

**Stock market valuation of European banks:
Evidence from the adoption of Quantitative Easing programme by ECB**

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ABSTRACT

This study examines whether investors perceive potential benefits among the European banking system to the key events leading to the adoption of Quantitative Easing programme (QE). The European Central Bank (ECB) through the QE programme aims to restore again investors' confidence in the Euro zone affected by the Global Financial Crisis providing new liquidity for the European banks. Our contribution consists in 1) emphasizing how the bank supervisory characteristics represent a sort of barometer for investors' valuation on banks and in 2) identifying the beneficial relations between regulatory aspects and central banks' interventions according to the financial structure of a bank. After an examination of the stock market reactions to the announcements of QE among the years 2015-2016, we exploit which bank supervisory characteristics might influence the investors' valuation on the European banking sector. Specifically, we identify 1) the capital adequacy, 2) the asset quality and 3) the risk solvency ratios in order to understand which banks might benefit more the new provided liquidity. The results document a negative overall market reaction among the QE announcements and highlight that banks not well capitalized might not be more beneficial because of their weak financial robustness and stability.

Keywords:

European banks, Event study, Quantitative Easing, Bank supervisory characteristics

1. Introduction

The Quantitative Easing (QE) has been experienced for the first time in the Euro zone starting from January 2015 as a solution to provide new liquidity for the European banking sector following the last Global Financial Crisis, including the US subprime-mortgage crisis (2007-2009) and the European sovereign debt crisis (2010). In the aftermath of the crisis, the accounting and the banking regulators have concentrated their efforts to allow banks to maintain a minimum level of liquidity and to adopt new measurement approaches for credit losses¹. The need to emphasize the role of liquidity raised mainly because of the crisis's consequences identified in 1) the drop of the regulatory capital and 2) the increased riskiness of loans. These conditions induce banks to raise new capital or to cut lending in order to meet the minimum regulatory capital requirements (Novotny-Farkas, 2016), but the banks' ability to raise new capital falls down in presence of financing frictions, reducing the lending activity and generating a credit crunch (Gebhardt and Novotny-Farkas, 2011). Further, during the recent sovereign Eurozone debt crisis, European banks increased their sovereign exposure and consequently the sovereign default risk (Acharya and Steffen, 2015), where bank and sovereign default risk became for some banks more closely intertwined corroborating the financial stability for the European banking system. In that sense, liquidity becomes the key source for responding to the economic need to support the real sector and the only solution appears to be the intervention of the central bank as lenders of last resort against pledged problem assets (Acharya and Ryan, 2016).

¹ Regulators responded through the issuance of a new accounting standard (IFRS 9) as well as the increase of thresholds of the existing banking ratios and further new regulatory ratios (Liquidity Coverage Ratio; Net Stable Funding Ratio).

The role of liquidity injected by a central bank in response to a change in accounting and banking regulations presents still much room in order to understand at bank-level how investors value European banks on the base of their QE pre-conditions. We explore 1) whether (an exogenous) liquidity shock exerts a positive effect on banks' economic value and 2) whether bank-level characteristics shape this relationship. We consider the exogenous liquidity shock generated by the adoption of QE as a potential increase in liquid assets available to banks. We employ short-windows stock returns as a proxy for the changes in investors' assessment of the future expected benefits banks may foresee as a result of additional liquidity. Next, we perform a further analysis to examine whether some banks' financial characteristics influenced investors' reactions to the liquidity injection.

Theory and prior evidences suggest that liquidity provisions issued by a central bank can drive to different results according to the firm's financial constraints and financial structure (Shleifer and Vishny, 1992; Kiyotaki and Moore, 1997; Zingales, 2009). Because new liquidity provided by ECB intervention is addressed to reactivate the lending channel for the European banks, it is also plausible that bankers might be worried to give the priority to the respect of regulatory constraints before supporting again their borrowers, intensifying the investor's uncertainty about the effectiveness of the same QE programme. Mainly these considerations induce to test whether banks' pre-QE financial conditions (e.g. risk-exposure; capital adequacy and asset quality) affect investors' assessments of the potential benefits of QE in terms of new liquidity (Bowen and Khan, 2014; Plantin et al., 2008; Dontoh et al., 2012; Elsinger et al., 2006). Market participants are also aware that ECB purchases "good assets" from banks' portfolios recognizing cash and we predict that only banks meeting or closely to the regulatory requirements would possibly benefit from liquidity. We argue that, by

inducing a shift from banks to ECB in the risk exposure, banks well-capitalized would increase their financial stability obtaining more liquid assets. We identify the bank supervisory characteristics in 1) the capital adequacy, 2) the asset quality, 3) the risk exposure corresponding to the issues faced by ECB/EBA's activities on which investors are today informed about the soundness and the stability of the European banking system (Bischof and Daske, 2013). The tests conducted by ECB/EBA (Transparency exercises and Stress tests) reflect the banks' health according to the respect of the regulatory constraints based on financial accounting reporting choices. If capital markets believe that the new liquid provisions have the potential to allow stronger banks to be more reactive for the lending activity, we would expect to find a better response from the markets. Our expectation is confirmed by the empirical findings where the liquidity externalities' benefits are based on the firm's economic conditions and firm's financial structure (Zingales, 2009). Further, if investors don't show any trust in the markets for the European banking system, they might forecast future potential benefits in terms of relief from assets and a boost in potential liquidity.

Consistent with expectations, we find a negative stronger market reaction among the QE announcements for European banks and document that stronger banks might benefit more of the new liquidity because more aligned to the regulatory capital requirements. Further they benefit of a risk shifting from their portfolios to ECB decreasing their risk sovereign exposure. Investors' perceptions don't focus on the amount of nonperforming loans (NPLs) that affect heavily the asset quality of European banks. The new bank reserves will be addressed to respond to the new regulatory constraints and ECB tends to be the first guarantee of the European banking sector's financial and economic stability.

Our paper contributes to the literature in more than one way. First, we investigate the capital markets' assessments on the expectations among the European banking sector to the adoption of QE programme identifying the bank's supervisory features (capital adequacy, asset quality and risk exposure ratios) as barometer to evaluate banks. The choice to use bank supervisory features in a context of bank stock market valuation assumes connotations of novelty because of the importance of new information addressed to investors (Ertan et al., 2017; Bischof and Daske, 2013). Moreover, the study is associated with the ongoing debate of the trade-off between a stricter banking regulation, as response to a financial crisis featured by a discretionary adoption of rules in timing and functions (Curtin, 2007), and the intervention role played by a central bank to alleviate the heavy consequences of a credit crunch (Kashyap and Stein, 1997; Dontoh et al., 2012).

The paper proceeds as follow. Section 2 delineates the prior contributions related to QE experiences and some regulatory considerations together with the most debated bank characteristics. Section 3 discusses the implications of QE and develops the hypotheses. Section 4 describes our sample and illustrates the methodology. Section 5 provides our main empirical findings and section 6 discusses some limitations of our analyses and concludes.

2. Background

2.1 Prior QE Experiences

Prior studies related to the QE experiences present empirical contributions to measure the impact of central bank asset purchases on financial markets (Joyce et al., 2011; Joyce et al., 2012; Christensen and Rudebusch, 2012) and the wider economic effects of the monetary policy intervention on bank

lending behavior (Gambacorta and Shin, 2016; Rodnyansky and Darmouni, 2017). In response to the sharp deterioration of the credit crunch hitting the banking sector, the Quantitative Easing programme appears to be the solution as recovery plan for the economy in different countries. The QE consists in using interest rate policies to promote lending as well as in pumping money directly into the economy to try to increase circulating money supply. It is also known under the term of “monetizing the debt” (Herbst et al., 2014). The Bank of England experiments the unconventional policy during the years 2009-10 as response to the deterioration of the last biggest financial crisis. Joyce and Spaltro (2014) highlight the relationship between bank lending growth and its determinants finding that small banks are more responsive than large banks to lend into the respect of the level of their deposits. A specific study conducted by Bowman et al. (2012) witnesses the QE experience in Japan during the years 2001-2009 with some evidences at firm-level. In this case both academic researchers and financial analysts agree that QE was not very successful to achieve the goal of stimulating aggregate demand to avoid deflation, but the efforts produced an increase of reserves and liquidity for Japanese banks. Other evidences related to the Euro zone emphasize the crucial role of liquidity issued by ECB in presence of financial tensions caused by country factors as well as by new banking regulation interventions (Fiordelisi et al., 2014; Ricci, 2015). Also TARP initiative in US in the years following the financial crisis was based on providing new liquidity for the banking sector (Calomiris and Khan, 2015), differentiating large banks from small banks, where the first ones were strongly pressured to participate to the programme even though in presence of intentions addressed to support the whole American weak banking system.

Before announcing the QE, ECB adopted several unconventional programs with the main goal to support the real economy of the Euro zone particularly affected by the last sovereign debt crisis in May, 2010 (Acharya et al., 2017). Starting from the sovereign debt crisis ECB has adopted in the Euro zone more than one non-standard program with the aim to contain the financial diseases and to support the funding conditions for banks. ECB has in this way activated a relevant period of particular dependency on its liquidity for all those banks under its supervision and affected by the same sovereign debt crisis. The prior results of these macroeconomic experiences have been to create among the banking industry the expectation of central bank to become the lender of last resort by providing liquidity against pledged problem assets as suggested by Acharya and Ryan (2016).

2.2 Bank regulatory considerations and bank supervisory characteristics.

Starting from some considerations, liquidity in banks has acquired more relevance following the last financial crisis. The regulator realized that although banks were aligned to regulatory capital ratio, they could incur the probability to fail because of a low level of liquid assets. In other words the requirement of regulatory capital has not been sufficient to absorb the impact of a financial turbulence inducing the regulator to provide higher ratios for the regulatory capital, but also requiring a level of liquid assets to guarantee the soundness and financial stability of a bank (EBA, *New Bank Liquidity Rules: Dangers Ahead*)². Liquidity for banks represents one of the main sources to balance the relation between loans and deposits that reflects the level of health and the financial stability of a bank. Liquidity is strictly connected with capital ratios, whom objective is to limit default risk and

² https://www.eba.europa.eu/documents/10180/807776/20121002_BSG_Liquidity_Paper_incl_amendment.pdf

to encourage good risk management (Jokipii and Milne, 2011; Calomiris et al., 2012). Because regulatory capital represents the first element to avoid bankruptcies and other negative externalities on the financial system (Dewatripont and Tirole, 1994), the regulator has identified for banks necessarily higher capital standards and a liquidity coverage ratio (LCR) to face future financial turbulences. Liquidity acquires a particular relevance also for the timing that banks should have available liquid assets, such as cash and all marketable securities that can be transformed in cash in 30 days of calendar. It has also been empirically verified that the decision to increase the regulatory capital ratio tends to amplify the natural procyclicality forcing banks to cut back lending activity in recessions (Peura and Jokivuolle, 2004) as well as higher capital standards reduce banks' ability to create liquidity (Diamond and Rajan, 2000). The divergence between capital and liquidity requirements lies also on the objective factors that while capital is not observable at all times and depends on risky assets, liquid assets, specially cash, are always observable and reduce strongly the default probability risk (Calomiris et al., 2012).

Prior contributions document several aspects that we have to consider into the respect of our analyses' development. Although the fundamental importance of banks' liquidity in order to face potential future financial downturns, it needs to investigate more on the effects of pre-liquidity conditions of a bank given an unconventional central bank's intervention for providing new liquidity. The focus on the bank supervisory determinants of capital market reactions is justified in light of the importance of risk and financial-based (ex-ante) measures for current and potential investors that are periodically informed about the health and the soundness of the European banks through the supervisory disclosure related the ECB/EBA's activities. The bank supervisory determinants are

extrapolated from the conduction of the main tests, such as the wide transparency exercises (WTE) and the wide stress testing (WST) focusing on the regulatory capital, the asset quality and the risk exposure (Ertan et al., 2017; Bischof and Daske, 2013). The results of these supervisory tests reflect generally the economic and financial stability of the banking system and represent the main drivers of investors' valuation for each bank.

Prior research in bank accounting has focused on regulatory capital management, because the same capital adequacy presents still much room for managerial incentives to use accounting discretion reducing lending or increasing the equity component (Beatty and Liao, 2014). Concerning the asset quality, this includes the exposure of credit losses according to the level of reserves addressed for the impaired loans (Nissim, 2003). In that sense, the last financial crisis has again highlighted the delayed recognition of loan losses under the incurred loss approach emphasizing at one side, the weakness of the financial accounting standards and at the other side incentivizing the role of loan loss provisions (LLPs) for the same bank financial stability (Novotny-Farkas, 2016). In this specific case, over the past few years, ECB involved banks through repo financing but without improving the underwriting standards related to the loan quality and not decreasing the risk taking behaviors (Ertan et al., 2017). However, the inherent complexity of a securitised credit structure allows to assess loan portfolio riskiness from an investor perspective discouraging banks from improving the asset quality and particularly the loan quality. Another issue that we have to take into account comes from the fact that favourable prudential and accounting treatments may provide ex ante incentives for risk shifting (Chircop and Novotny-Farkas, 2016; Lu, Sapra and Subramanian, 2012). Before the adoption of QE, European banks increased their sovereign exposure and consequently the sovereign default risk.

Acharya and Steffen (2015) highlight which banks increased the domestic sovereign exposure with the beginning of the same sovereign debt crisis starting in May 2010. In that sense bank and sovereign default risk became for some banks more closely intertwined corroborating the financial stability for the European banking system.

However, the particular heterogeneity of banks' assets side and the opacity in information environment as unique feature of the banking industry induce researchers to still investigate on understanding how banks might be affected by external decisions according to their "financial status" (Bowen and Khan, 2014; Acharya and Ryan, 2016; Bushman, 2014).

3. Hypotheses Development

3.1 Capital Market Reactions

We start by examining the stock market reactions to news events leading up to the announcements of the QE programme. To identify the events, we verify the ECB website for all publicly-issued statements related to this topic, obtaining an initial list of six events among the years 2015-2016.

QE programme affects not in a direct way the banking system of the Euro zone purchasing assets on the secondary market and crossing other requirements related to the typology and the duration of the eligible assets. These eligible assets are mainly governmental bonds held in European commercial banks' portfolios. We identify a group of European banks and a group of banks which the headquarter is situated in other countries like US, China, India, South Korea, Japan and Australia to verify different magnitudes given the announcements of QE liquidity provision. Following prior studies how they conduct event studies, we also control that the QE announcements by ECB have not been

disclosed by the press in the prior times and consequently the presence for other confounding events (Leuz, 2007) occurring the same period.

Into detail, the event dates correspond to the day in which the ECB President Mario Draghi announces information, features and further implementations about the extraordinary programme taking effect in January 2015³. The aim of most changes related to the QE ongoing and functioning is because the original rules rapidly constrain the purchases in countries with low levels of public debt and it raises the need to expand the “universe of available debt securities occurring to the supranational agencies”⁴. Precisely, the six event-announcements are:

- 1) Event one (*Ev_1*) (January 22nd, 2015) is the time in which the QE program is announced by the President of ECB. It provides the main rules related to how the program works into the respect of specific requirements.
- 2) Event two (*Ev_2*) (March 5th, 2015) corresponds to the beginning of the QE program through ECB’s assets purchases of a monthly amount corresponding to € 60 billion.
- 3) Event three (*Ev_3*) (April 15th, 2015) corresponds to the announcement ECB approves amendments to the initial list of agencies located in the Euro area issuing securities (corporate bonds) that are eligible for the PSPP. In that sense new future assets are included in this extraordinary program.

³ <https://www.ecb.europa.eu/mopo/implement/omt/html/index.en.html>

⁴ <http://bruegel.org/2016/02/the-european-central-banks-quantitative-easing-programme-limits-and-risks/>

- 4) Event four (*Ev_4*) (March 10th, 2016) is the time ECB announces the Corporate Sector Purchase Program (CSPP) and the APP increase of monthly purchases to € 80 billion until March 2017.
- 5) Event five (*Ev_5*) (April 21st, 2016) is the time ECB starts buying assets for € 80 billion per month and it announces the details of the Corporate Sector Purchase Program (CSPP).
- 6) Event six (*Ev_6*) (July 22nd, 2016) it is announced QE will be carried out until the end of 2017 and in any case until the Governing Council sees a sustained adjustment in the path of inflation that is consistent with its aim of achieving inflation rates below 2%.

Generally the announcements convey different communications about QE programme. Hence, we partition the sample events into three categories: 1) “*information announcements*” related to the process of purchases by ECB; 2) “*details’ announcements*”, through which ECB describes the rules and the requirements of the QE programme; 3) “*implementations’ announcements*” following which ECB adds new elements related to its purchases of public sector assets, such as new financial instruments issued by supranational agencies (see Appendix II – “Event Study Timeline”).

Focusing the attention on the announcements some concerns arise. In the meanwhile, ECB adds to the list of the eligible assets corporate bonds explicitly not held by European banks (i.e. bonds issued by big European companies), as well as an increase of the amount for the monthly purchases (from € 60 billion to € 80 billion) and finally an increase of the same duration of the programme (until the end of 2017) to allow still market liquidity. Overall, ex ante it is difficult to determine the sign and the magnitude of the potential benefits of new liquidity provided by ECB with the QE programme. This intervention adopted by ECB represents surely an opportunity to restore investors’ confidence

to believe in the economic growth of the Euro zone as partially suggested by prior experiences in other times and countries (Bowman et al., 2011; Joyce and Spaltro, 2014; Calomiris and Khan, 2015). However, QE might tend to boost banks reserve balances or to expand bank credit to the real sector (Herbst et al., 2014), suggesting different results among the same investors' perceptions.

Thus our first overall hypothesis matches the concerns about the effectiveness of ECB's goal to regain investors' trust thanks to the announcements of QE programme. For each individual announcement by ECB we expect also to find few credibility to address adequately the new liquidity injected by ECB adding that the decision to continue QE programme until September 2017 might be the first signal that European banks might not be ready to support again the real sector growth.

H1: *There is an overall positive (negative) bank stock price reaction to the announcements leading to the adoption of QE programme.*

3.2 Bank supervisory characteristics' identification

Capital market reactions at least partly reflect market participants' expectations of new liquid provisions for European banks anticipating the potential benefits. In line with the first concern relating to how investors perceive the intervention of QE for European banks, Acharya and Ryan (2016) suggested that investors may forecast the new liquid provisions as an element for banks to increase the own volatility inducing market bubbles or to take strategic choices of capital management meeting or beating Basel ratios. Because our expectations are based on several concerns related to the effectiveness of the QE programme and to the weakness of the European financial

system, it becomes crucial to verify what affects the magnitude of the markets' assessments at bank-level. We address the following questions: 1) whether investors might believe in a beneficiary economic impact for some banks instead of others and why; 2) in which sense and specifically how bank prior conditions become the barometer for investors' valuation among European banks. To these questions it is fundamental to start an examination of the cross-sectional relationship between the overall market reaction and the bank characteristics that indicate the stability and the soundness of a bank. We consider those banking features proposed in the prior literature that potentially contributed to banking risk-exposure considerations and to the assessment of the banks' financial vulnerability (Klomp and de Haan, 2012). We identify three bank regulatory categories, such as 1) the capital adequacy, 2) the asset quality and 4) the solvency ratio implying risk-exposure ratios. Bank capitalisation represents a fundamental issue on which financial supervisors and central banks focused particularly. EBA's asset quality review and stress test exercises for European banks are mainly concentrated on bank capital, viewed as a loss-absorbing buffer that enhances bank solvency in the face of adverse shocks (Gambacorta and Shin, 2016).

With regard to the economic and financial structure of each bank (Shleifer and Vishny, 1992; Kiyotaki and Moore, 1997; Zingales, 2009), this has also been suggested by prior empirical evidences that more capitalized banks are less exposed to monetary policy changes (Madura and Schnusenber, 2000). Furthermore, in presence of strict regulatory frictions, it becomes harder to ensure the capacity from capital and liquidity perspectives to properly manage risks (Farag et al., 2013). The tension among capital markets is dictated by the need to be aligned to the banking regulatory standards at one side and the need to increase banks' profitability through the lending activity at the other side.

The provision of new liquidity might present broadly some advantages among the European banking sector, indifferently if they are big or small banks, well or not well-capitalised banks. More specifically, 1) liquid assets give accessible ways to reinvest in other assets when prices are low; 2) liquid assets reduce some investing risks by ensuring that an investor will be able to quickly react to market moves (Brunnermeier, 2002). On the basis of the above reasoning we form further hypotheses based on an exploitation at bank-level, which predict the European banks' stock market valuation is related to the supervisory bank characteristics. Considering the heterogeneity across the European banks our second hypothesis specifies the directional association.

H2: *European banks stock valuation is positively associated with capital adequacy, asset quality and risk-exposure ratios in response to the ECB intervention with the QE programme.*

Notwithstanding this, we know that ECB purchases “good assets”, such as those safe assets with a low weight on regulatory capital exchanging cash. In some ways we predict from a regulatory capital standpoint to find no relevant effects or better only those banks already closed to meeting the regulatory parameters would possibly be more beneficial from liquidity provisions otherwise those would be more concentrated to balance the new liquidity with the need to obtain an economic and financial stability. The worst response to QE following investors' perceptions is that weaker and more financially unstable banks might be in trouble although the new liquidity provision issued by ECB. Hence, aware that capital management choices allow several different risk management solutions, financially stronger banks perfectly in line with the regulatory adequacy tend to adopt

further “dynamic” mechanisms awarding the two capital buffer ratios: conservative capital buffer and additional prudential capital buffer as protection against future financial turmoil. According to the contribution by Gambacorta and Shin (2016), the capital in excess of minimum capital requirements could be used by banks to finance consumption or profitable investments. Secondly, the well-capitalised banks are perceived as “less risky” by depositors and investors.

Again, on the basis of the above and considering the heterogeneity across the European banks our second hypothesis specifies the following directional association.

H3: *European banks stock valuation is negatively associated with capital adequacy, asset quality and risk-exposure ratios in response to the ECB intervention with the QE programme, when European banks don't meet the regulatory capital ratio.*

4. Sample selection and methodology

In this section, we describe our data sources, the sample selection process and the measurement of dependent and independent variables we use in the empirical tests.

4.1 Data sources and sample selection

Our setting is composed by the European banks explicitly involved to the QE's main liquidity provisions that aim to enhance the economic recovery. The European banks present interesting elements according to the development of the analyses for this research study. Today these banks follow the same accounting and banking regulations and they are under the same supervisory rules

exercised by the ECB and specifically by EBA. This scenario of regulatory homogeneity for the European banking sector presents still a degree of heterogeneity because of the different financial and economic backgrounds of each bank and because of the degree of discretion for which bank managers have still much room to adopt capital and earnings management decisions (Bushman, 2014).

We employ an ex-ante approach to identify the main events and features of QE programme detailed on ECB web site starting from the section how Public Sector Purchase Programme (PSPP) works ⁵. In this way we listed the announcements (date, description, main objectives) to take into account for the development of the event study. Because we intend to test the market reaction to QE announcements on the banking sector, we consider all the listed European banks, such as those banks situated in the area where QE programme would take effect. Data are gathered from Datastream Thomson Reuters Eikon for banks' stock prices, market value and book equity value, and market indexes. We keep the commercial and saving European banks in the sample, because of the importance of banking sector implied in the Euro QE programme as the first channel to support the European economic growth. Further, we use the same variables for another group of banks situated in completely different geographical areas, such as US, China, India, South Korea, Japan and Australia. All these banks outside the European area belong to our control group, that we following employ for testing the market reactions among banks not affected by ECB's decisions.

For conducting the cross-sectional analyses at bank-level we consider the banks' accounting and financial annual data from the database Orbis Bankscope for the time period 2014-2015, precisely

⁵ https://www.ecb.europa.eu/explainers/show-me/html/app_infographic.en.html

those years before the QE announcements identified in our study. Finally we obtain a sample of 120 European listed banks that represent the group of banks of our interest to develop the further analyses. Table 1 presents the sample composition of European banks aggregated by country indicating if the same country belongs to the Euro zone, European Union (EU) and Quantitative Easing (QE). The data for firms refer to those characteristics identified in the three categories: 1) capital adequacy; 2) asset quality; 3) risk-exposure ratios. Capital adequacy includes the regulatory capital and the liquid assets ratios. The asset quality presents as interesting ratios the level of non-performing loans (NPL) as well as the relation of loan loss provisions over total loans. The risk weighted assets indicate how the same bank is exposed in terms of credit risks, market risks, operational risks and liquidity risks. The dimension of risk exposure has assumed a strong relevance also in the accounting studies after the last financial crisis. One of the main issues on which there is an ongoing increase of research studies is how the accounting regulation can affect banking regulatory ratios. These last one have become the first barometer to explain the banking sector's health. In our study we identify these banking ratios for the capability to indicate and to predict the banks' prior conditions in relation with the market assessments to the QE programme.

Table 2 reports means, median and the distribution of the percentiles of the European banks' balance sheet characteristics and regulatory variables employed in our analyses conducted at firm-level. Table 3 presents the correlation matrix of the same variables highlighting a negative and significant correlation between the loan customer exposure and RWA (-0.535*) as well as between the regulatory capital ratio and the loans over total assets (-0.348*) and again the customer loan exposure (-0.159*).

4.2 Capital market reaction and cross-sectional analysis of CARs

We conduct an event study to estimate the abnormal returns and the cumulative abnormal returns for the European banks around the six announcements related to the QE programme in the Euro zone among the years 2015-2016. Event studies have been previously used to assess the firms' stock prices behaviours around corporate events (Kothari et al. 2004) and macroeconomic shocks (financial crisis, illiquidity, TARP).

We adopt the Fama-French 3 factor model to test market reactions for each event date corresponding to the day in which the President of the European Central Bank, Mario Draghi, announces the starting of an extraordinary programme as the Quantitative Easing never experienced before in the Euro zone. All the announcements provide information, details and descriptions following which QE takes effect⁶. The aim of most changes related to the QE ongoing and functioning is because the original rules rapidly constrain the purchases in countries with low levels of public debt and it raises the need to expand the “universe of available debt securities occurring to the supranational agencies”⁷.

We consider the daily stock price, the market value and the book value of equity for each listed bank and the daily price of the main financial market indexes of each country. We choose as short event windows a range of three days (-1; +1) and five days (-1; +3) or (-2; +2) for the computation of cumulative abnormal returns (CARs). The estimation period is based on a range of twenty-five working days prior to announcement (-30; -5); we excluded using alternative and longer observation windows (-60; -5) to avoid overlapping event windows related to QE announcements. Without

⁶ <https://www.ecb.europa.eu/mopo/implement/omt/html/index.en.html>

⁷ <http://bruegel.org/2016/02/the-european-central-banks-quantitative-easing-programme-limits-and-risks/>

overlapping the estimation periods and the event periods and controlling for the presence of other confounding events, we provide estimators for the parameter of the normal return model that are not influenced by the returns around the event. Including the event window in the estimation of the normal model parameters could lead to the event returns having a large influence on the normal return measure. In this situation both the normal returns and the abnormal returns would capture the event impact.

Specifically, the three factors in 3-factor model are: market return (R_t^{MKT}), size portfolio return (SMB_t) and book-to market portfolio return (HML_t).

$$R_{it} = \beta_0 + \beta_1 R_t^{MKT} + \beta_2 SMB_t + \beta_3 HML_t + \varepsilon_{it} \quad (\text{Eq.1})$$

To calculate the daily abnormal returns around different event windows we compute the abnormal returns (ARS_{it}) are the difference between the observed returns and market return (R_t^{MKT}), size portfolio return (SMB_t) and book-to market portfolio return (HML_t).

$$ARS_{it} = R_{it} - \beta_0 - \beta_1 R_t^{MKT} - \beta_2 SMB_t - \beta_3 HML_t + \varepsilon_{it} \quad (\text{Eq.2})$$

The abnormal returns are a direct measure of an unexpected change in a stock price associated to the event under consideration. An abnormal stock price effect associated with an un-anticipated event should be observed if the event has information content. Indeed information is defined “material” when the abnormal return is statistically significant, because the difference between the returns and

the predicted returns has an economic sense. QE announcements represent an exogenous shock in an economic context: 1) they can change significantly banks' behaviour or incentives; 2) the same banks of our sample are not directly chosen to be treated by this shock (Atanasov and Black, 2016). Aggregating the ARs over each event window we calculate the cumulative abnormal returns (CARs) for each stock price.

As discussed earlier, we also test for cross-sectional variation (hypotheses H2 and H3) in banks stock price reactions to the key events corresponding to the announcements of QE programme. We concentrate our efforts to investigate on those bank characteristics that might influence investors' valuation, such as the prior conditions of the European banking sector before QE would take effect. We use the regulatory ratios used under Basel framework to verify the financial soundness and stability of a bank. These ratios have been particularly emphasized also in prior studies highlighting how the supervision role by ECB can improve the loan quality among European banks (Ertan et al., 2017). It is also evident that those banks under the supervision through stress test exercises and wide transparency exercises are the biggest banks in the EU. The bank characteristics identified for our analyses, such as the capital adequacy, the asset quality and the risk-exposure, have been particularly considered in prior studies because they are also the results of earnings and capital management choices (Novotny-Farkas, 2016).

The capital adequacy that includes the regulatory capital and liquidity ratios. The regulatory capital is proxied by the Tier1 ratio (*Tier1*). There are different targets of capital, such as the book value capital, the fair value capital, the market capitalization and the economic capital. Regulatory capital includes book value of common shares, paid in capital, retained earnings, less goodwill, and any

other intangibles plus other instruments subordinated to subordinated debt, have no fixed maturity and no embedded incentive for redemption and for which a bank can cancel dividends or coupons at any time.

The bank level of liquidity is represented by the ratio of liquid assets to total assets (*LiquidASS/TA*) that measures the bank soundness and the ability to sustain its lending activity. Concerning the asset quality that has assumed a particular relevance from the perspective of the banking supervisor (e.g. the stress tests and the transparency exercises by ECB-EBA), we include: 1) the customer loan exposure (Laux and Reuter, 2016) as the relation between the total customer loans and the total customer deposits (*Customer Loan Exposure*); 2) the relation of total loans over total assets (*Loans/TA*); 3) the annual asset growth rate, as the percentage growth of total assets over the previous 12 months (*Asset Growth*).

The risk exposure explanatory variable has been identified in the risk weighted assets ratio (*RWA*) such as that solvency ratio that indicates the proportion of risk weighted assets over the deposits and short-term funding. The risk weighted assets minimum requirement would be increased at the threshold of 12.5%, which regulatory capital and capital buffers would absorb moderately any financial impact. It makes sense also to consider this ratio according to the important relation between regulatory capital and the RWAs: more increase the regulatory capital, more decrease the RWAs. The RWAs consider the bank's risk exposure observed in terms of credit risk, liquidity risk, market risk and operational risk.

The model to test the hypotheses 2 and 3 includes as dependent variable the cumulative abnormal returns, *CARs* for all the events and as explanatory variables the banking features that influence the

banks' valuation of investors and other regulatory factors that can mitigate the benefits of the new liquidity injection by ECB. These last regulatory factors reflect a country dimension coming from the past according to the experiences at country level about the supervisory/controlling roles as well as the adoption of more stringent ratios on liquidity before Basel regulation (Bruno et al., 2018). For each group of countries we create a dummy variable for distinguishing why some countries are included or not for our analyses. Therefore, the prior empirical contribution on the presence of the pre-existing regulation on liquidity (*Pre-existing Liquidity Regulation*) witnesses that the banks of countries as UK, Switzerland, Germany, Netherlands and Finland have already experienced higher ratios of liquidity in their banking regulation to attenuate potential financial downturns. The presence of big banks in these countries as well as of banks that are identified to support a systemic risk with a particular attention to maintain an economic and financial equilibrium has induced in the past before the adoption of Basel 2 framework the need to provide more liquidity.

All the analyses incorporate aspects at individual-level emphasizing how a bank can appear sound and stable and consequently solvent given several considerations coming from inside and outside the same bank.

In sum, we adopt the following model:

$$CARs = \beta_0 + \beta_1 \text{Capital Adequacy} + \beta_2 \text{Asset Quality} + \beta_3 \text{Risk Exposure} + \beta_4 \text{Controls} + \epsilon \quad (\text{Eq. 3})$$

Prior empirical evidences about European banks show that in the post crisis era, the ECB has served as the primary investor in the majority of asset backed securities (ABS) deals in the Eurozone and

provided banks with a very important source of liquidity. Importantly, the ECB issued very high amounts at below market level interest rates for repo backed by ABS making this facility a preferable source of liquidity for Eurozone banks (Ertan et al., 2017). It is also showed that in presence of financial distress and low risk appetite banks are characterized by low regulatory capital, more assets recorded at fair value, poor asset liquidity, larger potential impairments and more trading assets (Bowen and Khan, 2014). In this way investors' expectations might be focused to understand whether the weakest banks would be incentivized to invest again in better asset quality decreasing their leverage and improving their liquidity.

At the other side we know how the banks' financial and economic structure may make the difference according the goals of a central bank given the adoption of unconventional macroeconomic policies (e.g. TARP experience in U.S.). Because of prior mixed evidences further analyses are focused to verify whether under-capitalized banks are perceived differently from the well capitalized banks. Knowing that QE intervention has the aim to reactivate the lending channel for the SMEs, we want to investigate whether market assessments are more pronounced for those banks that are or not aligned with Basel ratios, particularly in terms of capital ratios. We employ the threshold of 15% corresponding to the Common Equity Tier 1 (CET1) fixed by Basel regulation to distinguish the two categories of European banks, such as the well and the not well capitalized (Bowen and Khan, 2014).

5. Empirical Results

5.1 The Overall Market Reaction

We first provide an outlook on the results obtained through the development of the event study

around the six QE announcements reported on the following Table 4, Panel A and Panel B. In the first panel (Panel A) we report the results for the sample of European banks and for the sample of banks of other countries like US, China, India, South Korea, Japan and Australia among different event-windows identified in (-1; +1), (-2; +2), (-1; +3). We can see a negative and significant bank stock reactions for both samples, even when we split in “*Early Events*” and “*Later Events*” (Gao et al., 2016).

Further, in Panel B we show for each event the CARs obtained among different event windows are again negative and significant. Hence, the results confirm our expectations to find a negative and significant reaction because of investors’ concerns related to the benefits for European banks. ECB announces different stages of QE programme never convincing investors about the efficiency for banks thanks to the new liquidity to support again the real sector through the lending channel. The new liquidity provided by ECB represents an instrument on which banks may take different decisions in order to respond to the internal needs on which to investigate through some analyses at bank-level.

5.2 Cross Sectional Analyses of Cumulative Abnormal Returns

After the conduction of the event study, some more specific research questions arise about 1) which bank factors might influence the banks’ valuation from the investors’ perspective and 2) why investors might have perceived or not a potential beneficiary economic impact first among the entire European sector and later on some specific banks.

Table 5 presents the results related to the hypotheses 2 and 3. The first findings show that in cross sectional tests the distribution of stock price reactions is consistent with investors worrying or not

totally confident about the financial difficulties faced by European banks according to the ECB goals. We find a positive and significant association between the CARs and the liquidity ratio as well as with leverage and total assets growth. Banks have surely the opportunity to increase its liquidity ratio, but at the same time it is expected a reduction of risk weighted assets. This point is crucial if we think about how the same regulator has addressed all the efforts to increase the threshold of the RWA to allow a sort of buffer for banks to attenuate any kind of financial turbulences generated also by different factors summarized as market risks, liquidity risks, credit risks and operational risks. It is plausible that the new liquidity might be addressed by banks to increase their risk exposure buying new assets, such as other governmental bonds, as well as issuing new credit without having a strong funding side. The short term funding ratio creates a sort of vulnerability into the respect of longer term assets and this is the first distortion allowed in the banking system. The new Basel framework (Basel 3) has added a new ratio, the net stable funding ratio (NSFR), that will conduct to rebalance the asset side with the liabilities side of bank's balance sheets.

Related to the hypothesis 3 we include in our regressions a cluster of countries (UK, Switzerland, Germany, Netherlands and Finland), such as those countries in the past have adopted higher liquidity ratios (pre-existing domestic liquidity regulation) as suggested by Bruno et al. (2018) contribution. We find a negative relation between CARs and the pre-existing domestic liquidity regulation. Again investors' don't perceive any kind of benefits for those countries that got higher requirements of liquidity ratios in the banking industry. These last considerations drive us to highlight how all European banks are valued more and more under an increased homogenous dimension given the presence of the same regulator and supervisor exercised by ECB together with the collaboration of

the European Banking Authority (EBA).

6. Conclusions

We examine stock price reactions to the announcements of QE programme among the time period 2015-2016 experienced for the first time in the Euro zone and we investigate which how and why supervisory bank characteristics might influence European banks' valuation from investors' perspective. The extant literature reflects high uncertainty about the effectiveness of QE and it is mainly focused to highlight the economic consequences of this unconventional programme. For these reasons we investigate which, how and why banks' characteristics might influence the market assessments of the European banking sector.

Because banks represent the first channel, through which ECB intends to reactivate the banking lending activity supporting SMEs' investments, we verify whether investors might see possible an economic recovery thanks to the banks' role. Our findings report a negative overall bank stock price reaction among the six QE announcements showing investors' concerns about the solution to regain their trust through an extraordinary intervention by a central bank. When we looked at the three bank supervisory characteristics identified in capital adequacy, asset quality and solvency ratios, we find that the magnitude of stock price reactions are positively related to liquidity and leverage ratios, while negatively related to risk weighted assets. These results are consistent with stock market participants worrying about the effectiveness of QE programme among a European banking sector heavily affected by the last financial diseases. In detail, considering the distinction between well or not capitalized banks, it seems that not well capitalized banks might not get more benefits than well

capitalized banks and the financial stability acquired before the QE programme might address properly banks to behave according to ECB goals.

Our findings and contributions are subject to the following caveats. First, similar to the most part of event studies, we assume the hypothesis of markets' efficiency, where the market adjusts rapidly to new information (Fama et al., 1969). Further, ECB has decided to not disclose completely information about the timing and the amount of bonds extrapolated from the specific banks' portfolios during the QE programme. Finally, because the results provide an estimate of the investors' assessments regarding the few trust on European banks given the QE programme, it is also evident that the range of time period about banks' accounting data are restricted to a short period of two years (2014-2015) and it might represent not a comprehensive evaluation of these outcomes.

In conclusion, European banks are still too weak to react in short times and to support the growth of real economy. Furthermore on the base of the prior studies that consider banking liquidity aspects, this study confirms that "new" liquidity injection thanks to the ECB's extraordinary intervention can assume a positive expectation when banks are already well structured and have good asset quality.

5.3 References

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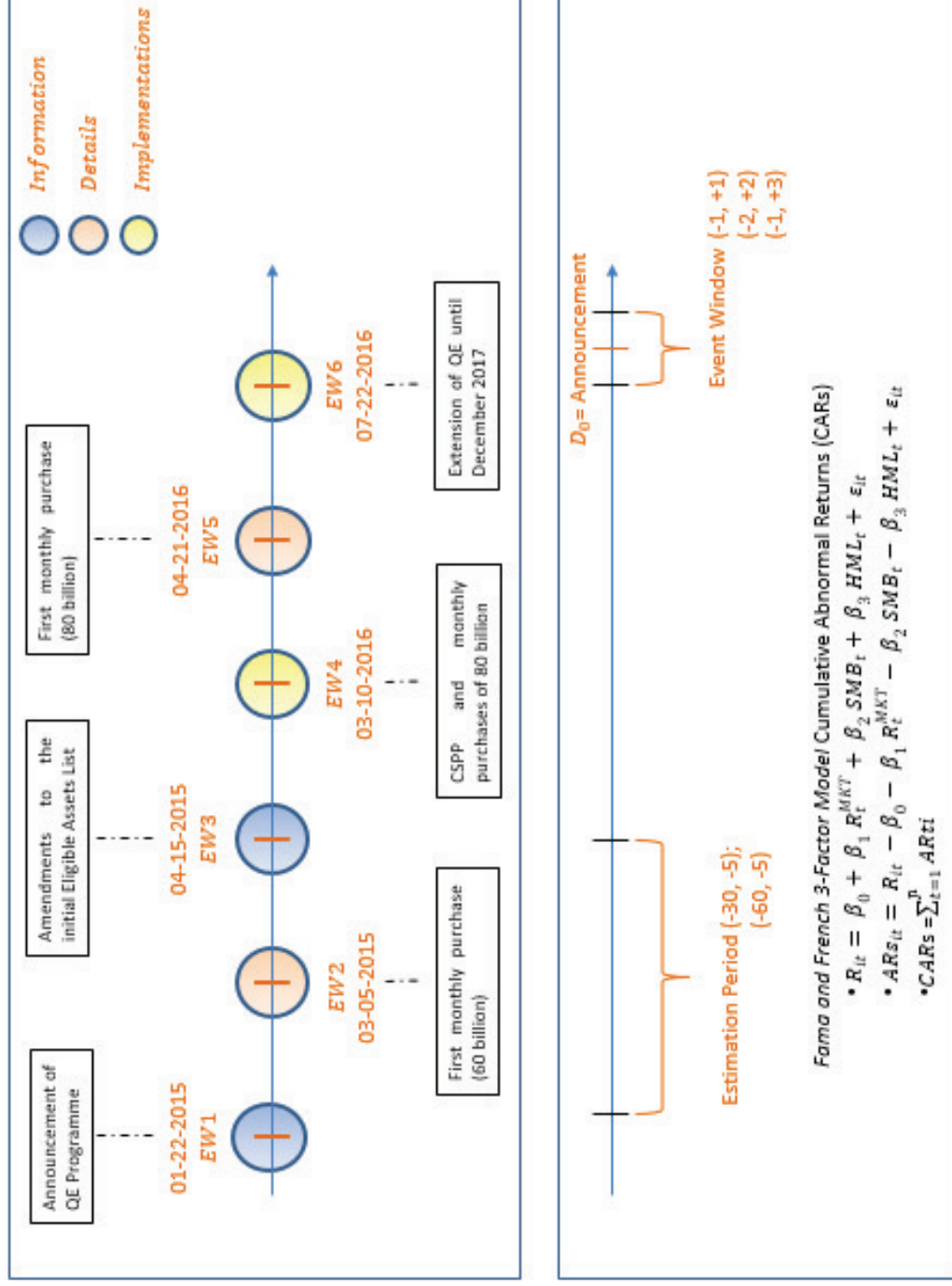
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5.4 Appendix I - Variable Description

<i>Variables</i>	<i>Definition</i>
CARs	Cumulative abnormal returns model obtained from the computation of Fama and French 3-factor model (Dep. Variable)
Capital Adequacy Ratios	
<i>Tier1</i>	the ratio between the regulatory capital and the total amount of risk-weighted assets
<i>LiquidASS/TA</i>	the ratio of assets that include cash, non-asset backed held to maturity and available for sale securities, governmental bonds and securities purchased under agreements to resell over total assets
Asset Quality Ratios	
<i>Customer Loans Exposure</i>	customer loans over customer deposits
<i>Loans/TA</i>	total loans over total assets
<i>Asset Growth</i>	the percentage growth of total assets over the previous 12 months
Risk Exposure Ratios	
<i>RWA</i>	the risk weighted assets over the deposits and short-term funding
Country-Liquidity Regulation	
<i>Pre-existing Liquidity Regulation</i>	equals to 1 for those countries that has a pre-existing domestic liquidity regulation (Finland, Germany, Netherlands, Switzerland, UK); 0 otherwise
Controls	
<i>GDP Growth</i>	Annual growth of GDP
<i>Leverage</i>	Total assets over total equity
<i>Size</i>	Natural logarithm of total assets
<i>Not well-cap banks</i>	equals to 1 if a bank is classified as "not well capitalized", 0 otherwise, i.e. a bank is classified as not well capitalized when the Tier1 ratio is under the threshold (<10.00). In this category is included any category worse than well-capitalized, including "adequately capitalized", "undercapitalized" or "significantly or critically undercapitalized" (Bowen and Khan, 2014)

The data-source of the banks' accounting data is Bankscope Bureau Van Dijk

5.5 Appendix II – Event Study Timeline



5.6 Tables

Table 1. Sample Composition of the European Banks

Country	Country Code	Nr. Listed Banks	QE	Euro zone	EU	Pre-Existing Liquidity Regulation
Austria	AT	6	Yes	Yes	Yes	No
Belgium	BE	1	Yes	Yes	Yes	No
Cyprus	CY	1	No	Yes	Yes	No
Finland	FI	2	Yes	Yes	Yes	Yes
France	FR	4	Yes	Yes	Yes	No
Germany	DE	5	Yes	Yes	Yes	Yes
Ireland	IE	1	Yes	Yes	Yes	No
Italy	IT	16	Yes	Yes	Yes	No
Malta	MT	3	Yes	Yes	Yes	No
Netherlands	NL	2	Yes	Yes	Yes	Yes
Portugal	PT	1	Yes	Yes	Yes	No
Slovakia	SK	3	Yes	Yes	Yes	<i>n.d.</i>
Spain	ES	6	Yes	Yes	Yes	No
Denmark	DK	22	No	No	Yes	No
Norway	NO	21	No	No	No	<i>n.d.</i>
Sweden	SE	4	No	No	Yes	No
Switzerland	CH	17	No	No	No	Yes
United Kingdom	GB	5	No	No	Yes	Yes
Total Banks		120				

** UK belonged to EU until June 23rd 2016

QE = countries under the programme of Quantitative Easing

Euro zone= countries which have adopted Euro currency

EU = countries member of the European Union

Pre-existing Domestic Liquidity Regulation = countries which have adopted higher liquidity ratios before Basel 3 Framework

All banks in all countries are subject to the Basel Regulation

Table 2. Descriptive Statistics of the European Bank Characteristics

<i>Variables</i>	<i>Mean</i>	<i>Median</i>	<i>sd</i>	<i>p10</i>	<i>p25</i>	<i>p75</i>	<i>p90</i>
CARs	-0.063	-0.065	0.085	-0.169	-0.119	0.002	0.047
Tier1	14.552	14.060	3.717	10.600	11.950	16.380	19.550
LiquidASS/TA	20.017	16.751	14.791	4.466	9.498	27.191	40.807
LiquidASS/DepSTfund	29.842	25.282	23.354	5.776	12.642	43.546	55.014
Customer Loans Exposure	113.838	109.154	42.679	67.043	87.203	133.199	172.562
Loans/TA	62.068	65.952	18.973	34.623	52.654	76.830	82.757
Asset Growth	5.630	3.226	15.711	-4.388	-0.982	7.249	14.205
RWA	15.571	11.855	13.659	1.256	6.616	22.461	32.065
GDP Growth	1.628	1.676	1.472	0.191	0.829	1.927	1.992
Leverage	1.190	1.182	0.037	1.153	1.166	1.205	1.234
Size (<i>log of TA</i>)	16.484	16.380	2.429	13.359	14.487	18.145	20.168

Table 3. Correlation Matrix

<i>Variables</i>	1	2	3	4	5	6	7	8	9	10
1 CARS	1.000									
2 Tier1	-0.050	1.000								
3 LiquidASS/TA	0.127*	0.287*	1.000							
4 Customer Loans Exposure	0.074*	-0.159*	-0.278*	1.000						
5 Loans/TA	-0.003	-0.348*	-0.506*	0.530*	1.000					
6 Asset Growth	0.113*	0.093*	0.068*	0.291*	0.085*	1.000				
7 RWA	-0.093*	0.158*	0.370*	-0.368*	-0.535*	-0.048	1.000			
8 GDP Growth	-0.147*	0.034	0.159*	-0.019	0.028	0.120*	0.190*	1.000		
9 Leverage	-0.034	-0.213*	-0.180*	-0.130*	-0.086*	-0.036	0.046	0.023	1.000	
10 Size (log of TA)	0.237*	-0.198*	0.188*	0.258*	-0.005	0.030	-0.034	-0.132*	-0.460*	1.000

The table reports the Pearson correlation coefficients. (*) indicating significance at 10% level

Table 4. Results of the Bank Stock Price Reactions

Panel A. Overall Market Reactions to the QE Programme Announcements of the European Banks and Other Banks

	Predicted Sign	CARS (-1;+1)	CARS (-2;+2)	CARS (-1;+3)
European Banks				
<i>Overall</i>	+/-	-0.051*** [0.024]	-0.109*** [0.004]	-0.106*** [0.004]
<i>Early Events</i>	+/-	-0.029*** [0.002]	-0.040*** [0.003]	-0.044*** [0.003]
<i>Later Events</i>	+/-	-0.061*** [0.003]	-0.143*** [0.005]	-0.137*** [0.006]
Other Banks (*)				
<i>Overall</i>	+/-	-0.022*** [0.001]	-0.025*** [0.015]	-0.022*** [0.001]
<i>Early Events</i>	+/-	-0.014*** [0.001]	-0.017*** [0.001]	-0.014*** [0.001]
<i>Later Events</i>	+/-	-0.026*** [0.001]	-0.029*** [0.002]	-0.026*** [0.002]

(*) These banks belong to other geographical areas extra Europe, such as US, China, India, South Korea, Japan and Australia
Early Events correspond to the Event_1 and Event_2
Later Events correspond to the Event_3, Event_4, Event_5 and Event_6

Table 4
(continued)

Panel B. Market Reactions of the European Banks to Each QE Programme Announcement						
	Events Period	Description	Predicted Sign	CARS (-1,+1)	CARS (-2,+2)	CARS (-1,+3)
1	January 22nd 2015	QE program has been announced on January 22nd 2015.	+/-	-0.016*** [0.026]	-0.016*** [0.003]	-0.016*** [0.002]
2	March 3rd 2015	QE program starts for the first time on March 5th 2015. This program consists in purchasing assets for a monthly amount corresponding to € 60 billion.	+/-	-0.043*** [0.003]	-0.064*** [0.005]	-0.072*** [0.005]
3	April 15th 2015	ECB approves amendments to the initial list of agencies located in the Euro area issuing securities that are eligible for the PSPP.	+/-	-0.049*** [0.005]	-0.096*** [0.011]	-0.105*** [0.012]
4	March 10th 2016	ECB announces the Corporate Sector Purchase Programme (CSPP) (Not banking corporate bonds); an increase of APP monthly purchases corresponding to € 80 billion.	+/-	-0.064*** [0.006]	-0.138*** [0.011]	-0.125*** [0.012]
5	April 21st 2016	First monthly assets purchase of € 80 billion in APP. Furthermore, The Eurosystem starts to buy corporate sector bonds under the corporate sector purchase programme (CSPP) on 8 June 2016.	+/-	-0.067*** [0.007]	-0.161*** [0.011]	-0.148*** [0.012]
6	July 22nd 2016	The APP (or QE) is intended to be carried out until December 2017	+/-	-0.062*** [0.007]	-0.175*** [0.011]	-0.168*** [0.012]

Table 5. Results of Cross-Sectional Analyses of the Hypothesis 2 & Hypothesis 3

	All Banks & All Event Windows			All Banks & All Event Windows			All Banks & All Event Windows		
	CARS (-1,+1) -0.001* [0.0007] 0.262*** [0.058]	CARS (-1,+1) -0.0002 [0.0007] 0.236*** [0.060]	CARS (-1,+1) 0.0004 [0.007] 0.236** [0.060]	CARS (-2,+2) -0.0002 [0.001] 0.142 [0.106]	CARS (-2,+2) 0.002 [0.001] 0.128 [0.112]	CARS (-2,+2) 0.002 [0.001] 0.128 [0.112]	CARS (-1,+3) 0.001 [0.001] 0.259* [0.111]	CARS (-1,+3) 0.003* [0.001] 0.193 [0.118]	CARS (-1,+3) 0.002 [0.001] 0.192 [0.118]
Tier1									
LiquidASS/TA									
Customer Loans Exposure									
Loans/TA									
Asset Growth									
RWA									
GDP Growth									
Leverage									
Size (log of TA)									
Pre-existing Liquidity Regulation									
Not well-cap banks									
Intercept									
Nr obs									
R-squared									
Prob>F									