Credit Risk Modelling for SMEs: a Spatial Analysis

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Abstract
This paper develops a credit risk model for small and medium-sized enterprises (SMEs) in the United Kingdom. As predictors of company creditworthiness, in addition to a set of company-specific characteristics (e.g., financial ratios) and contextual characteristics (e.g., socio-economic indicators in the region), we include the average risk of default of neighbouring companies (“local” risk of default). Indeed, companies are not simply independent economic agents competing for customers on markets. They exchange information and goods to allow production, they are linked by supply-customer financial transactions with some companies extending trade credit to other firms. In a networked economy where companies borrow from each other, a temporary shock to the liquidity of some firms may cause a chain reaction, in which other companies may also experience financial difficulties, thus leading to correlation in default probabilities for connected firms. When data contain such source of correlation in the dependent variable, conventional estimators are known to be biased, thus also affecting default probabilities.

We employ a sample consisting of over 6 million accounts of unlisted firms during the period 2009-2014. For each company, we define its neighbourhood by taking all companies located in the same geographical area and use information from the Input-Output Supply and Use Table to identify those that are potentially linked by financial transactions with the company. To estimate our credit risk model we use the generalized method of moments by Klier and McMillen (2008) designed for estimating large logistic models with spatial dependence. In our analyses, we compare the prediction performance and estimated parameters of a conventional credit risk model with that of a credit risk model that incorporates our measure of local risk of default.

We find that including our measure of local risk of default makes a significant contribution to increasing the default prediction power of risk models built specifically for SMEs. Our results may help bankers to improve their credit scoring of SMEs ultimately reducing their tendency to place unnecessary restrictions on credit.

1 The authors acknowledge financial support from EPSRC (grant number EP/L021250/1).
2 The authors are in the process of gathering data on financial transactions between companies. Once collected these data, they will use the (true) financial transactions in the definition of neighbourhood for each company.