

## Box 5

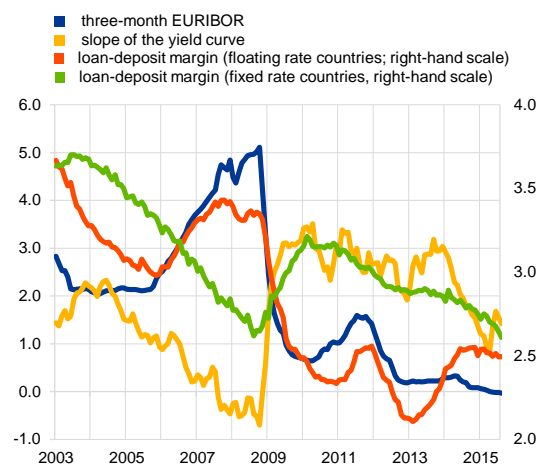
### Euro area banks' net interest margins and the low interest rate environment

#### Chart A

Low interest rates have contributed to depressing banks' net interest margins

#### Short-term interest rate, slope of the yield curve and MFI loan-deposit margins

(Jan. 2003 – Sep. 2015; percentages)



Sources: ECB, Bloomberg and ECB calculations.

Notes: Loan-deposit margins are defined as the volume-weighted lending rates to households and non-financial corporations minus the volume-weighted deposit rates on deposits from households and non-financial corporations. Weights are based on outstanding amounts.

rate loans, while the steepness of the yield curve plays a relatively larger role for those banks favouring fixed rate loans (see Chart A).

In recent years interest rates have fallen to historical lows across the maturity spectrum, which has been accompanied by a substantial flattening of the yield curve. Concerns have arisen that, should such a constellation continue for a protracted period of time, this may hamper euro area banks' ability to generate net interest income – further dampening profitability that is already depressed by low economic growth and lingering legacy asset quality issues.

Should this low interest rate environment persist over a longer period, banks could see a decline in their net interest margins, particularly smaller institutions that are less capable of hedging their interest rate risk than larger banks. Moreover, when assessing the impact of low interest rates on banks' net interest margins, it is important to distinguish between banks primarily granting loans at floating rates and banks primarily granting fixed rate loans. The level of short-term rates is more important for the net interest margins of banks with predominantly floating

## Table

### Net interest margin regression results

	Net interest margin		
	(1)	(2)	(3)
Net interest margin (t-1)	0.60*** (0.08)	0.58*** (0.08)	0.56*** (0.09)
CPI inflation	0.05* (0.02)	0.01 (0.02)	0.01 (0.02)
Real GDP growth	0.04*** (0.01)	0.03** (0.01)	0.02 (0.01)
Short-term interest rate	0.07** (0.03)		0.49*** (0.14)
Slope of the yield curve	0.07*** (0.02)		0.80*** (0.28)
Market capitalisation as % of GDP	0.00** (0.00)	0.00** (0.00)	0.00*** (0.00)
Common equity over total assets	0.10*** (0.03)	0.09*** (0.03)	0.09*** (0.02)
Loan growth	0.00*** (0.00)	0.00*** (0.00)	0.00*** (0.00)
Bank size			0.09 (0.09)
Short-term rate * floating rate dummy		0.08*** (0.03)	
Short-term rate * fixed rate dummy		-0.03 (0.03)	
Slope of the yield curve * floating rate dummy		0.06*** (0.02)	
Slope of the yield curve * fixed rate dummy		0.11*** (0.04)	
Bank size * slope of the yield curve			-0.07*** (0.03)
Bank size * short-term rate			-0.04*** (0.02)
Chi2	34196.6	29470.5	13344.0
Hansenp	0.31	0.34	0.46
AR2p	0.43	0.44	0.19
Number of observations	846	846	846

Notes: The net interest margin is defined as the net interest income over total earning assets. Heteroskedasticity and autocorrelation robust standard errors in parentheses; \*\*\* p<0.01, \*\* p<0.05, \* p<0.1. The Hansen test of over-identifying restrictions confirms that the (internal) instruments are valid, and the Arellano-Bond test rejects significant second-order serial correlation in the error term. The Wald test indicates that all the estimated coefficients are jointly significant.

A dynamic panel model can help to gauge the general effects of both the level of the short-term interest rate and the slope of the yield curve for a large number of banks. The analysis looks at the effects of bank-specific characteristics and of macroeconomic and financial conditions on the net interest margin.<sup>35</sup> In an empirical application to euro area banks over the 1994-2014 period,<sup>36</sup> two bank-specific variables (equity over total assets – as a proxy for the solvency position – and loan growth) and five macroeconomic variables<sup>37</sup> (real GDP growth, inflation, stock market capitalisation

<sup>35</sup> The regression includes bank fixed effects as well as time fixed effects.

<sup>36</sup> The banking data were taken from Bloomberg. The macroeconomic variables were sourced from the World Bank's World Development Indicators database. The inclusion of a lagged dependent variable in a panel framework might yield biased and inconsistent estimates owing to the correlation between the lagged dependent variables and the error terms. To address this issue and to tackle the possible endogeneity of the bank-specific explanatory variables, the model is estimated using a system GMM estimator. In this context, the explanatory variables are instrumented by using "internal" instruments.

<sup>37</sup> Other explanatory factors that could be taken into consideration when studying the relationship between banks' net interest margins and the interest rates are the maturity gap, the flexibility of contractual spreads, the amount of non-maturing deposits as a share of total deposits, and the residual maturity of loans granted.

as a ratio to GDP, the short-term interest rate and the slope of the yield curve) are included in a benchmark model for 72 institutions (column 1 in the table).<sup>38</sup>

The regression analysis suggests that the net interest margin is positively and significantly related to both the level of short-term interest rates and to the slope of the yield curve (see column 1 in the table).<sup>39</sup> These results can be attributed to the two key services supplied by banks and reflected in their interest income earnings: maturity transformation services and deposit transaction services.

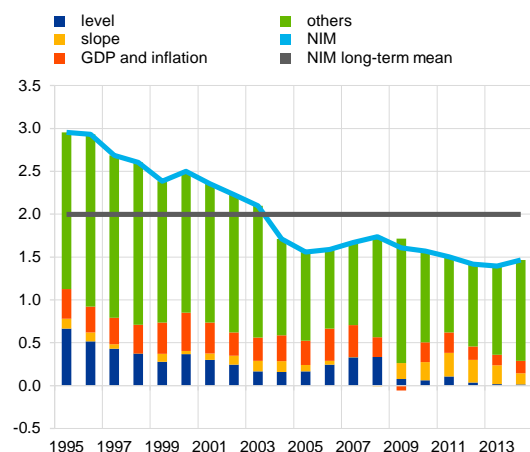
The short-term interest rate result may reflect the fact that bank deposit rates are typically lower and stickier than market rates (since banks provide transaction services). In particular, banks often fund a portion of their interest-earning assets with non-interest-bearing liabilities which primarily correspond to demand and transaction deposits. In addition, as bank deposit rates are constrained by the zero lower bound, low levels of market rates will tend to compress deposit margins (i.e. the spread between the market rate and bank deposit rates).

### Chart B

The contribution of interest rates to net interest margins has diminished over time

#### Net interest margin decomposition over time

(1995-2014; percentages)



Source: ECB calculations.

Notes: The net interest margin (NIM) is defined as the net interest income over total earning assets. "Others" includes the lagged dependent variable, the capital ratio, loan growth, stock market capitalisation, time dummies and the residual.

The importance of accounting for the loan rate fixation periods when assessing net interest margin developments is further examined in column 2 of the table, where the short-term rate and the slope of the yield curve are interacted with dummy

The slope of the yield curve result is also not surprising. Owing to their maturity transformation activities, banks tend to benefit from a steep yield curve characterised by a wide spread between long-term and short-term interest rates. By contrast, a flattening of the yield curve exerts downward pressure on banks' net interest margins.

Moreover, based on the benchmark regression (column 1 in the table), Chart B shows a decomposition of the average contribution of the different explanatory factors to euro area banks' net interest margins over the period 1995-2014. While there was a steady decline in net interest margins in the pre-crisis period, the fall in short-term rates since 2008 has further reduced margins. More recently, especially in 2014, the yield curve flattening has also contributed to the compression of net interest margins.

<sup>38</sup> The slope of the yield curve is defined as the spread between the ten-year sovereign bond yield and the short-term money market rate.

<sup>39</sup> All the other explanatory variables have the expected positive signs and are significant. In particular, the positive coefficient of the lagged net interest margin suggests strong persistence of the dependent variable over time, and the positive coefficients of real GDP and inflation might indicate that improving macroeconomic conditions are associated with improved borrower financial conditions boosting banks' profitability. The positive coefficient of bank capital may reflect the fact that banks with higher capital ratios tend to have lower funding costs and a broader capacity to extend credit, and thus broader scope to generate interest income.

variables for countries where lending is predominantly done either with fixed rate loans<sup>40</sup> or with floating rate loans<sup>41</sup>. As expected, the results suggest that (i) changes in the short-term rate mainly affect banks' net interest margins in "floating rate countries", while (ii) the slope of the yield curve is more relevant for banks exposed to fixed rate lending.

Finally, as shown in column 3 of the table, when bank size (measured as the logarithm of the bank's total assets) is interacted with both the short-term interest rate and the slope of the yield curve, larger banks display a lower sensitivity to interest rate and yield curve changes than smaller banks. This could indicate that larger banks are able to undertake hedging activities which allow them to better offset some of their exposures to interest rate risk.<sup>42</sup>

Overall, these findings indicate that the prolonged period of low interest rates is posing material challenges for banks' net interest income generation.<sup>43</sup> While some banks may be capable of coping with these challenges, the low interest rate environment may induce a number of banks to adjust their business models towards activities that rely less on traditional interest income-generating business.<sup>44</sup>

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<sup>40</sup> i.e. Belgium, France, Germany and the Netherlands. "Floating rate countries" and "fixed rate countries" are identified using the ECB's MFI interest rate statistics. More specifically, in "floating rate countries" the majority of new business loans to households for house purchase are given floating rates or an initial rate fixation period of up to one year, while in "fixed rate countries" a large share of new business loans to households for house purchase are granted with an initial rate fixation period of more than five years. However, it is worth mentioning that banks within the same country might have diverse business models and, thus, rate fixation periods that differ from those of their EU peers.

<sup>41</sup> i.e. Austria, Cyprus, Finland, Greece, Ireland, Italy, Luxembourg, Slovenia, Spain and Portugal.

<sup>42</sup> A similar result is found using data for US banks in Genay, H. and Podjasek, R., "What is the impact of a low interest rate environment on bank profitability?", *Chicago Fed Letter*, No 324, July 2014.

<sup>43</sup> However, it is important to note that the estimated negative effects on banks' net interest margins stemming from the low interest rate environment would be at least partly compensated for by the likely positive effects on net interest margins of low interest rates boosting economic activity.

<sup>44</sup> For example, some banks may choose to rely more on fees and commissions to generate income; see also Kok, C., Mirza, H. and Pancaro, C., "Macro stress testing European banks' fees and commissions", *Working Paper Series*, ECB, forthcoming.