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Implicit rating: A potential new method to alert crisis on the interbank lending market

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ABSTRACT

A new measure called "implicit rating" is introduced as a potential component of an early warning system. It relies on the aggregation of experts' knowledge hidden in transactional data of the interbank market of unsecured loans. Banks simultaneously assess each other's creditworthiness which is reflected in partner limits and interest rates. In the Hungarian interbank market the overall trading volume and the average interest rate showed no negative trends before the crisis of 2008; however, the average implicit partner limit started to decrease several months earlier, hence it might serve as a stress indicator both at system and bank level.

1. Introduction

Setting up early warning systems to alert financial crises and detecting the systematically important financial institutions (SIFIs) became critical issues for the regulators after the recent global financial crisis (BCBS 2011a, 2011b, and Tabak et al., 2016); however, there is no consensus on the right methodology. On the one hand the increasing amount of granulated information (e.g. detailed network data) may serve as a solid base for sophisticated quantitative analysis; on the other hand, commonly used analytical methods may have little relevance within certain conditions, see Acemoglu et al., (2015).

Early warning systems are mostly based on high powered econometrics (eventually supported by artificial neural network systems) to exploit the information hidden in market data, (Wilmott, 2006; Brussiere and Fratzscher, 2006, Davis and Karim, 2008; Kim et al., 2009; Balboa et al., 2015; Sohn and Par, 2016; Banbula and Iwanicz-Drozdowska, 2016). Sun and Li (2009) propagate a different approach which relies on the experts' knowledge by applying innovative group decision making procedures. Alessi et al., (2014) compare the effectiveness of nine early warning systems in predicting banking crises. They conclude that multivariate models performed better than simple signaling models.

In this paper, a new measure is introduced which can serve as an additional explanatory variable in multivariate warning systems. It relies on the aggregation of experts' knowledge hidden in transactional data of the interbank market of unsecured loans. When lending each other, banks are simultaneously assessing the creditworthiness of their partners which is reflected

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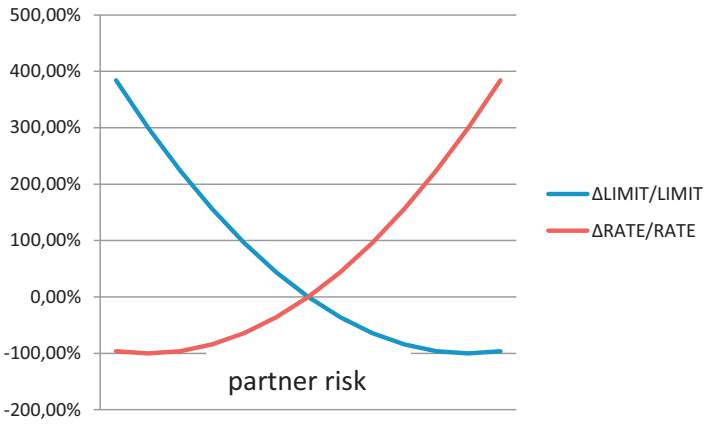

Fig. 1. Simultaneous adjustments of the interest rate and the partner limit, an illustration.
Source: the author.

in the partner limits (quantity adjustment) and the interest rates of the loan (price adjustment). This information can be mined out and aggregated into an indicator called "implicit rating" for each bank which can be easily monitored by the regulator.

In Section 2 the proposed measure is presented. In Section 3 it is applied to the Hungarian interbank market between 2003 and 2012. In Section 4 the results are analyzed, while in Section 5 conclusions are derived.

2. The proposed method

It is a well-documented empirical fact that credit markets do not clear out by price adjustments, i.e. lenders limit their supply of credit even if borrowers are willing to pay a higher interest. This phenomenon is called "credit rationing" which can be explained by adverse selection (Stiglitz and Weiss, 1981), moral hazard (Holmstrom and Tirole, 1998) and Guttentag and Herring, 1984)); or stochastic collateral (Jones, 1995). In all these papers increased partner risk (due to idiosyncratic or systemic factors) leads to increased credit rationing, hence decreased partner limits. Homolya et al., (2013) examined the practice of Hungarian banks and verified that partner limits depend most of all on the riskiness of the partner.

Without analyzing the possible causes of credit rationing, we suppose a strong negative correlation between partner risk and partner limit. More precisely, we assume that interest rates and partner limits adjust simultaneously but in opposite directions. When the riskiness of the jth bank increases, some of their potential partners perceive this and react in two ways at the same time: (i) they increase the interest rate and (ii) decrease their partner limit toward bank j. Fig. 1 illustrates this double-sided adjustment process.

Of course, the exact shape of these functions is not known, and we only assume that higher partner risk (= less attractive partners) goes with higher interest rate and lower partner limit (= less favorable loan conditions). Based on this idea, both partner limit and interest rate are linearly combined into a so-called implicit rating formula (IR), which is designed to reflect the relative attractiveness of the jth bank seen by the other banks:

$$IR_j = \alpha \cdot \frac{\Delta L_j}{\bar{L}} - (1-\alpha) \cdot \frac{\Delta R_j}{\bar{R}} \tag{1}$$

where

- α is the weight of quantity adjustment ($0 \le \alpha \le 1$)
- L_j is the average partner limit toward bank j (equally weighted)
- R_j is the average interest rate of bank j (volume weighted)
- Δ is the difference from the average
- $\bar{L}$ is the average partner limit toward all banks (equally weighted)
- $\bar{R}$ is the average interest rate of all banks (volume weighted)

Data on interest rates are usually available for the regulator, but unfortunately, partner limits are kept in secret. Hence, we can only approximate these by estimations obtained by analyzing transactional data, see next section.

This measure is called "rating" because it characterizes the credit/counterparty risk of the given bank. If it is strongly positive, then the bank is considered as a relatively good borrower, whereas its negative value indicates high counterparty risk. It measures the creditworthiness "implicitly" because it can be calculated inversely from market transactions. In the next sections we explore each component (implicit partner limits and interest rates), and then combine them into (1) with different weights.