

Low Interest Rates and Banks' Interest Margins: Does Belonging to a Banking Group Matter?

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Abstract

Using data for a large sample of banks from 31 OECD countries over 1995–2018, we analyze the impact of belonging to a banking group on banks' net interest margins. Our results confirm a positive relationship between interest rates and interest margins, which is stronger in a low-interest rate environment. For banks belonging to an international banking group, we find that interest margins are less sensitive to the local interest rate. Our results show that banks belonging to an international group are sensitive to the interest rate prevailing in the group's headquarter, but only in a low interest rate environment.

JEL-Codes: E430, E520, G210.

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1 Introduction

Interest rates in many OECD countries have been low for an extended period. Although these low rates may stimulate economic activity, they may also erode banks' net interest margins. A bank's net interest margin (NIM) reflects the difference between interest income generated on loans provided and interest paid out to lenders (notably on deposits), both relative to the bank's (interest-earning) assets. Some previous papers report a positive but non-linear relationship between interest rates and banks' net interest margins: the impact of low interest rates on banks' net interest margins is significantly higher than the impact of high interest rates (Borio et al., 2017; Claessens et al., 2018). If low interest rates reduce bank profits, this can erode bank capital positions through a reduction in retained earnings, which, in turn, can limit credit growth, thus hampering monetary policy transmission (Brunnermeier and Koby, 2018).

This paper analyzes the impact that belonging to a banking group has on the transmission of monetary policy using a large sample of banks from 31 OECD countries for the period 1995 – 2018. We examine the effect of (low) interest rates on banks' net interest margins and analyze how it differs across banks that belong to a group and stand-alone banks. We postulate that a bank belonging to a banking group can count on liquidity and capital support from other members of the group or the parent bank when needed. In contrast, banks that do not belong to a group can only count on their own resources. We thus expect that low interest rates will have less impact on banks' net interest margins for banks belonging to a banking group.

As section 2 will explain in more detail, our paper is related to three strands of literature. First, our paper contributes to the literature on the effects of the level of interest rate on banks' net interest margins when interest rates are low (Borio et al., 2017; Altavilla et al., 2018; Claessens et al., 2018). The model we estimate is similar to the one used by Claessens et al. (2018), who find that low interest rates (below 1.25%) have a significantly greater impact on bank net interest margins than high interest rates. We also use their cut-off level of 1.25% to define a low interest rate environment.¹ Whereas the final sample

¹ The alternative would be to use national thresholds based on, say, the 25th percentile of the distribution of short-term local interest rates to identify low interest rate periods. The advantage of using a distribution-based national threshold versus a standard threshold for all countries is that it allows to account for cross

of Claessens et al. (2018) contains 3385 banks from 47 countries for 2005–2013, our sample consists of 7564 banks from a more homogeneous sample of 31 OECD countries during the 1995–2018 period.

Second, our paper is related to studies on the existence of internal capital markets within banking groups (Ashcraft, 2008). Banking group membership insulates banks to some extent from negative shocks to external financing (Campello, 2002; Cremers et al., 2011). Internal capital markets within banking groups operate because of the presence of market frictions or because they lead to a more efficient allocation of resources. Intra-group allocation of liquidity or capital between affiliates belonging to the same group may result from a support or a substitution effect (de Haas and Lelyveld, 2010). The support effect arises when the parent bank allocates additional funding or liquidity to an affiliate which has been negatively hit. Alternatively, as banking groups use these transfers to allow for the expansion of lending in economies that are growing while reducing it in countries subject to a negative shock, substitution takes place. In our analysis, we distinguish between stand-alone banks and banks that belong to a group. For the latter, we differentiate further between banks that belong to a local banking group and those that belong to an international banking group (a bank that is located in a different jurisdiction than that of the group's headquarter).

Finally, our work is related to research on global banks and the international transmission of shocks. A good example is the study by Cetorelli and Golberg (2012b) who analyze the response of US banks to changes in monetary policy. Their results support the view that internal capital markets are in operation in global banks and contribute to the international propagation of shocks.

We contribute to the literature in several ways. First, we construct a novel data set covering a large sample of banks where we identify their corporate structure. This allows us to test whether the impact of (low) interest rates on banks' NIM differs across banks that belong to a group and those that do not. Likewise, we can test whether the impact of (low) interest rates differs across banks belonging to a local group and those that are part

country differences in interest rate levels. However, the main reasons why low interest rates may affect banks' NIMs differently apply if interest rates are close to the effective lower bound and not just historically low. Using a uniform threshold implies that some countries are never in a low interest rate environment (see Segev et al., 2021) and this will help identification.

of an international group. Second, the dataset we use covers a homogeneous group of OECD countries, whereas most previous cross-country studies also include banks in emerging market economies. Finally, our dataset allows us to distinguish between the interest rate of a bank's country of operation and that of the bank's parent.

Our results confirm a positive relationship between interest rates and net interest margins, which is stronger in a low-interest rate environment. However, we find that for banks that belong to a banking group, net interest margins are less sensitive to the local level of interest rates, in both low and high interest rate environments. Our findings suggest that the lower sensitivity arises notably for banks that are part of an international banking group. We also find that banks belonging to an international group are sensitive to the interest rate prevailing in the group's headquarter, but only in a low interest rate environment.

The remainder of the paper is structured as follows. Section 2 discusses related studies explaining in more detail how our paper is related to previous research; this section also introduces the hypotheses tested. Section 3 describes our data, while section 4 presents our methodology and the main results. Section 5 offers robustness checks. Section 6 concludes.

2 Related literature and hypotheses

This paper is related to the large and growing literature investigating the impact of low and negative interest rates on banks' profitability.² From a theoretical point of view, the effect of low or negative interest rates on banks' performance is a priori unclear. Low interest rates and, more specifically, negative rates could reduce bank profits due to incomplete pass-through to deposit rates leading to compression of net interest margins. Bank deposits are typically priced as a markdown on policy-driven market rates. This markdown is generally compressed when policy rates are reduced to very low or negative levels (Claesssens et al., 2018; Borio et al., 2017). However, low interest rates may also

² Other recent studies examine the influence of low and negative rates on bank lending supply and risk-taking (see, for example, Heider et al., 2019 and Hong and Kandrac, 2021).

induce banks to shift their activities from interest-generating to fee-related and trading activities as well as to adjust their funding structure to preserve their profitability.

There is cross-country empirical evidence suggesting an adverse impact of low interest rates on net interest margins (Claessens et al., 2018; Borio et al., 2017; Brei et al., 2019). Using data for large international banks headquartered in 14 major advanced economies for the period 1995–2012, Borio et al. (2017) report that low interest rates and a flat yield curve reduce bank interest margins. Likewise, Claessens et al. (2018) find that a decline in interest rates is associated with lower net interest margins. Moreover, they report that low interest rates have a significantly greater impact on bank net interest margins than high interest rates. A similar qualitative result for NIM is obtained in Bikker and Vervliet (2017) for a sample of U.S. banks for the period 2001-2015. Urbschat (2018) finds that German banks with high deposit ratios face lower net interest income under a negative interest rate policy.

However, there is also evidence suggesting that low interest rates do not affect banks' NIM (Altavilla et al., 2018; Tan, 2019). Altavilla et al. (2018) carry out their analysis on quarterly data between Q1 2000 and Q2 2016 for an unbalanced sample of 288 European banks. They conclude that lower monetary policy rates and a flattening of the yield curve are not associated with lower net interest income if current and expected economic and financial conditions are controlled for. Tan (2019) finds that banks' NIMs are not affected by low interest rates, except for a subsample of banks that are relatively well-capitalized.

Second, our paper also contributes to the literature that considers the existence of internal capital markets as a determinant of the behavior of banks that belong to a banking group (Ashcraft, 2008). Banking group membership insulates banks to some extent from negative shocks to external financing as intra-bank flows prove to be an important means of affiliate funding (Campello, 2002; Cremers et al., 2011). Using U.S. data for the 1981Q4 to 1997Q2 period, Campello (2002) studies the response of small banks to monetary policy. The author finds that as the Fed tightens money supply, internal capital markets within large financial conglomerates reduce the sensitivity of loan growth to cash flows of constrained affiliates in comparison to stand-alone banks. In particular, small banks are insulated from Fed actions when they operate with large unconstrained banks in a conglomerate. Insulation from variations in local financing conditions also results when headquarters help smooth funding at the level of affiliates (Cremers et al., 2011).

Several papers document that multinational banks operate an internal capital market across national boundaries (De Haas and Van Lelyveld, 2010; Cetorelli and Goldberg, 2012a). Banking groups may try to minimize interest costs by channeling funds from the cheapest source to different parts of the group. The idea is that banks re-allocate capital among subsidiaries in reaction to real-economic shocks that give rise to changes in the profitability of lending in a country. Using quarterly information from U.S. banks for the period 1980-2006, Cetorelli and Goldberg (2012a) show that global banks make use of internal capital markets with their overseas affiliates, which insulate banks partially from changes in US liquidity conditions. De Haas and van Lelyveld (2010) find that subsidiaries with financially stronger parent banks are able to expand their lending faster and reduce their credit less in case of financial distress. Also, global banks may channel funds and capital from its subsidiaries when the default risk of the parent rises, generating a positive correlation between the parent's bank and foreign affiliates default risks (Anginer et al., 2014).

Finally, our work is related to literature examining the contribution of global banks to the international transmission of shocks. More specifically, it addresses the cross-border spillovers of monetary policy through banking groups.³ The work carried out by the International Banking Research Network, using individual bank-level data for different countries, provides evidence of the outward and inward transmission of conventional and unconventional monetary policies on bank lending (Buch et al., 2019). The evidence gathered supports the view that policies spill over internationally through banks and that cross-border positions, funding structures, and levels of capitalization are bank characteristics that matter most for the transmission.

Consistent with the idea of an internal capital market within banking groups, the evidence shows that the funds transferred from branches in other countries to parent banks insulates banking groups from monetary policy shocks. Cetorelli and Golberg (2012b) analyze the response of US banks to changes in monetary policy by testing whether cross-border internal flows within a banking group are associated with changes in U.S. monetary policy. Their results support the view that internal capital markets are in operation in

³ See Peek and Rosengren (1997) for an analysis of how Japanese banks insulated domestic firms from a domestic shock, with the international transmission of the shock to their affiliates in the United States.

banks with foreign offices, which contributes to the international propagation of shocks in U.S. policies. In the same vein, Bräuning and Ivashina (2020) present a framework where monetary policy in one country affects the loan supply of a global bank in all currencies, as in equilibrium, marginal returns on domestic and foreign lending have to be equal. They also find that there is a positive relationship between foreign reserve holdings and the interest rate differential on excess reserves between the host and the bank's home market.

Based on these strands of literature, we test four hypotheses:

H1. The level of interest rates in a country affects net interest margins of all banks operating in that country in a non-linear way: low interest rates have a stronger impact on net interest margins than high interest rates.

H2. The impact of (low) interest rates on banks' NIM is weaker for a bank that belongs to a banking group than for a stand-alone bank.

H3. The impact of (low) interest rates on banks' NIMs is weaker for a bank that belongs to an international group than for a bank that belongs to a local group.

H4. For international banking groups, the level of interest rates in the country where the HQ of the group is located will affect the net interest margin of a member bank operating in a different country.

3 Data

To examine the effect of (low) interest rates on the bank's NIM dependent upon the type of banking group, we construct a large dataset from various sources. Our final sample contains 7,555 banks from 31 OECD countries and covers a timespan between 1995 and 2018. In order to obtain a more homogeneous sample, we focus on a subset of the OECD members, from which we exclude banks operating in the U.S. in order to avoid overrepresentation as well as banks in five other OECD countries because of missing

data.⁴ However, our sample includes banks whose headquarters is located in these excluded countries.

Table 1 provides a complete list of the variables used in our analysis and their sources. The bank data is collected from Fitch Connect. Its frequency is annual and the data is at the unconsolidated level, in order to allow us to isolate the effect of a country's interest rates on banks' operations in that country. We restrict the sample to commercial banks, cooperative banks, savings banks and bank holding companies. We collect the interest rate data from the OECD database and the macroeconomic control variables from the IMF IFS database.

[Table 1 here]

Figure 1 illustrates the distribution of short-term interest rates within countries. We follow Claessens et al. (2018) and consider a country to be in a low interest rate environment when the interest rate is below 1.25. The boxplot is based on the standard inter-quartile range, median and whiskers represent 1.5 x the inter-quartile range. The countries are sorted according to observed median interest rates in our unbalanced panel over the period 1994-2018. The figure shows that there is both a large variation across countries but also within countries.

[Figure 1 here]

The data on the corporate structure of banks enables us to analyze whether the effect of the level of interest rates differs between stand-alone banks and those belonging to a banking group. We further distinguish affiliates that belong to a local banking group from those that belong to an international banking group. In summary, we identify the following cases:

- Stand-alone banks, which are banks that do not belong to a banking group.⁵
- Banks belonging to a group, which we classify, based on the locations of the bank and the group's HQ, as:

⁴ The excluded countries are Chile, Estonia, Hungary, Iceland and Turkey.

⁵ Note that we treat domestic members of a cooperative groups as stand-alone in our approach.

- Banks belonging to a local group: Subsidiary banks that are located in the same country as their ultimate parent.⁶
- Banks belonging to an international group: Subsidiary banks that are located in a different country than their ultimate parent.

Note that, for the purpose of our analysis, we go up to the highest banking entity (or ultimate banking parent) within the corporate structure. In other words, we do not consider non-financial companies or conglomerates as the ultimate parent of a group (e.g. the banking subsidiary of a car manufacturer is considered stand-alone). Following the corporate structure of the banks over time in such a large dataset is non-trivial, given the large numbers of corporate actions (including acquisitions, mergers and divestments) that have taken place over the last 25 years. When constructing our dataset, we rely on the corporate structure information from Claessens and van Horen (2015) as a starting point for data up until 2013. We completed the data retroactively between 2013 and 2018, by using information from Fitch, public sources and local expert knowledge from the different country teams. Further, we crosscheck this information with data from Bloomberg and Moody's as well as other public sources (e.g. banks' annual reports or websites).

[Figure 2 here]

As shown in Figure 2, stand-alone banks account for the largest share in our sample. However, the proportion of banking groups as a share of overall banks has consistently increased over the sample period. Within that category, the proportion of international groups has increased more strongly. Figure 3 shows the distribution of the corresponding international headquarters. The figure highlights that close to 75% of the banks belonging to an international group are headquartered in Western Europe and close to 60% in the euro area. Banks headquartered in North America account for around 14% of the sample (these headquarter banks are not included in the sample as we exclude U.S. banks).

[Figure 3 here]

⁶ This does not imply that a "local group" does not have foreign affiliates, but only refers to the fact that the banks classified in this category are located in the same country as their HQ.

Table 2 provides a full set of summary statistics. We have cleaned the banking data by excluding inconsistent observations from our dataset and winsorizing at the 1% level.⁷ There remains variability in the bank variables, as shown in Panel A. The mean return on assets (ROA) shows higher variability than the mean NIM. Among the asset-based (control) variables, we notice the high level and low variability of the deposit ratio (DEP), highlighting the preponderance of deposits as source of funding in our sample of banks. On the other hand, the larger variability of the securities (SEC) and liquidity (LIQ) ratios reflects differences in the asset (business) mix in our sample. Finally, we also observe high variation in banks' capital ratio (CAP).

[Table 2 here]

Panels B-D show mean tests for the banking variables. Panel B indicates that banks in a high-interest rate environment have higher NIMs and ROAs, are less reliant on deposits and have lower capital ratios than those in low-interest rate environments. Panel C compares stand-alone banks to those belonging to local groups. While there is no significant difference in terms of NIMs, banks in local groups tend to have a higher ROA. Panel D shows that the NIMs of stand-alone banks are higher while their ROAs are lower than those of banks in an international group. Panels C and D highlight that stand-alone banks tend to have higher deposit ratios and lower liquidity ratios (and are thus closer to the classical retail bank) than their peers belonging to (local or international) groups.

4 Empirical framework and results

In this section we discuss our empirical strategy, present the specifications used to test our main hypotheses and describe our findings. We first examine the relationship between net interest margins and (low) interest rates. Next, we propose a specification to test for the effect of banking group membership and discuss the results obtained. After that, we discuss the differential effects of belonging to a local banking group versus an international banking group. Finally, we study the sensitivity of an affiliate bank's net interest margin to the interest rates prevailing in the jurisdiction of the banking group's

⁷ For instance, we exclude cases where assets are below zero or when deposits are greater than liabilities.

headquarter and present some robustness checks. In the text, we only discuss the results for the variables of interest.

4.1 Interest rates and banking groups

Previous studies assumed that the level of interest rates in a country affects net interest margins of all banks operating in that country, whether or not they belong to a group. We postulate that the NIM of a bank that belongs to a group will be less affected by the interest rate in the country where the bank operates, as intragroup transfers take place to support affiliates that have been negatively hit. We also test the hypothesis that the mitigating effect of belonging to a group will be larger if the group's HQ is located in a different jurisdiction than that of the affiliate.

Our baseline specification to estimate the relationship between interest rates and banks' NIMs closely follows the model of Claessens et al. (2018), differing only in the use of lagged bank level data and the treatment of fixed effects.⁸ Specifically, our baseline regression is specified as:

$$y_{i,j,t} = \alpha_0 + \alpha_1 y_{i,j,t-1} + \alpha_2 3M\ rate_{j,t} + \alpha_3 Spread_{j,t} + \gamma_1 X_{i,j,t-1} + \gamma_2 Z_{j,t} + \zeta_t + \varepsilon_{i,j,t} \quad (1)$$

where $y_{i,j,t}$ is the net interest margin at time t for bank i operating in country j ($NIM_{i,j,t}$). $3M\ rate_{j,t}$ is the monetary policy rate of country j at time t and $Spread_{j,t}$ is the spread at time t in country j , i.e. the difference between the 10 year government bond rate and the three month policy rate. $X_{i,j,t-1}$ is a set of lagged bank-specific control variables at the level of affiliate i in country j and $Z_{j,t}$ are country level controls. ζ_t are time fixed effects. This specification allows us to establish the association between the local level of interest rates and banks' performance.

Next, we assess the role of a low interest rate environment. As before, we follow Claessens et al. (2018) and use the following empirical specification:

⁸ As we include several bank-specific controls and banks have undergone large changes during the sample period, we have decided not to include bank fixed effects. Table A1 in the online appendix presents estimation results of equations (1) and (2) using various fixed effects specifications. The point estimates are stable across all specifications and show that our results are not driven by the choice to only use time fixed effects.

$$y_{i,j,t} = \alpha_0 + \alpha_1 y_{i,j,t-1} + \alpha_2 3M\ rate_{j,t} + \alpha_3 Spread_{j,t} + \alpha_4 D.Low\ IR_{j,t} + \alpha_5 3M\ rate_{j,t} * D.Low\ IR_{j,t} + \alpha_6 Spread_{j,t} * D.Low\ IR_{j,t} + \gamma_1 X_{i,j,t} + \gamma_2 Z_{j,t} + \zeta_t + \varepsilon_{i,j,t} \quad (2)$$

where $D.Low\ IR_{j,t}$ is a dummy variable that takes value 1 if the country j where the bank is located is in a low interest rate environment (i.e. has an interest rate below 1.25%) at time t and zero otherwise.⁹

We first estimate equations (1) and (2) for the whole sample and then split the observations between banks that do not belong to a group (stand-alone banks) and those that belong to a banking group.

[Table 3 here]

Table 3 presents the estimation results for equation (1) in columns (1)-(3) and the estimation results for equation (2) in columns (4)-(6). The results are aligned with those in Claessens et al. (2018): lower interest rates are associated with a decrease in NIM. In particular, columns (1)-(3) imply that a decrease in the short-term interest rate of one percentage point lowers NIM for banks belonging to a group by around 1.8 and for stand-alone banks by around 3.3 basis points. Our findings also suggest that the same drop in short-term interest rates has a stronger effect in a low interest rate environment (columns (4)-(6)). Banks belonging to a banking group see their NIM decrease by around 6.4, while stand-alone banks face a decrease of around 12.5 basis points. These results provide evidence in support of hypotheses H1 and H2.

Although we include controls for domestic macroeconomic conditions and time fixed effects to control for common responses to global conditions, the possible endogeneity of monetary policy implies that our results may suffer from an endogeneity bias. Unfortunately, most approaches to deal with the endogeneity of monetary policy (like constructing a monetary policy shocks variable) cannot be applied to our large sample of countries. We follow one of the approaches suggested by Dell’Ariccia et al. (2017) to deal with monetary policy endogeneity. These authors focus on observations in U.S. states whose economic cycles exhibit a low correlation with the U.S. cycle, as economic conditions in these states are less likely to affect monetary policy. Inspired by this

⁹ Our modeling approach implies that, in essence, we are estimating a diff-in-diff model with countries that never fall below 1.25% (Mexico, Colombia, New Zealand, Australia, Poland, and Korea) acting as a control group (cf. Molyneux et al., 2019).

approach, we re-estimate our models for small countries in the European monetary union (Austria, Belgium, Finland, Ireland, Latvia, Lithuania, Luxembourg, the Netherlands, Slovakia, Slovenia, and Portugal). In view of their size, their weight in euro area inflation and economic growth is very small. In other words, ECB policy rates can be considered exogenous in these countries. Since these countries have the same short-term interest rate every year we cannot use time FE but we include bank FE. The results shown in Table 4 broadly confirm our findings reported in Table 3. In the remainder of our analysis, we therefore stick to our approach to consider changes in the interest rate as exogenous.

More specifically, the results in Table 4 suggest that the positive effect of interest rates on NIM is larger for stand-alone banks than for banks belonging to a group, in accordance with hypothesis H2, as the coefficient of interest rates are not statistically significant for banks belonging to a group. The non-linearity of the relationship between interest rates and NIM, postulated in hypothesis H1 is also confirmed.

[Table 4 here]

4.2 *The role of the location of the banking groups' headquarters*

To study the differential effects of belonging to a local banking group versus an international banking group (i.e., to test hypothesis H3), we further split the sample between banks belonging to an international group versus those belonging to a local group and estimate equations (1) and (2) again.

[Table 5 here]

Table 5 presents the estimation results. The point estimates in columns (1) and (2) suggest that belonging to an international banking group lowers the sensitivity of the affiliate's NIM to the level of short-term interest rates, in accordance with hypothesis H3. (Using small euro area countries gives the same outcome; results available on request). In fact, in contrast to the results for banks belonging to a local group, the coefficient α_2 is not significantly different from zero. Furthermore, the results in columns (3) and (4) indicate that the benefit of belonging to an international group appears to persist even in a low interest rate environment, which does not apply to affiliates belonging to a local banking group. Note that the low interest rate environment is determined based on the short-term interest rate in the country where the affiliate is located.

4.3 *The role of interest rates in the location of the banking group's headquarter*

Next, we assess the role of interest rates prevailing in the country where the banking group's headquarter is located. More precisely, we test hypothesis H4 by examining whether the affiliate's NIM is sensitive to the level of short-term interest rates prevailing in the headquarter's jurisdiction. To do so, we replace the local short-term interest by the short-term rate faced by the banking group's headquarter. We estimate equations (1) and (2) for the sample of banks that belong to an international group.

[Table 6 here]

The point estimates in column (1), which corresponds to column (2) in Table 5, imply that the affiliate's NIM is not sensitive to the level of interest rates prevailing in the jurisdiction of the group's headquarter. So, using either the local interest rate or the one prevailing in the headquarter's jurisdiction does not make any difference. In columns (2)-(4), we restrict the definition of the dummy variable *low*.¹⁰ The estimates suggest that if the banking group's headquarter is also in a low interest environment (i.e. the short-term interest rate is below 1.25%), then the benefits of banking group membership for the affiliate disappear. As follows from the test statistics shown in the lower part of the table, once the headquarter is in a low interest rate environment, the short-term interest rate affects the affiliate's NIM (see columns (2) and (4)). Therefore, our results confirm hypothesis H4, but only if the banking group's headquarter location is in a low interest rate environment.

5 **Robustness checks**

This section provides several analyses to evaluate the robustness of the results presented in the previous section.

The results shown in Table 3 focus on the sensitivity of net interest margins to the levels of short-term interest rates. In Table 7, we decompose NIMs into the interest income and

¹⁰ In column (2), the dummy *low* takes the value 1 if the bank group headquarters is in a low interest rate environment (i.e. has an interest rate below 1.25%) and zero otherwise. In column (3), the dummy *low* takes the value 1 if *only* the affiliate bank is in a low interest period and zero otherwise. In column (4), the dummy *low* takes the value 1 if *only* the bank group headquarter's is in a low interest rate environment and zero otherwise.

expense components (IIM and IEM, respectively). The results suggest that the increased sensitivity in banks' NIMs in a low interest rate environment stems from the interest income component, given that the interest rate sensitivity of IEM falls to near zero.

[Table 7 here]

In the remainder of this section, we augment equations (1) and (2) to avoid estimating them with sample splits. Equation (1) becomes:

$$y_{i,j,t} = \alpha_0 + \alpha_1 y_{i,j,t-1} + \alpha_2 3M\ rate_{j,t} + \alpha_3 Spread_{j,t} + \alpha_4 D.Group_{i,j,t} + \alpha_5 3M\ rate_{j,t} * D.Group_{i,j,t} + \alpha_6 Spread_{j,t} * D.Group_{i,j,t} + \gamma_1 X_{i,j,t} + \gamma_2 Z_{j,t} + \zeta_t + \varepsilon_{i,t} \quad (3)$$

and equation (2) becomes:

$$y_{i,j,t} = \alpha_0 + \alpha_1 y_{i,j,t-1} + \alpha_2 3M\ rate_{j,t} + \alpha_3 Spread_{j,t} + \alpha_4 D.Low\ IR_{j,t} + \alpha_5 3M\ rate_{j,t} * D.Low\ IR_{j,t} + \alpha_6 Spread_{j,t} * D.Low\ IR_{j,t} + \alpha_7 D.Group_{i,j,t} + \alpha_8 3M\ rate_{j,t} * D.Group_{i,j,t} + \alpha_9 Spread_{j,t} * D.Group_{i,j,t} + \alpha_{10} D.Low\ IR_{j,t} * D.Group_{i,j,t} + \alpha_{11} 3M\ rate_{j,t} * D.Low\ IR_{j,t} * D.Group_{i,j,t} + \alpha_{12} Spread_{j,t} * D.Low\ IR_{j,t} * D.Group_{i,j,t} + \gamma_1 X_{i,j,t} + \gamma_2 Z_{j,t} + \zeta_t + \varepsilon_{i,t} \quad (4)$$

where α_5 in equation (3) measures the differential sensitivity of NIMs to the level of short-term rates between stand-alone banks and those banks belonging to a banking group. In equation (4), α_{11} measures the differential sensitivity of NIMs in a low interest environment between stand-alone banks and those belonging to a banking group.

[Table 8 here]

Table 8 presents the results. In line with the results presented in Table 3, column (1) confirms that belonging to a banking group reduces a bank's NIM's interest rate sensitivity (α_5 is negative). In addition, column (2) shows that this result also holds in a low interest rate environment (α_{11} is negative). That is, in a low interest rate environment, a one percentage point decrease in the short-term interest rate is associated with a drop in the NIM of stand-alone banks by around 14 basis points, while the NIM of banks belonging to a banking group declines by only around 4.5 basis points.

To evaluate the robustness of the results presented in Table 5, we use regression equations (3) and (4) with different sample splits in order to compare the differential effects between: (i) local banking group banks vs. stand-alone banks, (ii) international banking group banks vs. stand-alone banks and (iii) international banking group banks vs. local banking group banks. Table 9 presents the results.

[Table 9 here]

The results confirm the conclusions from Table 5. That is, we find that banks belonging to an international banking group exhibit a lower NIM sensitivity to the level of short-term interest rates (columns (2) and (3)). Furthermore, columns (4) and (5) highlight that compared to stand-alone banks, banks belonging to a banking group (local or international) tend to exhibit less sensitivity NIMs in a low interest rate environment. Column (6) suggests that there is no tangible difference between banks belonging to a local versus an international banking group.

Table 10 presents regressions results based on the decomposition in NIMs in to IIM and IEMs for banks belonging to a group, distinguishing between local and international groups. Similar to the results in Table 7, we find that the interest rate sensitivity of the NIM of banks belonging to local banking groups stems from the interest income component. The interest rate insensitivity of the NIM of banks belonging to an international banking group appears to be the result of the interest income and interest expense components being equally sensitive.

[Table 10 here]

As shown in the data section, the NIM of banks belonging to an international group is lower than the one for stand-alone banks, and such difference could be driving the results for the lower sensitivity of international banks. Table A2 in the online appendix presents regression results of a difference-in-difference analysis, where stand-alone banks that transition to an international group are the treatment group while stand-alone banks correspond to the control group. The sample thus excludes banks that belong to a group for the whole period. We estimate the following equation, which is a simplified and modified version of equation (1), excluding control regressors:

$$y_{i,j,t} = \alpha_0 + \alpha_1 y_{i,j,t-1} + \alpha_2 3M\ rate_{j,t} + \alpha_3 D.Post\ Transition_{i,j,t} + \alpha_4 3M\ rate_{j,t} * D.Post\ Transition_{i,j,t} + \zeta_i + \varepsilon_{i,t} \quad (5)$$

where $y_{i,j,t}$ is the NIM of bank i operating in country j at time t ; $D.Post\ Transition$ is a dummy variable that takes value 1 for the bank i at time t from the time t it transitions to a group and 0 if it stays as a stand-alone bank. The results in Table A2 support the prediction that after the transition to an international group, the sensitivity of the bank to interest rates diminishes, as α_4 is negative.

6 Concluding comments

Using a very large sample of banks from 31 OECD countries over 1995–2018, this paper examines the impact of low interest rates on banks' net interest margins. This is a relevant issue: if the low-for-long policies of central banks reduce banks' net-interest margins thereby eroding banks' capital bases, this, in turn, may hamper monetary policy transmission and create a threat to financial stability.

Our results confirm the finding of previous studies that there is a positive relationship between interest rates and interest margins, which is stronger in a low-interest rate environment. However, for banks that belong to a banking group, we find that interest margins are less sensitive to the level of interest rates, in both low and high interest rate environments. Our results suggest that this mitigating effect is stronger for banks operating in another country than where the group's HQ is located.

Our findings matter for policy makers. Our results imply that the impact of monetary policy on banks' net interest margins is stronger for stand-alone banks. This is especially relevant for the European currency union as there are large differences in the share of stand-alone banks across member countries. Our findings imply that the impact of the ECB's monetary policy on banks net interest margins will be stronger felt in countries where most banks do not belong to a banking group. By contrast, where the share of banks belonging to an international group is large, the effect will be less dependent on the "domestic" monetary policy and more dependent on the monetary conditions of the headquarters' countries.

Our analysis focuses on the impact of low interest rates. An interesting avenue for future research would be to examine whether our results also hold for negative interest rate periods. Regarding internal support mechanisms, a further research question would be to consider the impact of the prevailing models of subsidiary support, based on information such as the preferred resolution strategy (e.g. multiple or single point of entry).

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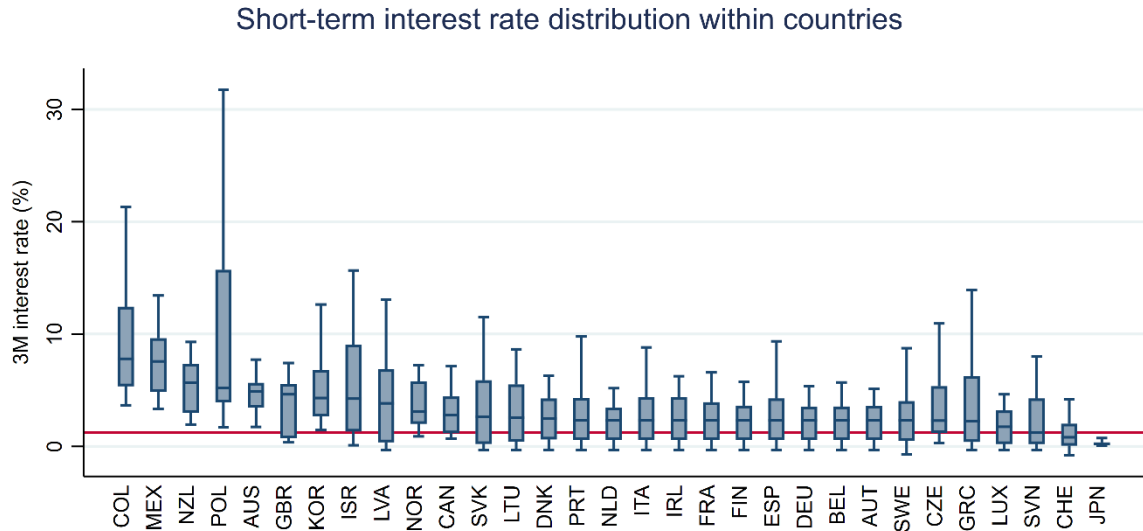
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Figure 1: Distribution of short-term interest rates

The figure presents for every year in the sample period a boxplot of short-term interest rate for all countries in the sample, showing the minimum, the maximum, the sample median, and the first and third quartiles. The red dashed line is the threshold used (1.25%), following Claessens et al. (2018) to define the low interest rate environment.



Source: OECD database.

Figure 2: Evolution of number of banks by group type

The figure presents for every year in the sample period the number of stand-alone banks, banks belonging to a local group, and banks belonging to an international group, as well as the share of banks belonging to a group (as % of the total number of banks) and the share of banks belonging to an international group (as share of the banks that are part of a group) (right-hand side scale).

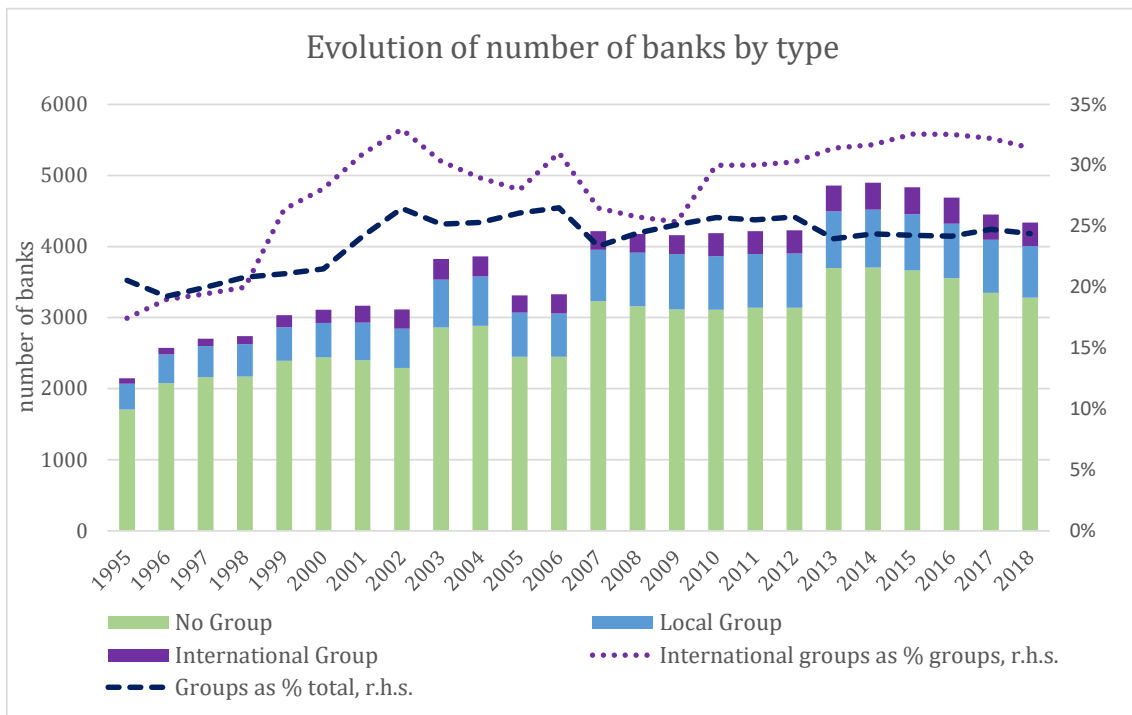


Figure 3: International groups' headquarters by country

The figure shows the number of banks that belong to an international group having their headquarters in a particular country in our sample.

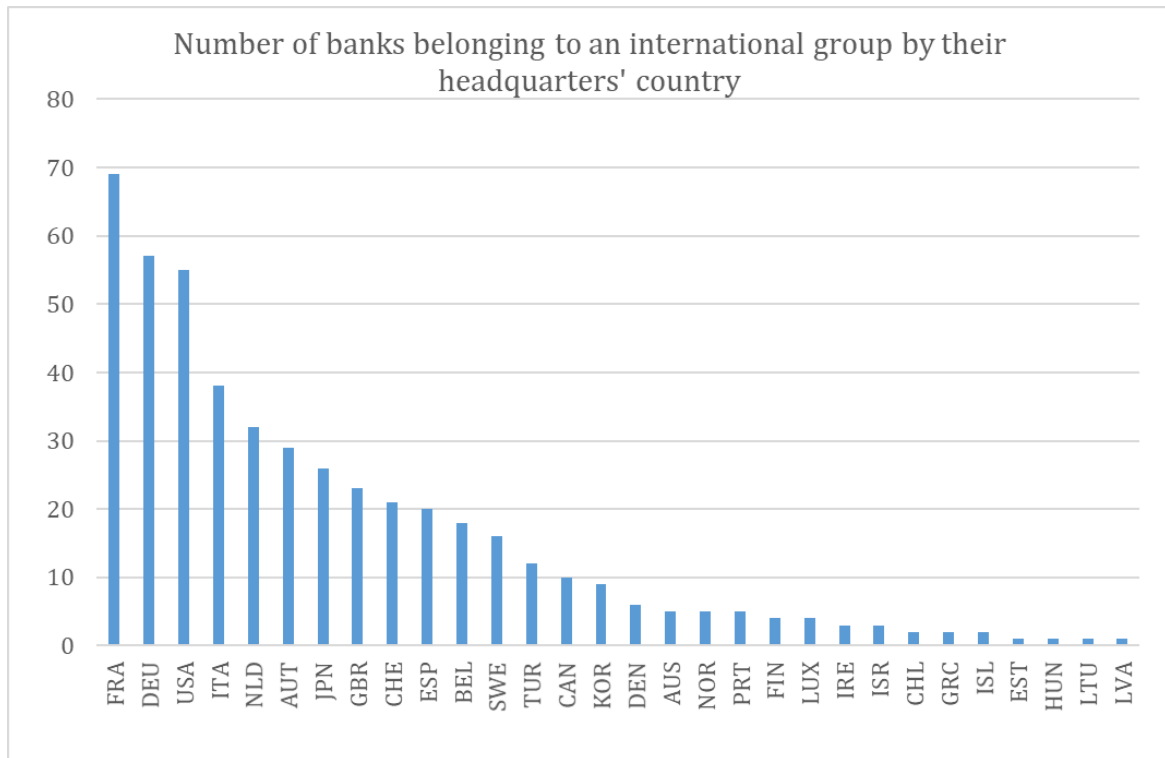


Table 1: Data description

Term	Definition	Data source
Panel A: dependent variable		
NIM	Net interest margin: net interest income for the year over average interest-earning assets	Fitch Connect
Panel B: interest rates		
3M rate	Short-term interest rates based on short-term money market rates where available	OECD
10Y rate	Long-term interest rates based on government bonds with a 10-year residual maturity	OECD
Spread	10Y rate - 3M rate	Author's calculations
Panel C: bank level controls		
DEP	Deposit ratio: total customer deposits over total liabilities	Fitch Connect
CAP	Capital ratio: equity over total assets	Fitch Connect
SEC	Securities ratio: other earning assets over total assets	Fitch Connect
LIQ	Liquidity ratio: liquid assets over total assets	Fitch Connect
Panel D: country level controls		
Inflation	Inflation based on average consumer prices	IMF International Financial Statistics (IFS)
GDP Growth	Yearly rate of GDP growth	IMF International Financial Statistics (IFS)

Table 2: Descriptive Statistics

Panel A presents the descriptive statistics for the main variables used in the analysis. See Table 1 for descriptions of all variables. The sample period is 1995 - 2018. The sample is an unbalanced panel that includes 7,555 banks with a total of 90,160 bank-year observations. Panels B-D show mean tests for the banking variables. Panel B tests whether these variables differ for all banks in the sample for periods with high and low interest rates. Panel C and D test whether these variables differ across stand-alone banks and banks belonging to a local and international banking group, respectively.

Panel A: Descriptives						
	nb obs	mean	p50	stdev	p10	p90
3M Rate	90160	1.914	1.391	1.951	-0.264	4.392
Spread	90160	1.249	1.097	1.067	0.138	2.318
3M Rate (parent bank)	4766	1.993	1.391	2.200	-0.264	4.634
Spread (parent bank)	4766	1.369	1.225	1.259	0.031	2.673
Net Interest Margin (NIM)	90160	2.418	2.320	1.240	1.150	3.600
Deposit Ratio (DEP)	90160	90.139	95.491	13.545	74.040	99.117
Capital Ratio (CAP)	90160	8.695	6.920	7.477	3.640	14.330
Securities Ratio (SEC)	90160	36.007	33.858	19.850	11.399	62.068
Liquid Assets Ratio (LIQ)	90160	26.544	16.760	32.028	5.470	57.150
GDP	90160	1.535	1.725	2.043	-0.201	3.815
Inflation	90160	1.445	1.445	1.101	0.130	2.699

Panel B: high (μ_1) vs low (μ_2) regime test						
	(μ_1)	(μ_2)	($\mu_1 - \mu_2$)	t-test	N_1	N_2
Net Interest Margin (NIM)	2.792	2.008	0.784	99.877	47103	43057
Deposit Ratio (DEP)	88.142	92.323	-4.181	-46.855	47103	43057
Capital Ratio (CAP)	8.340	9.084	-0.744	-14.940	47103	43057
Securities Ratio (SEC)	35.526	36.533	-1.007	-7.610	47103	43057
Liquid Assets Ratio (LIQ)	27.779	25.192	2.587	12.123	47103	43057

Panel C: Stand-alone banks (μ_1) vs local groups (μ_2) test						
	(μ_1)	(μ_2)	($\mu_1 - \mu_2$)	t-test	N_1	N_2
Net Interest Margin (NIM)	2.448	2.379	0.070	6.699	68406	15458
Deposit Ratio (DEP)	91.066	87.140	3.926	33.572	68406	15458
Capital Ratio (CAP)	8.362	8.342	0.020	0.337	68406	15458
Securities Ratio (SEC)	35.988	32.595	3.393	20.318	68406	15458
Liquid Assets Ratio (LIQ)	24.266	26.242	-1.977	-7.639	68406	15458

Panel D: Stand-alone banks (μ_1) vs international groups (μ_2) test						
	(μ_1)	(μ_2)	($\mu_1 - \mu_2$)	t-test	N_1	N_2
Net Interest Margin (NIM)	2.448	2.167	0.281	16.050	68406	4766
Deposit Ratio (DEP)	91.066	86.494	4.573	23.082	68406	4766
Capital Ratio (CAP)	8.362	11.563	-3.201	-29.681	68406	4766
Securities Ratio (SEC)	35.988	42.770	-6.782	-23.701	68406	4766
Liquid Assets Ratio (LIQ)	24.266	45.706	-21.440	-48.648	68406	4766

Table 3: NIM. Sensitivity to IR distinguishing between stand-alone banks and those belonging to a group

Table 3 reports the results of the estimation of equation (1) in columns (1) to (3) and of equation (2) in columns (4) to (6). They are obtained when all the sample is used (columns (1) and (4)), when only stand-alone banks are considered (columns (2) and (5)) or when banks belong to a group (columns (3) and (6)). The dependent variable is the Net Interest Margin. D.Low IR is a dummy variable that takes value 1 if the country is in a low interest period (below 1.25%) and zero otherwise. As additional bank control variables it includes the lagged value of NIM, the ratio of deposits over liabilities, equity over assets, securities over assets and liquid assets over assets. As macroeconomic control variables it includes GDP growth and inflation. Standard errors clustered by bank are reported in brackets. The bottom of columns (4) to (6) reports the null hypothesis that the coefficient for the low interest regime is zero. *, ** and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

Sample of Banks	INTEREST RATE EFFECT			WITH LOW INTEREST RATES UNDER COMMON THRESHOLD (1.25%)		
	(1)	(2)	(3)	(4)	(5)	(6)
	All	Stand-alone Banks	Group	All	Stand-alone Banks	Group
Lagged NIM	0.875*** [0.005]	0.870*** [0.007]	0.878*** [0.008]	0.873*** [0.006]	0.867*** [0.007]	0.877*** [0.008]
3M Rate	0.024*** [0.004]	0.033*** [0.004]	0.018*** [0.007]	0.025*** [0.005]	0.042*** [0.006]	0.015* [0.008]
3M Rate x D. Low IR				0.083*** [0.010]	0.081*** [0.012]	0.049*** [0.018]
Spread	0.019*** [0.003]	0.020*** [0.003]	0.020*** [0.006]	0.047*** [0.007]	0.076*** [0.009]	0.030*** [0.009]
Spread x D. Low IR				-0.051*** [0.007]	-0.082*** [0.008]	-0.024* [0.013]
D. Low IR				-0.009 [0.018]	0.038* [0.023]	-0.035 [0.030]
Lagged Deposits/Liabilities	0.002*** [0.000]	0.002*** [0.000]	0.002*** [0.000]	0.002*** [0.000]	0.002*** [0.000]	0.002*** [0.000]
Lagged Equity/Assets	0.003*** [0.001]	0.004*** [0.001]	0.002*** [0.001]	0.004*** [0.001]	0.005*** [0.001]	0.003*** [0.001]
Lagged Securities/Assets	-0.002*** [0.000]	-0.001*** [0.000]	-0.002*** [0.000]	-0.002*** [0.000]	-0.002*** [0.000]	-0.003*** [0.000]
Lagged Liquid Assets/Assets	-0.000*** [0.000]	-0.001*** [0.000]	-0.000 [0.000]	-0.000*** [0.000]	-0.001*** [0.000]	0.000 [0.000]
GDP Growth	-0.002 [0.002]	-0.006*** [0.002]	0.006* [0.003]	-0.003 [0.002]	-0.007*** [0.002]	0.006* [0.003]
Inflation	0.022*** [0.003]	0.021*** [0.003]	0.024*** [0.005]	0.014*** [0.003]	0.007** [0.003]	0.021*** [0.005]
Observations	90,160	68,406	21,743	90,160	68,406	21,743
R-squared	0.861	0.860	0.864	0.861	0.861	0.861
Bank FE	NO	NO	NO	NO	NO	NO
Time FE	YES	YES	YES	YES	YES	YES
Ho: $\beta_3[3M_Rate] + \beta_4[D.Low \times 3M_Rate] = 0$ for All IR+IR_low SE				0.108*** [0.0103]		
Ho: $\beta_3[3M_Rate] + \beta_4[D.Low \times 3M_Rate] = 0$ if D.Group=0 IR+IR_low SE					0.123*** [0.0126]	
Ho: $\beta_3[3M_Rate] + \beta_4[D.Low \times 3M_Rate] = 0$ if D.group=1 IR+IR_low SE						0.064*** [0.0184]

Table 4: Exogeneity of interest rates. Stand-alone and banks belonging to a group

Table 4 reports the same estimates as in Table 3 when the sample only includes banks located in small euro area countries, after they joined the euro, which include Finland, Ireland, Lithuania, Latvia, Slovakia, Slovenia, Belgium, Luxembourg, Austria, Portugal and the Netherlands.. The dependent variable is the Net Interest Margin. D.Low IR is a dummy variable that takes value 1 if the country is in a low interest period (below 1.25%) and zero otherwise. As additional bank control variables it includes the lagged value of NIM, the ratio of deposits over liabilities, equity over assets, securities over assets and liquid assets over assets. As macroeconomic control variables it includes GDP growth and inflation. Standard errors clustered by bank are reported in brackets. The bottom of columns (4) to (6) reports the null hypothesis that the coefficient for the low interest regime is zero . *, ** and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

Sample of Banks	INTEREST RATE EFFECT			WITH LOW INTEREST RATES UNDER COMMON THRESHOLD (1.25%)		
	(1) All	(2) Stand-alone Banks	(3) Group	(4) All	(5) Stand-alone Banks	(6) Group
Lagged NIM	0.485*** [0.060]	0.423*** [0.048]	0.522*** [0.093]	0.478*** [0.060]	0.406*** [0.046]	0.519*** [0.095]
3M Rate	0.085*** [0.011]	0.110*** [0.011]	0.067*** [0.016]	0.048*** [0.013]	0.125*** [0.023]	0.021 [0.017]
3M Rate x D. Low IR				0.106*** [0.041]	0.080* [0.043]	0.063 [0.070]
Spread	0.030*** [0.010]	0.068*** [0.013]	0.007 [0.013]	0.033* [0.019]	0.156*** [0.033]	-0.004 [0.021]
Spread x D. Low IR				-0.041** [0.018]	-0.157*** [0.032]	-0.001 [0.022]
D. Low IR				-0.114 [0.070]	0.164* [0.099]	-0.187* [0.099]
Lagged Deposits/Liabilities	0.002 [0.001]	0.003 [0.002]	0.001 [0.002]	0.002 [0.001]	0.003 [0.002]	0.001 [0.002]
Lagged Equity/Assets	0.015*** [0.004]	0.020** [0.008]	0.013** [0.005]	0.016*** [0.004]	0.022*** [0.008]	0.013** [0.006]
Lagged Securities/Assets	-0.003* [0.002]	-0.001 [0.002]	-0.003 [0.002]	-0.003* [0.002]	-0.002 [0.002]	-0.003 [0.002]
Lagged Liquid Assets/Assets	-0.001 [0.001]	-0.002 [0.001]	0.000 [0.001]	-0.001 [0.001]	-0.002 [0.001]	0.000 [0.001]
GDP Growth	0.012*** [0.004]	0.020*** [0.006]	0.012** [0.005]	0.011*** [0.004]	0.011* [0.006]	0.011** [0.005]
Inflation	-0.037*** [0.005]	-0.063*** [0.008]	-0.020** [0.008]	-0.042*** [0.006]	-0.057*** [0.007]	-0.030*** [0.009]
Observations	9,378	5,923	3,455	9,378	5,923	3,455
R-squared	0.854	0.853	0.852	0.856	0.856	0.853
Bank FE	YES	YES	YES	YES	YES	YES
Time FE	NO	NO	NO	NO	NO	NO
Ho: $\beta_{3M_Rate} + \beta_{D.Low \times 3M_Rate} = 0$ for All IR+IR_low SE				0.155*** [0.0349]		
Ho: $\beta_{3M_Rate} + \beta_{D.Low \times 3M_Rate} = 0$ if D.Group=0 IR+IR_low SE					0.205*** [0.0327]	
Ho: $\beta_{3M_Rate} + \beta_{D.Low \times 3M_Rate} = 0$ if D.group=1 IR+IR_low SE						0.0845 [0.0618]

Table 5: NIM - Sensitivity to IR for banks belonging to a banking group

Table 5 reports the results of the estimation of equation (1) in columns (1) and (2) for banks belonging to a local or an international group respectively, and of equation (2) in columns (3) and (4), also splitting the sample for banks belonging to a local or an international group. The dependent variable is the Net Interest Margin. Low is a dummy variable that takes value 1 if the country is in a low interest period (below 1.25%) and zero otherwise. As additional bank control variables it includes the lagged value of NIM, the ratio of deposits over liabilities, equity over assets, securities over assets and liquid assets over assets. As macroeconomic control variables it includes GDP growth and inflation. Standard errors clustered by bank are reported in brackets. The bottom of columns (3) and (4) reports the null hypothesis that the coefficient for the low interest regime is zero. *, ** and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

Sample of Banks	INTEREST RATE EFFECT		WITH LOW INTEREST RATES UNDER COMMON THRESHOLD (1.25%)	
	(1) LocalGroup	(2) InterGroup	(3) LocalGroup	(4) InterGroup
Lagged NIM	0.880*** [0.010]	0.878*** [0.017]	0.879*** [0.010]	0.875*** [0.017]
3M Rate	0.026*** [0.007]	0.001 [0.013]	0.027*** [0.008]	-0.010 [0.015]
3M Rate x D. Low IR			0.037** [0.018]	0.084 [0.058]
D. Low IR			-0.000 [0.028]	-0.094 [0.086]
Spread	0.024*** [0.006]	0.010 [0.015]	0.035*** [0.010]	0.027 [0.020]
Spread x D. Low IR			-0.023** [0.011]	-0.047 [0.036]
Lagged Deposits/Liabilities	0.002*** [0.001]	0.001 [0.001]	0.002*** [0.001]	0.001 [0.001]
Lagged Equity/Assets	0.003*** [0.001]	0.001 [0.002]	0.004*** [0.001]	0.001 [0.002]
Lagged Securities/Assets	-0.002*** [0.000]	-0.004*** [0.001]	-0.002*** [0.000]	-0.004*** [0.001]
Lagged Liquid Assets/Assets	-0.000 [0.000]	0.000 [0.001]	-0.000 [0.000]	0.000 [0.001]
GDP Growth	0.005 [0.003]	0.007 [0.006]	0.005 [0.003]	0.005 [0.006]
Inflation	0.025*** [0.005]	0.013 [0.010]	0.022*** [0.005]	0.012 [0.010]
Observations	15,458	4,766	15,458	4,766
R-squared	0.871	0.871	0.871	0.871
Bank FE	NO	NO	NO	NO
Time FE	YES	YES	YES	YES
Ho: $\beta_{[3M_Rate]} + \beta_{[D.Low IR \times 3M_Rate]} = 0$ if D.Group_Local=1			0.0643***	
IR+IR_low			[0.0193]	
SE				
Ho: $\beta_{[3M_Rate]} + \beta_{[D.Low IR \times 3M_Rate]} = 0$ if D.Group_International=1				0.0742
IR+IR_low				[0.0584]
SE				

Table 6: NIM - Sensitivity to parent's bank IR for banks belonging to an international banking group

Table 6 reports the results of the estimation of equation (1) in column (1) for banks belonging to an international group, and of equation (2) in columns (2) and (3), also for banks belonging to an international group. The dependent variable is the Net Interest Margin. The interest rate is the one prevailing in the parent's country. D.Low IR is a dummy variable that takes value 1 if the country of the parent's location is in a low interest period (below 1.25%) and zero otherwise in column (2). In column (3) the dummy low takes value 1 if the country where the affiliate is located is in a low interest period (below 1.25%), only when simultaneously the parent's location is not in a low regime. In column (4) the dummy takes value 1 if the low regime is in the parent's location, but not simultaneously in the affiliate's location. As additional bank control variables it includes the lagged value of NIM, the ratio of deposits over liabilities, equity over assets, securities over assets and liquid assets over assets. As macroeconomic control variables it includes GDP growth and inflation. Standard errors clustered by bank are reported in brackets. The bottom of columns (2) to (4) reports the null hypothesis that the coefficient for the low interest regime is zero. *, ** and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

	PARENT'S INTEREST RATE EFFECT	WITH LOW INTEREST RATES UNDER COMMON THRESHOLD (1.25%)		
	(1) InterGroup	(2) InterGroup	(3) InterGroup	(4) InterGroup
Sample of Banks	parent	parent	parent	parent
Interest rate	parent	parent	parent	parent
Low interest rate environment	no control	parent	only in home country	only in parent country
Lagged NIM	0.878*** [0.017]	0.878*** [0.017]	0.878*** [0.017]	0.876*** [0.017]
3M Rate	-0.000 [0.004]	0.007 [0.007]	0.001 [0.013]	0.005 [0.005]
3M Rate x D. Low IR		0.076* [0.046]	0.029 [0.064]	0.121* [0.072]
D. Low IR		0.076 [0.064]	0.029 [0.064]	0.121* [0.072]
Spread	0.015 [0.007]	0.015 [0.015]	0.009 [0.015]	0.000 [0.007]
Spread x D. Low IR		-0.030 [0.023]	-0.019 [0.035]	-0.044* [0.026]
Lagged Deposits/Liabilities	0.001 [0.001]	0.001 [0.001]	0.001 [0.001]	0.001 [0.001]
Lagged Equity/Assets	0.001 [0.002]	0.001 [0.002]	0.001 [0.002]	0.001 [0.002]
Lagged Securities/Assets	-0.004*** [0.001]	-0.004*** [0.001]	-0.004*** [0.001]	-0.004*** [0.001]
Lagged Liquid Assets/Assets	0.000 [0.001]	0.000 [0.001]	0.000 [0.001]	0.000 [0.001]
GDP Growth	0.007 [0.006]	0.007 [0.006]	0.007 [0.006]	0.005 [0.005]
Inflation	0.013 [0.011]	0.014 [0.011]	0.012 [0.010]	0.011 [0.011]
Observations	4,766	4,766	4,766	4,766
R-squared	0.871	0.871	0.871	0.871
Bank FE	NO	NO	NO	NO
Time FE	YES	YES	YES	YES
Ho: $\beta_{3M_Rate} + \beta_{D.Low IR \times 3M_Rate} = 0$ if				
IR+IR_low		0.0835*	0.0292	0.126*
SE		[0.0441]	[0.0660]	[0.0718]

Table 7. IIM and IEM: Sensitivity to IR distinguishing between stand-alone banks and those belonging to a group

Table 7 reports the results of the estimation of equation (1) in columns (1) to (6) for the whole sample (columns (1) and (4)), stand-alone banks (columns (2) and (5)) and banks belonging to a group (columns (3) and (6)), and of equation (4) in columns (7) to (12), also for the whole sample and splitting the sample for stand-alone banks and those belonging to a group. The dependent variable is the Interest Income Margin in columns (1) to (3) and (7) to (9), and Interest Expense Margin in columns (4), to (6) and (10) to (12). D.Low IR is a dummy variable that takes value 1 if the country is in a low interest period (below 1.25%) and zero otherwise. As additional bank control variables it includes the lagged value of the dependent variable, the ratio of deposits over liabilities, equity over assets, securities over assets and liquid assets over assets. As macroeconomic control variables it includes GDP growth and inflation. Standard errors clustered by bank are reported in brackets. The bottom of columns (7) to (12) reports the null hypothesis that the coefficient for the low interest regime is zero. *, ** and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

Dependent variable	INTEREST RATE EFFECT						WITH LOW INTEREST RATES UNDER COMMON THRESHOLD (1.25%)					
	IIM			IEM			IIM			IEM		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Sample of Banks	All	Stand-alone Banks	Group	All	Stand-alone Banks	Group	All	Stand-alone Banks	Group	All	Stand-alone Banks	Group
Lagged Dependent	0.826*** [0.009]	0.831*** [0.012]	0.822*** [0.013]	0.822*** [0.010]	0.829*** [0.013]	0.815*** [0.015]	0.825*** [0.009]	0.831*** [0.012]	0.822*** [0.013]	0.822*** [0.010]	0.831*** [0.013]	0.815*** [0.015]
3M Rate	0.157*** [0.010]	0.173*** [0.013]	0.137*** [0.015]	0.127*** [0.008]	0.136*** [0.010]	0.113*** [0.012]	0.155*** [0.011]	0.187*** [0.015]	0.130*** [0.017]	0.122*** [0.008]	0.139*** [0.010]	0.107*** [0.012]
3M Rate x D. Low IR							-0.004 [0.017]	-0.052** [0.020]	-0.053* [0.031]	-0.104*** [0.010]	-0.158*** [0.013]	-0.112*** [0.020]
Spread	0.023*** [0.006]	0.034*** [0.007]	0.017* [0.009]	-0.009** [0.004]	0.001 [0.005]	-0.016** [0.007]	0.054*** [0.011]	0.127*** [0.014]	0.015 [0.015]	-0.010 [0.007]	0.035*** [0.010]	-0.030*** [0.009]
Spread x D. Low IR							-0.053*** [0.011]	-0.130*** [0.014]	0.003 [0.017]	0.003 [0.007]	-0.044*** [0.010]	0.032*** [0.010]
D. Low IR							-0.006 [0.030]	0.117*** [0.038]	-0.043 [0.048]	-0.002 [0.019]	0.077*** [0.027]	-0.023 [0.031]
Lagged Deposits/Liabilities	0.001 [0.000]	0.001* [0.001]	0.001 [0.001]	-0.003*** [0.000]	-0.002*** [0.000]	-0.003*** [0.001]	0.001 [0.000]	0.001** [0.001]	0.001 [0.001]	-0.002*** [0.000]	-0.002*** [0.000]	-0.003*** [0.001]
Lagged Equity/Assets	0.004*** [0.001]	0.005*** [0.001]	0.002 [0.002]	0.001 [0.001]	0.002 [0.001]	-0.000 [0.001]	0.004*** [0.001]	0.005*** [0.001]	0.002 [0.002]	0.001 [0.001]	0.002 [0.001]	-0.000 [0.001]
Lagged Securities/Assets	-0.004*** [0.000]	-0.003*** [0.000]	-0.005*** [0.001]	-0.001*** [0.000]	-0.001*** [0.000]	-0.001 [0.001]	-0.004*** [0.000]	-0.003*** [0.000]	-0.005*** [0.001]	-0.001*** [0.000]	-0.001*** [0.000]	-0.001 [0.001]
Lagged Liquid Assets/Assets	-0.001*** [0.000]	-0.001*** [0.000]	-0.000 [0.000]	-0.001** [0.000]	-0.001** [0.000]	-0.001 [0.000]	-0.001*** [0.000]	-0.001*** [0.000]	-0.000 [0.000]	-0.001** [0.000]	-0.001** [0.000]	-0.001 [0.000]
GDP Growth	-0.015*** [0.003]	-0.015*** [0.004]	-0.011** [0.005]	-0.014*** [0.003]	-0.011*** [0.003]	-0.019*** [0.004]	-0.018*** [0.003]	-0.020*** [0.004]	-0.013*** [0.005]	-0.017*** [0.003]	-0.015*** [0.003]	-0.020*** [0.004]
Inflation	0.019*** [0.005]	0.001 [0.005]	0.039*** [0.008]	-0.010*** [0.004]	-0.029*** [0.004]	0.010 [0.008]	0.014*** [0.005]	-0.012** [0.006]	0.041*** [0.009]	-0.006 [0.004]	-0.027*** [0.004]	0.015** [0.008]
Observations	89,801	68,175	21,616	89,801	68,175	21,616	89,801	68,175	21,616	89,801	68,175	21,616
R-squared	0.889	0.911	0.854	0.883	0.903	0.847	0.889	0.912	0.854	0.883	0.904	0.847
Bank FE	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
Time FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Ho: $\beta_{3M_Rate} + \beta_{D.Low \times 3M_Rate} = 0$ for all IR+IR_low SE							0.151*** [0.0215]			0.0175 [0.0135]		
Ho: $\beta_{3M_Rate} + \beta_{D.Low \times 3M_Rate} = 0$ if D.Group=0 IR+IR_low SE								0.136*** [0.0276]			-0.0190 [0.0174]	
Ho: $\beta_{3M_Rate} + \beta_{D.Low \times 3M_Rate} = 0$ if D.Group=1 IR+IR_low SE									0.0772** [0.108]			-0.0044 [0.0226]

Table 8: NIM - Sensitivity to IR distinguishing between Stand Alone banks and those belonging to a group. No sample splits

Table 8 reports the results of the estimation of equation (3) in column (1) and of equation (4) in column (2). The dependent variable is the Net Interest Margin. The dummy variable Group takes value 1 if a bank belongs to a group. D.Low IR is a dummy variable that takes value 1 if the country is in a low interest period (below 1.25%) and zero otherwise. As additional bank control variables it includes the lagged value of NIM, the ratio of deposits over liabilities, equity over assets, securities over assets and liquid assets over assets. As macroeconomic control variables it includes GDP growth and inflation. Standard errors clustered by bank are reported in brackets. The bottom of each column reports the null hypothesis that the coefficient for banks belonging to a group is zero. *, ** and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

Sample of Banks	INTEREST RATES	LOW INTEREST RATE UNDER COMMON THRESHOLD (1.25%)
	(1) All	(2) All
Lagged NIM	0.875*** [0.006]	0.872*** [0.006]
3M Rate	0.028*** [0.003]	0.032*** [0.005]
3M Rate x D. Low IR		0.110*** [0.011]
3M Rate x D. Group	-0.007** [0.003]	-0.008 [0.006]
3M Rate x D. Low IR x D. Group		-0.088*** [0.016]
D. Low IR		0.063*** [0.007]
D. Group	0.009 [0.009]	-0.067*** [0.007]
D. Low IR x D. Group		-0.043 [0.028]
Spread	0.024*** [0.003]	-0.027*** [0.007]
Spread x D. Low IR		0.033*** [0.011]
Spread x D. Group	-0.011** [0.004]	0.017 [0.019]
Spread x D. Low IR x D. Group		0.040 [0.026]
Lagged Deposits/Liabilities	0.002*** [0.000]	0.002*** [0.000]
Lagged Equity/Assets	0.003*** [0.001]	0.004*** [0.001]
Lagged Securities/Assets	-0.002*** [0.000]	-0.002*** [0.000]
Lagged Liquid Assets/Assets	-0.000** [0.000]	-0.000*** [0.000]
GDP Growth	-0.001 [0.002]	-0.001 [0.002]
Inflation	0.022*** [0.003]	0.014*** [0.003]
Observations	90,160	90,160
R-squared	0.861	0.862
Bank FE	NO	NO
Time FE	YES	YES
Ho: $\beta_{3M_Rate} = \beta_{D.Group \times 3M_Rate} = 0$		
Coefficient	0.0214***	0.0239***
SE	[0.0045]	[0.0068]
Ho: $\beta_{3M_Rate} + \beta_{D.Low IR \times 3M_Rate} = 0$ if D.Group=0		
IR+IR_low		0.141***
SE		[0.0113]
Ho: $\beta_{3M_Rate} = \beta_{D.Low IR \times 3M_Rate} = 0$ if D.group=1		
IR+IR_low		0.0458***
SE		[0.0148]

Table 9: NIM - Sensitivity to IR for banks belonging to a banking group. No sample splits.

Table 9 reports the results of the estimation of equation (3) in columns (1) to (3) and of equation (4) in column (4) to (6), where the comparison is between stand alone banks and those belonging to a group, stand alone and those belonging to an international group and between international and local groups (LG), respectively. The dependent variable is the Net Interest Margin. The dummy variable Group takes value 1 if a bank belongs to a local group in columns (1) and (4) and zero otherwise, and takes value 1 if a bank belongs to an international group in columns (2), (3), (5) and (6). D.Low IR is a dummy variable that takes value 1 if the country is in a low interest period (below 1.25%) and zero otherwise. As additional bank control variables it includes the lagged value of NIM, the ratio of deposits over liabilities, equity over assets, securities over assets and liquid assets over assets. As macroeconomic control variables it includes GDP growth and inflation. Standard errors clustered by bank are reported in brackets. The bottom of each column reports the null hypothesis that the coefficient for banks belonging to a group is zero, that the coefficient of the low regime in zero for the group and the comparison population. *, ** and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

Sample of Banks	INTEREST RATES EFFECT			LOW INTEREST RATE UNDER COMMON THRESHOLD (1.25%)		
	(1)	(2)	(3)	(4)	(5)	(6)
	LocalGroup vs Stand-alone	InterGroup vs Stand-alone	InterGroup vs LocalGroup	LocalGroup vs Standalone	InterGroup vs Stand-alone	InterGroup vs LocalGroups
Lagged NIM	0.874*** [0.006]	0.874*** [0.007]	0.882*** [0.009]	0.871*** [0.006]	0.870*** [0.007]	0.880*** [0.009]
3M Rate	0.031*** [0.003]	0.030*** [0.004]	0.024*** [0.006]	0.035*** [0.005]	0.040*** [0.006]	0.029*** [0.008]
3M Rate x D. Low IR				0.102*** [0.011]	0.087*** [0.012]	0.034* [0.018]
3M Rate x D. Group (LG in cols 1 and 4)	-0.002 [0.003]	-0.023*** [0.007]	-0.018** [0.008]	0.004 [0.006]	-0.045*** [0.015]	-0.040*** [0.015]
3M Rate x D. Low IR x D. Group (LG in 4)				-0.093*** [0.016]	-0.029 [0.046]	0.052 [0.048]
D. Low IR				0.021 [0.020]	0.042* [0.022]	0.011 [0.027]
D. Group (LG in cols 1 and 4)	-0.004 [0.009]	0.042* [0.024]	0.036 [0.026]	-0.007 [0.025]	0.179*** [0.063]	0.144** [0.063]
D. Low IR x D. Group				-0.000 [0.027]	-0.166** [0.074]	-0.128* [0.074]
Spread	0.023*** [0.003]	0.022*** [0.003]	0.025*** [0.006]	0.064*** [0.007]	0.077*** [0.008]	0.040*** [0.009]
Spread x D. Low IR				-0.069*** [0.007]	-0.083*** [0.008]	-0.029*** [0.010]
Spread x D. Group (LG in cols 1 and 4)	-0.004 [0.005]	-0.023** [0.011]	-0.017 [0.012]	-0.017** [0.008]	-0.058*** [0.019]	-0.025 [0.019]
Spread x D. Low IR x D. Group (LG in 4)				0.030*** [0.009]	0.044 [0.034]	-0.000 [0.035]
Lagged Deposits/Liabilities	0.002*** [0.000]	0.002*** [0.000]	0.002*** [0.000]	0.002*** [0.000]	0.002*** [0.000]	0.002*** [0.000]
Lagged Equity/Assets	0.004*** [0.001]	0.004*** [0.001]	0.003** [0.001]	0.004*** [0.001]	0.004*** [0.001]	0.003*** [0.001]
Lagged Securities/Assets	-0.001*** [0.000]	-0.002*** [0.000]	-0.002*** [0.000]	-0.002*** [0.000]	-0.002*** [0.000]	-0.002*** [0.000]
Lagged Liquid Assets/Assets	-0.000*** [0.000]	-0.000*** [0.000]	-0.000 [0.000]	-0.000*** [0.000]	-0.000*** [0.000]	-0.000 [0.000]
GDP Growth	-0.003 [0.002]	-0.004* [0.002]	0.005* [0.003]	-0.003* [0.002]	-0.005** [0.002]	0.004 [0.003]
Inflation	0.021*** [0.003]	0.020*** [0.003]	0.023*** [0.005]	0.012*** [0.003]	0.008*** [0.003]	0.019*** [0.005]
Observations	83,874	73,182	20,224	83,874	73,182	20,224
R-squared	0.863	0.862	0.871	0.863	0.863	0.871
Bank FE	NO	NO	NO	NO	NO	NO
Time FE	YES	YES	YES	YES	YES	YES
Ho: $\beta_{[3M_Rate]} + \beta_{[D.Group \times 3M_Rate]} = 0$						
Coefficient		0.0291***	0.0291***	0.0398***	-0.00494	-0.0107
SE		[0.0042]	[0.0042]	[0.0064]	[0.0145]	[0.0140]
Ho: $\beta_{[3M_Rate]} + \beta_{[D.Low IR \times 3M_Rate]} = 0$ if D.Group=0						
IR+IR_low				0.137***	0.127***	
SE				[0.0113]	[0.0129]	
Ho: $\beta_{[3M_Rate]} + \beta_{[D.Low IR \times 3M_Rate]} = 0$ if D.Group_Local=1						
IR+IR_low				0.0488***		0.0636***
SE				[0.0151]		[0.0192]
Ho: $\beta_{[3M_Rate]} + \beta_{[D.Low IR \times 3M_Rate]} = 0$ if D.Group_International=1						
IR+IR_low					0.0532	0.0754*
SE					[0.0447]	[0.0464]

Table 10: Decomposing NIM into IIM and IEM - Sensitivity to IR for banks belonging to a banking group

Table 10 reports the results of the estimation of equation (1) in columns (1) to (4) for banks belonging to a local group (columns (1) and (3)) or an international group (columns (2) and (4)), and of equation (2) in columns (5) to (8), also splitting the sample for banks belonging to a local or an international group. The dependent variable is the Interest Income Margin in columns (1), (2), (5) and (6), and Interest Expense Margin in columns (3), (4), (7) and (8). D.Low IR is a dummy variable that takes value 1 if the country is in a low interest period (below 1.25%) and zero otherwise. As additional bank control variables it includes the lagged value of the dependent variable, the ratio of deposits over liabilities, equity over assets, securities over assets and liquid assets over assets. As macroeconomic control variables it includes GDP growth and inflation. Standard errors clustered by bank are reported in brackets. The bottom of columns (5) to (8) reports the null hypothesis that the coefficient for the low interest regime is zero. *, ** and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

Dependent variable	INTEREST RATE EFFECT				LOW INTEREST RATE UNDER COMMON THRESHOLD (1.25%)			
	IIM		IEM		IIM		IEM	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Sample of Banks	Local group	International Group	Local group	International Group	Local group	International Group	Local group	International Group
Lagged Dependent	0.840*** [0.016]	0.805*** [0.022]	0.847*** [0.017]	0.757*** [0.025]	0.841*** [0.016]	0.803*** [0.022]	0.847*** [0.017]	0.757*** [0.025]
3M Rate	0.157*** [0.018]	0.078*** [0.027]	0.127*** [0.014]	0.083*** [0.021]	0.158*** [0.019]	0.061** [0.029]	0.128*** [0.014]	0.076*** [0.023]
3M Rate x D. Low IR					-0.084*** [0.030]	-0.061 [0.099]	-0.130*** [0.020]	-0.148** [0.064]
D. Low IR					0.045 [0.045]	-0.088 [0.119]	0.062* [0.033]	-0.013 [0.075]
Spread	0.018* [0.010]	0.008 [0.020]	-0.016* [0.009]	-0.014 [0.014]	0.012 [0.016]	0.030 [0.032]	-0.031*** [0.011]	-0.014 [0.017]
Spread x D. Low					0.015 [0.016]	-0.058 [0.043]	0.034*** [0.012]	0.000 [0.021]
Lagged Deposits/Liabilities	0.002* [0.001]	-0.001 [0.002]	-0.003*** [0.001]	-0.005*** [0.002]	0.002 [0.001]	-0.001 [0.002]	-0.003*** [0.001]	-0.005*** [0.002]
Lagged Equity/Assets	0.002 [0.002]	0.000 [0.002]	-0.002 [0.002]	0.002 [0.002]	0.002 [0.002]	0.000 [0.002]	-0.002 [0.002]	0.002 [0.002]
Lagged Securities/Assets	-0.004*** [0.001]	-0.006*** [0.001]	-0.001 [0.001]	0.000 [0.001]	-0.004*** [0.001]	-0.006*** [0.001]	-0.001 [0.001]	0.000 [0.001]
Lagged Liquid Assets/Assets	-0.000 [0.001]	-0.001 [0.001]	-0.001 [0.001]	-0.002* [0.001]	-0.000 [0.001]	-0.001 [0.001]	-0.001 [0.001]	-0.002** [0.001]
GDP Growth	-0.025*** [0.006]	0.007 [0.009]	-0.034*** [0.005]	-0.003 [0.008]	-0.026*** [0.006]	0.003 [0.009]	-0.034*** [0.005]	-0.005 [0.008]
Inflation	0.023** [0.010]	0.037** [0.018]	-0.009 [0.009]	0.021 [0.016]	0.029*** [0.011]	0.038** [0.017]	0.000 [0.009]	0.024 [0.015]
Observations	15,364	4,753	15,364	4,753	15,364	4,753	15,364	4,753
R-squared	0.872	0.834	0.877	0.803	0.872	0.835	0.878	0.803
Bank FE	NO	NO	NO	NO	NO	NO	NO	NO
Time FE	YES	YES	YES	YES	YES	YES	YES	YES
Ho: $\beta_{[3M_Rate]} + \beta_{[D.Low IR \times 3M_Rate]} = 0$ if D.Group_Local=1					IR+IR_low		IR+IR_low	
					0.0746**		-0.00182	
					SE		SE	
					[0.0363]		[0.0238]	
Ho: $\beta_{[3M_Rate]} + \beta_{[D.Low IR \times 3M_Rate]} = 0$ if D.Group_International=1					IR+IR_low		IR+IR_low	
					0.00025		-0.0720	
					SE		SE	
					[0.108]		[0.0676]	

On line Appendix

Table A.1: NIM - Sensitivity to IR distinguishing between Stand Alone banks and those belonging to a group. Different FE.

Table A.1 reports a variation of Table 3 using different fixed effects. Columns (1) to (4) and (10) to (12) record the estimates obtained with only time fixed effects (FE); columns (5) to (8) and (13) to (15), with only bank FE and columns (9) to (12) and (16) to (18) with both time and bank fixed effects. It reports the results of the estimation of equation (1), obtained when all the sample is used (columns (1), (5), and (9)), when only stand-alone banks are considered (columns (2), (6) and (10)) or when banks belong to a group (columns (3), (7) and (11)). Columns (10) to (18) report the results of equation (2). The dependent variable is the Net Interest Margin. D.Low IR is a dummy variable that takes value 1 if the country is in a low interest period (below 1.25%) and zero otherwise. As additional bank control variables it includes the lagged value of NIM, the ratio of deposits over liabilities, equity over assets, securities over assets and liquid assets over assets. As macroeconomic control variables it includes GDP growth and inflation. Standard errors clustered by bank are reported in brackets. The bottom of each column reports the null hypothesis that the coefficient for banks belonging to a group is zero. *, ** and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

Sample of Banks	INTEREST RATE EFFECT									WITH LOW INTEREST RATES UNDER COMMON THRESHOLD (1.25%)								
	(1) All	(2) Stand Alone	(3) Group	(4) All	(5) Stand Alone	(6) Group	(7) All	(8) Stand Alone	(9) Group	(10) All	(11) Stand Alone	(12) Group	(13) All	(14) Stand Alone	(15) Group	(16) All	(17) Stand Alone	(18) Group
Lagged NIM	0.875*** [0.005]	0.870*** [0.007]	0.878*** [0.008]	0.602*** [0.014]	0.577*** [0.019]	0.626*** [0.021]	0.567*** [0.015]	0.527*** [0.023]	0.605*** [0.022]	0.873*** [0.006]	0.867*** [0.007]	0.877*** [0.008]	0.588*** [0.014]	0.554*** [0.020]	0.622*** [0.021]	0.564*** [0.016]	0.524*** [0.023]	0.604*** [0.022]
3M Rate	0.024*** [0.004]	0.033*** [0.004]	0.018*** [0.007]	0.076*** [0.004]	0.085*** [0.005]	0.064*** [0.006]	0.009* [0.005]	0.016*** [0.005]	0.000 [0.009]	0.025*** [0.005]	0.042*** [0.006]	0.015* [0.008]	0.074*** [0.004]	0.088*** [0.006]	0.057*** [0.007]	0.023*** [0.006]	0.047*** [0.008]	0.001 [0.010]
3M Rate x D.Low IR										0.083*** [0.010]	0.081*** [0.012]	0.049*** [0.018]	0.123*** [0.009]	0.146*** [0.010]	0.061*** [0.018]	0.098*** [0.013]	0.094*** [0.018]	0.055** [0.021]
Spread	0.019*** [0.003]	0.020*** [0.003]	0.020*** [0.006]	0.062*** [0.004]	0.076*** [0.004]	0.042*** [0.006]	-0.017*** [0.005]	-0.030*** [0.006]	-0.008 [0.008]	0.047*** [0.007]	0.076*** [0.009]	0.030*** [0.009]	0.091*** [0.005]	0.119*** [0.006]	0.053*** [0.008]	0.014* [0.007]	0.034*** [0.007]	-0.002 [0.010]
Spread x D. Low IR										-0.051*** [0.007]	-0.082*** [0.008]	-0.024* [0.013]	-0.102*** [0.007]	-0.135*** [0.008]	-0.048*** [0.012]	-0.060*** [0.008]	-0.099*** [0.009]	-0.015 [0.013]
D. low										-0.009 [0.018]	0.038* [0.023]	-0.035 [0.030]	0.070*** [0.014]	0.116*** [0.016]	-0.002 [0.028]	0.053** [0.022]	0.153*** [0.031]	-0.028 [0.035]
Lagged Deposits/Liabilities	0.002*** [0.000]	0.002*** [0.000]	0.002*** [0.000]	0.003*** [0.001]	0.003*** [0.001]	0.002** [0.001]	0.003*** [0.001]	0.003*** [0.001]	0.002** [0.001]	0.002*** [0.000]	0.002*** [0.000]	0.002*** [0.000]	0.003*** [0.001]	0.004*** [0.001]	0.002** [0.001]	0.003*** [0.001]	0.003*** [0.001]	0.002** [0.001]
Lagged Equity/Assets	0.003*** [0.001]	0.004*** [0.001]	0.002*** [0.001]	0.008*** [0.001]	0.011*** [0.002]	0.006*** [0.002]	0.011*** [0.001]	0.014*** [0.002]	0.007*** [0.002]	0.004*** [0.001]	0.005*** [0.001]	0.003*** [0.001]	0.009*** [0.001]	0.012*** [0.002]	0.006*** [0.002]	0.011*** [0.001]	0.014*** [0.002]	0.007*** [0.002]
Lagged Securities/Assets	-0.002*** [0.000]	-0.001*** [0.000]	-0.002*** [0.000]	-0.004*** [0.000]	-0.003*** [0.001]	-0.005*** [0.001]	-0.004*** [0.000]	-0.004*** [0.001]	-0.005*** [0.001]	-0.002*** [0.000]	-0.002*** [0.000]	-0.003*** [0.000]	-0.004*** [0.000]	-0.004*** [0.001]	-0.005*** [0.001]	-0.005*** [0.001]	-0.004*** [0.001]	-0.006*** [0.001]
Lagged Liquid Assets/Assets	-0.000*** [0.000]	-0.001*** [0.000]	-0.000 [0.000]	0.000* [0.000]	0.001** [0.000]	0.000 [0.000]	-0.000 [0.000]	-0.000 [0.000]	0.000 [0.000]	-0.000*** [0.000]	-0.001*** [0.000]	0.000 [0.000]	0.000 [0.000]	0.000 [0.000]	0.000 [0.000]	-0.000 [0.000]	-0.000 [0.000]	0.000 [0.000]
GDP Growth	-0.002 [0.002]	-0.006*** [0.002]	0.006* [0.003]	0.011*** [0.001]	0.006*** [0.001]	0.025*** [0.003]	0.006*** [0.002]	-0.004* [0.002]	0.015*** [0.004]	-0.003 [0.002]	-0.007*** [0.002]	0.006* [0.003]	0.013*** [0.001]	0.010*** [0.001]	0.024*** [0.003]	0.007*** [0.002]	-0.002 [0.002]	0.016*** [0.004]
Inflation	0.022*** [0.003]	0.021*** [0.003]	0.024*** [0.005]	0.004* [0.002]	0.004* [0.002]	0.001 [0.005]	0.028*** [0.003]	0.036*** [0.004]	0.020*** [0.005]	0.014*** [0.003]	0.007** [0.003]	0.021*** [0.005]	-0.004 [0.003]	-0.007*** [0.003]	-0.001 [0.005]	0.018*** [0.003]	0.018*** [0.004]	0.017*** [0.006]
Observations	90,160	68,406	21,743	90,160	68,406	21,743	90,160	68,406	21,743	90,160	68,406	21,743	90,160	68,406	21,743	90,160	68,406	21,743
R-squared	0.861	0.860	0.864	0.889	0.891	0.889	0.892	0.894	0.891	0.861	0.860	0.864	0.891	0.893	0.889	0.892	0.895	0.891
Bank FE	NO	NO	NO	YES	YES	YES	YES	YES	YES	NO	NO	NO	YES	YES	YES	YES	YES	YES
Time FE	YES	YES	YES	NO	NO	NO	YES	YES	YES	YES	YES	YES	NO	NO	NO	YES	YES	YES

Table A.2. The effect of transitioning from stand-alone to an international banking

Table A.2 reports the results from the estimation of equation (5), which is a simplified and modified version of equation (1), excluding control regressors. The variable Post transition takes the value 1 as soon as a stand-alone bank transitions into an international group status and zero otherwise. The dependent variable is the Net Interest Margin. Standard errors clustered by bank are reported in brackets. *, ** and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

Sample of banks	(1) Stand-alone vs. Transition to int. group
Lagged NIM	0.888*** [0.006]
3M Rate	0.033*** [0.003]
3M Rate x Post transition	-0.040* [0.021]
Post transition	0.084* [0.046]
Constant	0.149*** [0.013]
Observations	68,535
R-squared	0.858
Controls	NO
Bank FE	NO
Time FE	YES
Number of banks	6010
Number of transitioning banks	20