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Net interest margin in a low interest rate environment: Evidence for Slovenia

Meta Ahtik

Biswajit Banerjee
Haverford College, bbanerje@haverford.edu

Franc Remsak

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Meta Ahtik, Biswajit Banerjee and Franc Remšak*

NET INTEREST MARGIN IN A LOW INTEREST RATE ENVIRONMENT: EVIDENCE FOR SLOVENIA

Net interest income is an important component of bank profits in Slovenia. This paper analyses the building blocks of net interest income and net interest margin by exploring different types of decompositions in order to identify the relative contributions of bank assets and bank liabilities, and the relative importance of changes in the yields and shares of different balance sheet components. Recent trends in interest rates on new business indicate that banks might continue to face pressures of falling interest rates, especially on the asset side. Falling net interest margins could be compensated through increased volumes of lending and reversed through profound changes in bank business models.

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It is widely believed that a low interest rate environment negatively influences bank net interest margin (hereinafter NIM) and bank profitability.[1] A major attributing factor is maturity mismatch as liabilities are normally of shorter maturity than assets and hence more interest sensitive.[2] This is a simplistic assumption. It does not take into account the actual composition of assets and liabilities and the changes caused by the restructuring of bank balance sheets. Moreover, assets might also be more interest rate sensitive if variable rate contracts are common, and competition might prevent banks from changing deposit interest rates in accordance with their profit maximising intentions (Ennis et al., 2016). At the end, it is the spread between the interest rates on the asset and liability side that determines the net interest margin and not the level of (market) interest rates itself. However, in the period of very low or even negative interest rates, banks might (have) hit the interest rate lower bound on the liability side, meaning that the spread cannot remain unchanged, but can only fall due to continuing pressures on the asset side.

* Meta Ahtik, Head of Section, Financial Stability and Macroprudential Policy Department, Bank of Slovenia.
Biswajit Banerjee, Chief Economist, Bank of Slovenia.
Franc Remšak, Independent Analyst, Financial Stability and Macroprudential Policy Department, Bank of Slovenia.

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[1] See, for example, Borio et. al (2015), Busch & Memmel (2015), Claessens et al. (2016), Covas et al. (2016), Genay and Podjasek (2014), Weistroffer (2013).

[2] For detailed analysis of the mechanisms through which the level of interest rates and the shape of the yield curve influence net interest income, see Borio et al. (2015).

This paper on Slovenia adds to the literature by exploring different types of decompositions of net interest income (hereinafter NII) and the NIM in order to identify the relative contributions of bank assets and liabilities, and the relative importance of the changes in yields and shares of the different balance sheets components. It analyses the trend in interest rates and its likely impact on future NIM, and discusses possibilities for overcoming falling margins.

1. Literature review

There are three broad approaches in the empirical analysis of NII or NIM developments. The first approach focuses on descriptive analysis based on decompositions. That is, it investigates the contributions to the NIM or the NII of the asset and liability side of the balance sheet, prices versus quantities, or prices versus shares of different types of assets and liabilities. The second approach uses regression analysis to isolate the importance of different contributing factors from the impact of the interest rate itself. The third approach focuses on the broader consequences of a low interest rate environment; i.e., its impact on bank profitability, bank risk-taking and bank business models. This paper follows the first approach.

The first strand of the empirical literature tries to understand the building blocks of the NII and NIM creation. A common method is the so-called Dupont method that decomposes the NIM into yield/cost spread and gain/loss on net interest position (Anderson, 2012; Bank of Slovenia, 2016). The study on Slovenia based on the Dupont method found that the change in the yield/cost spread has been the main component of net interest margin change.

An alternative method is to decompose the contributions of the yield/cost

and share (composition) components (for example, Covas et al., 2015). Covas et al. investigate how the NIM is affected through changes in yields for individual type of assets or liabilities (the so-called yield effect) and through changes in the portfolio composition (the so-called share effect). The latter positively impacts the NIM if banks redirect themselves towards cheaper funding or more lucrative investment. For the United States, Covas et al. (2015) found

The likelihood of avoiding a further fall in the NII through increasing the volumes of lending in the near-term is small.

that the share effect accounted for a smaller portion of changes in the NIM than the yield effect.

A third method seeks to determine the impact of changes in prices and quantities on the NII. This analysis is routinely carried out by the Bank of Israel,[3] and is especially interesting for a banking system that is still facing deleveraging such as the Slovenian one. In this paper we follow the decomposition methods of Covas et al. and the Bank of Israel.

The results of the empirical studies from the second strand of the literature using regression analysis are not conclusive, at least for the period of

"normal" interest rates. The studies by Dietrich and Wanzenried (2011) for Switzerland and van Ommeren (2011) for a sample of 12 European countries did not find a statistically significant effect of interest rates or the yield curve on banks' NIM. However, Banerjee et al. (2015) for Slovenia found that interest rate had a positive significant impact on the NIM during the non-crisis period and a negative significant impact during the crisis period.

Among studies focusing on the impact of the low interest rate environment on NIM Borio et al. (2015) analysed data on 267 banks from 14 countries and found that the level of interest rates and the yield curve have a more intensive effect on the NIM when interest rates are low. Genay and Podjasek (2014) found that the low interest rate environment has negative effects on the NIM in the United States. Similar findings were reported by Busch and Memmel (2015) for Germany, and by Claessens et al. (2016) for a group of 44 countries. The latter found a stronger positive impact of the interest rate level on the NIM for the period of low than for the period of high interest rates. Even more pronounced differences between high (normal) and low interest rate environment have been identified for Slovenia - during a period of normal interest rates (defined as 3-month money market rate above 1%) the interest rate has a negative effect on the NIM: the higher the interest rate, the lower the NIM recorded by banks. With the changeover to a period of low interest rates, this relationship reverses: banks have the capacity to generate a higher NIM when the interest rate is higher. Also the size of

[3] See, for example, http://www.boi.org.il/en/ NewsAndPublications/RegularPublications/ Banking%20Supervision/HalfYearReports/ HalfYear2015/table6.pdf

the effect is not symmetric: during the normal period, a rise in the interest rate has only a small negative effect on the NIM, a fall of 1 percentage point in interest rates entailing an increase of 0.03 percentage points in the NIM. During a period of low interest rates, a fall of 1 percentage point in the money-market interest rate causes a decline of 0.3 percentage points in the NIM. With the fall in interest rates on the money market, banks approached the lower limit on the deposit side where a reduction in expenses is no longer practically feasible, with the exception of the expansion of sight deposits, which also has its own limit. Competitive pressures led to an intensive reduction in interest rates on the income side, which resulted in a decline in the NIM (Ahtik et al., 2016).

The third strand of literature focuses on the broader consequences of the low interest rate environment. Jobst and Lin (2016) estimate that the negative interest rate policy in the euro area might have important negative impact on bank profitability.[4] The impact is expected to differ importantly across euro area countries since banking systems that will be able to generate sufficient credit growth[5] will be able to compensate for the current low levels of the NIM, while those with still sluggish credit growth might experience a strong NII reduction. Additionally, banks and banking systems that rely primarily on retail deposits that have already hit the zero lower bound, will probably suffer larger margin compression than banking systems that rely mainly on wholesale funding (Arteta

et al., 2016). Jobst and Lin (2016) also note that the bank profitability outlook has worsened the most for euro area countries with prevailing variable rate loans.

The experience of countries that had introduced negative interest rates earlier can be used to draw lessons for countries that have introduced negative rates more recently. Banks in some countries that have been experiencing negative rates for a longer period of time (Denmark, Sweden, Switzerland) managed to mitigate the impact of low or even negative interest rates and preserve their profitability through increased cheap wholesale funding, increased interest and non-interest mortgage-related earnings, lower impairment charges, and by increasing operational efficiency through closing branches, cutting staff and undertaking consolidation activities (Jobst and Lin, 2016; Rostagno et al., 2016). Japanese banks that have been functioning in the environment of low interest rates for a prolonged period of time did not undertake any excessive risk taking and focused on lending to domestic sovereign and expanding credit abroad. Nevertheless, they faced severe decline in net interest income as well as pressures to reduce costs (Weistroffer, 2013). IMF (2016) emphasises that banks should significantly change their business models because existing balance sheets and business practices might not be able to earn a sustainable return should the low-rate environment persist for extended periods of time.

Several studies emphasise that the effects of negative interest rates go far beyond short-term profitability. In order to generate profits in the low interest rate environment, banks might be inclined to follow "absolute return" strategies that involve lowering credit standards and increasing loan volume by taking higher credit

risk and investing in long-maturity assets, and increasing the share of trading activities and fee income (de Bandt, 2015). Heider et al. (2016) study the impact of the introduction of negative interest rate policy on the international syndicated loans market. They confirm that if banks are unable to pass the negative rates to their depositors they become involved in riskier lending. As recognised by Noizet (2016), with the use of a risk adjusted NIM indicator,[6] low interest rates might boost lending but this lending activity could result in higher impairment and provisioning costs in the future when these loans turn out to be non-performing. On the other hand Cœuré (2016) emphasised that the falling NIM reduces the forward-looking measure of bank capital and consequently also the risk-bearing capacity of the bank and its supply of credit.

## 2. Bank profitability developments, 2004 - 2016

Bank profitability in Slovenia began a downward slide following the onset of the financial crisis in 2008 and moved into negative territory in 2010. Profitability bottomed out at –7.7% of assets in 2013 and turned positive in 2015. The decrease in profitability during 2008–2013 primarily reflects a sharp increase in loan impairment and provisioning costs as the quality of loan portfolio of banks deteriorated following the onset of the financial crisis. These costs fell sharply in 2014 as a significant volume of non-performing loans of banks was transferred to the Bank Asset Management Company, and profitability turned around consequently. Net interest income in percent of assets broadly flattened out during the crisis period notwithstanding deleveraging and decrease in lending activity by banks (Figure 1).

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[4] Based on the assumption of a 50 percent pass-through, a 10 basis point rate cut could reduce lending margins by 5 basis points, which would imply a cost of about 8.8 billion euro.

[5] Rostagno et al. (2016) show that under negative interest rate policy, total lending to companies has gone up relative to a counterfactual scenario.

[6] Calculated as (NII – loan impairment charges) / average earning assets.

Figure 1: Net profit of the banking sector and its components, in mn EUR (left panel) and in % of total assets (right panel) (12-month moving sums).
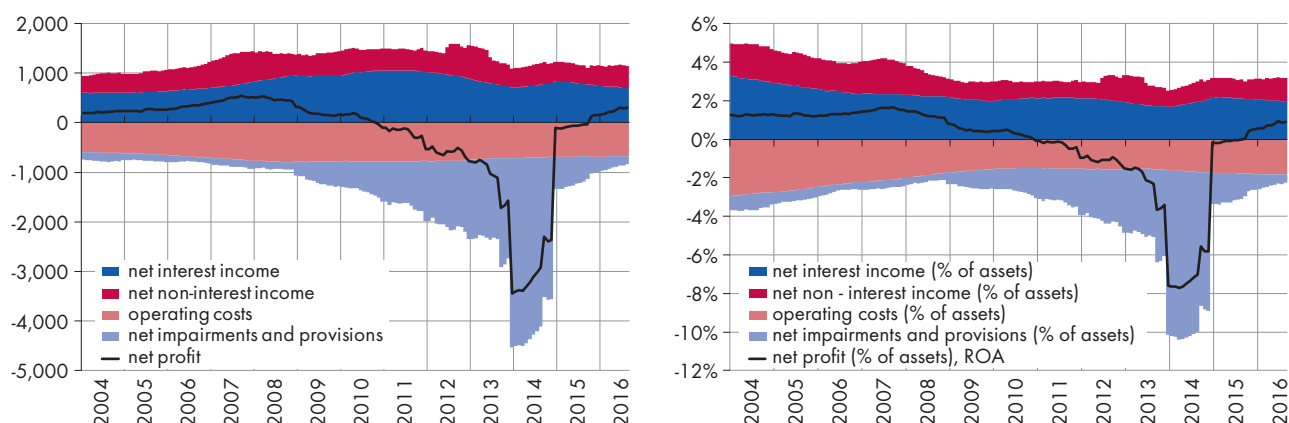
Note: Data for 2016 refer to the period up to August.
Source: Bank of Slovenia, authors' calculations.

Developments, however, differ across groups of banks.[7] During the crisis foreign-owned banks experienced significantly smaller pressures on their return on assets, since they were much less burdened with the costs of impairments and provisions.

3. What contributes to the changes in NII and NIM?

Net interest income has been a very important component of bank profits. The most important source of interest income is loans. On the interest expenses side, wholesale funding costs have steadily fallen since the onset of the financial crisis in 2008 with the gradual fading away of this source of financing. Subsequent to the onset of the crisis, both interest income and interest expenses fell to a lower plateau until mid-2012 and continued to

Figure 2: NII of the banking sector and its components, in mn EUR (left panel) and in % of total interest earning assets (right panel) (12-month moving sums).
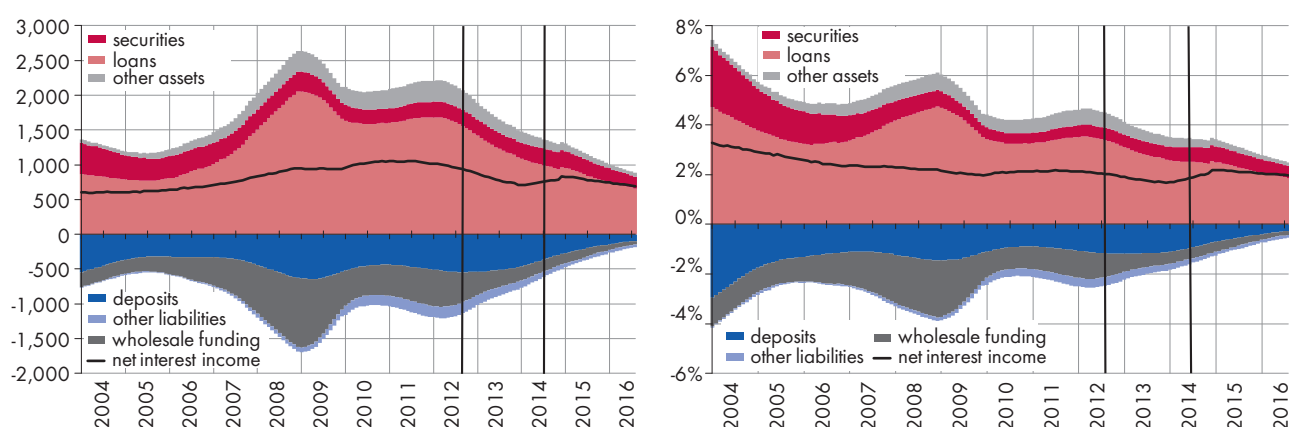
Note: Vertical lines indicate the OMT announcement in August 2012 and negative deposit facility rate introduction in June 2014. Unlike in Figure 1, NII is presented as a share of total interest earning assets, rather than of total assets in order to follow the standard definition of a NIM. Data for 2016 refer to the period up to August.
Source: Bank of Slovenia, authors' calculations.

[7] Banks are divided into three groups: large domestic banks (NLB, Abanka, Gorenjska banka, SID banka and Nova KBM); small domestic banks (PBS, DBS, Delavska hranilnica, Factor banka, Probanka, Hranilnica Lon and Hranilnica Vipava) and foreign-owned banks (SKB, Banka Koper, Unicredit banka, Sberbank, KBS, Addiko Bank, Sparkasse, BKS, RCI, Zveza bank and Brull Kalmus Bank). Since the analysis spans over long period of time, recent changes (i.e. change in ownership of Nova KBM) were not taken into account.

decline steadily thereafter (Figure 2, left panel).

The NIM fell steadily during the pre-crisis period, and displayed a mildly inverted U-shaped tendency during 2009–2013. Bank rehabilitation measures led to a slight NIM improvement in 2014, but it continued to fall thereafter (Figure 2, right panel) In the recent period (2014-August 2016), small domestic banks have been able to generate the highest NIM and it has been broadly stable. In contrast, the NIM of large domestic banks has fallen during the last two years after the rehabilitation measures-related improvement in 2014.

We now measure the relative importance of changes in the different components of income and expenses in explaining the changes in net interest income. In addition, for each component of interest income and interest expense we identify the changes that can be attributed to changes in quantities and changes in prices (interest rates). Such decompositions enable us to find out whether banks' net interest income in the recent period has been more affected by falling interest rates than by continued contraction of the balance sheet. It might also give indications whether the NII and the NIM have already hit the lower bound and point towards the need for compensation mechanisms, such as growth of interest earning assets that might offset falling margins. Decompositions are carried out for three types of assets (loans, securities and remaining interest earning assets) and three types of liabilities (deposits, wholesale funding and remaining interest bearing liabilities). Contributions of the price and quantity effects to changes in income from assets of different types have been calculated as follows:

$$\Delta CNII\_P_{i,t} = \left(\frac{\text{Interest income}_{i,t}}{\text{Interest earning assets}_{i,t}} - \frac{\text{Interest income}_{i,t-1}}{\text{Interest earning assets}_{i,t-1}} \right) * \text{Interest earning assets}_{i,t-1}$$

$$\Delta CNII\_Q_{i,t} = \left(\text{Interest earning assets}_{i,t} - \text{Interest earning assets}_{i,t-1} \right) * \frac{\text{Interest income}_{i,t}}{\text{Interest earning assets}_{i,t}}$$

where $\Delta CNII\_P_{i,t}$ is the contribution of the price component and $\Delta CNII\_Q_{i,t}$ is the contribution of the quantity component for asset type i. For measuring the contributions of the effects to changes in expenses on different types of liabilities, in the equations above interest income was replaced with interest expense and interest earning assets were replaced with interest bearing liabilities. Results of the decomposition exercise show that changes in income from assets had a stronger impact on changes in net interest income than changes in interest expenses, with the exception of 2005, 2010-2011 and 2014 (columns 23 and 26, Table 1). In 7 out of 8 years since 2009, changes in income from assets were negative and dragged down profitability. The negative contributions were partly offset by positive contributions arising from lower interest expenses on liabilities. Changes in the interest income were the most impacted by contributions of loans, while on the liability side the contributions of the wholesale funding that used to be the most important gave way to the contributions of deposits (columns 3, 6 and 9 for assets and 13, 16 and 19 for liabilities).

The contribution of the quantity effect to changes in net interest income shrank sharply following the onset of the financial crisis and turned negative during 2012–2014 on account of the contraction in bank lending and the restructuring of the balance sheets (column 28). The contribution of the price effect was negative throughout, expect for 2010 and 2014 (column 27); in 2014 mainly because of the impact of the bank re-

habilitation measures. Prior to 2009, bank lending grew rapidly and the positive quantity effect was greater than the negative price effect. From 2009 onwards, the contribution of the price effect has been greater than that of the quantity effect. The results for recent years should be interpreted with caution as they are influenced by the balance sheet restructuring measures. Results for December 2015 onward are free of these influences and show the price effect dominating the quantity effect (columns 27 and 28, Table 1 and Figure 3).[8]

Similar findings are observed on the contributions of quantity and price effects to both changes in income on assets and changes in expenses on liabilities. For both sides of the balance sheet, contributions of the price effect (i.e., reductions in interest rates) have been stronger than the contribution of changes in quantities since the onset of the financial crisis in 2008 (columns 21, 22, 24 and 25, Table 1). Not surprisingly, this result also holds in the case of interest income on loans.

The liability side quantity effect is affected by the fall in the share of interest bearing liabilities in the balance sheet in the recent period because of increased capital requirements. Since banks are required to have a larger share of equity in their balance sheets than before the crisis, it caused the interest bearing part of their

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[8] Since 12-month moving sums have been used, the impact of the resolution measures fully disappears only with the December 2015 data. However, the impact of the measures introduced in December 2013 has been much stronger than the impact of measures introduced in December 2014. The table shows only annual (end of December) data.

Table 1: Quantity and price contributions to changes in the NII on asset and liability sides, in mn EUR.

	ASSET-SIDE CONTRIBUTIONS									TOTAL
	LOANS			SECURITIES			OTHER			
	PRICE	QUANTITY	TOTAL	PRICE	QUANTITY	TOTAL	PRICE	QUANTITY	TOTAL	
	1	2	3=1+2	4	5	6=4+5	7	8	9=7+8	10=3+6+9
2004	-218.0	129.2	-88.8	-110.9	8.3	-102.5	-2.6	6.3	3.7	-187.6
2005	-142.7	147.5	4.9	-54.8	16.0	-38.8	13.8	25.4	39.2	5.3
2006	-23.5	212.1	188.6	-33.5	26.3	-7.2	17.4	25.9	43.3	224.7
2007	103.5	364.4	467.9	10.0	-32.4	-22.5	55.2	34.7	89.9	535.4
2008	133.5	460.8	594.4	16.1	-14.5	1.6	15.8	54.8	70.7	666.6
2009	-507.2	121.5	-385.7	-77.2	20.8	-56.5	-117.9	39.9	-78.0	-520.2
2010	-91.8	25.3	-66.6	-33.3	9.4	-23.9	19.3	31.4	50.7	-39.7
2011	96.6	-15.5	81.2	33.8	-17.2	16.7	51.2	-16.6	34.6	132.4
2012	-149.6	-77.3	-226.9	21.1	-8.7	12.3	-52.1	3.3	-48.8	-263.3
2013	-218.9	-125.5	-344.4	1.4	-10.6	-9.2	-91.5	2.0	-89.6	-443.1
2014	108.5	-247.2	-138.7	-14.0	31.8	17.8	-63.5	11.3	-52.2	-173.1
2015	-122.3	-84.5	-206.9	-63.6	23.2	-40.4	-43.2	-5.8	-49.0	-296.3
2016	-74.1	-28.3	-102.5	-33.9	5.0	-28.9	-17.8	-1.1	-18.9	-150.3

	LIABILITY-SIDE CONTRIBUTIONS									TOTAL
	DEPOSITS			WHOLESALE FUNDING			OTHER FUNDING			
	PRICE	QUANTITY	TOTAL	PRICE	QUANTITY	TOTAL	PRICE	QUANTITY	TOTAL	
	11	12	13=11+12	14	15	16=14+15	17	18	19=17+18	20=13+16+19
2004	205.0	-18.4	186.7	56.8	-50.7	6.0	-6.4	-6.5	-12.9	179.8
2005	74.4	-23.7	50.7	43.1	-78.0	-35.0	14.1	-2.1	12.1	27.8
2006	20.5	-27.9	-7.4	-21.3	-127.6	-148.9	-4.6	-4.3	-8.9	-165.2
2007	-63.9	-30.3	-94.2	-109.8	-171.8	-281.6	-12.4	-19.7	-32.1	-407.9
2008	-136.2	-65.5	-201.8	-84.3	-236.3	-320.7	2.2	-17.1	-14.9	-537.4
2009	147.0	-61.3	85.7	454.1	-5.7	448.3	5.7	-31.8	-26.1	507.9
2010	120.7	-17.5	103.2	108.1	-5.3	102.8	-43.7	-15.0	-58.7	147.4
2011	-50.7	-13.8	-64.5	-109.4	29.7	-79.8	-99.6	81.7	-17.9	-162.2
2012	-51.1	9.8	-41.3	74.5	89.6	164.1	94.2	-85.0	9.2	132.1
2013	75.4	-7.6	67.8	77.8	68.4	146.1	53.2	-2.4	50.8	264.8
2014	187.6	6.0	193.6	9.6	47.0	56.5	-13.0	60.2	47.2	297.3
2015	134.5	-5.6	128.8	39.7	26.0	65.8	-34.0	49.2	15.2	209.7
2016	58.9	-1.1	57.8	22.7	10.4	33.1	3.2	4.3	7.4	98.3

	ASSETS			LIABILITIES			CONTRIBUTIONS		TOTAL NII CHANGE
	PRICE	QUANTITY	TOTAL	PRICE	QUANTITY	TOTAL	PRICE	QUANTITY	
	21 = 1+4+7	22= 2+5+8	23=10; 23=21+22	24= 11+14+17	25= 12+15+18	26=20; 26=24+25	27= 21+24	28=22+25	29=23+26; 29=27+28
2004	-331.4	143.8	-187.6	255.4	-75.6	179.8	-76.0	68.3	-7.8
2005	-183.6	188.9	5.3	131.6	-103.8	27.8	-52.1	85.2	33.1
2006	-39.7	264.3	224.7	-5.4	-159.8	-165.2	-45.1	104.5	59.5
2007	168.7	366.7	535.4	-186.1	-221.7	-407.9	-17.4	145.0	127.5
2008	165.4	501.2	666.6	-218.4	-319.0	-537.4	-53.0	182.2	129.3
2009	-702.4	182.1	-520.2	606.7	-98.9	507.9	-95.6	83.3	-12.4
2010	-105.9	66.1	-39.7	185.2	-37.8	147.4	79.3	28.4	107.7
2011	181.7	-49.3	132.4	-259.8	97.6	-162.2	-78.1	48.3	-29.8
2012	-180.6	-82.7	-263.3	117.6	14.5	132.1	-63.0	-68.2	-131.2
2013	-309.0	-134.1	-443.1	206.4	58.4	264.8	-102.6	-75.7	-178.3
2014	31.0	-204.0	-173.1	184.2	113.1	297.3	215.1	-90.9	124.2
2015	-229.1	-67.1	-296.3	140.2	69.5	209.7	-88.9	2.4	-86.5
2016	-125.9	-24.4	-150.3	84.8	13.6	98.3	-41.1	-10.9	-51.9

Note: The original values of changes on the liability side are multiplied by -1, since a decline in interest rates on liabilities or a reduction in a share of a certain liability type contributes positively to the change in the NII. The data for 2016 refer to the period up to August.
Source: Bank of Slovenia, authors' calculations.

liabilities and their interest expenses to fall. Additionally, the cost of capital is an important factor in banks' portfolio allocation decisions that importantly affects banks' net interest income (ECB, 2016). In contrast, the contribution of the price effect to the liability side expenses has been boosted by the sharp increase in the share of non-interest bearing sight deposits in total deposits since 2009. Whereas the decomposition exercise above was for net interest income in nominal terms, we now examine the principal drivers of the NIM (which is measured as the ratio of net interest income to interest earning assets). Following Covas et al. (2015) we look into the contributions to the NIM changes. The contribution to the NIM from each asset or liability type can be caused either by changes in the return (yield) or cost of each type[9] or by changes in the share accounted for by each asset or liability type (changes in portfolio composition).[10] Banks actively change the composition of their assets and liabilities in order to maximise their net income. In order to identify these two components, we decompose the overall change in the NIM into changes in yields/cost and changes in the composition of assets and liabilities (as in Covas et al., 2015).

For each of the three asset types *i* in period *t*, $\Delta CNIM_{i,t}$ can be decomposed into:

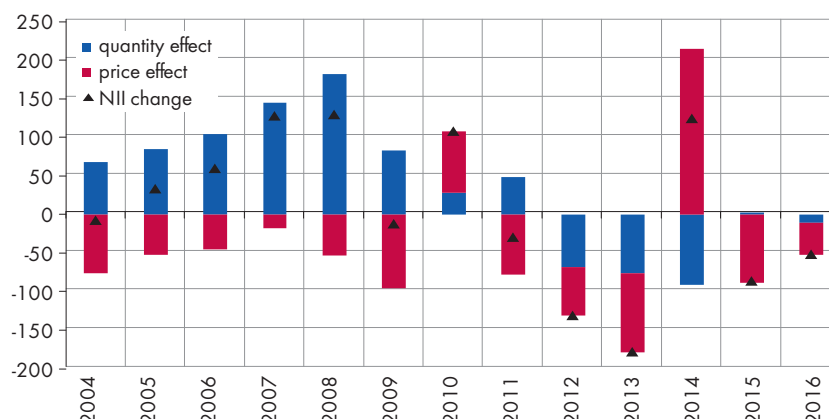$$\Delta CNIM_{i,t} = \Delta CNIM\_Y_{i,t} + \Delta CNIM\_S_{i,t}$$

where

$$\Delta CNIM\_Y_{i,t} = \left(\frac{\text{Interest income}_{i,t}}{\text{Interest earning assets}_{i,t}} - \frac{\text{Interest income}_{i,t-1}}{\text{Interest earning assets}_{i,t-1}} \right) * \frac{\text{Interest earning assets}_{i,t-1}}{\text{Interest earning assets}_{t-1}}$$

and

$$\Delta CNIM\_S_{i,t} = \left(\frac{\text{Interest earning assets}_{i,t}}{\text{Interest earning assets}_{t}} - \frac{\text{Interest earning assets}_{i,t-1}}{\text{Interest earning assets}_{t-1}} \right) * \frac{\text{Interest income}_{i,t}}{\text{Interest earning assets}_{i,t}}$$

Similar decomposition has been performed also for liabilities.[11] Results are presented in Table 2, while Figure 4 shows the contribution of both balance sheet sides to the change in the NIM.

In absolute terms, changes in the shares of items on both the asset and

Figure 3: The contribution of quantity and price effects to changes in the NII, in mn EUR.

Note: Data for 2016 refer to the period up to August.
Source: Bank of Slovenia, authors' calculations.

Figure 4: Contributions of interest earning assets and interest bearing liabilities to changes in the NIM, in percentage points.
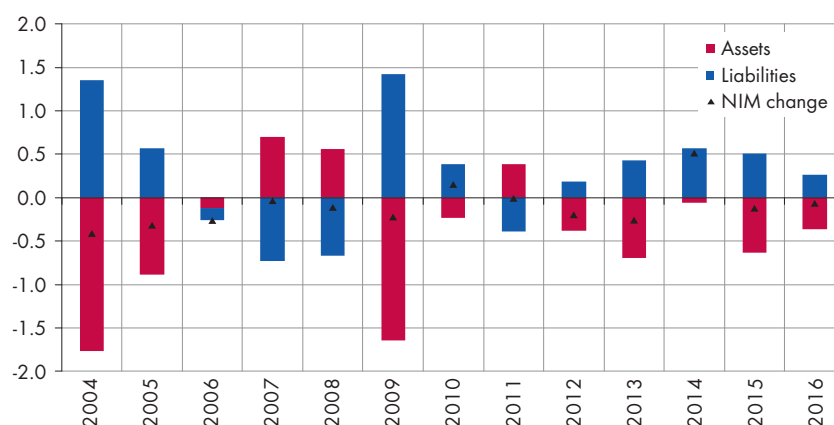
Data for 2016 refer to the period up to August.
Source: Bank of Slovenia, authors' calculations.

liability sides of the balance sheet of banks have generally contributed less to changes in the NIM than changes in the yield/cost component (Table 2). The contribution of the asset side of the balance sheet to changes in the NIM has been negative in most years, while the liability side has tended to contribute

[9] Effective interest rates calculated as interest income (expense) over interest-earning assets (interest bearing liabilities) per each asset and liability type.

[10] Similar to that presented above for changes NII that are affected through quantities and prices.

[11] Interest income and assets were replaced with interest expense and liabilities, respectively. The result was finally multiplied by -1.

Table 2: Share and yield/cost contributions to changes in NIM on asset and liability sides, in percentage points.

		ASSET-SIDE CONTRIBUTIONS									TOTAL
		LOANS			SECURITIES			OTHER			TOTAL
		YIELD	SHARE	TOTAL	YIELD	SHARE	TOTAL	YIELD	SHARE	TOTAL	
		1	2	3=1+2	4	5	6=4+5	7	8	9=7+8	10=3+6+9
2004		-1.20	0.22	-0.97	-0.61	-0.17	-0.78	-0.01	-0.00	-0.01	-1.77
2005		-0.69	0.12	-0.58	-0.27	-0.16	-0.43	0.07	0.05	0.12	-0.88
2006		-0.10	0.15	0.06	-0.14	-0.12	-0.26	0.07	0.01	0.08	-0.12
2007		0.35	0.41	0.76	0.03	-0.27	-0.24	0.19	-0.01	0.17	0.70
2008		0.38	0.27	0.65	0.05	-0.18	-0.14	0.04	0.00	0.05	0.56
2009		-1.18	-0.06	-1.24	-0.18	0.00	-0.18	-0.27	0.05	-0.23	-1.64
2010		-0.19	-0.06	-0.26	-0.07	0.00	-0.07	0.04	0.05	0.09	-0.23
2011		0.20	0.05	0.25	0.07	-0.02	0.05	0.10	-0.02	0.09	0.38
2012		-0.31	-0.04	-0.35	0.04	0.00	0.05	-0.11	0.03	-0.08	-0.38
2013		-0.48	-0.07	-0.55	0.00	0.02	0.02	-0.20	0.04	-0.16	-0.69
2014		0.26	-0.33	-0.07	-0.03	0.14	0.11	-0.15	0.06	-0.09	-0.06
2015		-0.32	-0.11	-0.44	-0.17	0.09	-0.08	-0.11	-0.01	-0.12	-0.63
2016		-0.21	-0.04	-0.24	-0.09	0.02	-0.07	-0.05	-0.00	-0.05	-0.36

	LIABILITY-SIDE CONTRIBUTIONS										TOTAL	
	DEPOSITS			WHOLESALE			OTHER			TOTAL	CHANGE IN NIM	NIM
	COST	SHARE	TOTAL	COST	SHARE	TOTAL	COST	SHARE	TOTAL			
	11	12	13=11+12	14	15	16=14+15	17	18	19=17+18	20=13+16+19	21=10+20	22
2004	1.12	0.13	1.25	0.31	-0.15	0.16	-0.04	-0.02	-0.06	1.35	-0.41	2.93
2005	0.36	0.13	0.49	0.21	-0.20	0.01	0.07	-0.00	0.07	0.57	-0.32	2.62
2006	0.08	0.13	0.21	-0.09	-0.24	-0.33	-0.02	-0.00	-0.02	-0.14	-0.26	2.35
2007	-0.22	0.14	-0.08	-0.37	-0.20	-0.57	-0.04	-0.04	-0.08	-0.73	-0.03	2.32
2008	-0.38	0.13	-0.26	-0.24	-0.17	-0.41	0.01	-0.02	-0.01	-0.67	-0.11	2.21
2009	0.34	-0.03	0.31	1.05	0.10	1.15	0.01	-0.05	-0.04	1.42	-0.22	1.98
2010	0.25	-0.01	0.25	0.23	0.02	0.25	-0.09	-0.02	-0.11	0.39	0.15	2.14
2011	-0.10	-0.05	-0.16	-0.22	0.03	-0.19	-0.20	0.16	-0.05	-0.39	-0.01	2.13
2012	-0.05	-0.03	-0.07	0.16	0.16	0.31	0.17	-0.23	-0.06	0.18	-0.20	1.93
2013	0.15	-0.10	0.05	0.17	0.11	0.28	0.13	-0.03	0.10	0.43	-0.26	1.67
2014	0.41	-0.06	0.35	0.02	0.07	0.09	-0.01	0.14	0.13	0.57	0.51	2.18
2015	0.34	-0.04	0.30	0.10	0.06	0.16	-0.08	0.13	0.05	0.51	-0.12	2.06
2016	0.16	-0.01	0.15	0.06	0.03	0.09	0.01	0.01	0.02	0.26	-0.10	1.96

Note: The original values of changes on the liability side are multiplied by -1. since a decline in interest rates on liabilities or a reduction in a share of a certain liability type contributes positively to the change in the NIM. Column 22 shows data on the level of the NIM for the corresponding years.
The data for 2016 refer to the period up to August.
Source: Bank of Slovenia. authors' calculations.

positively except for 2006–2008 and 2011 when EURIBOR rose and made bank funding more expensive (Figure 4 and columns 10 and 20, Table 2).

In the periods of falling market interest rates contributions of the liability side components were mainly positive (column 20), indicating that banks either managed to roll-over reductions in the money market

interest rates to their depositors or turn to cheaper types of funding consequently creating more favourable funding structure. It is possible to discern in Table 2 the substitution between the two main types of funding, deposits and wholesale funding, which is reflected in their contributions to the NIM (columns 12 and 15).[12] During 2004–2008, the importance of deposit financing fell,

causing the change in its share to positively contribute to the change in the NIM (and vice versa for wholesale funding). During the crisis period

[12] On the liability side the logic is the following: if certain liability type share diminishes, it burdens the institution less and consequently this type of liabilities contributes positively to the NIM. Consequently we observe a positive impact of liabilities whose share is falling and negative impact of liabilities whose share is increasing.

more stable deposit funding gained importance and its increased share negatively affected the NIM. The impact of the decrease in wholesale funding was just the opposite. As for the cost effect, the contribution is in the same direction for both, deposits and wholesale funding, although it is possible to see that rates on the latter react faster than deposit rates. In parallel with the lowering of money market and deposit interest rates also the structure of deposit funding changed – important share of short term deposits was transformed into sight deposits. This phenomenon is detected under positive cost developments of the recent years. During 2011–2012, cost of bank deposits rose and contributed negatively to the NIM development. This occurred as a result of intensified competition of banks for deposit funding in the aftermath of the massive withdrawal of wholesale funding. Bank of Slovenia reacted to this behaviour by introducing a ceiling on deposit rates in March 2012.[13] Following this measure, the contribution of deposits to changes in the NIM became positive[14] and has remained so until now. Average yield developments on the asset side of the balance sheet contributed negatively to changes in the NIM, with the exception of years 2007–2008 and 2011 when EURIBOR rose. Positive contributions of the asset side, especially of loans, when EURIBOR rose indicate that banks benefited from variable interest rate contracts that enabled them to increase their interest income. The share of securities income and its contribution to the change in NIM rose markedly in 2014 following the replacement of non-performing loans with securities during bank rehabilita-

tion processes.

The composition of the balance sheet of banks shifted towards loans during 2004–2008, signifying the lending boom that was occurring, and the rising share of loans contributed positively to changes in the NIM. The falling share of securities in the banks' portfolio during this period contributed negatively to changes in the NIM. Since 2012, changes in the share of loans have contributed negatively while the changes in the share of securities have contributed positively to changes in NIM. During 2014–2015, these developments reflect the impact of bank rehabilitation measures; in particular, the transfer of non-performing loans to the Bank Asset Management Company and the recapitalisation of the banking system with government securities. The share of other asset items changed very little and had minimal impact on changes in the NIM.

In the period ahead, the quantity effect will continue to negatively contribute to bank interest income, if banks continue to deleverage and scale back on lending. The space for further composition changes is limited, although banks might start to redirect towards higher yielding but riskier loans and securities on the asset side and towards cheaper, but more volatile, and consequently, riskier wholesale funding on the liability side.[15] Also additional reliance on sight deposit funding would expose banks to liquidity risk. On the other hand, the changes arising from the yield/cost component will probably start to approach zero, at least on the liability side. While there seems to be some space for reductions in yield on the asset side, these changes will probably diminish.

4. Interest rates for new and outstanding business

Trends in interest rates for new business indicate the outlook for near-term developments. If new contracts are more favourable for the banks than outstanding business, it is possible to assume that the net interest margin will increase and the other way around if new contracts are less profitable for banks. Current developments, although already indicating downward pressures on the NIM are masking potentially even more worrying developments that are to occur if banks do not react and accommodate their business models accordingly. In this section we first analyse interest rates on all interest-earning assets and interest-bearing liabilities for new and outstanding business that give the most complete picture of developments. Then we move to the analysis of interest rates on loans and deposits balance sheet components that have in the recent period contributed the most to changes in the NIM. Additionally, since some banks have a rather important share of their portfolio invested in securities, it is very important to investigate their maturity structure in order to identify when the pressures on banks' income will materialise. Interest rates on outstanding business have been exhibiting a declining trend for both sides of the balance sheet, reflecting short repricing lags to changes in market rates. Looking at new business, the trend of falling rates on liabilities not only reflects a decline in market rates but also an increase in the share of sight deposits which attract zero interest.[16] Rates for new business on the asset side have resumed falling in early-2015,

[13] More in: http://www.bsi.si/en/financial-stability.asp?MapaId=1889.

[14] The impact was caused by both the general fall in market interest rates and by the introduction of the instrument.

[15] As observed for Japan, banks might also not want get involved in risky lending (Weistroffer, 2013), because of the bad experience from the past.

[16] Interest rates on outstanding business are calculated from balance sheet and profit and loss statement data as effective interest rates on all interest earning assets and all interest bearing liabilities. Similarly, when calculating interest rates

ending at 1.3% as at August 2016. They have also remained below those for outstanding assets and liabilities (Figure 5), although the difference between them has narrowed, mainly due to sharply falling interest rates on outstanding assets influenced by a large share of assets at variable interest rates. Diversion towards fixed interest rates at rather low levels recently observed in new business could shield banks only if interest rates continued to fall, but might be problematic when interest rates start to increase.

The level of interest rates itself does not matter - what is important is the spread between asset-side and liability-side interest rates. Spread for new business is an important indicator for the future movement of the NIM. As shown in Figure 6, newly approved contracts contributed negatively to the NIM after 2011. Falling difference between interest rates on outstanding and new business on the liability side indicates that the room for additional liability-side interest rate reductions has shrunk significantly (see Figure 5). This statement is confirmed by the stated intention of banks not to introduce any (interest) charges for household deposits.[17,18] On the other hand, interest rates for new business on the asset side might continue to decrease, exhibiting sustained downward pressures on banks' NIM.

It is highly probable that banks will not be able to reinvest their assets that will mature in the following years at the same interest rate as they did in the past. Interest rates on newly approved loans to households and non-financial corporations (to large extent due to revolving loans and overdrafts, convenience and extended

Figure 5: Interest rates for outstanding and new business, in %.
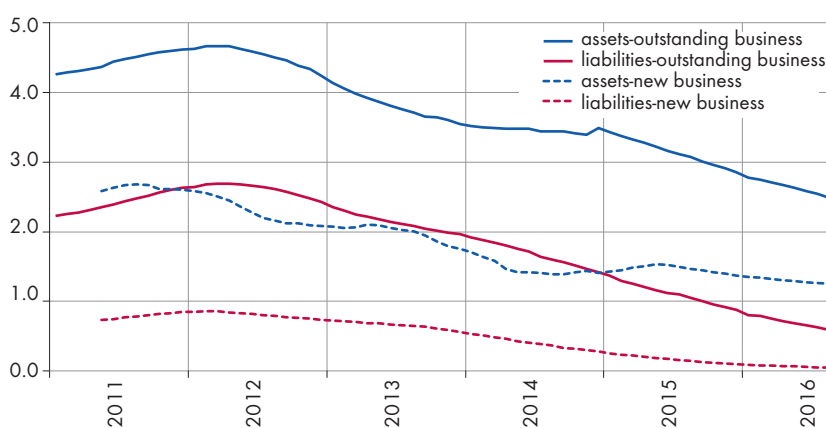
Note: Interest rates on new business reflect all, also the most liquid/sight forms of assets and liabilities in banks' balance sheets. On the asset side, loans to the banking and the non-banking sectors, new securities and stocks of overdrafts and revolving loans as well as sight claims on banks and reserves at the central bank (minimum reserves and excess reserves) are included. On the liability side, liabilities (deposits) of the non-banking sector, banks and central bank, and newly issued debt securities, as well as all demand liabilities of banks are included. Interest rates on outstanding amounts are calculated as moving averages of effective interest rates. The data for 2016 refer to the period up to August.
Source: Bank of Slovenia, own calculations.

Figure 6: Spread between lending and deposit rates on outstanding business and spread between lending and deposit rates on new business, in percentage points.
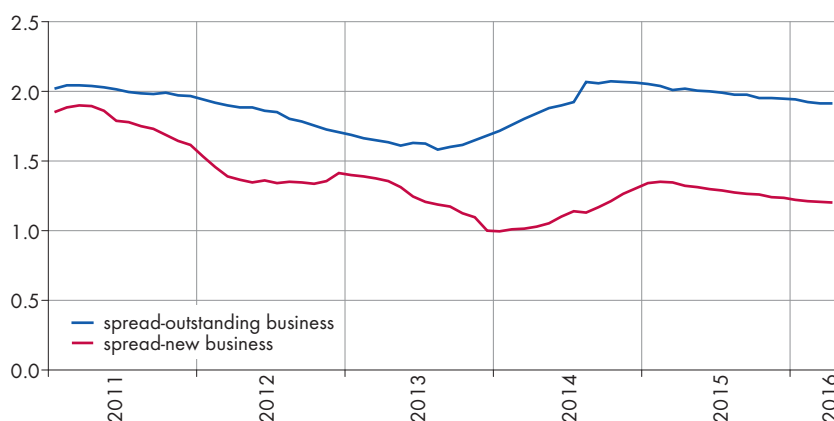
Note: Positive difference between spread on new business and spread on existing, outstanding business indicates that new business is contributing to higher interest margin than already recorded; negative difference indicates a negative contribution to the NIM. Data for 2016 refer to the period up to August.
Source: Bank of Slovenia, own calculations.

credit that have in average higher interest rates than other loans and represent majority of all newly approved loans) remain above rates on outstanding loans (Figure 7). However,

the rapidly falling difference between rates for newly approved loans and rates for outstanding loans is indicating strong pressures on the NIM arising from core lending activity.

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for new business all types of interest earning assets and interest bearing liabilities are considered. The main problem in constructing interest rates for new business is how to treat revolving loans and overdrafts, convenience and extended credit

on the asset side and how to treat sight deposits on the liability side. Following the methodology employed by the Deutsche Bundesbank (2015) these items are considered as renewed on every reporting occasion.

[17] See section 6 below.

[18] In any event, potential non-interest charges announced by banks for deposits of non-financial corporations will not appear in the interest income that is being scrutinised here.

Securities account for 25% of banks' assets[19] and 20% of their interest income. As it is evident from Figure 8, about 57% of the securities will mature before July 2019. In this period banks will have to reinvest 14% of their assets and they will not have investment with interest rates as high as those on outstanding securities available anymore. If the maturing securities are replaced with lower yielding investment, interest income will fall, causing the NIM to shrink further. Maturities of securities differ across banking groups – large and small domestic banks will see more than 60% of their securities mature before 2019, while only 40% of foreign owned banks' securities will mature in the following two to three years. Two groups of domestically owned banks will be consequently exposed to more pronounced income risk already in the short to medium term period, especially because they have a relatively large share of securities in their balance sheets (around 34% of all interest earning assets that contribute around 25% to their total interest income). Banks might combat the trend of falling margins by searching for higher yielding investments; for example, loans or securities issued by the corporate sector or certain governments. However, such lending might be, as emphasised by de Bandt (2015) and Heider et al. (2016), also riskier. Nevertheless, the consequences of riskier lending policies will become visible only after several years.

5. Banks' views on the low (negative) interest rate environment

Besides *ex post* evidence from bank balance sheets, more forward-ori-

Figure 7: Interest rates for outstanding and new loans and deposits to non-financial corporations and households, in %.
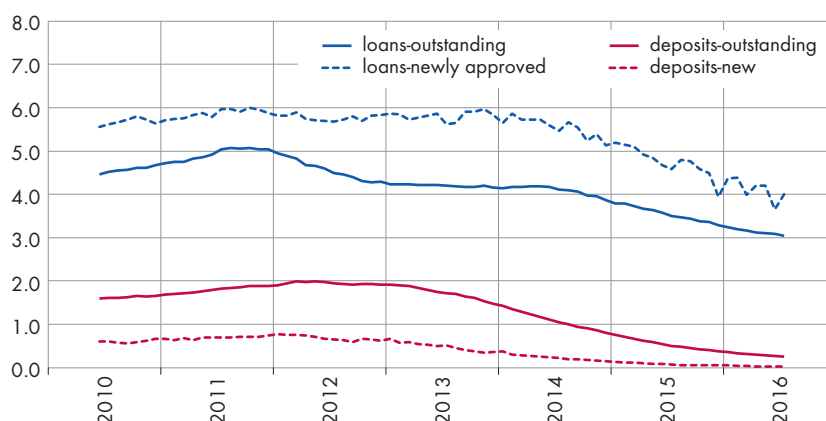
Note: The lending rate on new businesses reflects the interest rates interest rates on banks' loans to non-financial corporations and households, including revolving and overdraft loans. The deposit rate on new business on the liability side also includes sight deposits of non-financial corporations and households. Outstanding interest rates are calculated on the whole stock of loans and deposits to/from both sectors. Data for 2016 refer to the period up to July.
Source: ECB, authors' calculations.

Figure 8: Securities, by maturity, banking system.
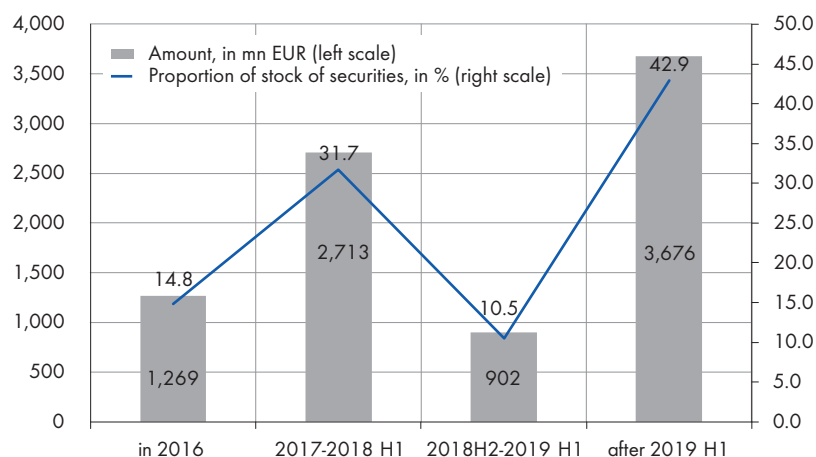
Note: The data on investment into debt securities as of June 2016.
Source: Bank of Slovenia, authors' calculations.

ented survey evidence is available as well. Responses to a question included in the April 2016 Bank Lending Survey (hereinafter: BLS) indicate that Slovenian banks are already feeling the effects of a negative deposit facility rate. Banks indicated a reduction in their NII that is a consequence of the low interest rate environment and expected it to

intensify in the future. Pursuant to a drop of the deposit facility rate into a negative territory, banks have decreased their lending rates and they are expecting that the transmission into lending rates and bank lending margins will continue and intensify in the future. These effects were particularly strong in the segment of loans to enterprises, followed by housing loans,

[19] In August 2016, loans accounted for 57%, securities for 25% and other assets for 18% of the banking sector's total interest earning assets.

while consumer loans were the least affected. Banks reported no impact on lending volumes or non-interest rate charges. The latter charges are considered as a factor that could off-set a reduction in the NII; however, banks did not foresee an increase of their non-interest charges as of April 2016, and such behaviour is also not visible from the data.

The Survey on demand for loans from non-financial corporations conducted by the Bank of Slovenia in August 2016 also included questions on the impact of negative deposit facility on lending developments and the NII, and the planned mitigation of negative effects arising from low interest rate environment (more specifically from negative deposit facility interest rate introduction).

Virtually all banks reported that they were negatively affected by the consequences of the negative deposit facility interest rate introduction. In accordance with Jobst and Lin (2016), they emphasised indirect effects through the lowering of market interest rates rather than through charges imposed on banks directly by the ECB.[20] More than 60% of banks (measured by total assets) claimed that their NII was strongly negatively affected. As emphasised before, banks could compensate lower interest margins with increased lending activity. However, only 4 banks with approximately 40% share in the market reported positive impact of low interest rate environment on lending activity, while another 40% of banks reported no impact on volumes of loan extended and 17% of banks indicated negative impact on lending activity. Some banks also expressed concerns that they were not competitive vis-à-vis their peers because they were obliged to

[20] Also, authors' calculations show that the direct impact of negative deposit facility rate is negligible at the moment.

Figure 9: Impact of the ECB's negative lending facility on the NII and lending activity.
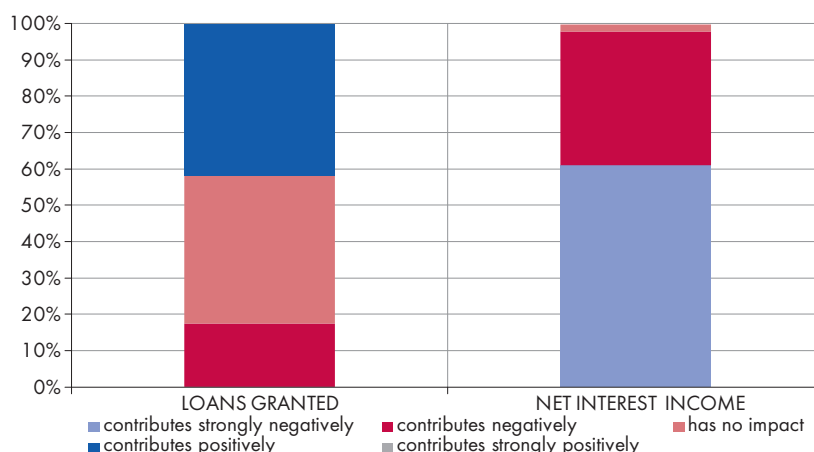
Source: Bank of Slovenia, Survey on demand for loans from non-financial corporations, August 2016; authors' calculations.

Figure 10: Mitigation measures introduced or planned by banks.
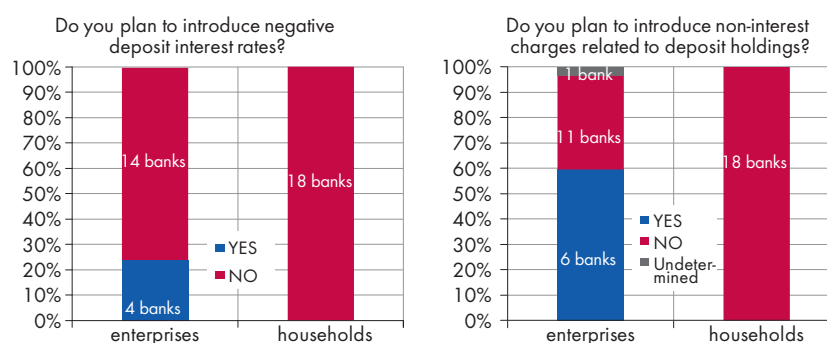
Note: Several banks responded that they do not plan to introduce the charges in the near future; however, their decision is subject to change over a longer time horizon.
Source: Bank of Slovenia, Survey on demand for loans from non-financial corporations, August 2016; authors' calculations.

respect the commitments regarding the pricing for new loans given to the European Commission upon the receipt of the state aid.

In contrast to the answers provided in the April 2016 BLS, some banks in the August 2016 survey reported that they had introduced charges for deposits of enterprises. More banks plan to do this in the future. Altogether, two thirds of banks in the Slovenian market are considering to start charging for keeping enterprise deposits – more than 20% of banks

(by market share) will introduce negative deposit rates, while more than 50% have introduced or will introduce non-interest charges for deposits. No bank currently plans to introduce any kind of charges for household deposits.

The impact of those mitigating measures will depend on the design and extent of charges for keeping deposits. However, it is hard to expect that they will be sufficient to compensate for the falling net interest income.

6. Conclusions

Historically, the NIM of Slovenian banks has been slowly but steadily decreasing since 2004. Banks managed to increase their NII in the period of rapid (excessive) credit growth during 2005–2009 mainly by increasing volumes of loans that compensated for the falling NIM. In the current low interest rate environment bank lending has been decreasing and the likelihood of avoiding a further fall in the NII through increasing the volumes of lending in the near-term is small. A release from the lending constraints that were imposed on some banks by the European Commission in the process of state-aid approval could help to achieve this goal. Additionally, it is particularly important that banks lend to all sectors of the economy, especially those involved in investment activity, without excessively focusing only on certain types of clients. Each bank should find its niche specialization and not only follow its competitors in the race to the bottom. The fact that loans to households for the first time in twenty-two years exceeded loans to non-financial corporations indicate that banks mainly focus on lending to households who currently appear as safer clients but might become riskier in the future.

Interest rates on deposits have largely (at least for households, as evident from the August 2016 Survey on demand for loans from non-financial corporations) reached the zero lower bound and banks can reduce their interest expenses only by reverting to currently very cheap wholesale funding or by further increasing the share of sight deposits. Both solutions mean a diversion towards unstable sources of funding that could increase liquidity risk. Similarly, on the asset side, banks could reverse a fall in interest rates by investing in higher yielding loans and securities, which are also at the same time normally riskier, indicating a potential increase of credit risk.

The future of the Slovenian banking system appears to be marked by a trade-off between (too) high riskiness and (too) low profitability. The former might end in yet another banking crisis, while the latter might push further banks to exit the market. Banks will have to find the right path between Scylla and Charybdis. In any case, the future for banking will not be rosy if banks do not adjust their business models to the new circumstances.

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