# Euro area credit market: who contributed to the recent recovery?

### **Carla Soares** Banco de Portugal

### Abstract

The dispersion of bank lending conditions in the euro area has increased substantially with the sovereign crisis. What is the importance of the close links between sovereign and banks during the recent credit recovery period, in the context of deepening the banking union? In this article, we examine the recent evolution of euro area bank credit according to some characteristics of the banks that are often associated with their vulnerabilities, and bearing in mind that links with their sovereign can stress such vulnerabilities. Apparently, banks perceived to be the most vulnerable seem to have experienced weaker lending developments in the private sector relative to the remaining ones. When control factors are included, the results suggest that country-specific factors, including the position in the business cycle, are relevant for the supply of credit and correlate with the degree of vulnerability of banks. The conclusions should be read with due caution, in particular conclusions on causation can not be drawn. (JEL: E58, E65, G20)

**B** ank lending growth in the euro area was more heterogeneous during the recent crisis period. In fact, there was a geographical fragmentation, in which the evolution of credit in the countries considered as vulnerable was much lower than in the countries with high credit rating. Fragmentation was associated with the close links between the sovereign and the country's banking system. Beyond this factor, the individual characteristics of banks may also be related to the heterogeneity observed in the evolution of euro area bank lending. In fact, banks with capital or balance sheet restrictions will be expected to have their ability to provide credit limited. For example, there is evidence that smaller, less capitalized and less liquid banks respond more strongly to a monetary policy impulse (Stein and Kashyap 2000). These banks will be less able to replace sources of financing and will therefore be more vulnerable to shocks.

This article explores this theme in the euro area over the last few years, trying to understand the relationship between the evolution of loans and some banks' characteristics, including some indicators of how the market perceives

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E-mail: csoares@bportugal.pt

them and factors associated with the home country. The analysis focuses on the recovery period of the euro area banks credit market, using data from January 2014 to December 2018. It is therefore sought to understand whether the recovery of lending in the euro area was due most to banks regarded as more robust per se, trying to separate the vulnerability related to country risk. The main source of data consists of an individual confidential database of Eurosystem banks (Individual Balance Sheet Items - IBSI), crossing it with individual report data (SNL) on bank characteristics. The results obtained can be justified in the light of some hypotheses about the transmission mechanisms. Banks with characteristics closer related to robustness, such as higher regulatory capital levels or higher credit ratings, would have contributed relatively more to the recovery of lending in the euro area. These are banks that would have lower balance sheet restrictions and lower financing costs, and thus would be able to transmit more favourable credit conditions. Nevertheless, these characteristics are closely related to countryspecific factors, which is in line with recent studies on the amplification effects of sovereign-banking nexus in face of adverse conditions.

The conclusions of this article should be read with due caution, since the analysis focuses on correlations between growth of bank loans and banks' characteristics, without proper control over other factors, in particular on the demand side of credit, not being due conclusions on causality effects.

The article begins with a brief description of the evolution of the banking lending market in the euro area over the past few years, and then goes on to characterize the banking system according to a set of bank indicators. In the third section, a graphical analysis is presented on the correlation between the evolution of bank credit and these characteristics. This assessment is further elaborated in the fourth section with an econometric analysis in which some factors are better controlled, although we are still unable to distinguish supply and demand factors for credit. The article ends with some final considerations.

### How have bank loans developed in the euro area?

The growth of bank lending in the euro area began to slow at the beginning of the second half of the 2000s, showing a sharp decline with the onset of the financial crisis in 2008 (Figure 1). With the sovereign crisis, the growth of bank credit reached minimum rates of change in early 2014, having even contracted in several countries, in particular those more vulnerable to the sovereign crisis (referred to in this article as the periphery)<sup>1</sup>, and more pronouncedly for non-financial corporations.

<sup>1.</sup> Throughout the article, this group of countries is referred to as the periphery and consists of Portugal, Spain, Italy, Ireland, Greece and Cyprus. The group of core countries consists of Germany, France, the Netherlands, Finland, Austria and Luxembourg. The banks from the





#### Source: ECB (author calculations).

Note: Annual growth rates based on the outstanding amount of loans to households and nonfinancial corporations adjusted for sales of loans, securitization and notional cash flows. Rates of change by region correspond to the averages weighted by the outstanding amounts of the respective country loans.

The recovery phase of bank credit in the euro area started from the end of 2013/early 2014, first on loans to households. In 2018, bank lending to households grew 3.3%, while loans to non-financial corporations grew 4%. However, there has been a considerable degree of dispersion in these growth rates between countries. Core countries continue to show stronger credit growth, while credit growth in peripheral countries remains fairly subdued, with growth rates close to 1%.

### How are euro area banks characterized?

Table 1 presents the average values for a set of variables relevant to the characterization of the euro area banking system in the period under review. To this end, confidential data on banks balance sheet items relevant for monetary and financial statistics (IBSI) was merged with individual information on bank characteristics.<sup>2</sup> Table 1 shows, based on balance sheet items, the average number of banks available in the database, the size of

remaining countries are a very small group, accounting for 4% of total loans to non-financial corporations and households in the euro area.

<sup>2.</sup> The sample of banks in the IBSI accounts for about 80% of the total assets of the euro area banking system.

the bank from total main assets and an outlook on loan portfolio based on the share of loans to households and non-financial corporations over total main assets and the share of loans to non-financial corporations. To further characterize the banks, the following indicators, available in the SNL database, were considered:

- Common Equity Tier 1 (CET1)
- Problem loans, measured as the ratio of non-performing loans, impaired, or other problematic loans over risk-weighted assets
- Credit rating, measured as the average credit rating available between the three major agencies (Moody's, Fitch and Standard & Poor's)
- Monthly average of the price-to-book ratio

The first three columns of this table present the statistics for the overall sample, and then disaggregated according to the group in which the banks conform to their characteristics. The groups based on CET1 and the problem loans ratio were defined according to the CET1 median and the problem loans ratio, respectively, that is, if the respective bank ratio in each year is below the median in the same year, this is assigned to the 'low' group. The ratingbased groups are defined in relation with the bank average credit rating of the three agencies in each year, if it is investment grade (above BBB+) or high yield (lower or equal to BBB+). The groups of banks based on the price-tobook ratio are defined according to the median of this ratio in January 2014.<sup>3</sup> Finally, the groups of core vs. periphery banks are defined according to the home country of the institution. The data resulting from the merge of the different information does not cover the entire sample because not all banks are listed, not all banks have a credit rating from the three agencies and not all banks have data available at SNL. In order to understand the importance of these groups of banks, the last two lines of table 1 show the percentage of the outstanding lending amount of each group in the total number of banks available at IBSI.

The average size of the banks as measured by total main assets decreased at the beginning of the period and recovered from 2016, so that the average bank in 2018 is slightly larger than the average bank in 2014. Despite this evolution of the total balance sheet, banks consistently increased their nonfinancial private sector lending portfolio to an average of 44% in 2018. This increase was made at the expense of household loans, although loans to nonfinancial corporations continue to account for more than half of their loan portfolio. Banks' vulnerability indicators have also shown improvements over the past few years. In fact, the average bank capital ratio has increased while the proportion of problem loans has declined since the peak reached in 2013.

<sup>3.</sup> In this case, the sample of banks in each group is constant over time, while it is variable for the three types of previous groups.

In general, banks that can be perceived as more vulnerable (low CET1, low problem loans, low rating, low price-to-book, resident in the periphery) present values for the different types of indicators that consistently point to greater vulnerability, although the differences are less marked according to the bank's capital level. For example, banks with higher problem loan ratios show lower capital ratios, ratings and price-to-book ratios. Banks in peripheral countries also have values in these indicators that point to greater vulnerability.

There are some differences also in the size of the banks according to the groups, although apparently not associated with their vulnerability. Banks with lower capital ratios, higher credit ratings and from core countries tend to be larger banks and are more likely to be listed banks. The comparison of the loan portfolio among the groups of banks also reveals some interesting differences. Banks with a relatively smaller portfolio of private sector loans tend to have higher capital ratios and ratings, less problem loans and are more likely to be located in core countries.

	All banks			Groups of banks throughout 2014-2018									
	2014-2018	2014	2018	Low CET1	High CET1	Low PL	High PĹ	Low rating	High Rating	Low PB	High PB	Core	Periphery
Average number of banks	307	313	290	66	66	61	61	55	57	20	20	166	94
Total main assets (TMA)	77 652	75 493	82 517	135 000	60 529	106 000	101 000	98 533	131 000	219 000	104 000	101 000	62 989
Loans to households + NFC / TMA	43.2%	42.3%	44.3%	47.6%	43.9%	40.3%	50.7%	47.0%	39.3%	37.4%	53.6%	38.3%	48.2%
Share NFC	52.6%	53.9%	52.3%	49.3%	47.1%	51.9%	46.0%	49.1%	51.%	58.2%	46.6%	53.8%	53.2%
CET1	16.0%	14.4%	17.7%	11.8%	20.1%	16.4%	14.6%	15.5%	15.4%	13.6%	13.5%	16.0%	14.8%
Problem Loans (PL) / RWA	13.1%	14.6%	11.8%	13.5%	13.1%	3.6%	22.7%	18.5%	4.8%	21.0%	15.2%	5.4%	24.7%
Rating	BBB+	BBB+	BBB+	BBB+	BBB+	A	BBB-	BBB-	A+	BBB	BB+	A	BB+
Price-to-book (PB)	77.7%	100.0%	72.9%	80.5%	70.9%	86.6%	72.1%	74.3%	77.6%	61.5%	97.3%	78.3%	67.8%
Loans to households / total sample				34.1%	17.3%	19.3%	29.7%	24.3%	21.8%	9.9%	13.4%	67.7%	28.2%
Loans to NFC / total sample				38.9%	17.1%	23.6%	31.0%	26.9%	25.3%	15.0%	13.7%	63.1%	33.0%

TABLE 1. Descriptive statistics by groups of banks

Source: ECB and S&P Global Market Intelligence (SNL) (author calculations).

Note: Total main assets in millions of euros. The rating is given by the average of the credit ratings of the three major agencies (Moody's, Fitch and Standard & Poor's), that are converted into an ordinal scale equivalent between the three agencies. Loans to households (NFC) / total sample is the percentage of the amount of loand to household (NFC) of the respective group of banks in the total sample.

# Is there a relationship between the evolution of bank loans and the characteristics of banks?

This section presents a graphical analysis of the relationship between recent developments in bank lending in the euro area and the characteristics of the banks referred to in the previous section. It is therefore sought to determine whether there is a differentiated behaviour between banks that may help explaining the contributes to the recovery of bank credit supply in the euro area, although it is not possible to distinguish possible effects on the demand side of credit.

There is already some discussion in the economic literature about the influence of different characteristics of banks on the supply of credit, which will be briefly presented below.

In principle, a higher capital cushion allows the bank to absorb negative shocks in its balance sheet with less need to reduce its assets, particularly the loan portfolio. Alternatively, banks may seek to keep the capital ratio constant, thus managing assets in order to achieve this goal. According to some studies on the effect of capital ratios and regulatory requirements on lending, less capitalized banks are more vulnerable to negative shocks and more susceptible to restrict credit, although the level of capital per se does not appear to be a relevant determinant in credit granting (Berrospide and Edge 2010; Gambacorta and Mistrulli 2004).

Another of the internal indicators considered is the ratio of problem loans as a percentage of risk-weighted assets. Indicators such as these related to the level of non-performing loans have gained attention in recent years, raising frequent questions about their possible impact on credit supply and economic activity (Aiyar et al. 2015). A bank with more non-performing loans not yet written down in the assets may need to deleverage, which may limit its ability to provide credit. Their prospects for future profitability may also be more contained. Thus, banks with these characteristics may be subject to higher financing costs, which may limit their lending activity. Correctly identifying the effect of non-performing loans on credit supply is difficult, since weak economic activity also leads to lower demand for credit and an increase in defaults. The studies on these effects are meager and arrive at different conclusions. In particular, Cucinelli (2015) finds a negative effect of the level of non-performing loans (NPL) on the credit supply, whereas cite Accornero17 find a negative effect of the NPL variation but not its level . Related to these effects, Segura and Suarez (2019) recognize that delaying the recognition of NPL prevents the granting of new credit, although the optimal solution is located at an intermediate point that reduces the possibility of bank resolution.

The capital ratio and the problem loan ratio are internal indicators of the bank's "quality", not revealing external perception about the bank. The way a bank is perceived by the market also influences its capacity and its financing costs, affecting its ability to grant credit. The main mechanism for assessing the importance of these indicators in terms of lending is thus via the financing costs of banks. A bank with a higher credit rating should benefit from more favourable terms. A bank with a lower market capitalization will have higher financing costs, which may limit its ability to provide credit.

Figure 2 shows charts with the evolution of bank loans according to banks' internal indicators. Graphs (A) and (B) show the evolution of loans according to the banks' capital level. The more capitalized banks appear to have expanded loans to households more than the less capitalized banks, but in the case of loans to non-financial corporations there appears to be no distinction between the two groups. It could be argued that the relevant distinction should be based on the distance between the observed ratio and the regulatory limit rather than on the ratio itself. However, within the available sample, the number of observations in which the capital ratio is close to the minimum requirements in terms of the CET1 ratio is very small, with no requirements for Pillar II being considered.<sup>4</sup>

The graphs (C) and (D) of Figure 2 panel show the relationship between the evolution of bank loans and the share of problem loans. By dividing the banks into two groups, below and above the median, there is a weaker growth in lending, both for households and for non-financial corporations, for banks with a higher ratio. The difference between the median annual rate of change in loans between the two groups is around 4 pp, both for loans to households and for non-financial corporations. Although this relationship appears to be in line with concerns about the effect of recognizing or not non-performing loans in banks' balance sheet, the ratio also likely reflects weak credit demand, especially in countries where the crisis had stronger effects and led to higher levels of defaults.

The graphs in Figure 3 show the evolution of bank loans according to the bank's external indicators. Charts (A) and (B) show the evolution of credit according to banks' credit rating and support the hypothesis that a bank with a higher credit rating benefits from lower financing costs, allowing it to granting of credit. Over the period under review, the median lending growth for both households and non-financial corporations in the group of high-rated banks was around 5 pp higher than the median growth of the high yield banks.

Finally, the evolution of bank loans was assessed according to the market valuation of each bank (charts (C) and (D)). In this case, it should be recalled that there may be some bias in the sample since it only includes listed banks. In this period, it appears that the growth of loans to households was slightly lower in banks with lower market value. In the case of loans to non-financial corporations, there appears to be no significant relationship between the price-to-book ratio and loan growth.

<sup>4.</sup> Total capital ratio was also tested for and the conclusions remain.



-Euro area -

(A) Loans to households according to CET1

-Low CET1



v.17 Sep.18 Jan.12 Nov.12 Sep.13 Jul.14 May.15 Mar.16 Jan.17 Nov.17 Sep.18 -High CET1 Interquartile range — Euro area — Low CET1 — High CET1

(B) Loans to NFC according to CET1



(C) Loans to households according to the problem loans ratio

(D) Loans to NFC according to the problem loans ratio

FIGURE 2: Bank loans in the euro area according to internal indicators | Annual rate of change, percentage

Source: ECB and S&P Global Market Intelligence (SNL) (author calculations).

Note: The annual rates of change for the euro area are calculated on the basis of the adjusted outstanding amount of loans to households and non-financial corporations. In the individual data, annual rates of change of unadjusted balances are used; loans to non-financial corporations have a maturity of more than one year. The interquartile range of individual annual rates of change is based on 245 banks with loans to households and 259 banks with loans to non-financial corporations. CET1 low (high) corresponds to the median of the rate of change for an average group of 72 (71) banks with a smaller capital ratio (higher) than the median in each year. PL/RWA high (low) corresponds to the median of the rate of change group of 64 (64) banks with the ratio above (below) the median in each year.

The information presented suggests that the aggregate evolution of lending in the euro area hides a high degree of heterogeneity, which may be related to the type of bank, its business model, its balance sheet or the constraints it may face, as well as factors related to the country where it is located. It appears that in the euro area, banks perceived to be the most vulnerable seem to show a weaker trend in lending to the private sector than the remaining banks. It should be recalled, however, that no potential effect from the demand side is taken into account in this analysis. In the next section, we look for a more detailed analysis on the relevance of these characteristics together with factors associated to the country.

Interquartile range



(C) Loans to households according to the priceto-book ratio (D) Loans to book ratio

(D) Loans to NFC according to the price-tobook ratio

FIGURE 3: Bank loans in the euro area according to external indicators | Annual rate of change, percentage

Source: ECB and S&P Global Market Intelligence (SNL) (author calculations).

Note: The annual rates of change for the euro area are calculated on the basis of the adjusted outstanding amount of loans to households and non-financial corporations. In the individual data, annual rates of change of unadjusted balances are used; loans to non-financial corporations have a maturity of more than one year. The interquartile range of individual annual rates of change is based on 245 banks with loans to households and 259 banks with loans to non-financial corporations. Low rating is the median of the rate of change for an average group of 56 (61) banks with the average credit rating of the three major agencies less than or equal to BBB + in each year. Low (high) price-to-book corresponds to the median of the rate of change for an average group of 22 (22) banks with a ratio below (above) the median in January 2014.

# Were the characteristics of the banks relevant to the recovery of bank credit?

As mentioned earlier, there appears to be some association between the country of origin of the bank and its degree of vulnerability, as banks resident in peripheral countries appear to be more vulnerable. At the same time, it is also on the periphery that the growth of bank lending has been weaker since the start of the financial crisis. This association is in line with the close links between banks and sovereign that has been explored in the literature. Dell'Ariccia *et al.* (2018) identify three channels of liaison between

banks and sovereigns, namely via banks' exposure to sovereign debt, via government guarantees on banks and via the common macroeconomic effects on banks and sovereign. In adverse environments such as that of the euro area sovereign crisis, the vulnerabilities of the two sectors are reinforced by feedback effects that amplify and accelerate the negative consequences (Farhi and Tirole 2018). According to Altavilla *et al.* (2017), during the eurozone sovereign crisis, banks more exposed to troubled sovereigns cut more credit during periods of stress and granted more credit when the tension in the markets eased. Evidence suggests that there is indeed a strong correlation between bank vulnerabilities and sovereign vulnerability that should significantly affect the supply of credit. In addition, demand for credit is also influenced by the macroeconomic conditions of the country and, consequently, by the sovereign.

In this context of strong factors interconnection, this section seeks to analyse the relationship between banks' vulnerabilities and the evolution of bank credit during the favourable context of recovery, aiming at partly isolating the effect of country factors. If during the crisis the fall in credit was stronger in the most vulnerable countries partly due to the sovereign-banks nexus, as measures were introduced that seek to mitigate these links, can credit developments be less dependent on country factors and more related to idiosyncratic factors of the banks?

For this purpose, panel regressions were estimated using as a dependent variable the change of the logarithms of the outstanding amount of loans to non-financial corporations and households and, as independent variables, the banks indicators evaluated previously, interacting properly with the region (core or periphery). Several fixed effects are included in the analysis in a progressive way. First, fixed time and country effects are included to capture the specific macroeconomic conditions across countries over the business cycle. Secondly, we include fixed-effects at the bank level to try to control for other bank characteristics that may influence their credit granting behaviour.<sup>5</sup> Thus, the results of the regressions should be interpreted as the effect of the independent variable for the same bank over time after withdrawing the effect of the particular economic cycle of the country. The standard errors of the regressions are clustered by country, based on the assumption that errors may be correlated between banks in the same country, being a more demanding approach to data. The results presented below follow a line of reasoning from a general viewpoint to an individual one, i.e. it begins with the relationships for the euro area for total loans to the non-financial private sector, to then disaggregate by counterpart of loans and by region.

<sup>5.</sup> It should be noted that the specification with fixed effects by bank may be too demanding for relatively small samples by absorbing too much variability of the data.

Table 2 presents the results of regressions on the annual rate of change of loans without distinction by geographical region, in three sets of columns for total loans to the non-financial private sector, loans to non-financial corporations and loans to households. The first column of each set shows the coefficients for a linear regression without any control other than the simultaneous inclusion of the capital ratio, the problem loans ratio and the credit rating. There is a positive correlation between the growth of bank credit and the level of regulatory capital of banks, that is, banks with a larger capital cushion were those with stronger credit growth, and this behaviour is due to the dynamics of corporate lending. This result contrasts with the previous graphical analysis, which points to the relevance of other characteristics of the banks. Banks with higher credit ratings have also had stronger credit growth since 2014, again from the dynamics of corporate credit.<sup>6</sup>

<sup>6.</sup> Remember that credit rating is transformed into a numeric variable decreasing with the rating grade.

		NFC + Ho			NF		Households					
CET1	0.128***	0.030	0.344	0.196	0.188***	0.265	1.448*	1.536	0.043	0.023	0.172	0.014
	(0.039)	(0.205)	(0.251)	(0.357)	(0.071)	(0.180)	(0.750)	(1.000)	(0.072)	(0.109)	(0.288)	(0.179)
Prob. loans	0.016	-0.091**	-0.064	-0.006	0.040	-0.138***	-0.061	-0.115	0.071***	-0.050	-0.034	0.039
	(0.016)	(0.038)	(0.072)	(0.033)	(0.030)	(0.042)	(0.079)	(0.096)	(0.027)	(0.042)	(0.049)	(0.038)
Rating	-0.382***	-0.156	1.092	0.866	-0.711***	-0.275	0.990	0.609	0.056	0.148	0.819	0.707
0	(0.075)	(0.535)	(0.915)	(0.743)	(0.136)	(1.229)	(2.373)	(2.140)	(0.122)	(0.365)	(0.658)	(0.572)
Fixed effects	N	Country-Year	Bank	Bank and Country-Year	N	Country-Year	Bank	Bank and Country-Year	N	Country-Year	Bank	Bank and Country-Year
Cluster std. errors	N	Y	Y	Y	N	Y	Y	Y	N	Y	Y	Y
$N^{o}$ obs.	5,344	5,344	5,344	5,344	5,314	5,314	5,314	5,314	5,234	5,234	5,234	5,234
ĸ	0.009	0.172	0.298	0.381	0.008	0.123	0.355	0.410	0.003	0.097	0.299	0.350

### TABLE 2. Results of panel regressions for bank characteristics

Note: Panel regression having as a dependent variable the 12-month change in the logarithm of the loans outstanding amount (to non-financial corporations and / or households) and as independent variables the 12-month lagged level of the following variables: capital ratio CET1 of the bank, the bank's problem loan ratio as a percentage of the risk-weighted assets (Prob. Loan) and the bank's credit rating as the average rating available of the three major credit rating agencies. The rating is set from 1 to 18, where 1 is the highest rating (AAA) and 18 is the lowest rating (CCC or DDD). Standard deviations in the second row between brackets grouped by country when indicated. Regression excludes banks from countries not included in either of these two regions. Period: January 2012 to December 2018. \*, \*\* and \*\*\* represent significance levels of 10 %, 5 % and 1 %, respectively.

		NFC + Ho			NI		Households					
CET1												
Core	0.210***	0.121	0.533**	0.308	0.349***	0.328**	2.340*	2.216	0.088	-0.070	0.379	0.044
	(0.048)	(0.084)	(0.209)	(0.489)	(0.088)	(0.120)	(1.144)	(1.609)	(0.079)	(0.096)	(0.263)	(0.139)
Periphery	0.042	0.007	0.093	0.012	-0.036	0.514*	0.203	0.658	0.111	0.425***	-0.177	-0.239
	(0.053)	(0.500)	(0.517)	(0.518)	(0.096)	(0.271)	(0.441)	(0.489)	(0.121)	(0.104)	(0.594)	(0.475)
Prob. loans												
Core	-0.130***	-0.042	-0.339*	0.013	-0.285***	-0.114	-0.471	-0.590	-0.100	-0.057	0.017	0.380***
	(0.047)	(0.048)	(0.171)	(0.184)	(0.084)	(0.163)	(0.394)	(0.931)	(0.076)	(0.119)	(0.156)	(0.069)
Periphery	0.018	-0.110**	-0.049	-0.004	0.072**	-0.167***	-0.034	-0.090	0.063**	-0.057	-0.033	0.031
<b>D</b>	(0.018)	(0.049)	(0.064)	(0.032)	(0.032)	(0.046)	(0.063)	(0.077)	(0.029)	(0.035)	(0.050)	(0.033)
Rating												
Core	-0.847***	-0.939**	2.344***	0.775	-0.889***	-2.230*	3.574***	2.586**	-0.675***	-0.265	1.074**	-0.865**
<b>D</b> 1 1	(0.149)	(0.399)	(0.346)	(0.582)	(0.280)	(1.093)	(0.535)	(0.937)	(0.247)	(0.413)	(0.437)	(0.304)
Periphery	-0.42/***	0.519	0.401	1.092	-0.585***	1.717	0.222	0.309	-0.244	0.740**	0.793	1.88/***
	(0.092)	(0.424)	(0.888)	(1.101)	(0.166)	(1.712)	(2.017)	(2.283)	(0.160)	(0.321)	(1.130)	(0.336)
				D 1 1				D 1 1				D 1 1
Fixed effects	N	Country-Year	Bank	Bank and	N	Country-Year	Bank	Bank and	Ν	Country-Year	Bank	Bank and
Churchen and annual	NT	Ň	V	Country-rear	NT	Ň	V	Country-rear	NT	Ň	V	Country-year
Cluster sta. erros	IN	I	I	I	IN	Ĩ	I	Ĩ	IN	I	Ĩ	I
Nº obs.	5,344	5,344	5,344	5,344	5,314	5,314	5,314	5,314	5,234	5,234	5,234	5,234
$\mathbb{R}^2$	0.016	0.178	0.301	0.381	0.014	0.137	0.364	0.413	0.009	0.100	0.299	0.351

TABLE 3. Results of panel regressions for bank characteristics by region

Note: Panel regression having as a dependent variable the 12-month change in the logarithm of the loans outstanding amount (to non-financial corporations and / or households) and as independent variables, the 12-month lag level of the following variables for each of the regions: the bank's capital ratio CET1, the bank's problem loan ratio as a percentage of risk-weighted asset (Prob. loans) and the bank's credit rating as the average rating available of the three major credit rating agencies). The rating is set from 1 to 18, where 1 is the highest rating (AAA) and 18 is the lowest rating (CCC or DDD). Standard deviations in the second row between brackets grouped by country when indicated. Regression excludes banks from countries not included in either of these two regions. Period: January 2012 to December 2018. \*, \*\* and \*\*\* represent significance levels of 10 %, 5 % and 1 %, respectively.

As previously seen, banks in the core countries tend to be banks with a higher level of regulatory capital and with higher credit ratings than banks in peripheral countries. Thus, the relationships identified in the first column may simply reflect this link between bank vulnerabilities and country factors. This hypothesis is supported by the results of the second column, which includes fixed country-year effects to try to control for it, in addition to the possibility of different phases of the economic cycle per country. In fact, the coefficients on the capital ratio and credit rating are no longer significant by including these fixed effects (and the treatment of standard errors by country). On the other hand, the coefficient on the problem loan ratio becomes significant, in the sense that banks with a larger proportion of problem loans will have shown weaker credit growth, mainly through loans to non-financial corporations. Even so, this effect disappears when fixed effects of banks are added. This means that, for the same bank, the changes in these indicators analyzed over time is not related to changes in the pace of lending activity to the nonfinancial private sector, even after controlling for different macroeconomic conditions over time and between countries.

It can then be concluded that, for the euro area as a whole, credit recovery in the period 2014 to 2018 was differentiated between euro area countries, stronger in the relatively more robust banks in terms of capital and credit rating, which tend to have in common the home country, and in banks with a lower proportion of problem loans, but these are not related to the country where they are located.

Given the strong differentiation between the two groups of countries, with most peripheral countries subject to adjustment programs, it is important to analyze whether the characteristics of the banks help to explain different loan concession between the two regions. To do this, we proceed to the same regressions, but now interacting with the region where the bank is located. It is therefore of interest to understand whether the capital ratio, for example, correlates differently with the growth of credit in the core than in the periphery. The results of these regressions are presented in the table 3.

The results of the first regression, without any fixed effect, are in line with the overall results, in the sense that higher capitalized banks with higher credit ratings showed stronger credit growth, mainly from loans to nonfinancial corporations and from core countries. In this group of countries, one also obtains a negative correlation with the problem loans ratio, that is, banks from the core with a higher problem loans ratio showed weaker credit growth compared to the peripheral banks. By including the fixed effects by country-year (second column) this negative relation becomes significant for the countries of the periphery, maintaining the relationship with the rating for the countries of the core. This means that, among the banks from the periphery, banks with a higher ratio of problem loans expanded less credit compared to the banks of the same country in the same year and, among the banks of the core, banks with higher credit ratings expanded more credit

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compared to banks in the same country in the same year. Again, these behaviours were mainly due to the dynamics of lending to non-financial corporations.

When including controls for other non-observable characteristics of banks that do not vary over time (third column), we obtain some different conclusions, in particular the positive relation with the capital ratio and the relationship with an opposite sign for credit rating for countries of the core. For a particular bank, downward revisions in the credit rating are associated with a credit acceleration. This is a counterintuitive result, but it is related to the economic cycle, since the result disappears when the country-year fixed effects are added again. In this last, more demanding specification, none of the characteristics of banks is relevant to the growth of total credit to the non-financial private sector of the euro area. However, when analysing the breakdown by loans to non-financial corporations and households, some different conclusions are obtained. In the case of non-financial corporations, after controlling for the bank and the macroeconomic conditions by country, only a significant signal is obtained for the credit rating in the core, which means that banks that saw the credit rating revised down one notch showed a stronger growth of these loans by 2.5 pp compared to the other banks. In the case of loans to households, this relationship with the credit rating holds for the banks from the periphery (down revision of one notch associated with a growth of 1.9 pp). In banks from the core, the relationship is the opposite, ie, higher rating associated with higher loan growth (up revision of one notch associated with an increase in the credit growth rate by 0.9 pp). In addition, there is also a positive relationship with the problema loans ratio for the banks from the core, ie, a bank in this region with an increase of 1 pp in this ratio would have had an increase in loan growth of 0.4 pp relative to peripheral banks.

In general, there are some significant differences between the behaviour of banks in the core and the periphery, in particular as regards credit rating. There is no relevant effect on the periphery of banks' vulnerability measures, suggesting that in fact the main vulnerabilities that may be relevant to the credit supply are related to the vulnerabilities of the sovereign. This result seems to be in line with Altavilla *et al.* (2017) which conclude that the banks more exposed to the sovereign were the ones that cut more credit at the peak of the sovereign crisis, but also were the ones that showed a stronger recovery after the period of market tensions.

It was still tested the relevance of these indicators in separate regressions for each one, since there must be some correlation between them and since there is no data for all indicators for all banks. The results are generally consistent with those shown in the tables 2 and 3. The only indicator that was not included in these tables was the price-to-book ratio, since in this case the sample is much more restricted and includes only listed banks. The results of the regressions, following the same order, for this variable only suggest a slight negative correlation between price-to-book and credit growth, common to the entire area. This negative correlation is maintained by including fixed effects in the regression. In other words, for the same bank and controlling for macroeconomic conditions per country, a 10 pp reduction in the priceto-book ratio is associated with an increase of 10 bp in the growth of total credit to the non-financial private sector, significantly only for banks from the (Chart 4). Thus, it does not seem that a more negative perception of the bank by investors is associated with a weaker credit supply in the recent period.



FIGURE 4: Relationship between the price-to-book ratio and loan growth | Percentage

Note: Results of a panel regression having as a dependent variable the 12-month change of the logarithm of the loans outstanding amount (to non-financial corporations and households) and independent variable the price-to-book ratio for each region, including fixed effects per bank and country-year. Period: January 2012 - December 2018. The coefficient for the periphery is not significant, while the coefficient for core is significant at 99%.

### **Final remarks**

The present article analysed the evolution of bank loans in the euro area, in particular during the recent recovery period, according to some characteristics of the banks that are usually associated with their vulnerabilities and taking into account that the nexus with the respective sovereign can emphasise such vulnerabilities. Recent developments in the euro area hide a high degree of heterogeneity, firstly among euro area countries, which is related with country factors, but that may also be related to the type of bank, its business model, its balance sheet or the restrictions it may face. Apparently, banks perceived to be more vulnerable seem to have experienced a weaker evolution in loans to the private sector than the other banks. However, when one controls for bankspecific factors or for macroeconomic conditions at the level of its country of residence, such conclusion changes. The relationship with the capital level and the credit rating weakens when one takes into account the specific factors of banks or the business cycle, which points to the relevance of country determinants. The behaviour of banks from the core countries of the euro area seem to have been slightly different from the behaviour of the peripheral banks, especially when looking at the breakdown by type of loans. There is no relevant effect on the periphery of measures of banks' vulnerabilities, suggesting that in fact the main vulnerabilities that may be relevant to the credit supply are related to the vulnerabilities in the sovereign. Lastly, it does not seem that a more negative perception of the bank by investors, ie a lower price-to-book ratio, is associated with a weaker credit supply in the recent period.

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