The bank lending channel from the European syndicated loan market perspective

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Abstract:

In 2008, the syndicated loan market is deeply impacted by the collapse of Lehman Brothers and the ensuing financial crisis. With a sample of 15 European banking groups, we investigate the efficiency of the bank lending channel, i.e. whether and how the monetary policy of the ECB mitigates the disruption in syndicated bank lending from 2004 to 2014. We show that non-standard measures of the ECB accommodating monetary policy contribute to alleviate credit institutions' funding constraints supporting bank lending activities in the syndicated loan market. We highlight that banks with a higher level of customer deposits and a lower level of short-term borrowings provide loans with larger amounts. However monetary policy measures leading to an increase of the size of the ECB balance sheet appear to be less effective for smaller banks.

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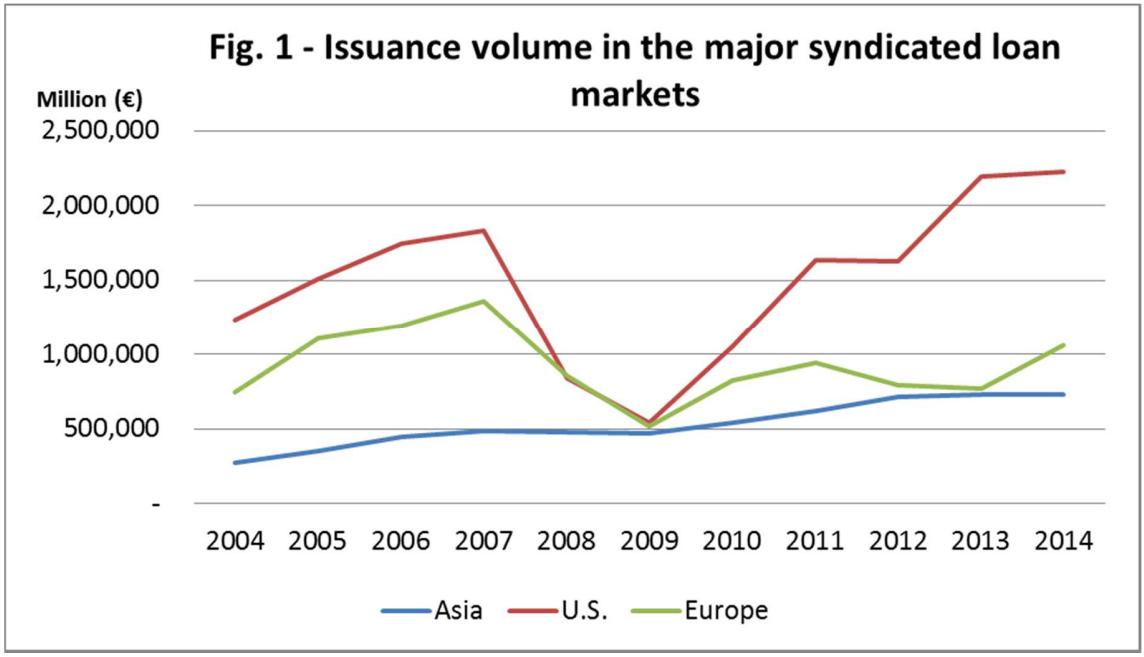
I. Introduction

"The recent credit crisis has reminded us of the crucial role performed by banks in supplying lending to the economy, especially in a situation of serious financial distress"

L. Gambarcorta and D. Marques-Ibanez[1]

In 2008, the bankruptcy of Lehman Brothers triggers one of the most significant financial crises deeply affecting the syndicated loan market. Figure 1 illustrates the collapse of the issuance volume of syndicated loans before and during the financial crisis in the three major syndicated loan markets. It has decreased by 60% from the crisis peak in 2007 (euro 3,680 billion).



Source: LPC Dealscan database and authors' calculations.

The syndicated loan market is a major source of external finance for firms and represents more than one third of all international corporate financing, including money market instruments, bonds and equities (Gadanecz, 2004).[2] A large body of literature explores the impact of the financial crisis on the syndicated loan market.[3] Ivashina and Scharfstein (2010) highlight how the

[1] Gambacorta and Marques-Ibanez (2011, p. 138).

[2] A syndicated loan is a hybrid of bank loan and public debt, gathering together commercial banks and other financial institutions and implying both monitoring and underwriting activities (Dennis and Mullineaux, 2000; Chaudhry and Kleimeier, 2015). Appendix A describes in more details the syndicated loan market and its participants.

[3] In an extensive study Kleimeier et al. (2013) analyze the impact of around 200 global financial crises on the geographical repartition of cross-border loans from 1995 to 2008. By distinguishing between banking, currency and

banking panic set off a disruption in syndicated bank lending. By focusing on the U.S. banking sector, the authors show evidence of a run on lines of credit granted before the crisis and amounting to USD 26.8 billion. This run affected banks' balance sheet damaging their liquidity position and reducing new loan origination to large corporations. The decrease in new syndicated loans was exacerbated for banks with less stable sources of funds (i.e. with a larger proportion of short-term debt compared with insured deposits).

In the context of the financial crisis, Santos (2011) investigates the role of banks' financial situation as a driver of banks' lending activities in the syndicated loan market. The author tests the hypothesis that banks with larger losses during the crisis incurred higher costs of funding resulting in an increase of syndicated loan rates. The results confirm the hypothesis displaying a significantly higher rise in spread for loans provided by riskier banks.

In a larger perspective, Cerutti et al. (2015) explore the evolution and the drivers of cross-border bank loan exposures from 1995 to 2012 for a panel of 26 lender countries and 76 borrower countries. First, the authors find that the 2008 financial crisis significantly impacts the syndicated loan market. In line with Ivashina and Scharfstein (2010), they highlight a disruption in the issuance volume of new loans associated with higher stocks of syndicated loans on banks' balance sheets due to significant drawdowns on existing lines of credit. Second, Cerutti et al. (2015) also show that information asymmetries are significant drivers of cross-border loans. The greater the geographical distance between lenders and the borrower, the lower the volume of this type of loans. Epstein (2001) argues that banks will be less tempted to grant credits when they are less able to assess borrowers' credit risk. This risk aversion increases with the distance between the lender and the borrower and contributes to support the home bias hypothesis.[4] Giannetti and Laeven (2012) provide evidence that this home bias is further amplified during a period of financial turmoil. The confidence crisis combined with an increase in the uncertainty makes banks reluctant to lend money abroad. They rather allocate more resources to domestic markets. This lending behavior then contributes to the transmission of the financial crisis at the international level. De Haas and Van Horen (2012) analyze a sample of 75 banks and show that these banks reduce their cross-border exposures after Lehman Brothers collapse. The contraction

twin crises, the authors highlight significant differences among the types of crises with stronger effect of twin financial turmoil.

[4] The home bias hypothesis, also called flight-to-home effect, is defined as the increase in the proportion of domestic loans in banks' loans portfolio because of the geographical proximity that eases the credit risk assessment (Epstein, 2001; Giannetti and Laeven, 2012).

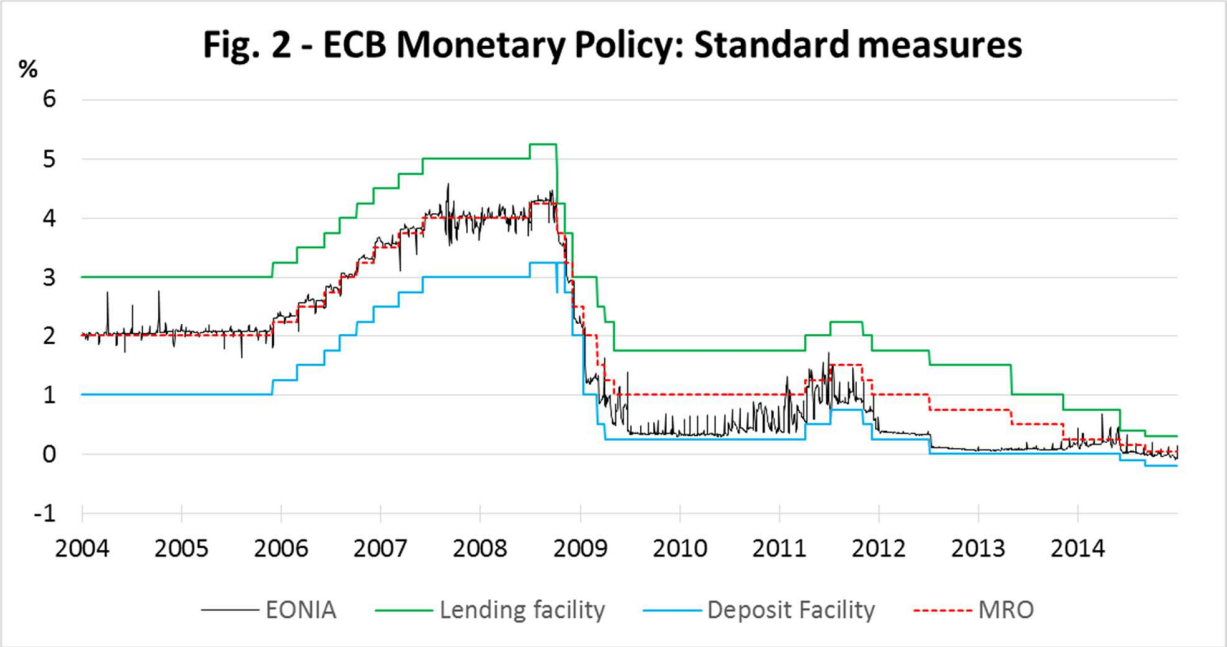
in lending supply is even more significant for banks with more funding constraints (i.e. with a higher level of long-term debt, a lower market-to-book ratio and the obligation to write down subprime assets).

In front of the magnitude of the financial shock and the increasing pressure on the banking industry, central banks intervene to reduce strains in financial markets and provide credit institutions with financial support.[5] The goal of this paper is to assess the impact of the accommodating monetary policy implemented by the ECB on the syndicated loan market. More precisely, we estimate the effect of standard and non-standard measures of the ECB monetary policy on the issuance volume of syndicated loans (bank lending channel) assessing whether these policies manage to support syndicated bank lending.

Typically, the ECB targets short-term interest rates to conduct the monetary policy, i.e. buy or sell short-term debt securities. The two main instruments used by the ECB are the Main Refinancing Operations (MROs) with a maturity of two weeks and the Longer-Term Refinancing Operations (LTROs) with a maturity of three months.[6] Both measures consist in direct lending of predetermined amounts sold at auctions to credit institutions against eligible collateral. One month after the collapse of Lehman Brothers, the ECB implements the Fixed-Rate, Full Allotment program (FRFA) to address the deterioration of financial conditions. In addition the ECB adjusts its standard policy to fulfill all the MROs and LTROs at the main refinancing rate. From October 2008 to May 2009, this rate decreases by 325 basis points (from 4.25% to 1%) as illustrated in Figure 2.

[5] Fawley and Neely (2013) provide a precise description of the quantitative easing programs implemented by the Federal Reserve (Fed), the Bank of England (BOE), the European Central Bank (ECB), and the Bank of Japan (BOJ).

[6] The first extension of LTROs maturity (from 3 to 6 months) takes place on March 28, 2008.



Source: ECB website. EONIA stands for Euro OverNight Index Average.

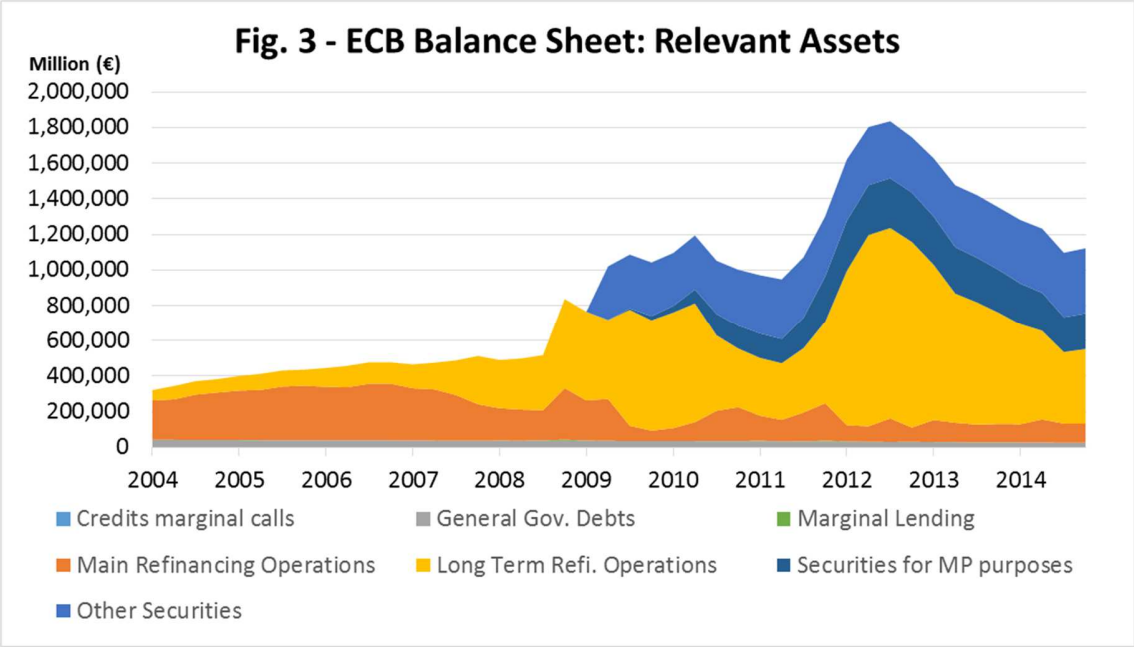
However, in 2009 concerns over counterparty risk remain significant disturbing the functioning of European interbank markets (Drudi et al, 2012). With short-term interest rates approaching the zero lower bound the ECB has to adopt non-standard measures to reduce financial distress and stimulate the economy. These measures contribute to increase the monetary base and mainly consist in lending programs and asset purchase programs targeting the main players of the European economy, i.e. banks.[7]

On May 7, 2009 the ECB extends the maturity of its LTROs to 12 months satisfying credit institutions' demand for longer maturities. In addition, the ECB announces the Covered Bond Purchase Program (CBPP) aiming at purchasing euro-denominated covered bonds for a predetermined amount equal to euro 60 billion over the next 14 months, i.e. until June 30, 2010. This program contributes to alleviate the maturity constraint credit institutions face by lending long and borrowing short, generally through on-demand deposits. The CBPP then becomes an important source of funding for European banks.

Nevertheless during the financial crisis tax revenues decrease and the economic growth slows down exacerbating budget and debt problems. In 2010 European credit institutions holding

[7] Fawley and Neely (2013) highlight one main significant difference between the programs implemented by the ECB and the BOJ and those implemented by the Fed and the BOE. This difference lies on the structure of their economies, i.e. more bank-oriented in Europe and Japan while bonds markets are more important in the U.S. and the U.K.

substantial amounts of sovereign debt have to face new difficulties linked to sovereign debt crisis occurring in the monetary union. On May 10, 2010 the ECB announces its Securities Market Programme (SMP)[8] with a two-fold objective: with the ability of purchasing government debt on the secondary market, the ECB aims at ensuring liquidity and restoring an appropriate transmission mechanism of the monetary policy. Unfortunately, the European sovereign debt crisis continues to plague European interbank markets and the ECB has to intervene with additional measures in 2011 to restore confidence. On October 6, 2011 a second CBPP is set up for euro 40 billion. In addition, on December 8, 2011, the ECB announced an extension of the LTROs maturity up to 36 months. As a result, the size of the ECB balance sheet significantly increases between 2008 and 2009 as depicted by Figure 3 below.



Source: ECB website.

All these measures carried out by the ECB may potentially affect the economy through several transmission channels (Mishkin, 1996). As banks are credit-constrained, the bank lending channel is effective when the monetary policy affects credit institutions' external finance premium subsequently altering credit availability in the economy (Stein, 1998; Gan, 2007;

[8] On September 6, 2012, the ECB replaces the SMP by the Outright Monetary Transactions program to address the lack of an enforcement mechanism to receive support.

Disyatat, 2011 among others).[9] Gambacorta and Marques-Ibanez (2011) provide evidence of a significant impact of the monetary policy before and during the crisis on bank lending. However, the authors argue that banks' reactions are not homogenous and depend on banks' capital level as well as their use of new and innovative tools such as securitization. In line with this analysis, several papers (Angeloni et al., 2003; Gambacorta, 2005 among others) investigate how the relationship between the monetary policy and the level of deposits can disturb bank lending activities. Gambacorta (2005) studies a sample of Italian banks and shows that a tightening monetary policy leads to a decrease of deposits and of loans afterwards, this effect being more significant for smaller banks unable to raise uninsured funds.

We contribute to the debate on the efficiency of the bank lending channel (Bernanke and Blinder, 1988; Bernanke and Gertler, 1995) by investigating whether the ECB accommodating monetary policy contributes to mitigating the disruption in the issuance volume of syndicated loans.[10] Peek and Rosengren (2013) emphasize the importance of understanding the role of credit institutions in the monetary policy transmission. The authors show that the development of new non-standard measures triggers a shift in the objective of the monetary policy requiring a re-assessment of its bank lending transmission channel. Adelino and Ferreira (2016) recently explain that the decrease in bank lending is due to a reduced access to wholesale funding and to an increase in the cost of funding reinforcing the importance of studying this channel.

Like Gambacorta and Marques-Ibanez (2011) as well as the other papers quoted previously we investigate the transmission mechanism of the monetary policy (with both standard and non-standard measures) and its impact on bank lending. However, in contrast to Gambacorta and Marques-Ibanez, we focus on the syndicated loan market. Although this approach addresses a specific category of credit, it provides new insights on the efficiency of the bank lending channel on a market that is far from anecdotal. To the best of our knowledge this is the first work that explores the impact of the overall ECB monetary policy on this syndicated loan market, one of the major sources of international finance for corporations. We hypothesize that the operations implemented by the ECB support syndicated bank lending reducing the impact of the 2008

[9] Considering the credit channel in general, Kishan and Opiela (2000) highlight the importance of distinguishing between the bank lending channel and the borrower net worth channel. They argue that the former one depends on banks asset size and bank capital.

[10] J.C. Trichet speech (11/23/2009) "*These "non-standard" measures started in October 2008 and were designed to… enable banks to continue their lending to households and firms*."

financial crisis. By providing credit institutions with funds, the ECB alleviates the constraints on banks' balance sheets providing them with more flexibility to allocate resources.

To test empirically our hypothesis, we estimate a cross-section regression for a sample of 15 European banking groups between 2004 and 2014. We analyze the potential effects of several monetary policy instruments (i.e. the interest rate, the size of the ECB balance sheet and the ECB non-standard policies) on syndicated bank lending through their impact on banks short-term borrowings. We also pay a specific attention to the microeconomic foundation of bank lending activities by using loan specific data rather than bank overall lending aggregates (Popov and Van Horen, 2015).

We find that a higher level of deposits strengthen bank lending activities while short-term borrowings act as a constraint for banks reducing syndicated loan amounts. This constraint is more significant for small banks. We also provide evidence that both standard and non-standard measures of the ECB accommodating monetary policy are able to alleviate this constraint. More precisely, policies affecting the size of the ECB balance sheet and to a lesser extent the non-standard policies of the ECB are more effective than interest rates instruments.

Our findings confirm the existence and the efficiency of the bank lending channel over the recent period for the syndicated loan market. This result remains valid when we consider banks' specific loan attribution process.

The remainder of this paper is organized as follows. Section 2 presents our methodology. Section 3 describes our data while section 4 provides descriptive statistics. Section 5 investigates whether the measures of the ECB monetary policy contribute to support syndicated bank lending through a reduction in credit institutions' funding constraints. Section 6 analyses the importance of banks' size for the bank lending channel. Section 7 is dedicated to robustness checks and Section 8 concludes.

II. Method

Following a financial shock such as the collapse of Lehman Brothers, credit institutions may experience higher funding constrains resulting in a contraction of syndicated bank lending. Our objective is to estimate to what extent standard and non-standard measures implemented by the

ECB mitigate the impact of the 2008 financial crisis supporting lending in the syndicated loan market.

Our methodology is based on the analysis developed by Kashyap and Stein (2000). The authors use a two-step analysis to study the bank lending channel in the U.S. between 1976 and 1993. In their model, they first regress the total volume of loans on the structure of bank's balance sheet using the ratio of securities and federal funds sold to total assets as a proxy. In a second step, they regress the previously obtained coefficient for the structure of bank's balance sheet on different monetary policy indicators including the fed funds rate. Cetorelli and Goldberg (2012) replicate this methodology to investigate the effectiveness of the monetary policy when banks experience a liquidity shock such as the financial crisis of 2007-2009. In our analysis, we start with the same model but our approach differs in several ways. First, we group the two steps of Kashyap and Stein (2000) analysis into a one-step regression to limit the influence of the first-step estimation uncertainty over the second one. We hypothesize that the ECB accommodating measures will impact syndicated bank lending only indirectly through a reduction in banks' funding constraints (Kashyap and Stein, 2000). As such, we include these monetary policy measures in our model through their interaction with banks' funding constraints disentangling between standard and non-standard monetary policy tools and controlling for time effects with year dummies. Second, our model is based on a cross-section analysis. In addition, we contribute to the literature on syndicated loans by considering all credit institutions that are part of the syndicate. In the syndicated loan market, a syndicate is divided in two distinct groups of lenders depending on their role. First, the lead arrangers are responsible for structuring, administering and monitoring the loan while the participants behave as investors and provide funds. Contrary to the literature, our analysis is not limited to loans provided by lead arrangers as we consider the bank's proper decision to lend. As such, even if the bank is only a participant it still has the choice to invest or not at the beginning of the syndication process and this decision may also be influenced by the implementation of the monetary policy. However, we control for lead arrangers in our model. Finally, we include new variables which better account for the bank's balance sheet or which may influence bank lending decisions such as the bank's level of customer deposits. These variables provide a precise description of the bank funding constraints.

As a result we model the amount of each syndicated loan j provided by bank i as follows:

$$Amount_{ij} = \alpha_1 + \boldsymbol{Lender\_constraints_i} + \alpha_2 * \Delta EONIA + \alpha_3 * Controls_{ij} + \varepsilon \quad (1)$$

$$\text{With } \boldsymbol{Lender\_constraints_i} = \alpha_4 * Financials_i + STB_i * (\theta_1 + \theta_2 * MP) \quad (2)$$

Where:

- $Amount_{ij}$ stands for the logarithm of the loan amount j provided by credit institution i;
- $Financials_i$ is a vector of credit institution i's financial information, i.e. the level of customer deposits on a quarterly basis (Jiménez et al., 2012 among others);
- STB_i represents the funding constraint of credit institution i proxied by the level of its quarterly short-term borrowings (Ivashina and Scharfstein, 2010);
- MP contains monetary policy variables, i.e. $\Delta EONIA$ (Jiménez et al., 2014 among others), the logarithm of the size of the ECB balance sheet (Gambarcorta and Marques-Ibanez, 2011) and the logarithm of a proxy for ECB non-standard policies;
- $\Delta EONIA$ is the variation of the quarterly EONIA. It represents the traditional interest rate channel that may affect lending activities;
- $Controls_{ij}$ is a matrix of our control variables for the characteristics of the loan (i.e. its all-in spread, its maturity, a dummy equal to one if the loan is secured, a dummy equal to one if it is a term loan, and the seasonal effects with one dummy variable equal to one when the loan is issued during the fourth quarter), the borrower (i.e. its industry, a risk measure of this industry, the borrower's credit rating at the time when the loan is issued, and a dummy variable equal to one when its nationality is the same as the lender), the lender (i.e. a dummy variable that accounts for the country of the lender, and a dummy variable when the bank is the lead arranger), the lender's strategy in terms of industry portfolio diversification (i.e. one variable to account for credit institution i's specialty in a specific industry), the relationship between the borrower and the lender (i.e. a dummy variable equal to one if the bank has already lent to the borrower during the previous year), and finally the macroeconomic context (i.e. the change in the Eurozone GDP taken with one lag, the banks' anticipations of credit demand based on question 9 of the bank lending survey provided by the ECB every quarter (Del Giovane et al., 2011), and two

dummy variables for 2008 and 2009 to control for the financial institution crisis and the state aid perceived by banks).[11]

In line with Gambacorta (2005) who provides evidence of an asymmetric transmission of monetary policy across Italian banks, we run the model using a cross-section estimation method per loan and per credit institution rather than per country. To run our estimation, we need to select fixed or random effects taking into account the potential correlation between explanatory variables ($Controls_{ij}$ and $Lender\_constraints_i$) and the different units (banks). These correlations may differ due to specific bank lending behavior. However, large (or small) banks might follow the same strategies resulting in similar lending behavior (Bell and Jones, 2015; Clark and Linzer, 2015). We then use random effects to account for unit effects.

As previously stated, we hypothesize that monetary policy measures, i.e. the $\Delta EONIA$, the size of the ECB balance sheet and non-standard policies impact syndicated bank lending through banks short-term borrowings. If the monetary policy is accommodating (tight), the interest rate will decrease (increase). As such, banks will borrow at a lower (higher) cost resulting in a higher (lower) capacity to lend. We expect that banks with a higher level of customer deposits will be less affected by a change in the monetary policy. They should be able to provide more credit before requiring the use of costly external financing sources. However a rise in the level of short-term borrowings may force banks to slow down their lending activities. As such, an accommodative monetary policy either through a decrease in the EONIA or an expansion of the size of the ECB balance sheet should ease banks' access to credit reducing their funding constraint.

III. Data

This paper focuses on the monetary policy implemented by the ECB.[12] Our analysis then considers all the credit institutions that can benefit from the open market operations of the ECB. According to the European Directive 2000/12/EC (European Parliament – March 20, 2000) "*a 'credit institution' shall mean an undertaking whose business is to receive deposits or other repayable funds from the public and to grant credits for its own account.*" The ECB establishes a

[11] Appendix B provides additional details on the construction of each variable.
[12] We do not extend our analysis to other Central Banks such as the Fed as they have different monetary policy objectives and measures.

list of Monetary Financial Institutions (MFIs) that fall within the scope of this definition.[13] From this list, we select only credit institutions that have to satisfy the reserve requirement. We come up with a list of 5,294 MFIs. To run our analysis on a quarterly basis, we restrict our sample to MFIs for which we have access to financial information and which are active in the syndicated loan market. Our final sample contains 86 credit institutions located in 10 Eurozone countries (Austria, Belgium, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands and Spain). We collect financial data of banks using Bloomberg and we complete our series with banks' balance sheet. In our study, we consider the quarter when the loan is issued to determine the relevant bank's financials. Then, we use LPC Deaslcan database to get data on syndicated loans provided by each MFI. In Dealscan, we obtain all the loan characteristics as well as the industry, the nationality and the credit rating of the borrower. We also have access to the nationality of the MFI and the bank allocation, i.e. how much each MFI has invested per loan.

In addition, our set of variables includes three monetary policy instruments. The EONIA represents standard measures of monetary policy. The second element is the size of the ECB balance sheet and includes the amounts of MROs, LTROs and all securities held for monetary policy purposes. However, MROs are considered as a standard monetary policy instrument before the FRFA implementation. This second measure is then representative of the monetary policy stance and contains both standard and non-standard measures. Finally, the third measure that accounts for non-standard measures of monetary policy contains only LTROs and securities held for monetary policy purposes. All these three variables are taken with a quarter lag to consider the delay in the transmission of monetary policy.

To investigate the effect of the ECB measures on syndicated bank lending we run our baseline analysis from January 2004 to December 2014. For the sake of our study, we group the 86 MFIs under the name of their parent for which we have financial information on a quarterly basis. Our final sample contains 19,866 unique loans provided by 15 banking groups to 6,873 borrowing companies between 2004 and 2014.

IV. Descriptive statistics

[13] MFIs are defined by the ECB as "*central banks, resident credit institutions as defined in Community law, and other resident financial institutions whose business is to receive deposits and/or close substitutes for deposits from entities other than MFIs and, for their own account (at least in economic terms), to grant credits and/or make investments in securities. Money market funds are also classified as MFIs.*" (Regulation (EC) No. 25/2009 – ECB/2008/32). On February 29, 2016, this list contains 7,959 MFIs. The list is updated on a monthly basis.

Table 1: Sample of Banking Groups

Banking Group	Countries	Number of loans	Loan Amount	Loan Spread	Loan Maturity	TA	CD	STB
Deutsche bank	GE/LU	8,825	71.02	239.81	55.49	1,667,439	453,251	189,531
ING	BE/FR/GE/IR/IT/LU/NL	5,787	36.73	244.33	61.72	1,171,419	488,228	186,068
Santander SA	BE/SP	2,194	62.27	190.86	69.17	1,011,695	430,971	154,217
Unicredit bank	IT/LU	3,344	41.35	221.50	64.39	825,230	373,461	181,191
Commerzbank	GE/IT/SP	5,470	38.92	175.00	54.15	636,243	190,569	181,297
Intesa Sanpaolo	IT	2,338	46.15	146.21	55.90	541,617	223,111	96,715
BBVA	FR/IT/SP	3,409	45.56	160.58	72.56	510,760	224,379	125,121
KBC bank NV	BE/IR	2,213	22.16	176.09	62.30	302,981	133,895	66,463
Banca Monte dei Paschi di Siena	IT	478	16.43	145.05	49.99	192,743	92,154	47,437
Erste bank	AU/LU	1,024	16.35	178.13	52.64	191,567	103,527	17,034
Banco Populare Espanol	SP	491	23.47	227.31	60.32	116,336	50,614	27,043
Sabadell SA	SP	703	20.57	188.56	78.73	96,115	47,557	17,158
Alpha Bank AE	GR	187	16.50	150.26	33.91	57,905	32,451	13,602
Bankinter	SP	342	14.38	274.77	65.39	50,043	17,942	13,601
Banca Popolare di Milano	IT	175	27.14	193.90	67.20	46,473	21,08	8,477

Notes: BBVA stands for Banco Bilbao Vizcaya Argentaria. Countries: Austria (AU), Belgium (BE), France (FR), Germany (GE), Greece (GR), Ireland (IR), Italy (IT), Luxembourg (LU), Netherlands (NL) and Spain (SP). Number of loans represents the sum of all loans to which the banking group has participated. Average loan characteristics (i.e. amount expressed in millions of euro, spread expressed in basis points, maturity expressed in months) as well as quarterly averages of the financial characteristics of each banking group (i.e. Total Assets, Customer Deposits, and Short-Term Borrowings, all expressed in millions of euro) are computed over the period 2004 - 2014. The first panel includes big banks with average total assets higher than euro 1,000 billion over the whole period under study. Medium banks are grouped in the second panel and have average total assets between euro 200 and euro 1,000 billion. The third panel contains small banks with average total assets lower than euro 200 billion.

Table 1 presents these 15 banking groups categorized as big, medium, and small according to their average total assets over the period under study. In this table, we report the countries in which these banking groups have MFIs involved in syndicated loans as well as descriptive statistics for each banking group over the whole time period. On average, both the number and the amount of loans decrease when the bank gets smaller while the loan spread and its maturity are similar across the three categories of banks. The level of customer deposits as well as the level of short-term borrowings of banks are positively related to their level of total assets.

Table 2 displays the description of our sample in terms of geographical repartition of the borrowers, the type, the objective and the maturity of the loans.

Table 2: Sample Description

Loans	Number		Amount	
Borrowers' region				
Africa	161	1%	65,148.62	1%
Asia Pacific	1,468	7%	465,367.42	5%
Eastern Europe/Russia	1,380	7%	379,307.05	4%
Latin America/Caribbean	697	4%	250,356.31	3%
Middle East	288	1%	172,672.37	2%
USA/Canada	7,266	37%	3,855,236.82	43%
Western Europe	8,606	43%	3,829,908.52	42%
Loan type				
Term loan	10,084	51%	3,612,903.75	40%
Lines of credit	8,028	40%	4,656,146.39	52%
Others	1,754	9%	748,946.97	8%
Loan objective				
General purposes	9,387	47%	4,984,473.86	55%
LBO	2,577	13%	505,854.71	6%
Takeover	1,123	6%	1,298,157.58	14%
Project finance	1,235	6%	313,245.09	3%
Recapitalization	799	4%	119,711.58	1%
Working capital	879	4%	387,250.26	4%
Acquisition	791	4%	426,521.04	5%
CP backup	226	1%	271,600.41	3%
Others	2,849	14%	711,182.58	8%
Loan maturity				
ST (<1y)	2,378	12%	1,591,635.07	18%
MT (1y-5y)	10,337	52%	5,303,281.46	59%
LT (>5y)	7,151	36%	2,123,080.58	24%

Note: The amount is expressed in millions of euro. The first panel provides the split of borrowers according to their geographical region. The second, third and fourth panels describe the sample of loans in terms of loan type, loan objective and loan maturity respectively.

Table 2 highlights that the 15 banking groups lend to companies that are mainly located either in Western Europe or North America with the two regions representing more than 80% of our sample. Our objective is to study lending behavior of banks active in the international syndicated loan market. As such, we do not restrain our analysis to a sample of European borrowers. Instead, we control for the geographical location of borrowers in our estimations. Regarding the most common loan characteristics, term loans and lines of credit dominate the sample and are used to mainly finance general corporate purposes, LBO and takeovers, with more than 50% loans maturing between 1 and 5 years.

V. Baseline Results

We start estimating our model with only the variables of interest, i.e. bank lending constraints in addition to the loan spread and the EONIA. Table 3 reports the results of this simplified model for five different specifications. In model 1, we do not include monetary policy instruments. In models 2, 3 and 4, we consider each instrument separately to assess the direct impact of the EONIA, the size of the ECB balance sheet and the ECB non-standard operations respectively on bank short-term borrowings. As such we are able to understand the indirect influence of these instruments on syndicated bank lending. Finally in model 5 we measure how the ECB monetary policy as a whole influences syndicated loan amounts.

Table 3: Baseline Models

VARIABLES	(1) Base Model	(2) EONIA	(3) Balance Sheet	(4) Non-Standard	(5) Both
Spread	-0.002***	-0.002***	-0.002***	-0.002***	-0.002***
ΔEONIA		0.134	0.073**	0.092***	-0.015
CD	0.482***	0.483***	0.268***	0.159**	0.270***
STB	-0.087**	-0.087**	-0.337***	-0.204***	-0.337***
STB * ΔEONIA		-0.011			0.007
STB * Balance Sheet			0.022***		0.022***
STB * Non-Standard				0.014***	
Constant	-1.825***	-1.842***	0.261	1.376*	0.247
Observations	36,979	36,979	36,979	36,979	36,979
Controls	No	No	No	No	No
R^2 Overall	0.10	0.10	0.09	0.07	0.09
Wald test (prob.)	0.00	0.00	0.00	0.00	0.00

Note: ***, **, * significant at 1%, 5% and 10% respectively using robust standard errors. Cross-section regressions of 15 banking groups with random effects.

In the base model, the relationship between the loan spread and the loan amount is negative and significant, i.e. a higher (lower) spread is associated with a lower (higher) amount. Regarding the financial structure of the bank, we find a positive and significant coefficient for customer deposits while the coefficient for short-term borrowings is negative and significant. In line with Kashyap et al. (2002) we show that banks with high level of customer deposits tend to lend more in the syndicated loan market. On the contrary, banks that use short-term borrowings as a source of funds are more constrained in their lending activities. These conclusions remain valid in the full model.

Regarding the monetary policy tools, the coefficient of the interaction term between the ΔEONIA and the short-term borrowings is not statistically significant highlighting a null effect of standard measures of the ECB monetary policy on banks' funding constraints (EONIA – Model 2).

In models 3 and 4, we focus on the size of the ECB balance sheet and the non-standard policies respectively. We assume that these two variables indirectly affect syndicated bank lending through banks' short-term borrowings compared to standard measures. In both models, the coefficient of the interaction term is positive and significant. Table 4 displays the marginal effect of both the size of the balance sheet and the non-standard policies on bank lending behavior for different levels of short-term borrowings.

Table 4: Marginal Effect of the Size of the ECB Balance Sheet and the Non-Standard Policies

STB		(3) Balance Sheet	(4) Non-Standard
Minimum	5.37	0.118	0.075
Maximum	12.97	0.285	0.182
Mean	10.89	0.240	0.152
Median	10.75	0.237	0.151

Note: STB are expressed in logarithm. We get the minimum, maximum, mean and median of STB over the full sample of the 15 banking groups for the entire period under study. For each level of STB, we compute the marginal effect of the balance sheet and the non-standard policies respectively by multiplying these values with the significant coefficient of the interaction term.

The marginal effect of these two monetary policy measures is positive for all levels of banks' short-term borrowings showing that the tools implemented by the ECB support the supply of syndicated bank lending. In addition, we observe that this relationship is more economically significant for high levels of STB. We conclude that the ECB non-standard instruments set up after the collapse of Lehman Brothers and contributing to the significant increase in the size of

the ECB balance sheet facilitate banks' access to funds. As such these credit institutions are more able to support their lending activities alleviating the impact of the 2008 financial crisis.

This is in line with the results of model 5. In this specification, we consider the ECB monetary policy as a whole (with both interaction between STB and the interest rate, and the size of the ECB balance sheet). In the former case the coefficient is not significant while in the second case, the coefficient is positive and significant at 1% confidence level. We then argue that non-standard measures are more effective than standard ones in providing banks with sufficient funds to compensate for a decrease in their deposits stocks.

In Table 5 below, we run the same models with additional controls for the characteristics of the loan, the borrower, the lenders, the borrower-lender relationship, and the economic environment.

These additional variables allow us not only to better take into account credit institutions' lending process but also to confirm our previous conclusions regarding the impact of monetary policy instruments on banks' funding constraints. Our conclusions on the bank lending channel and the transmission of monetary policy through banks' short-term borrowings remain unchanged. The ECB accommodating monetary policy significantly impact banks' lending activities by cutting down their funding constraints with a larger effect of non-standard measures. Moreover, the introduction of new variables significantly improves the fitting of our model (overall R^2 from 0.10 without controls to 0.25).

In line with the literature we show that banks tend to lend less when a loan is secured as it implies a higher level of the borrower's credit risk. In addition being rated provides the borrowing company with a larger loan, especially if the company belongs to the investment-grade category (from AAA to BBB-).

Table 5: Full Models

VARIABLES	(1) Base Model	(2) EONIA	(3) Balance Sheet	(4) Non-Standard	(5) Both
Spread	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***
Secured	-0.193***	-0.193***	-0.188***	-0.185***	-0.189***
Investment rating	0.804***	0.803***	0.801***	0.797***	0.800***
Junk rating	0.280***	0.280***	0.276***	0.273***	0.275***
BLS	-0.003***	-0.003***	-0.002***	-0.002**	-0.002***
ΔGDP	-0.027*	-0.027*	-0.001	0.002	-0.001
ΔEONIA	0.121***	0.527	0.123***	0.114***	0.449
CD	0.172***	0.172***	0.139*	0.127	0.139*
STB	-0.086**	-0.084**	-0.242***	-0.155***	-0.240***
STB * ΔEONIA		-0.034			-0.028
STB * Balance Sheet			0.013**		0.013**
STB * Non-Standard				0.007**	
Constant	0.131	0.125	0.373	0.459	0.366
Observations	35,850	35,850	35,850	35,850	35,850
Controls	Yes	Yes	Yes	Yes	Yes
R^2 Overall	0.26	0.26	0.26	0.26	0.26
Wald test (prob.)	0.00	0.00	0.00	0.00	0.00

Note: ***, **, * significant at 1%, 5% and 10% respectively. Cross-section regressions of 15 banking groups with random effects.

VI. The importance of bank sizes.

According to Kashyap and Stein (1995) and Kishan and Opiela (2000) among others, the size of the credit institution is critical when considering the transmission mechanisms of the monetary policy. They show that smaller banks are more subject to a reduced or costly access to alternative sources of funding. The bank lending channel should then be more effective for small banks mainly dependent on equities and deposits (Gambacorta, 2005). To test this relationship in the syndicated loan dataset, we sort the 15 banking groups in 3 categories using their average total assets between 2004 and 2014. We then run the cross-section regression for each group separately. Results are provided in Table 6.

Table 6: Baseline Model per Group of Banks

VARIABLES	(1) Big	(2) Medium	(3) Small
Spread	-0.001	-0.001***	-0.001***
Secured	-0.020	-0.352***	-0.212***
Investment rating	0.815***	0.785***	0.616***
Junk rating	0.251	0.273***	0.488***
BLS	-0.003***	-0.004***	0.004
ΔGDP	-0.037***	-0.035*	-0.001
ΔEONIA	0.088	0.124**	0.152*
CD	-0.152***	0.211***	0.156
STB	0.001	-0.003	-0.126***
Constant	3.324*	-0.963*	-0.177
Observations	16,152	16,361	3,337
Controls	Yes	Yes	Yes
R^2 Overall	0.17	0.26	0.29
Wald test (prob.)	0.00	0.00	0.00

Note: ***, **, * significant at 1%, 5% and 10% respectively. Cross-section regressions of 15 banking groups gathered according to their size (random effects). Big banks have their average total assets higher than euro 1,000 billion over the whole period under study, medium banks, between euro 200 and euro 1,000 billion and small banks, lower than euro 200 billion. Cross-sections dimensions are 3 for Big, 5 for Medium and 7 for Small.

First of all, lending activities of medium banks are highly dependent on the level of customer deposits (the coefficient is positive and significant) while it is negative for large banks and not significant for small banks. Second, in line with the literature, bank size is an important determinant of the relation between short-term borrowings and loan amounts in the syndicated loan market. The higher the level of short-term borrowings of small banks the lower the loan amount compared to medium and large banks that seem to be isolated from these funding constraints. The previous conclusions for the other variables remain almost identical for the three groups. Table 7 displays the results when we introduce the interaction term between the ECB monetary policies and banks' short-term borrowings.

Table 7: ECB Balance Sheet Effects Across Bank Sizes

	EONIA			Balance Sheet			Non-Standard Policies			Both		
	Big	Medium	Small	Big	Medium	Small	Big	Medium	Small	Big	Medium	Small
Spread	-0.001	-0.001***	-0.001***	-0.001	-0.001***	-0.001***	-0.001	-0.001***	-0.001***	-0.001	-0.001***	-0.001***
Secured	-0.020	-0.352***	-0.212***	-0.022	-0.344***	-0.204***	-0.019	-0.341***	-0.193***	-0.022	-0.344***	-0.205***
Investment rating	0.815***	0.785***	0.615***	0.813***	0.779***	0.613***	0.808***	0.773***	0.603***	0.813***	0.780***	0.613***
Junk rating	0.252	0.273***	0.486***	0.249	0.263***	0.487***	0.246	0.258***	0.482***	0.249	0.263***	0.486***
BLS	-0.003**	-0.004***	0.004	-0.003***	-0.004***	0.004	-0.002***	-0.003**	0.005*	-0.002***	-0.004**	0.004
ΔGDP	-0.037***	-0.035*	-0.001	0.005	-0.006	0.010	0.003	0.001	0.023	0.006	-0.006	0.009
ΔEONIA	-2.299	-0.548*	0.679	0.103	0.129***	0.155	0.082	0.119***	0.150*	-3.069**	-0.642*	0.667
CD	-0.145**	0.213***	0.155	-0.405***	0.110	0.131	-0.520***	0.066	0.080	-0.404***	0.111	0.130
STB	-0.021	-0.004	-0.123***	-0.243**	-0.223*	-0.269	-0.037	-0.124**	-0.280***	-0.279***	-0.226*	-0.265
STB * ΔEONIA	0.197	0.057*	-0.054							0.261**	0.065**	-0.052
STB * Balance Sheet				0.022***	0.017*	0.011				0.023***	0.017**	0.011
STB * Non-Standard							0.013***	0.010***	0.013			
Constant	2.106	-0.338	0.338	4.397***	0.694	1.007	4.669***	0.776	1.231	4.514***	0.689	1.000
Observations	16,152	16,361	3,337	16,152	16,361	3,337	16,152	16,361	3,337	16,152	16,361	3,337
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R^2 Overall	0.17	0.26	0.29	0.17	0.26	0.29	0.17	0.26	0.29	0.17	0.26	0.29
Wald test (prob.)	0	0	0	0	0	0	0	0	0	0	0	0

We show that non-standard accommodating measures reduce funding constraints of large and medium banks while the impact is not significant for smaller banks. As previously stated in the baseline model, the latter faces funding constraints and is limited in its lending activities by the level of short-term borrowings. Introducing the interaction term with monetary policy measures does not alleviate this constraint. In terms of monetary policy implementation, this result implies that the ECB by applying non-standard policies is less able to mitigate the funding constraint endured by small banks. In other words, the bank lending channel is less efficient when considering smaller banks. Despite the accommodating monetary policy small banks remain reluctant to lend money in a context of a financial crisis.

VII. Conclusion

The objective of this paper is to assess whether and how the monetary policy implemented by the ECB manages to alleviate the impact of the 2008 financial crisis on the syndicated bank lending. We run an empirical analysis on syndicated loan amounts provided by a sample of 15 banking groups between 2004 and 2014. We show that customers' deposits are an important driver of bank lending activities on this specific market as an increase of quarterly deposits leads to higher lending amounts. On the contrary, banks with a higher level of short-term borrowings will provide loans with smaller amounts. This conclusion is even more significant for small banks more reliant on these sources of funds compared to medium and large banks.

Our empirical analysis of the syndicated loan market provides evidence of the existence of the bank lending channel. The ECB non-standard policies successfully reduce these funding constraints. The accommodating monetary policy of the ECB facilitates banks' access to alternative sources of funds reducing the constraint imposed by a high level of short-term borrowings. On average, the instruments used by the ECB seem to play a significant role in reducing the strains on financial markets. These results contribute to the debate on the efficiency of such unforeseen measures. A further extension of this paper would be to deepen the analysis per sub-period with more detailed data on ECB open-market operations to better understand the mechanism of each instrument of the monetary policy.

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Appendices

Appendix A – The syndicated loan market

A.1 Definitions and syndication process

A syndicated loan is a debt instrument provided to one corporation by a group of lenders. The market where the loan is issued determines its geographical location. This loan may have different forms depending on the firm's borrowing needs. A company that wants to invest in a new project may ask for one term loan to start the project and one revolver loan to cover liquidity needs. Each of these two loans is a facility/tranche and together they form a deal.

At the beginning of the syndication process (pre-mandate phase), the issuer, i.e. the borrowing company awards the mandate to the most competitive bidding made by different financial institutions. The selected institution becomes the lead arranger and is entitled to structure, arrange, underwrite and administer the loan. The second step (post-mandate phase) aims at formally market the deal and invite investors to form the syndicate. The lead arranger sends the Information Memorandum with the description of the issuer and of the project as well as the terms of the transaction to potential lenders. The loan is closed when the syndicate is formed and the final agreement is reached. The final step (post-signing phase) covers the life of the loan. During this period, the loan remains flexible and can be revised and amended according to the agreement between the issuer and the lenders (Dennis and Mullineaux, 2000; Esty and Megginson, 2003; Sufi, 2007; Chaudhry and Kleimeier 2015).

A.2 Characteristics of the syndicate

The syndicate is the group of lenders (i.e. commercial banks, institutional investors, etc.) that have invested in one deal. One or more lenders may be designated as lead arrangers while the other lenders are the participants. However, beyond this division and the unique loan agreement contract, each lender has a separate claim on the debtor (i.e. a participation contract) (Dennis and Mullineaux, 2000). They all have to monitor and evaluate the loan respectively as if they were the sole lender. Hence, the lead arranger can only be liable for bad faith and gross neglect (Preece and Mullineaux, 1996; Sufi, 2007).

On one side, the syndicated loan market provides lead arrangers with the opportunity to diversify the risk and to reinforce their relationships with the issuer by being part of a loan they could not

afford alone. In addition, these lenders earn higher fees and can diversify their revenues. On the other side, being members of the syndicate provides participant lenders with opportunities to diversify their investments in terms of geographical areas, industries, etc. at lower origination costs (Gadanecz, 2004; Chui et al., 2010).

Nevertheless, investing in a syndicated loan is also associated with risks such as agency problems (adverse selection and/or moral hazard) not only between the lead arrangers and the borrower but also between the lead arrangers and the participant lenders. Lead arrangers may be tempted not to share all information about the borrower or not to correctly monitor the loan once it has been sold (Dennis and Mullineaux, 2000). However, Sufi (2007) and Chaudhry and Kleimeier (2015) argue that factors such as the reputation of lead arrangers or the lending history/relationship between the borrower and the lead arranger may help to reduce the problem of information asymmetry.

A.3 Loan pricing terms

The lead arranger when appointed by the issuer has to negotiate the loan pricing terms. Pricing a syndicated loan mainly consists in setting up two elements: the rate and the fees. A syndicated loan market is a floating-rate[14] debt instrument whose spread is computed based on a benchmark rate (mainly the LIBOR or the EURIBOR) and adjusted over time (Carey and Nini, 2007). Moreover, due to its architecture, a syndicated loan contains different types of fees paid to lenders according to their involvement and role in the syndicate. The ultimate objective of the lead arranger is to guarantee the success of the syndication and to attract potential lenders. As such, the lead arranger has to gauge their appetite for risk to set up a loan's price that clears the market.

[14] Additional compensations such as guarantees and collateral (especially for borrowers located in emerging countries) as well as covenants (more popular for borrowers in industrial countries) can be used as compensations for the lenders (Gadanecz, 2004).

Appendix B – Variables description

Loan Characteristics:

Amount: the logarithm of the amount lent by one bank to a borrower.

Spread: we consider the all-in spread, i.e. the sum of the loan spread (i.e. the difference between the rate of the loan and its benchmark rate) and the total fees.

Maturity: the logarithm of the loan's maturity expressed in months.

Secured: a dummy variable equal to one when the loan is secured.

Term loan: a dummy variable equal to one when the loan is a term loan.

Seasonal effects: a dummy variable equal to one when the loan is issued during the fourth quarter of the year.

Lender Characteristics:

Customer Deposits (CD): the logarithm of the lender quarterly customer deposits.

Short-term Borrowings (STB): the logarithm of the lender quarterly short-term borrowings.

Lead: a dummy variable when the lender is the lead arranger.

Country: a dummy variable that accounts for the country of the subsidiary that participates to the loan.

Lender Strategy:

Bank Specialization (LS): a bank may develop an expertise in one specific industry by being used to lending to companies that belong to this industry. As such the bank can save information gathering and monitoring costs. However, the risk of this "focus" strategy (Acharya et al., 2006) is the lack of diversification which may sometimes push banks to lend more to companies in other industries. To account for this degree of specialization, we compute the logarithm of the total amount lent by the credit institution to the industry of the borrower associated with the loan the year before.

Monetary Policy:

ΔEONIA: the variation of the quarterly EONIA taken with one lag.

Size of the Balance Sheet: the logarithm of the ECB quarterly balance sheet taken with one lag (equal to total assets minus general government debt denominated in euro, marginal lending facility, credits related to marginal calls and other securities).

Non-standard Policies: the logarithm of the value of ECB unconventional policies taken with one lag (sum of LTROs and securities purchased for monetary policy purposes from the quarterly balance sheet assets).

Borrower Characteristics:

Industry: set of 2 dummy variables with a value of one when the borrower belongs to one of the 2 main economic sectors, i.e. manufacturing and finance.

Industry Risk (VaR): it may affect bank's portfolio of loans especially during a crisis when investors become risk-averse. We compute a Value-at-Risk per industry to control for this risk using industry indices produced by Datastream. Then we manually match the industry of the borrower with these indices to associate one VaR per loan.

Rating: Dealscan provides credit ratings produced by the three leading U.S. credit rating agencies (CRAs), i.e. Standard & Poor's, Moody's and Fitch. These rating are automatically reported in the database when they exist. In our sample, we consider for each loan the rating each time it is provided by one the three CRAs. For rated loans with more than one rating, we apply the 'worst of 2 and median of 3 ratings' rule (Bongaerts et al., 2012). We then categorize borrowers as investment-grade, junk-grade or unrated. In the regression we use the group of unrated loans as the reference.

Domestic: a dummy variable equal to one when the borrower has the same nationality as the lender. This allows us to control for the home bias hypothesis developed in the literature.

Lender-Borrower Relationship:

Relation: a dummy variable equal to one when the lender has already lent to the borrower during the previous year.

Macroeconomic Environment:

ΔGDP: the change in the Eurozone GDP taken with one lag.

BLS: the main objective of the bank lending survey (BLS) is to provide the ECB's Governing Council with information regarding the financing conditions in the euro area. It consists in questionnaires banks as well as enterprises have to fulfill to give their opinion about the market appetite for loans. In our model, we use the information related to the answers to question 9 ("Please indicate how you expect demand for loans or credit line to enterprises to change at your bank over the next three months (apart from normal seasonal fluctuations)?"). We consider the quarterly variation of the overall category, i.e. all loans (short- and long-term) to all companies (small, medium and large) and we include the balance of opinions in our model (always between -100 and +100).

Year: two dummy variables equal to one when the loan is issued in 2008 or 2009.

We compute the descriptive statistics of the main variables used in our model and the correlation matrix of all variables that are not dummies or interaction terms in Tables B1 and B2 respectively.

Table B1: Descriptive Statistics

Variable	Mean	Median	Std. Dev.	Min	Max
Amount	2.944	3.018	1.383	-4.605	8.447
Spread	204.913	175.000	161.657	1.750	1450.000
ΔEONIA	0.033	0.050	0.330	-1.821	0.813
CD	12.429	12.705	0.783	9.127	13.390
STB	11.693	11.915	0.817	5.374	12.974
STB * ΔEONIA	0.399	0.599	3.891	-23.626	10.189
STB * Balance Sheet	155.244	148.472	12.663	72.433	177.005
STB * Non-Standard	146.526	157.608	16.741	71.129	174.937

Table B2: Pearson Correlation Matrix

	Maturity	Spread	LS	VaR	ΔGDP	BLS	ΔEONIA	CD	STB
Maturity	1.00								
Spread	0.24	1.00							
LS	-0.05	-0.02	1.00						
VaR	0.16	-0.14	0.07	1.00					
ΔGDP	0.11	-0.26	0.02	0.54	1.00				
BLS	-0.02	0.07	-0.02	-0.03	-0.23	1.00			
ΔEONIA	0.10	-0.10	0.06	0.38	0.56	0.02	1.00		
CD	0.01	0.19	0.46	-0.14	-0.16	-0.01	-0.03	1.00	
STB	0.01	0.07	0.44	-0.09	-0.01	-0.04	0.03	0.74	1.00