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Supervised and semi-supervised depth-based classifiers

The relationship between ownership structure and company performance remains one of the most important topics of management and finance research. The review of existing studies reveals mixed results on relationship between both ownership concentration and ownership by different shareholders and company performance. Limited research was devoted to such relationships in emerging, post-transition economies which offer a unique opportunity to examine the patterns of firms' reactions to dramatic institutional change and a shift in the allocation of control rights.

In the talk the links between company ownership structure and financial performance in the context of the Polish stock market will be discussed. We will present empirical evidence that ownership concentration is negatively related with company's ROA, supporting expropriation and collusion theories. These findings are additionally supported by the analysis of dividend payouts that we also find to be lower under concentrated ownership.

In recent years a broader than only financial perspective on company performance is gaining importance, encouraging companies to follow ESG best practices. In the talk the current trends following introduction of the non-financial reporting directive (NFRD) will be discussed. In this context a relationship of ownership structure on social reporting will be presented.

Depth functions have been largely used in supervised learning for years.

Their success is due to three main strengths: first, they are extremely easy to define and interpret; second, they are parameter-free, which makes them particularly appropriate when there is a lack of knowledge about the data distribution; third, they are typically robust to the occurrence of many types of contamination in the data. Based on depth functions, the so-called DD-classifiers (Li et al., 2012) and their extensions have been widely exploited in many fields, including functional and directional data analysis (Pandolfo et al., 2018, Vencalek et al., 2020, Demni et al., 2021).

However, the use of depth-based classifiers has not been investigated within a semi-supervised learning context. Semi-supervised learning refers to the case where the classification variable in the training set is affected by missing values. In such a case, it has been proved that including, rather

than discarding, the unlabeled observations can improve the overall performance of a classifier.

Accordingly, this work first revises supervised depth-based classifiers and then proposes to combine semi-supervised learning

techniques and DD-classifiers by extending the standard DD-classifier, which is optimal under some quite broad circumstances, to the semi-supervised setting.

The attention is focused on two well-known semi-supervised classifiers: the Linear Discriminant Analysis (LDA) and the Support Vector

Machine (SVM). A semi-supervised depth-based classifier is then obtained by combining them with a depth-based technique. Performance in both supervised and semi-supervised contexts is evaluated using both simulated and real datasets.

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This is a joint work with Simona Balzano and Mario Guarracino (both from the University of Cassino and Southern Lazio).

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