

The new preventive alert mechanism in the Italian Crisis Code: A statistical approach for predictive insolvency analysis

Eugenio Brentari, Gloria Ermici, Andrea Zanetti

Department of Economics and Management, University of Brescia, Brescia, Italy

1. Introduction

The Italian bankruptcy law has always provided tools to act on companies that were already in a state of crisis, instead of creating a preventive alert mechanism. As a result, the bankruptcy law reform and the Crisis Code were introduced (Legislative Decree 14/2019).

This problem has been studied in detail by various authors in order to create ratings or predictive tools to anticipate the business crisis and the analysis of business continuity and especially the going concern (Chye Koh and Kee Low, 2004).

The “Going Concern Principle” is “the accountant’s firm model” (Sterling, 1968) and is the basis for the financial statements and represents, according to the international standard on auditing ISA 570¹, that the financial statements are prepared on the assumption that the entity is a going concern and will continue its operations for a foreseeable future. It is a mandatory requirement for the Italian Accounting Organism (2018) and the Italian Civil Code² for the Italian financial statement.

One of the consequences of the lack of going concern is the company’s economic and financial disequilibrium that leads the company to bankruptcy. For example, according to ISTAT’s data (Istat, 2023), bankruptcy in Italy in the first quarter of 2023 has had a 19.1% increase compared to the previous quarter.

Altman’s Z score model is one of the best known international predictive models (see Altman, 1968; 1970; 1993; 2002; Altman and Hotchkiss, 1995) and many authors proposed to adapt it to the Italian prospective (Alberici, 1975; Altman, Danovi and Falini, 2013). However, the Altman’s Z score model is not well applicable to the Italian company structure and size, characterized by micro and small enterprises (Bottani, Cipriani and Serao, 2004).

The new code has delegated to the *Consiglio Nazionale dei Dottori Commercialisti ed Esperti Contabili* (National Council of Chartered Accountants and Accounting Experts – CNDCEC, 2019) the task of developing warning indicators able to promptly detect and prevent the state of insolvency of companies in compliance with business continuity. The companies with the major prejudicial out of range indicators have to communicate the crisis state to the Chamber of Commerce.

The CNDCEC also determines five more indicators. If all these five indicators are out of range, the company has to communicate the crisis state to the Chamber of Commerce.

The application of the New Crisis Code, introduced in 2019 and subsequently amended, has seen the extension of the administrator’s responsibility, implying the need to adopt adequate organizational, administrative and accounting structures that are able to detect insolvency situations and to adopt corrective elements.

In July 2022 the New Crisis Code was modified, introducing different indicators, with a focus

¹ International Standard on Auditing 570 (2016), *Going Concern*. [https://www.ifac.org/_flysystem/azure-private/publications/files/ISA-570-\(Revised\).pdf](https://www.ifac.org/_flysystem/azure-private/publications/files/ISA-570-(Revised).pdf) (Last access: 16/05/2023)

² Art. 2423 bis Italian Civil Code, “the valuation of the items has to be done according to prudence and in view of the continuation of activity”.

on cash and payables. The previous indicators remain a tool for companies to check their organizational, administrative and accounting structures.

This paper aims to verify: *Are the indicators determined by the Italian law in 2019 the right tools to predict the companies' failure?*

2. Indicators

The selection of the indexes was carried out by the CNDCEC (2019) with the collaboration of the Central Financial Statements of Cerved, the database of the Italian chambers of commerce.

For this selection, it was necessary to consider a group of indicators that, combined with each other, were able to select a cluster of companies close to insolvency.

The objective was to identify a combination of indicators which were representative of income, equity or financial imbalance.

The selection steps are as follows:

- Univariate analysis of the indices: analysis of the forecasting capacity of the default of each index. With this approach, the most representative indicators have been identified for each area.
- Multivariate analysis of the indices of the previous point: identification of the signals which, when suitably combined, were able to achieve the preventive warning objective.

An objective quantitative approach has therefore been used. This approach is based on the computation of the median of the index concerning the subjects who presented a default situation in the following 36 months.

There were different critical thresholds, depending on the companies belonging to different sectors. For this reason, specific alert indices have been introduced.

3. The dataset

The dataset includes data about 20,000 small, micro and medium-sized enterprises (SME)³ with headquarters in the province of Brescia, Italy.

The dataset was downloaded by the AIDA dataset, following the definition by the European Union Commission Recommendation of 6 May 2003 concerning the definition of micro, small and medium-sized enterprises. The sample was determined with some mandatory requirements, as the headquarters in the province of Brescia and available financial statements concerning 2020.

Additional sample requirements were used to select only the micro enterprises as defined by the European Union Commission, that represents in 2020 the 94.8% of Italian active enterprises (Istat, 2022).

These additional requirements consider the enterprises with two of these three thresholds in 2020 financial statements:

- Total production value⁴ (A) < 2,000,000 EUR
- Employees < 10
- Total balance sheet assets⁵ < 2,000,000 EUR

³ Small, micro and medium-sized enterprises, as defined by the European Union Commission Recommendation of 6 May 2003 concerning the definition of micro, small and medium-sized enterprises.

⁴ *Total Production Value* is the sum of all the components of the Group A of the Economic Statement (Revenues from sales and services, change in work in process and finished goods, change in work in process on long-term contracts, internally generated fixed assets and other revenues and income except of financial incomes).

⁵ *Total balance sheet* is the sum of Receivables from Shareholders for Share capital, Fixed assets, Current Assets and Accruals and prepayments.

Each record considers economical e financial data from the 2020 financial statements published by Brescia's Chamber of Commerce. Firstly, the dataset calculates net equity > 0 , prejudicial indicator about the going concern of each SME. The dataset includes the early-warning indicators chosen by the CNDCEC with the thresholds calculated for the manufactured and industry business:

1. Financial expenses / Revenues from sales and services $< 3.0\%$
2. Net equity / Total balance sheet assets $> 7.6\%$
3. (Current assets + Cash and cash equivalents) / Short-term liability $> 93.70\%$
4. Cash flow / Total balance sheet assets $> 0.5\%$
5. Tax and social security debts / Total balance sheet assets $> 4.9\%$

Some of the SMEs' indicators are not available because of the simplified Italian balance sheets required for the SMEs. Especially the fifth indicator is available for only 161 SMEs. Therefore, for the data analysis and for the last results, it turned out to be necessary to consider the only first four indicators.

We proceed by comparing the results determined by the indicators of the 2020 financial statements with:

- Failed companies list from the *Court Law of Brescia*⁶;
- Inactive or ceased companies list from the *Brescia Chamber of Commerce*.

The reason of these comparisons is connected with the research question: *Are the indicators determined by the Italian Law the right tools to predict the companies' failure?*

4. Results

Table 1 shows the results of the prejudicial indicator (net equity > 0) and the following four indicators.

<i>Indicator</i>	<i>Total Companies in the sample (with data available) (A)</i>	<i>Number of out of range Companies (B)</i>	<i>% of the sample (B/A)</i>
Net equity > 0	19,999	2,389	11.95
Financial expenses/Revenues from sales and services $< 3.0\%$	16,732	2,872	17.16
Net equity/Total balance sheet assets $> 7.6\%$	19,855	4,933	24.85
(Current assets + Cash and cash equivalents)/ Short term liabilities $> 93.70\%$	19,787	4,837	24.45
Cash flow/Total balance sheet assets $> 0.5\%$	19,961	6,752	33.83

Table 1 Result of the analyzed indicators

Data show that the prejudicial indicator is out of range for 2,389 companies. With the Italian law, these companies (about 12% of the total sample) have to begin the early warning procedure with the local chamber of commerce.

The other companies (17,610) must verify how many indicators are out of range. This test is

⁶ The data includes the failures from 01/01/2020 to 31/10/2022 declared by the Court of Law of Brescia

shown in the Table 2. The 65 SMEs with four out of range indicators must begin the early warning procedure with the chamber of commerce. With the application of the new Italian Law, the 12,27% of the total sample must begin the early warning procedure.

<i>Number of out of range indicators</i>	<i>Companies (A)</i>	<i>% of the sample (A/17.610)</i>
0	8,472	48.11
1	4,000	22.71
2	1,948	11.06
3	644	3.66
4	65	0.37
Lack of 1 or more indicators ⁷	2,481	14.09

Table 2: Out of range indicators

<i>Number of out of range indicators</i>	<i>Companies (A)</i>	<i>% of the sample (A/1,600)</i>
0	186	11.63
1	158	9.88
2	160	10.00
3	171	10.69
4	65	4.06
Lack of 1 or more indicators	860	53.75

Table 3: Inactive or ceased companies

After these analyses, how many companies have really ceased or failed? We compare this data with:

- the failed companies list of the *Brescia Court of Law*;
- inactive or ceased companies list from the *Brescia Chamber of Commerce*.

The companies which are declared failed by the Brescia Court of Law in the period 01/01/2020 – 31/10/2022 are about 399. None of these are included in our sample. This point could be explained by the Italian Failure Law, which declares that some dimensional requirements are necessary for the declaration of failure. These requirements exclude most of the micro and small enterprises. With the sample of the SMEs in Brescia we can analyze the inactive or ceased companies in 2020, 2021 e 2022 and their out of range indicators with Table 3.

<i>Number of out of range indicators</i>	<i>% of the total sample (17,610)</i>	<i>% of the inactive or ceased Companies (1,600)</i>	<i>Difference</i>
0	48.11	11.63	-36,48
1	22.71	9.88	-12,83
2	11.06	10.00	-1,06
3	3.66	10.69	+7,03
4	0.37	4.06	+3,69
Lack of 1 or more indicators	14.09	53.75	+39,66

Table 4: Comparison of inactive or ceased companies (total sample)

⁷ The simplified balance sheet for the Italian SMEs doesn't allow to calculate some of the indicators.

Data show a higher presence of out of range indicators in the inactive or ceased companies list if compared to the total sample. Data are also shown in Table 4.

5. Conclusions

This paper analyses the 2020 financial statements of the SMEs in Brescia with the failure companies list of the Court of Law of Brescia and the inactive or ceased companies by the Brescia's Chamber of Commerce. None of the companies in the sample failed in 2020, 2021 and 2022: this point is not enough to declare that indicators are not the right tools to predict the crisis state for the Italian SMEs.

One of the possible causes could be the technical and legal times for the bankruptcy declaration by the Court of Law, especially in 2020 with the suspension introduced by the Law decree 23/2020 in the Covid-19 period (09.03.2020 – 30.06.2020)⁸.

A further possible cause could be that the lack of going concern emerges after the three years analyzed, therefore, for example, in 2023 or 2024. For this reason, the research could be extended with the 2023 and 2024 bankrupt data from the Brescia Court of Law.

A final possible cause could be the non-compliance by companies with the reporting obligation and absence of calculation of the indicators.

Data also show a correlation between the presence of out of range indicators and ceased or inactive companies. These indicators seem not to be the best tools to predict the companies' failure, especially for the SMEs with the Italian simplified balance sheets, but in our opinion and by analyzing data, these are a step forward for the introduction of prediction analysis and for business management.

The research could be extended with the 2021 or 2022 financial statements or with the analysis of others Italian provinces. Furthermore, the research could be extended with the new indicators introduced in the 2022 modifications.

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⁸ D.L. 23/2020, art. 10, "All appeals pursuant to articles 15 and 195 of the R.D. 16 March 1942, n. 267 and 3 of the legislative decree of 8 July 1999, no. 270 deposited in the period between 9 March 2020 and 30 June 2020 are not procedable".

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