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Risk management of non-maturing liabilities ☆

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Abstract

Risk management of non-maturing liabilities is a relatively unstudied issue of significant practical importance. Non-maturing liabilities include most of the traditional deposit accounts like demand deposits, savings accounts and short time deposits and form the basis of the funding of depository institutions. Therefore, the asset and liability management of depository institutions depends crucially on an accurate understanding of the liquidity risk and interest rate risk profile of these deposits.

In this paper we propose a stochastic three-factor model as general quantitative framework for liquidity risk and interest rate risk management for non-maturing liabilities. It consists of three building blocks: market rates, deposit rates and deposit volumes. We give a detailed model specification and present algorithms for simulation and calibration. Our approach to liquidity risk management is based on the term structure of liquidity, a concept which forecasts for a specified period and probability what amount of cash is available for investment. For interest rate risk management we compute the value, the risk profile and the replicating bond portfolio of non-maturing liabilities using arbitrage-free pricing under a variance-minimizing measure. The proposed methodology is demonstrated by means of a case study: the risk management of savings accounts.

JEL classification: G12; G21; G31
Keywords: Demand deposits; Liquidity risk management; Interest rate risk management; Arbitrage-free pricing; Non-parametric HJM model

☆ The views expressed in this paper are those of the authors and do not necessarily reflect the position of Deutsche Bank AG or Münchener Rückversicherungs-Gesellschaft.

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1. Introduction

1.1. Importance of non-maturing liabilities in the AL management

The asset/liability problem that depository institutions face is quite simple to explain – although not necessarily easy to solve. A depository institution seeks to earn positive spread between the assets it invests in (loans and securities) and the cost of its funds (deposits and other sources). The spread income should allow the institution to meet operating expenses and earn fair profit on its capital.

In generating spread income a depository institution faces several risks, most important credit risk, interest rate (or funding) risk and liquidity risk. The management of interest rate and liquidity risk is particularly difficult for non-maturing liabilities, i.e. deposits without a specific maturity or deposits whose actual time horizon significantly differs from their contractual maturity. Non-maturing liabilities include most of the traditional deposit accounts like demand deposits, savings accounts and short time deposits and form the basis of the funding of depository institutions. Therefore, the asset and liability management of depository institutions depends crucially on an accurate understanding of the liquidity risk and interest rate risk profile of these deposits.

For quite some time bank regulators have been aware of the significance of proper risk management for non-maturing liabilities but also of the difficulties. In fact, uncertainty about measuring interest rate risk for these deposits was one factor in not adopting formal interest rate capital guidelines for banks' non-trading positions (see Federal Reserve, 1995; O'Brien, 2000). Recently several consulting papers proposed the introduction of a capital charge for institutions with a high exposure to interest rate risk arising from banking book items like non-maturing deposits (BIS, 1999; EU, 1999). These new regulations will increase the pressure on depository institutions to use transparent quantitative methodologies for the risk management of these positions.

1.2. Quantitative risk management techniques

The central problem in the risk management of non-maturing liabilities is the assignment of a maturity profile to these liabilities or, equivalently, the construction of a replicating bond portfolio with fixed maturities. Many banks use the following approach:

1. First the core of a balance position is determined, then the floating part is defined as balance minus core.
2. The floating part is invested in the overnight (O/N) bucket. The core is subdivided into portions which are invested in different time bands. Maturing tranches are reinvested in the same time band.

The subdivision into floating part and core portions with different maturities is usually done in a rather arbitrary way without theoretical justification. In fact, despite its significance this problem is still relatively unstudied.