

# Adapting lending policies against a background of negative interest rates

Óscar Arce, Miguel García-Posada and Sergio Mayordomo

## **Abstract**

Since June 2014 the European Central Bank (ECB) has placed its deposit facility interest rate (DFR) at negative levels. Against this background, the question arises as to whether maintaining negative interest rates over a prolonged period can adversely affect credit institutions' net interest income and, ultimately, the supply of credit. Euro area banks' responses to the Bank Lending Survey (BLS) enable the banks to be classified into two groups, depending on whether their net interest income has been impaired or not by the negative rates ("affected" versus "unaffected" banks). The analysis in this article shows that the affected banks are generally not as well capitalised. This circumstance might have hindered these banks from taking on fresh risks under their lending policy in order to attempt to offset the adverse effect of the negative rates on their unit lending margins. Indeed, the banks most affected by negative interest rates tightened the terms and conditions on their loans to a greater extent than those unaffected, to optimise their risk-weighted assets and, therefore, their capital ratios. Lastly, the article shows there are no differences between both groups of banks as regards the total credit offered and that the credit supply has been adapted via loan terms and conditions and not through the total amount offered. This result suggests that the current level of the DFR (-0.4%) is not causing a contraction in the volume of credit supplied by the banks affected.

**Keywords:** negative interest rates; risk-taking; lending policies.

**JEL codes:** G21, E52, E58.

## ADAPTING LENDING POLICIES AGAINST A BACKGROUND OF NEGATIVE INTEREST RATES

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### Introduction

Following its Governing Council meeting on 5 June 2014, the ECB announced it was cutting the interest rate on the deposit facility (DFR) to -0.10%.<sup>1</sup> This reduction in the DFR, along with other measures, sought to stimulate a sustainable pick-up in inflation in the euro area as a whole to levels compatible with the ECB's price stability objective, namely inflation rates below but close to 2% in the medium term. The DFR underwent further reductions that placed it at -0.4% in March 2016, at which level it has since held (see Chart 1).

During this period, the decline in the DFR has fed through directly to other reference interest rates for bank transactions, such as the EONIA and the EURIBOR. Against this background, it has frequently been questioned whether maintaining negative interest rates for prolonged periods can have adverse effects on credit institutions' net interest margins and on their profitability, and, ultimately, on the volume and conditions of the lending offered by banks.

The recent literature proposes several channels through which negative interest rates may adversely affect banks' net interest margins. The first channel is related to banks' exposure to retail deposits and is based on the idea that banks do not fully pass through negative interest rates to the return on these deposits, given the possibility of their losing retail deposit customers. This is due to the capacity of the latter to store cash at what is, in principle, a moderate cost, without experiencing the direct effect of the negative interest rate (see Heider et al., 2017). The second channel is the direct cost banks assume with excess liquidity, obtaining a negative return on reserves (see Demiralp et al., 2017 and Basten and Mariathan, 2018). A third channel is that via bank capital, given that the adverse effect of negative interest rates on banks' net interest margins might particularly affect banks with low capital ratios, which may limit their capacity to assume additional risks with a view to attempting to increase their total profit volumes [see Brunnermeier and Koby (2017)].

Nonetheless, banks have some leeway to mitigate the effect of negative interest rates on their net interest income. Hence, faced with the contraction of their net interest margins, banks have several options: to increase the volume of credit to meet a greater demand for borrowing induced by lower interest rates; to reduce their financial and non-financial expenses; to widen the spreads associated with some loans; to increase commissions and to assume more risks, etc. Thus, with a view to estimating the effect of negative interest rates on banks' supply of credit and on interest margins, the channel through which this effect operates must be determined, also identifying the adjustment banks can make in their lending policies in response to the low interest rate environment.

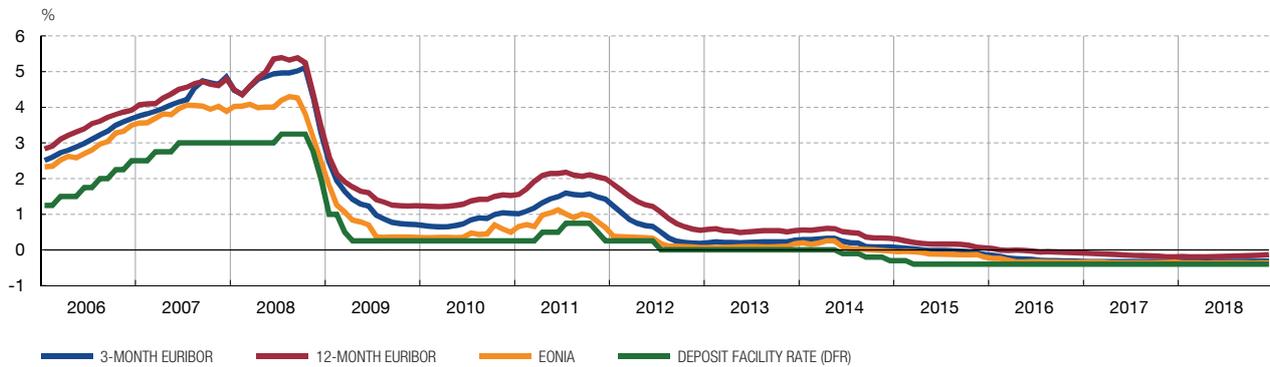
This article summarises the main findings of the recent empirical study by Arce et al. (2018) about the significance of the various channels through which negative interest rates may exert an adverse effect on net interest income within the euro area.<sup>2</sup> Also, motivated by the

<sup>1</sup> Prior to this cut, the DFR was reduced from 0.25% to 0% on 11 July 2012.

<sup>2</sup> See Arce et al. (2018).

The chart tracks the changes in the deposit facility rate (DFR), and the monthly averages of the EONIA, and the 3- and 12-month EURIBOR , for the period from January 2006 to December 2018.

POLICY AND REFERENCE INTEREST RATES



SOURCE: ECB.



possible changes made by banks in their lending policies in this setting, the authors analyse the impact of negative interest rates on the volume of lending offered by euro area banks, along with other aspects of credit supply, including the risk profile of their loans. Lastly, after documenting that the banks affected by negative interest rates incur fewer risks, they study whether these lending policies ultimately affect risk-weighted assets and bank capital ratios. This latter question is of particular significance, owing to the substantial increase in regulatory capital requirements during the period analysed.

The article does not, however, analyse the impact that negative interest rates have on the total net interest margin or bank profits. An analysis of this matter should take into account, inter alia, how a specific path of interest rates affects not only net interest margins, and the supply of credit (the focus of this paper), but also the demand for credit and, especially in the case of floating rate loan portfolios, the likelihood of losses on loans granted beforehand by the banks. The recent papers by Borio et al. (2017), Martínez (2017) and Banco de España (2017), among others, shed light on these latter aspects which are not covered in this article.

**The impact of negative interest rates, according to the characteristics of banks**

The following analysis is based on the replies to the Bank Lending Survey (BLS) and on the individual balance sheets (IBSI) of a sample of 122 banks, for 13 euro area countries over the period from 2014 Q2 to 2017 Q3.

One particular question in the BLS has expressly to do with the effect of negative interest rates on credit institutions’ net interest income. Specifically, banks are asked whether the negative interest rate on the deposit facility contributes to a reduction or to an increase in their net interest income. In total, in April 2016, 71% of the observations related to cases in which banks reported that their net interest income was impaired by negative interest rates. This percentage has gradually increased, rising to 74% in October 2017.

Table 1 shows the average characteristics of banks that report an adverse effect of negative interest rates on their net interest income (affected banks) and of those that report a zero or positive effect (unaffected banks), along with the difference between the averages of

The affected banks are those that indicate, in their replies to the Bank Lending Survey, an adverse impact of the negative deposit facility interest rate on their net interest income. The unaffected banks indicate a neutral or favourable impact. The sample analysed comprises 122 banks from 13 euro area countries in the period from 2014 Q2 to 2017 Q3.

Variable	Average: affected banks	Average: unaffected banks	Difference between averages	Significance (b)
Size (c)	10.69	10.67	0.02	
Capital ratio (d)	10.34	11.51	-1.17	***
Liquidity ratio (e)	8.75	6.92	1.83	***
Deposit ratio (f)	42.67	37.05	5.62	***
Recourse to the Eurosystem (g)	1.16	0.66	0.50	***
Excess liquidity (h)	2.63	1.68	0.96	***
Loan maturity (i)	60.13	58.32	1.81	**
Deposit maturity (j)	4.12	4.44	-0.33	

SOURCES: ECB and Banco de España.

a See Arce et al. (2018).

b \*\*\* significance at the 1% level, \*\* significance at the 5% level, \* significance at the 10% level.

c Logarithm of total assets.

d Capital and reserves relative to total assets, as a percentage.

e Cash, sovereign debt and Eurosystem deposits relative to total assets, as a percentage.

f Households' and non-financial corporations' deposits relative to total assets, as a percentage.

g Total borrowing from the Eurosystem relative to total assets, as a percentage.

h Excess liquidity (deposit facility + current account - minimum reserve requirements) relative to total assets, as a percentage.

i Weighted average of loan maturities.

j Weighted average of deposit maturities.

both groups.<sup>3</sup> Significantly, the affected banks have lower average capital ratios than the unaffected banks (10.3% and 11.5%, respectively).

One possible reason why the banks affected by negative interest rates have worse capital ratios is the following. After a reduction in the interest rate, the negative effect of lower net interest margins on banks' profits may be partly offset through the increase in the supply of loans. However, a scant level of capital entails a limit on the possible expansion of the credit supply [Brunnermeier and Koby (2017)]. When interest rates hold at very low levels for a prolonged period, and bank capital is scant and costly (two of the most prominent features of the European banking scene of recent years), this interest income-eroding mechanism operates with greater intensity, giving rise to a possible loop between low capital ratios and scant levels of margins, in which both factors feed back into one another through the foregoing mechanism.

Another notable feature, according to the figures in Table 1, is that affected banks have a greater proportion of deposits relative to total assets than unaffected banks (42.7% and 37.1%, respectively). That is consistent with the hypothesis in Heider et al. (2017), under which downward rigidities in the remuneration of deposits (specially retail deposits), when remuneration is close to zero, give rise to a contractionary effect of negative interest rates on the unit margin between the interest rate on loans and the remuneration of deposits.

<sup>3</sup> The classification of banks as affected and unaffected is updated every six months, depending on the bank's reply to the question on whether the negative DFR contributed to reducing its net interest income in the past half-year. This ad hoc question has been formulated twice a year since April 2016 and, given that the first question was several months after the date on which the DFR was placed in negative territory for the first time, the classification of banks for the June 2014-April 2016 period is based on the reply to the question formulated in April 2016. For this reason, several robustness analyses are conducted to show that this imputation method does not affect the consistency of our findings.

The chart shows the average quarterly growth of credit to non-financial corporations (NFCs) in the group of affected banks and in that of unaffected banks. Affected banks are those that report an adverse effect of negative interest rates on their net interest income, while unaffected banks are those that report a zero or positive effect.

QUARTERLY GROWTH OF CREDIT TO NON-FINANCIAL CORPORATIONS



SOURCES: ECB and Banco de España.



Finally, affected banks also have a higher percentage of excess liquidity (2.6% of total assets) than unaffected banks (1.7%), which is in line with the arguments set out by Demiralp et al. (2017) and Basten and Mariathasan (2018), about the additional cost incurred by those banks with excess liquidity in a context of negative interest rates.

### Negative rates and credit

Another question requiring clarification is the impact of negative interest rates on the supply of bank lending. The findings of the literature on this matter are not conclusive. While some empirical evidence sustains that negative interest rates stimulate bank lending [Demiralp et al. (2017); Rostagno et al. (2016)], other papers point to a moderate impact of a variable sign (Borio and Gambacorta, 2017), and more recent research even finds that negative interest rates have a contractionary effect on the supply of credit (Heider et al., 2017). Brunnermeier and Koby (2017), for their part, argue that below a certain interest rate (the so-called reversal rate), which is not necessarily zero, additional declines in the interest rate may reduce bank profitability and the build-up of capital through reinvested earnings, and, ultimately, restrict the supply of credit.

The findings in Arce et al. (2018) for the sample of European banks analysed suggest that there are no significant differences between the volume of credit offered by affected banks and that by unaffected banks. Chart 2, which depicts this result, shows the average quarterly growth rates of loans to non-financial corporations in these two groups of banks.<sup>4</sup> According to the logic of Brunnermeier and Koby (2017), this finding would therefore suggest that for the average euro area bank the “reversal rate” had not yet been reached.

Melding the BLS replies of the ten participating Spanish credit institutions with the information on loans from the Banco de España Central Credit Register (CCR) and with the information on bank balance sheets from supervisory returns, a similar analysis to the foregoing can be conducted, but with a greater degree of detail. The results of this analysis reveal similar findings to those encountered with the European sample. That is to say, there are no significant differences in the change in the supply of credit between affected and unaffected banks.

<sup>4</sup> Several multiple regression analyses conducted by Arce et al. (2018) confirm this result.

This table shows the effect of a negative DFR on several terms and conditions of loans extended to non-financial corporations (collateral, maturity, size and commissions) by those euro area banks whose net interest income was adversely affected by negative rates. The results are obtained from an ordered probit model in which the dependent variable indicates whether the terms and conditions are eased, remain unchanged or are tightened. The explanatory variable of interest in the analysis is a categorical variable that indicates whether the margins of a specific bank are affected or not by the negative DFR. Moreover, use is made of a series of controls relating to the bank and to the behaviour of non-financial corporations' demand for credit and country and time-fixed effects. The second column shows the effect and the sign of the negative rates on the same terms and conditions described in the first column, but confining the analysis sample to those banks that report themselves as feeling adversely affected by a negative DFR. The explanatory variable of interest in the second column is a categorical variable that is equal to one for banks with a low capital ratio and zero otherwise. A bank is considered to have a low capital ratio when its average is below the 25th percentile of the distribution of all the banks' capital ratios. The controls are the same as those used in the first column. The sample period used in both analyses is that from 2014 Q2 to 2017 Q3. The sign – (+) denotes a tightening (easing) of the related term or condition while the symbol NS indicates that the estimated effects are not statistically significant. The standard errors are robust to heteroskedasticity and clustered at the bank level.

	(1)	(2)
	Negative DFR	Low capital (Negative DFR)
Collateral	NS	NS
Maturity	–	–
Size	NS	NS
Commissions and fees	–	–
Controls (bank and demand)	Yes	Yes
Fixed country-time effect	Yes	Yes
Observations	1,511	899

SOURCES: ECB and Banco de España.

a See Arce et al. (2018).

### Level of bank capital and credit risk-taking

In line with the foregoing evidence, it is worth analysing whether the banks affected by the negative rates adapt their credit portfolio by extending less risky loans, i.e. with a shorter maturity and of a smaller size, and with greater collateral requirements, in order to improve their risk-weighted assets and, therefore, their regulatory capital ratio. Column 1 in Table 2 shows the adjustment made in the terms and conditions of loans by the banks affected by negative rates in comparison with those banks that report that they were not affected.<sup>5</sup> Specifically, the following terms and conditions are considered: average size of the loans, maturity, commissions applied and collateral or guarantees to be provided by the borrower. The results show that the banks affected tend to tighten loan terms and conditions through a reduction in average loan maturities and a greater level of commissions than unaffected banks. Also, the banks affected by negative interest rates show a decline in their level of risk tolerance in the segment of lending to non-financial corporations.

The results obtained for the sub-sample of Spanish banks are consistent with those obtained for the European sample as regards loan maturity and, moreover, they provide evidence on greater collateral requirements being set by the affected banks. It is also worth noting that, following the introduction of the negative interest rate on the deposit facility, in June 2014, the affected Spanish banks reduced their supply of loans aimed at companies with a higher risk profile and raised their supply to companies with a lower risk level, in both cases to a greater extent than unaffected banks did.

<sup>5</sup> The BLS enables banks to distinguish between whether the terms and conditions have been tightened/eased considerably or slightly. However, this article avoids the distinction between the degree of tightening/easing of these terms and conditions and simply considers whether they have been tightened, eased or have not been changed.

A further question relates to the effect that the degree of competition banks face in the credit markets in each country has on the intensity of banks' adjustment of loan terms and conditions, in the current setting of negative policy interest rates. The evidence analysed reveals that banks affected by negative interest rates tend to reduce the maturity and size of their loans and to increase the commissions associated with them only in those jurisdictions where there is a high degree of bank concentration.<sup>6</sup> On the contrary, there is no adjustment in the more competitive markets, probably to avoid the loss of customers and because of lower negotiating power with customers.<sup>7</sup>

The setting of negative interest rates by the ECB was against a background in which the regulatory authorities had appreciably increased bank capital requirements. It is thus to be expected that the availability of capital to banks plays a significant role when it comes to adapting their lending policies and risk-taking to the environment of negative interest rates. An analysis therefore follows of whether banks with worse capital ratios, among those who report themselves as affected by negative interest rates, assume fewer risks.

The results in column (2) of Table 2 confirm that the worst capitalised banks<sup>8</sup>, from among those affected by negative interest rates, are those that tighten loan terms and conditions by shortening the average maturity and applying higher commissions. This evidence confirms the hypothesis that the worst capitalised banks limit risk-taking, which may in turn reduce their net interest income and, therefore, their capacity to build up capital organically through the net interest margin. Hence these banks tend, on average, to try to offset lower net interest income by raising commissions.

The fact that negative rates limit some banks' capacity to build up capital organically entails a likewise negative effect on the net worth of these banks. Hence, a reduction in net worth that places a specific bank close to minimum capital requirements will restrict its capacity for new risk-taking to obtain higher profits. Normally, that will lead to a lower level of risk-weighted assets. Given that, as earlier stated, the optimisation of capital ratios was not accomplished by reducing the supply of credit, the adjustment of loan terms and conditions represents the main channel for the optimisation of credit-weighted assets. Indeed, a regression analysis based on the 2012-2017 period for the euro area confirms this hypothesis and shows that the ratio of risk-weighted assets to total assets falls by 2.7 pp more in affected than in unaffected banks, following the application of negative interest rates. The size of this effect is important, since this reduction accounts for 5.2% of the average ratio of risk-weighted assets during this period.

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<sup>6</sup> The degree of concentration is measured by the Herfindahl-Hirschman Index (HHI) and the country is considered to have a high degree of concentration if the HHI is above the median.

<sup>7</sup> Spain's degree of concentration is lower than that of the euro area average and is in line with the levels for the biggest economies in the area.

<sup>8</sup> Low-capital banks are those whose average capital ratio for the 2014 Q2-2017 Q3 period is lower than the 25th percentile of the distribution of capital ratios for the sub-sample of banks adversely affected by negative interest rates. The rest are high-capital banks.

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