Financial constraints prediction: an application of Neural Networks to the Italian manufacturing industry

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This study applies a neural network framework to optimize the classification of firms and to predict their difficulties in collecting external financial resources in the short term. In detail, we adopt replicated bootstrapped algorithms optimized on sensitivity and specificity as error measures and we propose a comparative analysis to identify the best-performing one. According to our results, the Conjugate gradient backpropagation with Fletcher-Reeves updates (i.e., CGF) is the best-performing algorithm, with sensitivity equal to 74.41% and specificity equal to 70.11%. Then, we use this algorithm and its weights to provide a classification of the Italian manufacturing industry in 2019, identifying the geographical areas in which firms under financial constraints are located, as well as the most critical industrial sectors. Based on this evidence, we highlight interventions by policy makers to support firms' access to the capital market, fostering their investments and the consequent socio-economic development.