ESTIMATION OF DEFAULT PROBABILITY FOR LOW DEFAULT PORTFOLIOS

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Abstract. *This article presents several approaches to estimating the probabilities of default for low default portfolios, their advantages and disadvantages, and provides exemplary calculations using data of one external credit register of Lithuania. The results show that three approaches seem to be most appropriate: those of K. Pluto and D. Tasche (2005) without correlation, and those of N. M. Kiefer (2006) and A. Forrest (2005) without correlation. The first one could be easily implemented by banks; however, if the ordinal ranking of obligors is incorrect, then the monotony of probabilities of default is not ensured. The same problem exists with the second approach. The A. Forrest (2005) approach without correlation ensures the monotony of default probabilities and allows estimating conservative PDs; however, it requires programming skills, otherwise iterative recalculation will be very time-consuming.*

Key words: *low-default portfolios, probability of default*

Introduction

According to the New Capital Adequacy Directive, banks applying the internal-rating-based approach have to estimate their own probabilities of default (thereinafter PDs) for their obligors. However, in practice a substantial part of bank assets often consists of low default portfolios. This impedes not only the development of a statistical scoring model, but also the estimation of PDs and other credit risk parameters, as well as the validation process. The key concern for regulators is that credit risk might be underestimated because of data scarcity. Supervisory requirements (Basel II, New Capital Adequacy Directive and local supervisory regulations) provide no excuse or relief for low default portfolios (thereinafter LDP). To avoid excluding LDPs from the internal ratings based approach, it is recommended to use some data-enhancing tools. Banks should put more emphasis on alternative data sources, apply alternative methods with more emphasis on qualitative tools. At the same time, the Basel Committee on Banking Supervision (BCBS, 2005b) has advised to use larger margins of conservatism if an uncertainty in PDs estimated for LDPs remains.

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Defining LDP is not a straightforward task. Different authors and supervisory institutions have used different definitions of LDP (see BBA, LIBA, ISDA 2004; 2005; FSA 2005; CEBS 2006; Bank of Lithuania 2006a). For example, the Bank of Lithuania defines LDP as a portfolio with only few actual defaults, or a portfolio free from any actual defaults. As all these definitions have the drawback of being judgmental and introduce the question of degree, the FSA (2006) proposed using a concrete number of defaults in order to define LDP without taking into account the total portfolio size. It was proposed to use 20 defaults on the rating level; this definition will be used further in this article.

Till now, the problem of LDPs has not been analysed by Lithuanian researchers. L. Dzidzevičiūtė (2010b) only mentioned the LDP problem in the context of statistical scoring model development.

Even though there is a range of statistical techniques available to choose from, there is no consensus on the best technique to estimate PDs for LDPs. Various authors have proposed the approaches related to rating transition matrices and bootstrapping, the distribution of numbers of defaults and simulation, the CAP and ROC curves, macroeconomic variables, etc. The purpose of this article is to analyze various approaches to PD estimation for LDPs, their advantages and disadvantages, to provide a comparative analysis and exemplary calculations. The LDP problem has an effect on the statistical scoring model development, the estimation of credit risk parameters and their validation. The Basel II determines three credit risk parameters needed to calculate risk-weighted assets and expected loss amount; these are the probability of default (PD), loss-given default (LGD) and exposure at default (EAD). The article focuses on the estimation of only one risk parameter – PD.

Part 1 of the article shows the spheres of the LDP problem, approaches to PD estimation for LDPs, and Part 2 presents exemplary calculations with data of one external credit register of Lithuania, defining LDP as a rating having no more than 20 actual defaults.

1. Comparative analysis of PD estimation approaches to LDPs

1.1. The spheres of LDP problem

Often, the insufficiency of defaults impedes the development of statistical scoring models. However, if obligors are assigned to ratings based on the result of expert scoring models, the LDP problem is not actual (see Fig. 1). When obligors are already assigned to ratings, banks applying the internal ratings based approach for capital adequacy calculation purposes have to estimate PD for each rating (Directive, 2006). To estimate the rating PD is recommended even for banks that not apply internal ratings based approach (Dzidzevičiūtė, 2010b). Rating PD may be estimated applying various methods (see Table 1).