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Model for Determining the Stability of Retail Deposits with Higher Outflow Rates

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Abstract

Retail deposits are treated as one of the cheapest and most stable funding sources for banks, especially for those with high volumes of retail deposits. A bank defines three main categories of retail deposits that are subject to different outflow rates for the purpose of liquidity coverage requirements in reporting and compliance. The outflow rates for the first two main groups are 5% and 10% respectively, but for the third main group the bank calculates its own outflow rates. We analyzed the latter in this paper. Each bank should assign retail deposits to one of the three categories based on the number and type of predetermined risk factors. Risk factors are divided into two groups according to the degree of risk. The paper first describes the legislative framework, followed by the method of calculating higher outflow rates for retail deposits according to the historical movements and the expected volatility assessment in the situation of stress conditions. At the end of the paper, we briefly provide the future treatment of retail deposits with higher outflow rates.

Keywords: retail deposits, stability, transactional account, LCR, deposit guarantee scheme, depositors, higher outflow rates, Basel III

1 Introduction

On 6 December 2013, the European Banking Authority (EBA) published "Guidelines on retail deposits subject to higher outflows for the purposes of liquidity reporting under the Regulation (EU) no. 575/2013 on prudential requirements for credit institutions and investment firms and amending Regulation (EU) No 648/2012 (*CRR 2013*)." For the purpose of the liquidity coverage ratio (LCR) of CRR Part 6, the guidelines (EBA/GL/2013/01) defined detailed rules on retail deposits with higher outflows in accordance with the third paragraph of Article 421 of CRR (*Guidelines*).

For the purposes of the LCR calculation, institutions report the amount of retail deposits covered by a deposit guarantee scheme (DGS), which are either part of an established relationship making withdrawal highly unlikely or held in a transactional account. In principle, these retail deposits are considered the most stable and will be subject to the lowest outflow rates of 5%. All other retail deposits not included in the previous items and that do not fulfill the conditions of retail deposits with a higher outflow rate are subject to the 10% outflow rates. A retail deposit should be considered part of an established relationship when the depositor meets at least one of the following criteria: (a) has an active contractual relationship with the institution of a minimum duration of 24 months,

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(b) has a borrowing relationship with the institution for mortgage loans or other long-term loans, or (c) has a minimum of two active products, other than loans, with the institution. A retail deposit should be considered as being held in a transactional account when salaries, income, or transactions are regularly credited and debited against that account.

Guidelines cover the methodology for the identification of retail deposits that are subject to higher outflows. Retail deposits are grouped in three main categories. Each category is formed based on the number and riskiness of the risk factors they meet. The guidelines do not prescribe the outflow rates for the three categories, but stipulate that institutions are to report retail deposit amounts allocated to each of the three categories together with their own estimates of expected outflows under stress conditions. This paper demonstrates how a commercial bank can develop a simple internal model for calculating the stability of the retail deposits with higher outflow rates that are subject to LCR reporting. The bank's own econometric model is based on the historical data and expected stability/volatility for the specific retail deposits. Thus, we have developed our model based on two main hypotheses: how the historical data impact the stability of considered retail deposits and what level of stability we can expect in the subsequent 22 working days.

This paper is divided into three main parts. The first part considers the regulatory issues that are the basis for the empirical part, which is the second part, including the interpretation of the results of the internal model. The last part describes the future challenges in the field of measuring the stability of the retail deposits with higher outflow rates according to the Delegated Act.

2 Results of the EBA Discussion Paper and the Basis for the Guidelines

In February 2013, the EBA published its discussion paper (DP) on retail deposits subject to higher outflows for the purposes of LCR reporting. The scope of the DP covered all retail deposits as per Article 409 of CRR, but emphasis was put on the process of identifying retail deposits that carry a higher outflow risk. The result of the DP was presented in the form of 18 questions that should be answered by any potential respondent. EBA received 25 responses, of which 21 were published on the EBA website (EBA, 2013b). Before presenting a summary of the key points arising from the consultation, here are the most significant, from a technical point of view, questions (EBA, 2013a):

- Availability of data: the introduction of liquidity requirements to some extent is based on actual behavior observed during a stressed situation that may be considered realistic. Thus, the institutions should use local historical data and a forward-looking approach (the latter within the circumstances of a combined idiosyncratic and market-wide stress scenarios).
- Factors affecting the stability of retail deposits: the value of deposits, products that are rate-driven or have preferential conditions, maturing fixed term or notice period deposits, high risk distribution channels including Internet-only access and brokered deposits, the currency and location of deposits, non-resident deposits, depositors who are sophisticated or high net worth individuals, product-linked deposits and any other characteristics that might indicate a retail deposit with a higher outflow rate.
- Factors divided into two groups: high risk and very high risk.
- Mix of characteristics according to their riskiness and three categories: category 1 with an outflow rate of 15%, category 2 with an outflow rate of 20%, and category 3 with an outflow rate of 25%.

A summary of the key points arising from the DP is provided below (EBA, 2013b):

- Most respondents considered that the proposed risk factors concerned the characteristics of the deposits rather those of the depositors.
- Some respondents proposed additional risk factors; these were basically the financial position of the bank, the financial stability of the country, the customer as a single product user, and concentration risk.
- Some respondents considered that some risk factors may be closely correlated; such a situation was mentioned regarding sophisticated and rate-driven deposits, which are by default deemed to be associated.
- Some respondents did not agree that deposits with virtual (Internet only) banks must be subjected to a more stringent regime than those linked to Internet accounts with traditional banks, which have a network of physical branches.
- Many respondents considered that the non-resident condition itself could be potentially discriminative.
- Some respondents rejected the idea that rate-driven deposits must be subjected to higher outflow rates.
- Some respondents saw the imposition of higher outflows on maturing term deposits or fixed-notice accounts as counterintuitive and should be seen as providing stable funding.
- Some respondents argued that the imposition of specific higher outflow rate places EU banks at a disadvantage compared to non-EU banks.
- Many respondents stated that the DGS amount in each relevant jurisdiction should be the threshold for determining whether a retail deposit should be subjected to a higher outflow rate. For a split between high and very

high-risk retail deposits, a threshold of 1 million € was proposed instead of 500,000 €.
- Some respondents raised concerns about the technical difficulties inherent in the data collection process.
- Some respondents stated that significant investment in IT infrastructure would be necessary to implement the identified process and new staff would be needed to analyze databases.

In August 2013, the EBA published its Consultation Paper (CP) considering the draft guidelines as a further step of the previously published DP. As a change to the approach proposed in the DP, the draft guidelines will not prescribe the associated outflow rates for the three categories. Instead, the draft stipulates that credit institutions shall report retail deposit amounts allocated to each of the three categories together with their own estimates of expected outflows under stress conditions.

3 Data Preparation, Collection, and Analysis

The bank is in the process of data preparation, collection, and analysis, which includes detailed examination of the criteria and methodology for the definition of retail deposits with higher outflow rate, fully taking into account the guidelines. The latter continue to include a three-tiered "bucket" approach to allocate retail deposits subject to higher outflows for the purposes of liquidity reporting. At the aggregated level of reporting liquidity outflows within CRR, three main groups of retail deposits are considered (CRR, 2013 and ZBS, 2013):
- retail deposits covered by a DGS and which are either part of an established relationship making withdrawal highly unlikely or held in a transactional account, including accounts to which salaries are regularly credited. Such retail deposits are subject to an outflow rate of 5%.
- retail deposits that do not meet criteria from the previous point or are not identified as deposits with a higher outflow rate. These are subject to an outflow rate of 10%.
- retail deposits based on the number and risk level of the risk factors are grouped into three categories set out in the guidelines. Such retail deposits have three different outflow rates depending on the credit institution's own estimates of expected outflows under stress conditions.

Our paper emphasizes the retail deposits that are subject to a higher outflow rates. First, the criteria for their definition need to be clarified. Second, the methodology for the identification of three categories needs to be determined. Third, the time series that represent the core for the econometric modeling needs to be identified in order to calculate the outflow rates for all three categories.

Above all, we need to emphasize what represents the starting point for the development of the model presented in this paper. The respective bank has developed a number of simple econometric models that have been inspired primarily by the following papers: Stesevic (2008), Perusko and Zenzerovic (2011), Takemura and Kozu (2009), OENB (2008), and von Feilitzen (2011). The latest has also been a fundamental issue within the development process of the internal model, which has been described in the article.

3.1 Criteria for Definition of Retail Deposits with Higher Outflow Rates

Criteria are presented as a list of factors that form the basis for the bank's calculations of retail deposits with higher outflow rates. High value deposits are particularly sensitive in a combined idiosyncratic and market-wide stress scenario and may therefore be subject to higher and faster outflows. In addition, high value deposits contribute to the concentration of the deposit base, and over-reliance on such deposits can compromise the stability of the deposit base.

Depositors influenced by higher yield, preferential conditions, or negotiated rates can be more responsive to competitors and other attractive offers. Consequently, these deposits may prove to be less stable. Maturing fixed-term retail deposits or deposits with fixed-notice periods may be less stable during stress periods because they are more likely to be funds that depositors do not need for day-to-day transactions.

The clients of Internet-only banks have access to their bank only through the Internet, and the absence of direct contact with staff can have a negative effect on confidence and stability under stress conditions. Moreover, exchange rate volatility can also affect the stability of both foreign and local currency denominated deposits. The ability of retail non-resident depositors to transfer deposits may impact the stability of such deposits.

The following summarized list of risk factors or harmonized criteria will be used for our empirical analysis (EBA, 2013c):
1.) High value deposits: over 100,000 € to 500,000 € (C1)
2.) Very high value deposits: over 500,000 € (C2)
3.) Deposits that are rate-driven or have preferential conditions: exceeding the average rate for similar retail products offered by peers, return is derived from the return on a market index or set of indices, or return is derived from any market variable other than a floating interest rate (C3)

4.) Maturing fixed-term or notice period deposits: fixed-term deposit with an expiry date maturing within the 30-day period or deposit with fixed notice period shorter than 30 days (C4)
5.) High-risk distribution channels: including Internet-only access and brokered deposits (C5)
6.) The currency of deposits: deposits denominated in foreign currencies (C6)
7.) Non-resident deposits: the statistical or tax definition at the depositor level (C7)
8.) Product-linked deposits: banking product to which the deposit is linked terminates during the 30-day period and the client can then disburse the savings (C8)

3.2 Method for Determining the Retail Deposits with Higher Outflow Rates

Risk factors or criteria described in the previous chapter are classified into two groups according to the level of risk, which impacts the stability of retail deposits (EBA, 2013c):

a) Group 1 (high risk – VR), which includes the following risk factors:
   - VR_C1: deposits over 100,000 € to 500,000 €
   - VR_C3: interest-rate sensitivity
   - VR_C5: Internet bank
   - VR_C6: deposits in foreign currency
   - VR_C8: product-linked deposits

b) Group 2 (very high risk – ZR), which includes following risk factors:
   - ZR_C2: deposits over 500,000 €
   - ZR_C4: fixed-term deposits with residual maturity up to 30 days or notice period deposits shorter than 30 days
   - ZR_C7: non-resident deposits

Using the scoring system, the bank assessed the retail deposits from points (a) and (b) and assigned retail deposits to one of the three following tiered buckets defined based on the number of risk factors attributed to the underlying deposit (Nova KBM d.d., 2014):

- CATEGORY 1 (KAT01): retail deposits with two factors from Group 1 *or* written for the econometric modeling use →

  a = VR_C1 + VR_C3 + VR_C5 + VR_C6 +VR_C8 = **2**

  and

  b = ZR_C2 + ZR_C4 + ZR_C7 = **0**

- CATEGORY 2 (KAT02): retail deposits with three factors from Group 1 or with one factor from Group 1 and one factor from Group 2 →

  a = 3 and **b = 0** or **a = 1** and **b = 1**

- CATEGORY 3 (KAT03): retail deposits with two factors from Group 2 or two factors from Group 1 and one factor from Group 2 or with any other mix of factors →

  a = 2 and **b = 0** or **a = 2** and **b = 1** or **a > 2** and **b > 1**

3.3 Time Series

Time series are data that are collected over a certain period of time (e.g., unemployment rate, salaries, rents, inflation, Euribor). These data can be collected daily, weekly, monthly, quarterly, or annually. The main purpose of the time series is to observe the evolution of economic phenomena over time and to establish the general findings of this movement. The latter enables the prediction of further development and the acceptance of appropriate measures. Included are daily data from 1 September 2013 to 31 March 2014. A longer time series, from a historical point of view, was not possible due to the complexity of defining individual categories and transactional systems.

4 Empirical Analysis

4.1 Starting Point for Model Estimation and Implementation of Regression Analysis

We used ordinary least squares (OLS), which is considered the most commonly used method of determining the regression coefficients. OLS is often called the “queen” of the assessment methods of regression coefficients and is considered the “best linear unbiased estimator” (BLUE). Regression analysis must meet certain assumptions that the estimator of regression coefficients will be BLUE. In our regression analysis, we considered the assumptions unconditionally (Greene 2003, Gujarati 1988, Pfajfar 1998 and Schwert 2011).

In our analysis, we used two types of data: quantitative and qualitative data. Quantitative data were determined by time series of daily data from September 2013 to March 2014 (DPRS 2013 and 2014, EURIBOR 2013 and 2014, SURS 2013 and 2014). Qualitative data were included through a dummy variable, with which we indicated the presence or absence of certain properties. Using regression analysis,

we studied the movement of retail deposits separately for KAT01, KAT02, and KAT03 and evaluated models that incorporate the selected parameters. Based on the results, we conducted a 30-day forecast (or 22 working days) and calculated the stability of retail deposits for each category in the form of higher outflow rates. Regression analysis was performed using the Econometric Views 7 (EViews 7, 2010a and 2010b) software package.

4.2 Regression Model for Category 1 (KAT01)

The mathematical form of the model for KAT01 is as follows:

$$KAT01_t = \beta_1 + \beta_2 KAT01(t\text{-}1)_t + \beta_3 EURIBOR_t + \\ + \beta_4 NETO\_PLACA_t + \\ + \beta_5 ST\_REG\_BREZPOS_t + \\ + \beta_6 DUMMY\_INFOR_t + u_t ,$$

where:

$KAT01_t$	retail deposits for Category 1 for *t* day (dependent variable)
$KAT01(t\text{-}1)_t$	retail deposits for Category 1 for *t*-1 day, hereafter referred to as KAT01(-1), (explanatory variable)
$EURIBOR_t$	reference interest rate 6M Euribor for *t* day (explanatory variable)
$NETO\_PLACA_t$	net salary in Slovenia for *t* day (explanatory variable)
$ST\_REG\_BREZPOS_t$	unemployment rate in Slovenia for *t* day (explanatory variable)
$DUMMY\_INFOR_t$	dummy variable due to negative information about the bank in media for *t* day (explanatory variable)
u_t	stochastic disturbance (or stochastic error term) for *t* day
β_1	regression coefficient of the constant (or an intercept)
β_2 do β_5	regression coefficients of the explanatory variables
β_6	regression coefficient of the dummy variable
t	time series from 1 September 2013 until 31 March 2014

We expect the following signs of regressions' coefficient estimators:

- for *KAT01(-1)* a positive sign. As this is a lagged dependent variable, the only reasonably outcome is a positive sign.
- for *EURIBOR* a positive sign. Higher interest rates should attract deponents to put their funds into the bank.;
- for *NETO_PLACA (net salary)* a positive sign. Higher salaries should lead to higher savings/deposits.
- for *ST_REG_BREZPOS (registered unemployment rate) a* negative sign. Increased unemployment usually means that people receive just an unemployment compensation for the certain period of time and afterwards social support. Both amounts are lower than the salary.
- for *DUMMY_INFOR* a negative sign.
- for *CONSTANT* a positive sign because of an increase in or the preservation of KAT01 retail deposits' balance.

4.3 Regression Model for Category 2 (KAT02)

The mathematical form of the model for the medium risky category, KAT02, is as follows:

$$KAT02_t = \beta_1 + \beta_2 KAT02(t\text{-}1)_t + \beta_3 EURIBOR_t + \\ + \beta_4 NETO\_PLACA_t + \\ + \beta_5 ST\_REG\_BREZPOS_t + \\ + \beta_6 DUMMY\_INFOR_t + u_t ,$$

where:

$KAT02_t$	retail deposits for Category 2 for *t* day (dependent variable)
$KAT02(t\text{-}1)_t$	retail deposits for Category 2 for *t*-1 day, hereafter referred to as KAT02(-1) (explanatory variable)
$EURIBOR_t$	reference interest rate 6M Euribor for *t* day (explanatory variable)
$NETO\_PLACA_t$	net salary in Slovenia for *t* day (explanatory variable)
$ST\_REG\_BREZPOS_t$	unemployment rate in Slovenia for *t* day (explanatory variable)
$DUMMY\_INFOR_t$	dummy variable due to negative information about the bank in media for *t* day (explanatory variable)
u_t	stochastic disturbance (or stochastic error term) for *t* day
β_1	regression coefficient of the constant (or an intercept)
β_2 do β_5	regression coefficients of the explanatory variables
β_6	regression coefficient of the dummy variable
t	time series from 1 September 2013 until 31 March 2014

We expect the same signs of regressions coefficient estimators for KAT02 retail deposits as we described for KAT01 retail deposits.

4.4 Regression Model for Category 3 (KAT03)

The mathematical form of the model for the riskiest category, KAT03, is as follows:

$$KAT03_t = \beta_1 + \beta_2 KAT03(t\text{-}1)_t + \beta_3 EURIBOR_t + \beta_4 NETO\_PLACA_t + \beta_5 ST\_REG\_BREZPOS_t + \beta_6 DUMMY\_INFOR_t + u_t ,$$

where:

$KAT03_t$	retail deposits for Category 3 for *t* day (dependent variable)
$KAT03(t\text{-}1)_t$	retail deposits for Category 3 for *t*-1 day, hereafter referred to as KAT02(-1) (explanatory variable)
$EURIBOR_t$	reference interest rate 6M Euribor for *t* day (explanatory variable)
$NETO\_PLACA_t$	net salary in Slovenia for *t* day (explanatory variable)
$ST\_REG\_BREZPOS_t$	unemployment rate in Slovenia for *t* day (explanatory variable)
$DUMMY\_INFOR_t$	dummy variable due to negative information about the bank in media for *t* day (explanatory variable)
u_t	stochastic disturbance (or stochastic error term) for *t* day
β_1	regression coefficient of the constant (or an intercept)
β_2 do β_5	regression coefficients of the explanatory variables
β_6	regression coefficient of the dummy variable
t	time series from 1 September 2013 until 31 March 2014

We also expect the same signs of regressions' coefficient estimators for KAT03 retail deposits as described for KAT01.

4.5 Testing Stationary Time Series

The series used in the model for the estimation of outflow rates for the three categories of retail deposits are KAT01, KAT01(-1), KAT02, KAT02(-1), KAT03, KAT03(-1), Euribor, net salary, and registered unemployment rate. Using augmented Dickey-Fuller (ADF) testing, we can conclude that series KAT01, KAT01(-1), KAT02, and KAT02(-1) are non-stationary in their absolute form. Series KAT03, KAT03(-1), Euribor, net salary, and registered unemployment rate are stationary on the first difference. Therefore, we used the logarithm transformation.

4.6 Economic and Statistical Interpretation of the Results

Econometric model for Category 1

Table 1 Results of Econometric Model for Retail Deposits Category 1 (KAT01), 1 September 2013 to 31 March 2014

Dependent Variable:	LOG(KAT01)
N:	150
Constant	1.77
t-stats	*(2.72)*
LOG(KAT01(-1))	0.91
t-stats	*(27.03)*
LOG(EURIBOR)	0.15
t-stats	*(1.89)*
LOG(ST_REG_BREZPOS)	-0.28
t-stats	*(-1.98)*
R^2:	0.877
Adjusted R^2:	0.874

Note: Statistically insignificant variables are omitted from the table.

The estimated regression coefficients are statistically significant and their signs are in accordance with our expectations after the elimination of statistically insignificant regression coefficients. Regression constant *C* in our model represents an increase or preservation of the retail deposits balance for KAT01.

As evident in Table 1, we eliminated two explanatory variables: the net salary and the dummy variable. They were defined as statistically insignificant. The other three explanatory variables have an impact on the KAT01 retail deposits, as shown in Table 1. The estimated equation suggests that the increase of KAT01 retail deposits by one percentage point during the previous day will lead to an increase of KAT01 by 0.91 percentage points the next day.

The results of diagnostic tests in Table 2 show that the regression model is very good and suitable for predicting the movement of Category 1 retail deposits.

The results of the econometric model for retail deposits of Category 1 were used to estimate the volatility and expected movements of these deposits within the next 22 working days under stress conditions. The estimated stability of retail deposits (KAT01, KAT02, and KAT03) were calculated as the ratio between the lowest predictive value of the deposits in the next 22 working days minus two standard errors and the maximum predictive value of

Table 2 Diagnostic Test Results of Regression Model for Retail Deposits Category 1 (KAT01) (number of observations = 150)

Test	Critical value (c)*	Calculated value *	Fulfillment Yes/No & Results description
t-statistics	1.655	t_i > 1.894	Yes. We can reject the null hypothesis that individual regression coefficients are zero at significance level α = 0.10.
F-statistics	2.667	347.889	Yes. The regression model is overall statistically significant ($F > F_c$).
R^2/Adjusted R^2	$0<R^2<1$	0.877 / 0.874	Yes. 87% of changes in the dependent variable is explained by our regression model.
Autocorrelation (h-test)	-1.96<h<+1.96	-0.75	Yes. There is no autocorrelation.
Heteroskedasticity (White test)	11.0705	4.391	Yes. In our regression model we do not have heteroskedasticity ($\chi^2 < \chi^2_c$).
Multicollinearity (VIF test)	VIF < 10	VIF_i < 6	Yes. No multicollinearity is present.
Model specification (Ramsey-Reset test)	2.667	0.134	Yes. As F < Fc we cannot reject the null hypothesis; therefore, we conclude that our model is correctly specified.

Note: * at the α = 0.05 significance level (confidence interval 95%).
** i = regression coefficients/variables. *** VIF = Variance Inflation Factor.

deposits in the next 22 working days (at the 95% confidence interval). The commercial bank adopted a very conservative approach by calculating the stability of deposits. Thus, it takes into account the lowest possible forecasted value of deposits in the next 22 working days.

Retail deposits within Category 1 are treated as the least risky category, taking into account a predetermined number and type of risk factors. For the purpose of the LCR reporting, the outflow rate for retail deposits that fall into Category 1 was calculated at 15.21% using the historical and expected volatility assessment.

Econometric model for Category 2

Table 3 Results of Econometric Model for Retail Deposits Category 2 (KAT02), 1 September 2013 to 31 March 2014

Dependent Variable:	LOG(KAT02)
N:	150
Constant	1.71
t-stats	*(2.97)*
LOG(KAT02(-1))	0.89
t-stats	*(24.72)*
LOG(ST_REG_BREZPOS)	-0.24
t-stats	*(2.24)*
D_INFOR	-0.01
t-stats	*(-1.35)*
R^2:	0.870
Adjusted R^2:	0.868

Note: Statistically insignificant variables are omitted from the table.

Table 3 shows that the estimated regression coefficients are statistically significant and their signs are in accordance with our expectations after the elimination of statistically insignificant regression coefficients. The calculated *t* statistic for the regression coefficient estimator of the dummy variable *d_infor* was 1.349; therefore, we can reject the null hypothesis about its statistical significance only at 80% probability (t_c = 1.287). Yet we need to emphasize that, due to data complexity, only a short time series has been included. The bank considered in this paper is one of the three largest banks in Slovenia and is treated as a systematically important bank in Europe; thus, we decided to keep the impact of media on the bank's retail deposits within Category 2.

Similarly, two explanatory variables were eliminated here—namely, the Euribor and net salary—as these were defined as statistically insignificant. Although the other three explanatory variables have an impact on the KAT02 retail deposits, as clearly seen in Table 3, the regression analysis of KAT02 retail deposits showed that an increase of the registered unemployment rate by one percentage point would lead to a decrease of KAT02 retail deposits by 0.24 percentage points.

The results of the diagnostic tests are presented in Table 4. They indicate that the regression model is good and suitable for predicting the movement of Category 2 retail deposits.

The results of the econometric model for retail deposits of Category 2 were used to estimate the volatility and expected movements of these deposits within the next 22 working days under stress conditions. Retail deposits within Category 2 are treated as the medium risky category,

Table 4 Diagnostic Test Results of Regression Model for Retail Deposits Category 2 (KAT02) (number of observations = 150)

Test	Critical value (c)*	Calculated value *	Fulfillment Yes/No & Results description
t-statistics	1.976	t_i > 2.240	Yes. We can reject the null hypothesis that individual regression coefficients are zero, except for *d_infor*.
F-statistics	2.667	326.992	Yes. The regression model is overall statistically significant ($F > F_c$).
R^2/Adjusted R^2	$0<R^2<1$	0.870 / 0.868	Yes. 87% of changes in the dependent variable is explained by our regression model.
Autocorrelation (h-test)	-1.96<h<+1.96	-0.04	Yes. There is no autocorrelation.
Heteroskedasticity (White test)	11.0705	28.725	No. Because ($\chi^2 > \chi^2_c$), we reject the null hypothesis of no heteroscedasticity, and it is corrected with White test.
Multicollinearity (VIF test)	VIF < 10	VIF_i < 3	Yes. No multicollinearity present.
Model specification (Ramsey-Reset test)	2.667	0.376	Yes. As F < Fc we cannot reject the null hypothesis; therefore, we conclude that our model is correctly specified.

Note: * at the α = 0.05 significance level (confidence interval 95%).

** i = regression coefficients/variables. *** VIF = Variance Inflation Factor.

taking into account the predetermined number and type of risk factors (retail deposits that meet three criteria from high-risk Group 1 factors or one criterion from Group 1 and one criterion from Group 2 risk factors). For the LCR reporting, the outflow rate for retail deposits that fall into Category 2 was calculated at 22.57% using historical and expected volatility assessment.

Econometric model for Category 3

Table 5 Results of Econometric Model for Retail Deposits Category 3 (KAT03), 1 September 2013 to 31 March 2014

Dependent Variable:	LOG(KAT03)
N:	150
Constant	1.94
t-stats	*(2.92)*
LOG(KAT03(-1))	0.89
t-stats	*(22.96)*
LOG(EURIBOR)	0.10
t-stats	*(1.33)*
LOG(ST_REG_BREZPOS)	-0.26
t-stats	*(-1.82)*
R^2:	0.800
Adjusted R^2:	0.797

Note: Statistically insignificant variables are omitted from the table.

Table 5 shows that the estimated regression coefficients are statistically significant and their signs are in accordance with our expectations after the elimination of statistically insignificant regression coefficients. The calculated *t* statistic for the regression coefficient estimator of 6M Euribor is 1.332; therefore, we can reject the null hypothesis about its statistical significance only at 80% probability (t_c = 1.287). Yet we need to emphasize that due to data complexity only a short time series was included. We decided to keep the impact of 6M Euribor on the bank's retail deposits within Category 3 because some contracts included in this category are based on the reference rate movement.

As shown in Table 5, we again eliminated two explanatory variables: net salary and the dummy variable. The other three explanatory variables have an impact on the KAT03 retail deposits. An increase in 6M Euribor by one percentage point will lead to an increase in KAT03 retail deposits by 0.10 percentage points (taking into account the 80% probability).

The results of diagnostic tests are presented in Table 6. They show that the regression model is good and suitable for predicting the movement of Category 3 retail deposits.

The results of the econometric model for retail deposits of Category 3 were used to estimate the volatility and expected movements of these deposits within the next 22 working days under the assumption of a combined idiosyncratic and market-wide stress scenario. Retail deposits within *Category 3* are treated as the riskiest category, taking into account the predetermined number and type of risk factors (retail deposits who meet two criteria from very high-risk Group 2 factors or two criteria from Group 1 and one criterion from Group 2 risk factors or any other risk factor combination). For the LCR reporting, the outflow rate for retail deposits that fall into Category 3 was calculated at 34.40% using the historical and expected volatility assessment.

Table 6 Diagnostic Test Results of Regression Model for Retail Deposits Category 3 (KAT03) (number of observations = 150)

Test	Critical value (c)*	Calculated value *	Fulfillment Yes/No & Results description
t-statistics	1.655	t_i > 1.815	Yes. We can reject the null hypothesis that individual regression coefficients are zero, except for *Euribor*.
F-statistics	2.667	195.791	Yes. The regression model is overall statistically significant ($F > F_c$).
R^2/Adjusted R^2	$0<R^2<1$	0.800 / 0.797	Yes. 80% of changes in the dependent variable is explained by our regression model.
Autocorrelation (h-test)	-1.96<h<+1.96	-0.57	Yes. There is no autocorrelation.
Heteroskedasticity (White test)	15.086	13.105	No. Because ($\chi^2 > \chi^2_c$), we accept the null hypothesis of no heteroskedasticity.
Multicollinearity (VIF test)	VIF < 10	VIF_i < 5	Yes. No multicollinearity is present.
Model specification (Ramsey-Reset test)	2.667	0.196	Yes. As F < Fc we cannot reject the null hypothesis; therefore, we concluded that our model is correctly specified.

Note: * at the α = 0.05 significance level (confidence interval 95 %).

** i = regression coefficients/variables. *** VIF = Variance Inflation Factor.

5 Future Treatment of Observed Retail Deposits under Delegated Regulation

The delegated regulation of 10 October 2014, supplementing Regulation (EU) 575/2013 with regard to LCR for credit institutions (known as the Delegated Act), established rules to specify in detail the LCR provided for in Article 412(1) of CRR (CRD IV, 2013 and CRR, 2013). The Delegated Act is divided into the following four main titles:

- Title 1: scope and application, definitions, calculation of LCR and stress scenarios
- Title 2: general and operational requirements, the valuation of liquid assets, the list of Level 1 and Level 2 assets specification, and alternative liquidity approaches
- Title 3: net liquidity outflows, liquidity outflows, and liquidity inflows
- Title 4: final provisions and application date (1 October 2015).

As our paper focuses on the retail deposits that are subject to higher outflow rates, let us summarize the requirements in the Delegated Act considering these types of retail deposits. As stated in Article 25, credit institutions shall apply a higher outflow rate where (EC, 2014a, 2014b and 2014c):

- the retail deposits fulfill point (a) below or two of the criteria in points (b) to (e), and the outflow rate shall be between 10% and 15%; and
- the retail deposits fulfill point (a) below and at least another criterion (b) to (e) or three or more criteria (a) to (e), and the outflow rate shall be between 15% and 20%.

Criteria for classification of the retail deposits subject to higher outflow into Category 1 or Category 2 are as follows (EC, 2014a, 2014b and 2014c):

a) the total deposit balance exceeds 500,000 €
b) the deposit is an Internet-only account
c) the deposit offers an interest rate that fulfills any of the following conditions: the rate significantly exceeds the average rate for similar retail products; its return is derived from the return on a market index or set of indices; and/or its return is derived from any market variable other than a floating interest rate
d) the deposit was originally placed as a fixed term with an expiry date maturing within the 30 calendar day period or the deposit presents a fixed notice period shorter than 30 calendar days
e) for credit institutions established in the EU, the depositor is resident in a third country or the deposit is denominated in a currency other than the Euro or the domestic currency of a member state

As we can see, the major difference compared to the current ECB/ITS reporting of LCR is in the number of categories and in the advanced defined outflow rates for these categories. Although today we have three categories and credit institutions must calculate outflow rates on an individual basis, only two categories are requested for future reporting, and for these categories the outflow rates should be prescribed in advance.

6 Summary

The main purpose of this paper was to show how a commercial bank can develop a simple internal model for calculating the stability of the retail deposits with higher outflow rates that are the subject of LCR reporting. First, we introduced the legal basis with its major documents. Then we

described the most important steps that are necessary within the business process of setting up the groundwork with its main elements to collect the data needed for econometric modelling. As the bank considered in this paper is the only Slovenian bank that has developed such a model, it represents a solid base to present the procedures and main results of a well-established internal model.

As indicated, the calculated outflow rates are very similar to those that EBA has suggested within the DP, especially for Category 1 and Category 2. Although the outflow rate under the stress conditions for Category 3, which comprises the riskiest factors, is even higher at the bank's level, the benchmark bank from this paper still uses the model today. The actual data on the retail deposits demonstrated that the model is very good at predicting the future movements of the considered deposits.

What we can expect in the future is more transparent output based on the detailed rules and harmonized input, with an aim to make the credit institutions less dependent on short-term financing and central bank liquidity provision by requiring them to hold sufficient liquid assets. The latest must withstand the excess of liquidity outflows over inflows that could be expected to accumulate over a 30-day stressed period.

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Model za izračun stabilnosti vlog na drobno z višjo stopnjo odliva

Izvleček

Vloge na drobno veljajo za enega najcenejših in tudi najstabilnejših virov financiranja za banke, ki razpolagajo z večjimi vrednostmi teh vlog. Za namen poročanja in izpolnjevanja zahteve glede likvidnostnega kritja definira banka tri glavne skupine vlog na drobno, ki jim pripadajo različne stopnje odlivov. Za prvi dve glavni skupini so značilne stopnje odlivov 5 % oziroma 10 %, za tretjo glavno skupino pa banka sama določi stopnje odlivov. Tretja glavna skupina je tudi predmet obravnave v tem članku. Banka na podlagi števila in dejavnikov tveganja razvrsti vloge na drobno v tri kategorije. Dejavniki tveganja so glede na stopnjo tveganja razdeljeni v dve skupini. V članku je najprej opisan zakonodajni okvir, nato pa način izračuna višjih stopenj odlivov za vloge na drobno v skladu s preteklimi nihanji in pričakovano oceno nestanovitnosti v situaciji stresnih razmer. Na koncu je na kratko podana prihodnja obravnava vlog na drobno z višjimi stopnjami odlivov.

Ključne besede: vloge na drobno, stabilnost, transakcijski račun, LCR, jamstvo za vloge, deponenti, višji odlivi, Basel III