The effect of the NIRP on bank lending and bank deposits

A study focused in Spain

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Master Thesis Financial Economics

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Abstract

This paper aims to investigate the impact of the negative interest rate policy (NIRP), implemented by the ECB in 2014, on Spanish banks and how it affected bank deposits and bank lending. Moreover, this paper investigates whether banks in Spain are able to charge higher fees and commissions, in order to substitute the negative deposit rates, and whether these banks started lending to riskier firms. It is shown that sounder banks are able to pass higher fees and commissions to their customers before and after 2014, thus no effect of the NIRP is found after testing the first hypothesis. No effect of the NIRP is observed when checking for the TLTRO of 2016 as well as when the sample is divided in high and low deposit ratio banks. Moreover, it is shown that sounder banks in Spain, are able to have higher deposit and loan growth YoY before and after 2014, thus once again no effect of the NIRP is observed in the results. The results remain robust when checking for the TLTRO of 2016 and when the high deposit ratio bank sample is tested. However, the results are not robust for low deposit ratio banks. It appears that before 2014 only higher excess liquidity ratio predicts higher deposit growth YoY and lower npl ratio predicts higher loan growth YoY. After 2014, it appears that only higher excess liquidity ratio predicts higher deposit growth YoY and higher excess liquidity ratio and higher npl ratio predict higher loan growth YoY. As a result, an effect of the NIRP is found for low deposit ratio banks in terms of a bank's loan growth YoY. Last, in the years following the implementation of the negative DFR by the ECB, when examining if banks in Spain started lending to riskier firms, it appears that banks with higher excess liquidity ratio and higher npl ratio the year before started lending to riskier firms the year after, but there is no zombie-lending, since all the coefficients are relatively small.

Table of Contents

1. Introduction

In 2009, the European sovereign debt crisis began following the financial crisis of 2007. Several European countries like Spain, Greece, Ireland, Portugal and Cyprus were unable to repay or refinance their government debt without the help of other eurozone members or the European Central Bank (ECB). In 2012, Spain applied for a rescue package of 100 billion euros from the European Stability Mechanism (ESM) in order to save its financial sector. As a result, several Spanish banks in 2012 had a downgrade on their credit rating and the negative impact on their financial statements was huge. Because of that, many Spanish banks merged together in order to survive the crisis.

In 2014, in order to increase the Eurozone's inflation rate to the target of 2 percent and help bank's lending to the real economy, Mario Draghi and the ECB announced a combination of monetary policy measures. These measures included the introduction of the negative deposit facility rate (negative DFR) and the targeted longer-term refinancing operations programs (TLTROs).

In June of 2014, ECB introduced for the first time the negative DFR decreasing it to –0.10%. Since then, the DFR has been decreased four times, with the latest decrease coming in September 2019 when the DFR decreased to -0.50%. The main goal of this measure was for banks to hold less excess liquidity and increase lending to the real economy.

The first series of the TLTROs was introduced together with the negative DFR in June of 2014. The TLTROs basically provided banks with financing with favorable conditions in order to increase lending to the economy. Since 2014, two more series of TLTROs have been introduced in March 2016 and March 2019. TLTRO II and TLTRO III have the similarity that the more loans a bank issued to non-financial corporations and households, the more favorable the interest rate would be.

Many papers on modern macroeconomics show that when the interest rates become negative, banks can't pass these negative rates on their deposits because deposits would become inferior to cash, thus the transmission mechanism of monetary policy would be impaired and the economy would enter in a liquidity trap. However, many recent papers show that mostly banks in sound Eurozone countries

are able to pass negative rates on their deposits, thus the transmission mechanism of monetary policy is not necessarily impaired when deposit rates go below the zero lower bound.

This paper investigates three main hypotheses and focuses in Spain. First, it investigates whether Spanish banks are able to pass negative rates on deposits in the form of fees and commissions. Second, it investigates which bank characteristics lead to higher deposits and higher lending. Last, it observes the immediate reaction of Spanish banks to the above-mentioned measures and if Spanish banks started lending to riskier firms because of these.

It is shown that, sound banks are able to charge higher fees and commissions to their customers before and after 2014, thus being able to offset the impact of the negative DFR and to safeguard their profitability. However, no effect of the NIRP is observed in the results since the same bank characteristics drive the results before and after 2014. Next, it is shown that banks in Spain with higher excess liquidity ratio, higher bank ROA and higher capital adequacy ratio in the previous year are able to have higher growth on deposits and loans YoY in the following year before and after 2014. Once again, no effect of the NIRP is found in the results. However, the results are not robust and which factors drive the results are examined in the section Further Robustness Checks. It is shown that there is an effect of the NIRP when the low deposit ratio bank sample is considered. Last, it is found that in the years following the implementation of the negative DFR by the ECB, banks in Spain with higher excess liquidity ratio and higher npl ratio started lending to riskier firms. However, it appears that there is no zombie-lending.

2. Related Literature

This paper contributes in the existing literature of negative policy rates by offering an empirical analysis of how banks of a stressed country like Spain transmit the negative policy rates to the real economy and what was their immediate reaction to the measures taken by the ECB in 2014. In this section, the main results of other papers focused on related subjects to this paper are illustrated.

Altavilla et al (2019), showed that banks are able to charge negative rates in their deposits, mainly corporations, as long as they are sound, thus the transmission mechanism of monetary policy is not necessarily impaired for these banks. In addition, this does not lead to banks experiencing a decrease in their deposits. Corporations on the other hand seem to decrease their liquid assets and increase their fixed assets.

Heider, Saidi and Schepens (2018) in their paper found that after the introduction of the negative policy rates by the ECB in 2014, banks with higher deposits decreased lending and started lending to riskier firms in the market of syndicated loans as compared to lower deposit banks. They conclude that since normally high-deposit banks are viewed as the banks that provide the most lending and negative policy rates might change the role of these banks and the supply of credit that they provide to the real economy.

On the other hand, Grandi and Guille (2020) showed that banks with higher reliance on deposits in France increased their lending and started lending in riskier and long-term assets. Specifically, this increase in lending is concentrated more in banks that are funded with household deposits and deposits that can be easily withdrawn. The explanation given for this result, is that these banks are trying to get high-yield assets to restore their previous lost profitability.

Eggertsson et al (2019) found that the negative rates have not been transmitted to aggregate deposit rates. In addition, they showed that banks in Sweden with high reliance on deposits were less likely to decrease their lending rates when policy rate cuts occurred after the deposit rate had reached its lower bound. In addition, these banks experienced lower credit growth when the deposit rate became unresponsive.

In their paper, Demiralp, Eisenschmidt and Vlassopoulos (2019), they investigated banks' reactions when the policy rates became negative. They found evidence that banks that were highly exposed to this policy started lending more. However, they illustrated that the difference between their results and other papers was mainly due to the explicit consideration of the role of excess liquidity in their analysis and the longer time span of their sample.

Acharya, Eisert, Eufinger and Hirsch (2018) examined the causes behind the credit crunch during the sovereign debt crisis in Europe and how it impacted European firms in terms of changes in corporate policies. They showed that after the European sovereign debt crisis the lending relationship between European firms and banks suffered. Thus, these firms became financially constrained resulting in lower sales growth rates, employment growth rates and lower levels of investment. They conclude that an effective bank recapitalization is needed in order for the economy in Europe to recover.

In their paper Bottero et al (2019) investigated the effects of the NIRP in Italy. It is found that the NIRP affected more banks with liquid balance-sheets than banks with higher retail deposits. Moreover, these banks rebalanced their portfolios from liquid assets to credit in more risky and smaller in size firms but also reduced loan rates, resulting in having substantial real effects.

Madaschi and Nuevo (2017) investigated the evolution of the profitability of banks in the countries of Sweden and Denmark in the context of negative interest rates. It is found that the profitability of these banks continued to increase during the negative interest rate period, thus showing that the transmission mechanism of monetary policy is not impaired for the banks of these two countries.

Acharya et al (2018) investigated the banks' reaction in Ireland due to the limits that were introduced in February 2015 on residential mortgages. It is shown that banks reallocated their credit from low-income to high-income borrowers. Moreover, banks that were highly exposed to the policy reduced their mortgage issuance to low-income borrowers and increased their mortgages to high-income borrowers. These measures were effective in reducing the growth of house prices in Ireland.

3. Hypothesis Development, Methodology & Data

3.1 Hypothesis Development

In the sovereign crisis of 2009, stressed countries like Spain, Greece, Cyprus, Italy, Portugal and others were unable to refinance their outstanding debt. Because of that, the credit worthiness of these countries deteriorated, thus the price of their sovereign bonds vastly decreased. As a result, banks in stressed countries had a huge negative shock in their financial statements. In addition, many borrowers were unable to repay their loans because of the crisis. However, the results of this crisis in non-stressed countries were the exact opposite since these countries were considered as financially stable.

From 2012 to 2016 many central banks in the euro area reduced their policy rates below zero for the first time. In particular, ECB reduced the DFR to negative numbers for the first time in June 2014 from 0% to -0.10%. Four more reductions have happened since then, with the latest coming in September 2019 from -0.40% to -0.50%. The DFR is the rate that banks can use to make overnight deposits within the ECB. In addition, ECB in March of 2015 created the Assets Purchases Programme (APP) in order to increase banks' liquidity. APP is a refinancing operation for banks in order to support the monetary transmission mechanism and create price stability. The latest APP was introduced in March 2020 until the end of the year.

In general, when the DFR is positive and ECB lowers the DFR, banks will lower their deposit rates. This way, banks are able to reduce their funding cost and increase their net worth. However, when the ECB lowered the DFR below zero this doesn't seem to be the case. Figures 2 and 3 show that Spanish banks are reluctant to pass negative deposit rates to their deposits. This is based on the zero-nominal return on cash. For example, if banks reduced their deposit rates below zero, then the depositors can withdraw their money from the bank and hold cash since cash would be superior to deposits.

This paper investigates three main hypotheses based on the above incidents. First, it investigates which banks in Spain are able to pass higher fees and commissions throughout the period of 2013 to 2019 in order to get a significant relief from the

negative DFR imposed by the ECB. This is accomplished by taking each bank's fees and commissions ratio as dependent variable and using different bank characteristics as independent variables. All the independent variables are lagged 1 year instead of the same year in order to reduce any endogeneity concerns.

Second, it investigates which banks in Spain are able to increase their deposits and loans throughout the same period. To investigate this hypothesis, deposit growth and loan growth are used as dependent variables and different bank characteristics are used as independent variables. Again, all the independent variables all lagged 1 year to reduce endogeneity. This way, it can be observed which bank characteristics predict deposit and loan growth before and after 2014.

Last, this paper observes the immediate reaction of Spanish banks to the implementation of the negative DFR by the ECB, in order to see if and which Spanish banks started lending to riskier companies, in order to have lower funding cost, and if so to check if zombie-lending exists. To accomplish that, five different firm financial ratios are used as risk measures. These risk measures are used as dependent variables while 1 year lagged different bank characteristics are used as independent variables in order to observe which banks lend to riskier firms.

3.2 Methodology

To test the above-mentioned hypotheses, a panel data methodology is used. The baseline specification is the following:

$$y_{i,t} = \beta_1 \times Excess\ Liquidity_{i,t-1} + \beta_2 \times Excess\ Liquidity_i \times After2014_{t-1} + \beta_3 \times X_{i,t-1} + \delta_t + \eta_i + \varepsilon_{i,t} \quad (1)$$

For the first hypothesis, $y_{i,t}$ represents the fees and commissions ratio of a bank i at the time t. For the second hypothesis, $y_{i,t}$ represents the deposit and loan growth of bank i at time t. For the third hypothesis, $y_{i,t}$ represents different financial ratios from firms that bank i lends at time t. Excess liquidity ratio is the main explanatory variable and is calculated by dividing the excess liquidity of bank i at time t-1 to its total assets at time t-1. After 2014 is a dummy variable that takes the value

0 before 2014 and the value 1 after 2014. $X_{i,t-1}$ represents different bank characteristics before and after 2014 while δ_τ denotes for time fixed effects and η_ι denotes for bank fixed effects. Last, $\varepsilon_{i,t}$ represents the standard errors of the regressions. In all hypotheses standard errors are clustered at the bank level in order to adjust the results from serial correlation.

To test the robustness of the results of the first two hypotheses, two actions are taken. First, a dummy variable After2016 is used in order to see if the results stay the same after the introduction of the second TLTRO in 2016. To examine this possibility, the following regression is estimated:

$$y_{i,t} = \beta_1 \times Excess\ Liquidity_{i,t-1} + \beta_2 \times Excess\ Liquidity_i \times After2016_{t-1} + \beta_3 \times X_{i,t-1} + \delta_t + \eta_i + \varepsilon_{i,t} \quad (2)$$

where the dummy variable After2016 replaces the dummy variable After2014 of the baseline specification and $X_{i,t-1}$ represents different bank characteristics before and after 2016.

Second, the bank data are split in high-dependent and low-dependent banks on deposits, based on their deposit ratios and a threshold of 89%, in order to observe if a group of banks drives the results. The baseline specification stays the same, however two regressions are calculated to check each result, one for the high deposit ratio banks and one for the low deposit ratio banks.

3.3 Data

In this paper, two main datasets are constructed. The first dataset contains different financial ratios from 154 banks in Spain for the period of 2013 to 2019. The second dataset contains financial ratios from firms that got loans from 129 of the above-mentioned banks during the period of 2013 to 2016. Table 1 presents and explains the variables used to construct the first dataset, while Table 2 presents and identifies the variables used to construct the second dataset. Both datasets are collected from Amadeus Bureau Van Dijk.

Table 1

Banks	
Variable Name	**Description**
Deposit ratio	Total deposits divided by total liabilities
NPL ratio	Impaired loans divided by total loans
Bank ROA	Ratio of net income divided by total assets
Excess liquidity	Ratio of excess liquidity over total assets
Fees and commissions ratio	Fees and commissions divided by total deposits
Loan growth	Growth of loans
Deposit growth	Growth of deposits
After 2014	Control variable equal to 1 when year is after 2014
Capital adequacy ratio	Total capital divided by risk weighted assets

Table 2

Firms	
Variable Name	**Description**
2-year logged ROA volatility	2-year logged standard deviation of ROA
Profit margin average	Average of net profit divided by revenue
Current ratio average	Average of current assets divided by current liabilities
Liquidity ratio average	Average of cash and receivables divided by current liabilities
Solvency ratio average	Average of total debt divided by total equity
After 2014	Control variable equal to 1 when year is after 2014

In Panel A of Table 3, the descriptive statistics of the first dataset are observed while on Panel B of Table 3, the descriptive statistics of the second dataset are presented. Both datasets are winsorized at 95%.

Table 3

Panel A

Banks					
Variable Name	**Obs**	**Mean**	**St.Dev**	**Min**	**Max**
Deposit ratio	1078	0.763	0.286	0.034	0.976
NPL ratio	1078	0.148	0.080	0.011	0.216
Bank ROA	1078	0.929	1.031	-0.181	2.644
Excess liquidity	1078	0.132	0.143	0.002	0.343
Fees and commissions ratio	1078	0.072	0.102	0.001	0.237
Loan growth	1078	0.209	0.274	-0.266	0.536
Deposit growth	1078	0.170	0.231	-0.321	0.438
Capital adequacy ratio	1078	0.384	0.160	0.047	0.495

Panel B

Firms					
Variable Name	**Obs**	**Mean**	**St.Dev**	**Min**	**Max**
ROA	473673	0.032	0.072	-0.110	0.207
Profit margin	447250	0.031	0.092	-0.174	0.264
Current ratio	466566	2.421	2.356	0.42	9.95
Liquidity ratio	466553	1.795	1.887	0.16	7.75
Solvency ratio	474477	0.452	0.278	0.017	0.942

For the robustness checks, the bank data are split in high deposit ratio banks and low-deposit ratio banks with 70 and 84 banks respectively.

4. Results

4.1 Transmission Mechanism of Negative Deposit Rates

Figure 2 shows the evolution of the deposit facility rate (DFR) offered by ECB from 2010 to 2020. The first time that ECB implemented the negative DFR policy was in June 2014 and the DFR introduced was -0.10%. Since then, ECB cut off the DFR four times more. The first decrease came in September 2014 from -0.10% to -0.20%, the second in December 2015 from -0.20% to -0.30%, the third in March 2016 from -0.30% to -0.40% and the last in September 2019 from -0.40 to -0.50%.

Figures 3 and 5 describe the evolution of the deposit rates that Spanish banks offer to corporations on overnight deposits and deposits with maturities up to 1 year from 2000 to 2020. The deposit rate on overnight deposits from corporations is positive throughout the entire period. However, Spanish banks are able to pass negative rates to corporation deposits with maturities up to 1 year from early 2019. Moreover, as it is shown in the paper by Altavilla et al (2019) sound banks from non-stressed countries have been able to pass negative deposit rates as early as in 2014.

Figures 4 and 6 show the evolution of the deposit rates that Spanish banks offer to households on overnight deposits and deposits with maturities up to 1 year from 2000 to 2020. It is shown that both deposit rates remained positive throughout the entirety of this period and close to zero from 2016. This is in line with the fact that households have way lower deposits than corporations and can take the money away from the banks easier than corporations. In addition, when banks offer negative deposit rates, deposits become inferior to cash, thus making it difficult for banks to offer negative deposit rates to households that can hold cash easily. As a result, since 2014 more and more banks are charging fees and commissions instead of offering negative deposit rates.

As it is indicated in the paper from Altavilla et al (2019) bank health is a crucial factor for the transmission of monetary policy. Spanish banks in 2014 were still recovering from the financial crisis of 2009, thus had no leverage to charge negative deposit rates. Spanish banks started offering negative deposit rates in 2019, thus

showing that the transmission mechanism of monetary policy is not impaired, at least for sound banks.

Figures 7 to 10 indicate the evolution of loan rates that Spanish banks offer to corporations and households (only home purchase loans) for new loans and for loans with maturity over 5 years. From 2014 a steady decrease in loan rates appears to happen for all loans to both households and corporations. However, it is displayed that the loan rates for loans to households (for house purchase) with maturity over five years are way lower than the loan rates for loans to corporations with the same maturity.

4.2 Can Fees and Commissions substitute deposit rates?

Table 4 investigates the hypothesis that higher fees can substitute deposit rates. Fees and commissions ratio is used as the dependent variable, while different bank characteristics (Excess liquidity ratio, Bank ROA, Npl ratio, Deposit ratio, Capital adequacy ratio) are used as independent variables, all lagged 1 year. In addition, a dummy variable (After 2014) is used to take into account the period after 2014, while time and bank level fixed-effects are used in the regressions accordingly.

In column (1), the independent variables used are the lagged excess liquidity ratio before and after 2014. It is shown that before and after 2014, banks with higher excess liquidity ratio in the previous year, have higher fees and commissions ratio in the following year. This shows that there is not an effect of the NIRP, as far as excess liquidity is concerned, since the results indicate that this is a continuation of a trend, rather than an effect of the NIRP implemented by the ECB in 2014. Both variables are statistically significant at 1%.

In column (2), 1 year lagged independent variables bank ROA and npl ratio before 2014 are added. The results before and after 2014 are the same as in column (1). In column (3), lagged independent variables deposit ratio and capital adequacy ratio are added. It appears that before 2014, banks that in the previous year have higher excess liquidity ratio, higher deposit ratio and lower capital adequacy ratio are able to have higher fees and commissions ratio in the next year. In addition, after 2014

once again banks that have higher excess liquidity ratio in the previous year are able to charge higher fees and commissions the year after. The lagged independent variables npl ratio and bank ROA are statistically insignificant, while all the other variables are statistically significant at 1%.

In column (4), the lagged independent variables taken into account are excess liquidity ratio, bank ROA and npl ratio before and after 2014. Before and after 2014, it is shown that banks with higher excess liquidity ratio in the previous year have higher fees and commissions ratio the next year. Moreover, after 2014 it appears that banks with higher bank ROA the year before are able to charge higher fees the year after. The lagged independent variables excess liquidity ratio and bank ROA*(After2014) are statistically significant at 1% while the lagged independent variables npl ratio before and after 2014, as well as bank ROA before 2014 are statistically insignificant.

In column (5), all lagged independent variables are taken into consideration before and after 2014. The results for the period before 2014 are similar to the results of column (4) with the exception of the lagged independent variable capital adequacy ratio before 2014 which becomes statistically insignificant. For the period after 2014, it appears that banks with higher excess liquidity, higher ROA and higher capital adequacy ratio in the previous year tend to have higher fees and commissions ratio in the following year. The rest lagged independent variables are all statistically insignificant.

In recent bibliography, banks with higher excess liquidity charge higher fees after 2014. The above-mentioned results are in line with the results of recent bibliography. However, it appears that there is not an effect of the NIRP since banks in Spain with higher excess liquidity were able to charge higher fees and commissions to their customers before 2014 as well. In addition, before 2014, higher deposit ratio and lower capital adequacy ratio are able to predict higher fees and commissions ratio. However, it appears that after 2014, banks that have higher bank ROA and capital adequacy ratio the year before are able to have higher fees and commissions ratio the year after. This makes sense since banks with higher ROA and higher capital adequacy ratio were considered as the “safest” options by the customers in a stressed

country like Spain after 2014. As a result, these banks were able to safeguard their profitability after the policy rates turned negative and were able to offset in some extent the negative impact of the implementation of the negative DFR by charging higher fees and commissions to their customers.

Table 4

Table 4 investigates whether higher fees can substitute deposit rates before and after 2014. For this purpose, Table 4 relates Fees and Commissions Ratio with different bank characteristics before and after 2014. All explanatory variables have a lag of 1 year. All regressions include time and bank fixed effects and standard errors are clustered at bank level. Statistical significance at the 1%, 5% and 10% is indicated by ***, **, *respectively.

Dependent Variable: Fees and commissions ratio	(1)	(2)	(3)	(4)	(5)
Excess liquidity ratio $_{t-1}$	0.255***	0.232***	0.222***	0.242***	0.215***
	(0.046)	(0.056)	(0.052)	(0.055)	(0.056)
Excess liquidity ratio $_{t-1}$*(After 2014)	0.147***	0.146***	0.140***	0.095***	0.074**
	(0.029)	(0.028)	(0.028)	(0.027)	(0.029)
Bank ROA$_{t-1}$		0.005	0.007	0.008	0.009
		(0.005)	(0.005)	(0.005)	(0.004)
Bank ROA $_{t-1}$*(After 2014)				0.015***	0.014***
				(0.004)	(0.004)
Deposit ratio $_{t-1}$			0.052***		0.066***
			(0.012)		(0.023)
Deposit ratio $_{t-1}$*(After 2014)					0.016
					(0.020)
Capital adequacy ratio $_{t-1}$			-0.080***		-0.020
			(0.023)		(0.031)
Capital adequacy ratio $_{t-1}$*(After 2014)					0.071**
					(0.030)
Npl ratio $_{t-1}$		-0.019	-0.057	0.049	-0.005
		(0.043)	(0.061)	(0.053)	(0.062)
Npl ratio $_{t-1}$*(After 2014)				0.061	0.014
				(0.050)	(0.052)
Time FE	Yes	Yes	Yes	Yes	Yes
Bank FE	Yes	Yes	Yes	Yes	Yes
Observations	924	924	924	924	924
R-squared	0.1176	0.1191	0.1531	0.1470	0.1855

4.3 Which bank characteristics drive deposit and lending growth?

Table 5 investigates which bank characteristics, before and after the implementation of the negative deposit facility rate by the ECB, drive deposit (Panel A) and lending growth (Panel B). To achieve this, deposit growth and lending growth are used as dependent variables, while different bank characteristics (Excess liquidity ratio, Bank ROA, Npl ratio, Capital adequacy ratio) are used as independent variables, all lagged 1 year. Moreover, a dummy variable (After 2014) is used to take into account

the period after 2014, while time and bank level fixed-effects are used in the regressions accordingly.

Both in Panel A and In Panel B the same methodology is used. In columns (1) and (2) lagged independent variables before 2014 are taken into consideration while in columns (3) and (4) lagged independent variables before and after 2014 are considered.

In column (2) of Panel A where all independent variables before 2014 are considered, it is observed that before the implementation of the negative DFR, banks with higher excess liquidity ratio in the previous year are able to grow their deposits YoY. As it is shown below, the lagged independent variables bank ROA, capital adequacy ratio and npl ratio are not statistically significant.

In column (4) of Panel A, when all lagged independent variables are taken into consideration, it appears that before and after the implementation of the negative DFR, banks with higher excess liquidity, higher ROA, and higher capital adequacy ratio the year before are able to have higher deposit growth YoY the year after. This shows that there is not an effect of the NIRP on deposit growth since in the periods before and after 2014, the results did not change, thus showing that this is a continuation of a trend that started before 2014 rather than an effect of the NIRP.

In column (2) of Panel B, it is shown that before 2014, banks with higher excess liquidity ratio, higher bank ROA and lower Npl ratio in the previous year have higher loan growth YoY in the following year. Lagged independent variable capital adequacy ratio before 2014 is statistically insignificant. In column (4) of Panel B, it is noticeable that before and after 2014, banks with higher excess liquidity and higher ROA one year before have higher loan growth YoY the year after. In addition, before 2014, banks with higher capital adequacy ratio in the previous year have higher loan growth YoY, while after 2014, lower npl ratio in the previous year leads to higher loan growth YoY in the next year.

The most important takeaway is that before and after 2014, higher excess liquidity ratio and higher ROA predict higher deposit and loan growth YoY. This result shows that more sound banks are able to have higher deposit and loan growth YoY. However, it appears that there is no effect of the NIRP since the same banks are able

to have higher deposit and loan growth YoY before and after 2014, thus showing that this is a continuation of a trend.

Table 5

Table 5 investigates which bank characteristics drive deposit and lending growth before and after 2014. Table 5 is split in two panels, Panel A and Panel B. Panel A relates Deposit Growth with different bank characteristics while Panel B relates Loan Growth with different bank characteristics. All explanatory variables have a lag of 1 year. All regressions include time and bank fixed effects and standard errors are clustered at bank level. Statistical significance at the 1%, 5% and 10% is indicated by ***, **, *respectively.

Panel A

Dependent Variable: Deposit Growth	(1)	(2)	(3)	(4)
Excess liquidity ratio $_{t-1}$	0.379***	0.376***	0.601***	0.582***
	(0.140)	(0.139)	(0.140)	(0.141)
Excess liquidity $_{t-1}$*(After 2014)			0.343***	0.310***
			(0.101)	(0.100)
Bank ROA $_{t-1}$	0.027	0.028	0.038**	0.033*
	(0.018)	(0.018)	(0.018)	(0.018)
Bank ROA $_{t-1}$*(After 2014)			0.053***	0.052***
			(0.017)	(0.017)
Capital adequacy ratio $_{t-1}$		-0.024		0.213***
		(0.064)		(0.108)
Capital adequacy ratio $_{t-1}$*(After 2014)				0.215**
				(0.105)
Npl ratio $_{t-1}$	-0.319**	-0.272	0.009	-0.088
	(0.098)	(0.169)	(0.171)	(0.199)
Npl ratio $_{t-1}$*(After 2014)			-0.035	-0.149
			(0.175)	(0.202)
Time FE	Yes	Yes	Yes	Yes
Bank FE	Yes	Yes	Yes	Yes
Observations	924	924	924	924
R-squared	0.0516	0.0518	0.1467	0.1545

Panel B

Dependent Variable: Loan Growth	(1)	(2)	(3)	(4)
Excess liquidity ratio $_{t-1}$	0.600***	0.591***	0.839***	0.829***
	(0.141)	(0.139)	(0.154)	(0.155)
Excess liquidity $_{t-1}$*(After 2014)			0.362***	0.339***
			(0.110)	(0.112)
Bank ROA $_{t-1}$	0.029	0.033*	0.040**	0.035*
	(0.018)	(0.017)	(0.019)	(0.019)
Bank ROA $_{t-1}$*(After 2014)			0.045***	0.045***
			(0.017)	(0.017)
Capital adequacy ratio $_{t-1}$		-0.079		0.190*
		(0.056)		(0.101)
Capital adequacy ratio $_{t-1}$*(After 2014)				0.168
				(0.108)
Npl ratio $_{t-1}$	-0.595***	-0.439***	0.106	-0.006
	(0.126)	(0.231)	(0.163)	(0.178)
Npl ratio $_{t-1}$*(After 2014)			0.461***	0.387**
			(0.147)	(0.151)
Time FE	Yes	Yes	Yes	Yes
Bank FE	Yes	Yes	Yes	Yes
Observations	924	924	924	924
R-squared	0.0859	0.0873	0.1931	0.1978

4.4 Which bank characteristics lead to riskier lending?

Tables 6, 7, 8, 9, 10 investigate which bank characteristics drive lending to riskier firms. The risk measures used for this analysis are the logged 2-year standard deviation of average firm ROA, the profit margin average, the current ratio average, the liquidity ratio average and the solvency ratio average. The period examined is from 2014 to 2016. Five bank characteristics, excess liquidity ratio, bank ROA, npl ratio, deposit ratio and capital adequacy ratio before and after 2014, are used as independent variables, all lagged 1 year. Time and bank fixed effects are added in the regressions.

Before 2014, it is illustrated that banks with lower excess liquidity (Tables 7, 10), lower npl ratio (Tables 7, 10), and lower deposit ratio (Tables 7, 10) in the previous year are lending to riskier firms in the following year. After 2014, it is shown that only banks with higher excess liquidity ratio (Tables 7, 9, 10) and higher npl ratio (Table 7) the year before are lending to riskier firms the year after. However, since all coefficients are low, it appears that there is no zombie-lending after 2014. The rest independent variables are all statistically insignificant both before and after 2014 in all the regressions.

One of the main concerns is that there might be other events that coincide with the implementation of the negative DFR from ECB that might affect risk taking of Spanish banks. One event examined is the Basel III liquidity coverage ratio, however this was introduced in January 2015 with four years window to be executed, thus it is impossible that it affected the results.

Another event examined is the targeted long-term refinancing operations (TLTRO) introduced by ECB in June 2014. Even though Spain was in the middle of the crisis of 2009 and only a few Spanish banks got the TLTRO I, this event shouldn't affect the results since banks in stressed countries used the liquidity from the program mainly to cover losses from withdrawal of deposits and to substitute liquidity that were getting from other ECB operations.

Table 6

Table 6 investigates which bank characteristics drive lending to riskier firms from one year before to one year after the implementation of the negative DFR in 2014. Table 6 relates riskier lending to firms with different bank characteristics in the period of 2014-2016. The risk measure and dependent variable used is the 2-year logged ROA volatility. All explanatory variables have a lag of 1 year. All regressions include time and bank fixed effects and standard errors are clustered at bank level. Statistical significance at the 1%, 5% and 10% is indicated by ***, **, *respectively.

Dependent Variable:	2014-2016				
2-year logged ROA volatility	(1)	(2)	(3)	(4)	(5)
Excess liquidity ratio $_{t-1}$	0.012	-0.151	-0.148	-0.130	-0.132
	(0.041)	(0.172)	(0.173)	(0.171)	(0.174)
Excess liquidity ratio $_{t-1}$*(After 2014)	0.085	0.086	0.086	0.124	0.104
	(0.064)	(0.065)	(0.065)	(0.142)	(0.143)
Bank ROA $_{t-1}$		0.018	0.017	0.018	0.018
		(0.023)	(0.025)	(0.023)	(0.025)
Bank ROA $_{t-1}$*(After 2014)				0.009	0.012
				(0.021)	(0.021)
Deposit ratio $_{t-1}$			0.020		0.002
			(0.029)		(0.030)
Deposit ratio $_{t-1}$*(After 2014)					-0.043
					(0.027)
Capital adequacy ratio $_{t-1}$			0.011		0.026
			(0.109)		(0.110)
Capital adequacy ratio $_{t-1}$*(After 2014)					0.069
					(0.077)
Npl ratio $_{t-1}$		0.071	-0.032	0.030	-0.034
		(0.178)	(0.266)	(0.181)	(0.270)
Npl ratio $_{t-1}$*(After 2014)				-0.158	0.119
				(0.206)	(0.258)
Time FE	Yes	Yes	Yes	Yes	Yes
Bank FE	Yes	Yes	Yes	Yes	Yes
Observations	387	387	387	387	387
R-squared	0.0037	0.0112	0.0124	0.0158	0.0203

Table 7

Table 7 follows the same methodology as Table 6 but has a different risk measure as the dependent variable. The risk measure and dependent variable used is the profit margin average. All explanatory variables have a lag of 1 year. All regressions include time and bank fixed effects and standard errors are clustered at bank level. Statistical significance at the 1%, 5% and 10% is indicated by ***, **, *respectively.

Dependent Variable:	2014-2016				
Profit margin average	(1)	(2)	(3)	(4)	(5)
Excess liquidity ratio $_{t-1}$	-0.050**	-0.055	-0.058	-0.054	-0.054
	(0.024)	(0.063)	(0.063)	(0.053)	(0.053)
Excess liquidity ratio $_{t-1}$*(After 2014)	0.043*	0.038	0.039	0.081	0.085
	(0.024)	(0.025)	(0.025)	(0.099)	(0.101)
Bank ROA $_{t-1}$		0.008	0.010	0.007	0.008
		(0.009)	(0.009)	(0.008)	(0.008)
Bank ROA $_{t-1}$*(After 2014)				-0.020	-0.019
				(0.017)	(0.017)
Deposit ratio $_{t-1}$			-0.018*		-0.020*
			(0.010)		(0.011)
Deposit ratio $_{t-1}$*(After 2014)					-0.010
					(0.012)
Capital adequacy ratio $_{t-1}$			-0.023		-0.011
			(0.028)		(0.028)
Capital adequacy ratio $_{t-1}$*(After 2014)					0.014
					(0.027)
Npl ratio $_{t-1}$		-0.079**	0.041	-0.053	0.045
		(0.036)	(0.091)	(0.043)	(0.098)
Npl ratio $_{t-1}$*(After 2014)				0.146**	0.149*
				(0.058)	(0.076)
Time FE	Yes	Yes	Yes	Yes	Yes
Bank FE	Yes	Yes	Yes	Yes	Yes
Observations	387	387	387	387	387
R-squared	0.0295	0.0451	0.0571	0.0938	0.1040

Table 8

Table 8 follows the same methodology as Tables 6 & 7 but has a different risk measure as the dependent variable. The risk measure and dependent variable used is the current ratio average. All explanatory variables have a lag of 1 year. All regressions include time and bank fixed effects and standard errors are clustered at bank level. Statistical significance at the 1%, 5% and 10% is indicated by ***, **, *respectively.

Dependent Variable:	2014-2016				
Current ratio average	(1)	(2)	(3)	(4)	(5)
Excess liquidity ratio $_{t-1}$	-0.001	0.023	0.023	0.014	0.015
	(0.013)	(0.027)	(0.027)	(0.022)	(0.022)
Excess liquidity ratio $_{t-1}$*(After 2014)	0.004	0.003	0.003	-0.028	-0.028
	(0.009)	(0.009)	(0.009)	(0.035)	(0.036)
Bank ROA $_{t-1}$		-0.003	-0.003	-0.003	-0.003
		(0.003)	(0.003)	(0.003)	(0.003)
Bank ROA $_{t-1}$*(After 2014)				0.003	0.004
				(0.006)	(0.003)
Deposit ratio $_{t-1}$			-0.005		-0.006
			(0.007)		(0.007)
Deposit ratio $_{t-1}$*(After 2014)					-0.005
					(0.005)
Capital adequacy ratio $_{t-1}$			-0.002		0.014
			(0.013)		(0.013)
Capital adequacy ratio $_{t-1}$*(After 2014)					0.006
					(0.012)
Npl ratio $_{t-1}$		-0.019	0.007	-0.010	0.011
		(0.023)	(0.035)	(0.022)	(0.034)
Npl ratio $_{t-1}$*(After 2014)				0.014	0.020
				(0.018)	(0.031)
Time FE	Yes	Yes	Yes	Yes	Yes
Bank FE	Yes	Yes	Yes	Yes	Yes
Observations	387	387	387	387	387
R-squared	0.0035	0.0186	0.0221	0.0295	0.0341

Table 9

Table 9 follows the same methodology as Tables 6, 7 & 8 but has a different risk measure as the dependent variable. The risk measure and dependent variable used is the liquidity ratio average. All explanatory variables have a lag of 1 year. All regressions include time and bank fixed effects and standard errors are clustered at bank level. Statistical significance at the 1%, 5% and 10% is indicated by ***, **, *respectively.

Dependent Variable:	2014-2016				
Liquidity ratio average	(1)	(2)	(3)	(4)	(5)
Excess liquidity ratio $_{t-1}$	-0.007	0.030	0.030	0.020	0.020
	(0.014)	(0.028)	(0.027)	(0.022)	(0.022)
Excess liquidity ratio $_{t-1}$*(After 2014)	0.013*	0.012	0.012	-0.024	-0.024
	(0.007)	(0.007)	(0.007)	(0.035)	(0.036)
Bank ROA $_{t-1}$		-0.003	-0.003	-0.003	-0.002
		(0.003)	(0.003)	(0.003)	(0.003)
Bank ROA $_{t-1}$*(After 2014)				0.004	0.004
				(0.006)	(0.006)
Deposit ratio $_{t-1}$			-0.006		-0.006
			(0.007)		(0.007)
Deposit ratio $_{t-1}$*(After 2014)					-0.005
					(0.005)
Capital adequacy ratio $_{t-1}$			-0.003		0.015
			(0.012)		(0.012)
Capital adequacy ratio $_{t-1}$*(After 2014)					0.010
					(0.012)
Npl ratio $_{t-1}$		-0.027	0.002	-0.016	0.006
		(0.034)	(0.035)	(0.020)	(0.034)
Npl ratio $_{t-1}$*(After 2014)				0.021	0.018
				(0.021)	(0.033)
Time FE	Yes	Yes	Yes	Yes	Yes
Bank FE	Yes	Yes	Yes	Yes	Yes
Observations	387	387	387	387	387
R-squared	0.0073	0.0285	0.0325	0.0434	0.0486

Table 10

Table 10 follows the same methodology as Tables 6, 7, 8 & 9 but has a different risk measure as the dependent variable. The risk measure and dependent variable used is the solvency ratio average. All explanatory variables have a lag of 1 year. All regressions include time and bank fixed effects and standard errors are clustered at bank level. Statistical significance at the 1%, 5% and 10% is indicated by ***, **, *respectively.

Dependent Variable:	2014-2016				
Solvency ratio average	(1)	(2)	(3)	(4)	(5)
Excess liquidity ratio $_{t-1}$	-0.055***	-0.018	-0.018	-0.026	-0.025
	(0.019)	(0.036)	(0.033)	(0.039)	(0.037)
Excess liquidity ratio $_{t-1}$*(After 2014)	0.041**	0.035*	0.035*	0.002	0.009
	(0.020)	(0.020)	(0.020)	(0.039)	(0.039)
Bank ROA $_{t-1}$		0.005	0.005	0.005	0.005
		(0.005)	(0.005)	(0.005)	(0.005)
Bank ROA $_{t-1}$*(After 2014)				0.005	0.005
				(0.004)	(0.004)
Deposit ratio $_{t-1}$			-0.024***		-0.023***
			(0.008)		(0.008)
Deposit ratio $_{t-1}$*(After 2014)					0.001
					(0.009)
Capital adequacy ratio $_{t-1}$			0.006		0.006
			(0.020)		(0.021)
Capital adequacy ratio $_{t-1}$*(After 2014)					0.001
					(0.025)
Npl ratio $_{t-1}$		-0.105**	-0.018	-0.100*	-0.017
		(0.047)	(0.055)	(0.055)	(0.056)
Npl ratio $_{t-1}$*(After 2014)				-0.004	-0.017
				(0.057)	(0.073)
Time FE	Yes	Yes	Yes	Yes	Yes
Bank FE	Yes	Yes	Yes	Yes	Yes
Observations	387	387	387	387	387
R-squared	0.0471	0.0836	0.0983	0.0878	0.1020

5. Further Robustness Checks

In this section, further robustness checks are provided for the results of Table 4 and Table 5. This section is split in two parts. First, the targeted longer-term refinancing operations (TLTRO) of 2016 is considered. Even though only a few Spanish banks got the TLTRO of 2016, it is worth considering since the total payment was way higher than that of the TLTRO of 2014. Second, the bank data are split in two subparts, based on their deposit ratio. The two subparts of high and low deposit ratio banks are picked to check whether the results are driven by either high dependent or low dependent banks in terms of deposits.

The TLTRO is an attractive long-term funding for banks offered by the ECB in order to create credit and further easing the existing credit conditions. The first TLTRO was conducted in 2014, the second in 2016 and the third in 2019. The second TLTRO had a maturity of four years and the possibility of repayment after two years. In order to check if the TLTRO of 2016 affected the results of Table 1 and Table 2, a dummy

variable is introduced (After 2016) that replaces the dummy variable (After 2014). Then, Table 4 and 5 are replicated in Table 11 and Table 12 with the addition of the new dummy variable in order to check if bank behavior changed after the introduction of the second TLTRO, thus driving the above-mentioned results.

After comparing Table 11 and Table 4, it is observed that the results are similar with just a few differences. First, 1-year lagged bank ROA before 2014 is statistically significant in all regressions in Table 11. Second, 1-year lagged excess liquidity ratio is statistically insignificant in column (5) of Table 11 but remains statistically significant in the rest regressions. As a result, the same bank characteristics drive higher fees and commissions offered by banks after 2016, thus when taking into account the TLTRO of 2016 the results of Table 4 are robust.

Table 11

Table 11 follows the same methodology as Table 4 and investigates whether the results of Table 4 are robust to the TLTRO of 2016. For this purpose, the examined period is split in two periods, before and after 2016. All explanatory variables have a lag of 1 year. All regressions include time and bank fixed effects and standard errors are clustered at bank level. Statistical significance at the 1%, 5% and 10% is indicated by ***, **, *respectively.

Dependent Variable: Fees and commissions ratio	(1)	(2)	(3)	(4)	(5)
Excess liquidity ratio $_{t-1}$	0.193***	0.140***	0.131***	0.145***	0.117***
	(0.038)	(0.037)	(0.037)	(0.037)	(0.040)
Excess liquidity ratio $_{t-1}$*(After 2016)	0.150***	0.156***	0.152***	0.086**	0.062
	(0.031)	(0.034)	(0.036)	(0.043)	(0.044)
Bank ROA $_{t-1}$		0.013***	0.013***	0.015***	0.014***
		(0.004)	(0.004)	(0.004)	(0.004)
Bank ROA $_{t-1}$*(After 2016)				0.012**	0.010*
				(0.005)	(0.005)
Deposit ratio $_{t-1}$			0.031**		0.047**
			(0.013)		(0.022)
Deposit ratio $_{t-1}$*(After 2016)					0.013
					(0.020)
Capital adequacy ratio $_{t-1}$			-0.047**		0.012
			(0.022)		(0.030)
Capital adequacy ratio $_{t-1}$*(After 2016)					0.081*
					(0.042)
Npl ratio $_{t-1}$		-0.028	-0.047	0.050	0.011
		(0.041)	(0.050)	(0.048)	(0.053)
Npl ratio $_{t-1}$*(After 2016)				0.125*	0.072
				(0.065)	(0.075)
Time FE	Yes	Yes	Yes	Yes	Yes
Bank FE	Yes	Yes	Yes	Yes	Yes
Observations	924	924	924	924	924
R-squared	0.0940	0.1101	0.1251	0.1288	0.1518

Table 12, is split in the same two panels as Table 5 and the methodology of Table 5 remains identical on Table 12. All in all, the results of Panel A and Panel B of Table 12 are similar with the results of Panel A and Panel B of Table 5 for the most

part, thus it is safe to say that the results of Table 5 are robust. The most important takeaway is that after 2016 the statistical significance of the previous year excess liquidity ratio in predicting next year's loan growth dropped from 1% to 10%. However, once again it appears that there is not a significant effect on the results from the TLTRO of 2016 since there is not much of a difference on the results before and after 2016. Thus, the same banks that are able to have higher deposit and loan growth before 2016, are able to have higher deposit and loan growth after 2016, showing signs of a continuation of a trend rather than an effect of the TLTRO of 2016.

Table 12

Table 12 follows the same methodology as Table 5 and investigates whether the results of Table 5 are robust to the TLTRO of 2016. For this purpose, the examined period is split in two periods, before and after 2016. Table 12 is split in two panels, Panel A and Panel B. Panel A relates Deposit Growth with different bank characteristics while Panel B relates Loan Growth with different bank characteristics. All explanatory variables have a lag of 1 year. All regressions include time and bank fixed effects and standard errors are clustered at bank level. Statistical significance at the 1%, 5% and 10% is indicated by ***, **, *respectively.

Panel A

Dependent Variable: Deposit Growth	(1)	(2)	(3)	(4)
Excess liquidity ratio $_{t-1}$	0.254**	0.275**	0.387***	0.349***
	(0.127)	(0.120)	(0.117)	(0.118)
Excess liquidity $_{t-1}$*(After 2016)			0.422***	0.349**
			(0.142)	(0.152)
Bank ROA$_{t-1}$	0.038***	0.042***	0.050***	0.048***
	(0.014)	(0.014)	(0.015)	(0.015)
Bank ROA $_{t-1}$*(After 2016)			0.049**	0.049**
			(0.019)	(0.019)
Capital adequacy ratio $_{t-1}$		-0.118**		0.194*
		(0.059)		(0.099)
Capital adequacy ratio $_{t-1}$*(After 2016)				0.295**
				(0.124)
Npl ratio $_{t-1}$	-0.364***	-0.150	0.038	0.006
	(0.117)	(0.153)	(0.168)	(0.176)
Npl ratio $_{t-1}$*(After 2016)			-0.051	-0.289
			(0.197)	(0.250)
Time FE	Yes	Yes	Yes	Yes
Bank FE	Yes	Yes	Yes	Yes
Observations	924	924	924	924
R-squared	0.0599	0.0652	0.1364	0.1466

Panel B

Dependent Variable: Loan Growth	(1)	(2)	(3)	(4)
Excess liquidity ratio $_{t-1}$	0.477***	0.499***	0.623***	0.598***
	(0.121)	(0.122)	(0.124)	(0.126)
Excess liquidity $_{t-1}$*(After 2016)			0.278**	0.265*
			(0.129)	(0.142)
Bank ROA $_{t-1}$	0.035**	0.039***	0.047***	0.044***
	(0.014)	(0.014)	(0.015)	(0.015)
Bank ROA $_{t-1}$*(After 2016)			0.045**	0.045**
			(0.018)	(0.019)
Capital adequacy ratio $_{t-1}$		-0.131**		0.178*
		(0.051)		(0.099)
Capital adequacy ratio $_{t-1}$*(After 2016)				0.161
				(0.119)
Npl ratio $_{t-1}$	-0.518***	-0.281*	0.220	0.126
	(0.117)	(0.197)	(0.141)	(0.152)
Npl ratio $_{t-1}$*(After 2016)			0.583***	0.508**
			(0.181)	(0.210)
Time FE	Yes	Yes	Yes	Yes
Bank FE	Yes	Yes	Yes	Yes
Observations	924	924	924	924
R-squared	0.0971	0.1026	0.1818	0.1863

After checking for the TLTRO of 2016, the bank data are split in high deposit ratio and low deposit ratio banks with a threshold of 89%. The goal of this split is to see whether banks that are highly dependent on deposits are able to pass the negative DFR in terms of fees and commissions on their deposits and if high dependent on deposits or low dependent on deposits banks are able to grow their deposits and loans. The high deposit ratio banks dataset includes 70 banks, while the low deposit ratio banks dataset includes 84 banks. The same methodology as the one of Table 4 is followed for Tables 13 and 14 while the same methodology of Table 5 is followed for Tables 15 and 16.

Table 13 takes into account the high deposit ratio banks dataset. After checking Table 13 and Table 4, the results have some slight differences. First of all, when all lagged independent variables are taken into account in column (5), the statistical significance of the previous year excess liquidity ratio in the period before 2014 dropped from 1% to 10% and in columns (2) and (3) the same independent variable is statistically insignificant.

The second difference is in column (5) of Table 13, where the coefficient of the previous year's bank ROA, in the period before 2014, is statistically significant at 10%. Last, lagged independent variables deposit ratio before 2014 and capital adequacy ratio after 2014 are not statistically significant in Table 13. As a result, for banks with high deposit ratio, there is not any major effect from the implementation of the negative DFR by the ECB after 2014 but there is a continuation of a trend that began before 2014.

Table 14 follows the same methodology as Table 4 and Table 13, but it takes into account the low-deposit ratio banks dataset. There are some differences once again in the results. The main difference with Table 4, when all variables are taken into account, is that the lagged independent variables excess liquidity ratio and capital adequacy ratio after 2014 are no longer significant.

However, the lagged independent variable excess liquidity ratio after 2014 is statistically significant in the rest regressions, thus it appears that predicts next year's fees and commissions ratio of a bank in some extent. As a result, once again no

significant effect of the negative DFR is found in the results for low-dependent on deposits banks.

The main takeaways from the above-mentioned results are the following. The result that banks with higher excess liquidity ratio the previous year after 2014 are able to have higher fees and commissions ratio the next year appears to be driven by highly dependent banks on deposits. In addition, it seems that the result that banks that have the year before higher deposit ratio in the period before 2014 are able to have higher fees and commissions ratio the following year is driven by the low deposit ratio banks. However, 1-year lagged capital adequacy ratio after 2014 is not statistically significant in both Table 13 and Table 14 while 1-year lagged bank ROA before 2014 is statistically significant for high deposit ratio banks. In conclusion, the results of Table 4 considering the dependance of banks on deposits appear to not be completely robust, however no major effect of the NIRP once again is shown in the results.

Table 13

Table 13 follows the same methodology as Table 4 and tries to investigate whether the high-deposit ratio banks drive the results of Table 4. For this purpose, Table 13 takes into account only the high-deposit ratio banks and relates Fees and Commissions Ratio with different bank characteristics. All explanatory variables have a lag of 1 year. All regressions include time and bank fixed effects and standard errors are clustered at bank level. Statistical significance at the 1%, 5% and 10% is indicated by ***, **, *respectively.

Dependent Variable: Fees and commissions ratio	(1)	(2)	(3)	(4)	(5)
Excess liquidity ratio $_{t-1}$	0.276***	0.129	0.133	0.147*	0.157*
	(0.054)	(0.085)	(0.083)	(0.086)	(0.092)
Excess liquidity ratio $_{t-1}$*(After 2014)	0.121***	0.144***	0.139***	0.101***	0.087**
	(0.036)	(0.035)	(0.036)	(0.034)	(0.035)
Bank ROA $_{t-1}$		0.016	0.017*	0.016	0.016*
		(0.010)	(0.009)	(0.010)	(0.009)
Bank ROA $_{t-1}$*(After 2014)				0.011**	0.012**
				(0.005)	(0.006)
Deposit ratio $_{t-1}$			0.016		-0.009
			(0.018)		(0.031)
Deposit ratio $_{t-1}$*(After 2014)					-0.034
					(0.028)
Capital adequacy ratio $_{t-1}$			-0.065		0.010
			(0.069)		(0.105)
Capital adequacy ratio $_{t-1}$*(After 2014)					0.098
					(0.068)
Npl ratio $_{t-1}$		0.097	0.151	0.171**	0.165
		(0.059)	(0.116)	(0.072)	(0.116)
Npl ratio $_{t-1}$*(After 2014)				0.085	0.002
				(0.077)	(0.091)
Time FE	Yes	Yes	Yes	Yes	Yes
Bank FE	Yes	Yes	Yes	Yes	Yes
Observations	420	420	420	420	420
R-squared	0.1437	0.1653	0.1680	0.1793	0.1926

Table 14

Table 14 follows the same methodology as Table 4 and tries to investigate whether the low-deposit ratio banks drive the results of Table 4. For this purpose, Table 14 takes into account only the low-deposit ratio banks and relates Fees and Commissions Ratio with different bank characteristics. All explanatory variables have a lag of 1 year. All regressions include time and bank fixed effects and standard errors are clustered at bank level. Statistical significance at the 1%, 5% and 10% is indicated by ***, **, *respectively.

Dependent Variable: Fees and commissions ratio	(1)	(2)	(3)	(4)	(5)
Excess liquidity ratio $_{t-1}$	0.072	0.130**	0.149**	0.144**	0.158**
	(0.054)	(0.063)	(0.072)	(0.059)	(0.075)
Excess liquidity ratio $_{t-1}$*(After 2014)	0.177***	0.136***	0.132***	0.092**	0.069
	(0.046)	(0.043)	(0.042)	(0.042)	(0.053)
Bank ROA $_{t-1}$		-0.001	0.001	0.004	0.005
		(0.005)	(0.006)	(0.005)	(0.007)
Bank ROA $_{t-1}$*(After 2014)				0.015***	0.014***
				(0.005)	(0.005)
Deposit ratio $_{t-1}$			0.036***		0.059**
			(0.011)		(0.025)
Deposit ratio $_{t-1}$*(After 2014)					0.024
					(0.023)
Capital adequacy ratio $_{t-1}$			-0.051**		-0.015
			(0.020)		(0.023)
Capital adequacy ratio $_{t-1}$*(After 2014)					0.035
					(0.024)
Npl ratio $_{t-1}$		-0.113**	-0.129**	-0.038	-0.063
		(0.057)	(0.059)	(0.072)	(0.071)
Npl ratio $_{t-1}$*(After 2014)				0.064	0.042
				(0.061)	(0.060)
Time FE	Yes	Yes	Yes	Yes	Yes
Bank FE	Yes	Yes	Yes	Yes	Yes
Observations	504	504	504	504	504
R-squared	0.1376	0.1661	0.2044	0.2049	0.2499

Table 15 follows the methodology of Table 5, is split in two panels, Panel A and Panel B, and takes into account the high deposit ratio banks dataset. Panel A relates deposit growth with different bank characteristics while Panel B relates loan growth with the same bank characteristics. In Panel A, it is observed that the results of Table 15 and Table 5 are almost identical. Thus, it appears that for high deposit ratio banks the results of Table 5 are robust.

In Panel B, the results are slightly different. The main difference with the results of Table 4 is that after 2014 It is shown that high deposit ratio banks with higher capital adequacy ratio in the previous year are able to have higher loan growth in the following year, while the lagged independent variable npl ratio after 2014 is statistically insignificant. However, the main results of Table 5 are robust, since no significant effect of the NIRP appears in the results.

In Table 16, the low deposit ratio bank dataset is taken into consideration and the methodology is the same as Table 5 and Table 15. In both Panel A and Panel B of Table 16 the results are way different with the results of Panel A and Panel B of Table

5. In Panel A of Table 16, the main difference with Panel A of Table 5 is that only the previous year excess liquidity ratio, before and after 2014, is statistically significant in column (5) and can predict the deposit growth of a bank in Spain the following year. Lagged independent variables bank ROA and capital adequacy ratio are both statistically insignificant before and after 2014. Thus, the results of Table 5 are not robust. However, once again it is not observed any effect of the NIRP in the results after 2014.

In Panel B of Table 16, the results are not close with the results of Table 5. The first difference is that before 2014, excess liquidity ratio of the previous year is not significant and can't predict the loan growth of a bank in Spain the following year. However, after 2014 it appears that the same variable is statistically significant and banks with higher excess liquidity ratio the year before have higher loan growth YoY the year after. Lagged independent variables bank ROA and capital adequacy ratio are both statistically insignificant before and after 2014.

Moreover, it is shown that banks with lower npl ratio in the previous year. in the period before 2014, are able to have higher loan growth YoY in the following year. However, the results for the npl ratio after 2014 are completely the opposite since banks with higher npl ratio the year before have higher loan growth YoY the next year. As a result, the results of Table 5 are not robust and it appears that there is an effect of the NIRP in the results for low deposit ratio banks.

The main takeaways for the above-mentioned results are indicated below. First, it appears that the main results of Table 5 are robust when the high deposit ratio bank sample is taken into consideration. However, when the low deposit ratio bank sample is taken into account the main results of Table 5 are not robust. In Panel A of Table 16 for low deposit ratio banks it appears that only excess liquidity ratio of the previous year is able to predict a bank's deposit growth the following year but once again no effect of the NIRP is shown in the results.

However, this is not the case for Panel B of Table 16. It appears that for low deposit ratio banks before 2014 only banks with lower npl ratio in the previous year are able to have higher loan growth YoY in the year after. Moreover, after 2014 it is

shown that banks with higher excess liquidity ratio and higher npl ratio the year before are produce higher loan growth YoY in the following year.

To sum up, the main results of Table 4 seem to be robust when the TLTRO of 2016 is taken into account but when the sample is split in high and low deposit ratio banks, the results are not robust. Nevertheless, no effect of the NIRP is found in the results. Table 5 is not robust for low deposit ratio banks and an effect of the NIRP appears in the results. Before 2014 only banks with lower npl ratio in the previous year have higher growth in loans YoY in the next year, while after 2014 higher excess liquidity ratio and higher npl ratio in the year before are able to lead to higher loan growth YoY the year after.

Table 15

Table 15 follows the same methodology as Table 5 and investigates whether the results of Table 5 are driven by the high-deposit ratio banks. Table 15 is split in two panels, Panel A and Panel B. Panel A relates Deposit Growth of high-deposit ratio banks with different bank characteristics while Panel B relates Loan Growth of high-deposit ratio banks with different bank characteristics. All explanatory variables have a lag of 1 year. All regressions include time and bank fixed effects and standard errors are clustered at bank level. Statistical significance at the 1%, 5% and 10% is indicated by ***, **, *respectively.

Panel A

Dependent Variable: Deposit Growth	(1)	(2)	(3)	(4)
Excess liquidity ratio $_{t-1}$	0.190	0.207	0.562***	0.507***
	(0.130)	(0.126)	(0.153)	(0.159)
Excess liquidity $_{t-1}$*(After 2014)			0.304**	0.207*
			(0.125)	(0.121)
Bank ROA $_{t-1}$	0.043***	0.046***	0.034**	0.029*
	(0.016)	(0.016)	(0.017)	(0.016)
Bank ROA $_{t-1}$*(After 2014)			0.066***	0.065**
			(0.025)	(0.025)
Capital adequacy ratio $_{t-1}$		- 0.182*		0.290*
		(0.102)		(0.172)
Capital adequacy ratio $_{t-1}$*(After 2014)				0.493***
				(0.168)
Npl ratio $_{t-1}$	-0.105	0.257	0.260	0.256
	(0.151)	(0.245)	(0.222)	(0.261)
Npl ratio $_{t-1}$*(After 2014)			-0.011	-0.437
			(0.231)	(0.282)
Time FE	Yes	Yes	Yes	Yes
Bank FE	Yes	Yes	Yes	Yes
Observations	420	420	420	420
R-squared	0.1109	0.1160	0.2751	0.3258

Panel B

Dependent Variable: Loan Growth	(1)	(2)	(3)	(4)
Excess liquidity ratio $_{t-1}$	0.629***	0.641***	1.083***	1.027***
	(0.113)	(0.109)	(0.134)	(0.146)
Excess liquidity $_{t-1}$*(After 2014)			0.415***	0.344**
			(0.145)	(0.155)
Bank ROA $_{t-1}$	0.028*	0.031*	0.016	0.010
	(0.016)	(0.016)	(0.012)	(0.014)
Bank ROA $_{t-1}$*(After 2014)			0.071***	0.068**
			(0.026)	(0.026)
Capital adequacy ratio $_{t-1}$		-0.130		0.379**
		(0.088)		(0.163)
Capital adequacy ratio $_{t-1}$*(After 2014)				0.427**
				(0.175)
Npl ratio $_{t-1}$	-0.451***	-0.194	0.208	-0.014
	(0.141)	(0.459)	(0.176)	(0.140)
Npl ratio $_{t-1}$*(After 2014)			0.253	-0.079
			(0.204)	(0.238)
Time FE	Yes	Yes	Yes	Yes
Bank FE	Yes	Yes	Yes	Yes
Observations	420	420	420	420
R-squared	0.1259	0.1548	0.3473	0.3656

Table 16

Table 16 follows the same methodology as Table 5 and investigates whether the results of Table 5 are driven by the low-deposit ratio banks. Table 16 is split in two panels, Panel A and Panel B. Panel A relates Deposit Growth of low-deposit ratio banks with different bank characteristics while Panel B relates Loan Growth of low-deposit ratio banks with different bank characteristics. All explanatory variables have a lag of 1 year. All regressions include time and bank fixed effects and standard errors are clustered at bank level. Statistical significance at the 1%, 5% and 10% is indicated by ***, **, *respectively.

Panel A

Dependent Variable: Deposit Growth	(1)	(2)	(3)	(4)
Excess liquidity ratio $_{t-1}$	0.311	0.320	0.493**	0.523**
	(0.265)	(0.263)	(0.242)	(0.237)
Excess liquidity $_{t-1}$*(After 2014)			0.411**	0.429**
			(0.175)	(0.175)
Bank ROA $_{t-1}$	0.019	0.015	0.039	0.031
	(0.030)	(0.031)	(0.031)	(0.031)
Bank ROA $_{t-1}$*(After 2014)			0.026	0.026
			(0.020)	(0.020)
Capital adequacy ratio $_{t-1}$		0.050		0.115
		(0.077)		(0.128)
Capital adequacy ratio $_{t-1}$*(After 2014)				0.005
				(0.124)
Npl ratio $_{t-1}$	-0.497**	-0.592**	-0.252	-0.402
	(0.209)	(0.231)	(0.243)	(0.277)
Npl ratio $_{t-1}$*(After 2014)			-0.044	0.026
			(0.271)	(0.288)
Time FE	Yes	Yes	Yes	Yes
Bank FE	Yes	Yes	Yes	Yes
Observations	504	504	504	504
R-squared	0.0303	0.0312	0.0757	0.0795

Panel B

Dependent Variable: Loan Growth	(1)	(2)	(3)	(4)
Excess liquidity ratio $_{t-1}$	0.075	0.066	0.231	0.254
	(0.234)	(0.234)	(0.247)	(0.250)
Excess liquidity $_{t-1}$*(After 2014)			0.297*	0.315*
			(0.161)	(0.162)
Bank ROA $_{t-1}$	0.031	0.035	0.046	0.042
	(0.029)	(0.029)	(0.030)	(0.029)
Bank ROA $_{t-1}$*(After 2014)			0.006	0.005
			(0.017)	(0.017)
Capital adequacy ratio $_{t-1}$		-0.050		0.048
		(0.065)		(0.106)
Capital adequacy ratio $_{t-1}$*(After 2014)				-0.028
				(0.123)
Npl ratio $_{t-1}$	-0.688***	-0.591**	-0.086	-0.183
	(0.207)	(0.244)	(0.268)	(0.276)
Npl ratio $_{t-1}$*(After 2014)			0.596***	0.656***
			(0.199)	(0.238)
Time FE	Yes	Yes	Yes	Yes
Bank FE	Yes	Yes	Yes	Yes
Observations	504	504	504	504
R-squared	0.0594	0.0602	0.1051	0.1066

6. Conclusion

This paper tries to investigate the effects of the NIRP in the Spanish banking system and how it affected bank lending and bank deposits. The bibliography on this subject is relatively small since central banks moved the interest rates into negative territory in recent years. However, the NIRP is expected to be relevant in the future as well since more and more central banks of advanced economies are breaking the ZLB.

First of all, it is shown that sound banks (higher excess liquidity, higher bank ROA and higher capital adequacy ratio) in Spain are able to pass higher fees and commissions to their customers before and after 2014. These results show that there is not any significant impact of the NIRP since the same banks that are able to have higher fees and commissions ratio before 2014 also have after 2014. Moreover, no major effect of the NIRP is found when the period is split in before and after 2016, as well as when the sample is split in high and low deposit ratio banks.

Next, it is observed that when all Spanish banks are considered, banks that are sounder (higher excess liquidity ratio, higher bank ROA and higher capital adequacy ratio) are able to have higher growth on deposits and loans YoY before and after 2014. The results are robust when the TLTRO of 2016 is taken into account.

However, the results are not robust when the sample is split in high and low deposit ratio banks. For high deposit ratio banks the results of Table 5 are not robust, however no effect of the NIRP is found in the results. For low deposit ratio banks, it is found that before 2014 only banks with lower npl ratio in the year before have higher loan growth YoY in the next year, while in the period after 2014 banks with higher excess liquidity ratio and higher npl ratio in the previous year have higher loan growth YoY in the year after. Thus, an effect of the NIRP is found in the results for low dependance on deposits banks in Spain.

Last, it is found that in the years following the implementation of the negative DFR, Spanish banks with higher excess liquidity ratio and higher npl ratio started lending to riskier firms. However, since all the coefficients are low, it appears that there is no zombie lending.

To conclude, no final conclusion should be drawn about the impairment or not of the transmission mechanism of monetary policy in Spain from the above-mentioned results. A more thorough analysis with confidential data about the deposit and loan interest rates, number of deposits and loans, that each bank offered, should be done in order to have a clearer perspective and a way more accurate conclusion about the transmission mechanism of monetary policy in Spain.

Appendix
A1. Bank Sample

id	Bank Name
1	Banco Santander SA
2	Banco de España
3	Banco Bilbao Vizcaya Argentaria SA-BBVA
4	Caixabank SA
5	Banco de Sabadell SA
6	BFA Tenedora de Acciones SAU
7	Bankia SA
8	Santander Consumer Finance
9	Bankinter SA
10	Fundacion Bancaria Ibercaja
11	Kutxabank SA
12	Abanca Corporacion Bancaria SA
13	Unicaja Banco SA
14	Ibercaja Banco SA
15	Abanca Holding Financiero Sa
16	Cajamar Caja Rural SCC
17	Fundacion Bancaria Unicaja-Unicaja
18	Banco De Credito Social Cooperativo Sa
19	Liberbank SA
20	Instituto de Crédito Oficial
21	Fundacion Bancaria Caixa D Estalvis I Pensions De Barcelona
22	Criteria Caixa-Criteria CaixaHolding SA
23	Laboral Kutxa
24	Deutsche Bank SAE
25	Banca March SA
26	Caja Rural de Navarra Sociedad Cooperativa de Crédito
27	Grucajrural Inversiones SL
28	CECABANK SA
29	Cajasur Banco SA
30	Banco Cetelem SA
31	Confederación Española de Cajas de Ahorros - CECA
32	Open Bank SA
33	Banco Cooperativo Espanol
34	Eurocaja rural
35	Caja Rural de Albacete Ciudad Real Y Cuenca SCC
36	Caja Rural del Sur S Coop de Credito
37	Santander Securities Services SA
38	Caja Rural de Granada
39	Credit Suisse Securities Sociedad De Valores SA
40	Wizink Bank SA

41	Caja Rural de Aragón Sociedad Cooperativa de Crédito
42	Caja Rural de Asturias
43	EVO Banco SA
44	Caixa de Credit dels Enginyers S Coop de Credit-Caja de Crédito de Los Ingenieros Sociedad Coopérativ
45	Banco Caminos SA
46	Bank of Tokyo - Mitsubishi UFJ Ltd
47	Allfunds Bank SA
48	Bilbao Bizkaia Kutxa BBK Fundacion Bancaria
49	Caja Rural de Jaen Barcelona y Madrid Sociedad Cooperativa de Credito
50	Banque PSA Finance
51	CajaSiete Caja Rural
52	Targobank SA
53	PSA Financial Services Spain EFC SA
54	Crédit Suisse AG
55	Bankoa SA
56	Caja Rural de Almendralejo Sociedad Cooperativa de Credito
57	Banco Mediolanum SA
58	Banesco Holding
59	Caja Rural de Burgos Fuentepelayo Segovia Y Castelldans SCC
60	Caja Rural de Zamora
61	Institut Catala de Finances
62	Arquia Bank SA
63	Novo Banco SA Sucursal En Espana
64	Caja Rural Central Sociedad Cooperativa de Crédito
65	Caixa Popular-Caixa Rural SCCV
66	Aresbank SA
67	Fundacion Bancaria Kutxa-Kutxa
68	BBVA Senior Finance SAU
69	Renta 4 Banco SA
70	Caja Rural de Soria Sociedad Cooperativa de Crédito
71	Banca Pueyo SA
72	Caja Rural de Teruel Sociedad Cooperativa de Crédito
73	Sabadell Consumer Finance SA
74	EBN Banco de Negocios SA-EBN Banco
75	Nuevo Micro Bank SA
76	Caja Rural de Extremadura Sociedad Cooperativa de Credito
77	Bancofar SA
78	Andbank Espana SA
79	Banco Pichincha Espana SA
80	Caja de Ahorros y Monte de Piedad de Ontinyent - Caixa Ontinyent

81	Caixa Rural Galega Sociedad Cooperativa de Crédito Limitada Gallega
82	Popular Banca Privada
83	Caja Rural de Salamanca Sociedad Cooperativa de Crédito
84	Caja Rural de Guissona Sociedad Cooperative de Crédito
85	JP Morgan Chase Bank
86	BMCE Bank International SA-BMCE International
87	BPE Financiaciones SA
88	Banco Finantia Spain SA
89	Banco Inversis SA
90	Colonya Caixa d'Estalvis de Pollensa
91	General Electric Money Financial Services SLU-GE Capital Bank
92	Caixa Rural Torrent Cooperativa de Credit Valenciana
93	Bnp Paribas Sa Sucursal En Espana
94	Self Trade Bank SA
95	A&G Banca Privada SA
96	Citibank España
97	Caja Rural de Gijon Cooperativa de Credito
98	Caja Rural Catolico Agraria Sociedad Cooperativa de Crédito Valenciana
99	Caja Rural San Jose de Almassora Sociedad Cooperativa de Crédito Valenciana
100	Caja Rural Nuestra Senora de la Esperanza de Onda Sociedad Cooperativa de Crédito Valenciana
101	Grupo Ahorro Corporacion-Ahorro Corporacion SA
102	Eurofactor Hispania SAU EFC
103	Caixa Rural Benicarlo S Coop de Credito V
104	Caja Rural San Jose de Alcora S Coop de Credito V
105	Caja Rural Regional San Agustin Fuente Alamo Murcia Socidedad Cooperative de Crédito
106	Caixa Rural La Vall 'San Isidro' Sociedad Cooperativa de Crédito Valenciana
107	Caixa Rural d'Algemesi SCVC
108	Banco Alcala
109	Caixa Rural Altea Cooperativa de Credit Valenciana
110	Santander Investment SA
111	Caixa Rural de l'Alcudia Sociedad Cooperativa Valenciana de Crédito
112	Caja Rural de Utrera Sociedad Cooperativa Andaluza de Credito
113	Mapfre Inversion Sociedad De Valores SA
114	Caja Rural San Jose de Burriana S Coop de Crédito V
115	Caixa Rural Vinaros S Coop de Credit V
116	Caja de Credito de Petrel Caja Rural Cooperativa de Credito Valenciana
117	Caja de Ahorros de Murcia - Cajamurcia
118	Caja Rural de Betxi S Coop de Credito Valenciana
119	Caixa Rural de Callosa d'En Sarria Cooperativa de Crédito Valenciana
120	COFIDES-Compañía Española de Financiación del Desarrollo SA

121	Bank Degroof Petercam Spain SA
122	Caja Rural de Baena Nuestra Senora de Guadalupe Sociedad Cooperativa de Crédito Andaluza Baena
123	Caja Rural San Jose de Nules Sociedad Cooperativa de Crédito Valenciana
124	Monte de Piedad y Caja General de Ahorros de Badajoz-Caja Badajoz
125	Instituto De Finanzas De Cantabria
126	Caja General de Ahorros de Granada - La General
127	Caja Rural de Cheste Sociedad Cooperativa de Credito
128	Caixa Rural Sant Vicent Ferrer de La Vall d' Uixo Coop de Credit V
129	Caja Rural Nuestra Senoria Del Rosario De Nueva Carteya
130	Caja Rural San Jaime de Alquerias Nino Perdido Sociedad Cooperativa de Crédito Valencia
131	Banco de la Nacion Argentina
132	CIMD Group
133	Sociedad de Avales y Garantias de Andalucia SGR
134	Caja Rural de Canete de Las Torres Nuestra Senora del Campo Sociedad Cooperativa Andaluza de Crec
135	Caja Rural de Alginet Sociedad Cooperativa Credito Valenciana
136	Caja Rural de Albal Coop Credito Valenciana
137	Caja Rural de Villamalea S Coop de Credito Agrario de Castilla-La Mancha
138	Banco de Depósitos SA
139	Caja Rural de Villar Coop de Credito V
140	Caja Rural 'Nuestra Madre del Sol' Sociedad Cooperativa Andaluza de Crédito
141	Caja de Ahorros y Monte de Piedad de las Baleares - Sa Nostra
142	Caja Rural de Casa Ibanez S Coop De Credito de Castilla-La Mancha
143	Caixa Rural Sant Josep de Vilavella S Coop de Crédito V
144	Caixa Rural de Turis Cooperativa de Credito Valenciana
145	Caixa Rural les Coves de Vinroma S Coop de Credit V
146	Banco Industrial de Bilbao SA
147	Caixa Rural Albalat dels Sorells Cooperativa de Credit Valenciana
148	Caja Rural San Roque de Almenara S Coop de Credito V
149	Banco Europeo de Finanzas SA
150	Deutsche Bank Trust Company Americas
151	Caja Rural la Junquera de Chilches S Coop de Credito V
152	Caja Rural San Isidro de Vilafames S Coop de Credito Valenciana
153	Intermoney Valores Sociedad de Valores SA
154	Ahorro Corporacion Financiera SV SA

A2. High-Deposit Ratio Bank Sample

id	Bank Name
1	Abanca Holding Financiero Sa
2	Grucajrural Inversiones SL
3	CECABANK SA
4	Banco Cetelem SA
5	Open Bank SA
6	Caja Rural de Albacete Ciudad Real Y Cuenca SCC
7	Caja Rural del Sur S Coop de Credito
8	Santander Securities Services SA
9	Credit Suisse Securities Sociedad De Valores SA
10	Wizink Bank SA
11	Caja Rural de Aragón Sociedad Cooperativa de Crédito
12	EVO Banco SA
13	Bilbao Bizkaia Kutxa BBK Fundacion Bancaria
14	PSA Financial Services Spain EFC SA
15	Caja Rural de Almendralejo Sociedad Cooperativa de Credito
16	Banesco Holding
17	Caja Rural de Burgos Fuentepelayo Segovia Y Castelldans SCC
18	Institut Catala de Finances
19	Arquia Bank SA
20	Novo Banco SA Sucursal En Espana
21	Caixa Popular-Caixa Rural SCCV
22	Fundacion Bancaria Kutxa-Kutxa
23	BBVA Senior Finance SAU
24	Caja Rural de Soria Sociedad Cooperativa de Crédito
25	Banca Pueyo SA
26	Caja Rural de Teruel Sociedad Cooperativa de Crédito
27	Sabadell Consumer Finance SA
28	Caja Rural de Extremadura Sociedad Cooperativa de Credito
29	Andbank Espana SA
30	Banco Pichincha Espana SA
31	Caixa Rural Galega Sociedad Cooperativa de Crédito Limitada Gallega
32	Caja Rural de Salamanca Sociedad Cooperativa de Crédito
33	Caja Rural de Guissona Sociedad Cooperative de Crédito
34	JP Morgan Chase Bank
35	BPE Financiaciones SA
36	Colonya Caixa d'Estalvis de Pollensa
37	General Electric Money Financial Services SLU-GE Capital Bank
38	Caixa Rural Torrent Cooperativa de Credit Valenciana
39	Bnp Paribas Sa Sucursal En Espana
40	Self Trade Bank SA

41	A&G Banca Privada SA
42	Citibank España
43	Caja Rural Catolico Agraria Sociedad Cooperativa de Crédito Valenciana
44	Caja Rural San Jose de Almassora Sociedad Cooperativa de Crédito Valenciana
45	Caja Rural Nuestra Senora de la Esperanza de Onda Sociedad Cooperativa de Crédito Valenciana
46	Eurofactor Hispania SAU EFC
47	Caixa Rural Benicarlo S Coop de Credito V
48	Caja Rural San Jose de Alcora S Coop de Credito V
49	Caja Rural Regional San Agustin Fuente Alamo Murcia Socidedad Cooperative de Crédito
50	Caixa Rural La Vall 'San Isidro' Sociedad Cooperativa de Crédito Valenciana
51	Caixa Rural d'Algemesi SCVC
52	Banco Alcala
53	Caixa Rural Altea Cooperativa de Credit Valenciana
54	Caixa Rural Vinaros S Coop de Credit V
55	Caja de Credito de Petrel Caja Rural Cooperativa de Credito Valenciana
56	Caja de Ahorros de Murcia - Cajamurcia
57	Bank Degroof Petercam Spain SA
58	Caja Rural de Baena Nuestra Senora de Guadalupe Sociedad Cooperativa de Crédito Andaluza Baena
59	Monte de Piedad y Caja General de Ahorros de Badajoz-Caja Badajoz
60	Caja General de Ahorros de Granada - La General
61	Caja Rural Nuestra Senoria Del Rosario De Nueva Carteya
62	Sociedad de Avales y Garantias de Andalucia SGR
63	Caja Rural de Albal Coop Credito Valenciana
64	Caja de Ahorros y Monte de Piedad de las Baleares - Sa Nostra
65	Caixa Rural Sant Josep de Vilavella S Coop de Crédito V
66	Caixa Rural de Turis Cooperativa de Credito Valenciana
67	Caixa Rural les Coves de Vinroma S Coop de Credit V
68	Caixa Rural Albalat dels Sorells Cooperativa de Credit Valenciana
69	Banco Europeo de Finanzas SA
70	Deutsche Bank Trust Company Americas

A3. Low-Deposit Ratio Bank Sample

id	Bank Name
1	Banco Santander SA
2	Banco de España
3	Banco Bilbao Vizcaya Argentaria SA-BBVA
4	Caixabank SA
5	Banco de Sabadell SA
6	BFA Tenedora de Acciones SAU
7	Bankia SA
8	Santander Consumer Finance
9	Bankinter SA
10	Fundacion Bancaria Ibercaja
11	Kutxabank SA
12	Abanca Corporacion Bancaria SA
13	Unicaja Banco SA
14	Ibercaja Banco SA
15	Cajamar Caja Rural SCC
16	Fundacion Bancaria Unicaja-Unicaja
17	Banco De Credito Social Cooperativo Sa
18	Liberbank SA
19	Instituto de Crédito Oficial
20	Fundacion Bancaria Caixa D Estalvis I Pensions De Barcelona
21	Criteria Caixa-Criteria CaixaHolding SA
22	Laboral Kutxa
23	Deutsche Bank SAE
24	Banca March SA
25	Caja Rural de Navarra Sociedad Cooperativa de Crédito
26	Cajasur Banco SA
27	Confederación Española de Cajas de Ahorros - CECA
28	Banco Cooperativo Espanol
29	Eurocaja rural
30	Caja Rural de Granada
31	Caja Rural de Asturias
32	Caixa de Credit dels Enginyers S Coop de Credit-Caja de Crédito de Los Ingenieros Sociedad Coopérativ
33	Banco Caminos SA
34	Bank of Tokyo - Mitsubishi UFJ Ltd
35	Allfunds Bank SA
36	Caja Rural de Jaen Barcelona y Madrid Sociedad Cooperativa de Credito
37	Banque PSA Finance
38	CajaSiete Caja Rural
39	Targobank SA
40	Crédit Suisse AG

41	Bankoa SA
42	Banco Mediolanum SA
43	Caja Rural de Zamora
44	Caja Rural Central Sociedad Cooperativa de Crédito
45	Aresbank SA
46	Renta 4 Banco SA
47	EBN Banco de Negocios SA-EBN Banco
48	Nuevo Micro Bank SA
49	Bancofar SA
50	Caja de Ahorros y Monte de Piedad de Ontinyent - Caixa Ontinyent
51	Popular Banca Privada
52	BMCE Bank International SA-BMCE International
53	Banco Finantia Spain SA
54	Banco Inversis SA
55	Caja Rural de Gijon Cooperativa de Credito
56	Grupo Ahorro Corporacion-Ahorro Corporacion SA
57	Santander Investment SA
58	Caixa Rural de l'Alcudia Sociedad Cooperativa Valenciana de Crédito
59	Caja Rural de Utrera Sociedad Cooperativa Andaluza de Credito
60	Mapfre Inversion Sociedad De Valores SA
61	Caja Rural San Jose de Burriana S Coop de Crédito V
62	Caja Rural de Betxi S Coop de Credito Valenciana
63	Caixa Rural de Callosa d'En Sarria Cooperativa de Crédito Valenciana
64	COFIDES-Compañía Española de Financiación del Desarrollo SA
65	Caja Rural San Jose de Nules Sociedad Cooperativa de Crédito Valenciana
66	Instituto De Finanzas De Cantabria
67	Caja Rural de Cheste Sociedad Cooperativa de Credito
68	Caixa Rural Sant Vicent Ferrer de La Vall d' Uixo Coop de Credit V
69	Caja Rural San Jaime de Alquerias Nino Perdido Sociedad Cooperativa de Crédito Valencia
70	Banco de la Nacion Argentina
71	CIMD Group
72	Caja Rural de Canete de Las Torres Nuestra Senora del Campo Sociedad Cooperativa Andaluza de Crec
73	Caja Rural de Alginet Sociedad Cooperativa Credito Valenciana
74	Caja Rural de Villamalea S Coop de Credito Agrario de Castilla-La Mancha
75	Banco de Depósitos SA
76	Caja Rural de Villar Coop de Credito V
77	Caja Rural 'Nuestra Madre del Sol' Sociedad Cooperativa Andaluza de Crédito
78	Caja Rural de Casa Ibanez S Coop De Credito de Castilla-La Mancha
79	Banco Industrial de Bilbao SA
80	Caja Rural San Roque de Almenara S Coop de Credito V

81	Caja Rural la Junquera de Chilches S Coop de Credito V
82	Caja Rural San Isidro de Vilafames S Coop de Credito Valenciana
83	Intermoney Valores Sociedad de Valores SA
84	Ahorro Corporacion Financiera SV SA

Figures

Figure 1

Figure 1 shows the amounts pf public sector purchase programme (PSPP), third covered purchase programme (CBPP3), corporate sector purchase programme (CSPP), asset-backed securities purchase progeamme and average monthly APP target for the period of 2015 to 2020.

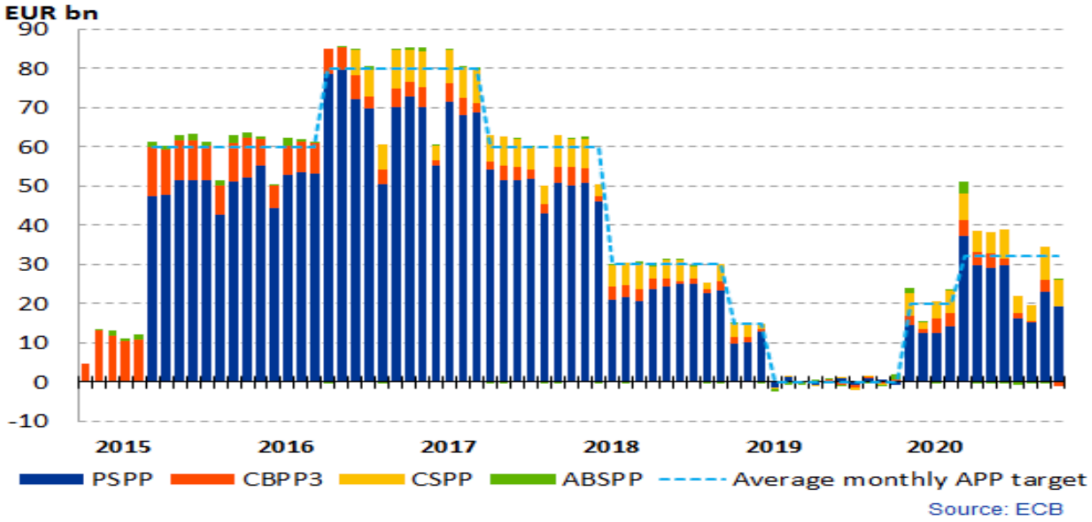
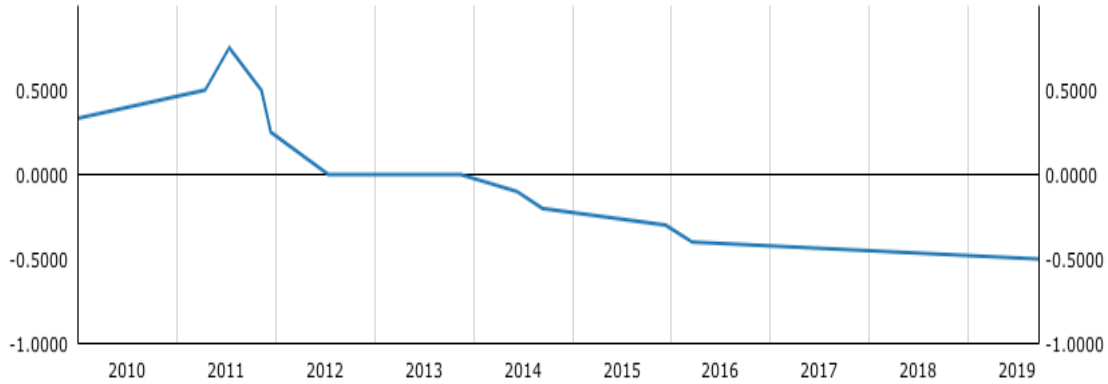


Figure 2: ECB Deposit facility rate - Level

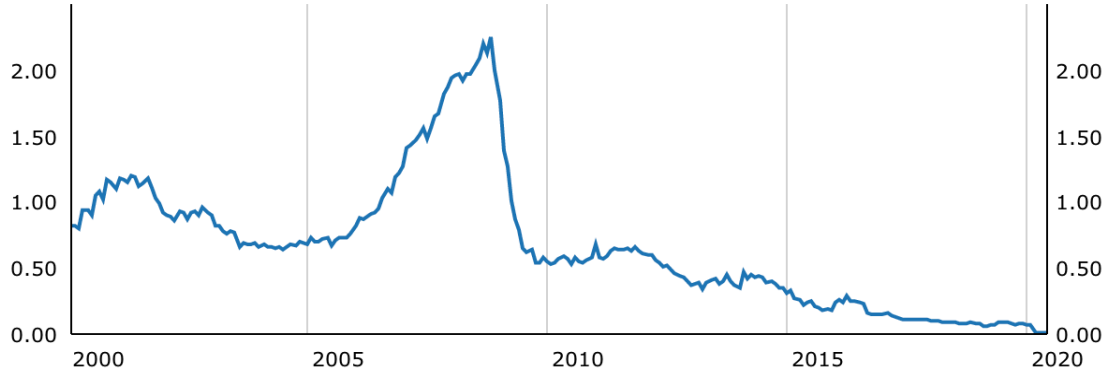
The figure shows the evolution of the deposit facility rate offered by ECB from 2010 to 2020.



Sources: European Central Bank

Figure 3: Bank interest rates - overnight deposits from corporations – Spain

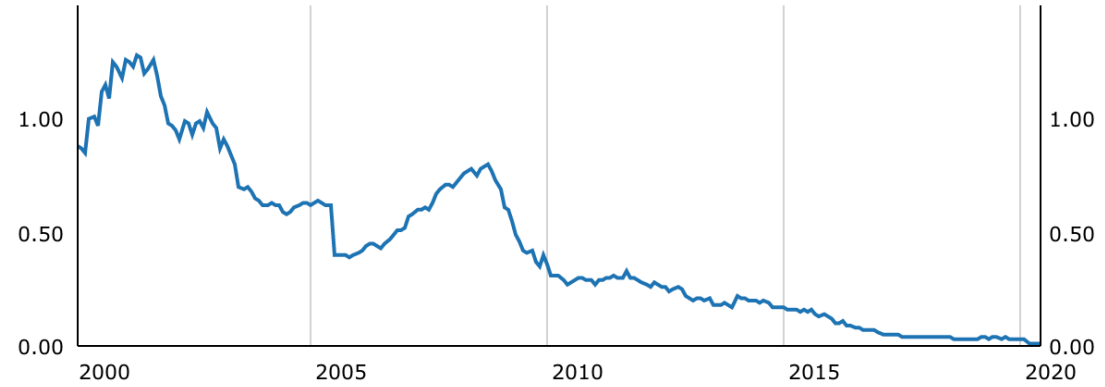
The figure shows the evolution of bank interest rates in overnight deposits from corporations in Spain from 2000 to 2020.



Sources: European Central Bank, Banco De España

Figure 4: Bank interest rates - overnight deposits from households – Spain

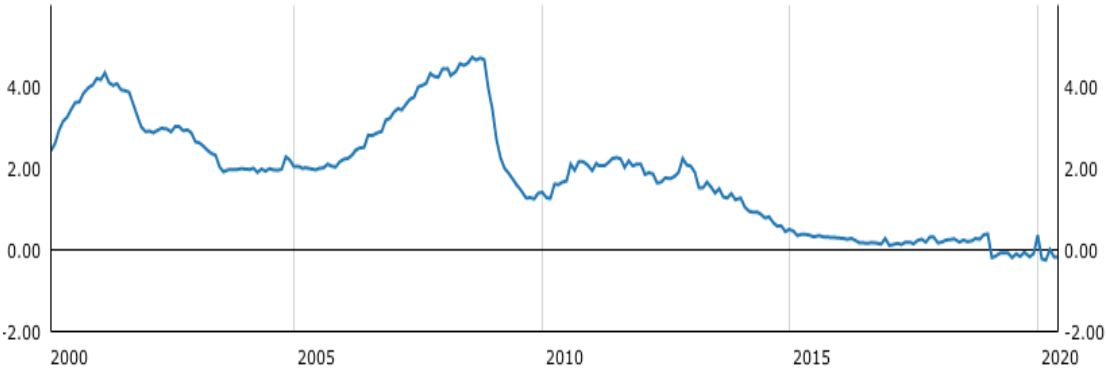
The figure shows the evolution of bank interest rates in overnight deposits from households in Spain from 2000 to 2020.



Sources: European Central Bank, Banco De España

Figure 5: Bank interest rates - deposits from corporations with an agreed maturity of up to one year (new business) – Spain

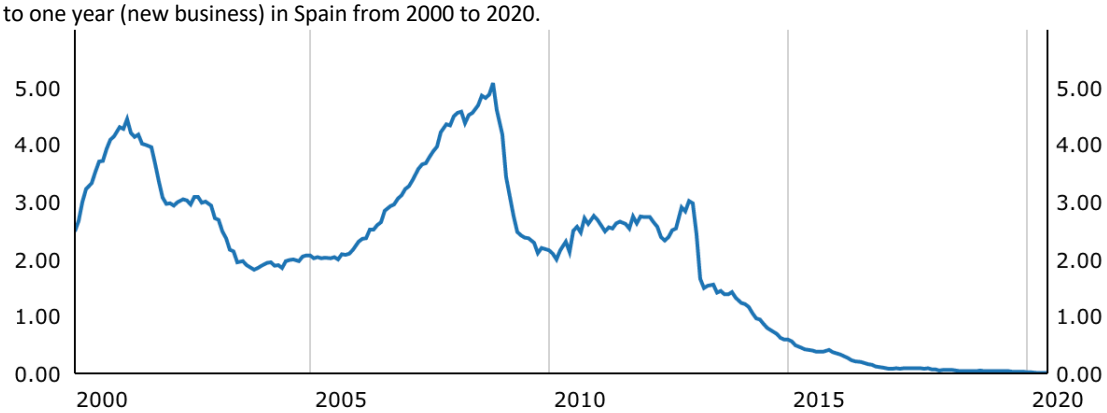
The figure shows the evolution of bank interest rates in deposits from corporations with an agreed maturity of up to one year (new business) in Spain from 2000 to 2020.



Sources: European Central Bank, Banco De España

Figure 6: Bank interest rates - deposits from households with an agreed maturity of up to one year (new business) – Spain

The figure shows the evolution of bank interest rates in deposits from households with an agreed maturity of up to one year (new business) in Spain from 2000 to 2020.



Sources: European Central Bank, Banco De España

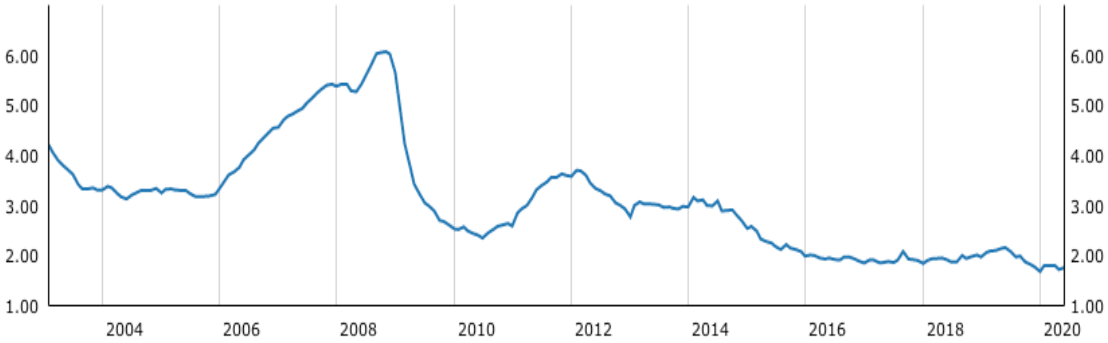
Figure 7: Cost of borrowing for corporations – Spain

The figure shows the evolution of bank interest rates in loans to corporations in Spain from 2003 to 2020.

Sources: European Central Bank, Banco De España

Figure 8: Cost of borrowing for households for house purchase – Spain

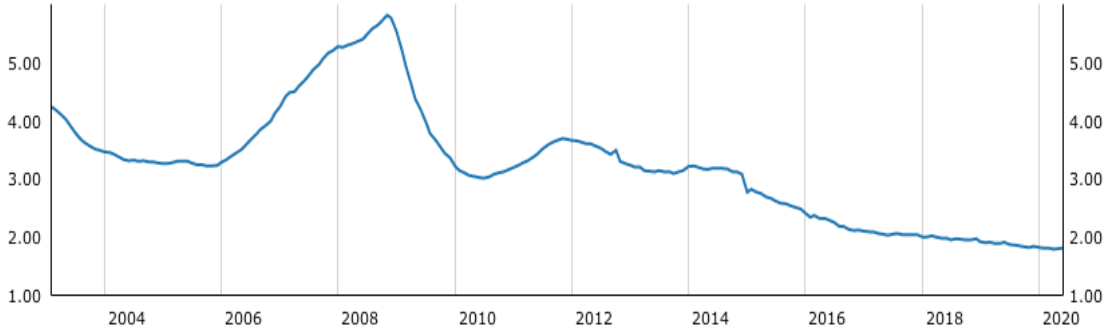
The figure shows the evolution of bank interest rates in loans to households for house purchase in Spain from 2003 to 2020.



Sources: European Central Bank, Banco De España

Figure 9: Bank interest rates - loans to corporations with an original maturity of over five years (outstanding amounts) – Spain

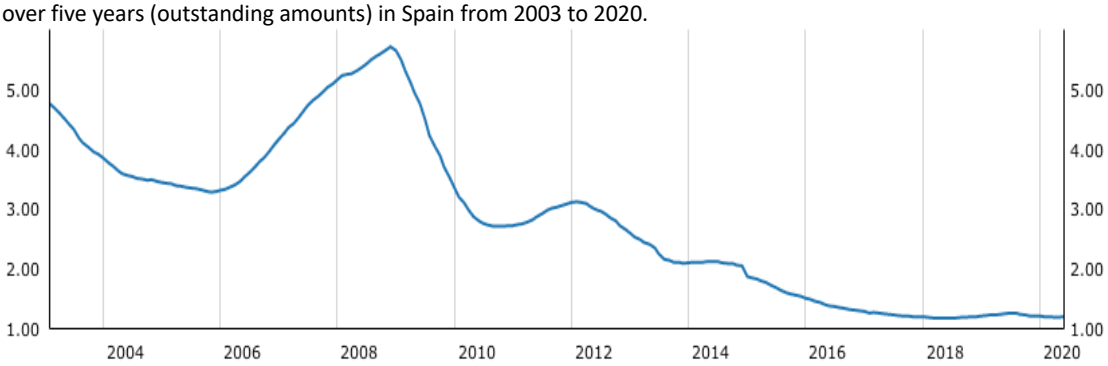
The figure shows the evolution of bank interest rates in loans to corporations with a maturity of over five years (outstanding amounts) in Spain from 2003 to 2020.



Sources: European Central Bank, Banco De España

Figure 10: Bank interest rates - loans to households for house purchase with an original maturity of over five years (outstanding amounts) - Spain

The figure shows the evolution of bank interest rates in loans to households for house purchase with a maturity of over five years (outstanding amounts) in Spain from 2003 to 2020.



Sources: European Central Bank, Banco De España

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