

In this presentation, we explore a graph-based approach to corporate default modelling and risk assessment of SMEs by focusing on the complex network of company connections. We demonstrate how defaults propagate through this network, affecting other companies based on the strength of their connections, and how this information can be used to enhance credit scoring, particularly for newly founded companies with limited financial data.

Companies can be connected through various channels, such as ownership structures, common senior staff roles or supply chain relationships. These connections can be represented as directed or undirected edges, and in some cases weighted with factors such as ownership share. Even after discretising weighted edges, the total number of connection types is of the order 10^3 . Therefore, some type of categorization of connection types is necessary. The “connection strength” between companies, determined by the different types of edges, strongly influences how defaults spread to neighboring firms.

In the talk, we discuss how such categorization of edges into “connection strength” groups is possible using historical default data and network analysis techniques. We then explore some of the variables which can be derived from these groups, and how they can be incorporated into the credit score of companies. Training variables of this kind, where we are in essence taking a weighted average of default probabilities of connected companies, introduces the challenge of circular reference. This arises because for a given company C , the default probabilities of companies connected to C are a function of the default probability of C . We discuss some of these challenges along with possible mitigation strategies.

We present empirical results from our dataset, which includes information on all Icelandic firms for the past 5 years. We give an overview of the predictive strength the network-based variables provide. The results are the most promising for newly founded companies, where financial information is lacking.