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Retail interest rates in Slovakia vs. other euro area countries

Where do banks rush and where do they take their time?*

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Interbank interest rates, as well as government bond yields, increased throughout the euro area after the ECB started to tighten its monetary policy in summer 2022. Banks reflected this development in both retail mortgage loan rates and term deposit rates. The increase in these rates was in practically all euro area countries in line with the estimated rise based on their historical development. On the other hand, interest rates on sight deposit increased less than estimated. In Slovakia, the situation is to a large extent comparable to other euro area countries. Mortgage loan rates and term deposit rates behave in line with their historical development. However, the increase in sight deposits rates has so far been even lower than the increase at the euro area level. This development confirms the importance of the financial stability concerns of the ECB related to the impact of a potential increase of funding costs on the earnings of European banks.

Increasing funding costs can pose negative pressure on banks' profitability in the euro area.

Funding costs may increase due to increasing deposit rates or increasing share of term deposits.

Interest rates on term deposits are increasing in line with historical experience, the increase is much slower in case of sight deposits.

The development in Slovakia is broadly in line with other euro area countries, only interest rates on sight deposits adjust more slowly than in other countries.

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Introduction

Banks' profitability in Slovakia and other euro area (EA) countries has so far benefited from increasing lending rates, but potential future hikes in deposit rates could pose profitability concerns. Lending rates adjusted quickly after the European Central Bank (ECB) started to increase its key policy rates in July 2022. On the contrary, sight deposit rates remained sluggish. Potential higher funding costs, together with worsening asset quality, were pointed out by the ECB as one of the main challenges to the EA financial stability (European Central Bank, 2023). This Policy Brief therefore aims to provide a quantitative assessment of recent developments in retail lending and deposit rates in Slovakia and in other EA countries. While there is a lot of discussion about the development of these interest rates, there is in general a lack of studies providing quantitative estimations comparable across countries.

We estimate the transmission of monetary policy tightening to interest rates on retail loans and deposits across EA countries using vector error-correction (VEC) models. We estimate historical relationship between retail interest rates on mortgage loan rates, sight deposit or term deposit rates[1] and EURIBOR interbank interest rates or government bond yields[2]. In the first stage of the transmission, it is expected that changes in the policy rates affect short-term interest rates on the interbank market and long-term government bond yields (Pétursson, 2001). Moreover, the development of interbank rates during the period under consideration should also include the impact of the quantitative easing (QE) not reflected in the monetary policy rate. Interbank rates or government bond yields can, consequently, affect the development of retail deposit and lending rates (Panagopoulos, et al., 2010). We estimate the models until September 2014, when QE started, until June 2022, i.e. until the end of ultra-low interest rates and until August 2023, the most recent data available at the time of analysis. Comparing these different estimations help revealing potential changes in the historical relationship between market and retail interest rates caused by QE or MP tightening.

We focus on retail mortgage loans and deposits because they make up a significant share of the banking sector's balance sheet. Loans granted to non-financial corporations (NFCs) and households make up around one third of EA banks' balance sheets. The same holds for NFC and household deposits. Out of this, housing loans represent 13% of assets, and household deposits almost 23% of liabilities. Moreover, most loans granted to NFCs have a floating rate connected to EURIBOR interest rates, the transmission of changes in market rates is therefore typically fast.

Mortgage loan rates

Estimations confirm a strong relationship between mortgage loan rates and interbank rates or government bond yields. For most countries, it was possible to estimate standard VEC models for loans with floating rates and with fixation up to 1 year. The other three types of fixations – from 1 to 5 years, from 5 to 10 years and over 10 years – are important in a smaller number of countries (more details provided in Tables 1 to 8 in the Appendix). In most cases, we were able to detect a long-term relationship between the loan rates and interbank rates. In

[1] Interest rates on new business enter the estimation. While bank profitability is impacted by the interest rates on the outstanding amount of loans and deposits, we opted for new business for several reasons. First, there are large cross-country differences in the fixation of mortgage loan interest rates that would make the estimation results incomparable across countries. Second, as the interest rates on the outstanding amount of loans and term deposits with longer maturity change only gradually, estimation of the historical relationship between these rates on outstanding amount and market rates are in general much harder than in case of new business. In case there is a change in banks' behaviour, it is easier to detect such a change using interest rates on new business.

[2] While there are many different factors influencing the development of retail loan and deposit rates, in this analysis we are focusing on their relationship with the selected market rates for cross-country comparability reasons.

a few countries, especially those with higher government bond yields during the sovereign debt crisis (such as Spain, Italy, or Portugal), incorporating these government yields improved estimations for the shorter fixations. This is because, unlike interbank rates, government bond yields also reflect the sovereign risk of the respective countries. The importance of government bond yields naturally increased across almost all countries with increasing fixation periods. This is because interbank rates are only available with a maturity up to 1 year, while government bond yields are usually available also with a much longer maturity.

BOX 1 Methodology

For the estimations, we use standard VEC models with monthly data in line with the related literature (Panagopoulos, et al., 2010), (Friedman & Shachmurove, 2017), (Gambacorta, et al., 2015). We estimate the models for the following interest rates:

- Mortgage loan rates, with floating rates and fixation up to 1 year, fixation from 1 to 5 years, fixation from 5 to 10 years and fixation above 10 years
- Interest rates on sight deposits
- Interest rates on term deposits with maturity up to 1 year, between 1 and 2 years and above 2 years
- Interest rates on deposits redeemable at notice – the results are not showed.

We include only those countries that joined the EA before Slovakia. In the base specification, we include the respective retail interest rate and the interbank interest rate into the estimations. Although we estimate VEC models using the Johansen approach, we are interested in the equation explaining the development of retail interest rates:

$$\Delta IR_t = -\alpha(IR_{t-1} - \beta_0 - \beta_1 IBR_{t-1}) + \sum_{l=1}^{L} \gamma_l \Delta IR_{t-l} + \sum_{l=1}^{L} \delta_l \Delta IBR_{t-l} + \upsilon_t,$$

where IR_t is the retail interest rate and IBR_t is the interbank rate. In case of Slovakia, BRIBOR interest rates are used until the end of 2008 and EURIBOR interest rates afterward. In case we include the government bond yield, it is included in the cointegrating equation as well.

We are mainly interested in the estimation of two coefficients. The first is the speed of adjustment, α. The larger is this coefficient, the quicker is the transmission of the changes in the interbank rate/government bond yield into the retail interest rates. The second is β_1. The closer is the estimation of this coefficient to 1, the larger is the part of the change in the interbank rate/government bond yield transmitted to the retail interest rate in the long run. If the coefficient equals one, 100% of the change is transmitted.

As mainly in case of deposits the zero lower bound could be an issue, we also include a dummy variable capturing the lowering impact of the QE on the interbank rates. This dummy is based on the overall volume of assets purchased by the ECB during the QE and is included in case of deposits with short maturities.

Interbank rates and government bond yields with different maturities as well as different model lags were tested. Models were selected based on the outcome of the cointegration tests and the goodness of fit.

While there are differences in the estimated relationships between countries, these relationships remain relatively stable over time. In general, 60% to 100% of the changes in both the interbank rates and government bond yields are transmitted to changes in loan rates in the long run. While there are differences between countries, the relationships at country level remain quite robust over time. Changes are typically transmitted over a period of 20 – 30

months. Again, while there are differences between countries, the relationship is relatively stable over time[3].

The relationship is weaker in case of Slovakia due to structural factors but remains stable over time. In Slovakia, the two most important fixations are up to 1 year and from 1 to 5 years. The estimated relationships improve when government bond yields are included but are weaker compared to other countries. Several structural factors can affect this result. In case of Slovakia, interest rates on mortgage loans are not directly linked to any market rate, meaning the underlying market rate can differ even across banks. The relationship was also impacted by different structural changes, e.g. the reduction of refinancing fees in 2016. Supply side factors played role as well, as banks recently favoured fixation around 3 years, impacting the pricing of mortgage loans. However, the estimated historical relationship until June 2022 remains largely unchanged even after the start of monetary policy tightening. Simulated values for the most important fixations for the period July 2022 – August 2023 are to a large extent in line with the actual development both in case of loans with the shortest fixation (Chart 1) and loans with fixations between 1 and 5 years (Chart 2).

Chart 1
Interest rates on mortgage loans – floating rates and fixation up to 1 year (%)

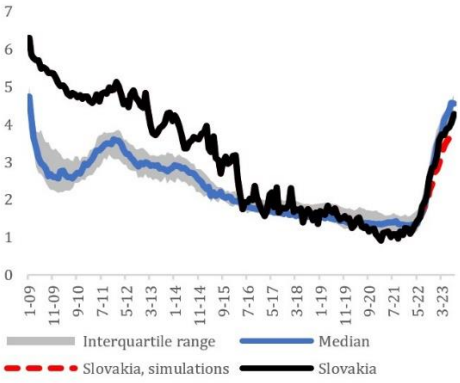
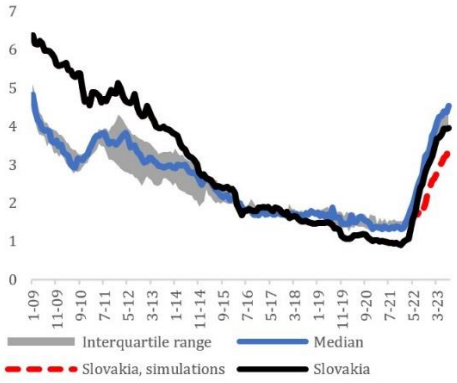


Chart 2
Interest rates on mortgage loans – fixation from 1 to 5 years (%)



Source: ECB. Notes: charts show data for new business. Estimations based on equations estimated until June 2022 including government bond yields. For the sake of readability simulations shown only for Slovakia, for other countries available upon request.

Deposit rates

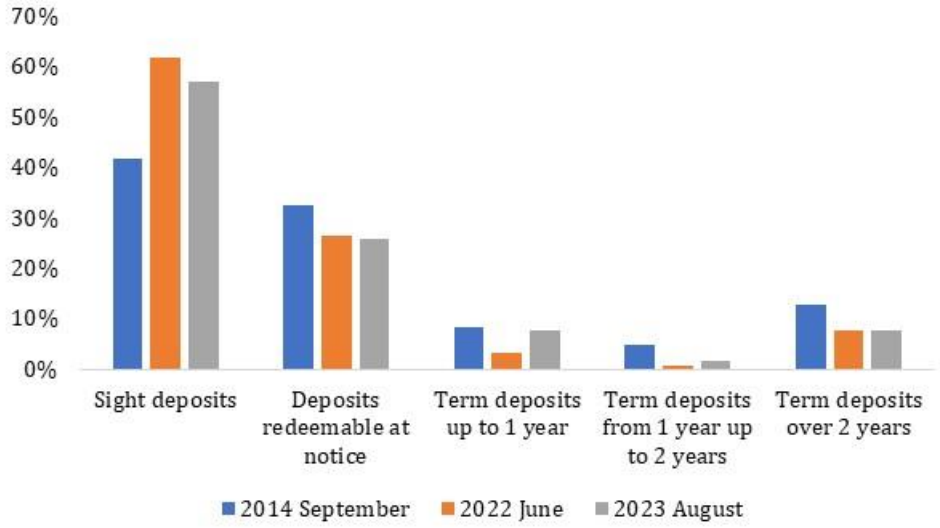
The share of term deposits decreased slightly between September 2014 and August 2023. Before QE, the main interest was in longer-term deposits with a maturity of over 2 years. After the start of QE, the share of sight deposits in EA banks increased rapidly. This trend reversed after the start of MP tightening and currently the demand is stronger for deposits with a maturity of up to 2 years. Still, the overall share of term deposits is slightly lower compared to pre-QE levels. While the share of deposits redeemable at notice is also high, the share is not increasing currently and this type of deposits is important only in selected larger countries (Belgium, Germany, Finland, France, Italy, and the Netherlands). In Slovakia, the share of such deposits is only slightly above 3% of all retail deposits.

Interest rates on sight deposits have started to increase, but estimations confirm that the increase is lower than what can be expected based on historical development. For almost all countries it was possible to estimate VEC models using interbank rates (Table 9 in the Appendix). While country differences exist, there are similar trends over time. Only around

[3] The available time period after the start of the MP tightening is not long enough to apply breakpoint tests on the estimated coefficients of the VEC models. However, the robust relationship between mortgage loan rates and market rates are confirmed by LR tests and also by simulations for the period July 2023 – August 2023 using VEC models estimated until the start of MP tightening (see Chart 1 and Chart 2 depicting simulated rates for Slovakia).

20% – 40% of the changes in the interbank rates are transmitted into deposit rates in the long run. This share increased in only a few countries after June 2022. The time needed to transmit these changes increased rapidly in all countries. This points to a slower reaction of banks to the MP tightening, compared to previous periods (changes in market rates were transmitted over a period of 10 – 30 months prior to the MP tightening, this increased in most cases to 30 – 80 months). In August 2023, rates were lower by 17 – 80 basis points in the respective countries compared to the simulated levels based on historical relationships until June 2022[4].

Chart 3
Share of the respective types of deposits on the overall volume of deposits in the EA



Source: ECB. Notes: shares based on the outstanding amount.

In Slovakia, the increase in interest rates was far below the rest of EA. Interest rates remained low compared to other EA countries, but also compared to their simulated level, by almost 30 basis points (Chart 4). This is because the share of market rate changes transmitted in the long run decreased rapidly while the time needed for the transmission increased after the start of MP tightening.

Historical relationships for term deposits remained to a large extent unchanged, alike in case of mortgage loans. While again, there are country differences, historical relationships at country level remained robust over time (Tables 10 – 15 in the Appendix). Including government bond yields improved the estimations in many cases. This can be because interbank rates are only available with a maturity of up to 1 year and government bond yields capture country-specific credit risk, especially in the case of countries impacted the most by the sovereign debt crisis. Approximately 40% – 80% of the changes in interbank rates/government bond yields are transmitted in the long run to the deposit rates, with no significant change after the MP tightening. The same holds for the time needed to transmit these changes. While there were a few cases, when this time increased after June 2022, in general the estimations didn't change significantly[5].

[4] Again, it is not possible to apply breakpoint tests on the estimated coefficients of the VEC models. LR tests showed that in VEC models estimated on the whole period constraining the values of the long-run coefficients to the ones estimated until the start of MP tightening is significantly more binding than in case of mortgage loan rates or term deposits. Also, simulations for the period July 2023 – August 2023 using VEC models estimated until the start of MP tightening show huge differences between the simulated and the actual interest rates (see Chart 4 depicting results for Slovakia).

[5] Again, confirmed by LR tests and simulated rates for the period July 2022 – August 2023 (see Chart 5 for the results for Slovakia)

Chart 4
Interest rates on sight deposits (%)

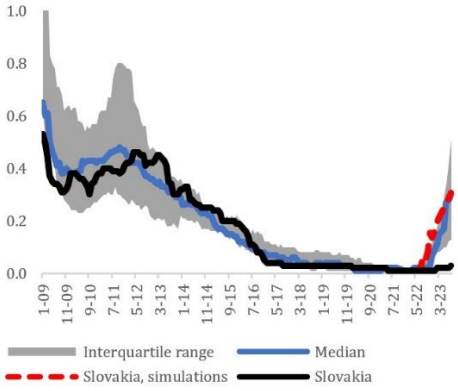
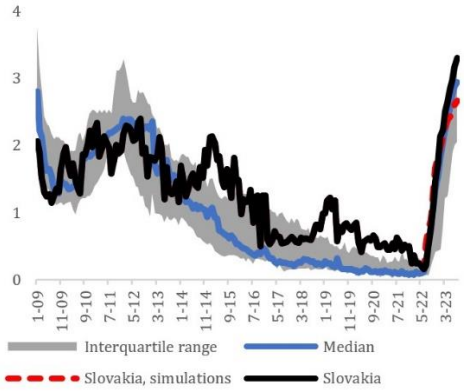


Chart 5
Interest rates, term deposits, up to 1 year (%)



Source: ECB. Notes: chart shows data for new business. Estimations based on equations estimated until June 2022 including EURIBOR interbank rates. For the sake of readability estimations shown only for Slovakia, for other countries available upon request.

The historical relationship also holds for Slovakia. Around 30% - 50% of changes in interbank rates are transmitted to deposit rates in the long run, and these figures remained roughly the same after June 2022. The changes are transmitted relatively quickly, within approximately 2 – 3 quarters. Estimations also confirm a robust relationship, as the simulated level of term deposit rates almost matches their actual levels after the start of MP tightening (Chart 5).

Conclusions

Despite substantial country differences, it is possible to find long-term relationship between retail interest rates and market rates. Even a simple VEC model including only interbank rates or government bond yields can nicely capture the development of mortgage loan rates and term deposit rates in most EA countries. Naturally, the development of these rates in different EA countries can vary due to several reasons. These can be structural factors, the relative importance of the respective loan or deposit categories in different countries but also due to a late impact of past crises events on different countries.

Banks responded to increased market rates in case of mortgage loans and term deposits in line with historical developments, while interest rates on sight deposits are lagging. Generally, interest rates on mortgage loans and term deposits increased quickly and in line with the estimated historical relationships until the start of the MP tightening. On the other hand, the increase in sight deposit rates is much lower than expected based on history. Based on our estimations, sight deposit rates are currently 17 – 80 basis points lower compared to their expected level in the analysed countries. There are several possible explanations for this development. For banks in liquidity need increasing interest rates on term deposits can help to gain some long-term funding. On the other hand, increasing term deposit rates for banks with solid long-term funding base helps maintain their funding structure. However, this means that a potential future increase in interest rates on sight deposits, caused e.g., by competition for stable deposits, can have a negative impact on profitability. Even though in general these interest rates are very low, the amount of sight deposits means banks can feel even a mild increase of these rates.

The developments in Slovakia are largely in line with other EA countries. Mortgage and term deposit rates are increasing with at a pace comparable to other EA countries. On the other hand, interest rates on sight deposits remain very low and are lagging even behind other countries. There are several possible explanations for this development. The price increase in Slovakia due to the energy crisis and the war in Ukraine was among the highest across euro area countries. As a result, household expenditure increased significantly and retail deposit growth decreased even stronger than in other EA countries (Národná banka Slovenska, 2022).

This negative impact on the volume of deposits was exogenous to the level of interest rates. Furthermore, the gradual decrease in loan growth because of MP tightening eased the pressure on funding needs of banks. This, coupled with the experience of neighbouring countries with a minimal impact of increased interest rates on the volume of retail deposits possibly led to a decision of banks leave sight deposit rates flat (Národná banka Slovenska, 2023).

References

European Central Bank, 2023. Financial Stability Review November 2023.
Friedman, J. & Shachmurove, Y., 2017. Monetary Transmission: The Federal Funds Rate and the London Interbank Offered Rate (LIBOR). *Journal of Finance and Economics,* 5(1), pp. 1-8.
Gambacorta, L., Illes, A. & Lombardi, M. J., 2015. Has the Transmission of Policy Rates to Lending Rates Changed in the Wake of the Global Financial Crisis?. *International Finance,* 18(3), pp. 263-280.
Národná banka Slovenska, 2022. Financial Stability Report November 2022.
Národná banka Slovenska, 2023. Financial Stability Report May 2023.
Panagopoulos, Y., Reziti, I. & Spiliotis, A., 2010. Monetary and banking policy transmission through interest rates: an empirical application to the USA, Canada, the UK and the Eurozone. *International Review of Applied Economics,* 24(2), pp. 119-136.
Pétursson, T. G., 2001. The transmission mechanism of monetary policy. *Central Bank of Iceland Monetary Bulletin,* Volume 4.

Appendix A Estimation details

Table 1 Housing loans with floating rates or fixation up to 1 year

	2000M01 - 2014M09				2000M01 - 2022M06				2000M01 - 2023M08					
	α	β	aR^2	lags	α	β	aR^2	lags	α	β	aR^2	lags	EURIBOR	Cointegration
AT	0.138	0.915	61.3%	5	0.129	0.914	59.5%	5	0.093	0.912	66.5%	6	1M	**
DE	0.031	1.045	61.3%	3	0.032	0.959	58.1%	3	0.038	0.963	58.0%	6	12M	**
ES	0.038	0.667	63.4%	4	0.041	0.741	58.6%	4	0.039	0.733	61.7%	4	12M	*
FI	0.028	0.815	61.6%	2	0.031	0.812	60.0%	2	0.036	0.782	56.1%	4	12M	
FR	0.042	0.868	47.3%	3	0.050	0.811	40.5%	5	0.059	0.803	43.1%	5	12M	**
IE	0.041	0.349	27.9%	3	0.034	0.207	24.8%	4	0.046	0.274	22.1%	4	12M	
IT	0.049	0.453	52.0%	6	0.030	0.701	47.6%	6	0.034	0.651	56.5%	6	12M	*
LU	0.033	0.795	43.2%	6	0.045	0.763	41.6%	6	0.013	0.802	62.2%	6	1M	*
NL	0.005	0.243	61.7%	4	0.019	0.931	63.6%	6	0.016	1.001	68.5%	6	12M	*
PT	0.014	0.256	71.2%	4	0.002	0.368	68.7%	4	0.002	0.391	73.3%	4	12M	
SI	0.048	0.774	70.7%	6	0.024	1.069	63.9%	6	0.039	0.976	70.4%	6	12M	*
SK	0.156	0.525	20.3%	6	0.183	0.530	17.4%	6	0.108	0.592	16.3%	6	12M	**

Table 2 Housing loans with floating rates or fixation up to 1 year – government bond yields included

	2000M01 - 2014M09					2000M01 - 2022M06					2000M01 - 2023M08							
	α	β IBR	β GB	aR^2	lags	α	β IBR	β GB	aR^2	lags	α	β IBR	β GB	aR^2	lags	EURIBOR	Government bond	Cointegration
AT	0.082	1.359	-0.457	61.3%	4	0.034	1.820	-0.780	59.1%	4	0.020	-1.192	1.941	60.3%	4	1M	2Y	**
DE	0.091	0.145	0.710	62.9%	3	0.105	0.153	0.691	60.7%	3	0.125	0.510	0.363	62.6%	4	12M	2Y	**
ES	0.059	0.385	0.696	65.2%	5	0.052	0.458	0.355	59.8%	5	0.057	0.372	0.663	63.8%	5	12M	2Y	*
FI	0.013	-1.228	1.914	62.1%	4	0.014	-1.179	1.884	61.1%	4	0.034	-0.715	1.504	61.0%	2	12M	2Y	*
FR	0.027	2.106	-1.104	43.6%	2	0.047	1.425	-0.586	42.8%	4	0.068	0.564	0.142	45.1%	5	12M	2Y	**
IE	0.035	0.531	-0.216	27.2%	4	0.037	0.549	-0.227	24.7%	4	0.044	0.531	-0.206	21.7%	4	12M	2Y	
IT	0.069	0.078	0.815	56.7%	6	0.058	0.081	0.774	52.9%	6	0.066	0.150	0.684	60.5%	6	12M	2Y	**
LU	0.033	0.978	-0.262	41.5%	6	0.054	0.917	-0.204	40.1%	6	0.015	0.956	-0.218	61.5%	6	1M	10Y	*
NL	0.051	1.764	-1.036	70.5%	6	0.051	1.731	-1.012	67.3%	6	0.047	1.864	-1.095	72.5%	6	12M	2Y	*
PT	0.025	0.581	0.445	70.6%	3	0.014	0.503	0.661	73.3%	6	0.013	0.515	0.689	77.2%	6	12M	2Y	**
SI	0.050	1.013	0.313	69.4%	2	0.057	0.968	0.038	64.1%	6	0.061	0.971	0.191	70.4%	6	12M	5Y	*
SK	0.191		0.652	23.9%	5	0.239		0.641	22.1%	6	0.162		0.680	20.4%	6	12M	2Y	*

Note: ** - strong cointegration across different specifications, * - cointegration detected, but not across all specifications, no star - cointegration barely detected.

IBR - Interbank rates, GB - Government bond yields. For Luxembourg, only 10 years government bond yields and for Slovenia only 5 years government bond yields are available.

Table 3 Housing loans with fixation from 1 to 5 years

	2000M01 - 2014M09				2000M01 - 2022M06				2000M01 - 2023M08					
	α	β	aR^2	lags	α	β	aR^2	lags	α	β	aR^2	lags	EURIBOR	Cointegration
AT	0.066	0.747	28.7%	3	0.070	0.697	25.5%	3	0.063	0.708	28.6%	4	12M	*
DE	0.022	0.984	52.4%	4	0.031	0.866	47.6%	4	0.034	0.902	54.3%	4	12M	*
ES	0.026	0.552	59.6%	5	0.021	0.530	54.1%	6	0.017	0.528	59.1%	5	12M	*
FI	0.043	0.899	18.2%	4	0.107	0.799	13.8%	4	0.090	0.787	16.1%	4	12M	*
FR	0.039	0.648	48.4%	5	0.030	0.820	40.2%	4	0.039	0.820	50.8%	6	12M	*
IT	0.028	0.197	23.0%	3	0.040	0.855	19.1%	3	0.040	0.924	24.4%	3	12M	
NL	0.041	0.634	48.9%	6	0.029	0.834	45.2%	6	0.041	0.608	57.4%	6	12M	*
SK	0.090	0.727	16.8%	5	0.039	1.094	15.7%	6	0.035	1.085	20.0%	5	12M	**

Table 4 Housing loans with fixation from 1 to 5 years – government bonds yields included

	2000M01 - 2014M09					2000M01 - 2022M06					2000M01 - 2023M08					EURIBOR	Government bond	Cointegration
	α	β IBR	β GB	aR2	lags	α	β IBR	β GB	aR2	lags	α	β IBR	β GB	aR2	lags			
AT	0.081		0.651	17.7%	5	0.071		0.583	17.4%	6	0.059		0.600	22.2%	5	12M	2Y	**
DE	0.055		0.825	61.6%	4	0.054		0.822	55.1%	4	0.056		0.829	58.0%	4	12M	2Y	*
ES	0.050	0.350	0.536	64.1%	3	0.058	0.459	0.445	57.9%	6	0.046	0.310	0.771	63.3%	3	12M	2Y	*
FI	0.095		0.679	21.2%	3	0.146		0.709	18.2%	3	0.136		0.679	18.5%	4	12M	2Y	*
FR	0.028		0.529	47.9%	5	0.020		0.699	40.4%	5	0.022		0.695	51.3%	6	12M	2Y	*
IT	0.088	-0.108	1.091	35.1%	2	0.098	-0.067	0.885	26.8%	2	0.106	-0.002	0.825	31.2%	2	12M	2Y	*
NL	0.012		0.330	48.4%	2	0.012		0.604	45.1%	3	0.009		0.432	53.3%	6	12M	2Y	*
SK	0.147		0.847	22.3%	4	0.079		1.086	19.0%	6	0.066		1.090	23.6%	5	12M	2Y	*

Note: ** - strong cointegration across different specifications, * - cointegration detected, but not across all specifications, no star - cointegration barely detected

IBR - Interbank rates, GB - Government bond yields

Table 5 Housing loans with fixation from 5 to 10 years

	2000M01 - 2014M09				2000M01 - 2022M06				2000M01 - 2023M08					Cointegration
	α	β	aR^2	lags	α	β	aR^2	lags	α	β	aR^2	lags	EURIBOR	
AT	0.045	0.923	28.9%	2	0.034	1.116	27.5%	2	0.044	1.033	30.1%	2	12M	*
BE	0.032	0.611	46.5%	3	0.014	1.089	38.9%	3	0.013	1.084	49.4%	3	12M	
DE	0.015	1.062	47.7%	5	0.016	1.013	52.9%	5	0.020	1.001	52.1%	6	12M	*
ES	0.072	0.062	11.3%	3	0.061	0.613	8.6%	5	0.020	0.091	6.5%	5	12M	
FI	0.141	0.634	23.5%	5	0.174	0.565	21.8%	5	0.095	0.618	28.8%	5	12M	*
FR	0.052	0.718	51.9%	6	0.034	0.914	49.1%	6	0.034	0.907	55.2%	6	12M	**
IT	0.103	0.329	17.6%	1	0.022	1.126	13.8%	1	0.030	0.985	18.0%	1	12M	
NL	0.026	0.499	51.3%	4	0.020	0.823	36.3%	4	0.023	0.849	43.6%	6	12M	*
SK	0.217	0.377	13.7%	4	0.037	1.830	9.5%	4	0.041	1.717	9.0%	4	12M	*

Table 6 Housing loans with fixation from 5 to 10 years – government bond yields included

	2000M01 - 2014M09					2000M01 - 2022M06					2000M01 - 2023M08					EURIBOR	Government bond	Cointegration
	α	β IBR	β GB	aR2	lags	α	β IBR	β GB	aR2	lags	α	β IBR	β GB	aR2	lags			
AT	0.212		0.718	32.6%	2	0.209		0.728	31.6%	2	0.200		0.738	34.6%	2	12M	5Y	*
BE	0.040	0.313	0.325	49.1%	3	0.018	0.745	0.233	42.4%	3	0.029	0.282	0.574	53.3%	3	12M	5Y	*
DE	0.043		0.808	61.0%	6	0.037		0.832	64.6%	6	0.038		0.847	63.9%	5	12M	5Y	*
ES	0.093	0.009	0.089	12.9%	6	0.109		0.901	13.0%	6	0.082		0.932	10.1%	6	12M	10Y	*
FI	0.152	0.548	0.085	30.3%	5	0.298	0.216	0.377	29.7%	5	0.158		0.621	34.8%	4	12M	5Y	*
FR	0.032	1.306	-0.567	51.4%	6	0.046		0.757	43.2%	6	0.046		0.728	50.9%	6	12M	5Y	*
IT	0.135	0.193	0.649	28.4%	1	0.070	0.184	0.876	21.1%	1	0.070	0.219	0.833	24.8%	2	12M	5Y	*
NL	0.015		0.402	55.8%	4	0.008		0.579	43.3%	4	0.010		0.570	48.3%	4	12M	5Y	*
SK	0.218		0.489	11.7%	2	0.128	0.293	0.657	13.4%	4	0.066	0.676	0.757	12.0%	4	12M	5Y	*

Note: ** - strong cointegration across different specifications, * - cointegration detected, but not across all specifications, no star - cointegration barely detected

IBR - Interbank rates, GB - Government bond yields

Table 7 Housing loans with fixation over 10 years

	2000M01 - 2014M09				2000M01 - 2022M06				2000M01 - 2023M08					
	α	β	aR2	lags	α	β	aR2	lags	α	β	aR2	lags	EURIBOR	Cointegration
AT	0.070	0.904	30.1%	6	0.043	1.192	29.3%	6	0.033	1.269	28.5%	6	12M	*
BE	0.053	0.463	62.1%	6	0.014	1.005	59.8%	6	0.014	0.991	66.2%	6	12M	*
DE	0.020	1.022	30.8%	5	0.024	0.972	29.8%	5	0.023	1.016	35.8%	5	12M	*
ES					0.046	0.756	16.2%	2	0.039	0.537	16.3%	2	12M	
FI	0.175	0.704	20.9%	6	0.136	0.763	17.2%	6	0.112	0.753	16.9%	6	12M	**
FR	0.030	0.717	56.5%	5	0.020	0.948	53.4%	5	0.023	0.934	63.1%	5	12M	*
IT	0.101	0.476	12.4%	4	0.016	1.287	10.4%	3	0.020	1.212	15.7%	2	12M	*
NL					0.014	1.205	13.6%	3	0.012	1.134	15.8%	4	12M	*
SK	0.091	1.017	16.4%	1	0.117	0.900	22.5%	1	0.083	0.768	20.8%	1	12M	

Table 8 Housing loans with fixation over 10 years– government bond yields included

	2000M01 - 2014M09					2000M01 - 2022M06					2000M01 - 2023M08							
	α	β IBR	β GB	aR2	lags	α	β IBR	β GB	aR2	lags	α	β IBR	β GB	aR2	lags	EURIBOR	Government bond	Cointegration
AT	0.258	0.068	0.683	30.7%	5	0.125	0.467	0.477	32.8%	5	0.115	0.408	0.531	33.5%	5	12M	10Y	*
BE	0.062	0.381	0.031	67.7%	6	0.019	0.613	0.298	66.8%	6	0.031	0.426	0.268	73.0%	6	12M	10Y	*
DE	0.102		0.879	49.1%	6	0.086		0.819	49.1%	6	0.081		0.829	51.1%	6	12M	10Y	*
ES	0.095	0.505	0.824	21.9%	2	0.102	0.269	0.514	24.2%	6	0.091	0.237	0.525	24.3%	6	12M	10Y	*
FI	0.168	0.616	0.040	26.0%	6	0.153	0.687	0.072	20.0%	6	0.126	0.616	0.122	16.6%	4	12M	10Y	*
FR	0.035		0.727	56.3%	6	0.029		0.793	54.7%	6	0.033		0.795	64.3%	6	12M	10Y	**
IT	0.085	0.473	0.421	18.5%	4	0.044	0.554	0.713	19.9%	4	0.044	0.533	0.745	25.0%	4	12M	10Y	**
NL	0.013		0.487	33.1%	4	0.023		0.768	20.5%	4	0.021		0.687	22.2%	4	12M	10Y	*
SK	0.090		1.765	15.4%	1	0.124	0.404	1.124	23.2%	1	0.111	0.070	1.334	22.4%	1	12M	10Y	*

Note: ** - strong cointegration across different specifications, * - cointegration detected, but not across all specifications, no star - cointegration barely detected

IBR - Interbank rates, GB - Government bond yields

Table 9 Sight deposits

	2000M01 - 2014M09				2000M01 - 2022M06				2000M01 - 2023M08					
	α	β	aR^2	lags	α	β	aR^2	lags	α	β	aR^2	lags	EURIBOR	Cointegration
AT	0.071	0.340	54.0%	3	0.043	0.376	53.1%	5	0.013	0.546	52.4%	6	12M	**
DE	0.040	0.394	67.3%	4	0.033	0.400	64.3%	5	0.012	0.523	64.4%	6	12M	**
ES	0.024	0.267	26.6%	5	0.013	0.342	25.5%	5	0.001	1.075	24.4%	4	12M	**
FI	0.046	0.115	49.5%	5	0.042	0.110	49.2%	5	0.031	0.103	46.8%	5	1M	**
IT	0.038	0.251	62.3%	4	0.041	0.264	59.5%	4	0.007	0.026	54.5%	5	12M	
LU	0.117	0.524	62.1%	4	0.104	0.510	59.4%	4	0.061	0.501	57.9%	4	12M	*
NL	0.145	0.094	17.5%	2	0.206	0.086	17.4%	2	0.002	0.975	7.2%	2	12M	**
PT	0.135	0.047	29.1%	6	0.125	0.052	29.1%	6	0.022	0.026	20.2%	6	1M	*
SI	0.099	0.090	25.7%	6	0.077	0.100	28.2%	6	0.022	0.119	24.8%	6	12M	**
SK	0.195	0.042	39.5%	3	0.177	0.044	39.0%	3	0.028	0.006	28.3%	3	12M	**

Note: ** - strong cointegration across different specifications, * - cointegration detected, but not across all specifications, no star - cointegration barely detected

Table 10 Term deposits with maturity up to 1 year

	2000M01 - 2014M09				2000M01 - 2022M06				2000M01 - 2023M08					
	α	β	aR^2	lags	α	β	aR^2	lags	α	β	aR^2	lags	EURIBOR	Cointegration
AT	0.069	0.842	71.8%	5	0.068	0.777	69.4%	5	0.053	0.820	72.2%	4	12M	**
CY	0.081	0.396	30.0%	6	0.063	0.382	26.8%	6	0.034	0.380	23.5%	6	12M	**
DE	0.086	0.863	55.1%	4	0.081	0.855	51.1%	4	0.114	0.842	56.3%	6	12M	*
ES	0.052	0.702	36.8%	2	0.033	0.940	36.1%	2	0.041	0.859	36.3%	2	12M	*
FI	0.072	0.711	52.3%	6	0.057	0.789	50.0%	4	0.059	0.782	48.3%	4	12M	**
FR	0.056	0.443	43.4%	6	0.055	0.437	34.7%	6	0.066	0.482	38.4%	6	12M	
IT	0.013	0.025	45.1%	5	0.013	0.264	30.0%	1	0.012	0.170	32.1%	2	1M	
LU	0.064	0.883	39.1%	3	0.082	0.696	38.3%	3	0.067	0.866	40.0%	3	12M	*
NL	0.095	0.381	29.2%	3	0.085	0.359	26.9%	4	0.061	0.346	26.8%	5	12M	*
PT	0.025	0.119	39.5%	5	0.019	0.073	38.0%	5	0.015	0.013	37.8%	5	12M	
SI	0.033	0.629	62.9%	2	0.022	0.988	67.2%	5	0.021	0.797	58.8%	6	12M	*
SK	0.146	0.337	23.9%	2	0.176	0.361	23.8%	3	0.198	0.373	25.9%	4	12M	*

Table 11 Term deposits with maturity up to 1 year – government bond yields included

	2000M01 - 2014M09					2000M01 - 2022M06					2000M01 - 2023M08							
	α	β IBR	β GB	aR^2	lags	α	β IBR	β GB	aR^2	lags	α	β IBR	β GB	aR^2	lags	EURIBOR	Government bond	Cointegration
AT	0.068	0.631	0.141	70.5%	2	0.045	1.205	-0.403	71.9%	5	0.062	0.654	0.065	73.3%	3	12M	2Y	**
CY	0.070	0.496	0.087	27.1%	1	0.051	0.729	0.437	25.3%	4	0.024	0.654	0.527	20.8%	6	12M	10Y	
DE	0.104	0.596	0.229	56.0%	4	0.101	0.512	0.289	52.4%	4	0.101	0.512	0.289	52.4%	4	12M	2Y	*
ES	0.065	0.592	0.179	46.1%	6	0.054	0.572	0.338	45.1%	6	0.056	0.453	0.405	44.1%	6	12M	2Y	*
FI	0.054	1.095	-0.368	55.8%	4	0.050	1.171	-0.393	52.1%	4	0.053	0.977	-0.254	57.1%	4	12M	2Y	**
FR	0.059		0.459	36.2%	6	0.061		0.490	26.9%	6	0.046	0.210	0.324	37.5%	5	12M	2Y	*
IT	0.049	-0.468	1.159	57.5%	6	0.063	-0.376	1.095	34.5%	6	0.058	-0.500	1.095	37.5%	6	1M	2Y	**
LU	0.022	1.310	-0.387	37.9%	5	0.008	1.466	-0.584	38.7%	3	0.068	1.184	-0.332	41.8%	4	12M	10Y	*
NL	0.220	1.064	-0.595	38.1%	5	0.229	1.108	-0.628	34.7%	5	0.093	0.673	-0.281	32.2%	5	12M	2Y	**
PT	0.002	0.593	0.384	53.3%	4	0.008	0.467	0.308	53.0%	5	0.009	0.400	0.352	50.8%	4	12M	2Y	**
SI	0.036	0.893	0.634	69.6%	4	0.036	0.553	0.208	68.3%	6	0.024	0.462	0.241	58.2%	6	12M	5Y	*
SK	0.136	0.734	-0.370	21.5%	2	0.161	0.685	-0.287	21.9%	3	0.185	0.601	-0.209	24.9%	3	12M	2Y	*

Note: ** - strong cointegration across different specifications, * - cointegration detected, but not across all specifications, no star - cointegration barely detected.

IBR - Interbank rates, GB - Government bond yields. For Luxembourg and Cyprus, only 10 years government bond yields and for Slovenia only 5 years government bond yields are available.

Table 12 Term deposits with maturity from 1 to 2 years

	2000M01 - 2014M09				2000M01 - 2022M06				2000M01 - 2023M08				EURIBOR	Cointegration
	α	β	aR^2	lags	α	β	aR^2	lags	α	β	aR^2	lags		
AT	0.179	0.739	44.9%	5	0.144	0.772	42.5%	5	0.116	0.786	57.0%	5	12M	**
DE	0.191	0.866	50.3%	4	0.195	0.843	47.6%	4	0.159	0.857	48.1%	6	12M	**
ES	0.063	0.652	21.9%	1	0.017	1.191	24.5%	3	0.019	1.187	22.5%	3	12M	
FI	0.091	0.626	51.0%	2	0.079	0.755	46.2%	4	0.125	0.694	49.9%	5	12M	
FR	0.060	0.150	10.8%	5	0.029	1.094	10.6%	5	0.041	0.740	15.7%	5	12M	*
IT	0.012	0.051	30.9%	2	0.029	0.305	25.5%	2	0.032	0.353	29.5%	1	12M	
MT					0.012	1.433	31.4%	1	0.069	1.003	42.1%	3	12M	**
SI					0.013	1.756	45.1%	2	0.020	1.567	43.6%	2	12M	*
SK	0.009	0.080	29.3%	6	0.042	0.914	28.8%	4	0.040	0.825	25.2%	4	12M	*

Table 13 Term deposits with maturity from 1 to 2 years – government bond yields included

	2000M01 - 2014M09					2000M01 - 2022M06					2000M01 - 2023M08					EURIBOR	Government bond	Cointegration
	α	β IBR	β GB	aR^2	lags	α	β IBR	β GB	aR^2	lags	α	β IBR	β GB	aR^2	lags			
AT	0.151	0.896	-0.152	49.2%	6	0.152	0.772	-0.063	46.5%	5	0.114	0.661	0.089	60.0%	5	12M	2Y	**
DE	0.168	1.170	-0.258	50.9%	6	0.201	0.968	-0.112	48.2%	6	0.151	0.781	0.054	48.2%	6	12M	2Y	**
ES	0.012	0.080	0.188	32.4%	5	0.012	-0.202	0.845	32.5%	5	0.027	-0.064	0.723	28.6%	6	12M	2Y	*
FI	0.001	1.312	-0.607	53.0%	5	0.049		0.707	42.4%	6	0.088	0.965	-0.266	53.5%	6	12M	2Y	*
FR	0.227	0.979	-0.814	16.4%	5	0.027		0.614	8.1%	5	0.030		0.539	12.2%	5		2Y	*
IT	0.078		0.871	50.5%	2	0.066		0.917	38.7%	2	0.067		0.530	41.2%	4		2Y	**
MT						0.176		0.578	47.1%	4	0.213		0.618	44.4%	4		10Y	**
SI						0.005		0.922	30.7%	6	0.017		0.805	31.8%	6		5Y	*
SK	0.049		0.225	29.5%	5	0.071		0.524	26.8%	5	0.056		0.439	20.9%	5		2Y	*

Note: ** - strong cointegration across different specifications, * - cointegration detected, but not across all specifications, no star - cointegration barely detected.

IBR - Interbank rates, GB - Government bond yields. For Malta, only 10 years government bond yields and for Slovenia only 5 years government bond yields are available.

Table 14 Term deposits with maturity over 2 years

	2000M01 - 2014M09				2000M01 - 2022M06				2000M01 - 2023M08				EURIBOR	Cointegration
	α	β	aR^2	lags	α	β	aR^2	lags	α	β	aR^2	lags		
AT	0.160	0.668	44.4%	4	0.086	0.799	35.5%	4	0.089	0.794	42.5%	4	12M	**
DE	0.058	0.784	19.5%	2	0.066	0.736	20.5%	2	0.072	0.731	23.8%	2	12M	*
ES	0.086	0.463	19.1%	3	0.020	0.985	18.6%	3	0.009	1.293	22.2%	3	12M	
FI	0.400	0.601	38.2%	6	0.336	0.656	31.8%	6	0.277	0.645	31.7%	6	12M	**
FR	0.055	0.411	11.6%	2	0.033	0.795	9.9%	2	0.044	0.730	16.2%	2	12M	**
IT	0.041	0.014	19.1%	1	0.033	0.314	17.0%	1	0.058	0.495	19.3%	1	12M	
LU	0.138	0.869	41.0%	5	0.146	0.745	39.2%	5	0.153	0.818	47.1%	5	12M	*
MT					0.026	1.690	34.6%	6	0.048	0.299	16.8%	1	12M	*
NL	0.061	0.098	28.4%	4	0.084	0.530	30.0%	6	0.082	0.493	29.7%	6	12M	*
SI	0.056	1.111	29.5%	1	0.044	1.865	34.3%	3	0.059	1.796	44.3%	6	12M	*
SK					0.121	0.252	18.5%	4	0.124	0.263	19.3%	4	12M	*

Table 15 Term deposits with maturity over 2 years – government bond yields included

	2000M01 - 2014M09					2000M01 - 2022M06					2000M01 - 2023M08					EURIBOR	Government bond	Cointegration
	α	β IBR	β GB	aR^2	lags	α	β IBR	β GB	aR^2	lags	α	β IBR	β GB	aR^2	lags			
AT	0.230	0.521	0.145	48.8%	5	0.136	0.555	0.204	40.2%	4	0.169	0.461	0.281	45.5%	5	12M	5Y	**
DE	0.076		0.663	15.9%	3	0.072	0.093	0.511	20.3%	5	0.071	0.628	0.047	24.1%	4	12M	5Y	*
ES	0.214	0.078	0.321	25.9%	6	0.080	-0.044	0.763	25.5%	6	0.069	-0.181	0.809	27.5%	6	12M	2Y	*
FI	0.233	0.806	-0.196	40.3%	6	0.189	0.935	-0.269	33.3%	6	0.248	0.591	0.051	35.1%	6	12M	2Y	**
FR	0.072		0.309	7.5%	4	0.079		0.377	8.1%	2	0.072		0.289	20.3%	6	12M	2Y	*
IT	0.175	-0.458	1.231	31.5%	2	0.198	-0.301	1.076	29.0%	6	0.217	-0.218	0.820	30.8%	6	12M	2Y	**
LU	0.181	0.693	0.043	30.7%	1	0.062	1.539	-0.753	39.8%	5	0.059	1.578	-0.785	47.3%	5	12M	10Y	*
MT						0.234		0.556	24.4%	6	0.122		0.518	23.4%	4	12M	10Y	*
NL	0.082		0.114	28.4%	6	0.038		0.302	28.6%	6	0.053		0.346	28.8%	6	12M	2Y	*
SI						0.004		0.938	26.7%	6	0.044		0.892	32.6%	6	12M	5Y	*
SK	0.250		0.111	23.9%	4	0.205		0.292	23.2%	4	0.210		0.297	23.2%	4	12M	5Y	*

Note: ** - strong cointegration across different specifications, * - cointegration detected, but not across all specifications, no star - cointegration barely detected.

IBR - Interbank rates, GB - Government bond yields. For Malta, only 10 years government bond yields and for Slovenia only 5 years government bond yields are available.