

# WHY ARE SAVINGS ACCOUNTS PERCEIVED AS RISKY BANK PRODUCTS?

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## Abstract

Risk management for banking products can be challenging in general, but is even more risky in a global, low interest rate environment. This paper deals with the risk management of savings accounts, a bank product defined as a non-maturing account with embedded option that bears a relatively attractive rate of return. We focus on the interest rate risk of savings accounts. By constructing the replicating portfolio and simulating market rates and client rates, we show that under the severest scenario, some banks in the Czech Republic might face a significant capital shortage in next two years if market rates start to increase dramatically from recent low levels. We conclude that savings accounts are riskier liabilities than current accounts and term deposits for banks. Moreover, we propose imposing stricter regulation and supervision on these bank products since they might increase systemic risk of the Czech banking sector in coming years.

**Keywords:** bank, demand deposits, interest rate risk, replicating portfolio, risk management, savings accounts, simulations

**JEL Classification:** C150, G21, G11

## 1. Introduction

Banks are financial intermediaries that are engaged in a financial process focussed on a maturity transformation from short-term funding to long-term financing. Banks usually collect money from retail customers through standard channels: sight deposits (current accounts), term deposits, and a new channel: savings accounts. In this paper, we focus on the risk management of the later and follow Maes and Timmermans (2005) stating that savings deposit accounts raise important financial stability issues in Belgium because they represent a significant proportion of bank liabilities leading to huge maturity mismatching.

The significance of savings accounts has been increasing in the Czech banking sector and their volume amounted approximately to CZK 400 billion or 15% of total banks' deposit funding as of 31 May 2015. Such high volume is alarming mainly due to the fact that it happened during a low interest rate environment starting in 2012. This means that banks collecting large amounts of funds through savings accounts can reinvest the deposits

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only into low yield bearing instruments (either on the financial market or as loans and mortgages). Despite this limitation, savings accounts are characterized by a relatively high deposit rate stemming from client's expectations, on the one hand, and banks' offensive marketing strategies to attract and maintain clients on the other hand.

The aim of this paper is to describe the interest risk management of savings accounts from both theoretical and practical points of view. We aim to show that low market rates and the aggressive acquisition of clients through a high deposit rate bearing savings accounts will result in significant interest rate risk in some Czech banks in the future when market rates increase. In our research we follow conclusions of Bank of England (2013) and International Monetary Fund (2014) warning that suddenly increasing market rates resulted from central banks' monetary policy actions will have a negative impact on banks and other financial institutions. On a related note, the recent following works underpins the importance of our research topic. Mandel and Tomšík (2014) analyse the interest rate transmission mechanism of monetary policy and credit channel, while Zamrazilová (2014) discusses implications of non-conventional monetary policy instruments during a global, low interest rate environment. Last but not least, the theoretical part of this article fills the gap in the lack of academic research. As far as we know, only Strnad (2009) focussed on interest rate risk of demand deposits in Central and Eastern Europe. The following text is structured as follows: Section 2 discusses the characteristics of savings accounts, their risk management and dynamics in the Czech Republic. Section 3 describes the model and Section 4 provides empirical research of the interest rate risk management of savings accounts in the Czech Republic. Section 5 concludes the paper.

## 2. Theoretical Background

### 2.1 Savings accounts

We define savings accounts as a deposit on demand characterized by unlimited disposability, high deposit rates and low fees for maintenance and account operations. Savings accounts are non-maturing liabilities that combine the common features of current accounts (withdrawal on a notice) with the common features of long-term deposits (higher deposit rates). These characteristics are embedded in the structure and operations of savings accounts, which transforms them essentially into a product with embedded options, *i.e.* a product with uncertain timing of future cash flows and uncertain pricing (*i.e.* savings accounts' deposit rate can be changed at any time by a bank). The possibility of changing a deposit rate increases the flexibility of a bank since it can quickly react to changes in market rates/competition. However, in reality, deposit rates are not changed immediately due to administrative and transaction costs.

### 2.2 Behavioural patterns hidden behind savings accounts

We distinguish two types of agents and their behavioural patterns: banks' bidding for clients and interest rate sensitive and financially aware clients bidding for the highest return.

First, we focus on banks' bidding for clients. Savings accounts with relatively high deposit rates have become attractive acquisition instruments, especially for newly established financial institutions. This is due to several reasons: (i) acquisition of client information, (ii) cross-sell, (iii) attractive instrument bearing a relatively high return in time when yields are

rather low (potential inflows of money from clients who would otherwise invest elsewhere when market rates would be higher) and (iv), liquidity to boost balance sheet.

We can observe three types of different pricing strategies of banks that offer savings accounts: a low-cost bank, a traditional bank and a third type bank. First, many new (low cost) banks have entered the market during the last 5 years in the Czech Republic. Those banks focus on offering low-cost (a zero-fee policy) deposit products with relatively high rate of return that can be operated entirely or almost entirely through the internet. We observe that new banks focus on savings accounts as on a primary source of funding (in the extreme case, savings accounts may amount up to 90% of bank's liabilities as documented by results of some small banks in the Czech Republic, see Table 1). A high share of savings accounts in liabilities implies higher cost of funding. Furthermore, these banks need to attain relatively high deposit rates on savings accounts; a high deposit rate is the most important factor that attracts and retains their clients. For these banks, in our analysis, we expect aggressive pricing of savings accounts. Second, a traditional bank is a well-established bank that has a diversified funding source. Clients are usually more loyal to the traditional bank as the traditional bank can offer them a wide portfolio of services and products. This loyalty implies higher stability of deposits in the traditional bank. Additionally, the traditional banks usually charge higher fees compared to the low-cost banks, which represents an important source of income. For this type of bank, we assume less aggressive deposit pricing. Third, a third type bank is a residual category since not all banks can be considered to be either as the low-cost or the traditional banks.

**Table 1 | Representative Balance Sheets of Banks as of 31 December 2013**

Air Bank		ČSOB		Česká Spořitelna	
Assets	Liabilities	Assets	Liabilities	Assets	Liabilities
Bonds 43%	CA 5%	Bonds 43%	CA 29%	Bonds 28%	CA 26%
Retail Loans 5%	SA 83%	Retail Loans 31%	SA 21%	Retail Loans 34%	SA 5%
Other 51%	Other 12%	Other 26%	Other 50%	Other 38%	Other 69%

Note: CA are current accounts and SA are savings accounts from retail customers. Other on the liability side includes all other deposits. By loans we mean loans to retail and in some cases, to small enterprises. Other on the asset side includes all other assets.

Source: Authors based on Air Bank (2014), CSOB (2014) and CS (2014)

Second, clients of savings accounts exhibit strong behavioural patterns. We observe increasing interest rate sensitivity of bank clients, on the liability as well as on the asset side. This increased interest rate sensitivity is closely connected to easily accessible information (internet) about bank's products and their pricing. People actively use several internet sites that enable them to compare different pricing of same products by different banks. Tůma (2013) provides evidence that many savings accounts' owners are sensitive to deposit rates on savings accounts and that these clients actively transfer their deposits between bank to the one that provides them with the highest return. Teplý (2014) explains that such clients' behaviour follows the recent trend of commoditization of money in banking, *i.e.* clients perceive bank products as commodities and therefore they choose these products solely based on their prices rather than other product features.

### 2.3 Interest rate risk management of savings accounts

In terms of interest rate risk management, savings accounts are risky liabilities that cannot be hedged by standard risk mitigation techniques used for other bank liabilities such as sight or term deposits. The following two important issues arise. First, savings accounts have zero contractual maturity similar to current accounts. However, as opposed to current accounts, the savings accounts' deposit rate is usually much higher than current accounts' deposit rate. Furthermore, a deposit rate on current accounts is, in the majority of Czech banks, absolutely independent from the market development (*i.e.* the rate remains usually at 0.01% regardless whether government bonds yield at 2% or 5%, based on the market practice, see pricing list of most commercial banks in the Czech Republic). On the contrary, the deposit rate on savings accounts reflects movements in market rates and is therefore subject to supply-and-demand pressures. The margin from savings accounts reinvestment is thus more interest rate sensitive. Without any competition and transactional costs, savings accounts interest rate risk would be minimal as all banks would price savings accounts in such a way that their margin would be absolutely stable in time as all changes in market rates would be directly transferred to the client. In the competitive environment with transactional costs, however, deposit rates are not adjusted immediately and are derived not only from underlying market rates (cost of funding), but also from competitors' pressures and expectations about clients' response. This makes the interest rate risk management of savings accounts different from current accounts.

Savings and current accounts do not differ only in pricing, but also in different dynamics of balances of individual accounts, which rises mainly from different purpose of both types of deposit instruments. Current accounts are transactional accounts and as such they have relatively easily predictable development of individual outstanding amount during the month (balances increase when wages come and then decrease during the whole month). On the contrary, savings accounts' balances are not predictable. Client may or may not deposit some savings each month; he/she may or may not withdraw a balance to go on vacation and so on. This makes liquidity risk management of savings accounts more difficult than the liquidity risk management of savings accounts.

The approximation of maturity of savings accounts presents risks as well. Even though the contractual maturity of savings accounts is zero, the reinvestment or effective maturity of savings accounts is higher as a large portion of depositors leaves their balances in a bank. A rational bank therefore redistributes the core of savings accounts into medium-term and long-term investments and provides a positive maturity transformation. However, a bank should estimate the reinvestment maturity of savings accounts properly to ensure that it retains available funds to simultaneously cover unexpected withdrawals and to attain relatively stable margins from savings accounts. Ideally, the margin from savings accounts should compensate a bank for a higher deposit rate, transactional costs and also for risks that arise from savings accounts. To ensure stable margins and to estimate the effective maturity (duration) of savings accounts, banks in Europe usually employ replicating portfolio models, statistical analysis of historical volumes and simulations. We focus at replicating portfolios.

The replicating portfolio is a portfolio of instruments with given maturities and interest rate behaviour into which a bank reinvests savings accounts. In our analysis it is based on the optimization described in Maes and Timmermans (2005):

$$M = (II_{RP} - C_{i,t}) \tag{1}$$

$$s. t. : \sum_{i=1}^n II_i w_i = II_{RP}, \sum_{i=1}^n w_i = 1, w_i \geq 0, \forall i, V_{i,t,not\ invested} = 0, t = 1, \dots, T,$$

$$i = 1, 2, 3 \text{ (type of a bank)}$$

In the Equation 1 we either minimize the standard deviation of the margin  $\sigma_M$  or maximize margin  $M$ .  $II_{RP}$  is the interest income from the replicating portfolio that equals to the sum of interest incomes of all individual investments and  $w_i$  is the weight of each investment and as no short-selling is allowed, its value is always positive or zero.  $C$  is the interest expense paid to clients and  $V$  is the outstanding volume on savings accounts. The last condition is that all volumes are perfectly replicated for the whole observed period. The client rate and outstanding volumes define  $C$  process. Banks adjust deposit rates to market rates to secure margin or to account for marketing and management strategies. The adjustment of the deposit rate to market rates is found to be asymmetric in (Paraschiv, 2011; Frauendorfer and Schurle, 2006; Maes and Timmermans, 2005; O’Brien, 2000; and “lagged” Paraschiv, 2011). Due to the presence of such non-linear adjustments, the simple linear model cannot neatly fit the deposit rate (Paraschiv, 2011). Deposit rates can be fitted by non-linear models such as a logit in Blochlinger (2010), by the threshold model as in Frauendorfer and Schurle (2006), by the non-linear partial adjustment model as in Maes and Timmermans (2005), by the friction model by Paraschiv (2011) or the asymmetric partial adjustment model of O’Brien (2000). The second class of models exploits the long-run relation between a deposit rate and market rates (Paraschiv, 2011).

Apart from the client rate model, the bank has to estimate dynamics of volumes as well. Unexpected withdrawals lead to liquidity and market risk pressures when a bank is forced to hold a “fire sale” to sell a part of its portfolio to remain liquid. It is a well-documented fact that volumes on savings accounts decrease when market rates increase as more attractive investment opportunities arise. The opposite applies for decrease in wholesale market rates. Apart from such predictable movements of deposits, the development of volumes is still uncertain. For this reason, a bank always reinvests a part of the portfolio into short-term instruments (Džmuráňová and Teplý, 2014).

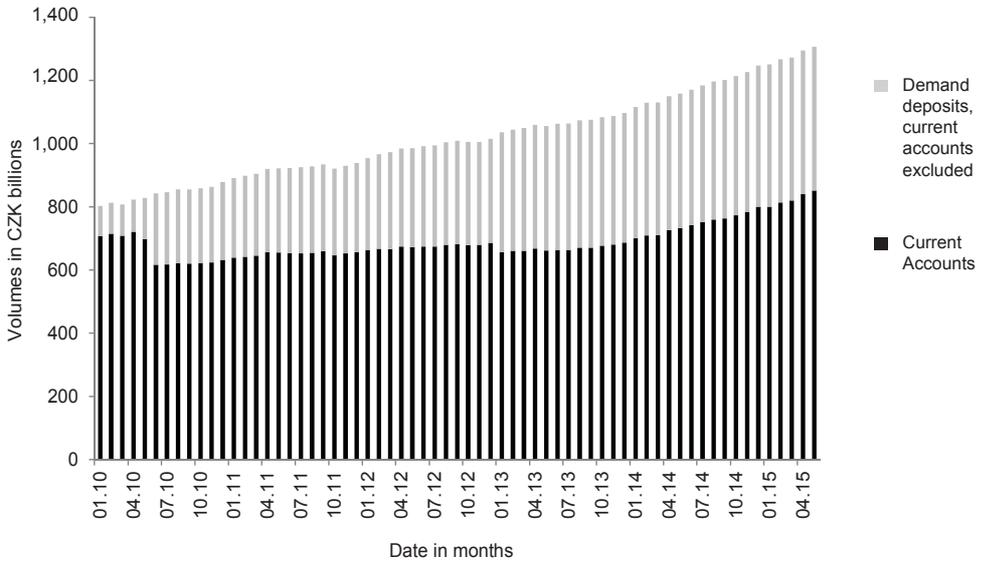
Finally, we should mention that replicating portfolios are either stable or dynamic. First, static replicating portfolio models are based on once in a time calculation of weights of savings accounts reinvested into pure-discount instruments with various maturities (Maes and Timmermans, 2005; Kalkbrener and Willing, 2004). Second, there are dynamic replicating portfolio models (Frauendorfer and Schurle, 2006; Dewachter *et al.*, 2006) that include changes in weights in time.

## 2.4 Savings accounts in the Czech banking sector

The importance of savings accounts in the Czech Republic has been increasing recently. Figure 1 shows a decrease in current accounts resulting from the transfer of savings accounts from current accounts to savings demand deposits as of 30 June 2010. Since then, the volume of savings accounts in the category demand deposits, current accounts excluded, has been growing steadily due to rising demand for savings accounts. We estimate (we

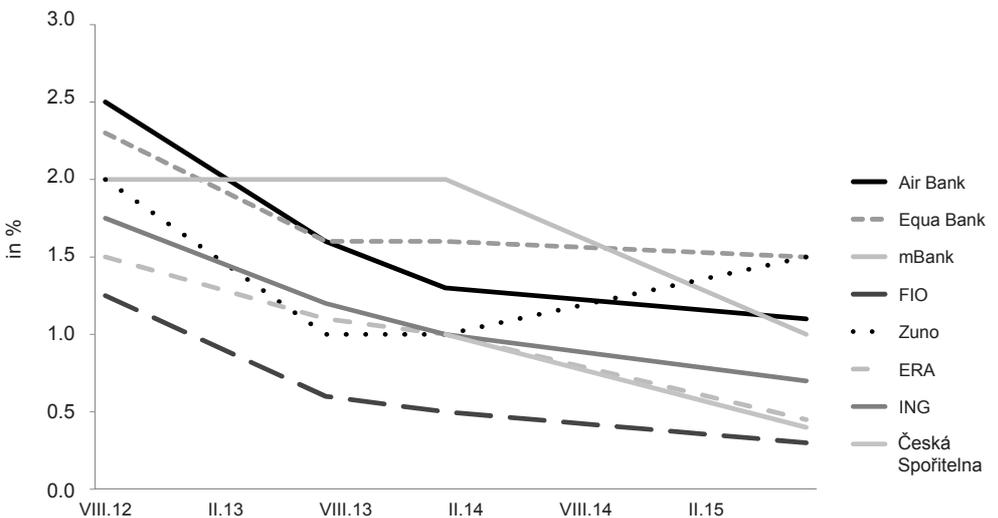
cannot fully say how much savings accounts are in the category savings demand deposits) savings accounts (households) at approximately CZK 400 billion as of 31 May 2015. We expect an increase in savings accounts due to their ongoing attractiveness and stable high yields in comparison with other deposit products.

**Figure 1 | The Savings Account Volumes from 31 January 2010 to 31 May 2015 (in CZK billions)**



Source: Authors based on the data from ARAD time series database provided by the CNB

**Figure 2 | Dynamics of Savings Accounts in Selected Bank in Recent Years**



Source: Authors based on pricing lists provided by respective banks

Concerning deposit rates, generally, the peak in savings account deposit rates occurred during the end of 2011 and the first half of the year 2012, influenced by the introduction of the Air Bank with its commitment to have the deposit rate among TOP 3 banks on the Czech market. Since then, we observe the gradual decrease in deposit rates (see Figure 2), which is an obvious consequence of historically low market rates during this period, however, yields on savings accounts remain persistently high and even higher than reinvestment opportunities on the market, as we show in Section 4.

### 3. The Model

We employ the modification of the static replicating portfolio approach described above<sup>1</sup> and investigate whether a similar investment strategy (which means defining the reinvestment strategy of a bank, *i.e.* weights  $w_i$ ) results in different outcomes for the capital in banks that use different risk management of savings accounts (differences in the risk management are driven by banks' pricing strategies, see Section 2.2) under random simulations as well as under different scenarios for the market rate.

Our analysis requires defining four models.

- (i) A model for market rates that represents an interest rate environment and yields into which a bank can reinvest deposits, see Equation 2.
- (ii) The client rate model that represents a banks' interest rate cost of deposits, see Equation 3.
- (iii) Models describing how much savings accounts' deposits a bank has available to reinvest in each point in time, see Equation 4.
- (iv) Replicating portfolio, *i.e.* a portfolio of assets into which deposits are reinvested (Table 2).

Using (i)–(iv) we are able to derive banks' net interest income from deposits as the difference between the yield from the replicating portfolio and interest rate cost paid to clients.

#### Market rate model

$$dm_t = a(b - m_t)dt + \sigma dW_t$$

$$B(t, T) = \frac{1}{a} [1 - e^{-a(T-t)}] \tag{2}$$

$$A(t, T) = \exp \left\{ \left( b - \frac{\sigma^2}{2a^2} \right) [B(t, T) - T + t] - \frac{\sigma^2}{4a} B^2(t, T) \right\}$$

$$yield(t, T) = -\ln [A(t, T) e^{-B(t, T)m_t}] / T$$

#### Client rate model

$$\nabla c_{i,t} = \rho_i \quad \text{if } |c_{i,t-1} - m_t| \geq \alpha_i \text{ and } (m_t - m_{t-1}) > 0 \text{ and } mt > 0$$

$$\nabla c_{i,t} = -\tau_i \quad \text{if } |c_{i,t-1} - m_t| \geq \beta_i \text{ and } (m_t - m_{t-1}) < 0$$

1 For simplicity, we focus on market risk only in our model (for more details on market risk management see Resti and Sironi (2007) or Stádník and Miecińskiene (2015)). Obviously, credit risk is of great importance in banking as highlighted by, for instance, Dvořák (2005), Janda *et al.* (2013), Šútorová and Teplý (2013) or Mejstřík *et al.* (2014).

$$\begin{aligned} \nabla c_{i,t} &= 0 \text{ if } |c_{i,t-1} - m_t| < \beta_i \text{ and } (m_t - m_{t-1}) < 0 \\ \nabla c_{i,t} &= 0 \text{ if } |c_{i,t-1} - m_t| < \alpha_i \text{ and } (m_t - m_{t-1}) > 0 \\ \nabla c_{i,t} &= 0 \text{ if } (m_t - m_{t-1}) = 0 \\ c_{i,t} &\geq \mu_i, \beta_i \geq \alpha_i > 0 \end{aligned} \tag{3}$$

### Dynamics of volumes

$$\nabla V_{i,t} = \left( \frac{1}{2} \sqrt{1 + c_{i,t}} \right) V_{i,t-1} \tag{4}$$

In Equation 2  $m_t$  is a short-term interest rate,  $a$  is the speed at which the interest rate returns to its mean  $b$ ,  $\sigma$  is volatility at time  $t$ ,  $i$  stands for a bank  $I$ ,  $W_t$  is a Wiener process. In Equation 3  $c_{i,t}$  is the deposit rate,  $\rho_i$  defines the adjustment upwards in each bank and  $\tau_i$  defines the adjustment downwards. The  $\alpha_i$  is the threshold value that defines the maximum limit of the absolute difference between the deposit rate and the market rate in each bank during increasing market rates,  $\beta_i$  is the threshold value that defines the maximum limit of the absolute difference between the deposit rate and the market rate in each bank during decreasing market rates. The bank adjusts the market rate when this limit is exceeded. Finally,  $\mu_i$  is the downward limit value for the deposit rate in the bank and  $V_{i,t}$  in Equation 3 is the volume on savings accounts.

The market rate model was obtained by the calibration of the Vašíček model<sup>2</sup> to the daily historical values of 2W repo rate from 1 January 1999 to 28 February 2013 using the procedure in Brigo *et al.* (2007), see Appendix for details. The yield curve representing reinvestment opportunities is derived from the market rate using procedure in Brigo and Mercurio (2006). The deposit rate adjustment to the market rate is based on the calibrated asymmetric adjustment model, see Appendix for details.

Due to the lack of the data, we cannot assess the aggregate development of savings accounts balances in the Czech Republic. Therefore, we let savings accounts' volumes to grow only at the deposit rate, *i.e.* by recapitalization, with starting value being CZK 100 million of deposits for all types of banks.

The pricing (a deposit rate) and the reinvestment of savings accounts defined in the model is based on pricing and reinvestment in Czech banks (Table 1). We divide banks into three categories (*i.e.*, I = i, ii, iii) based on their pricing strategies, defined in Section 2.2. In our model, each bank type reinvests savings accounts volumes into the replicating portfolio under weights  $w_i$  defined in Table 2 with the condition that  $\sum_{i=1}^n w_i = 1$  and that no short selling is allowed. For *the low-cost bank*, we define two types of portfolios: non-aggressive and aggressive. The aggressive portfolio aims to show that a riskier investment of savings accounts results in positive net interest income even under a relatively high deposit rate, but at the cost of a risky position in high-yield instruments, such as consumer loans or mainly corporate bonds.<sup>3</sup>

<sup>2</sup> See Vašíček (1977) and Witzany (2013).

<sup>3</sup> When creating the aggressive portfolio, we were inspired by results of an interview undertaken by Tinkl (2012), where CEOs of several banks in the Czech Republic discussed investment strategies of their banks.

**Table 2 | Weights of Different Reinvestments in the Replicating Portfolio for Scenarios**

Reinvestment	The traditional and the third type bank, weights in %	The low-cost bank non-aggressive portfolio, weights in %	The low – cost bank aggressive portfolio, weights in %
<b>O/N money market deposits</b>	10	10	10
<b>3M money market deposits</b>	10	10	10
<b>10Y bonds</b>	40	40	33
<b>Loans and mortgages</b>	40	40	14
<b>Corporate bonds</b>	0	0	33

Note: Company bonds have maturities longer than 5 years.

Source: Authors

#### 4. Empirical Analysis

We firstly focus on the current low-interest rate environment as it raises several concerns in the sound risk management of savings accounts. The pending low wholesale market rates imply that banks *de facto* cannot achieve high margins from the reinvestment of savings accounts and should therefore provide lower deposit rates. Figure 3a illustrates that the banks that started to offer savings accounts during decreasing market rates (as denoted by time *T*) have lower yields from savings accounts than the other banks that were able to reinvest savings accounts during the period of high market rates (especially in time *T-9*). This means that the sound risk management of savings accounts in banks that enter the market (or start to offer savings accounts) during low market rates should definitely be based on the strategy that the deposit rate is lower than long-term market rates.

In managing interest rate risk exposure, it is the common practice to derive effective pricing of demand deposits based on the relationship between the banks’ clients and market rates. Therefore, we investigated the historical pricing of saving accounts by a simpler replicating portfolio assuming only the reinvestment on the market as demonstrated in Table 3).

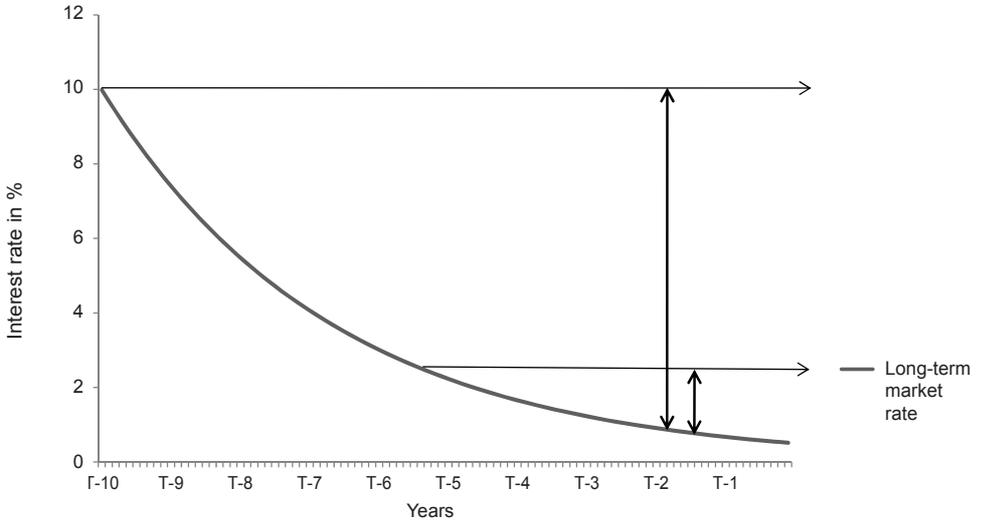
**Table 3 | A Simple Replicating Portfolio**

Maturity (Reinvestment)	Weights in %
<b>O/N money market deposits</b>	13
<b>3M money market deposits</b>	13
<b>6M money market deposits</b>	13
<b>1Y money market deposits</b>	13
<b>5Y bonds</b>	23
<b>10Y bonds</b>	23

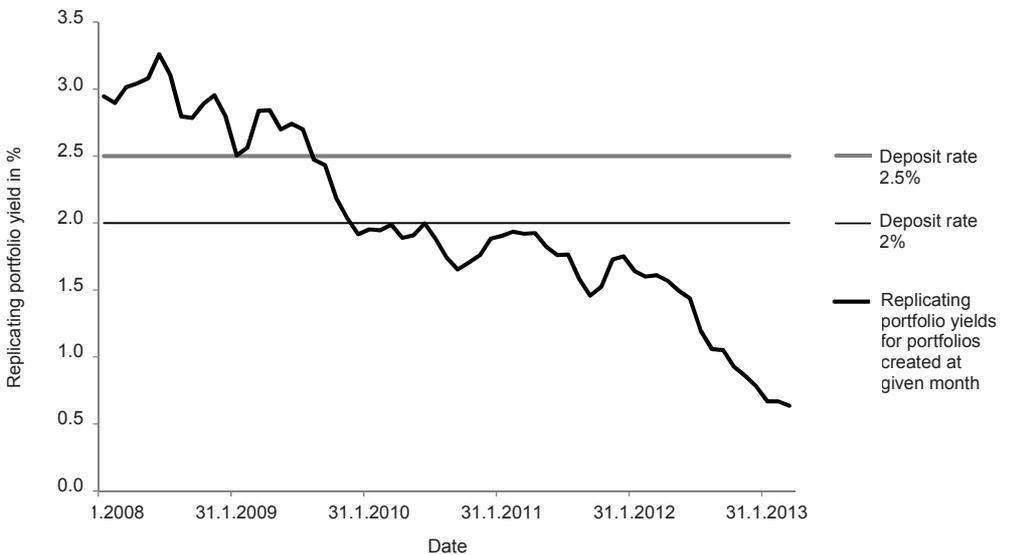
Source: Authors

Figure 3b shows sustainable yields from the reinvestment of savings accounts into the simpler replicating portfolio in recent years. Evidently, any deposit rate higher than 2% would result in the net interest rate loss after 2010 given a bank would invest only on the market even before the inclusion of obligatory deposit insurance expense. We stress that many deposit rates were above 2% during 2011. The situation was similar during 2014–2015, even though deposit rates decreased significantly.

**Figure 3a | Theory: Bank's Yield under Low and High Market Rates**



**Figure 3b | Practice: the Yield Achievable on the Market in 1 January 2008–31 March 2013**



Source: Authors based on the CNB

## 4.1 Impact on the net cumulative interest income of banks

To investigate possible future development of the net interest income from savings accounts in Czech banks we simulated the development of the net interest income from savings accounts from the same portfolio as in Table 1 under a random development of market rates (random simulations of the Equation 2) that starts during a low-yield period using our modified replicating portfolio approach defined in Section 3. We employed 1,000 runs over a horizon of 2 and 5 years in our three different types of banks (Table 4 summarizes results). We find that for any type of analysed bank, it is feasible to reinvest savings accounts only on the market. This indicates that the reinvestment of savings accounts that bear a high or a moderate deposit rate would be feasible only if banks would invest in other investment, such as consumer loans or mortgages. However, these instruments are less liquid and secure than the reinvestment on the market.

**Table 4 | Average Cumulative Net Interest Income from the Reinvestment of Savings Accounts**

CZK ths	The traditional bank	The low – cost bank	The third type bank
2 years	-1,296	-4,332	-2,808
5 years	-1,702	-13,480	-6,944

Source: Authors' calculations

We provide evidence that savings accounts are riskier liabilities, as the risk free re-investment cannot generate positive net interest income to a bank. We find three challenges pertaining to the risk management of savings accounts in the Czech Republic: (i) insufficient hedging of interest rate risk, (ii) competition and aggressive acquisition of new clients through high deposit rates and (iii) the lack of adequate regulation. Due to this, we investigated the impact of increasing market rates on banks' net interest income from savings accounts using our modified replicating portfolio approach defined in Section 3. In this case, market rate  $m_t$  is not randomly simulated, but follows a predefined scenario defined in Table 5.

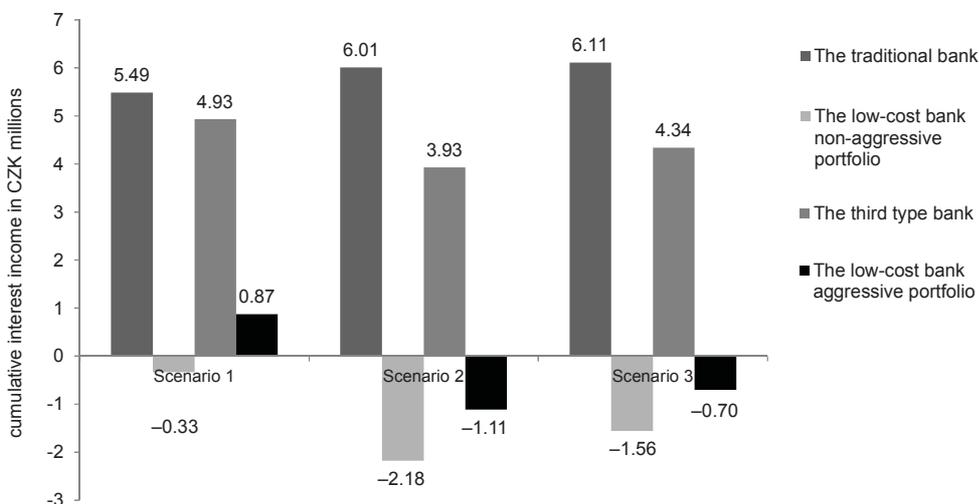
**Table 5 | Market Rate Scenarios**

Scenario	Final market rate value	Time to final value
1	0%	2 years
4	0%	5 years
2	2%	2 years
5	2%	5 years
3	5%	2 years
6	5%	5 years

Source: Authors

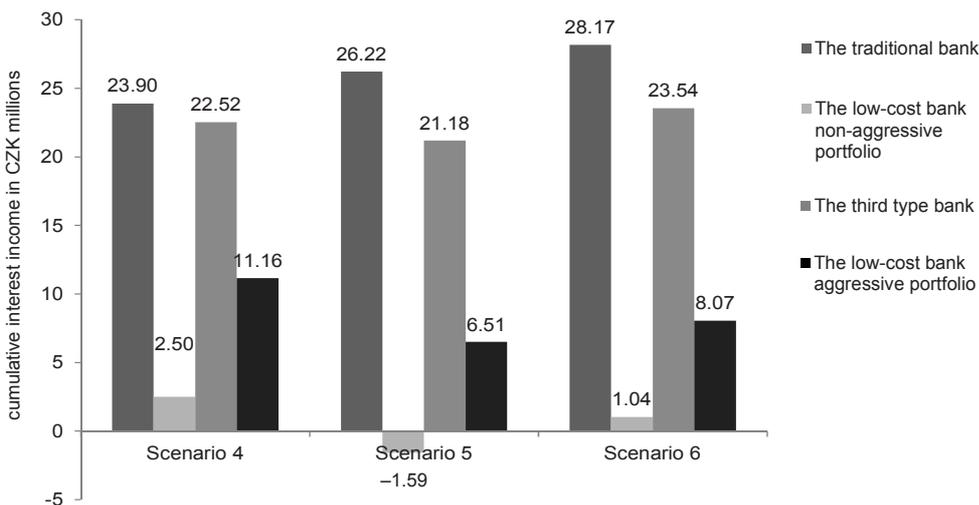
For better transparency, we divide results into two groups: (i) the net cumulative interest income of the bank (CNII) and (ii) the impact on the capital of the bank. First, Figure 3 and Figure 4 show CNII, which bank is able to generate income from savings accounts deposits for each out of six scenarios. Evidently, the *low-cost bank* is able to generate positive CNII only for the aggressive reinvestment strategy under Scenarios 1, 4, 5, and 6 while Scenarios 1, 2, 3 and 5 for the conservative portfolio of the *low-cost bank* generate negative CNII in the observed periods and Scenarios 4 and 6 very low positive CNII. On the contrary, both *the well-established bank* and *the third type bank* generate positive CNII from savings accounts in all scenarios.

**Figure 4 | Cumulative Net Interest Income for Scenarios 1–3**



Source: Authors

**Figure 5 | Cumulative Net Interest Income for Scenarios 4–6**

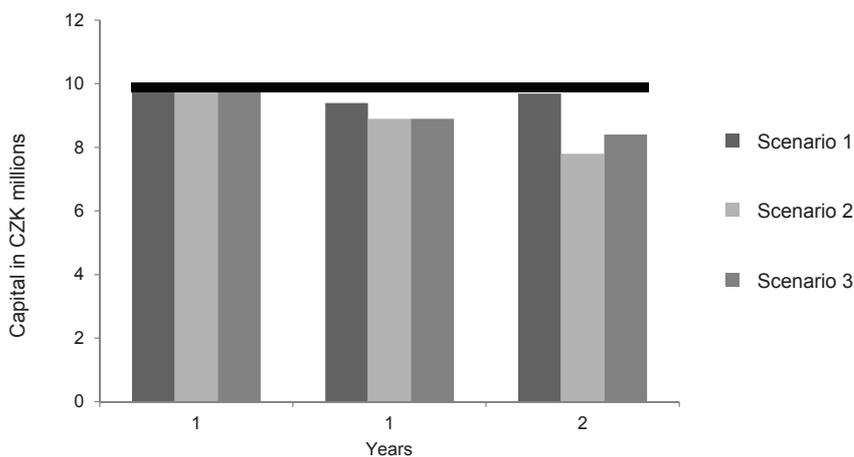


Source: Authors

## 4.2 Impact on banks' capital

Second, in banks with common zero-fee policies, the net interest rate loss from savings accounts would have to be absorbed directly by their capital. For simplicity, we assume that initial value of the capital is CZK 10 million, what corresponds to 10% capital adequacy<sup>4</sup> and we exclude all other costs and revenues such as taxes, obligatory deposit insurance or charged fees. Figure 5 shows the impact on the capital of the non-aggressive strategy for 2-year scenarios). Evidently, the capital decreases in all scenarios, even though we find that a quick increase in the market rates to 5% in Scenario 3 leads to slightly lower loss than an increase to 2% in Scenario 2. This is a result of increasing consumer loans' interest rates and yields on bonds.

**Figure 6 | Impact on Banks' Capital**



Source: Authors

We find that rapidly increasing market rates after a prolonged period of low market rates are a crucial factor for bank's profitability from savings accounts. This result is in line with International Monetary Fund (2014) and Bank of England (2013) research. We show that potential losses stemming from the portfolio of long-term low yield assets<sup>5</sup> are substantial for banks with business model built upon a high deposit rate bearing savings accounts in order to attract new clients. We also show that savings accounts, even when hedged properly, are riskier liabilities than current accounts only because they are more costly and require a higher yield reinvestment, which is obviously connected with higher risk. Adding competitive pressures, we conclude that savings accounts are indeed riskier instruments in banks' balance sheets than current accounts and term deposits. We argue that

4 For more details on capital adequacy rules set by Basel III for global banks and by Capital Requirements Directive IV (CRD IV) for EU banks we refer to, for instance, BCBS (2011), Mejstřík *et al.* (2014) or Šútorová and Teply (2014a and 2014b).

5 When savings accounts are repriced more quickly, what results from both maturity and duration mismatch.

we find sufficient evidence that banks' relying on funding in the form of savings accounts are obviously risky. Second, Maes and Timmermans (2005) stress that savings deposits raise stability issues in Belgium due to difficult risk mitigation stemming from embedded options. We provide evidence that savings accounts are risky liabilities for banks. As the importance of savings accounts in the Czech banking sector increases, so may increase potential stability issue stemming from unsound interest rate risk management of savings accounts.

### 4.3 Policy recommendations

Based on our results, we propose stricter regulation of savings account including variable caps on deposit rates or longer notice periods on withdrawals that exceed a certain amount (savings accounts are regulated instruments in Belgium, Austria, Germany and France). Stricter regulation would discourage banks from offering unsustainably high deposit rate savings accounts. Another possibility is to focus on the moral hazard behind savings accounts. Clients' deposit their savings on a high deposit rate bearing savings accounts without taking into the account the risk as all deposits are, by law, insured, as all banks are required to pay 16 bps *per annum* to the Deposit Insurance Fund. Should savings accounts be excluded from the obligatory insurance scheme, many risk-averse clients would rather place their funds into less riskier instruments. Still, this might lead some banks to increase the client deposit rate even more. The other solution would be to have more levels of an obligatory deposit insurance cost depending on the riskiness of a bank. Naturally, a higher deposit insurance cost in riskier banks would decrease the profitability of the product, which would push banks to decrease the client rate. Third, the regulator should be able to assess a degree to which individual banks are exposed to savings accounts' risks. Maes and Timmermans (2005) point out the need of unified models used for modelling of savings accounts. A unified approach would enable the regulator to compare risk management of savings accounts in different banks. Finally, we argue that we find sufficient evidence that savings accounts are risky instruments in banks' balance sheet and the banks relying on this type of funding are obviously risky. We doubt that business models of some banks in the Czech Republic, which report savings accounts as a primary source of their funding, are sustainable and viable in the long-term horizon.

Bases on previous policy recommendations, we see several further research opportunities. For example, liquidity risk remains at the centre of regulator's attention these days and should be addressed accordingly by future research focussing, for example, at European Banking Authority (2013) stable and non-stable division of deposits. Second, reputational risk can be tested when assuming deterioration in bank's brand followed by outflows of bank's deposits or even by bank runs. Third, a deeper comparative study of savings accounts with other EU banking sectors including Austria, Belgium, France and Germany might shed light on these products from a regulatory perspective.

## 5. Conclusion

This paper focussed on the risk management of savings accounts defined as non-maturing accounts bearing a relatively attractive rate of return. We highlight two assumptions in the structure and operations of savings accounts that lend an "embedded optionality" to savings accounts: a customer's option to withdraw money at any time and a bank's option

to set the deposit rate freely. As a result, the risk management of saving accounts remains an art as well as a science and simultaneously raises serious concerns by some regulators (particularly in Belgium). We focussed on interest rate risk management of savings accounts in the Czech Republic and provided evidence that many high deposit rates offered on savings accounts have not been in accordance with sound pricing recently. We argue that in order to attain high deposit rates, banks will have to either opt for risky reinvestments or to increase its capital to cover the net interest rate loss from savings accounts, especially when market rates increase. To conclude, we propose stricter regulation and supervision of savings accounts as highly risky banking products in order to maintain financial stability of the Czech banking sector.

## Appendix

### Market rate model

$$dm_t = 0.44(1.31\% - m_t)dt - 0.063dW_t.$$

### Client rate model

Table below shows dynamics of deposit rates in relation to 2W repo rate in typical representatives of three types of banks in the Czech Republic until spring 2013 as well as their expected dynamics in case of increasing market rates in case of low-cost banks. For traditional banks, dynamics of deposit rate in ING (freely available) and anonymous bank (belonging to three biggest banks in the Czech Republic) that provided its deposit rate were used. For the low-cost banks, dynamics of deposit rates in Air Bank, Zuno and Equa bank were mainly used. The third type bank is defined as a mid-step between those two types of banks.

### Dynamics of Deposit Rate

	The traditional bank	The low-cost bank	The third type bank
<i>P</i>	25 bps	30 bps	20 bps
<i>T</i>	30 bps	20 bps	25 bps
<i>A</i>	100 bps	50 bps	75 bps
<i>B</i>	100 bps	200 bps	150 bps
<i>μ</i>	100 bps	200 bps	150 bps
<b>Initial value (spring 2013)</b>	150 bps	220 bps	180 bps

Source: Authors' own calculations

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