance and autonomy prescriptions and instead adopt differentiated strategies that account for hospital size, resource structure, and managerial capacity.

5. Conclusions

This study provides a comprehensive analysis of how corporate governance and financial autonomy relate to public hospital performance, using a mixed-method approach that combines predictive analysis via LASSO with configurational analysis via csQCA. The results show that a linear relationship among variables cannot explain financial performance in public hospitals; instead, specific combinations of institutional conditions shape it.

Hypothesis H1 (direct governance–performance relationship) is not supported. Both analytical approaches indicate that hospitals with higher governance scores tend to exhibit higher weighted case costs. Formal governance mechanisms may, in certain contexts, reflect greater organizational complexity, including elaborate decision-making structures and extensive internal processes, that generate additional costs. High governance does not automatically translate into financial efficiency in public hospitals.

Hypothesis H2 (FAR conditions the governance–performance relationship) receives configurational support. The csQCA indicates that high financial autonomy contributes to lower costs only in the context of low governance formalization ($G_{low} \wedge FAR_{high}$). This finding points to a contingent role of autonomy: a hospital's capacity to manage resources flexibly becomes an advantage only when institutional constraints are limited.

The triangulation of the two methods supports the conclusion that emergent financial performance in public hospitals is not determined by the isolated actions of governance or autonomy, but by how they combine and condition each other within specific organizational configurations. The study emphasizes the need to go beyond unidimensional explanatory models and confirms the relevance of configurational analyses in health systems research. The study emphasizes the need to go beyond unidimensional explanatory models and confirms the relevance of configurational analyses in health systems research. Financial efficiency depends on each hospital's context and internal institutional architecture, rather than on nominal levels of governance or autonomy.

This study presents several limitations. First, the small sample restricts generalizability; the relationships identified should be understood as exploratory patterns rather than definitive causal models. Second, the analysis is cross-sectional, which prevents any assessment of governance–performance dynamics over time. Third, governance scores are derived from publicly available documents, which may introduce variation in information quality and reporting detail across hospitals. Fourth, a degree of temporal heterogeneity is present in the data, as reporting years

differ across hospitals, an unavoidable consequence of the uneven availability of public information.

Future research directions should include expanding the sample to a national or international comparative level, integrating longitudinal data to capture the evolution of governance mechanisms, and developing externally validated governance scores. Future studies could also examine the role of other configurational conditions, such as case complexity, service mix, staff structure, or degree of digitalization, to assess the extent to which these conditions shape the relationships identified in the present analytical framework.

Another limitation is the heterogeneity of reporting years, an inevitable consequence of the uneven availability of public information, which may introduce additional contextual variation.

These conclusions should be interpreted in the context of an exploratory approach, oriented toward generating hypotheses and governance scenarios, rather than toward validating universal causal relationships.

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Annex 1

Table A1. Empirical Data Used in the Analysis Model

ID	Governance	FAR	ACWC	G_high	FAR_high	ACWC_low
H1	27	44.99519	6659.548071	1	0	1
H2	26	83.19805	10044.08075	1	1	0
H3	25	36.19142	7767.664796	1	0	0
H4	24	65.08232	10231.2253	1	0	0
H5	24	79.94764	9060.178589	1	1	0
H6	24	59.31229	11801.38783	1	0	0
H7	24	89.34113	6692.185798	1	1	1
H8	23	84.68322	26405.94319	1	1	0
H9	22	67.68123	6322.904137	1	0	1
H10	22	99.38359	9255.179745	1	1	0
H11	18	75.05954	7424.948218	0	0	0
H12	19	79.45777	3965.416635	0	1	1
H13	23	67.74394	3982.608015	1	0	1
H14	16	87.22409	8570.648632	0	1	0
H15	16	75.33061	4422.254776	0	0	1
H16	12	97.86222	6884.927948	0	1	1
H17	17	89.94419	5279.816375	0	1	1
H18	23	83.4211	6941.201773	1	1	1
H19	8	99.97784	7015.394572	0	1	0
H20	16	48.33933	6669.869149	0	0	1
H21	19	68.51425	8074.119716	0	0	0

Note: Governance = composite governance score (0-28); FAR = Financial Autonomy Ratio (equity/total liabilities, %); ACWC = Adjusted Cost per Weighted Case (RON); G_high = 1 if Governance > 22 (median), else 0; FAR_high = 1 if FAR > 79.46 (median), else 0; ACWC_low = 1 if ACWC < 7,015.39 RON (median), else 0.

Source: Authors' own creation.

Annex 2

Table B2. Corporate Governance Matrix in Hospitals

Hospital ID	Transparency	Structures	KPI	Risk Management	Stakeholders	Ethics	Finacial Management	Governance Score
H1	4	4	4	4	4	3	4	27
H2	4	3	4	4	4	3	4	26
H3	4	3	4	3	4	3	4	25
H4	4	3	4	3	3	3	4	24
H5	4	3	4	3	3	3	4	24
H6	4	3	4	3	3	3	4	24
H7	4	4	3	3	3	3	4	24
H8	4	3	4	3	3	2	4	23
H9	3	4	4	2	3	2	4	22
H10	4	4	2	2	3	3	4	22
H11	3	3	3	2	2	2	3	18

Hospital ID	Transparency	Structures	KPI	Risk Management	Stakeholders	Ethics	Finacial Management	Governance Score
H12	3	4	3	2	2	2	3	19
H13	4	3	4	3	3	3	3	23
H14	3	3	2	2	2	2	2	16
H15	3	3	2	2	2	2	2	16
H16	3	4	1	1	1	0	2	12
H17	3	4	2	1	1	3	3	17
H18	3	4	3	3	2	4	4	23
H19	2	4	1	1	0	0	0	8
H20	3	4	3	2	1	0	3	16
H21	3	3	2	2	2	4	3	19

Source: Authors' own creation.