THE INTEREST OF BEING ELIGIBLE

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ABSTRACT. Major central banks accept pooled individual corporate loans as collateral in their refinancing operations with banks. Such "eligible" loans to firms therefore provide a liquidity advantage to the banks that originate them. Banks may in turn pass on this advantage to the borrowers in the form of a reduced liquidity risk premium: the eligibility discount. We exploit a temporary surprise extension of the Eurosystem's universe of eligible collateral to medium-quality corporate loans, the Additional Credit Claims (ACC) program of February 2012, to assess the eligibility discount to corporate loans spreads in France. We find that becoming eligible to the Eurosystem's collateral framework translates into a reduction in rates by 7bp for new loans issued to ACC-firms, controlling for loan-, firm- and bank-level characteristics. We also find that this collateral channel of monetary policy is only active for banks which ex ante pledged more credit claims as part of their collateral.

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I. Introduction

Banks traditionally perform a function of liquidity transformation. For instance, bank loans to non-financial firms are typically illiquid assets, which banks fund partly through liquid liabilities, such as short-term deposits or wholesale funding. As a consequence, bank loans to firms tend to increase the liquidity risk of the issuing financial institution and command therefore a liquidity risk premium. Banks via securitization can convert these illiquid loans into liquid securities therefore lowering their funding liquidity risk. But as evidenced by the financial crisis of 2007-2009, the interbank and secondary markets for these securitized assets can dry up. In many countries, however, banks may alternatively pledge corporate loans as collateral in their refinancing operations with the central bank. In the euro area, for example, the Eurosystem accepts a large set of so-called "credit claims" as collateral in its regular lending operations with resident banks.[1] While the impact of loan securitization on loan supply has been extensively studied (cf. for instance Mian and Sufi, 2009; Nadauld and Weisbach, 2012; Shivdasani and Wang, 2011; Ivashina and Sun, 2011), little is known about the effects of collateral eligibility for central bank liquidity injections on banks' loan pricing of corporate loans.

In this paper, we investigate the effect of a change in the eligibility criteria of the Eurosystem's collateral framework on the cost of credit for French firms during a time of financial stress. We exploit the Eurosystem's Additional Credit Claims (ACC) program of the winter 2011-2012 as a quasi-natural experiment. The ACC program consisted of an unexpected extension of the Eurosystem's collateral framework to medium-quality corporate loans. It was announced at the height of the euro area sovereign crisis, in December 2011, and was swiftly implemented in February 2012, along with the second round of the Eurosystem's 3-year longer term refinancing operations (LTROs).[2] Using a rich dataset of newly issued loans to a large sample of French firms, including a majority of small, non-listed firms, we measure the reduction in loan spreads (relative to the short-term risk free rate) for newly eligible firms that is associated with the implementation of the program. We find evidence for an average reduction of about 7 bp in loan spreads for these medium-quality firms relative to the spreads of higher

[1]The Eurosystem denotes the network of the European Central Bank (ECB) and all national central banks in the euro area. The latter are in charge of implementing common monetary policy operations in each of the euro area's member countries. In what follows we may use indifferently the names Eurosystem and ECB for simplicity. Note that the Bank of Japan also accepts credit claims as collateral for most of its monetary operations. In contrast, the US Federal Reserve and the Bank of England accept credit claims for certain operations, such as discount windows facilities, but not for their main open market operations. See, e.g., Tamura and Tabakis (2013) and Cheun et al. (2009) for details.

[2]The 3-year LTROs were announced by the ECB's Governing Council on 8 December 2011 and implemented in two rounds which took place on 21 December 2011 and on 29 February 2012 respectively. Taken together, the two operations saw a gross liquidity injection into the euro area's banking system of more than one trillion euros. See, e.g., Andrade et al. (2015) for details.

quality, already eligible firms. Furthermore, we find that this effect is only active for the banks which ex ante pledged more credit claims as part of their collateral with the Eurosystem.

From a theoretical perspective, it is not clear what ought to be the effect of such a program on loan rates. On the one hand, if liquidity premia are driven by the amount of available liquidity, such as treasuries, in the financial system, then the ACC program by increasing the aggregate supply of liquidity ought to imply a reduction in rates for all loans. In this case, the ACC program may help to solve the standard pledgeability problem (Holmstrom and Tirole, 1998). But if the overall supply of liquidity is all that matters, then there should be no differential effect across loans such as the one we find. On the other hand, collateral eligibility may imply an asset specific effect due to a higher demand for pledgeable assets. In this case, two assets with identical future cash flows but which differ in their pledgeability may face different demand curves. As a consequence, one may expect that such loans command a smaller compensation for liquidity risk (on top of any remaining credit risk premium) than other loans, notably in times of financial stress.[3] We label here this specific reduction in the liquidity risk premium the eligibility discount.[4]

During good times, as evidenced by the boom of securitization in the 2000s, banks can easily repackage and distribute the loans they originated to other investors and then obtain liquidity at a lower haircut. This is however likely to change in times of liquidity stress, when private repo markets seize up. Although the haircuts applied by the Eurosystem on credit claims is high, the opportunity cost of pledging them is indeed close to zero for local banks since these assets generally cannot be used on interbank markets, while the operational cost, in France at least, is quite small. In times of financial stress, the safe assets which are required for collateralized interbank lending, such as AAA-government bonds, become scarce and banks' holdings of such high-quality liquid assets (HQLAs) are to a large extent already encumbered. In addition, liquidity regulations such as the LCR, increase further the opportunity cost of pledging HQLAs as collateral with the central bank. This may then imply an opportunity cost view of the eligibility discount in which the eligibility discount is not only a function of the supply of aggregate liquidity, but may also entail the opportunity cost of pledging a certain asset with the central bank.

Our empirical set-up uses a difference-in-difference regression, whereby we identify the eligibility discount in times of financial stress by comparing the loan spreads to firms which are

[3]Spreads are compensations required by investors for taking risks. Note that, if investors (here, banks) are not risk-neutral, such a compensation is itself the sum of the probability of an adverse event (be it a default or a liquidity squeeze) and a risk premium, which depends on the risk-aversion of the investors. For simplicity however, we indifferently use in this paper the terms risk compensation and risk premium.

[4]Bindseil and Papadia (2009) dub the spread between eligible and ineligible assets to the Eurosystem's repurchase operations (or repos) the eligibility *premium*. We prefer to speak of eligibility *discount* since eligibility ought to impact mainly on the liquidity risk premium associated with holding the asset.

newly eligible thanks to the ACC program (which we denote 4-rated firms according to their Banque de France rating), with the spreads to firms of close but superior quality which were already eligible (which we denote 4+-rated firms), both before and after the implementation of the measure. Although several other policy measures were also implemented over the winter of 2011-2012, including notably the Eurosystem's 3-year LTROs and the European Banking Authority's 2011 Capital exercise, the ACC-program is the only one that specifically targets 4-rated firms and not firms with other credit ratings. By focusing only on the differential effect of loans becoming eligible, our identification strategy differences out any common effect on the liquidity premium for all loans due to the increase in collateral availability for banks, and captures therefore the asset specific effect which is due to loans being eligible as central bank collateral. Our results can then be viewed as a lower bound of the overall effect of the collateral extension policy on corporate loan prices.[5]

There are many challenges that need to be dealt with when trying to identify the eligibility discount on corporate loan rates in such a set-up. First, loans of different types or different maturities command a priori different interest rates, so detailed information on individual new loans is obviously required to control for confounding loan characteristics. Second, changes in new loan rates can reflect both loan supply effects, such as the one we are tracking, and loan demand effects, which depend on firms' characteristics and in turn on the demand they face for their products.[6] Third, notably in times of financial stress, lending banks can be hit by other simultaneous shocks, like windfall losses depleting their capital or regulatory shocks, and adjust their pricing for reasons that are not related to the policy that was implemented by the Eurosystem at that time.[7] Last but not least, the policy measure needs to be largely unexpected.[8] It is rather undisputed that this measure, which was announced by ECB-President Mario Draghi only one month after he took office, came largely as a surprise, all the more given

[5]Trying to estimate the overall effect of the program would be difficult given that it coincides with the LTRO program which may also drive down liquidity premia due to a relaxation of bank's liquidity constraints as well as significantly lengthening the maturity of the liabilities side of banks' balance sheet.

[6]Decreases in relative spreads could also reflect increases in credit risk within the credit rating class of already eligible firms. However, average default probabilities within Banque de France rating classes remain relatively stable, notably during our period of interest. For instance, ex post one-year default probabilities of 4+-rated firms ranged from 0.18% in 2011 to 0.20% in 2012 and 0.16% in 2013 according to the 2017 Banque de France's annual assessement of its rating system.

[7]Mésonnier and Monks (2015) for instance find that euro area banks reduced loan supply as a response to tightened capital requirements imposed upon their holding companies by the European Banking Authority over the period from December 2011 to June 2012.

[8]If banks had anticipated the ACC program, they could have behaved strategically and lowered the price of such loans before the program was announced so to swiftly take advantage of the extended eligibility of credit claims once the measure is implemented.

that the Eurosystem already accepted a broad range of collateral for its refinancing operations relative to other major central banks.[9]

To address the identification issues, we take advantage of having access to a rich database of new corporate loans issued by banks located in France from January 2011 to June 2013. Our main data source are the disaggregated items to a quarterly survey on lending conditions, which is conducted by the Banque de France, the French national central bank within the Eurosystem. The disaggregated files report precise information about all the corporate loans issued by branches from a representative sample of the French banking system during the first month of each quarter. We match this dataset with information on borrowing firms' balance sheets and other characteristics, notably credit ratings, and on banks' balance sheet and collateral pools, also collected or produced by the Banque de France. We are therefore able to control for loan characteristics as well as loan demand and bank-specific confounding factors by including in our regression loan- and firm-level covariates, as well as various combinations of industry, region, time and bank fixed effects. Interestingly, while most comparable studies focus on large, often syndicated, loans to large firms, our merged dataset includes a lot of information on small firms.

Furthermore, France provides an ideal context to study the effects of the Eurosystem's ACC program given the history of the Banque de France in accepting credit claims as collateral in its refinancing operations. First, the Banque de France has developed an acknowledged expertise in rating the credit risk of non-financial firms, including small SMEs, and it routinely assesses the credit ratings of some 250,000 corporates. Banque de France ratings are used by the Eurosystem to assess the eligibility of credit claims linked to French companies and are also used by most resident commercial banks in screening borrowers. Besides, the Banque de France has implemented in 2002 the highly efficient automated platform *Traitement Informatique des Créances Privées* (TRICP) for individual banks to report and pledge credit claims at a very low transaction cost. Banks' pools of private credit claims can therefore be easily and frequently adjusted, which implies that the implementation of the ACC in France faced very little, if any, technical impediments on the side of banks.

Our main finding is that the extension of collateral eligibility to medium-quality corporate loans by the Eurosystem has induced on average an eligibility discount of some 7 bp on spreads to targeted loans. Although small in absolute terms, this amounts to a third of the unconditional pre-policy average spread between treated and control loans, and about a half of the conditional spread (conditional to all controls). We then check for a confirmation of the hypothesis of a positive bank credit supply shock due to the enhanced liquidity of loans to ACC-treated firms by also looking at the volumes lent by the same banks to 4+- and 4-rated firms. More specifically,

[9]Cf. Cheun et al. (2009), ECB (2013) and BIS (2013).

we look at bank-firm level information on changes in total outstanding credit commitments from the French credit registry and control for firms' loan demand by including region-industry fixed effects and firm-specific balance sheet variables. Our results clearly point to an increased supply of credit over the year 2012 to the newly eligible 4-rated firms by those banks which are both active corporate lenders and active direct Eurosystem borrowers. Overall, our results are supportive of an active collateral channel of monetary policy transmission which can effectively and timely strengthen the bank lending channel when the latter gets partly impaired by the central bank's rate hitting its zero lower bound (ZLB).

Our main result proves robust to a range of placebo and falsification tests. First, we exploit a discontinuity of the ACC program, which accepts only loans with maturities equal to or less than 5 years. Looking at non-eligible, longer-maturity loans and comparing already eligible, 4+-rated, and newly eligible, 4-rated firms again, we find no impact on the relative spreads to the lower-quality credit claims when their maturity exceeds the eligibility limit set by the Eurosystem. Second, we also check that our estimate does not reflect an unobserved deterioration of the credit quality of loans in the control group (4+ loans) by replacing the treated group with the loans of high-quality firms which were already eligible before the ACC measure. As expected, we again find no effect of the measure in such a case. We also replace our control group with that of the credit rating below the ACC treated firms, whose loans are ineligible both before and after the program. Again we find that our main result holds.

We finally investigate the channels through which the liquidity benefit associated with collateral eligibility is transmitted to borrowers. Banks are likely to differ in their valuation of the liquidity advantage associated with the ACC program. This heterogeneity may reflect differences in liquidity needs, in the opportunity costs faced by the banks when pledging certain types of collateral (maybe in turn reflecting different business models), or simply in the financial soundness of the institutions, as measured for instance by their capitalization ratios. We therefore look more closely at the differentiated effects of the ACC-program on the eligibility discount along variations in proxies for these three dimensions of bank heterogeneity. We find that the transmission to borrowers of an eligibility discount due to the liquidity advantage granted by the ACC program is concentrated in the set of banks which *ex ante* pledged higher levels of high quality credit claims as part of their central bank refinancing. The transmission of the eligibility discount to borrowers is however affected neither by banks' ex ante capitalization nor by the collateral-strain potentially induced by their LTRO-uptakes. Overall, this suggests that the opportunity cost view of collateral choice matters for explaining the eligibility discount.

We contribute with this study to three main strands of the recent literature. First, our study contributes to a literature on liquidity and the pricing of corporate debt. It is well known that liquidity plays an important role in the pricing of corporate bonds (Covitz and Downing, 2007;

Chen et al., 2007; Boa et al., 2011), and that this is especially pronounced in times of financial stress (Dick-Nielsen et al., 2012; Friewald et al., 2012; Acharya et al., 2013). With respect to bank loans however much less is known empirically. Since securitization plays an important role in bank's funding liquidity (Loutskina, 2011; Loutskina and Strahan, 2009), a set of papers have explored the link between securitization and the pricing of corporate loans (Ivashina and Sun, 2011; Kara et al., 2016; Nadauld and Weisbach, 2012). The latter paper finds strong evidence for a collateral demand hypothesis in the US syndicated loan markets. Our paper is the first to formally isolate changes to the liquidity premium of corporate loans due to collateral eligibility with the central bank.

Second, our study relates to a recent literature that examines how central banks' collateral policy can be an additional monetary policy tool. As argued by Bindseil and Papadia (2009) the central bank can control the amount of liquidity it provides to the banking system by defining the set of collateral it accepts in its refinancing agreements. A set of recent papers have made the case for an active collateral policy as an effective alternative tool for affecting banks funding costs, especially at times when conventional monetary policy hits its zero-lower bound (Ashcraft et al., 2011; Cassola and Koulischer, 2016; Bindseil, 2013). The above papers along with Bekkum et al. (2017) provide empirical evidence which shows that eligibility impacts the market prices of such eligible assets. We show that extending collateral eligibility can not only prove effective in affecting banks funding costs, but also that the transmission varies across banks depending on the costs they face when pledging such loans as collateral.

Last, we contribute to a series of recent papers that provide assessments of the unconventional policies implemented by the Eurosystem during the euro area crisis, notably large and longer-term liquidity injections (LTROs). Several papers have investigated the policy-package of December 2011, which included both the 3-year LTROS and the ACC program. Andrade et al. (2015) for France, Garcia-Posada and Marchetti (2016) for Spain and Carpinelli and Crosignani (2017) for Italy find evidence of positive effects of the LTROs on bank lending supply to firms. Bignon et al. (2016) and Cahn et al. (2017) look at the impact of the 2012 ACC-program on credit volumes supplied to firms in France. The latter notably finds an increase in bank credit and a fall in the payment defaults with suppliers of small, standalone, single-bank firms. However, other papers are less positive on the effects of these unconventional policies. Nyborg (2015) argues that given that opportunity costs are heterogeneous across collateral types and therefore may not be eliminated by currently defined haircuts, the collateral framework in the euro area promotes risky and illiquid collateral. Others have also found evidence that unlimited liquidity injections combined with the Eurosystem's collateral policy may have incentivized banks in periphery euro-area countries to increase their exposure to risky domestic government debt (Drechsler et al., 2016; Acharya and Steffen, 2015; Crosignani et al., 2015).

In the remaining of this paper, we first provide a more detailed account of the Eurosystem's collateral framework and its 2012 extension in section II. Section III presents our dataset and shows descriptive statistics. Section IV details our empirical framework then presents and discusses our results. Section V concludes.

II. Institutional Background

A. The Eurosystem's Collateral Framework

In contrast with other major central banks, which implement their monetary policy via open market operations by conducting mostly outright asset purchases from deposit banks, the Eurosystem supplies liquidity to credit institutions chartered in the euro area in the form of collateralized lending operations, known as "refinancing operations".[10] In order to mitigate counterparty risk, the Eurosystem operates a collateral framework which establishes the eligibility criteria and the haircuts of eligible assets.[11] As a general rule, assets pledged as collateral with the Eurosystem are priced at market price when such a price is available, or according to the Eurosystem's pricing model (CEPH). The collateral value of the pledged asset, and hence the amount that can be borrowed from the Eurosystem backed by this asset, is then derived from this market or model-based price by deduction of a haircut. When setting haircuts the ECB discriminates along three dimensions: the liquidity class; maturity; and credit rating of the asset. The set of eligible collateral consists of two main categories of assets: marketable assets and non-marketable assets. The first category consists of a large set of negotiable assets, from very liquid euro area governments bonds to bank and corporate bonds and asset-backed securities. The second category is mainly made up of credit claims to non-financial corporations and public sector entities located in the euro area. The required collateral is pledged by a credit institution with the desk of the national bank of the euro area country where it is located and at the discount window of which it bids for ECB liquidity injections.

The use of credit claims as collateral with the Eurosystem has increased steadily since their inclusion in the Eurosystem's single list of eligible collateral in 2007. Between the end of 2007 and the end of 2011, non-marketable assets increased from 3% to 23% of total pledged collateral, increasing further to 27% by the end of 2012 and thereby making credit claims the largest asset class as a portion of pledged collateral. This underlines the importance of

[10]Before the financial crisis in 2007, the refinancing operations had mostly short-term maturities, varying between one-week for the main operations (often dubbed repos, for repurchase agreements) and one to three months for long-term ones. With the global financial crisis and the ensuing euro area sovereign debt crisis, the maturity of these operations has been extended to 6, 12, 18, 36 and even 48 months. These longer term refinancing operations are usually denoted by their acronym, LTROs.

[11]See Nyborg (2016) for an extensive analysis of the Eurosystem's collateral framework and Bindseil and Papadia (2009) for an analysis of the collateral framework as a credit risk mitigation tool.

credit claims from a monetary policy implementation perspective. Since the implementation of the Additional Credit Claims program in February 2012, on which this paper focuses, loans belonging to the set of eligible credit claims (CC) are of two types: standard and temporary. The standard CCs are those already eligible and are associated with a low default probability of below 0.4% at a 1-year horizon, in line with the Basel criteria. The temporary CCs, which the ACC program concerns, permits national central banks, but at their own risk, to accept credit claims with a default probability of between 0.4% and 1% at a one-year horizon. Even though the haircuts of credit claims can be quite high, up to 70%, the opportunity cost of pledging them with the Eurosystem is very low, given that in the absence of securitization they generally cannot be used on interbank or secondary markets. This growing importance of credit claims has led to an opportunity cost perspective of the use of credit claims as part of banks' optimal collateral choice with the central bank.

B. Liquidity Provision During the Crisis and the 2012 ACC Program

Since October 2008, and in response to the severe liquidity drought in European money markets after the Lehman bankruptcy, the Eurosystem saturated the demand for liquidity of commercial banks by conducting full allotment, fixed rate refinancing operations. In this context, the sole limitation faced by a bank regarding its access to central bank liquidity is the after-haircut value of its pledged collateral. As the euro area sovereign crisis escalated over the second semester of 2011, the Eurosystem however decided to extend its collateral framework to include additional credit claims (the ACC program). This decision was motivated by several considerations. First, with the unfolding of the crisis, the value of available collateral declined substantially, due to credit rating downgrades across different asset classes. In addition, credit rating downgrades to firms with ratings around the eligibility threshold implied that the credit claims of many firms across Europe became ineligible. Second, it was part of the Eurosystem's strategy to help banks free up high-quality assets to be used as collateral in private operations so as to boost the faltering interbank market. Third, the Governing Council of the ECB also acted in anticipation of possible future shortages of banks' collateral, at least for some banks in crisis-hit countries, so as to not prevent them from bidding in the second 3-year LTRO of February 2012.

The details of the extension announced in December 2012 were made public by the eight participating national central banks in early 2012 and approved by the Governing Council on February 9, 2012. As far as France is concerned, the Banque de France defined a set of criteria which included in the ACC program several types of additional private credit claims, such as some types of mortgage loans and, most importantly, corporate loans to firms with a lower credit quality than the already eligible ones. The Banque de France decided that firms with a

BdF rating of 4 would become eligible, whereas previously the lowest eligible rating was 4+. A BdF rating of 4 is roughly equivalent to a Fitch rating of BB-, the rating at which a firm's debt is considered speculative, and corresponds to a 1-year default probability between 0.4% and 1%.[12] An additional eligibility condition, which we will exploit in our empirical analyses, was that eligibility was limited to credit claims with a residual maturity of less than or equal to 5 years.

Since 4-rated firms made up a substantial part of French banks' loan portfolios in 2011, the extension of eligible credit claims proved a major positive shock to the nominal value of the pool of eligible assets held by French banks by some EUR 90 bns[13], or more than a third of the pool of eligible bank loans to firms.[14] At the end of 2012, newly eligible corporate credit claims represented almost 20% of the value of pledged credit claims (after haircut). However, the use of corporate ACCs varied widely across banks, depending notably on how they were invested in loans to 4-rated firms in the first place. Among the 56 resident credit institutions that posted collateral with the Banque de France at the end of 2012, only 16 banks posted corporate ACCs. These 16 institutions were however major banks, which accounted alone for about three quarters of the total value of pledged collateral with the Banque de France.

III. Data

A. Data Sources

To study how the Eurosystem's extension of collateral eligibility to medium quality firms affected French banks' corporate loan pricing, we merge five proprietary databases of the Banque de France. First, we draw individual loan-level data, including the interest rates on new corporate loans which are used to compute our dependent variable, from the M-Contran dataset. This information is collected by the Banque de France in order to compute quarterly aggregate statistics on the interest rates of new loan contracts, with breakdowns by types of loans, borrowing sectors and types of credit institution. It also enables Banque de France to estimate and publish usury interest rates, an upward limit on lending rates set by French law. All main credit institutions report exhaustive information for all new individual loans from their reporting branches granted during the first month of each quarter. The initial dataset reports, on average, about 100,000 new loans in each quarter during the period 2011-2013. In addition to interest rates, the survey provides rich information on a wide range of relevant loans characteristics, such as

[12]High, investment-grade, BdF ratings rank from 3++ to 4+. Lower ratings rank from 4 to 5+, 5 and 6. Firms with at least one recent payment incident have ratings of 7 or lower.

[13]The following statistics are taken from Bignon et al. (2016) and Barthélémy et al. (2016)

[14]At the end of 2011, already eligible outstanding corporate loans -including drawdowns on credit lines- amounted to EUR 265 bns. Non-eligible corporate loans, because the borrowing firms had too low a rating or did not participate in the BdF's rating system and therefore had no rating, amounted to some EUR 730 bns.

the size of the loan, the loan's precise purpose (investment, treasury, leasing etc.), its maturity at issuance, whether it is fixed-rate or adjustable rate, and whether it is secured or not. In addition, the dataset provides us with unique bank and borrowing firm identifiers, which allows us to merge this information with other bank- and firm-specific datasets.

Second, we draw information on firms' credit rating and other balance sheet characteristics from the FIBEN database. FIBEN accounting data are extracted from the individual company accounts collected yearly through the branch network of the Banque de France (balance sheet and income statements) based on fiscal documents. The data collection covers all companies conducting business in France whose annual turnover exceeds EUR 0.75 million or whose bank debt exceeds EUR 0.38 million. We exploit this database to obtain relevant firm-level variables such as firm total assets, leverage, but also the age of the firm, the 2-digit industry in which it operates, and whether it belongs to a group or it is a standalone company.

Importantly, the FIBEN database includes the in-house credit assessments of individual firms computed by the Banque de France, which allows us to sort firms into firms that are treated by the Eurosystem's policy measure and control firms which are not. These credit ratings are one of the four in-house credit assessment systems (ICAS) validated by the Eurosystem, which means that the Eurosystem can rely on them when assessing the credit quality of eligible credit claims within its collateral framework.[15] The Banque de France assigns a full-scale rating to the some 240,000 non-financial companies which are monitored in FIBEN on a yearly basis, of which the ACC-affected rating 4 is the largest group, as they account for nearly a quarter of the population of rated firms.[16] The rating reflects the overall assessment of a company's ability to meet its financial commitments at a three-year horizon. The rating has two components: a turnover rating and a credit rating which ranks the company on a credit risk scale. Regarding the latter there are twelve credit rating positions (3 ++, 3+, 3, 4+, 4, 5+, 5, 6, 7, 8, 9, P), from the most favorable (3 ++) to the least favorable (P, which stands for a formal bankruptcy). To be eligible to the Eurosystem's collateral framework before the ACC program, a firm required a rating of 4+ or above. According to the Banque de France's documentation[17], a firm with rating of 4 "has an acceptable capacity to fulfil its financial commitments, but shows some elements of weakness or uncertainty" (because, e.g., of business or capital links with weak firms, or a somewhat weakened solvency or liquidity position of its own).

[15]The information gathered and analyzed by the Banque de France is used to conduct a comprehensive assessment of a company's credit risk. The data are based on hard information such as balance sheet data, payment incidents data etc., as well as soft information gathered from interviews with company managers.

[16]Note that some 3.2 million firms operate as legal units in France. More than 95% of them are micro-firms of less than 10 employees which therefore fall below the FIBEN and rating inclusion thresholds.

[17]Available (in French) at `www.fiben.fr`

Third, we gather information on banks' collateral pools and collateral management from the proprietary database of the Banque de France's General Directorate Operations, in charge of the local implementation of the Eurosystem's monetary policy with banks chartered in France. We notably look at the share of credit claims in the after-haircut value of the collateral pledged by each bank with the Banque de France as well as their uptakes in the LTROs during this period. Fourth, we merge this with (unconsolidated) bank balance sheet information from the French supervisor. We can then compute bank-level standard ratios, such as the capital-to-assets ratios. Fifth and last, we merge the previous datasets with the credit registry of the Banque de France. The French credit registry collects all individual bank exposures to individual non-financial firms above EUR 25 thousand, and therefore allows us to estimate the quantity effects of the program across a wider spectrum of firms than our loan-level dataset.

The level of observation of bank-related information in our dataset is the individual credit institution, not the banking group these institutions may belong to. Since we do not know much about the internal markets for central bank liquidity within each banking group, we consider as a rule the individual bank as the relevant level of observation. However, we make an exception for the mutualist (cooperative) entities in each of the three major French mutualist banking groups.[18] Regional entities, called *Caisses régionales* or *Banque régionales mutualistes*, that belong to the mutualist networks of these groups operate under a centralised liquidity management system in which a central body borrows from the Banque de France's refinancing operations. For this reason, we aggregate the regional and national entities of each major mutualist network into one pseudo-consolidated mutualist bank.

B. Sample Selection

We focus on the quarters before and after the implementation of the ACC program in February 2012. More specifically, we define a pre-treatment period from January to December 2011, and a post-treatment period, from July 2012 to June 2013. Our dataset records 789,362 loan observations over the 8 quarters of study. Many of the loans in the initial dataset are effectively different tranches of the same loan, therefore for these loans we take a weighted average along the dimensions of month, bank, firm and a list of categorical loan characteristics such as maturity, fixed/variable rate, secured.

As far as individual loan contracts are concerned, we focus on the simplest, standard corporate loans. We drop therefore non-standard contracts such as loans with subsidized rates and loans which bear a zero interest rate. We then keep only fixed-rate, investment and treasury (cash) loans, which are also the more common in our database. Simple scatter plots confirm that other loan categories such as consumer credit and lease purchases as well as floating-rate

[18]These are Crédit Agricole, Crédit Mutuel and Banques Populaires-Caisses d'Epargne.

loans bear a poor relationship between credit risk and the loan rates. Given that our identification strategy rests on our ability to disentangle the credit risk premium and the liquidity risk premium of loan spreads such loans would bias our results.[19]

For the firms in our sample we keep only those which are based in mainland France belonging to our two treatment groups and which have a positive value for total assets. We are also concerned of attrition bias due to the fact that some firms in our sample switch between ratings and therefore keep only firms with constant ratings throughout.

For the banks in our sample, we keep only banks which borrow actively from the Eurosystem and who appear in the merged dataset in both periods, for both the treatment and control groups of borrowing firms. We also eliminate foreign branches and specialized financial institutions. Finally, we impose a balanced panel at the bank level by keeping only banks which are present in the loans dataset for both treatment groups in both periods. This leaves us with 9 banks belonging to the five major French banking groups, including three aggregated mutualist bank networks and 6 individual capitalist institutions. All the major deposit banks in France are included in this selection and the five major banking groups they belong to represent some 80% of aggregated individual bank balance sheets in France.[20] The banks in our sample account for 48% of total corporate credit to resident firms by capitalist or mutualist banks chartered in France.[21] They also account for some 70% of the total liquidity borrowed by banks located in France from the Eurosystem.

Finally, we clean our loan dataset from outliers by dropping within each credit rating class and quarter the observations with a spread beyond the median plus 5 times the interquartile range.[22] This leaves us with a sample of 3,977 loans issued by 9 banks to 3,429 firms. About a half of these loans are issued to firms in the control group and a half to firms in the treated group.

C. Summary Statistics

Table 1 provides summary statistics on loan characteristics in our sample broken down by credit rating category. Comparing these two groups reveals that the average 4 rated loan differs substantially on two key dimensions from the average 4+ rated loan. First, the spread is higher, partly reflecting the differences in credit risk. Secondly these loans are of smaller size.

[19]In addition for other non-standard types of credit, the first two moments of observed rates differ quite significantly from our chosen core loan categories.

[20]Aggregated bank balance sheets over resident banks of each group are more representative of the group's market share of banking activities with French residents than consolidated banking group balance sheets, which also include the substantial share of large groups' activities run abroad.

[21]Specialized financial institutions and French branches (but not subsidiaries) of foreign banks are excluded here.

[22]In practice, this amounts to dropping 4 outlier loans with spreads larger than 12 percentage points which is 5 pps higher than the fifth highest loan spread. Our results remain unchanged if we drop instead observations with spreads beyond the first/last few percentiles within each credit rating and quarter.

Table 2 does the same for the firm characteristics in our sample. Comparing these two groups reveals two key differences. First 4 rated firms are smaller than the 4+ rated firms. In the pre-ACC period 4-rated firms have a median value for total assets of EUR 1,598k whereas 4+-rated firms have a median value of EUR 1,921k. Second they have higher leverage ratios. In the pre-treatment period 4-rated firms have a median value of 0.27 for its debt-to-assets ratio whereas 4+-firms have a value of 0.21. Both these facts ought to explain much of the differences in their credit risk ratings.

Table 3 reports the values for the key dimensions of bank heterogeneity. Due to confidentiality agreements we can not report statistics based on less than three observations. Regarding pre-ACC credit claims usage, which is measured for each individual bank as a ratio of the after haircut value of pledged standard credit claims to the value of total collateral, high credit claims users have a mean ratio of 0.89 whereas low credit claims users have a mean value of 0.27. An interesting feature of this distribution therefore is that banks tend to either use credit claims quite intensively or not much at all. Although we cannot report unique values for bank variables, we can say that the lowest value for high credit claims users is nearly twice as high as the highest value for low credit claims users.

Table 4 reports statistics verifying the suitability of our control group with respect to how well balanced the covariates are across both groups. As we can see from the table the covariates between groups are very well balanced: for all variables, the normalized difference in means across groups stays low, and, importantly, it remains relatively the same for both periods. No preliminary correction of selection bias is therefore required.

IV. Results

A. Empirical Framework

We observe loan spreads from a representative sample of banks to firms with various credit ratings over two time windows (or "periods") of 4 consecutive quarters each, one before and one after the implementation of the ACC program. To test our hypothesis that the extension of the Eurosystem's collateral framework to medium quality, ACC-eligible firms entailed an eligibility discount reducing the relative spreads these firms had to pay for bank loans, we estimate the following standard difference-in-difference regression:

$$Spread_{ijkt} = \alpha + \beta_1 ACC_{jt} + \beta_2 POST_t + \beta_3 (ACC * POST)_{jt} + \beta_4 X_{it} + \beta_5 Z_{jt} + \eta_{kt} + \varepsilon_{ijt} \quad (1)$$

where $Spread_{ijkt}$ denotes the spread (vis--vis the EONIA) of a loan i borrowed by firm j from bank k in the first month of quarter t. *ACC* is a dummy variable which takes the value of one when firm j is "treated" by the ACC program, i.e., is a 4-rated firm. *POST* is a dummy

variable which takes the value of one when quarter t belongs to the post-ACC one-year period, from 2012 Q3 to 2013 Q2. X and Z are vectors of, respectively, loan- and firm-specific controls detailed in section III above. We control for loan type, loan maturity, loan size and whether the loan is collateralized. Since the ACC program targets credit claims with initial maturity below 5 years, we consider only such loans in our regressions, unless otherwise stated. At the firm level, we include controls for firm size, firm leverage, asset turnover, firm age and whether the firm is a standalone company or belongs to a wider corporate group.

Our preferred specification for (1) also includes a set of fixed effects. First, we improve our control for firm-specific demand by adding industry-period and region-period fixed effects to the firm-specific covariates in the Z vector. We also include quarter fixed effects to account for country-wide, macroeconomic fluctuations beyond monetary policy-induced changes in the short-term risk-free rate, which are already incorporated in the spreads. Last, lending banks may be hit by exogenous shocks other than the ACC program, which may bear on their lending rates. To control for such unobserved confounding factors at the bank level, we therefore include bank-period fixed effects η_{kt} in our preferred regression. Last but not least, we correct the standard errors of estimated coefficients for possible clustering at the bank-quarter level in all our regressions.[23]

The main coefficient of interest in (1) is the Diff-in-Diff coefficient β_3. In our baseline regression sample, we keep only the treated, 4-rated firms, which become eligible with the implementation of the ACC program, and the already eligible 4+-firms, i.e., the firms with a close, but slightly higher, rating. As a consequence, β_3 reads directly as a measure of the eligibility discount in percentage points. Since it corresponds to a reduction in the liquidity risk premium of ACC-eligible loans, we expect the sign of β_3 to be negative.

B. Univariate Results

Figure 1 shows the intuition for our results from a univariate perspective. The figure compares the average spreads above EONIA paid by treated, 4-rated firms and control, 4+-rated firms in each of the two semesters of the pre-ACC and post-ACC periods defined above. These spreads, for the representative firms in each rating class, are the sum of two components: a compensation for credit risk and a compensation for liquidity risk, or, loosely speaking, the sum of a credit risk premium and a liquidity risk premium required by the lenders.[24]

By construction of the Banque de France's ratings scale, we expect the credit risk associated with low-rating firms to be higher than the one associated with high-rating firms. We see in the figure that this holds: the spread paid by 4-rated firms is always larger than the spreads

[23]With 9 banks and 8 quarters, we have 72 clusters, which is above the conventional threshold of 50 required for using asymptotic results.

[24]Cf. note 3 above.

for 4+-rated firms. However, until the ACC is implemented, loans to 4-rated firms cannot be pledged as collateral in refinancing operations with the Eurosystem, while loans to 4+-rated firms are eligible. As the ACC program comes into force, this liquidity advantage is extended to 4-rated loans.[25] Our identification strategy therefore implies that before the program the spread between both groups is due to differences in the credit risk premium and the liquidity risk premium, but that after the program, because of the eligibility discount, the difference is now mainly due to the credit risk premium. The figure is consistent with this claim: while the absolute levels of the 4 and 4+ spreads goes up from 2011 to the second semester of 2012, reflecting heightened credit risk concerns in the primary market for corporate loans as the economic outlook deteriorates, the distance between both spreads shrinks.

C. Multivariate Results

To confirm this preview of the results and quantify the eligibility discount, we need however to go beyond a simple univariate comparison and run multivariate regressions along the lines of equation (1). Table 5 shows the results of these regressions comparing loan spreads for 4+-rated and 4-rated firms. The first column presents a raw measure of the eligibility discount, where potential confounding factors are not controlled for. This first estimate of a spread reduction for ACC-treated loans by some 13 bp is consistent with the average spread reduction made visible in figure 1. Controlling for loan-characteristics, as shown in column 2, leads to a reduction in the main coefficient of interest by some 18%, although both estimates are not statistically different. In particular, and consistently with the common knowledge informed by aggregate credit statistics, spreads tend to be lower for shorter-term loans and larger loans.

In columns 3 and 4, additional controls for firm-characteristics and in particular fixed-effects aimed at capturing firm demand are included in the regressions. Most firm-specific covariates turn out to be significant and to affect loan spreads with the expected sign. Within a given rating class, loan spreads are indeed lower for larger firms, firms with a higher turnover-to-assets ratio and firms belonging to a corporate group, which may back them in case of financial stress. Firms' age and leverage do not seem to matter much however as regards the spread they pay to their lenders, once other features are accounted for. Since a vast majority of the firms in our sample appear only once in this dataset of new loans, including firm fixed-effects to control for firm-specific loan demand shocks is impractical. We therefore assume that, conditional on having the same observable characteristics (rating, size, leverage, profitability etc.), firms within the same region and industrial sector face the same outlook in a given time period and therefore issue the same loan demand to their lenders. Controlling for loan demand with

[25]Note that the "size" of this liquidity advantage is not necessarily the same, since loans with different ratings call for different haircuts.

sector-period and region-period fixed effects contributes to somewhat reducing the estimated eligibility discount, suggesting that ACC-treated firms were on average demanding less loans in the Post-ACC period. This is plausible since the economic situation abated in the course of 2012 and these firms were on average financially weaker than the reference 4+-rated firms.

In the remaining two columns, we add additional bank-period fixed effects in order to control for any bank-specific shocks and quarter fixed effects, so as to wipe out any residual impact of macroeconomic fluctuations on our results. Column 6 then shows our baseline estimate of the eligibility discount. We find that the implementation of the ACC program led to a reduction in corporate loan spreads by 7 basis points for targeted firms. This estimate is somewhat lower than the 17 bp effect on loan spreads found by Nadauld and Weisbach (2012) for loans suitable for securitization issued by securitization-active banks. It is also less than the effect found by Bekkum et al. (2017) who quantify the impact of changes to the eligibility criteria of RMBSs for Eurosytem refinancing. They find a 13 bp effect on loans issued by banks that actively issue RMBSs. Our smaller effect may be explained by the fact that unlike these papers which apply treatment at the bank level, we compute the treatment effect within bank and therefore our effect differences out any additional effects which may be related to differences in funding costs across banks due to the program or the LTRO packages at this time. Alternatively, a reason for our lower estimate of the eligibility discount, even in stressed times, could be due to the fact that not all banks have the same demand for using these loans as collateral. We investigate this issue of differentiated effects of the ACC across banks in section F below. Prior to this, we test in the next section the robustness of our baseline result.

D. Robustness

We show in this section that our main result for the impact of collateral eligibility on loan pricing is not due to alternative explanations.

A first potential concern with our baseline regression is that the effect we identify may not be due to the eligibility discount but rather due to a rating-class specific credit risk shocks, either to our treated or control groups of firms, which would change the price of their newly issued loans. As already stressed above, actual *ex post* default rates between rating groups are quite stable and there is no clear evidence of such a shock having occurred.

Fortunately, a nice feature of the ACC program is that it provides an opportunity to directly test for this alternative explanation due to a discontinuity in the eligibility criteria regarding loan maturity. Loans with a maturity greater than five years are not part of the ACC program, however, for loans already eligible such as loans to 4+ firms, no such restriction is in place. This means that we have a possibility for conducting a placebo test by comparing spreads for new 4+ and 4 rated loans with initial maturities beyond 5 years. As our first robustness, we

therefore check the absence of any significant effect of the ACC for 4 rated loans *which are non-eligible* because of an initial maturity greater than 5 years. The second column of table 6 reports the results. We find no statistically significant effect when restricting our sample to loans above a 5-year maturity. The effect is thus unlikely due to a rating-specific credit risk shock between credit ratings.

However, it could still be the case that the results are driven by a relative increase in the cost of *short-term* (i.e. below 5 years) credit for our control group that is not captured in the previous test. We then run a second placebo test, where we compare spreads in our control group with spreads for an already eligible, higher-quality, credit rating category: namely, loans rated 3. If 4+ firms in the baseline control group were hit by a negative shock raising the default probability on their short-term debt, the ensuing increase in their spreads could be wrongly interpreted as a treatment effect of the ACC program on the relative spread between 4-rated loans vis-à-vis 4+ loans. However, as shown in the third column of table 6, we find no effect of the ACC program on the spread between 3 and 4+ rated loans for maturities below 5 years. The alternative explanation, that our results may be due to a confounding weakening of the credit quality of our control group, is therefore ruled out.

We would also like to verify that our treatment effect occurs when replacing our control group with a non-eligible group of slightly lower quality than the ACC affected firms. We therefore propose using the rating group 5+ as our control. This group has a credit rating score one notch below our ACC treated, 4-rated group. We see that in column 4 of table 6 the effect is larger than the one we identified, with a treatment effect of 13bp. An explanation of this larger effect may be due to a "flight-to-collateral" as in Fostel and Geanakoplos (2008) where banks substitute away from ineligible loans to eligible loans. In the event that this control group has been negatively affected by the program, the treatment effect however would suffer from an overestimation bias. We hence prefer to use the already eligible, 4+-rated loans as the control group in our baseline.

E. Impact on Lending Volumes

Looking first at loan spreads, we provided evidence above that the ACC program induced a reduction in the price of newly eligible loans. To confirm that the program indeed triggered a positive credit supply shock in France, we look in this section at the impact of the measure on loan quantities and show that lending volumes to newly eligible, ACC-treated firms also increased over the year 2012 when the program was implemented.

For the purpose of this complementary investigation, we construct an additional dataset of continuing bank-firm credit relationships over the 12-month period from December 2011 (before the ACC) to December 2012, that we draw from the French credit registry. We restrict

our sample to credit commitments issued by the 9 selected banks of the baseline exercise and to their 4-rated and 4+-rated borrowers. We drop firms that switch between credit ratings over 2012. As individual bank-firm credit growth rates can be very volatile, notably when exposures (and firms) are small, we drop observations with annual growth rates of total bank-firm credit below the 5th or above the 95th percentiles of each rating group's distribution.[26]

Table 7 presents our estimates of the impact of the ACC program on the intensive margin of credit supply. In all regressions, standard errors are corrected for clustering at the bank*industry level. In column 1, we do not control for firm-demand nor for banks' characteristics. In columns 2 and 3, we add two types of controls for firm demand and risk: first, the same firm-level standard balance sheet variables as before and second, industry*region fixed effects.[27] Last, in column 4, we also absorb the effects of all possible bank characteristics by including bank-fixed effects.

It turns out that the eligibility extension induced an increase in lending volumes supplied to targeted firms: over the 12-month period starting from December 2011, the growth rate of credit is higher by 1.5 percentage points for newly eligible firms compared to one-notch-above, but otherwise similar, firms. This effect along the intensive margin is economically large and significant, as the average 12-month growth rate of credit to 4+-rated firms in our sample is -9.2% over 2012. [28]

As a robustness check, we re-ran the same regressions while comparing targeted, 4-rated firms with ineligible firms of credit quality just one-notch below (e.g., 5+-rated firms). We find confirmation of the main result: controlling for firm and bank characteristics, the growth rate of credit for 4-rated firms turns out to be stronger by 2.6 pp than the one for non-eligible but comparable firms.[29] This last result compares well with the findings of Cahn et al. (2017), who compare 4-rated and 5+-rated small firms and show evidence of a large average impact of the ACC program on credit supply to independant, single-bank SMEs over the period from February 2012 to March 2013, but not on credit supply to other types of firms.

F. Banks' Collateral Management and the Eligibility Discount

Fecht et al., 2011 show that the prices that individual banks pay for central bank liquidity is not only a function of market conditions but also bank characteristics. If banks differ in their

[26]Annual credit growth rates still vary between -81% and 96% across the some 33,000 bank-firm observations kept in our sample.

[27]Note that, since our treatment is firm-specific, applying the now standard within-firm identification strategy with firm-fixed effects as in Khwaja and Mian (2008) is not feasible here.

[28]A decrease in lending volumes is a priori consistent with the observed increase in loan rates in our baseline sample of corporate loans (as shown in Figure 1) and points to the big picture of a negative credit supply shock during to the second phase of the euro area crisis (possibly aggravated by receding credit demand).

[29]To save space, the detailed results are left for the online appendix. See table B.1

liquidity needs, and how they value specific types of collateral, then the impact of the program ought to differ across banks. We therefore explore three dimensions of bank heterogeneity to gain a better understanding of which mechanisms are at play in the collateral channel associated with the ACC program.

We first measure for each bank the share of credit claims in the bank's total collateral pledged with the Banque de France as of the end of September 2011, i.e. before the announcement of the ACC program. This ratio may account for a bank's comparative advantage in pledging credit claims due to perhaps a lower opportunity cost for this bank. However, since the euro area crisis had already been aggravating for several quarters at that date and some French banks may have been more hit than others by the ensuing liquidity stress on private repo markets, this ratio may also capture the degree to which banks were at that time already constrained in their access to high-quality, marketable collateral. We sort our 9 banks according to the size of this ratio into two groupings, below and above the median. A nice feature of this distribution in our sample is that banks tend to either use credit claims intensively as collateral with the Eurosystem or not much at all. As a matter of fact, the lowest value for high credit-claims users is nearly twice as high as the highest value for low credit claim users.

Secondly, we use a measure of the potential collateral stress that banks would have faced due to their LTRO-uptakes during the winter of 2011-2012 absent the ACC program. We take the difference between the value of borrowed central bank liquidity in September 2011 and March 2012 and divide it by the amount of collateral pledged at the end of 2011 Q3, i.e. not including ACC-targeted loans in their collateral pool. In a full-allotment policy a bank's availability of collateral becomes its main binding condition. Again, we sort our 9 banks into two groupings strictly below and above the median of their "LTRO-collateral squeeze" ratio.

Thirdly, we sort banks into well- and weakly-capitalized banks as measured using an unweighted capital-to-assets ratio, where our definition of capital includes core equity and reserves and is also close to Tier 1 equity. Bank's capitalization aims here at capturing banks' balance sheet weakness at a time of high financial stress. For example, Drechsler et al. (2016) find that liquidity injections benefitted primarily weak banks and in addition these banks tended to use lower quality collateral. It could be the case then that given that the ACC program is for riskier and illiquid collateral, weakly capitalized banks may have had the greatest incentives to provide a discount to their borrowers in order to use this type of collateral.

Table 8 presents our results. Regarding our measure of the *ex ante* credit claims usage of overall pledged collateral, we find that the pricing effect is fully concentrated in the sample of banks which already pledged high amounts of standard credit claims before the program. For these banks, the transmitted eligibility discount is higher and estimated at some 10 bp. Given also the higher amounts of ACC loans *ex ante* on the balance sheets of these banks relative

to the other group, this result tends to vindicate an opportunity cost view of optimal collateral choice by banks, that may also reflect some features of their business model. Even in spite of the large haircuts this result comes in support of the hypothesis that there are heterogeneous opportunity costs across collateral classes which are not eliminated by the haircuts.

We find however no differential effects due to the potential collateral squeeze associated with the LTRO uptakes of the major French banks over December 2011-March 2012. This may be due to the fact that the borrowing constraints of most French banks were not binding at that time. This additional result also suggests that the regular credit claims to collateral ratio commented above indeed mostly accounts for banks' opportunity costs of pledging these ACC loans and not primarily for their collateral constraints.

Nor does it seem that the level of bank capitalization plays any additional role in the transmission. This seems at odds with Drechsler et al. (ibid.), however their results pertain to a euro area-wide study, and it may simply be the case that heterogeneity in terms of capitalization of major banks was not strong enough at the country level for a country like France at this juncture. In addition, our unweighted measure of bank capitalization is a noisy proxy for the regulatory capital requirement and is measured at the institution level instead of the banking group level, and therefore is not equivalent to the regulatory measure which may be more relevant to assess under-capitalization. For this reason, we also sorted banks according to whether or not their group was subject to forced recapitalization under the rules of the December 2011 Capital exercise of the European Banking authority. In December 2011, the EBA indeed published detailed information on its estimates of the capital shortfall of major European banking groups. This shortfall was measured in terms of core equity tier 1 to risk-weighted assets and the EBA required banking groups with a shortfall to close it before the end of June 2012, forcing some banks to rapid deleveraging.[30] However, comparing banks in our sample which belonged to groups with an identified capital shortfall with banks belonging to other European groups, we do not find any evidence neither of a role of bank capital weakness in the transmission of the eligibility discount.[31]

V. Conclusion

Using the recent ACC-program of the Eurosystem as a quasi-natural experiment, we provide evidence that loan spreads to firms whose debt is eligible as collateral for refinancing operations with the lender of last resort are lower due to an eligibility discount reflecting the associated liquidity advantage to the lending banks and their relatively low opportunity cost in

[30]See Mésonnier and Monks (2015) for more details on the EBA Capital exercise.

[31]These additional results are reported in the appendix.

pledging these loans as collateral. Our main contribution is to cleanly identify this effect using detailed loan-level information and to price this eligibility discount. Our preferred estimate of the induced liquidity premium reduction, by some 7 bps, is low in absolute terms, but it nevertheless accounts for a third of the pre-program unconditional average spread between rates to ACC-treated corporate loans and rates to control loans. We check the robustness of our main finding along several dimensions, and we additionally show that lending volumes supplied to the ACC-treated firms increased in the year following the implementation of the program. The combination of relatively decreasing prices and increasing volumes then confirms that this enlargment of the central bank's collateral framework to lower-quality corporate loans induced a positive credit supply shock, at least as these firms are concerned, which helped to alleviate the overall negative impact of the aggravating sovereign bond crisis in the euro area.

We view our results as vindicating the existence of a collateral channel of monetary policy. However, our assessment is likely to underestimate the full extent of this transmission channel. Indeed, it is likely that the policy, by relaxing the borrowing constraints of banks, lowers the price of credit in aggregate. Therefore our effect should be viewed as a lower bound with respect to the total impact of the ACC on the cost of credit to French firms.

Finally, a key policy implication of our results is that any post-crisis tightening of monetary policy needs to take into account the role of heterogeneous opportunity costs across banks regarding the collateral they use. A monetary policy tightening via the collateral channel may affect some banks too severely and others too modestly.

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TABLE 1. Loans in our Sample in 2011 and 2012q3-2013q2

	Pre-ACC period					
	count	mean	sd	p1	p50	p99
4						
Loan Spread	1091	2.44	0.65	1.01	2.39	4.67
Credit Volume k	1091	245.77	2818.40	5.00	47.00	2000.00
Maturity Years	1091	3.52	1.31	1.00	4.00	5.00
Investment Loan	1091	0.86	0.34	0.00	1.00	1.00
Secured	1091	0.42	0.49	0.00	0.00	1.00
4+						
Loan Spread	845	2.21	0.59	0.89	2.19	3.89
Credit Volume k	845	255.39	1221.64	6.00	50.00	4750.00
Maturity Years	845	3.65	1.18	1.00	4.00	5.00
Investment Loan	845	0.93	0.26	0.00	1.00	1.00
Secured	845	0.37	0.48	0.00	0.00	1.00
	Post-ACC period					
	count	mean	sd	p1	p50	p99
4						
Loan Spread	1250	2.61	0.84	0.72	2.61	5.06
Credit Volume k	1250	370.64	2539.24	5.00	45.00	6142.00
Maturity Years	1250	3.33	1.42	1.00	3.00	5.00
Investment Loan	1250	0.83	0.38	0.00	1.00	1.00
Secured	1250	0.46	0.50	0.00	0.00	1.00
4+						
Loan Spread	791	2.51	0.79	0.64	2.47	4.94
Credit Volume k	791	619.58	3627.33	4.00	47.00	12500.00
Maturity Years	791	3.51	1.32	1.00	4.00	5.00
Investment Loan	791	0.88	0.33	0.00	1.00	1.00
Secured	791	0.38	0.48	0.00	0.00	1.00

Note. This table presents descriptive statistics for our sample of newly issued loans. Only standard investment and treasury loans with fixed rates are included. Loan spreads over EONIA are expressed in percentage points. Credit volumes are in EUR thousand. *Investment loan* and *Secured loans* are dummy variables for these loan categories respectively.

TABLE 2. Firms in our Sample in 2011 and 2012q3-2013q2

			Pre-ACC period			
	count	mean	sd	p1	p50	p99
4						
Total Bilan (KEUR)	945	14060.52	259975.45	232.00	1598.00	50385.00
Debt/Assets	945	0.32	0.29	0.00	0.27	1.47
Sales-to-Assets	945	2.16	1.33	0.13	1.95	7.14
Age >10 years	945	0.78	0.41	0.00	1.00	1.00
Part of Group	945	0.49	0.50	0.00	0.00	1.00
Nb of Loans	945	1.68	1.78	1.00	1.00	10.00
4+						
Total Bilan (KEUR)	731	12060.81	85465.75	316.00	1921.00	147910.00
Debt/Assets	731	0.26	0.24	0.00	0.21	1.17
Sales-to-Assets	731	2.02	1.06	0.10	1.90	5.68
Age >10 years	731	0.84	0.37	0.00	1.00	1.00
Part of Group	731	0.53	0.50	0.00	1.00	1.00
Nb of Loans	731	1.67	1.57	1.00	1.00	8.00
			Post-ACC period			
	count	mean	sd	p1	p50	p99
4						
Total Bilan (KEUR)	1067	13372.32	126706.47	241.00	1454.00	185582.00
Debt/Assets	1067	0.30	0.26	0.00	0.25	1.13
Sales-to-Assets	1067	2.10	1.34	0.02	1.95	7.15
Age >10 years	1067	0.78	0.42	0.00	1.00	1.00
Part of Group	1067	0.48	0.50	0.00	0.00	1.00
Nb of Loans	1067	1.73	1.60	1.00	1.00	8.00
4+						
Total Bilan (KEUR)	686	43754.30	532256.52	287.00	1700.00	992050.00
Debt/Assets	686	0.26	0.21	0.00	0.21	1.02
Sales-to-Assets	686	2.05	1.19	0.03	1.91	6.96
Age >10 years	686	0.83	0.37	0.00	1.00	1.00
Part of Group	686	0.54	0.50	0.00	1.00	1.00
Nb of Loans	686	1.67	1.39	1.00	1.00	8.00

Note. This table presents descriptive statistics for our sample of firms. *Total Assets* are in EUR thousand. *Age >10 years* and *Part of Group* are dummy variable for firms aged more than 10 years and for firms belonging to a larger corporate group, respectively. *Nb of Loans* is the number of newly issued loans observed per firm in our sample.

TABLE 3. Descriptive statistics on selected banks: means of key characteristics for different groupings

	N	(1) Credit Claims/Collateral mean	(2) LTRO Squeezed mean	(3) Capital Ratio mean
Low-X	4	0.27	0.12	0.02
High-X	4	0.89	0.49	0.05

Note. This table presents descriptive statistics for our sample of 9 banks (3 of them being aggregates of mutualist bank networks), focusing on two upper or lower sub-groupings sorted according to the variable *X* referred to in each column header. Column 1 refers to the share of credit claims over total collateral pledged (after haircut values as of Q3 2011). Column 2 refers to the ratio of the change in Eurosystem-borrowing over the LTRO implementation period (from September 2011 to March 2012) to the ex ante value of collateral. Column 3 refers to the unweighted capital-to-assets ratio, where capital is defined as the sum of core equity and reserves.

TABLE 4. Test of the balancing hypothesis of loan and firm covariates, Pre-ACC and Post-ACC

	Pre-ACC period				
	Mean 4	SD 4	Mean 4+	SD 4+	Std Diff
Log Loan Size	10.90	1.29	11.01	1.33	-0.06
Maturity Years	3.52	1.31	3.65	1.18	-0.07
Investment Loan	0.86	0.34	0.93	0.26	-0.15
Secured	0.42	0.49	0.37	0.48	0.08
Log Total Assets	7.69	1.31	7.94	1.41	-0.13
Debt/Assets	0.34	0.31	0.28	0.26	0.13
Sales-to-Assets	2.11	1.39	1.93	1.06	0.10
Age >10 years	0.79	0.41	0.85	0.36	-0.10
Part of Group	0.52	0.50	0.55	0.50	-0.05
	Post-ACC period				
	Mean 4	SD 4	Mean 4+	SD 4+	Std Diff
Log Loan Size	10.98	1.65	11.07	1.44	-0.04
Maturity Years	3.33	1.32	3.51	1.42	-0.09
Investment Loan	0.83	0.33	0.88	0.38	-0.10
Secured	0.46	0.48	0.38	0.50	0.12
Log Total Assets	7.76	1.71	7.99	1.54	-0.10
Debt/Assets	0.31	0.23	0.27	0.26	0.10
Sales-to-Assets	2.04	1.20	2.02	1.32	0.01
Age >10 years	0.78	0.37	0.84	0.42	-0.11
Part of Group	0.51	0.50	0.55	0.50	-0.05

Note. This table compares descriptive statistics for our sample of loans across rating classes (treated, 4+-rated vs controls, 4-rated) within each period. Loan sizes and firms' total assets are measured in EUR thousand and expressed in logs. *Investment loan* and *Secured loans* are dummy variables for these loan categories respectively. *Age >10 years* and *Part of Group* are dummy variable for firms aged more than 10 years and for firms belonging to a larger corporate group, respectively. *Std Diff* is the normalized difference (Imbens and Wooldridge, 2008), defined as the difference between the means of the treated and control groups, normalized by the square root of the sum of variances.

TABLE 5. Measuring the eligibility discount: impact of the ACC on spreads to newly eligible loans

	(1)	(2)	(3)	(4)	(5)	(6)
Rating4	0.225***	0.230***	0.219***	0.190***	0.179***	0.171***
	(0.029)	(0.025)	(0.025)	(0.022)	(0.024)	(0.023)
POST	0.296***	0.325***	0.324***			
	(0.084)	(0.070)	(0.066)			
POST*Rating4	-0.122**	-0.110***	-0.117***	-0.087**	-0.086**	-0.070**
	(0.053)	(0.039)	(0.040)	(0.037)	(0.037)	(0.035)
Investment Loan		-0.057	-0.063	-0.064	-0.079	-0.109
		(0.113)	(0.107)	(0.096)	(0.141)	(0.128)
Maturity Years		0.168***	0.156***	0.160***	0.132***	0.127***
		(0.022)	(0.021)	(0.020)	(0.017)	(0.015)
Log Loan Size		-0.129***	-0.044**	-0.058***	-0.059***	-0.055***
		(0.016)	(0.019)	(0.019)	(0.019)	(0.017)
Secured		-0.028	-0.045	-0.043	0.089***	0.096***
		(0.044)	(0.040)	(0.039)	(0.025)	(0.025)
Log Total Assets			-0.094***	-0.100***	-0.079***	-0.078***
			(0.021)	(0.020)	(0.017)	(0.017)
Debt/Assets			-0.115***	-0.046	-0.053	-0.062*
			(0.033)	(0.036)	(0.035)	(0.033)
Sales-to-Assets			-0.031***	-0.027**	-0.025**	-0.025***
			(0.010)	(0.011)	(0.010)	(0.009)
Part of Group			-0.159***	-0.147***	-0.129***	-0.131***
			(0.024)	(0.023)	(0.021)	(0.021)
Age >10 years			-0.039	-0.025	-0.025	-0.030
			(0.036)	(0.035)	(0.032)	(0.032)
Sector*Period FE	No	No	No	Yes	Yes	Yes
Region*Period FE	No	No	No	Yes	Yes	Yes
Bank*Period FE	No	No	No	No	Yes	Yes
Quarter FE	No	No	No	No	No	Yes
Observations	3977	3977	3977	3977	3977	3977
$Adj.R^2$	0.037	0.191	0.227	0.284	0.339	0.378

Note. This table presents the results of OLS regressions at the level of individual corporate loans, where the dependent variable is the loan spread over EONIA in percentage points. The sample includes quarterly information on new corporate loans issued by selected banks over 2011 (Pre-ACC period) and from 2012 Q3 to 2013 Q2 (Post-ACC period). We consider here only new bank loans with maturity less than or equal to 5 years to higher-quality, already eligible 4+-rated firms and lower-quality, ACC-eligible, 4-rated firms. 4+-rated firms are the benchmark. The coefficient of the interacted term $Post * Rating4$ provides a direct estimate of the eligibility discount in percentage points. Standard errors are corrected for clustering at the Bank*Quarter level. ***, **, * indicate significance of the estimated coefficients at the 1%, 5% and 10% levels, respectively.

TABLE 6. Measuring the eligibility discount: robustness

	(1) Ref.	(2) $>$ 5y	(3) 3/4+	(4) 4/5+
Rating4	0.171***	0.091	-0.118***	-0.117***
	(0.023)	(0.055)	(0.025)	(0.031)
POST*Rating4	-0.070**	-0.009	-0.038	-0.134**
	(0.035)	(0.076)	(0.043)	(0.054)
Loan Controls	Yes	Yes	Yes	Yes
Firm Controls	Yes	Yes	Yes	Yes
Sector*Period FE	Yes	Yes	Yes	Yes
Region*Period FE	Yes	Yes	Yes	Yes
Bank*Period FE	Yes	Yes	Yes	Yes
Quarter FE	Yes	Yes	Yes	Yes
Observations	3977	920	2889	3733
$Adj.R^2$	0.378	0.462	0.452	0.373

Note. This table presents the results of OLS regressions at the level of individual corporate loans, where the dependent variable is the loan spread over EONIA in percentage points. The sample includes quarterly information on new corporate loans issued by selected banks over 2011 (Pre-ACC period) and from 2012 Q3 to 2013 Q2 (Post-ACC period). In the first two columns, we consider only new bank loans with maturity less than or equal to 5 years (except in col. 2) to higher-quality, already eligible 4+-rated firms (controls) and lower-quality, ACC-eligible, 4-rated firms (treated). 4+-rated firms are taken as the benchmark. The coefficient of the interacted term $Post * Rating4$ provides a direct estimate of the eligibility discount in percentage points. Column 1 replicates the baseline results for comparison purpose. Column 2 shows the results of a placebo regression when only loans with maturity over 5 years, which are not eligible to the ACC program, are considered. Column 3 shows the results of another placebo regression where spreads of 3-rated, high-quality loans are compared with spreads of benchmark 4+-rated loans. Last, column 4 shows the results of an alternative regression where spreads to ACC-treated, 4-rated loans are compared with spreads of low-quality, non-eligible, 5+-rated loans. Standard errors are corrected for clustering at the Bank*Quarter level. ***, **, * indicate significance of the estimated coefficients at the 1%, 5% and 10% levels, respectively.

TABLE 7. Impact of the ACC on loan volumes (intensive margin)

	(1) $\Delta ln(L_{i,j})$	(2) $\Delta ln(L_{i,j})$	(3) $\Delta ln(L_{i,j})$	(4) $\Delta ln(L_{i,j})$
Rating4	0.017***	0.016***	0.015***	0.015***
	(0.004)	(0.004)	(0.004)	(0.004)
Log Total Assets		0.007***	0.005***	0.006***
		(0.002)	(0.002)	(0.002)
Debt/Assets		0.046***	0.046***	0.049***
		(0.013)	(0.011)	(0.011)
Sales-to-Assets		0.015***	0.009***	0.008***
		(0.003)	(0.003)	(0.003)
Sector*Region FE	No	No	Yes	Yes
Bank FE	No	No	No	Yes
Observations	33,259	33,259	33,053	33,053
R^2	0.001	0.005	0.054	0.055

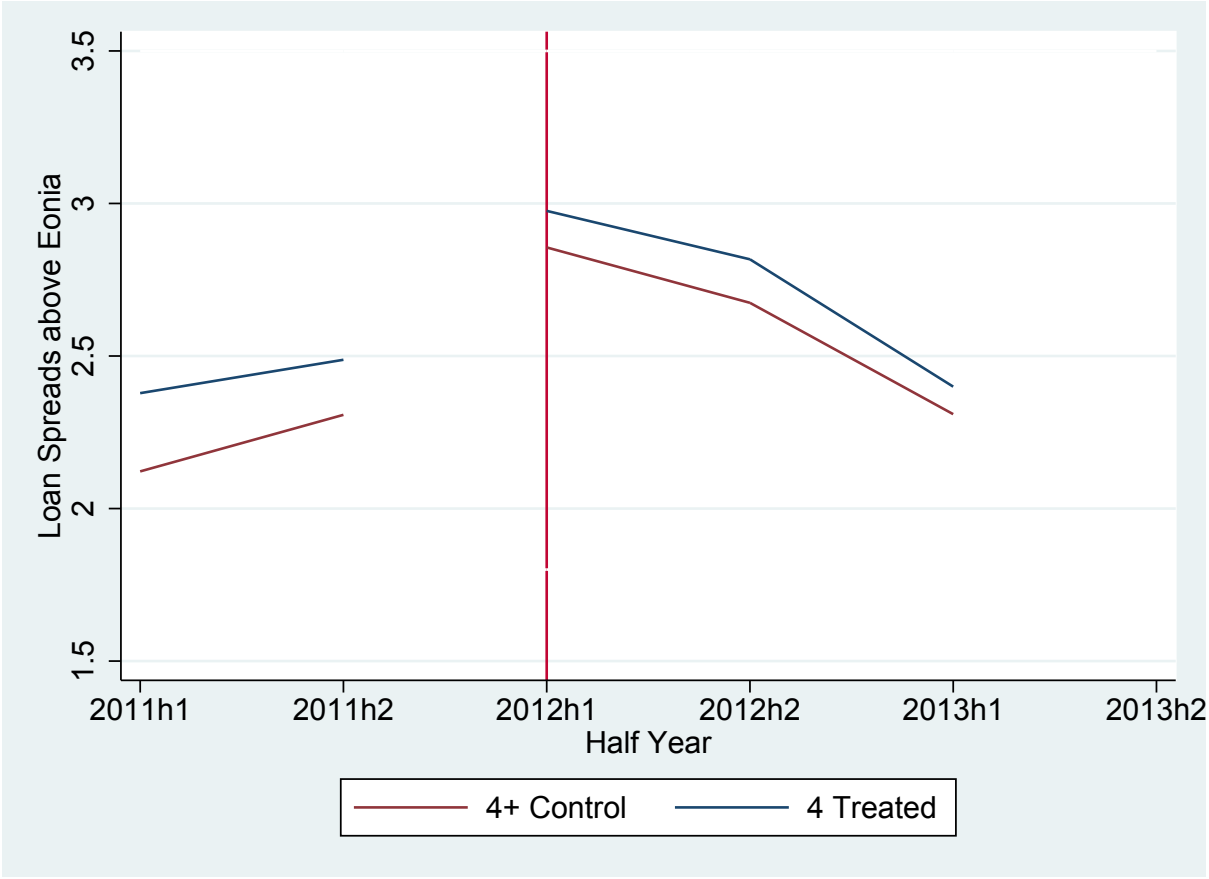
Note. This table presents the results of OLS regressions at the level of bank-firm credit exposures, where the dependent variable is the rate of growth of the bank-firm total credit commitment over the 12-months period from December 2011 (Pre-ACC) to December 2012 (Post-ACC). The sample includes 4 and 4+-rated firms with a continuous credit relationship (including unused credit commitments) to the selected banks over this period. Higher-quality, 4+-rated firms are taken as the benchmark. The coefficient of the term *Rating*4 provides a direct estimate of the impact of the ACC program on the intensive margin of loan credit supply. A constant is included in regressions 1 and 2, but not shown. Standard errors are corrected for clustering at the Bank*Industry level. ***, **, * indicate significance of the estimated coefficients at the 1%, 5% and 10% levels, respectively.

TABLE 8. Explaining further the eligibility discount: impact of bank heterogeneity on the intensity of transmission

	(1) All	(2) High CC	(3) Low CC	(4) High Squeeze	(5) Low Squeeze	(6) High Cap	(7) Low Cap
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Rating4	0.171***	0.173***	0.177***	0.170***	0.138***	0.158***	0.212***
	(0.023)	(0.032)	(0.032)	(0.031)	(0.037)	(0.031)	(0.029)
POST*Rating4	-0.070**	-0.096**	-0.002	-0.055	-0.002	-0.057	-0.091
	(0.035)	(0.045)	(0.048)	(0.045)	(0.072)	(0.044)	(0.058)
Loan Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Sector*Period FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Region*Period FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Bank*Period FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Quarter FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	3977	2085	1596	1999	1141	2129	1689
$Adj.R^2$	0.378	0.306	0.414	0.296	0.467	0.411	0.395

Note. This table presents the results of OLS regressions at the level of individual corporate loans, where the dependent variable is the loan spread over EONIA in percentage points. The sample includes quarterly information on new corporate loans issued by selected banks over 2011 (Pre-ACC period) and from 2012 Q3 to 2013 Q2 (Post-ACC period). We consider here only new bank loans with a maturity less than 5 years to higher-quality, already eligible 4-rated firms and lower-quality, ACC-eligible, 4-rated firms. 4+-rated firms are the benchmark. Column 1 replicates the baseline results for comparison purpose. The coefficient of the interacted term $Post * Rating4$ provides a direct estimate of the eligibility discount in percentage points. Columns 2 and 3 contrast results when the sample is restricted to the 4 banks (among the 9 selected banks) with the largest share of credit claims as a share of their pledged collateral as of September 2011 (*High CC* banks), respectively 4 banks with the smallest share (*Low CC* banks). Columns 4 and 5 contrast results when the sample is restricted to the 4 banks with the highest ratio of the increase in Eurosystem-borrowing due to LTRO uptake to the after-haircut value of their collateral pool in September 2011 (*LTRO-squeezed* banks), respectively the 4 banks with the lowest ratio (*Not squeezed* banks). Last, columns 6 and 7 contrast results when the sample is restricted to the 4 most capitalized banks (*High-cap.* banks), respectively the 4 least capitalized banks (*Low-cap.* banks). Standard errors are corrected for clustering at the Bank*Quarter level. ***, **, * indicate significance of the estimates coefficients at the 1%, 5% and 10% levels, respectively.

FIGURE 1. Impact of the ACC on spreads to newly eligible loans: univariate analysis



[Not for publication, online appendix]

A. Sample of Selected Banks

TABLE A.1. List of selected banks

Bank Id.	Bank Name	Group Name	Obs. Pre-ACC	Obs. Post-ACC
16188	BPCE (and regional network)	GPE BPCE	440	487
22040	CN Crédit Mutuel (and regional network)	GPE CREDIT MUTUEL	86	89
30002	CREDIT LYONNAIS	GPE CREDIT AGRICOLE	74	198
30003	STE GENERALE	GPE SOCIETE GENERALE	462	411
30004	BNP PARIBAS	GPE BNP-PARIBAS	246	214
30006	Crédit Agricole S.A. (and regional network)	GPE CREDIT AGRICOLE	473	488
30066	CREDIT INDUSTRIEL ET COMMERCIAL - CIC	GPE CREDIT MUTUEL	90	94
30076	CREDIT DU NORD	GPE SOCIETE GENERALE	33	30
40978	BANQUE PALATINE	GPE BPCE	171	199

Note. This table lists the selected banks in our sample. Individual regional mutualist banks belonging to the mutualist network of BPCE, Crédit Agricole SA and Crédit Mutuel have been aggregated with their respective national bank. Note that the respective banking groups also own non-mutualist, listed banking institutions. We also report for each bank the number of observed loan spreads in our final sample in both periods before and after the launch of the ACC program.

B. Additional Robustness Checks

TABLE B.1. Robustness: Impact of ACC on loan volumes (intensive margin), 5+ loans (non-eligible) as controls

	(1) $\Delta ln(L_{i,j})$	(2) $\Delta ln(L_{i,j})$	(3) $\Delta ln(L_{i,j})$	(4) $\Delta ln(L_{i,j})$
Rating-4 Firm	0.040***	0.038***	0.026***	0.026***
	(0.006)	(0.004)	(0.004)	(0.004)
Log Total Assets		0.006***	0.005***	0.005***
		(0.002)	(0.002)	(0.002)
Debt/Assets		0.046***	0.050***	0.051***
		(0.010)	(0.009)	(0.009)
Sales-to-Assets		0.016***	0.007***	0.007***
		(0.003)	(0.002)	(0.002)
Sector*Region FE	No	No	Yes	Yes
Bank FE	No	No	No	Yes
Observations	37379	37378	37179	37179
R^2	0.005	0.011	0.062	0.063

Note. This table presents the results of OLS regressions at the level of bank-firm credit exposures, where the dependent variable is the rate of growth of the bank-firm log of total credit commitment over the 12-months period from December 2011 (Pre-ACC) to December 2012 (Post-ACC). The sample includes 4 and 5+-rated firms with continuous credit relationship (including unused credit commitments) to the selected banks over this period. Lower-quality, 5+-rated firms are taken as the benchmark. The coefficient of the term *Rating*4 provides a direct estimate of the impact of the ACC program on the intensive margin of loan credit supply. A constant is included in regressions 1 and 2, but not shown. Standard errors are corrected for clustering at the Bank*Industry level. ***, **, * indicate significance of the estimated coefficients at the 1%, 5% and 10% levels, respectively.

TABLE B.2. Robustness. Measuring the eligibility discount: impact of bank heterogeneity on the intensity of transmission: 5 banks in "high" bucket vs 4 banks in "low" bucket.

	(1) All	(2) High CC	(3) Low CC	(4) High Squeeze	(5) Low Squeeze	(6) High Cap	(7) Low Cap
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Rating4	0.171***	0.170***	0.177***	0.170***	0.191***	0.146***	0.212***
	(0.023)	(0.031)	(0.032)	(0.031)	(0.025)	(0.031)	(0.029)
POST*Rating4	-0.070**	-0.100**	-0.002	-0.055	-0.060	-0.033	-0.091
	(0.035)	(0.045)	(0.048)	(0.045)	(0.050)	(0.043)	(0.058)
Loan Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Sector*Period FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Region*Period FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Bank*Period FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Quarter FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	3977	2380	1596	1999	1976	2288	1689
$Adj.R^2$	0.378	0.391	0.414	0.296	0.462	0.405	0.395

Note. This table presents the results of OLS regressions at the level of individual corporate loans, where the dependent variable is the loan spread over EONIA in percentage points. The sample includes quarterly information on new corporate loans issued by selected banks over 2011 (Pre-ACC period) and from 2012 Q3 to 2013 Q2 (Post-ACC period). We consider here only new bank loans with a maturity less than 5 years to higher-quality, already eligible 4-rated firms and lower-quality, ACC-eligible, 4-rated firms. 4+-rated firms are the benchmark. Column 1 replicates the baseline results for comparison purpose. The coefficient of the interacted term $Post * Rating4$ provides a direct estimate of the eligibility discount in percentage points. Columns 2 and 3 contrast results when the sample is restricted to the 5 banks (among the 9 selected banks) with the largest share of credit claims as a share of their pledged collateral as of September 2011 (*High CC* banks), respectively 4 banks with the smallest share (*Low CC* banks). Columns 4 and 5 contrast results when the sample is restricted to the 5 banks with the highest ratio of the increase in Eurosystem-borrowing due to LTRO uptake to the after-haircut value of their collateral pool in September 2011 (*LTRO-squeezed* banks), respectively the 4 banks with a lowest ratio (*Not squeezed* banks). Last, columns 6 and 7 contrast results when the sample is restricted to the 5 most capitalized banks (*High-cap.* banks), respectively the 4 least capitalized banks (*Low-cap.* banks). Standard errors are corrected for clustering at the Bank*Quarter level. ***, **, * indicate significance of the estimates coefficients at the 1%, 5% and 10% levels, respectively.