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Risk Management of Demand Deposits in a Low Interest Rate Environment

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Risk Management of Demand Deposits in a Low Interest Rate Environment

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Abstract:
In this paper, we focus on the liquidity characteristics (stability and maturity) of retail deposits in the Czech Republic and changes in the structure of retail deposit products that occurred because of low interest-rate environment. Retail deposits are a primary source of funding for banks in the Czech Republic. In simplicity, we divide retail deposits into two main groups: (i) demand deposits are products with non-maturing features as maturity (timing of cash flows) is not known by a bank as a client can withdraw a deposit on notice while in reality deposits remain in a bank for a longer period; (ii) term deposits are products with maturing characteristics, i.e. a timing of cash flows is known. Bankers deem retail deposits as a largely stable and cheap funding source. Our research shows that demand deposits are a stable funding source with much higher maturity than term deposits. Moreover, we conclude that the transfer of term deposits to demand deposits that accelerated in recent years resulted from a low interest rate environment. This transfer implies increasing liquidity risk of the Czech banking sector. However, we argue that banks should be able to hedge this risk properly.

Keywords: asset and liability management, demand deposits, term deposits, liquidity risk, interest rate sensitivity
JEL: G21, C22, C53

1. Introduction

Asset and liability management (ALM) departments in a bank are, apart from other things, responsible for liquidity and interest rate risk management of assets and liabilities (Mejstřík et al, 2014). Bank assets and liabilities, concerning client products, can be divided into two main groups: (i) maturing and (ii) non-maturing products. Maturing products are products that have defined contractual characteristics. In other words, timing of cash flows is defined in the contract as well as their price (interest). Non-maturing products, on the other hand, do not have defined timing of cash flows and the price (interest) is not fixed. A bank has embedded optionality to change the price without changing the contract with the client. Both maturing and non-maturing products liquidity and interest rate risk management requires sound internal models defined by each bank to ensure that: (i) a bank has enough liquidity to cover leaving deposits as well as to ensure that (ii) the excess liquidity is managed in the most effective way.

In case of maturing products, even though a bank knows timing and the price of cash flows, bank must still model them as there are embedded optionality of clients like prepayments and defaults on the asset side or early withdrawals from term deposits on the liability side. These facts imply a need to model these products in such a way that a bank is able to estimate the probability that a contractual maturity will differ from the realized/effective one. The need to estimate this probability is emphasized by a regulator (EBA, 2015 and BCBS, 2015). Still, banks normally impose high fees on prepayments and early withdrawal optionality in case of maturing products to discourage clients. Due to this feature, contractual maturity of maturing products should be close to realized maturity. However, an increased competition combined with price wars on asset-side of the banks in the over-liquid environment in the Czech Republic in fact leads to higher discrepancies between contractual and effective maturity of loan contracts. Consequently, it has resulted in increasing liquidity and interest rate risk of individual banks' balance sheets (but such analysis is beyond the scope of this paper).

For non-maturing products, the need to model them properly is even more important as embedded optionality of non-maturing products is an inherent part of the contract. In case of non-maturing products, as their name suggest, the effective or realized maturity (cash flow profile) differs from contractual (legal) maturity and is unknown. The legal maturity of non-maturing products is overnight or very short – a client has a right to withdraw deposit on notice or use a credit card within an approved loan limit as he/she wishes. However, in reality and, for example, in case of transactional deposits like current accounts, these cash flows do not happen each day and importantly, they cancel each other out on the aggregate level (national level). In other words, each transaction has a creditor and a debtor and a total amount of deposits remains unchanged. On a banks' level, in case a bank is rather large, the cancelling out works as well. If one client debits his/her account, another client's accounts is credited. This results in the stability of demand deposits and as the bank gets larger, the stable core of demand deposits is formed and to this core, banks largely and correctly assign much larger maturity than is the legal one. We call this maturity effective maturity and it is limited by a regulator in such a way that average modelled effective maturity of demand deposits should not be longer than 5 years (EBA, 2015).

In this paper, we focus on the liquidity risk of demand deposits and term deposits of households (i.e. retail deposits) as these form a main part of banks' funding in the Czech Republic. First, we discuss differences in the liquidity management of demand and term deposits. Second, we show how term deposits are slowly dying out in the Czech Republic, which is a long-term process that mostly accelerated during recent years due to low-rates environment. Third, we compare maturity profile of term deposits and demand deposits in the Czech-banking sector and we discuss how liquidity management of these products will be affected when market rates increase. We point out that we do not focus on a traditional analysis of demand deposits that is dedicated to deriving the effective duration (defined as the change in the value of demand deposits when market rates change by x basis points) of demand deposits using procedures described, for example, in Džmuráňová and Teplý (2015). Moreover, the analysis of effective duration of demand deposits is mainly important for a single bank as it tells what is the value of demand deposits and how much is this value sensitive to changes in market rates. On the aggregate level, however, we are more interested in estimating the liquidity characteristics of volumes, i.e. we focus not at their value and interest rate risk, but at their cash flow profile and liquidity risk. In other words, we only aim to estimate when cash flows will

happen, but not at which price (the interest). Another reason why we opt only for liquidity behavior is the common feature of transactional demand deposits mentioned, for example, by Maes and Timmermans (2005). It is a fact that transactional deposits are mostly insensitive to changes in market rates as clients need to do transactions regardless market rates being 0 or 5%. Due to this, effective duration of transactional demand deposits is close to their maturity. And as transactional demand deposits like current accounts still form a major part of demand deposits in the Czech Republic (even though the share of savings accounts tends to increase rapidly), we can arbitrary assume that duration of aggregate demand deposits will be close to their effective maturity.

The main contribution of this paper is the further development of an analysis of demand deposits in the Czech Republic as a case study. As far as we know, we were first to analyze this topic practically on savings accounts in the Czech Republic in Džmuráňová and Teplý (2014). Given that Czech banks rely on funding from demand deposits, with our research, we aim to fill this relative gap in the analysis of demand deposits in the Czech Republic. Last but not least, this topic is also closely related to current regulatory issues. For instance, EBA (2015) and BCBS (2015) focus largely on modeling of non-maturing products suggesting to banks how they should properly model them. Both regulators also aim to harmonize modeling practices to ensure that banks are comparable on the international basis.

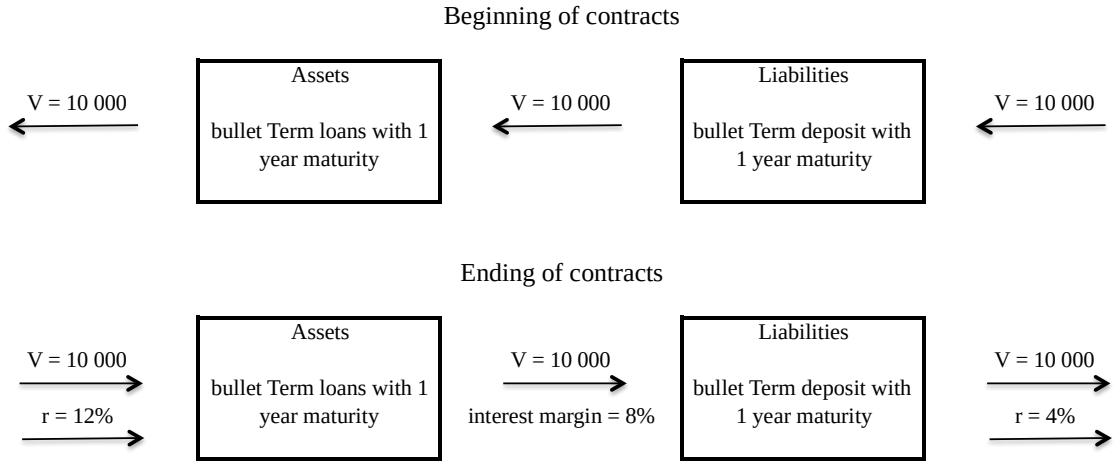
The following text is structured as follows. Section 2 discusses basic characteristics of retail demand and term deposits and their implications for the liquidity management. Section 3 provides an analysis of dynamics of retail demand and term deposits in the Czech Republic, focusing at interactions between these two. It also discusses the results of the analysis presented in the light of increasing market rates environment and finally, Section 4 concludes the paper.

2. Main Characteristics of Retail Deposits

Retail (households) deposits form a major source of funding for Czech banks and these use them to provide loans to a retail as well as a corporate sector. In this paper, we focus on the liquidity management of demand deposits and term deposits. Demand deposits can be further divided into two main groups, current accounts and other deposits redeemable on notice (mainly savings accounts and passbooks available on notice).

Term deposits are contractual products. A client leaves a deposit in a bank for a given period and an interest rate. After this period ends, a client either withdraws the balance or rolls-over a deposit at a new or the same price, depending on a bank and client's decision. From liquidity point of view, all nominal and interest rate cash flows arising from a term deposit are known and a bank can easily hedge them. (We neglect a possibility of earlier withdrawals as banks tend to pose high fees on this embedded option and clients are thus discouraged.) Given that all interest rate cash flows are known, a margin, which is a banks' interest income from a term deposit, defined in the internal pricing (fund transfer pricing system) as a difference between a reinvestment gain on the market (=mixture od short-term rates and government bonds yields and long-term rates) is fixed for a whole term of a deposit. Due to this, term deposits are a relatively easily manageable product for a bank. Liquidity management of term deposits is straightforward as the timing of all cash flows is known and a deposit can be rolled over to assets with same cash flow (and pricing) characteristics as depicted in Figure 1.

Figure 1: Liquidity Management and Reinvestment of Term Deposits

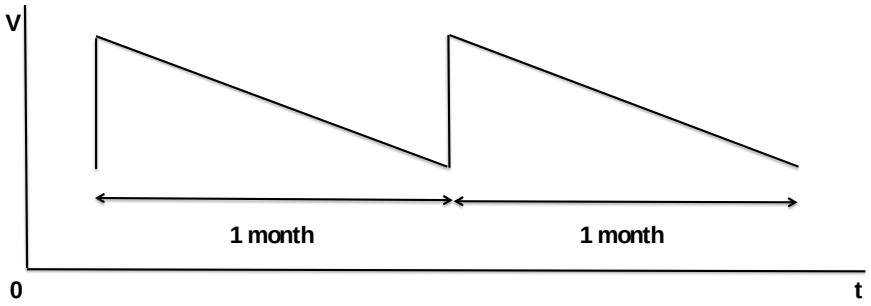


Source: Authors.
Note: V is volume and r is interest rate.

Liquidity management of demand deposits is not as straightforward as liquidity management of term deposits. First, we discuss the liquidity management of transactional deposits – current accounts and second, of savings deposits – savings accounts and some types of passbooks available on notice.

Transactional accounts are accounts that clients use to cover their daily liquidity needs – salary is coming to the account, a client pays bills and invoices and sends spare money to savings deposit from the account and so on. Due to this, a pure and used transactional account has predictable development during a month. Figure 2 depicts how salary comes at the beginning of the month, which results in the peak in the balance on the account. Since then, a balance on the transactional account declines during the month until the moment when a new salary arrives in the next month. We can also see that there is a stable non-zero balance held by a client on the account to cover unexpected liquidity needs if necessary. And in case this balance is not enough, the client may even fall below 0 balance without a penalty in case he/she has an overdraft contract signed with a bank. Last but not least, a typical feature of transactional accounts is a minimal client rate paid on these (usually 1 basis points or even less).

Figure 2: Liquidity Development of a Typical Transactional Account



Source: Authors.
Note: V stands for volume and t for time.

The predictability in the development of balances on transactional accounts and the fact that many transactions happen between two transactional accounts implies that, especially in a large bank and definitely on the aggregate level, volumes on transactional accounts will exhibit high stability as clients need to hold balances there to cover their daily liquidity needs (Maes and Timmermans, 2005). Still, the timing of cash flows is unknown; some cash flows like salaries and bill payments tend to occur on a regular basis, but other like paying for a clothes, vacation or a car do not.

Apart from transactional deposits, there are savings deposits such as savings accounts. Savings deposits are deposits available on demand that bear a relatively attractive client rate. Unlike transactional deposits, savings deposits do not serve for transactional purposes. Banks do not allow clients to do transactions from savings accounts apart from transactions in which client either sends or withdraws money from his/her savings deposit. Concerning the development of the liquidity on savings accounts, we cannot observe typical features that arise from the liquidity behavior of transactional deposits. Due to this, the development of balances on a savings deposits is not easily predictable. We cannot predict when a client will stop sending regular savings to a deposit or when a client will buy a house. However, there are certain ways how a bank can at least estimate the overall dynamics of savings deposits. One way is the interest rate sensitivity analysis – a bank needs to know to which extent clients are sensitive to deposit rates, especially when a bank decides to reprise or not to reprise accounts (either as a reaction to changes on the market or to changes in competitors' deposit rates). In case a bank's clients are sensitive to price and a bank will price bellow a market or pear competitors' average, then a bank can expect an outflow of savings deposits and vice versa. The second way is the knowledge of observed characteristics of savings deposits from other countries like the fact that savings deposits typically increase when rates are low as other investment opportunities are low or risky (Maes and Timmermans, 2005).

A bank must define internal models to estimate when cash flow will happen from both transactional and savings deposits, i.e. to assign some liquidity profile to these deposits and derive their effective maturity. The outcome of these models is the maturity profile of demand deposits that is than used as an input in the analysis of the sensitivity of demand deposits to changes in market rate (duration) and to derive the value of demand deposits. In the next Section, we describe a model for liquidity profile estimation in theory as well as in practice.

3. Liquidity Profile of Retail Deposits in the Czech Republic

The aim of this paper is to assess the liquidity characteristics of retail deposits in the Czech Republic. In this analysis, we divide deposits into two main groups theoretically described above – term deposits and demand deposits. In this chapter we first analyze their liquidity features and we compare them. Second, we highlight important changes in the structure of deposits in the Czech Republic in recent years. Last but not least, we derive some conclusion of what might happen if market rates increase eventually.

3.1 Liquidity Characteristics of Term Deposits

The liquidity profile of a portfolio of term deposits is the sum of all cash flows that are scheduled based on the contract between a client and a bank. These cash flows are known and have given contractual maturities in each date when the deposit is in bank's portfolio. Maturity of a portfolio of term deposits (M_{TD}), under an assumption of negligible earlier withdrawals, is equal to a weighted average residual (remaining time to maturity) maturity (m_i) of each individual term deposit in a portfolio:

$$M_{TD} = \sum_{i=1}^{n} m_i \qquad (1)$$

Using the equation (1) and the data for term deposits (all deposits deemed as a term deposit, including building savings and passbooks with notice periods) we aim to calculate average residual maturity of aggregate term deposits in the Czech Republic. We face two problems concerning the freely available data. First, The Czech National Bank ("CNB") provides data for term deposits based on their contractual maturities, not residual ones. Second, term deposits based on their contractual maturities are divided only into 5 time buckets – up to 3 months, 3 months – 12 months, 1 year – 2 years, 2 years – 5 years and 5 years and more. To partially solve the second problem, we can say (in full simplicity) that average contractual maturity of term deposits in each of first four time buckets can be a half of a time, i.e., for example, average contractual maturity of deposits in a bucket 2 years – 5 years is 3.5 years. However, we cannot use this in case of a last bucket: 5 years and more, but we decided to use average contractual maturity of all term deposits in this bucket as 5 years to be conservative. The solution to the second problem would be to obtain residual maturities and it is,

unfortunately, given free available data, not possible. Due to this, we will calculate average contractual maturities of aggregate term deposits in the Czech Republic and we can say that average residual maturity of aggregate term deposits in the Czech Republic must be strictly lower than average contractual maturity.

As an interest about maturity is always centered on the last available information about the portfolio, we calculated average contractual maturity of aggregate term deposits in the Czech Republic as of May 2015 to be 1.75 years. This implies that average residual maturity of term deposits lies between 0 – 1.75 years and is strictly lower than 1.75 years.

Second, for the purposes of investigating the changes in the structure of deposits in the Czech Republic in recent years, we are also interested to see dynamics of the development of average contractual maturity of aggregate term deposits. Recently, we could have observed a structural change in deposit products in the Czech Republic – the transfer from term deposits to demand deposits. This transfer is driven by low rates environment that directly translates into low rates offered on term deposits. We expect changes in contractual maturity of term deposits due to this. On the contrary, demand deposits-savings accounts provide better return and liquidity (on demand) characteristics than short-term term deposits. To demonstrate this, we provide Table 1 with deposit rates offered on term deposits and savings accounts in major Czech large, medium and small banks. Evidently, only long-term term deposits rates can stand up to savings accounts rates while short-term term deposit rates fall far below savings accounts rates. This indicates that interest rate sensitive clients that do not want to save at a long-term, i.e. want to have quick access to their money, would rather opt for savings account than for a short-term term deposit. Second, Figure 3 shows the stagnation and even decrease in outstanding aggregate balances of term deposits and increasing volumes in demand deposits, especially savings accounts. Finally, Figure 4 demonstrates that the average contractual maturity of term deposits has been increasing recently. This suggests that only a long-term term deposits of clients with low liquidity needs like building savings remain in banks' portfolios as these are the only ones that provide at least a comparable return to savings accounts whereas short-term term deposits do not. In other words, the average contractual maturity of aggregate term deposits in the Czech Republic gets longer since interest rate sensitive clients prefer savings accounts (due to low return available on short-term term deposits).

Table 1: Deposit Rates at Savings Accounts versus Term Deposits as of August 2, 2015

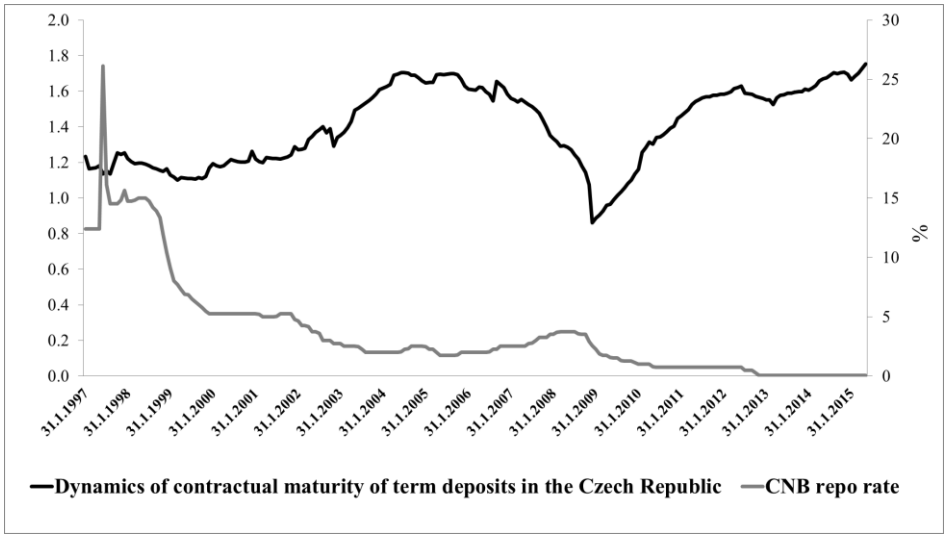
in %	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*
demand deposits - savings accounts (available on demand)	0.40	0.45	0.12	0.30	1.30	1.10	1.50	1.50	0.30	0.45	0.70
term deposits - 1M	0.01	0.10	0.01	0.01	0.01	NA	NA	0.60	0.40	0.01	NA
term deposits - 1Y	0.10	0.15	0.05	0.10	0.01	NA	0.50	1.10	0.75	0.15	0.50
term deposits - 2Y	0.20	0.20	0.05	0.10	0.01	NA	0.70	1.25	1.05	0.20	NA
term deposits - 3Y	0.30	0.25	0.05	0.15	0.01	NA	1	1.25	1.35	0.30	NA
term deposits - 4Y	0.40	NA	0.05	NA	0.01	NA	1.20	NA	1.55	NA	NA
term deposits - 5Y	NA	NA	0.05	0.25	NA	NA	1.50	NA	1.75	NA	NA

Source: Authors using interest rate lists of selected banks. Bank numbering: 1 – Ceska sporitelna, 2 – CSOB, 3 – Komercni banka, 4 – UniCreditBank, 5 – Raiffaisenbank, 6 – Air Bank, 7 – Equa bank, 8 – Zuno bank, 9 – Fio bank, 10 - Era bank, 11 – ING bank.

Figure 3: Development in Aggregate Volumes of Deposits in the Czech Republic in January 1993-January 2015

Source: Authors based on the data provided by the Czech National Bank (CNB).
Note: Figure includes all household deposits in CZK in the Czech Republic. Savings accounts are only approximated, as the CNB is not providing them separately from savings deposits available on demand. Nevertheless, savings accounts form a majority of savings deposits available on demand. Term deposits include all deposits classified as term deposits (including building savings).

Figure 4: Dynamics of Contractual Maturity of Term Deposits in the Czech Republic in January1997 - May 2015



Source: Authors' own calculation using data from CNB.

3.2 Liquidity Characteristics of Demand Deposits

Deriving maturity of demand deposits is a much complex exercise than deriving the maturity of term deposits due to their non-maturity features described in the previous Section. The maturity estimation of demand deposits in this paper consist of two major steps: time series analysis of outstanding aggregate volumes and the outflow profile (maturity) estimation. The outcome of these two steps is liquidity profile of outstanding aggregate demand deposits in the Czech Republic and their effective maturity calculated as of May 2015. To receive this liquidity profile, we employ a similar approach as Kalbrener and Willing (2004).

3.2.1 Time Series Analysis of Volumes - Theory

The aim of time series analysis is to fit a model describing a dynamics of volumes. The estimation of proper representative model of volumes in this paper follows Box and Jenkins (1976) procedure. First, we discuss summary statistics of analyzed time series. Second, we test for a presence of unit root by an Augmented Dickey-Fuller test (Dickey and Fuller, 1979) taking into account deterministic seasonality terms that make sense economically for our analyzed time series. For example, we can expect a tendency of lower growth or even a decrease of outstanding volumes during certain periods like vacations or Christmas given that the Czech economy is open economy and retail customers are spending their money abroad. Third, we adjust an analyzed series to receive a mean-reverting process that is fitted with AR and MA terms, see, for example, Box and Jenkins (1976). The method of estimation that is used in this paper is non-linear least squares method. Fourth, we ensure that the best fitting model fulfills all necessary criteria, namely normality of residuals, no autocorrelation of residuals and stable variance of residuals.

The model investigated in this paper is a general autoregressive integrated moving average process with seasonal terms ARIMA (p,d,q) x (P,D,Q)s in the following form:

$$\Phi(B^s)\phi(B)\nabla_s^D\nabla^d V_t = \alpha + (1+\Theta B^s)(1+\theta B)e_t \quad (2)$$

In equation (2) and ARIMA set up above t is time, V are outstanding volumes, p are lags of AR terms, q are lags of MA terms, d is a number of differencing, P are lags of seasonal AR terms, Q are lags of seasonal MA terms, D is a number of seasonal differences and s is a lag of a seasonal difference. Finally, $e_t \sim IID$ are errors with zero mean and constant variance.

Given that we employ monthly data similar to time series analyzed in Macroeconomic studies, we do not care about volatility. Evidently, aggregate demand deposits in a whole economy that is developed are not expected to be highly volatile, especially when a data used is on a monthly basis.

In the next Section, we discuss application of theoretical approach described here.

3.2.2 Time Series Analysis of Volumes – Application to Czech Demand Deposits

Table 2 shows summary statistics of aggregate demand deposits from January 2001 to May 2015 (173 observations and including all demand deposits including savings accounts) in the Czech Republic. Furthermore, Figure 3 illustrates dynamics of analyzed time series.

Table 2: Summary statistics

	volumes in levels	*volumes in log-levels*	*volumes in log-levels seasonally adjusted*	*volumes in log-levels seasonally adjusted and first differenced*
mean	640 152	13.24	0.12	0
maximum	1 248 495	14	0.2	0.03
minimum	205 551	12.23	0.06	-0.02
std. deviation	305 519	0.52	0.03	0.008
normality	0.001419*	0.002*	0.001*	0.25*
seasonal lag	0*	0*	0.001*	0.001*
statioanarity	0.99*	0.58*	0.43*	0*
deterministic trend	0.96*	0.6*	0.62*	Not tested

Source: Authors' own calculations. * Null hypothesis for normality is that a series is normally distributed. Null hypothesis for seasonal lag is that a seasonal lag 12 is not significantly different from zero. Null hypothesis for stationarity is unit root process, alternative is that is stationary process. Null hypothesis for deterministic trend is that a series is unit root process, alternative is that it is trend stationary.

We find that the best fitting model for aggregate demand deposits in the Czech Republic using procedures described in Section 3.2.1 is autoregressive moving average process with deterministic seasonality terms ARIMA$(0,1,0)(0,1,0)_{12}$ defined in equation (3), where v_t is a process of first

differences of seasonally adjusted volumes of logarithmically transformed aggregate demand deposits and e_t are errors with zero mean value and standard deviation of 0.008. As we can see, after all adjustments, series is random walk. As there is evidence of log-normal distribution of volumes, we use log of volumes. The deterministic seasonality was supported by unit root test and by a presence of significant seasonal lags and it is consistent with our expectations. Seasonal AR and MA terms were also tested in a model, but a model with them did not significantly outperform selected model. Best fitting model also satisfies all necessary criteria (residuals are normally distributed, random and homoscedastic).

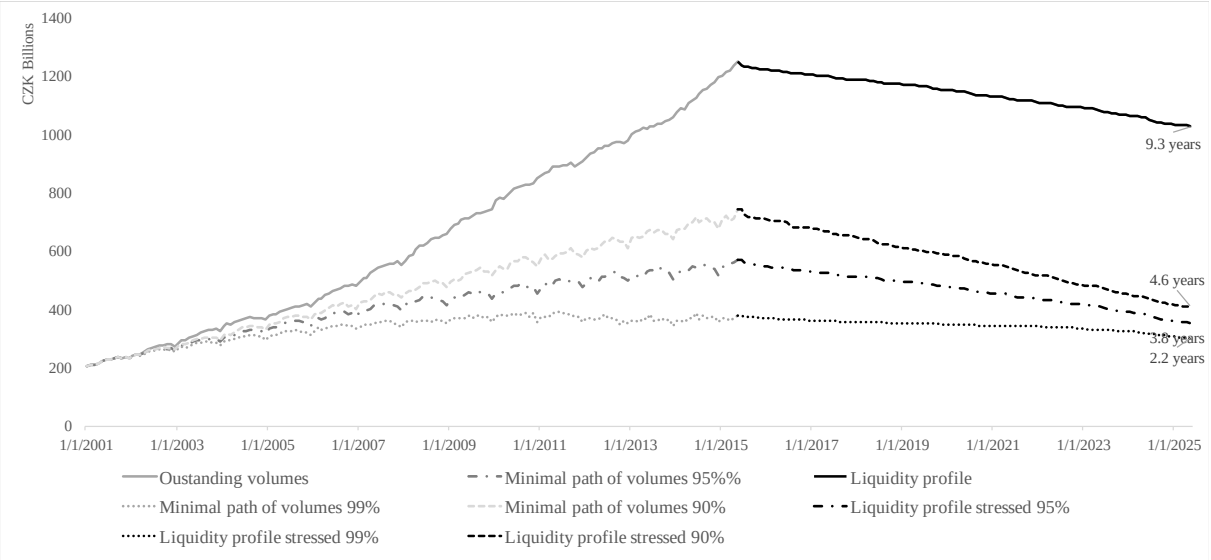
$$v_t = e_t \tag{3}$$

3.2.3 Maturity of Demand Deposits in the Czech Republic

We employ Monte Carlo simulations of the process in equation (3) to receive 1000 possible realizations of aggregate demand deposits volumes (for more details on the use of the Monte Carlo simulation method in finance see, for instance, Brigo and Mercurio, 2006 or Jorion, 2007). We order simulations by calendar date and we construct the so-called minimal path of volumes by selecting 5% percentile across all simulated observations in each calendar date, i.e. we find a volume that remains in a portfolio for all 1000 observations with 95% probability for each date. 95% probability is selected to ensure that we can define stable liquidity structure from outstanding volumes. From this minimal path of volumes, we order probabilities of volumes being in a portfolio for a given maturity term. For example, when a global minimum is 100 across 173 observations, then 100 is expected to remain in a portfolio for 173 periods. This enables us to assign cash outflow to each future period after May 2015 as we know the most restrictive estimated cash flow profile. For the sake of consistency with regulatory requirements, we focus on outflows only up to ten years after May 2015, hence all outstanding balance in May 2025 is expected to outflow immediately. Finally, we calculate weighted average effective maturity of all cash flows, which is equal to effective maturity of aggregate demand deposits in the Czech Republic. We receive that effective maturity is equal to 9.3 years.

Figure 5 shows our results graphically. It includes outstanding volumes of aggregate demand deposits in the Czech Republic from January 2001 to May 2015 together with the minimal path of volumes for 95% probability ("Minimal path of volumes 95%" line) in these dates and estimated outflow profile of demand deposits ("Liquidity profile" line). As we can see, outflow profile of demand deposits is very slow and majority of a portfolio remains after 10 years. Hence, the maturity of 9.3 years is driven by our assumption that all remaining volume outflows at once in May 2025. Without this limitation, maturity is much longer. Still, we opt to limit maturity to be consistent with common bank practice and regulation. The result for effective maturity is consistent with the fact that retail demand deposits are stable and on the aggregate level, transactions cancel each other out. However, our result is in contrast to restrictive unified regulatory approach that requires 5 years in EBA (2015) and only 1.8 years in BCBS (2015). EBA (2015) requirement may be considered as reasonable for individual bank level as it accounts for other than liquidity risk, mainly interest rate risk that is not touched by this paper, but we argue that, given our results, BCBS (2015) proposal is too restrictive.

Figure 5: Dynamics of Volumes of Demand Deposits in the Czech Republic 1/2001 - 5/2015, their Liquidity Profile and Maturities



Source: Authors' own calculations using data provided by the CNB. The "Liquidity profile stressed 90%, 95% and 99%" lines show liquidity profile of demand deposits in case we would assume that all money above minimal path of volumes constructed from volumes that do not fall bellow 90%, 95% and 99% of all volumes outflow in the first period. In this case, maturity of demand deposits would be 4.6 years for 90%, 3.8 years for 90% and 2.2 years for 99%. Dynamics of these results are in line with results obtained by Kalbrener and Willling (2004). However, such scenarios are very unrealistic, i.e. assuming that almost half of outstanding demand deposits in the whole Czech economy would be transferred somewhere else within one month does not have any reasonable economical explanation given that most demand deposits are transactional accounts that people use on a daily basis and that cannot be easily substituted by any other kind of payment instruments. Due to this, the outflow profile "Liquidity profile" with maturity equal to 9.3 year is used as basic results in our analysis and the rest serves to show the sensitivity of a stressed result to a selection of probability under which we expect that volumes in the case of minimal path of volumes do not fall.

3.3 Implications of Low Interest-rate Environment for Management of Retail Deposits in the Czech Republic

In the analysis above, we discussed following points from which we will derive conclusions in this Section. First, we discussed that term deposits' liquidity risk can be hedged relatively easily due to defined contractual features of the product. On the contrary, we provided reasoning why non-contractual products like transactional and savings accounts cannot be as easily hedged due to the lack of contractual features. Second, we showed that effective maturity of term deposits in the Czech Republic is 1.75 years at most while effective maturity of demand deposits in the Czech Republic is almost 10 years. Third, we showed the evidence of structural transfer of volumes from term deposits to demand deposits resulting from pending low-rates environment in the Czech Republic. Now the question remains what will happen when market rates increase. Džmuráňová and Teplý (2014) show that banks dependent on funding from savings accounts will face capital losses when market rates increase due to high interest rate sensitivity of depositors. The evidence of this interest rate sensitivity is also evident in the above-mentioned structural transfer from term deposits to demand deposits. Due to this, in the full simplicity, when market rates increase, we may except that interest rate sensitivity money that currently lays on demand deposits as no other product provides better return, will leave demand deposits as soon as term deposits will provide relatively better investment opportunity. On the aggregate level, this may be seen just as a change in the structure of deposits without significant impact, but it is not so on the single bank level.

As we show in our paper, aggregate demand deposits effective maturity is many times longer than effective maturity of term deposits. Assuming the same holds for single banks, which is definitely true for large banks in the Czech Republic due to their structure of balance sheets, then banks are

currently overestimating true effective maturity of demand deposits (as a part of volumes there will move to term deposits as soon as market rates increase sufficiently). However, most large banks tend to take interest rate sensitivity of volumes into account. It means that the overestimation should be minimized and posing to significant threat to the sector, under an assumption that banks indeed take into account the interest rate sensitivity of volumes.

3.4 Further Research Opportunities

Concerning further research opportunities, we aim to continue with our analysis of deposits in the Czech Republic for the following reasons. First, it is in the focus of Interest Rate Risk Management of Banking Book regulation (EBA, 2015 and BCBS, 2015). Second, the deposit market might become an important issue related directly to the stability of the Czech banking sector. Finally, the deposit side of banks remains relatively unexplored area academically in the Czech Republic because of low data availability. In the near future, we plan to assess closely interest rate sensitivity of deposit volumes to show, how volumes would develop under different scenarios and simulations.

4. Conclusion

In this paper we focused on retail deposits as these form the major part of banks' funding in the Czech Republic. We discussed differences in liquidity risk management between term deposits (contractual products) and demand deposits (on-demand products without contractual features). Term deposits' liquidity risk can be relatively easily hedged due to the fact all interest and principal cash flows are defined by the contract between a client and bank. Demand deposits, on the other hand, are not as easily hedged as their effective maturity is dependent on behavioral characteristics of clients and no contractual cash flows are defined.

Using data freely provided by the CNB, we derived that term deposits' effective maturity is much shorter than of demand deposits because most demand deposits are transactional products that have a large stable part of core deposits. Our findings are consistent with stylized facts verified by Kalkbrener and Willing (2004). Second, we showed that aggregate balances on term deposits are decreasing due to the pending low interest rate environment and that these volumes are transferred to demand deposits. We deduct a potential concern for banks' stability since a part of money that is currently placed on demand deposits may have shorter liquidity profile than is the long-one traditionally derived for demand deposits. However, we do consider this threat rather theoretical as many banks incorporate this risk in their internal models.

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