SESSION: GENERAL ISSUES OF CORPORATE GOVERNANCE

PREDICTION OF DEFAULT RISK IN ITALIAN MUNICIPALITIES

Eveny Ciurleo *, Alba Maria Gallo **, Ubaldo Comite **

* University of Calabria, Arcavacata, Italy
** Giustino Fortunato University, Benevento, Italy

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Abstract

This study addresses the growing phenomenon of financial default among Italian municipalities, focusing on early detection and predictive analysis. Although more than 350 municipalities have entered default since 2001 — especially concentrated in Southern Italy — no institutional early warning systems are currently in place. The research combines a systematic literature review (SLR) and an econometric analysis to identify the main drivers of fiscal distress and to develop a predictive model based on official administrative data. Using a dataset covering all Italian municipalities from 2014 to 2024, the study applies a weighted logistic regression model corrected through post-stratification to account for population structure imbalances. Results highlight the importance of variables such as tax pressure, financial autonomy, and population size in predicting default risk. The model achieves excellent predictive performance, validated through real-world case studies. These findings suggest that the proposed approach can serve as a reliable early warning tool for national and local authorities, enabling a shift from reactive crisis management to preventive governance. Future research will extend the model to other national contexts, including the U.S., to foster fiscal resilience in decentralized government systems.

1. INTRODUCTION AND INSTITUTIONAL BACKGROUND

In Italy, municipalities represent the core level of local government and are responsible for key public services such as education, transportation, urban maintenance, and social assistance. Over the last two decades, many municipalities have experienced increasing financial fragility, often evolving into severe budget crises.

Italian law defines two critical conditions for financial distress:

- Pre-default (*pre-dissesto finanziario*): a temporary situation in which the municipality maintains formal autonomy but must submit a multi-year recovery plan, approved by the Ministry of the Interior and the Court of Audit (*Corte dei Conti*), usually involving strict fiscal adjustments.
- Default (*dissesto finanziario*): an irreversible state in which the municipality declares insolvency and is placed under the control of a government-appointed commission (*Commissione Straordinaria di Liquidazione*), responsible for debt liquidation and budget rebalancing.

Financial default leads to reduced public services, suspended investments, and loss of administrative autonomy, with long-term reputational and financial consequences.

Since 2001, more than 350 out of 7,885 Italian municipalities have entered default, with a strong concentration in Southern Italy. Geospatial analysis of ISTAT and AIDA PA data, processed with R Studio, confirms that default risk is higher in socio-economically vulnerable areas.

Despite the relevance of municipal financial distress, institutional responses in Italy remain largely reactive, with limited emphasis on prevention. Currently, no official early-warning tools or predictive systems exist to identify municipalities at high risk of default.

This study addresses this gap through two objectives:

- analyzing economic, demographic, and financial factors that significantly shape default risk in Italian municipalities;
- developing an interpretable predictive model based on administrative data to detect high-risk municipalities in advance and support timely institutional intervention.

2. RESEARCH QUESTION AND METHODOLOGICAL APPROACH

This study is guided by the following research question:

RQ: Can the financial default of Italian municipalities be reliably predicted using publicly available administrative data and statistical modeling?

To answer it, the research design combines two phases:

- A systematic literature review (SLR), conducted according to the PRISMA protocol, identified 36 relevant publications (28 from

Scopus, 8 from Web of Science) on municipal distress, early-warning tools, and fiscal sustainability. The literature remains fragmented — especially in the Italian context — highlighting the need for data-driven approaches.

- A quantitative econometric analysis, based on a large dataset of Italian municipalities (2014–2024), was estimated through weighted logistic regression models with post-stratification to correct demographic imbalances.

The study pursues two main objectives:

- identifying the key economic and structural determinants of municipal default;
- developing an accurate predictive model to estimate the probability of default for each municipality.

A co-word analysis conducted with the bibliometrix package (biblioshiny) reveals four recurring thematic clusters in the literature:

- *Demography and Vulnerability*: population aging, depopulation, and social inequality as drivers of financial fragility;
- *Governance and Sustainability*: administrative capacity, transparency, and resource management as protective factors;
- *Technology and Policy Making*: emerging use of artificial intelligence and machine-learning tools to strengthen risk prevention and accountability;
- *Urban Planning*: environmental strategies, territorial cohesion, and adaptive capacity linked to long-term municipal resilience.

3. DATASET AND VARIABLES

The empirical analysis relies on a dataset that includes all Italian municipalities over the period 2014–2024, totaling more than 50,000 observations. Data were collected from ISTAT and AIDA PA and include 21 economic, demographic, and financial variables, such as population size, revenues, expenditures, debt levels, tax pressure, and indicators of financial and fiscal autonomy.

Municipalities were grouped into three size classes (small, medium, large) to capture structural differences. Since small municipalities are overrepresented in administrative datasets, post-stratification weights were computed using ISTAT population totals to ensure unbiased estimates. Additional data cleaning steps included median imputation of missing values and the construction of a binary outcome variable (default = 1, no default = 0).

A weighted logistic regression model was estimated to predict municipal default. Independent variables included financial aggregates, autonomy indicators, fiscal pressure, and population categories. All coefficients were statistically significant ($p < 0.05$), with results consistent with theoretical expectations: higher population size and tax burden increase default risk, whereas financial autonomy reduces it.

Model performance metrics show excellent predictive capacity. The model achieves an accuracy of 98.4% and an area under the curve of 0.9917, confirming a strong ability to distinguish between defaulting and solvent municipalities. Sensitivity reaches 99.6%, indicating an effective identification of high-risk cases.

To test external validity, the model was applied to the 2021 financial data of Afragola, a municipality that entered default in 2022. The predicted probability of default was equal to 1, correctly signaling an extreme-risk scenario. This validation procedure was replicated across the full dataset, confirming the model's robustness and its potential use as an early-warning tool for financial distress in local governments.

4. CONCLUSIONS AND IMPLICATIONS FOR POLICY AND FUTURE RESEARCH

The findings of this study have relevant implications for both operational practice and public policy.

Operationally, the proposed model offers a replicable, data-driven approach to anticipating financial distress before default is formally declared. By isolating statistically robust risk factors — such as tax pressure, financial autonomy, and population size — the model can support the development of early-warning tools for financial supervision, risk monitoring, and targeted interventions by institutions such as the Ministry of the Interior and the Court of Audit.

From a policy perspective, the adoption of predictive systems would enable a shift from reactive to preventive governance. Current interventions often occur when fiscal imbalances have already become irreversible. A predictive tool would allow authorities to detect early signs of fragility and activate recovery mechanisms in advance.

The methodological framework — combining logistic regression with post-stratification — also demonstrates high adaptability and can be applied in comparative international settings.

Building on these results, future research will extend the analysis to the U.S. local government system. Planned developments include: adapting the model to American institutional and fiscal structures; examining U.S. mechanisms for default prevention and risk monitoring; comparing early-warning systems across countries; assessing differences in structural risk and resilience; and exchanging methodological approaches to enhance predictive accuracy.

This international extension aims to deepen understanding of fiscal vulnerability in decentralized public finance systems and to support evidence-based strategies for preventing and managing local government financial crises.

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