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## Segments of Money Market Yield Curves in a Dealers Model of Optimum Interest Rate Margin

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### Abstract

The paper deals with interest rate volatility interpretation in the dealer's model of optimal interest margin. It defines main sources of interest rate volatility and studies how specific source of volatility influences optimal interest margin. Special attention is focused on unexpected shock in liquidity of banking system, actual central bank's decision on targeted level of interest rate, long-term deviation of inflation and output from central bank's targeted values and potential impact of these factors on term premium instability. Sources of interest rates are discussed in term of bank's refinancing/reinvestment risk with an attempt to formalize interest rate volatility for further empirical research. The conclusion is that dealer's model of optimal interest margin is consistent with only permanent shocks to banking system liquidity and long-lasting central bank's surprises with its monetary policy that increase a level of refinancing/reinvestment risk faced up by banks. On the other hand it is not consistent with interest rate volatility caused by transitory liquidity shocks, expected current changes in central bank's targeted main policy rate and long run trends in main policy rate based on disinflation.

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### 1. Introduction

A traditional approach to transmission through the bank channel relies on an assumption that lending and deposit rates follow the movements of central bank's main policy rate while especially the level of interest rate on credits

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has restrictive and/or expansive effects. This approach does not usually have any microeconomic fundaments that necessarily lead to the finding that banks manage credit and deposit rates in the sense of interest margin. Without change in interest margin a change in the costs of financing through bank credits would cause the respective change in yields from bank deposits whereas the final effect of this change would be connected only with different structure between the recipients of bank credits (mainly the corporate sector) and creators of bank deposits (mainly the household sector) and/or with different marginal inclination to consumption/investments and interest elasticity of the function of savings supply and demand for credits.

Models of optimum interest margin of banks bring about an important approach to the mechanism of interest margin determination from the banks point of view that are in the imperfectly competitive banking market in the position of market makers determining individually the spread of deposit and lending rates. The use of these models by central bank for the analysis of monetary conditions allows understanding why under certain conditions the interest margin behaves in opposite direction to central bank's main policy rate. Nevertheless, models of optimum interest margin suffer from simplification when based on the existence of refinancing/reinvestment risk they automatically consider increasing/decreasing variability of interest rates on money market as the cause of an increase/decrease in the interest margin.

The objective of the present study is a theoretical analysis of main segments of money market yield curve in terms of sources of interest rate variability such as unexpected shock in the aggregated liquidity of the banking system, central bank's decision on a change in main policy rate, long-term deviation of inflation and output from the values targeted by central bank and related transmissions into the instability of term premium incl. their potential impacts on the interest margin of banks.

## 2. An Interest Rate Risk on Money Market in a Dealer's Model of Optimum Interest Margin

The pioneer paper of Ho and Saunders (1981) presented a classical approach to the management of interest margin. The authors defined the basic determinants of interest margin as imperfect competition on the bank market, risk aversion of a bank, volatility of interest rates and the size of demand for credits and/or supply of deposits. The model of the optimal interest margin was subsequently developed in the studies of McShane and Sharpe (1985), Allen (1988), Angbazo (1996), Saunder and Schumecher (2000), and Maudos and Fernandez de Guevara (2004) while the original approach was enlarged by the factors such as credit risk, level of operating costs and influence of regulatory measures. The model does not involve a scenario when the banking sector undergoes a dramatic change in the institutional structure and a jump change in the behaviour of banks and their clients like in transition economies that will influence the stability of the interest rate transmission mechanism of monetary policy at the stage of transmission of changes in market interest rates into client interest rates.

The model of the optimal interest margin assumes that on the side of the supply of savings the bank is taken as a passive recipient of deposits, on the side of the demand for savings the model leaves a space for a scenario that the bank will restrain the supply of credits. The bank accepts deposits and grants credits the maturity of which goes beyond the horizon of a short period the bank takes into account for determination of an optimal interest margin. The bank grants credits and accepts deposits at fixed "long-term" lending and deposit interest rate  $IR_L$  and  $IR_D$  whose level is based on a mark-up to the actual market interest rate  $IR_M$ .

According the model supply of deposits and demand for credits are random variables. The probability of granting a loan and receiving a deposit is simulated as Poisson's process, and it is a decreasing function of the size of the margin on the loan and deposit market  $a$  and  $b$ . The exposure of a bank to interest risk means that the supply of deposits may be realised at a different time moment than the demand for loans. In this case the bank gets into a speculative position on the money market when it is exposed to refinancing or reinvestment risk due to the fluctuation of interest rates. The interest margin  $a + b$  is considered as the bank's earnings for the risk of an unexpected future change in interest rate and consequent loss of the bank's net worth in relation to the potentially unbalanced position between the volumes of new loans (L) and deposits (D). The bank decides on the size of interest margin to maximise the expected net worth ( $W^e$ ) at the end of the period for which the rates  $IR_L$  and  $IR_D$  were fixed. This aim is achieved at the moment when margin  $a$  and  $b$  are fixed so as to minimise the risk of imbalance between the supply of deposits and demand for credits. The optimal interest margin is given by this equation:

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