Central bank liquidity policy and the cross-section of bank equity returns

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Abstract

This paper examines abnormal bank equity returns around the announcement and implementations of the largest central bank liquidity operations to date. Those were conducted by the European Central Bank (ECB) at the height of the sovereign debt crisis in 2011 and 2012. I find that banks in countries perceived as being relatively riskier at the time experienced larger positive abnormal equity returns. Relating country-level abnormal returns to country-level liquidity uptake shows that banks with higher liquidity uptake profit disproportionately more from larger returns over this period. This provides evidence that the ECB alleviates stress in the euro area through the provisioning of relatively more liquidity to banks in riskier countries.

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1 Introduction

Since October 2008 the European Central Bank (ECB) has used a variety of unconventional monetary policy tools to respond to the financial and the European sovereign debt crisis. Among other measures the ECB has offered repeatedly supplementary repurchase agreements (repos) to Eurozone banks with durations exceeding those of conventional one-week and three-month repos. From 2008 to 2012 the ECB conducted 20 six-month, 4 one-year, and 2 three-year operations in addition to the regular operations.[1] Until today, the three-year operations are the largest bank-refinancing operations between the ECB and Eurozone banks.

This paper studies the impact of these three-year central bank repos on stock prices of Eurozone banks. Under the efficient market hypothesis, abnormal returns on Eurozone bank stocks should reflect the market's opinion of actual values. Compared to other studies the analysis in this paper is narrow in the sense that I focus exclusively on the three-year operations. The aim instead is to distinguish between the effects on bank equity in two particular ways, namely 1) separately for different countries within the Eurozone and 2) separately for the announcement and each of the two cash settlement dates.

Therefore, first, I analyze bank stock price reactions country-by-country across the Eurozone. Nyborg (2017) argues that the three-year operations served as an indirect bailout of financially stressed banks and sovereigns. Crosignani, Faria-e Castro, and Fonseca (2017) show that Portuguese banks use the liquidity uptake from the first three-year operation to buy high-yielding Portuguese government debt between the two operations and pledge these bonds as collateral with the ECB to take even more liquidity in the second three-year operation. This "collateral trade" suggests that the three-year funds flow from financially stressed banks to financially stressed sovereigns, as suggested by Nyborg (2017).[2] If, how-

[1] Woschitz (2017) provides a detailed overview of all such supplementary (or "extraordinary") operations studying them in the context of bank rollover costs.

[2] In this vein, Acharya and Steffen (2015) provide evidence that Eurozone bank risks in the period from 2007 to 2013 exhibit patterns similar to a large-scale bank carry trade behavior because bank equity returns load positively (negatively) on bond returns of peripheral countries (German government bond returns). The authors find that this carry trade behavior is stronger for banks with low capital ratios and

ever, the three-year operations help banks in more financially stressed countries relatively more one would also expect relatively larger positive abnormal bank equity returns in more financially stressed countries. Therefore, I examine the impact of the three-year repos on bank equity prices across banks separately for each of the 12 Eurozone countries in my sample.

Second, I differentiate between two "shocks" that the three-year repos entail. The first shock is the announcement of the extraordinarily long-dated duration of three years. The second shock is represented by the banks' large liquidity uptake in the aggregate.[3] I separate the effects of the announcement from those of the cash settlements. The announcement and the large uptake in the first three-year transaction are expected to shock the stock market while the large uptake in the second operation – more than two months after the first cash settlement – should be incorporated into the banks' stock prices and no longer produce abnormal returns.

The data for the event study is downloaded from Thomson Reuters Datastream. In the main setup I estimate abnormal returns for 89 listed Eurozone banks across 12 different countries using a standard market model as described in MacKinlay (1997) and country-level total market return indices. Abnormal returns are then added up to cumulative abnormal returns over different event windows and averaged across banks within a country. To better understand the abnormal return correlation structure I assess statistical significance with several test statistics (Brown and Warner 1980, Boehmer, Musumeci, and Poulsen 1991, Kolari and Pynnönen 2010).[4]

The ECB's three-year liquidity operations came at the height of the European sovereign

high risk-weighted assets which supports the risk-shifting hypothesis (see, e.g., Diamond and Rajan 2011).

[3]In standard three-month transactions roughly 100 to 300 banks bid for aggregate amounts between EUR 15 and 70 billion. In the two three-year operations at least 800 counterparties bid for an aggregate amount of, in total, more than EUR 1,000 billion (these numbers are from Woschitz 2017, Table 1).

[4]As pointed out by Aït-Sahalia, Andritzky, Jobst, Nowak, and Tamirisa (2012), using event studies has a number of advantages. The estimation is relatively simple, gives an immediate response on a short-horizon estimate for the market reaction, and avoids specification issues in the underlying model. However, disadvantageous is that the estimated effects do not necessarily measure direct causality. Furthermore, there is the obvious trade-off between narrow and wide windows. Narrow windows exclude potential colluding effects but might miss potentially delayed or anticipated reactions of market participants. The latter I address by calculating cumulative abnormal returns over several different event windows.

debt crisis end of 2011 and beginning of 2012. The countries which suffered the most and were perceived as being the most risky ones from a financial perspective at the time were the more peripheral countries. The non-peripheral countries suffered less regarding their financial situation during that time. Therefore, it is interesting to analyze abnormal bank equity returns by comparing banks in peripheral countries to those in non-peripheral countries. In my sample, peripheral countries include Cyprus, Greece, Italy, Portugal, and Spain, and non-peripheral countries are covered by Austria, Belgium, Finland, France, Germany, Malta, and the Netherlands.

I summarize the main results by focusing on countries with at least four banks in the sample.[5] Over the announcement of the three-year operations and using the Brown and Warner (1980) test statistic I find positive cumulative abnormal returns of between 4.0% in Italy and 15.3% in Spain in the peripheral countries that are statistically different from zero at the 10% significance level over different event windows.[6] In comparison, cumulative abnormal returns statistically different from zero in financially less stressed, non-peripheral countries are negative and range from −4.9% in Austria to −3.1% in the Netherlands. Using the more conservative test statistic developed by Kolari and Pynnönen (2010), which explicitly controls for cross-correlation of bank equity returns, leaves one cumulative abnormal return in peripheral countries statistically different from zero (at 10% level), which is 11.7% in Spain.[7] The corresponding statistically significant cumulative abnormal returns in non-peripheral countries tend to be smaller and lie between −4.9% in Austria and 5.4% in Germany.

Similarly, over the first cash settlement (using the test statistic proposed by Brown and Warner 1980), in peripheral countries statistically significant cumulative abnormal returns, at the 10% level, lie between 4.4% in Italy and 16.0% in Portugal across different windows. In non-peripheral countries, Belgium is the only country with at least one cumulative

[5]For Malta, Greece, and Cyprus the sample includes only one bank each.

[6]The test statistic essentially builds an equally-weighted portfolio across banks within a country and evaluates statistical significance of these equally-weighted portfolio returns.

[7]However, cumulative abnormal returns of 4.0%, 6.3%, and 9.6% in Italy over different event windows have p-values of 11.3%, 11.4%, and 12.9%, respectively.

abnormal return (6.5%) statistically different from zero. Using the more conservative test statistic in the peripheral countries leaves one cumulative abnormal return, 2.3% in Spain, statistically different from zero at the level of 10%. One cumulative abnormal return, 16.0% in Portugal, however, has a p-value of 12.0%. Correspondingly, for non-peripheral countries, this test statistic leaves only one cumulative abnormal return, 1.9% in Finland, statistically significant (at the 5% level).

These findings provide evidence that banks in peripheral countries profit disproportionately more over the announcement and the first cash settlement of the three-year operations in terms of equity price increases than banks in non-peripheral countries. At the same time, estimates of country-level liquidity uptake reveal that the largest and second-largest uptakes, on a country-level, were made by Spanish and Italian banks, respectively.[8] For instance, I estimate the liquidity uptake of Spanish banks to be more than four times larger than the one by German banks. These findings are in line the ECB using large-scale liquidity provisioning to alleviate stress for banks in countries perceived as being riskier.

Perhaps not surprisingly, I find practically no abnormal equity returns over the second cash settlement. The large liquidity uptake in the first operation might have been unexpected by the market while the large uptake in the second operation – more than two months after the first operation – likely was not a surprise to the market anymore.

I perform a variety of robustness checks along the lines of Nyborg (2017) which confirm these findings. First, I use equally-weighted bank stock returns per country instead of the bank stock returns themselves. Second, I replace each country-level market index by the "STOXX Europe 600". And third, I replace the equally-weighted portfolios or bank stock-level returns by country-level bank indices. The findings remain qualitatively the same.

This paper relates to the literature in several ways. First, there is a large literature on moral suasion or financial repression (see, e.g., Battistini, Pagano, and Simonelli 2014,

[8]The data is collected from Bruegel (see Pisani-Ferry and Wolff 2012) and the webpages of the Eurosystem's national central banks.

Reinhart and Sbrancia 2015, De Marco and Macchiavelli 2016). Translated to the context of this paper, the argument is that banks are urged by financially stressed governments to take liquidity from the ECB and use it to purchase domestic sovereign debt. Later the news have started to refer to this idea as the "Sarko trade" because the French President, Nicolas Sarkozy, while referring to the three-year LTROs explained that "[t]his means that each state can turn to its banks, which will have liquidity at their disposal."[9] The finding that banks from relatively riskier countries profit abnormally in terms of bank equity returns, however, is not consistent with this argument. If a bank, supposedly being a profit maximizer, buys government debt not because it is optimal but it is urged to do so by the government, it strictly speaking erods equity value. Consequently, if the market thinks moral suasion is a major force around the three-year liquidity operations the bank's equity price should fall and especially so for banks in more financially stressed countries. This paper, however, documents the opposite: The stock prices of banks from riskier countries outperform those of banks from less risky countries.

Second, the paper generally relates to the literature that examines the impact of unconventional monetary policy measures on equity prices of banks. Close to this study, Nyborg (2017) investigates the influence of the announcement of the large-scale asset purchase programs (September 4, 2014) on bank equity across Eurozone countries. He finds that especially banks in peripheral Eurozone countries experience positive abnormal equity returns. My analysis distinguishes itself from that of Nyborg (2017) by assessing the three-year operations instead of the asset purchase program. Fiordelisi, Galloppo, and Ricci (2014) analyze the effects of both conventional and unconventional policy actions on the interbank credit market, the stock market, and the banking sector. While conventional measures tend to be more effective on the interbank market, unconventional measures have a larger impact on the stock market. Ricci (2015) studies the impact of ECB announcements in general on a sample of 28 European banks from 2007 to 2013. She finds that unconventional measures have a stronger impact than conventional actions and that

[9]See FT Alphaville article: "How big could the Sarko trade go?" (Dec. 15, 2011) by Joseph Cotterill.

especially risky banks with low capitalization react most sensitively to policy interventions.

1.1 The broader related literature

Other event studies investigate the impact of unconventional (and conventional) central bank measures in a broader spectrum. Aït-Sahalia, Andritzky, Jobst, Nowak, and Tamirisa (2012) categorize a number of different policy actions in the US, UK, Eurozone, and Japan from 2007 to 2009 and examine their individual effects on interbank risk premia. They find that interest rate cuts and bank recapitalizations are strong drivers for positive market responses but do not find strong evidence that liquidity support relieved pressure on the interbank market. Lambert and Ueda (2014) determine the impact of unconventional monetary policy on announcement dates between 2000 and 2012 on bank stock returns and changes in yield spreads in the US, Euro area, and the United Kingdom. Using one-year-ahead futures of the three-month Eurodollar and Euribor rates as measures of the surprise element of monetary policies (see Bernanke and Kuttner 2005) for the US and the Euro area, respectively, they find no significant effect for bank stock returns in the US but a positive effect in the Euro area after September 2008. Haitsma, Unalmis, and de Haan (2016) examine the reaction of stock markets to policies of the ECB from 1999 to 2015 and find that especially unconventional monetary policy actions affect stock prices. Furthermore, they find evidence of a credit channel, notably during the crisis period, to which highly levered firms are most sensitive. Falagiarda and Reitz (2015) identify more than 50 unconventional monetary policy events by the ECB and investigate their effect on sovereign spreads of peripheral countries relative to Germany from 2008 to 2012. They find that the unconventional measures reduced long-term government bond yields in all peripheral countries except Greece whereby events in the period 2010 to 2012, the Securities Markets Programme, and the Outright Monetary Transactions had a strong impact.

Different methodologies are used to assess unconventional policy measures. Rigobon and Sack (2004) address the problem of endogeneity when estimating the impact of monetary policy to different asset prices and propose to use a heteroskedasticity estimator

for variance increases. Kholodilin, Montagnoli, Napolitano, and Siliverstovs (2009) apply the heteroskedasticity approach by Rigobon and Sack (2004) and show that the ECB's monetary policy has differential effects on sectoral stock market indices in the Eurozone. Eser and Schwaab (2016) use a time series panel regression model to estimate the yield impact of the Securities Markets Programme in five Eurozone sovereign bond markets. The authors show that bond yield volatility and tail risk are reduced on intervention days. Pelizzon, Subrahmanyam, Tomio, and Uno (2016) investigate the market liquidity depending on credit risk in the European sovereign debt markets using a vector autoregression setting. They argue that sovereign credit risk dynamically drives market liquidity. This link of market makers' liquidity provision to credit risk weakens with the three-year repo announcement in December 2011. Interestingly, their model estimates that the most likely structural break date is December 21, 2011, which represents the auction date of the first three-year transaction studied in this paper. Saka, Fuertes, and Kalotychou (2015) study Eurozone fragility by analyzing Draghi's famous "whatever it takes" speech. The authors use principal component and event study methodology to show that after the speech the perceived default risk commonality has increased among peripheral and core Eurozone sovereigns.

Most event studies on monetary policy actions focus on the US. For example Yin and Yang (2013) find that on the US market large and badly capitalized banks as well as banks relying more on interbank liquidity react more strongly to unexpected interest rate changes. Bernanke and Kuttner (2005) use a technique proposed by Kuttner (2001) to distinguish expected from unexpected policy actions based on changes in Federal funds futures. They show that an unexpected 25bp cut in the Federal funds rate increases broad stock indices by 1%. Gagnon, Raskin, Remache, and Sack (2011) study large-scale asset purchases in the US and provide evidence that these led to long-lasting reductions in longer-term interest rates not only on securities that are bought in the purchase programs. Krishnamurthy and Vissing-Jorgensen (2011) apply an event study to evaluate the effect of the Fed's Quantitative Easing programs QE1 and QE2 on interest rates. They identify and

separate different channels through which the bond purchase programs affect interest rates. Swanson (2011) studies the effect of Operation Twist in the context of QE2 on long-term interest rates. The author finds that the effects on longer-term treasury yields are about 15 basis points while the effects on longer-term agency and corporate bonds are smaller. Glick and Leduc (2012) study large-scale asset purchases by the Federal Reserve and the Bank of England since 2008 and find that announcements about purchases lowered long-term interest rates through a signaling channel about future growth. Kontonikas, MacDonald, and Saggu (2013) examine US stock returns after changes in Federal funds futures between 1989 and 2012. They show that in contrast to the crisis period, where stocks do not react to Federal funds rate cuts, they positively respond in the non-crisis period.

The paper proceeds as follows. Section 2 provides an overview of the three-year operations in the context of the ECB's monetary policy. Section 3 presents the data and summary statistics, Section 4 the technicalities of the estimation approach, and Section 5 the results. Section 6 concludes.

2 Overview of the institutional setting

This section provides an overview of the ECB's monetary policy tools relevant to the study and the modalities of the three-year operations including estimates of country-level liquidity uptake.

2.1 The ECB's monetary policy

Conventional liquidity-injecting monetary operations of the ECB are divided into open market operations and a standing facility. Main refinancing operations (MROs) and longer-term refinancing operations (LTROs) are the two main types of open market operations that allow the ECB to inject liquidity against collateral provided by the counterparty. MROs and LTROs are implemented on a recurring basis (MROs weekly, LTROs monthly) for a pre-specified duration (MROs one week, LTROs traditionally three months) in the

form of reverse transactions.

Before October 7, 2008, when a bank applied for a MRO or LTRO loan it participated in an auction with the ECB by providing the interest rate it is willing to pay for a certain amount of liquidity (variable rate tender). The aggregate amount that the ECB offered to Eurozone banks was limited ("liquidity neutral period", see Nyborg, Bindseil, and Strebulaev 2002, Fecht, Nyborg, and Rocholl 2011) to what banks, in the aggregate, need to fulfill reserve requirements.[10] In the aftermath of Lehman Brothers collapse on September 15, 2008, the ECB replaces, as of October 8, 2008, its variable-rate liquidity neutral system with a fixed-rate full allotment system. Essentially this means that banks, if they provide sufficient collateral, receive as much liquidity from the Eurosystem as they want at the policy rate, which is fixed by the ECB.

As of October 2008, the ECB also starts to conduct different types of unconventional monetary policy measures (see, e.g., Cour-Thimann and Winkler 2013, Nyborg 2017, for comprehensive overviews on such unconventional measures). One unconventional measure used repeatedly over a four-year period is the offer of additional repos with extended durations. Woschitz (2017) provides an overview of these supplementary (or "extraordinary") repos. Over the four-year period from 2008 to 2012 the ECB offers additionally to its standard three-month LTROs "extraordinary LTROs" with durations of six months, one year, and three years. Over this four-year period the ECB holds in total 20 six-month, 4 one-year, and 2 three-year LTROs.[11]

[10] As explained by European Central Bank (2002) other autonomous factors can also play a role in determining the allotment size.

[11] Notice that the ECB has also implemented so-called "Targeted LTROs" (TLTROs) with durations of even four years. TLTROs are special in the sense that, compared to other "extraordinary LTROs", the bank that receives the liquidity in such a repo is obliged to lend it to the private sector with the ECB monitoring this process.

2.2 The three-year LTROs and liquidity uptake

The ECB announces the three-year LTROs on December 8, 2011, officially as a measure to "support bank lending and liquidity in the euro area money market."[12] However, on December 1, 2011, a few days before the official press release, the ECB President, Mario Draghi, gives a speech to the European Parliament where he emphasizes the ECB's awareness of banks' maturity mismatches and stressed bank funding.[13] On that day an article in the Financial Times states that Draghi's speech is interpreted by the markets as indication of the ECB to expand the Securities Markets Programme or to announce three-year ECB loans.[14] The event study takes this pre-announcement into account by widening the event window to $[-7, 7]$ days where, in trading days, "-5" represents December 1, 2011.

The modalities of the three-year LTROs are the same for all banks with access to Eurosystem liquidity operations. Interest is to be paid at maturity. The rate is fixed at the MROs' retrospective average rate over the respective time period (three years). On the announcement day the MRO rate was at 1%. The three-year LTROs include an option for early repayment after one year. Furthermore, after the first year and if the counterparties inform the respective national central bank one week ahead they are allowed to repay (fully or partly) the alloted amounts on days coinciding with MRO settlements (every week). Counterparties are also allowed to transfer the outstanding amounts from the earlier conducted one-year LTRO (October 2011) into the first three-year LTRO.

The liquidity uptake is extraordinarily large in the three-year LTROs (see Crosignani, Faria-e Castro, and Fonseca 2017). In the two operations with cash settlement dates on December 22, 2011 and March 1, 2012, a total of 523 and 800 banks take EUR 489.2 and 529.5 billion, respectively. The uptake in the first three-year LTRO includes EUR 45.7

[12] See ECB press release, December 8, 2011: "ECB announces measures to support bank lending and money market activity", https://www.ecb.europa.eu/press/pr/date/2011/html/pr111208_1.en.html.

[13] See FT Alphaville article by Izabella Kaminska, December 1, 2011: "Draghi: 'We are aware of the scarcity of eligible collateral'," https://ftalphaville.ft.com/2011/12/01/775341/draghi-we-are-aware-of-the-scarcity-of-eligible-collateral/?mhq5j=e2.

[14] See Financial Times article by Ralph Atkins, December 1, 2011: "Draghi hints at eurozone aid plan," https://www.ft.com/content/87b3db16-1bfc-11e1-9631-00144feabdc0?mhq5j=e3 (see also Krishnamurthy, Nagel, and Vissing-Jorgensen 2015).

billion that are transferred from the one-year LTRO conducted in October 2011. Aggregate net uptake in the week of the first (second) operation amounts to EUR 210.0 (254.9) billion. Aggregate net uptake is substantially lower because banks substitute maturing MRO and standard three-month LTRO liquidity by three-year LTRO liquidity.[15]

Uptake in the three-year LTROs is unfortunately not publicly available on a country-level basis. However, some of the Eurosystem's national central banks provide statistics on MRO and LTRO liquidity outstanding on a monthly basis as collected by Bruegel (see Pisani-Ferry and Wolff 2012). The position "LTRO" includes both standard outstanding three-month and extraordinary three-year liquidity. Unfortunately, the national central banks provide these figures in different formats (see Woschitz 2017, for details). To provide estimates on LTRO liquidity uptake I follow the procedure in Woschitz (2017) and calculate a monthly average of outstanding MRO and LTRO liquidity for each country for which the national central bank provides these statistics separately for MRO and LTRO liquidity.[16] A monthly estimate of liquidity uptake from month m to month $m+1$ can then be calculated by subtracting average outstanding liquidity in month m from that in month $m+1$.

Table 1 estimates net liquidity uptake in MROs, LTROs, and in total over the two cash settlements of the three-year LTROs for those countries providing the respective figures separately. Panel A provides outstanding liquidity end of October 2011 and liquidity uptake from beginning of November 2011 to end of January 2012 as well as from beginning of February to end of April 2012, two periods which span over the first and second three-year LTRO cash settlements, respectively. Numbers are in million EUR. Countries are sorted according to LTRO uptake over the first cash settlement (in the period November 2011 to January 2012). Panel B calculates the percentage changes on outstanding liquidity end of October 2011 and January 2012.

Insert Table 1 here.

Panel A shows that in most countries banks substitute MRO by LTRO liquidity. Two

[15]These numbers are from the European Central Bank (2012)'s Monthly Bulletin, March 2012.

[16]For the Netherlands, Cyprus, and Malta only total outstanding liquidity is publicly available. The total position is not separated into MRO and LTRO liquidity outstanding.

special cases, Ireland and Greece, actually reduce LTRO and even total borrowing over the cash settlements of both three-year LTROs. The largest uptakes over the first cash settlement period are taken by banks in Spain (EUR 112.0 bn), Italy (EUR 94.2 bn), France (EUR 68.6 bn), and Germany (EUR 24.2 bn). Notice that the aggregate uptake in Spain is more than four times larger than the one in Germany. The order of net uptake in MROs and LTROs for the four largest economies is the same with net uptake of EUR 160.2 bn in Spain, EUR 112.6 bn in Italy, EUR 36.6 bn in France, and EUR 30.3 bn in Germany. The same order holds over the period of the second cash settlement with slightly different numbers.

Panel B shows that in relative terms banks in Austria and Belgium increase their LTRO position by 125.8% and 169.2%, respectively. Relatively speaking this is more than what French banks take in the aggregate (107.3%). However, both Austrian and Belgium banks have with EUR 3.1 and 6.7 bn relatively little outstanding LTRO liquidity end of October 2011 (see Panel A). Portuguese banks increase LTRO liquidity only by 16.6% and 34.2% over the period of the first and second cash settlements, respectively. Portuguese banks in the aggregate, however, have EUR 32.8 bn outstanding LTRO liquidity end of October 2011, which is roughly 1.7 times as much as the aggregate of German banks. Relatively speaking Finland shows the largest uptake of 2,096.2% over the first cash settlement, which results from the small EUR 0.1 bn outstanding LTRO liquidity end of October 2011.

Overall, these numbers provide evidence that, controlling for country size and outstanding liquidity end of October 2011, in particular the peripheral Eurozone countries make use of the three-year LTROs.

3 Data and summary statistics

I use daily equity returns from Thomson Reuters Datastream. The unfiltered data covers 130 banks from 15 out of the 19 Eurozone countries: Austria (4 banks), Belgium (4), Finland (7), France (32), Germany (23), Luxembourg (1), Malta (3), Netherlands (6),

Greece (4), Ireland (1), Italy (28), Portugal (4), Slovenia (1), Spain (11), and Cyprus (1).[17] I keep banks only if the full return series from -192 business days before the announcement of the three-year LTROs (December 8, 2011) to 7 business days after the second cash settlement (March 1, 2012) is available. This covers the time period from March 15, 2011 to March 12, 2012 (260 business days). I lose 2 Spanish banks because their time-series start only as of July 20 and 21, 2011. Furthermore, I drop banks with more than 35 zero return days ($\approx$ 13.5% of the 260 total business days) in an attempt to balance the overly loss of banks versus keeping too many whose equity does not trade.[18] Due to this filter I lose Ireland and Luxembourg (1 bank each) as well as a total of 38 banks located in Finland (3 banks), France (14), Germany (10), Greece (3), Italy (2), Malta (2), Netherlands (1), and Spain (3). Finally, I exclude Slovenia (1 bank) from the analysis because I have not found a Slovenian bank index in Datastream that trades well over the respective time period. Therefore, the final bank sample consists of 89 banks in 12 countries observed on 260 business days (23,140 bank-day observations), whereby each security trades on at least 225 days (86.5% of the 260 total business).

For each country in the bank sample I download a total market as well as a total bank return index from Datastream.[19] I work with the following total *market* return indices (by country):

> "ATX" (Austria), "BEL 20" (Belgium), "OMX Helsinki" (Finland), "CAC 40" (France), "DAX 30" (Germany), "STOXX Malta", "AEX all-share" (Netherlands), "ATHEX" (Greece), "FTSE MIB" (Italy), "PSI all-share" (Portugal), "IBEX 35" (Spain), and "STOXX Cyprus". In robustness checks I use the overall European Union index "STOXX Europe 600".

For further robustness checks I use the following total *bank* return indices:

[17] The raw sample does not contain banks from the Eurozone countries Latvia, Slovakia, Estonia, and Lithuania.

[18] Notice that zero return days can also be country specific holidays, for instance, where trading does not take place because an exchange is closed.

[19] In line with the literature, I use the total return index as the main return variable since it accounts for potential dividend payments which would be re-invested at the closing price on the ex-dividend date.

"FTSE Austria Banks", "FTSE Belgium Banks", "NOMXH Banks (Finland)", "FTSE France Banks", "FTSE Germany Banks", "Malta-DS Banks", "Netherland-DS Banks", "FTSE Greece Banks", "FTSE Italia all-shr Banks", "FTSE Portugal Banks", "FTSE Spain Banks", and "Cyprus-DS Banks".

Summary statistics: Table 2 provides summary statistics by country. Panel A shows descriptive statistics for the bank equity return sample. For Malta, Greece, and Cyprus the sample contains only one bank. Italy exhibits with 26 banks the maximum number of banks per country followed by France (18 banks) and Germany (13). Over the total 260 business days the maximum percent of zero returns is observed in Greece with 10.77% followed by France (7.54%) and Austria (7.40%). The same statistic for the three [-7,7] event windows shows that Austria exhibits with 13.75% the maximum percent of zero returns in the sample followed by Greece with 12.50%.[20] On average, bank equity returns are negative in all countries except for Malta (4 bps). The lowest average is observed in Greece with -37 bps. Spanish banks exhibit both the minimum (-28.38%) and maximum (40.38%) return over the sample period. The second highest minimum return is held by the Greek bank (-28.02%) and the second highest maximum by an Italian bank (33.17%). In the pooled sample as well as in most countries the median is zero or close to mean value which provides evidence that the bank equity returns are nicely behaved in terms of the normality assumption.

Insert Table 2 here.

Panel B shows summary statistics for equally-weighted bank equity return portfolios built across the banks in Panel A per country. For each country I now observe 260 business days out of which 40 business days belong to at least one event window used later on (see footnote 20). In total the sample comprises 3,120 country-day observations. For Malta,

[20]The event window figure includes days of all three event windows that I study later on. This figure therefore includes the [-7,7] = 15 business days around December 8, 2011, December 22, 2011, and March 1, 2012. This is a total of 45 business days. However, the sub-windows [3,7] from event one (December 8) and [-7,-3] from event two (December 22) overlap, which reduces the number of overall event days by 5 days. Thus, the figure discussed includes in total 40 event days.

Greece, and Cyprus – with only one bank in the sample – values in Panel B are the same as in Panel A. Abstracting from those countries, the number of zero returns over the full sample period of 260 business days reduces drastically from between 2.60% (Belgium) and 7.54% (France) in Panel A to between 1.15% (Belgium, France, Germany, Netherlands, and Portugal) and 2.31% (Austria) in Panel B. The same observation is made for zero returns on business days that are included in at least one event window: zero returns reduce from between 2.50% (Belgium) and 13.75% (Austria) in Panel A to between 2.5% (Belgium, Finland, France, Germany, Netherlands, Italy, Portugal, and Spain) and 5% (Austria) in Panel B. For countries with more than one bank in the sample, Portugal provides the minimum and maximum observed return with -10.63% and 11.63%. Including countries with only one bank in the sample Greece leads this statistic (minimum: -28.02%, maximum: 29.52%) followed by Cyprus (minimum: -16.38%, maximum: 25.76%).

Panel C provides summary statistics for the market return indices for each country. Again, for each country I observe 260 business days out of which 40 business days belong to at least one event window. The last row in Panel C shows the summary statistics for the "STOXX Europe 600" index. The highest numbers of zero returns across the full 260 business days are observed in Malta with 11.54% followed by Austria with 4.62%. The non-peripheral countries exhibit zero returns of between 1.15% and 3.46%. Restricting the sample to days used in at least one event window, shows that the same two countries exhibit the highest percentage of zero return days: Malta with 17.50% and Austria with 7.50%. The non-peripheral countries exhibit percentages between 2.50% and 5.00%. Even the "STOXX Europe 600" index does not trade on 1.15% of the full 260 business days and 2.50% of days classified as event days. The mean returns are negative in all countries except for Germany.

Panel D shows summary statistics for the bank index sample that I use in robustness checks. Over the full 260 business days I observe between 0.00% (Netherlands) and 4.62% (Austria) zero returns. The same statistic for the 40 days classified as event days shows that zero returns make up for between 0.00% (Malta and Netherlands) and 7.50% (Austria)

of the observed event days. Across the full 260 sample days the mean return is negative in all countries.

4 Event Study: Methodology

I study the impact of the announcement and the two cash settlements of the three-year LTROs separately on end-of-day stock prices of Eurozone banks. Therefore, an important issue that this study has to deal with is the fact that I examine (cumulative) abnormal returns in a cross-section of bank stocks using only one event which is the same for the whole industry (banks). In this section I explain how I calculate (cumulative) abnormal returns and how I attempt to overcome this issue.

I estimate abnormal bank equity returns using the standard market model approach as lined out by MacKinlay (1997).[21] I set $t = 0$ as the event date (for each of the three events – the announcement and the two cash settlements – separately), the period T_0 to T_1 as estimation window, and T_2 to T_3 as event window. The abnormal return for bank i on date t is calculated as

$$AR_{i,t} = r_{i,t} - E[r_{i,t}|r_{m,t}], \tag{1}$$

where $r_{i,t}$ is the realized and $E[r_{i,t}|r_{m,t}]$ the expected return on bank stock i on date t. The latter term is estimated from a market model using the realized return on the market, $r_{m,t}$, with a regression model of the form

$$r_{i,t} = \beta_{i0} + \beta_{i1} r_{m,t} + \beta_{i2} r_{m,t-1} + \beta_{i3} r_{m,t+1} + \epsilon_{i,t}. \tag{2}$$

Adding lead and lag ($r_{m,t-1}$ and $r_{m,t+1}$) of the market index $r_{m,t}$ controls for non-synchronous trading. The market model is estimated individually per bank using the estimation window $[T_0, T_1] = [-192, -8]$.[22] The cumulative abnormal return for bank i is then calculated by

[21] For an extensive survey of event studies applied in the context of banking see Degryse, Kim, and Ongena (2009).

[22] In this case, this procedure to calculate $AR_{i,t}$ yields the same result as using both the estimation and

summing up the abnormal returns over the event window $[T_2, T_3]$,

$$CAR_{i,[T_2,T_3]} = \sum_{t=T_2}^{T_3} AR_{i,t}. \tag{3}$$

As I am interested in the impact of the three-year LTROs on bank equity on a country-level I average both abnormal and cumulative abnormal returns across banks within a country,

$$AR_{c,t} = \frac{1}{N_c} \sum_{i=1}^{N_c} AR_{i,t} \quad \text{and} \quad CAR_{c,[T_2,T_3]} = \frac{1}{N_c} \sum_{i=1}^{N_c} CAR_{i,[T_2,T_3]}, \tag{4}$$

where N_c is the number of banks in country c. I show estimated $CAR_{c,[T_1,T_2]}$ not only for the full event window $[T_2, T_3] = [-7, 7]$ but also for shorter windows $[0, 1]$, $[0, 3]$, $[-1, 1]$, $[-1, 3]$, $[-3, 3]$, and $[-5, 5]$ to evaluate the effect of each event in more detail.[23] I evaluate economic magnitudes using these definitions of (cumulative) abnormal returns.

To assess statistical significance of the (cumulative) average abnormal returns I rely on two established test statistics. First, I use the crude dependence adjustment (CDA) test by Brown and Warner (1980). This test statistic accounts for cross-correlations of abnormal returns by calculating the standard deviation on country-level abnormal returns across days in the estimation window. The test statistic for the country-level abnormal return on date t is calculated as

$$t_{BW,AR_{c,t}} = \frac{AR_{c,t}}{S_{AR_c}}, \tag{5}$$

where

$$S_{AR_c} = \sqrt{\frac{1}{185-4} \sum_{t=T_0}^{T_1} (AR_{c,t} - \overline{AR_c})^2} \tag{6}$$

the event window and running the regression $r_{i,t} = \beta_{i0} + \beta_{i1} r_{m,t} + \beta_{i2} r_{m,t-1} + \beta_{i3} r_{m,t+1} + \sum_{k=T_2}^{T_3} \gamma_{i,k} \delta_{i,k,t} + \epsilon_{i,t}$, where $\delta_{i,k,t}$ is an indicator variable for date k. Each of these 15 indicator variables takes on the value 1 on one of the 15 days in the event window and is zero on the other days. The coefficient $\gamma_{i,k}$ measures the abnormal return on day k.

[23] A short event window has the advantage of minimizing effects of confounding events (Degryse, Kim, and Ongena 2009). However, it runs the risk to miss the effect of complex information that requires time to be incorporated in stock prices (Gagnon, Raskin, Remache, and Sack 2011).

and $\overline{AR_c}$ is the average abnormal return across daily observations in the estimation window.[24] The term $185 - 4$ subtracts the number of parameters estimated in Eq. 2 from the number of daily observations in the estimation window.[25] The test statistic for cumulative abnormal returns is calculated as

$$t_{BW,CAR_{c,[T_1,T_2]}} = \frac{CAR_{c,[T_1,T_2]}}{\sqrt{(T_3 - T_2)}\ S_{AR_c}}. \tag{7}$$

This procedure is one way to control for cross-correlation. Brown and Warner (1980) show that their test statistic is robust to event-induced changes in variance. Harrington and Shrider (2007) demonstrate that cross-sectional variation in the abnormal returns always produces event-induced variance. Not controlling for it renders the independence assumption for the abnormal returns incorrect and may lead to over-rejections of the null hypothesis for zero abormal returns (Kothari and Warner 2007). However, I examine (cumulative) abnormal returns in a cross-section of bank stocks using only one event which is the same for the whole industry (banks). The Brown and Warner (1980) test statistic does not explicitly control for this type of cross-correlation.

The second test statistic used is developed by Kolari and Pynnönen (2010). The authors propose a correction term (which controls explicitly for cross-correlation) to the test statistic developed by Boehmer, Musumeci, and Poulsen (1991). The latter test statistic is based on standardized abnormal returns as proposed by Patell (1976). The Patell (1976) test statistic standardizes abnormal returns by the regression residual standard deviation and a correction term to reduce the weight of more volatile observations (forecast error), as

$$SAR_{i,t} = \frac{AR_{i,t}}{S_{AR_{i,t}}}, \tag{8}$$

[24]Notice that using the Brown and Warner (1980) test statistic to assess statistical significance in the bank stock sample is in this case very similar to first averaging bank equity returns into an equally-weighted portfolio per country, running the market model on the country-level (essentially this is one regression per country), and assessing the statistical significance of $AR_{c,t}$ with a simple t-test in this sample.

[25]The statistic is Student-t distributed with $T - 4$ degrees of freedom under the null hypothesis of zero abnormal returns (see Serra 2002).

where

$$S^2_{AR_{i,t}} = S^2_{AR_i}\left(1 + \frac{1}{185} + \frac{(r_{m,t} - \overline{r}_m)^2}{\sum_{t=T_0}^{T_1}(r_{m,t} - \overline{r}_m)^2}\right), \tag{9}$$

and

$$S^2_{AR_i} = \frac{1}{185 - 4}\sum_{t=T_0}^{T_1} AR^2_{i,t}. \tag{10}$$

The term $\overline{r}_m$ represents the mean of the market returns in the estimation window and the term in brackets is the forecast error. Using this approach of standardized abnormal returns, Boehmer, Musumeci, and Poulsen (1991) estimate a cross-sectional standard deviation on the event day which then controls for event-induced changes in variance. The authors propose the test statistic

$$z_{BMP,ASAR_{c,t}} = \frac{\sqrt{N_c}\ ASAR_{c,t}}{S_{ASAR_{c,t}}} \tag{11}$$

where $ASAR_{c,t}$ is defined as the average of the standardized abnormal returns, $SAR_{i,t}$, across the N_c banks in country c for date t,

$$ASAR_{c,t} = \frac{1}{N_c}\sum_{i=1}^{N_c} SAR_{i,t}, \tag{12}$$

and its standard deviation as

$$S_{ASAR_{c,t}} = \sqrt{\frac{1}{N_c - 1}\sum_{i=1}^{N_c}\left(SAR_{i,t} - \frac{1}{N_c}\sum_{l=1}^{N_c} SAR_{l,t}\right)^2}. \tag{13}$$

Notice that standardized (cumulative) abnormal returns are only used to assess statistical (not economic) significance.[26] Boehmer, Musumeci, and Poulsen (1991)'s test statistic for standardized cumulative abnormal returns is defined as

$$t_{BMP,CAR_{c,[T_1,T_2]}} = \frac{CSAR_{c,[T_2,T_3]}}{S_{CSAR_{c,[T_2,T_3]}}} \tag{14}$$

[26]Standardized (cumulative) abnormal returns have less meaningful interpretation than their non-standardized counterparts (see Kolari and Pynnönen 2010).

where bank-level standardized abnormal returns are cumulated over the event window,

$$CSAR_{i,[T_2,T_3]} = \sum_{\tau=T_2}^{T_3} SAR_{i,t}, \tag{15}$$

and the cross-sectional average is calculated as the average of the bank-level standardized cumulative abnormal returns across the N_c banks in country c,

$$CSAR_{c,[T_2,T_3]} = \frac{1}{N} \sum_{i=1}^{N_c} CSAR_{i,[T_2,T_3]}. \tag{16}$$

The standard deviation of $CSAR_{c,[T_2,T_3]}$ is estimated from the cross-section of event-window standardized cumulative abnormal returns as

$$S_{CSAR_{c,[T_2,T_3]}} = \sqrt{\frac{1}{N_c(N_c-1)} \sum_{i=1}^{N_c} \left(CSAR_{i,[T_2,T_3]} - CSAR_{c,[T_2,T_3]}\right)^2}. \tag{17}$$

Boehmer, Musumeci, and Poulsen (1991) provide evidence that their test statistic is comparable in size to the one of Brown and Warner (1980) but has more power. If the event has an effect on the variances, Boehmer, Musumeci, and Poulsen (1991)'s test statistic controls for the variance change by cross-sectionally estimating the average of variance on the event day (Kolari and Pynnönen 2010). Otherwise it collapses into the Patell (1976) test statistic.

However, the Boehmer, Musumeci, and Poulsen (1991) test statistic does not control for cross-correlation. Thus, I make use of the Kolari and Pynnönen (2010) correction that adjusts Boehmer, Musumeci, and Poulsen (1991)' test statistic and controls for both event-induced changes in variance and cross-correlation. Based on Boehmer, Musumeci, and Poulsen (1991), Kolari and Pynnönen (2010) propose the test statistic

$$t_{KP,ASAR_{c,t}} = z_{BMP,ASAR_{c,t}} \times \sqrt{\frac{1-\overline{r}}{1+(N_c-1)\overline{r}}}, \tag{18}$$

which corrects Boehmer, Musumeci, and Poulsen (1991)'s test statistic with the term

under the square root. $\bar{r}$ is the average of the sample cross-correlation of residuals in the estimation period. Under the assumption that the square-root rule holds for the standard deviation of different return periods, statistical significance of cumulative abnormal returns can be assessed using the same adjustment to Boehmer, Musumeci, and Poulsen (1991)'s cumulative abnormal return test statistic (see Kolari and Pynnönen 2010).

5 Event Study: Results

In this subsection I present the event study results. First, I compare average abnormal returns on event days to those on non-event days. Second, I discuss cumulative abnormal returns that are calculated over different event windows. Third, I assess the statistical significance of the cumulative abnormal returns in more detail. And fourth, I describe conducted robustness checks.

5.1 Average abnormal returns: Event versus non-event days

Table 3 shows the results of two-sample t-tests for equal means, Kruskal-Wallis χ^2-tests for equal medians, and variance-ratio F-tests for equal variances comparing event and non-event days as shown in Delaloye, Habib, and Ziegler (2012). Countries are classified into peripheral and non-peripheral countries. Each of the three panels provides sample means, medians, and standard deviations (given as percentages) as well as number of observations on event days and non-event days. For each event and each country the tests are based on $[-192, -8] = 185$ non-event days (estimation window) and $[-7, 7] = 15$ event days (event window).[27] Panel A shows these tests for the announcement of the three-year LTROs on December 8, 2011 and Panel B (Panel C) for the first (second) three-year LTRO cash settlement on December 22, 2011 (March 1, 2012). Test statistics and corresponding means, medians, and/or variances that are statistically significant at a level of at least 10% are

[27] Notice that the means of abnormal returns on non-event days across events and countries are zero. This feature comes from the fact that non-event days in the sample correspond to the days in the estimation window and by construction the abnormal returns must be zero due to the OLS procedure that I use to estimate the market model.

marked in bold. a, b, and c next to the test statistics denote significance at the levels of 1%, 5%, and 10%, respectively.

INSERT TABLE 3 HERE.

Panel A provides the results using the three-year LTRO announcement as the event day ($t = 0$). The results of the two sample t-tests show that in particular the peripheral countries profit in terms of average abnormal returns over the event window of $[-7, 7]$ days around December 8, 2011. The only exception is Greece (one bank). The Greek bank exhibits a daily average abnormal return over the 15 days event window of -2.72%. Abstracting from Greece, the daily average abnormal return for peripheral countries lies between 42.5 bps (Portugal) and 102.1 bps (Spain). In non-peripheral countries abnormal returns range from 6.0 bps (France) to 43.5 bps (Malta). The average abnormal returns of 102.1 and 63.8 bps on event days in Spain and Italy, respectively, are statistically different from those of 0.0 bps on non-event days at the significance levels of 5% and 1%. As seen in Table 1 Spanish and Italian banks also have the largest liquidity uptakes in both operations. Notice that in all countries (except Greece) the daily average abnormal returns are positive on event days showing that banks in all countries profit from positive abnormal returns on their equity. Peripheral banks (except for the Greek bank), however, profit on average more. The Kruskal-Wallis χ^2-tests for equal medians provide similar results both in terms of economic magnitudes and statistical significance except for Austria and Finland where abnormal returns on event days are statistically significantly higher compared to those on non-event days.

Panel B shows the results using the first cash settlement as the event day. Neither the two sample t-statistics nor the Kruskal-Wallis χ^2-statistics provide evidence for statistical significance. The only two countries with banks abnormally losing on their equity prices are the Netherlands and – as in Panel A – Greece. In all non-peripheral countries daily average abnormal returns on event days are larger than on non-event days. Abstracting from the Netherlands and Greece the average daily abnormal returns range from 7.4 bps

(Spain) to 64.7 bps (Cyprus, only one bank) in peripheral countries and from 3.6 bps (France) to 42.1 bps (Malta, only one bank) in non-peripheral countries. Even if in most countries banks profit abnormally from increased equity prices over the first cash settlement, banks in peripheral countries profit more (abstracting from Greece). Again, the Kruskal-Wallis χ^2-tests provide similar results both in terms of economic magnitudes and statistical significance.

Panel C shows the results using the second three-year cash settlement as the event day. As expected the results are mixed for the second cash settlement which is in line with the argument that the large uptake in the second three-year LTRO was less of a surprise for the market because of the large uptakes in the first three-year LTRO.

The results so far provide first evidence that in particular banks from peripheral countries profit in terms of abnormal returns on their equity and especially so over the announcement and first cash settlement.

5.2 Cumulative abnormal returns

This subsection shows country-level cumulative abnormal returns calculated as averages across cumulative abnormal returns of banks within a country (see Section 4). Notice that in this and the two consecutive subsections I use the acronym $CAAR$, instead of CAR_c, for "cumulative average abnormal returns" (country-level cumulative abnormal returns) to keep the reading flow. Figure 1 plots the results over the event window $[-7, 7]$ for the three different events separately. The three columns of subplots represent the three events (the announcement, the first cash settlement, and the second cash settlement), respectively, as indicated by vertical lines in each subplot. The vertical line at December 1, 2011 in the first column of subplots represents the ECB's first indication of large-scale help for Eurozone banks. Each line represents one country as indicated in the figure.

Insert Figure 1 here.

Panel A compares $CAARs$ of Germany, France, and the peripheral countries (except for

Greece) over the event window $[-7, 7]$ around the announcement date. All countries profit abnormally in terms of bank equity prices. However, banks in peripheral countries profit more than German and French banks. Panel B shows that bank equity performs similarly in other non-peripheral countries. German, French, and Finish bank stocks exhibit only small positive abnormal returns. The $CAARs$ in the Netherlands, Austria, Belgium, and Malta lie between the $CAARs$ in France (the minimum) and Spain (the maximum). Panel C shows that Greece (one bank) is a special case. The Greek bank loses abnormally over the announcement period of the three-year LTROs. Across all three panels $CAARs$ start to increase (except for Greece) as of December 1, 2011, which represents the first ECB statement about its awareness of banks' funding difficulties.

The subplots in the middle column show $CAARs$ over the event window $[-7, 7]$ around the first cash settlement. $CAARs$ develop similarly in Germany, France, Italy, and Spain. The middle column of subplots across panels shows no jump in $CAARs$ on the cash settlement day of the first three-year LTRO. However, the first cash settlement takes place on a Thursday. Stock prices of banks in Greece, Cyprus, and Portugal react abnormally from Monday to Tuesday the following week (2 and 3 business days after the cash settlement).

The third column of subplots provides the results for the second three-year cash settlement. Not surprisingly the results are rather unspectacular except for Cyprus, with the one sample bank exhibiting a large positive abnormal return on the cash settlement day. Furthermore, some of the non-peripheral countries show slightly increasing $CAARs$ but compared to the announcement and first cash settlement the positive $CAARs$ are negligibly small.

Table 4 provides the numbers for the full event window of $[-7, 7]$ days and six further sub-windows as indicated in the table. Panel A shows the results for the announcement of the three-year LTROs on December 8, 2011 and Panel B (Panel C) for the first (second) cash settlement on December 22, 2011 (March 1, 2012). Significance is evaluated using the test statistic proposed by Brown and Warner (1980), which is presented in brackets underneath the $CAARs$. $CAARs$ are marked in bold if significant at the level of at least

10%. a, b, and c next to the $CAARs$ denote significance at levels of 1%, 5%, and 10%, respectively. Numbers are given in decimals.

Insert Table 4 here.

Panel A reveals that positive abnormal returns are particularly high for banks in peripheral countries over the announcement period. As already seen in Figure 1 the only exception is Greece. The Greek bank exhibits $CAARs$ of -18.1% and -40.8% over the windows $[-1, 3]$ and $[-7, 7]$, respectively, which are statistically different from zero at significance levels of 5% and 10%. Abstracting from Greece, 8 out of the 28 $CAARs$ in peripheral countries are significant at the level of at least 5% (which respresents 28.6%). In terms of economic magnitudes significant $CAARs$ range from 4.0% in Italy to 15.3% in Spain over the windows $[-3, 3]$ and $[-7, 7]$, respectively. Looking at shorter windows, only the $CAARs$ of 5.3% and 7.1% in Portugal over the windows $[0, 1]$ and $[-1, 1]$, respectively, are significantly different from zero. In the non-peripheral countries $CAARs$ are significantly different from zero in 4 out of the 49 country-window combinations (8.2%) at significance levels of at least 10%. Statistically significant $CAARs$ range from -4.9% in Austria to -3.1% in the Netherlands over the windows $[0, 3]$ and $[-1, 3]$, respectively.

Panel B shows a similar picture for $CAARs$ around the first three-year cash settlement. In peripheral countries, $CAARs$ lie between 4.4% in Italy and 16.0% in Portugal over the window $[-5, 5]$ if they are statistically significant at levels of at least 10%. Across peripheral country-window combinations 5 out of the 35 $CAARs$ are statistically different from zero (14.3%). Across non-peripheral countries Belgium is the only country with at least one $CAAR$ (6.5% over the window $[-5, 5]$) statistically different from zero. Across all non-peripheral country-window combinations this represents 2.0%.

Panel C shows the results for the second three-year cash settlement on March 1, 2012. Not surprisingly significance in Panel C is absent. The only exception is Cyprus (one bank). As seen in Figure 1 the Cypriot bank profits abnormally on the day of the cash settlement itself. The $CAAR$ is 23.0% over the window $[0, 1]$ and statistically different

from zero at the significance level of 1%.

The results provide evidence that over the announcement and the first cash settlement periods first and foremost peripheral countries (with the exception of Greece) profit. According to statistically significant $CAARs$, non-peripheral countries even lose abnormally in terms of their equity prices over the announcement period. Furthermore, high $CAARs$ line up with relatively larger liquidity uptake as seen in Table 1. The largest and second-largest LTRO uptakes (including standard LTRO liquidity) of approximately EUR 160 and 113 bn were made by Spanish and Italian banks in the second three-year LTRO (corresponding numbers for the first operation are EUR 112 and 94 bn, respectively). Hence, Spanish and Italian banks take approximately 4.6 and 3.9 times as much LTRO liquidity as German banks over the period of first cash settlement (corresponding multiples for the second cash settlement are 5.3 and 3.7, respectively).

5.3 Assessment of statistical significance

In this subsection I reproduce Table 4 from the previous subsection but provide statistical significance with the test statistics of Kolari and Pynnönen (2010) and, for sake of comparison, Boehmer, Musumeci, and Poulsen (1991). Throughout this subsection I am going to use the acronyms "BMP" for Boehmer, Musumeci, and Poulsen (1991) and "KP" for Kolari and Pynnönen (2010). The comparison allows me to better understand the cross-correlation structure across banks within a country. KP's adjustment scales down BMP's test statistic if abnormal returns of banks within a country are, on average, positively correlated (in the estimation window). For instance, if the average of cross-correlations of abnormal returns of four bank stocks is $\bar{r} = 0.25$ and BMP's test statistic takes on a value of 2.0 (significant at the level of 1%) then KP suggest to multiply the value of BMP's test statistic by $\sqrt{(1-\bar{r})/(1+(N_c-1)\bar{r})} = 0.4472$, which results in an adjusted value for the test statistic of $2.0 \times 0.447 = 0.894$ (not significant even at the level of 10%). I restrict the analysis to countries with more than one bank in the sample because the calculation of both test statistics is based on the cross-section of banks within a country.

Table 5 provides the results. BMP's test statistic is presented in round brackets underneath the $CAARs$. KP's test statistic is presented in square brackets underneath BMP's test statistic. a, b, and c next to the $CAARs$ denote significance at the levels of 1%, 5%, and 10%, respectively, with the BMP test statistic and, in square brackets, the KP test statistic.[28] $CAARs$ that are significant at the level of at least 10% with the BMP test statistic are marked in bold. Numbers are given in decimals.

Insert Table 5 here.

Comparing statistical significance with BMP in Table 5 and Brown and Warner (1980)'s test statistic in Table 4 shows that, even if both tests are robust to event-induced variance, the $CAARs$ are more often significant with the BMP as compared to the Brown and Warner (1980) test statistic. This is due to its higher power.

Panel A shows $CAARs$ over the announcement period of the three-year LTROs. In the peripheral (non-peripheral) countries using the BMP test statistic 9 (11) out of the 21 (42) country-window combinations for $CAARs$, which represents 42.9% (26.2%), are statistically significantly different from zero at the significance level of at least 10%. In peripheral countries, statistically significant $CAARs$ lie between 1.7% in Italy and 15.3% in Spain over the windows $[-1, 1]$ and $[-7, 7]$, respectively. The corresponding numbers for non-peripheral countries are -4.9% in Austria and 5.4% in Germany over the windows $[0, 1]$ and $[-7, 7]$, respectively. Using the KP test statistic instead leaves only the $CAAR$ of 11.7% in Spain over the window $[-5, 5]$ statistically significant at the level of 10% in peripheral countries. Notice, however, that the $CAARs$ of 4.0%, 6.3%, and 9.6% in Italy over the windows $[-3, 3]$, $[-5, 5]$ and $[-7, 7]$, respectively, have KP t-statistics of 1.593, 1.589, and 1.527 which result in p-values of 11.3%, 11.4%, and 12.9%. Using the KP test statistic in the non-peripheral countries leaves 7 out of the 42 country-window combinations statistically significant covering the same range of $CAARs$ as with the BMP test (-4.9% in Austria and 5.4% in Germany).

[28] Notice that I provide the BMP test statistic first not because it is the more relevant test statistic but because it makes results more visible in Table 5.

Panel B shows $CAARs$ over the first cash settlement period. In peripheral countries, 7 out of the 21 statistically significant $CAARs$ (using BMP test) lie between -2.1% in Spain and 16.0% in Portugal over the windows $[0, 3]$ and $[-5, 5]$, respectively. Correspondingly, in non-peripheral countries 7 out of 42 statistically significant abnormal returns range from -0.9% in the Netherlands to 4.0% in Germany over the windows $[0, 3]$ and $[-7, 7]$, respectively. Using the KP test statistic in the peripheral countries leaves only the $CAAR$ of 2.3% in Spain over the window $[-5, 5]$ statistically different from zero at the level of 10%. Correspondingly for the non-peripheral countries the KP test statistic leaves only the 1.9% $CAAR$ in Finland over the window $[-5, 5]$ statistically significant (at the 5% level).

The results in Panels A and B support the previous findings that $CAARs$ are higher for banks in peripheral than in non-peripheral countries if they are statistically significant with the KP test-statistic. The comparison of test statistics reveals a higher correlation across bank stocks in peripheral countries, in particular over the announcement period, than in non-peripheral countries. Furthermore, notice that the $CAAR$ of 16.0% for Portugal in the window $[-5, 5]$ has a KP t-statistic of 1.563 that results in a p-value of 12.0%.

Panel C shows $CAARs$ over the second cash settlement period. Using the KP test statistic for the peripheral countries leaves only the $CAAR$ of -11.0% in Portugal over the window $[-7, 7]$ to be statistically different from zero at the level of 5%. Using the KP test statistic for the non-peripheral countries leaves 8 out of the 42 country-window combinations statistically significant covering the range of $CAARs$ from 0.9% in Belgium to 4.2% in Austria over the windows $[0, 1]$ and $[-5, 5]$ respectively. The results in Panel C are generally (also with the BMP test statistic) more mixed across peripheral and non-peripheral countries.

Overall, these results echo the previous findings even if controlling for cross-correlation of abnormal returns on bank stocks across banks within a country (using the Kolari and Pynnönen 2010, or KP, test statistic).

5.4 Robustness checks

I ran a number of robustness checks similar to Nyborg (2017). First, I examine whether I receive the same results if I build equally-weighted portfolios of bank stock returns and use that sample for the event study. Table A-1 in the appendix compares average abnormal returns on event to non-event days (the equivalent to Table 3) for the equally-weighted portfolio sample. Not surprisingly the results are practically identical because the only difference is the order of running the market model regressions and the averaging process. Due to the lower number of observations for countries with more than one bank in the sample, test statistics generally imply lower statistical significance. Nevertheless, the findings in terms of evaluating statistically significant means and medians remain the same compared to Table 3. Results remain basically the same in Panels B and C for the first and second cash settlements, respectively. As described in Footnote 24 also the assessment of statistical significance for the $CAARs$ remains unchanged.

Second, instead of using country-level total market return indices as described in Section 3 I use the "STOXX Europe 600" index as the market index for each country. Table A-2 in the appendix shows that the results for the comparison of means and medians of abnormal returns on event versus non-event days are both qualitatively and quantitatively very similar to the results in Table 3. Results for the analysis of the $CAARs$ are provided in the Tables A-3 and A-4 as well as in Figure A-1 in the appendix (these are the equivalents to the Tables 4 and 5 as well as Figure 1, respectively). Again, both qualitatively and quantitatively the results are very similar to the previous findings independent of the applied test statistic (Brown and Warner 1980, Boehmer, Musumeci, and Poulsen 1991, Kolari and Pynnönen 2010).

Third, instead of using bank stock-level data I use total return bank indices for each country (see Section 3 for an overview). Comparing Figure A-2 in the appendix to Figure 1 shows a few noteworthy differences. Results with the bank index sample show that $CAARs$ are smaller over the announcement period of the three-year LTROs as compared to results with the bank stock-level sample. Furthermore, also non-peripheral countries profit from

abnormal returns over the announcement period (in particular France from December 1 to 8, 2011). However, the positive abnormal returns over the first cash settlement two weeks later, on December 22, 2011, are higher for Cyprus and Portugal than they are in Figure 1. Using country-level bank indices seems to shift the higher abnormal returns in peripheral countries, as compared to non-peripheral countries, from the announcement to the first cash settlement of the three-year LTROs. Both Tables A-5 and A-6 in the appendix confirm these findings also in terms of economic magnitudes and statistical significance (these are the equivalents to Tables 3 and 4, respectively). Both the economic magnitudes and the statistical significance are lower for peripheral countries over the announcement period but higher over the first cash settlement period of the three-year LTROs, in particular in Portugal and Cyprus.

Overall, the robustness checks confirm the results of the main analysis. However, using country-level bank indices instead of bank stock-level data shifts the effects from the announcement of the three-year LTROs to the first cash settlement. Banks in peripheral countries profit more as compared to non-peripheral countries in particular over the first cash settlement period in terms of abnormal equity price increases.

6 Conclusion

In this paper I examine the impact of the ECB's three-year LTROs on banks' stock prices using event study methodology. Compared to other studies I exclusively focus on the three-year LTROs and bank equity. The study aims at comparing (cumulative) abnormal returns across Eurozone countries using a variety of tests to assess the statistical significance. In the main setup the paper estimates a market model to predict abnormal returns on 89 bank stocks from 12 different Eurozone countries with country-level total market return indices (the data is from Thomson Reuters Datastream).

The results provide evidence that over the announcement and the first cash settlement periods banks in peripheral countries profit more compared to banks in non-peripheral

countries in terms of abnormal equity returns. I find no differences in abnormal returns between peripheral and non-peripheral countries over the second cash settlement.

Even if I use the test statistic developed by Kolari and Pynnönen (2010), which controls explicitly for cross-correlation and renders many country-level cumulative abnormal returns ($CAARs$) insignificant, I find that Spanish banks, on average, exhibit a $CAAR$ of 11.7% over the window of $[-5, 5]$, which is significant at the level of 10%. Spanish banks have, at the same time, the largest liquidity uptake over both cash settlement periods. $CAARs$ for Italian banks of 4.0%, 6.3%, and 9.6% over the event windows of $[-3, 3]$, $[-5, 5]$, and $[-7, 7]$ have p-values of 11.3%, 11.4%, and 12.9%, respectively. Italian banks have the second-largest liquidity uptake. At the same time, statistically significant $CAARs$ in non-peripheral countries are generally smaller and lie between -4.9% in Austria and 5.4% in Germany for the windows $[0, 1]$ and $[-7, 7]$, respectively. At the same time Austrian and German banks take less central bank liquidity in the two operations.

Using the Kolari and Pynnönen (2010) test statistic to assess statistical significance over the first cash settlement leaves only the $CAAR$ of 2.3% in Spain over the window $[-5, 5]$ statistically different from zero at the level of 10%. The $CAAR$ of 16.0% in Portugal over the same window, however, has a p-value of 12.0%. Portuguese banks take 1.4 times as much LTRO liquidity as Austrian banks and have already 10.6 times as much outstanding prior to the three-year LTROs. At the same time, the only statistically significant cumulative abnormal return in non-peripheral countries is the one of 1.9% in Finland over the same window.

Using less conservative test statistics (Brown and Warner 1980, Boehmer, Musumeci, and Poulsen 1991) renders $CAARs$ more significant. The findings, however, remain qualitatively the same. $CAARs$ in peripheral countries are higher than in non-peripheral countries. A number of robustness checks do not change them.

Overall, the results in this paper provide evidence that the ECB alleviates stress in the Eurozone through long-term liquidity provisioning. Banks' uptake of central bank liquidity is tilted towards countries perceived as relatively riskier at the time (peripheral

countries). At the same time bank equity in those countries experiences relatively larger positive abnormal equity returns compared to bank equity in non-peripheral countries.

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Table 1

Estimates of net liquidity uptake over the three-year LTRO cash settlements. This table shows estimates of liquidity uptake in MROs, LTROs, and the total by country for those countries whose national central banks provide separate figures on MROs and LTROs on their balances sheets. As different national central banks provide the figures in different formats, I proceed according to Woschitz (2017) to make the numbers comparable. Panel A provides outstanding liquidity end of October 2011 and liquidity uptake from beginning of November 2011 to end of January 2012 as well as from beginning of February to end of April 2012, two time periods which span over the first and second three-year LTRO cash settlements, respectively. Numbers are in million EUR. Countries are sorted according to LTRO uptake in the period November 2011 to January 2012. Panel B calculates the percentage change on outstanding liquidity end of October 2011 and January 2012. "(P)" indicates countries that are classified as peripheral countries. (*) indicates countries that the sample of bank stocks used in the event study later on does not cover. The bank stock sample, however, additionally covers the Netherlands, Malta, and Cyprus (P). Source: Bruegel data (see Pisani-Ferry and Wolff 2012).

Panel A: Estimates of absolute net liquidity uptake over 3y-LTRO implementations [in million EUR]

	Outstanding liquidity			Absolute net uptake over 1st 3y-LTRO			Absolute net uptake over 2nd 3y-LTRO		
	End of Oct-2011			Nov-2011 to Jan-2012			Feb-2012 to Apr-2012		
	MRO	LTRO	Total	MRO	LTRO	Total	MRO	LTRO	Total
Spain (P)	43,185	42,994	86,178	-36,740	111,983	75,243	-4,664	160,176	155,513
Italy (P)	46,821	61,164	107,985	4,083	94,191	98,274	-48,402	112,637	64,235
France	33,090	63,897	96,987	-31,400	68,558	37,158	-157	36,645	36,488
Germany	6,394	19,025	25,419	-3,185	24,186	21,001	-1,907	30,341	28,435
Belgium	11,579	6,650	18,229	-715	11,253	10,538	-10,699	21,893	11,194
Port. (P)	12,814	32,764	45,578	-4,792	5,432	640	-3,575	13,074	9,500
Austria	2,333	3,099	5,432	37	3,898	3,935	-2,282	8,741	6,460
Finland	0	105	105	5	2,201	2,206	-5	1,375	1,370
Luxemb.(*)	1,797	1,727	3,524	-278	1,528	1,251	-1,467	1,740	273
Slovenia(*)	4	625	629	52	1,058	1,110	-20	2,088	2,068
Ireland(*)	22,206	77,715	99,921	3,861	-5,341	-1,480	-19,225	6,702	-12,523
Greece (P)	8,886	66,858	75,744	6,054	-7,146	-1,092	19,375	-23,645	-4,269
Total	189,109	376,622	565,731	-63,017	311,799	248,782	-73,025	371,767	298,742

Panel B: Relative net liquidity uptake as percentage of outstanding liquidity end of last period [as percentage]

	Relative net uptake over 1st 3y-LTRO			Relative net uptake over 2nd 3y-LTRO		
	Nov-2011 to Jan-2012 as of Oct-2011			Feb-2012 to Apr-2012 as of Jan-2011		
	MRO	LTRO	Total	MRO	LTRO	Total
Spain (P)	-85.1	260.5	87.3	-72.4	103.4	96.3
Italy (P)	8.7	154.0	91.0	-95.1	72.5	31.1
France	-94.9	107.3	38.3	-9.3	27.7	27.2
Germany	-49.8	127.1	82.6	-59.4	70.2	61.3
Belgium	-6.2	169.2	57.8	-98.5	122.3	38.9
Port. (P)	-37.4	16.6	1.4	-44.6	34.2	20.6
Austria	1.6	125.8	72.4	-96.3	124.9	69.0
Finland	-	2,096.2	2,101.0	-100.0	59.6	59.3
Luxemb.(*)	-15.4	88.5	35.5	-96.6	53.5	5.7
Slovenia(*)	1,300.0	169.3	176.5	-34.8	124.1	119.0
Ireland(*)	17.4	-6.9	-1.5	-73.8	9.3	-12.7
Greece (P)	68.1	-10.7	-1.4	129.7	-39.6	-5.7

Table 2

Summary statistics. This table provides descriptive statistics (as percentage) and number of observations by country. Panel A covers the bank equity return sample. Panel B calculates per country an equally-weighted portfolio of the bank equity returns from Panel A. Panel C provides statistics on the country-level market indices as well as the "STOXX Europe 600" index and Panel D on country-level bank indices. The sample spans 260 business days from March 15, 2011 (-192 days from the announcement of the three-year LTROs on December 8, 2011) to March 12, 2012 (+7 business days from the second three-year LTRO cash settlement on March 1, 2012). "(P)" indicates whether a country is classified as peripheral country (the other countries are classified as non-peripheral).

Panel A: Bank equity sample by country

	Descriptive Statistics								Number of				Number of zero returns			
	Mean	SD	SE	P25	Med	P75	Min	Max				$[-7,7]$	obs.		$[-7,7]$ day obs.	
Country	in %	in %	in %	in %	in %	in %	in %	in %	banks	days	obs.	day obs.	count	%	count	%
Austria	-0.07	3.06	0.09	-1.43	0.00	1.34	-13.19	14.76	4	260	1,040	160	77	7.40	22	13.75
Belgium	-0.08	2.80	0.09	-1.31	-0.16	1.03	-13.17	16.46	4	260	1,040	160	27	2.60	4	2.50
Finland	-0.03	2.27	0.07	-1.30	0.00	1.19	-8.59	9.57	4	260	1,040	160	64	6.15	10	6.25
France	-0.08	2.34	0.03	-0.93	0.00	0.76	-16.23	22.54	18	260	4,680	720	353	7.54	60	8.33
Germany	-0.03	3.21	0.06	-1.41	0.00	1.27	-14.88	30.00	13	260	3,380	520	164	4.85	30	5.77
Malta	0.04	2.24	0.14	-0.76	0.05	0.82	-15.00	18.35	1	260	260	40	11	4.23	2	5.00
Netherl.	-0.09	2.49	0.07	-1.22	0.00	1.05	-10.25	11.49	5	260	1,300	200	42	3.23	8	4.00
Greece (P)	-0.37	7.35	0.46	-3.55	-0.55	2.20	-28.02	29.52	1	260	260	40	28	10.77	2	5.00
Italy (P)	-0.10	2.90	0.04	-1.49	-0.05	1.21	-17.27	33.17	26	260	6,760	1,040	351	5.19	69	6.63
Portugal (P)	-0.34	3.41	0.11	-2.22	-0.37	1.41	-13.55	20.55	4	260	1,040	160	59	5.67	11	6.88
Spain (P)	-0.18	2.92	0.06	-1.56	-0.03	1.10	-28.38	40.38	8	260	2,080	320	81	3.89	17	5.31
Cyprus (P)	-0.34	4.51	0.28	-2.78	-0.47	1.98	-16.38	25.76	1	260	260	40	15	5.77	5	12.50
Total	-0.10	2.93	0.02	-1.37	0.00	1.09	-28.38	40.38	89	260	23,140	3,560	1,272	5.50	240	6.74

Panel B: Equally weighted portfolio across bank equity by country

	Descriptive Statistics								Number of				Number of zero returns			
	Mean	SD	SE	P25	Med	P75	Min	Max	Count-			$[-7,7]$	obs.		$[-7,7]$ day obs.	
Country	in %	in %	in %	in %	in %	in %	in %	in %	tries	days	obs.	day obs.	count	%	count	%
Austria	-0.07	2.21	0.14	-1.19	-0.07	1.19	-6.22	7.26	1	260	260	40	6	2.31	2	5.00
Belgium	-0.08	1.90	0.12	-1.10	-0.03	0.82	-5.51	6.98	1	260	260	40	3	1.15	1	2.50
Finland	-0.03	1.84	0.11	-0.99	-0.16	1.01	-5.49	7.84	1	260	260	40	4	1.54	1	2.50
France	-0.08	1.31	0.08	-0.72	0.01	0.61	-4.76	5.92	1	260	260	40	3	1.15	1	2.50
Germany	-0.03	1.55	0.10	-0.76	0.04	0.85	-6.12	5.75	1	260	260	40	3	1.15	1	2.50
Malta	0.04	2.24	0.14	-0.76	0.05	0.82	-15.00	18.35	1	260	260	40	11	4.23	2	5.00
Netherl.	-0.09	1.79	0.11	-0.84	-0.03	0.81	-5.82	6.08	1	260	260	40	3	1.15	1	2.50
Greece (P)	-0.37	7.35	0.46	-3.55	-0.55	2.20	-28.02	29.52	1	260	260	40	28	10.77	2	5.00
Italy (P)	-0.10	1.76	0.11	-1.03	0.01	0.96	-5.66	4.32	1	260	260	40	4	1.54	1	2.50
Portugal (P)	-0.34	2.90	0.18	-1.83	-0.26	1.31	-10.63	11.63	1	260	260	40	3	1.15	1	2.50
Spain (P)	-0.18	2.04	0.13	-1.29	-0.06	0.87	-5.37	7.43	1	260	260	40	3	1.15	1	2.50
Cyprus (P)	-0.34	4.51	0.28	-2.78	-0.47	1.98	-16.38	25.76	1	260	260	40	15	5.77	5	12.50
Total	-0.14	3.08	0.06	-1.25	-0.05	0.96	-28.02	29.52	12	260	3,120	480	86	2.76	19	3.96

Table to be continued

Table 2 – continued

Panel C: Market index by country and index for total EU (EU STOXX 600)

	Descriptive Statistics								Number of				Number of zero returns			
	Mean	SD	SE	P25	Med	P75	Min	Max	Coun-			$[-7,7]$	obs.		$[-7,7]$ day obs.	
Country	in %	in %	in %	in %	in %	in %	in %	in %	tries	days	obs.	day obs.	count	%	count	%
Austria	-0.07	1.89	0.12	-1.13	0.00	0.98	-6.11	5.81	1	260	260	40	12	4.62	3	7.50
Belgium	-0.03	1.55	0.10	-0.96	-0.02	0.82	-5.34	5.50	1	260	260	40	3	1.15	1	2.50
Finland	-0.03	1.80	0.11	-0.99	0.00	0.99	-5.94	5.60	1	260	260	40	7	2.69	2	5.00
France	-0.01	1.81	0.11	-0.89	0.00	1.03	-5.48	6.28	1	260	260	40	3	1.15	1	2.50
Germany	0.02	1.83	0.11	-0.87	0.00	0.95	-5.82	5.35	1	260	260	40	3	1.15	1	2.50
Malta	-0.06	0.89	0.06	-0.35	0.00	0.26	-6.63	4.52	1	260	260	40	30	11.54	7	17.50
Netherl.	-0.01	1.41	0.09	-0.81	0.00	0.85	-4.46	4.47	1	260	260	40	3	1.15	1	2.50
Greece (P)	-0.28	2.47	0.15	-1.75	-0.44	0.96	-6.92	14.37	1	260	260	40	9	3.46	2	5.00
Italy (P)	-0.07	2.09	0.13	-1.23	0.02	1.22	-6.80	5.49	1	260	260	40	4	1.54	1	2.50
Portugal (P)	-0.09	1.37	0.09	-0.95	-0.06	0.85	-5.02	3.70	1	260	260	40	3	1.15	1	2.50
Spain (P)	-0.05	1.74	0.11	-1.10	-0.04	0.94	-5.49	4.96	1	260	260	40	3	1.15	1	2.50
Cyprus (P)	-0.24	2.88	0.18	-2.07	-0.04	1.11	-10.71	17.62	1	260	260	40	4	1.54	1	2.50
Total	-0.08	1.88	0.03	-1.02	-0.01	0.86	-10.71	17.62	12	260	3,120	480	84	2.69	22	4.58
EU STOXX	0.01	1.39	0.09	-0.68	0.05	0.80	-4.77	4.37	1	260	260	40	3	1.15	1	2.50

Panel D: Bank index by country

	Descriptive Statistics								Number of				Number of zero returns			
	Mean	SD	SE	P25	Med	P75	Min	Max	count-			$[-7,7]$	obs.		$[-7,7]$ day obs.	
Country	in %	in %	in %	in %	in %	in %	in %	in %	tries	days	obs.	day obs.	count	%	count	%
Austria	-0.17	3.53	0.22	-2.09	0.00	1.67	-9.71	11.49	1	260	260	40	12	4.62	3	7.50
Belgium	-0.18	4.27	0.26	-2.65	-0.28	2.34	-13.03	15.15	1	260	260	40	4	1.54	1	2.50
Finland	-0.01	2.19	0.14	-1.32	-0.05	1.28	-5.92	8.25	1	260	260	40	7	2.69	2	5.00
France	-0.11	3.92	0.24	-2.14	-0.11	2.05	-13.77	18.62	1	260	260	40	3	1.15	1	2.50
Germany	-0.05	3.31	0.21	-1.80	-0.12	1.59	-8.58	15.58	1	260	260	40	4	1.54	1	2.50
Malta	-0.03	0.79	0.05	-0.31	0.01	0.29	-6.41	3.48	1	260	260	40	3	1.15	0	0.00
Netherl.	-0.15	1.61	0.10	-0.95	0.00	0.72	-9.19	4.52	1	260	260	40	0	0.00	0	0.00
Greece (P)	-0.30	6.23	0.39	-3.53	-0.54	2.46	-20.39	29.39	1	260	260	40	10	3.85	2	5.00
Italy (P)	-0.17	3.47	0.22	-2.08	0.00	1.88	-11.63	8.85	1	260	260	40	4	1.54	1	2.50
Portugal (P)	-0.40	3.30	0.20	-2.18	-0.49	1.48	-12.16	14.38	1	260	260	40	4	1.54	2	5.00
Spain (P)	-0.07	2.30	0.14	-1.40	-0.03	1.25	-7.72	7.79	1	260	260	40	3	1.15	1	2.50
Cyprus (P)	-0.47	3.62	0.22	-2.50	-0.55	1.48	-11.07	16.49	1	260	260	40	1	0.38	1	2.50
Total	-0.18	3.47	0.06	-1.80	-0.08	1.35	-20.39	29.39	12	260	3,120	480	55	1.76	15	3.13

Table 3

Comparison of abnormal returns on bank stocks on event versus non-event days per country. This table compares estimated abnormal returns on event to those on non-event days for the bank stock sample by country. Numbers are in percentage points. Countries are classified into non-peripheral and peripheral countries as indicated in the table. Each of the three panels provides sample means, medians, standard deviations, and number of observations on event days and non-event days. In each panel and for each country the table shows two-sample t-tests for equal means, Kruskal-Wallis χ^2-tests for equal medians, and variance-ratio F-tests for equal variances comparing event versus non-event day abnormal returns. Abnormal returns are estimated with the market model in Eq. 2 using the estimation window $[T_0, T_1] = [-192, -8]$ for each event (panel) separately. $r_{m,t}$ is based on a country-level total market return index (see Section 3). For each country in each panel the tests are based on a total of $[-192, 7] = 200$ days: $[-7, 7] = 15$ event days and $[-192, -8] = 185$ non-event days. In Panel A, $t = 0$ is the announcement of the three-year LTROs on December 8, 2011. In Panel B (C), $t = 0$ represents the first (second) three-year LTRO cash settlement on December 22, 2011 (March 1, 2012). Test statistics and corresponding means, medians, and/or variances that are significant at the level of at least 10% are marked in bold. a, b, and c next to the test statistics denote significance at the levels of 1%, 5%, and 10%, respectively.

		Non-peripheral countries							Peripheral countries				
		Austria	Belgium	Finland	France	Germany	Malta	Netherl.	Greece	Italy	Portugal	Spain	Cyprus
Panel A: December 8, 2011 (announcement of three-year LTROs)													
Event	Mean	0.332	0.234	0.248	0.060	0.183	0.435	0.041	**-2.717**	**0.638**	0.425	**1.021**	0.768
days	Med	**0.184**	-0.037	**0.333**	0.040	0.091	0.344	-0.062	**-2.200**	**0.287**	-0.305	**0.474**	0.196
	SD	2.349	3.405	1.737	1.908	2.902	2.206	2.302	4.054	2.923	4.866	5.170	2.277
	Obs	60	60	60	270	195	15	75	15	390	60	120	15
Non-	Mean	-0.000	-0.000	0.000	0.000	0.000	-0.000	-0.000	**0.000**	**0.000**	-0.000	**0.000**	0.000
event	Med	**0.011**	0.010	**0.014**	0.034	-0.071	-0.036	-0.008	**-0.209**	**-0.033**	-0.016	**-0.065**	0.128
days	SD	1.863	1.854	1.528	1.635	2.712	2.490	1.552	4.826	2.017	2.395	1.819	2.532
	Obs	740	740	740	3,330	2,405	185	925	185	4,810	740	1,480	185
Event vs non-event days: Test for equal													
means	TT t-stat	-1.067	-0.526	-1.072	-0.504	-0.852	-0.727	-0.151	**2.458**^{b}	**-4.227**^{a}	-0.670	**-2.152**^{b}	-1.245
	TT p-val	0.290	0.601	0.288	0.615	0.395	0.477	0.880	0.025	0.000	0.505	0.033	0.230
meds	KW χ^2-stat	**2.922**^{c}	0.328	**2.764**^{c}	0.020	1.633	0.926	0.000	**6.123**^{b}	**14.450**^{a}	0.011	**23.059**^{a}	0.814
	KW p-val	0.087	0.567	0.096	0.888	0.201	0.336	0.993	0.013	0.000	0.918	0.000	0.367
vars	VR F-stat	**0.629**^{a}	**0.296**^{a}	0.774	**0.734**^{a}	0.874	1.273	**0.455**^{a}	1.417	**0.476**^{a}	**0.242**^{a}	**0.124**^{a}	1.236
	VR p-val	0.008	0.000	0.149	0.000	0.183	0.632	0.000	0.466	0.000	0.000	0.000	0.683

Table to be continued

Table 3 – continued

		Non-peripheral countries							Peripheral countries				
		Austria	Belgium	Finland	France	Germany	Malta	Netherl.	Greece	Italy	Portugal	Spain	Cyprus
Panel B: December 22, 2011 (first three-year LTRO settlement)													
Event	Mean	0.155	0.280	0.201	0.036	0.267	0.421	-0.053	-0.962	0.253	0.429	0.074	0.647
days	Med	0.080	0.181	0.053	-0.013	0.075	0.369	-0.191	-1.367	0.012	0.354	-0.058	0.071
	SD	1.631	2.404	1.617	1.672	3.415	1.895	1.385	3.892	2.987	3.679	2.545	3.396
	Obs	60	60	60	270	195	15	75	15	390	60	120	15
Non-	Mean	0.000	-0.000	-0.000	-0.000	-0.000	0.000	-0.000	-0.000	0.000	-0.000	-0.000	0.000
event	Med	0.003	0.013	-0.007	0.037	-0.068	-0.066	0.005	-0.090	-0.052	-0.066	-0.090	0.078
days	SD	1.768	2.042	1.549	1.669	2.715	2.482	1.632	4.903	2.110	2.649	2.270	2.564
	Obs	740	740	740	3,330	2,405	185	925	185	4,810	740	1,480	185
Event vs non-event days: Test for equal													
means	TT t-stat	-0.701	-0.878	-0.930	-0.341	-1.063	-0.806	0.312	0.901	-1.640	-0.885	-0.307	-0.721
	TT p-val	0.485	0.383	0.356	0.733	0.289	0.431	0.755	0.379	0.102	0.379	0.759	0.482
meds	KW χ^2-stat	0.419	0.771	0.378	0.056	0.986	2.061	0.609	1.361	0.201	0.842	0.226	0.277
	KW p-val	0.518	0.380	0.539	0.813	0.321	0.151	0.435	0.243	0.654	0.359	0.635	0.599
vars	VR F-stat	1.175	**0.722**^{c}	0.917	0.997	**0.632**^{a}	1.716	**1.388**^{c}	1.587	**0.499**^{a}	**0.518**^{a}	**0.795**^{c}	**0.570**^{c}
	VR p-val	0.442	0.066	0.610	0.952	0.000	0.247	0.075	0.324	0.000	0.000	0.073	0.097
Panel C: March 1, 2012 (second three-year LTRO settlement)													
Event	Mean	0.096	0.206	0.056	0.122	0.133	-0.240	-0.122	-0.240	-0.066	**-0.734**	0.009	-0.530
days	Med	0.076	0.190	0.231	0.101	-0.016	-0.007	0.031	-0.552	-0.091	**-0.820**	-0.100	-1.757
	SD	1.535	1.467	1.185	1.491	3.113	1.080	1.307	5.100	1.994	1.944	2.993	7.716
	Obs	60	60	60	270	195	15	75	15	390	60	120	15
Non-	Mean	0.000	-0.000	-0.000	0.000	-0.000	0.000	0.000	-0.000	0.000	**-0.000**	-0.000	-0.000
event	Med	0.011	-0.070	-0.070	-0.023	-0.102	-0.118	-0.035	-0.229	-0.130	**-0.122**	-0.084	0.001
days	SD	1.918	2.330	1.674	1.774	2.985	1.595	1.731	5.322	2.397	3.123	2.417	3.154
	Obs	740	740	740	3,330	2,405	185	925	185	4,810	740	1,480	185
Event vs non-event days: Test for equal													
means	TT t-stat	-0.459	-0.993	-0.339	-1.277	-0.578	0.793	0.756	0.175	0.621	**2.659**^{a}	-0.033	0.264
	TT p-val	0.648	0.324	0.736	0.203	0.564	0.437	0.451	0.864	0.535	0.009	0.974	0.795
meds	KW χ^2-stat	0.243	2.206	0.321	1.682	0.144	0.030	0.118	0.575	0.005	**4.898**^{b}	0.001	2.480
	KW p-val	0.622	0.137	0.571	0.195	0.704	0.862	0.731	0.448	0.945	0.027	0.973	0.115
vars	VR F-stat	**1.560**^{b}	**2.524**^{a}	**1.995**^{a}	**1.416**^{a}	0.919	**2.182**^{c}	**1.756**^{a}	1.089	**1.445**^{a}	**2.581**^{a}	**0.652**^{a}	**0.167**^{a}
	VR p-val	0.033	0.000	0.001	0.000	0.403	0.096	0.003	0.919	0.000	0.000	0.001	0.000

Table 4

Cumulative average abnormal returns on bank stocks by country assessed with Brown and Warner (1980)'s test statistic. This table provides CAR_c for seven different windows and the three events, as indicated in the table, based on the bank stock sample by country. Numbers are given in decimals. In Panel A, $t = 0$ is the announcement of the three-year LTROs (December 8, 2011). In Panel B (C), $t = 0$ represents the first (second) three-year LTRO cash settlement on December 22, 2011 (March 1, 2012). CAR_c is calculated as average of CAR_i across banks within a country. CAR_i for each bank is calculated as the sum of $AR_{i,t}$ over the respective time window. Abnormal returns are estimated with the market model in Eq. 2 using the estimation window $[T_0, T_1] = [-192, -8]$ for each event (panel) separately. $r_{m,t}$ is based on a country-level total market return index (see Section 3). Significance is evaluated using the test statistic proposed by Brown and Warner (1980) which is presented in brackets underneath the CAR_c. a, b, and c next to the CAR_c denote significance at the levels of 1%, 5%, and 10%, respectively.

	Non-peripheral countries							Peripheral countries				
	Austria	Belgium	Finland	France	Germany	Malta	Netherl.	Greece	Italy	Portugal	Spain	Cyprus
# of banks	4	4	4	18	13	1	5	1	26	4	8	1
Panel A: December 8, 2011 (announcement of three-year LTROs)												
$[0, 1]$	-0.018	-0.007	0.018	-0.005	0.002	-0.009	-0.017	-0.050	0.005	**0.053**^{b}	-0.017	0.046
	(-1.40)	(-0.50)	(1.40)	(-0.56)	(0.11)	(-0.26)	(-1.56)	(-0.73)	(0.54)	(2.04)	(-1.48)	(1.26)
$[0, 3]$	**-0.049**^{a}	-0.027	0.006	-0.007	0.009	-0.000	**-0.032**^{b}	-0.137	0.007	-0.000	-0.012	0.081
	(-2.64)	(-1.37)	(0.36)	(-0.61)	(0.43)	(-0.01)	(-2.04)	(-1.41)	(0.53)	(-0.01)	(-0.79)	(1.59)
$[-1, 1]$	-0.012	-0.005	0.017	-0.004	0.006	-0.005	-0.017	-0.094	0.017	**0.071**^{b}	-0.016	0.026
	(-0.73)	(-0.28)	(1.07)	(-0.34)	(0.33)	(-0.12)	(-1.27)	(-1.12)	(1.55)	(2.21)	(-1.18)	(0.60)
$[-1, 3]$	**-0.042**^{b}	-0.025	0.005	-0.006	0.014	0.004	**-0.031**^{c}	**-0.181**^{c}	0.019	0.017	-0.012	0.062
	(-2.04)	(-1.12)	(0.26)	(-0.45)	(0.57)	(0.06)	(-1.82)	(-1.67)	(1.33)	(0.41)	(-0.68)	(1.09)
$[-3, 3]$	-0.018	-0.005	0.007	0.009	0.031	0.011	-0.016	-0.172	**0.040**^{b}	0.062	**0.088**^{a}	0.099
	(-0.74)	(-0.21)	(0.29)	(0.57)	(1.08)	(0.17)	(-0.78)	(-1.33)	(2.37)	(1.26)	(4.19)	(1.46)
$[-5, 5]$	0.035	0.045	0.032	0.015	0.054	0.022	0.017	-0.238	**0.063**^{a}	0.096	**0.117**^{a}	0.101
	(1.14)	(1.38)	(1.08)	(0.74)	(1.52)	(0.26)	(0.66)	(-1.48)	(3.04)	(1.57)	(4.44)	(1.19)
$[-7, 7]$	0.050	0.035	0.037	0.009	0.027	0.065	0.006	**-0.408**^{b}	**0.096**^{a}	0.064	**0.153**^{a}	0.115
	(1.39)	(0.93)	(1.06)	(0.38)	(0.66)	(0.67)	(0.21)	(-2.16)	(3.92)	(0.89)	(4.98)	(1.17)

Table to be continued

Table 4 – continued

	Non-peripheral countries							Peripheral countries				
	Austria	Belgium	Finland	France	Germany	Malta	Netherl.	Greece	Italy	Portugal	Spain	Cyprus
# of banks	4	4	4	18	13	1	5	1	26	4	8	1
Panel B: December 22, 2011 (first three-year LTRO settlement)												
$[0,1]$	0.006	-0.016	0.018	-0.008	-0.010	0.013	-0.009	-0.023	0.001	0.019	-0.012	0.006
	(0.50)	(-1.04)	(1.35)	(-0.85)	(-0.67)	(0.37)	(-0.78)	(-0.32)	(0.16)	(0.68)	(-0.85)	(0.17)
$[0,3]$	0.011	-0.005	0.011	-0.002	0.004	0.013	-0.009	0.042	-0.005	**0.098**^{b}	-0.021	0.043
	(0.60)	(-0.22)	(0.60)	(-0.16)	(0.18)	(0.25)	(-0.58)	(0.42)	(-0.40)	(2.48)	(-1.06)	(0.84)
$[-1,1]$	0.004	-0.015	0.009	0.002	-0.001	0.017	-0.000	0.005	0.013	0.035	-0.013	0.041
	(0.25)	(-0.83)	(0.59)	(0.19)	(-0.06)	(0.39)	(-0.03)	(0.06)	(1.11)	(1.02)	(-0.79)	(0.91)
$[-1,3]$	0.008	-0.004	0.003	0.008	0.013	0.016	-0.001	0.069	0.006	**0.114**^{b}	-0.022	0.078
	(0.42)	(-0.19)	(0.13)	(0.54)	(0.54)	(0.29)	(-0.06)	(0.62)	(0.40)	(2.58)	(-1.02)	(1.35)
$[-3,3]$	0.015	0.022	0.018	0.016	0.020	-0.004	0.002	-0.018	0.023	**0.101**^{c}	0.023	0.091
	(0.61)	(0.79)	(0.73)	(0.96)	(0.73)	(-0.06)	(0.11)	(-0.14)	(1.30)	(1.92)	(0.89)	(1.33)
$[-5,5]$	0.026	**0.065**^{c}	0.019	0.015	0.023	0.041	-0.006	-0.026	**0.044**^{b}	**0.160**^{b}	0.023	0.105
	(0.86)	(1.84)	(0.61)	(0.73)	(0.67)	(0.50)	(-0.22)	(-0.16)	(2.00)	(2.44)	(0.70)	(1.22)
$[-7,7]$	0.023	0.042	0.030	0.005	0.040	0.063	-0.008	-0.144	0.038	0.064	0.011	0.097
	(0.66)	(1.01)	(0.84)	(0.22)	(0.98)	(0.65)	(-0.25)	(-0.75)	(1.48)	(0.84)	(0.29)	(0.97)
Panel C: March 1, 2012 (second three-year LTRO settlement)												
$[0,1]$	-0.002	0.009	0.002	0.001	0.014	0.004	0.007	-0.050	0.007	-0.017	0.021	**0.230**^{a}
	(-0.12)	(0.51)	(0.14)	(0.13)	(0.88)	(0.19)	(0.55)	(-0.66)	(0.67)	(-0.49)	(1.43)	(5.12)
$[0,3]$	0.007	0.004	-0.004	-0.001	-0.010	-0.020	0.005	0.035	0.001	-0.013	0.021	**0.240**^{a}
	(0.36)	(0.18)	(-0.22)	(-0.08)	(-0.46)	(-0.61)	(0.29)	(0.33)	(0.08)	(-0.28)	(1.04)	(3.77)
$[-1,1]$	0.014	0.008	0.012	0.006	0.028	0.003	-0.004	-0.006	0.015	-0.015	0.028	**0.258**^{a}
	(0.84)	(0.36)	(0.68)	(0.53)	(1.46)	(0.10)	(-0.30)	(-0.06)	(1.11)	(-0.36)	(1.58)	(4.68)
$[-1,3]$	0.022	0.003	0.005	0.004	0.004	-0.021	-0.006	0.080	0.009	-0.012	0.029	**0.268**^{a}
	(1.04)	(0.11)	(0.24)	(0.26)	(0.16)	(-0.60)	(-0.32)	(0.66)	(0.50)	(-0.22)	(1.25)	(3.76)
$[-3,3]$	0.025	0.010	0.016	0.008	-0.002	-0.018	-0.004	0.057	-0.001	-0.001	0.000	**0.194**^{b}
	(1.00)	(0.30)	(0.61)	(0.45)	(-0.06)	(-0.43)	(-0.19)	(0.40)	(-0.03)	(-0.02)	(0.00)	(2.31)
$[-5,5]$	0.042	0.031	0.010	0.026	0.036	-0.004	-0.002	0.127	-0.006	-0.043	-0.015	0.168
	(1.32)	(0.75)	(0.31)	(1.10)	(0.96)	(-0.08)	(-0.05)	(0.71)	(-0.24)	(-0.53)	(-0.44)	(1.59)
$[-7,7]$	0.014	0.031	0.008	0.018	0.020	-0.036	-0.018	-0.036	-0.010	-0.110	0.001	-0.079
	(0.39)	(0.65)	(0.22)	(0.67)	(0.46)	(-0.58)	(-0.54)	(-0.17)	(-0.33)	(-1.17)	(0.04)	(-0.65)

Table 5

Cumulative average abnormal returns on bank stocks by country assessed with Kolari and Pynnönen (2010)'s test statistic. This table provides CAR_c for seven different windows and the three events, as indicated in the table, based on the bank stock sample for sample countries with more than one bank. Numbers are given in decimals. In Panel A, $t = 0$ is the announcement of the three-year LTROs (December 8, 2011). In Panel B (C), $t = 0$ represents the first (second) three-year LTRO cash settlement on December 22, 2011 (March 1, 2012). CAR_c is calculated as average of CAR_i across banks within a country. CAR_i for each bank is calculated as the sum of $AR_{i,t}$ over the respective time window. Abnormal returns are estimated with the market model in Eq. 2 using the estimation window $[T_0, T_1] = [-192, -8]$ for each event (panel) separately. $r_{m,t}$ is based on a country-level total market return index (see Section 3). Significance is evaluated using both the test statistic proposed by Boehmer, Musumeci, and Poulsen (1991) presented in brackets underneath the CAR_c, which controls for event-induced changes in variance, and Kolari and Pynnönen (2010) presented in square brackets underneath Boehmer, Musumeci, and Poulsen (1991)'s test statistic, which controls for both event-induced changes in variance and cross-correlation. a, b, and c next to the CAR_c denote significance at the levels of 1%, 5%, and 10%, respectively, with the Boehmer, Musumeci, and Poulsen (1991) test statistic and, in square brackets, the Kolari and Pynnönen (2010) test statistic.

	Non-peripheral countries						Peripheral countries		
	Austria	Belgium	Finland	France	Germany	Netherl.	Italy	Portugal	Spain
# of banks	4	4	4	18	13	5	26	4	8
Panel A: December 8, 2011 (announcement of three-year LTROs)									
$[0, 1]$	**-0.018**$^{c,[\cdot]}$	-0.007	**0.018**$^{b,[\cdot]}$	-0.005	0.002	-0.017	0.005	0.053	-0.017
	(-1.70)	(-1.53)	(2.33)	(-0.85)	(0.46)	(-1.32)	(0.72)	(1.22)	(0.29)
	[-1.51]	[-1.15]	[1.51]	[-0.47]	[0.28]	[-1.08]	[0.42]	[0.53]	[0.16]
$[0, 3]$	**-0.049**$^{c,[c]}$	**-0.027**$^{a,[a]}$	0.006	-0.007	0.009	**-0.032**$^{c,[\cdot]}$	0.007	-0.000	-0.012
	(-1.90)	(-3.96)	(0.84)	(-0.62)	(0.86)	(-1.85)	(0.81)	(0.52)	(0.34)
	[-1.69]	[-2.98]	[0.55]	[-0.34]	[0.52]	[-1.53]	[0.48]	[0.22]	[0.18]
$[-1, 1]$	-0.012	-0.005	0.017	-0.004	0.006	-0.017	**0.017**$^{c,[\cdot]}$	0.071	-0.016
	(-1.03)	(-0.39)	(0.81)	(-0.19)	(1.26)	(-0.65)	(1.73)	(1.08)	(0.39)
	[-0.92]	[-0.29]	[0.52]	[-0.11]	[0.76]	[-0.54]	[1.01]	[0.47]	[0.21]
$[-1, 3]$	**-0.042**$^{b,[b]}$	-0.025	0.005	-0.006	0.014	-0.031	**0.019**$^{c,[\cdot]}$	0.017	-0.012
	(-2.51)	(-0.97)	(0.28)	(-0.17)	(1.47)	(-0.91)	(1.69)	(0.58)	(0.41)
	[-2.23]	[-0.73]	[0.18]	[-0.09]	[0.89]	[-0.75]	[0.99]	[0.25]	[0.22]
$[-3, 3]$	-0.018	-0.005	0.007	**0.009**$^{a,[c]}$	**0.031**$^{b,[\cdot]}$	-0.016	**0.040**$^{a,[\cdot]}$	0.062	**0.088**$^{b,[\cdot]}$
	(-0.02)	(-0.01)	(1.22)	(3.25)	(2.22)	(0.28)	(2.71)	(0.85)	(2.08)
	[-0.02]	[-0.01]	[0.79]	[1.79]	[1.34]	[0.23]	[1.59]	[0.37]	[1.12]
$[-5, 5]$	0.035	0.045	**0.032**$^{b,[c]}$	0.015	**0.054**$^{a,[b]}$	**0.017**$^{b,[c]}$	**0.063**$^{a,[\cdot]}$	**0.096**$^{c,[\cdot]}$	**0.117**$^{a,[c]}$
	(1.50)	(0.60)	(2.58)	(1.29)	(3.35)	(2.24)	(2.71)	(1.87)	(3.33)
	[1.33]	[0.45]	[1.67]	[0.71]	[2.02]	[1.85]	[1.59]	[0.81]	[1.78]
$[-7, 7]$	0.050	0.035	0.037	0.009	0.027	0.006	**0.096**$^{b,[\cdot]}$	0.064	**0.153**$^{b,[\cdot]}$
	(1.52)	(0.38)	(0.99)	(-1.50)	(1.01)	(0.46)	(2.60)	(0.73)	(2.60)
	[1.35]	[0.28]	[0.64]	[-0.83]	[0.61]	[0.38]	[1.53]	[0.32]	[1.40]

Table to be continued

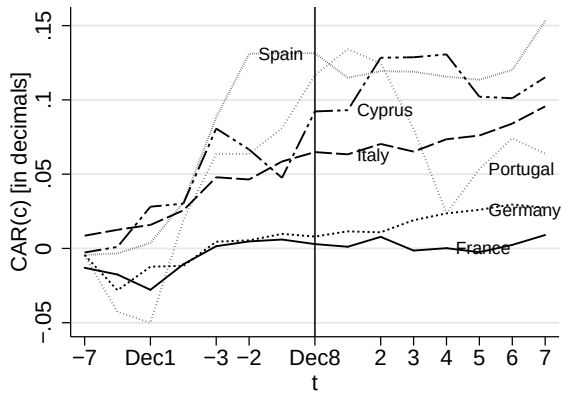
Table 5 – continued

	Non-peripheral countries						Peripheral countries		
	Austria	Belgium	Finland	France	Germany	Netherl.	Italy	Portugal	Spain
# of banks	4	4	4	18	13	5	26	4	8
Panel B: December 22, 2011 (first three-year LTRO cash settlement)									
$[0,1]$	0.006	-0.016	0.018	-0.008	-0.010	-0.009	0.001	0.019	-0.012
	(0.31)	(-0.26)	(0.73)	(-0.69)	(-1.38)	(-1.46)	(0.33)	(0.61)	(-1.46)
	[0.32]	[-0.18]	[0.50]	[-0.39]	[-0.86]	[-1.23]	[0.19]	[0.26]	[-0.84]
$[0,3]$	0.011	-0.005	0.011	-0.002	0.004	**-0.009**$^{c,[\cdot]}$	-0.005	0.098	**-0.021**$^{c,[\cdot]}$
	(0.52)	(0.18)	(0.74)	(-0.12)	(-0.41)	(-1.86)	(-0.53)	(1.54)	(-1.88)
	[0.53]	[0.13]	[0.51]	[-0.07]	[-0.26]	[-1.57]	[-0.30]	[0.67]	[-1.09]
$[-1,1]$	0.004	-0.015	0.009	0.002	-0.001	-0.000	0.013	0.035	-0.013
	(-0.06)	(-1.11)	(0.22)	(1.26)	(0.24)	(0.34)	(0.78)	(1.03)	(-1.12)
	[-0.06]	[-0.77]	[0.15]	[0.72]	[0.15]	[0.29]	[0.45]	[0.45]	[-0.64]
$[-1,3]$	0.008	-0.004	0.003	**0.008**$^{c,[\cdot]}$	0.013	-0.001	0.006	**0.114**$^{c,[\cdot]}$	-0.022
	(0.10)	(-0.31)	(0.00)	(1.75)	(0.57)	(0.41)	(0.41)	(1.75)	(-1.39)
	[0.10]	[-0.22]	[0.00]	[0.99]	[0.35]	[0.35]	[0.24]	[0.76]	[-0.80]
$[-3,3]$	0.015	**0.022**$^{c,[\cdot]}$	0.018	**0.016**$^{c,[\cdot]}$	0.020	0.002	0.023	0.101	**0.023**$^{c,[\cdot]}$
	(1.52)	(1.94)	(1.27)	(1.82)	(1.47)	(0.06)	(1.64)	(1.26)	(1.95)
	[1.55]	[1.34]	[0.87]	[1.03]	[0.92]	[0.05]	[0.94]	[0.55]	[1.13]
$[-5,5]$	0.026	0.065	**0.019**$^{a,[b]}$	0.015	**0.023**$^{b,[\cdot]}$	-0.006	**0.044**$^{c,[\cdot]}$	**0.160**$^{a,[\cdot]}$	**0.023**$^{a,[c]}$
	(1.40)	(1.45)	(2.94)	(1.12)	(2.13)	(0.10)	(1.75)	(3.61)	(2.99)
	[1.43]	[1.01]	[2.03]	[0.64]	[1.33]	[0.08]	[1.00]	[1.56]	[1.73]
$[-7,7]$	0.023	0.042	0.030	0.005	**0.040**$^{c,[\cdot]}$	-0.008	0.038	0.064	**0.011**$^{c,[\cdot]}$
	(1.27)	(0.38)	(1.19)	(0.22)	(1.88)	(0.09)	(1.50)	(-0.84)	(1.81)
	[1.30]	[0.26]	[0.82]	[0.12]	[1.17]	[0.07]	[0.86]	[-0.37]	[1.04]

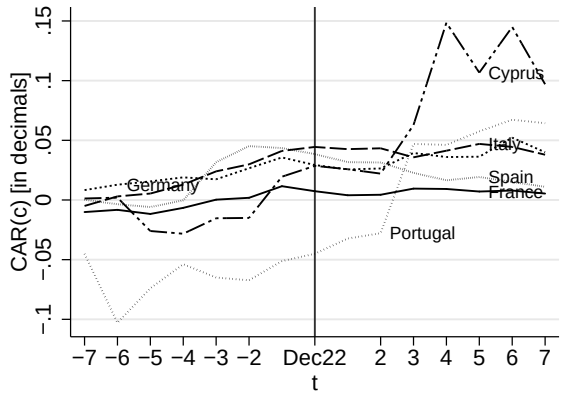
Table to be continued

Table 5 – continued

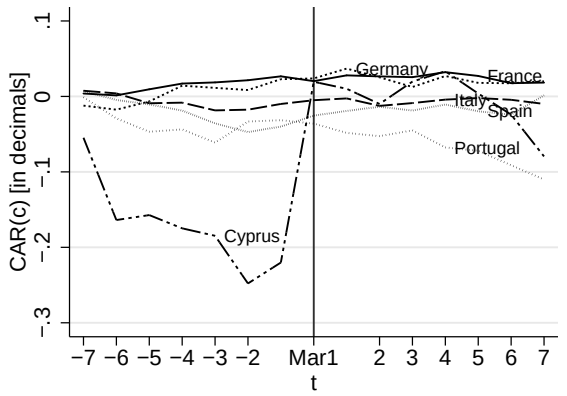
	Non-peripheral countries						Peripheral countries		
	Austria	Belgium	Finland	France	Germany	Netherl.	Italy	Portugal	Spain
# of banks	4	4	4	18	13	5	26	4	8
Panel C: March 1, 2012 (second three-year LTRO cash settlement)									
$[0,1]$	-0.002	**0.009**$^{b,[b]}$	0.002	0.001	0.014	0.007	0.007	-0.017	0.021
	(0.15)	(2.34)	(0.65)	(-0.35)	(1.19)	(1.11)	(1.30)	(-1.32)	(0.22)
	[0.12]	[2.00]	[0.46]	[-0.18]	[0.75]	[0.80]	[0.71]	[-0.55]	[0.13]
$[0,3]$	0.007	0.004	-0.004	-0.001	-0.010	0.005	0.001	-0.013	0.021
	(0.67)	(1.57)	(0.17)	(-0.35)	(-0.71)	(1.23)	(0.31)	(-1.02)	(-0.23)
	[0.54]	[1.34]	[0.12]	[-0.18]	[-0.44]	[0.89]	[0.17]	[-0.43]	[-0.13]
$[-1,1]$	0.014	0.008	0.012	0.006	**0.028**$^{a,[c]}$	-0.004	**0.015**$^{b,[\cdot]}$	-0.015	0.028
	(1.06)	(0.96)	(1.44)	(1.64)	(2.73)	(-0.84)	(2.25)	(-1.37)	(1.32)
	[0.86]	[0.82]	[1.02]	[0.84]	[1.72]	[-0.60]	[1.24]	[-0.57]	[0.77]
$[-1,3]$	0.022	0.003	0.005	0.004	0.004	-0.006	0.009	-0.012	0.029
	(1.53)	(0.56)	(0.98)	(1.30)	(1.48)	(-0.61)	(1.40)	(-0.84)	(0.79)
	[1.24]	[0.48]	[0.69]	[0.67]	[0.93]	[-0.44]	[0.77]	[-0.35]	[0.46]
$[-3,3]$	**0.025**$^{a,[a]}$	0.010	**0.016**$^{a,[a]}$	**0.008**$^{b,[\cdot]}$	-0.002	-0.004	-0.001	-0.001	0.000
	(3.47)	(1.28)	(3.86)	(2.05)	(0.53)	(-0.48)	(-0.98)	(-0.31)	(-1.19)
	[2.81]	[1.09]	[2.72]	[1.05]	[0.33]	[-0.35]	[-0.54]	[-0.13]	[-0.69]
$[-5,5]$	**0.042**$^{b,[c]}$	**0.031**$^{a,[a]}$	**0.010**$^{a,[a]}$	**0.026**$^{b,[\cdot]}$	0.036	-0.002	**-0.006**$^{c,[\cdot]}$	**-0.043**$^{b,[\cdot]}$	-0.015
	(2.32)	(3.08)	(5.63)	(2.44)	(1.51)	(0.29)	(-1.79)	(-2.14)	(-0.70)
	[1.87]	[2.63]	[3.97]	[1.25]	[0.95]	[0.21]	[-0.99]	[-0.89]	[-0.41]
$[-7,7]$	0.014	**0.031**$^{b,[b]}$	**0.008**$^{c,[\cdot]}$	**0.018**$^{b,[\cdot]}$	0.020	-0.018	-0.010	**-0.110**$^{a,[b]}$	0.001
	(0.90)	(2.57)	(1.81)	(2.00)	(0.07)	(-0.29)	(-0.42)	(-5.01)	(-0.80)
	[0.73]	[2.20]	[1.28]	[1.03]	[0.04]	[-0.21]	[-0.23]	[-2.10]	[-0.47]



Announcement

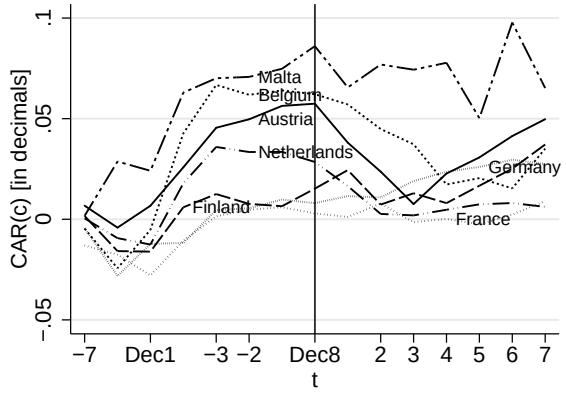


1st cash settlement



2nd cash settlement

Panel A: Large Eurozone and peripheral countries (except for Greece)



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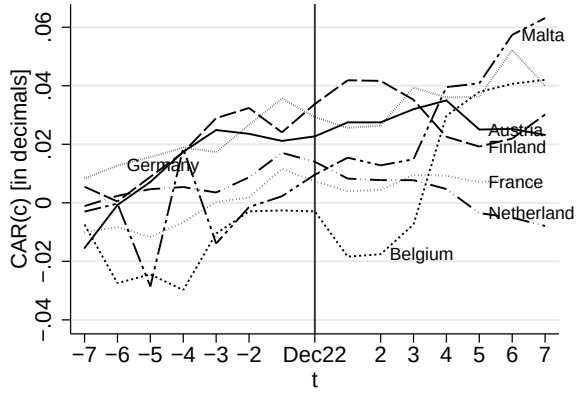
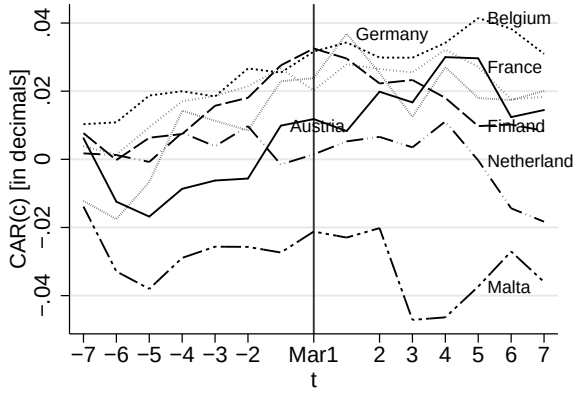
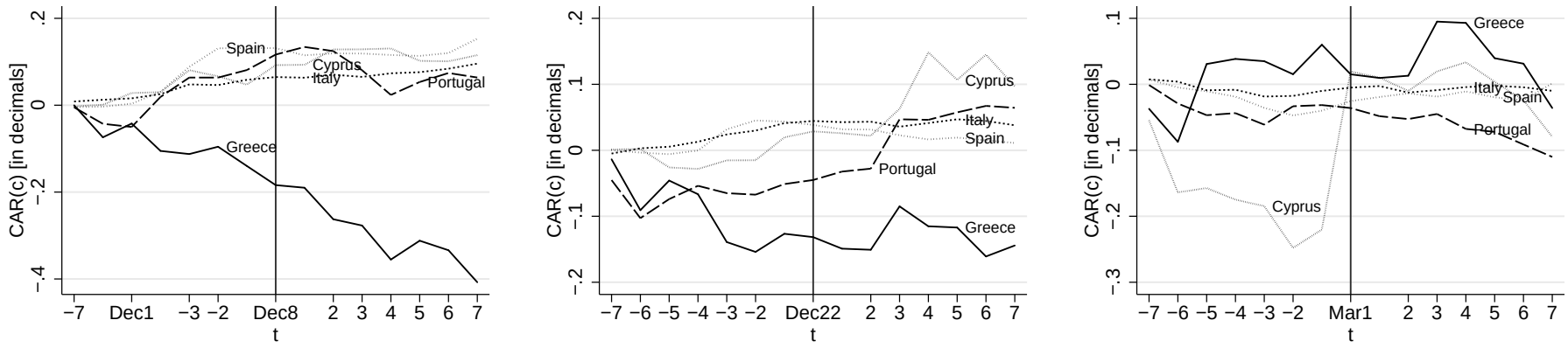


1st cash settlement



2nd cash settlement

Panel B: Non-peripheral countries



Announcement | 1st cash settlement | 2nd cash settlement

Panel C: Peripheral countries

Figure 1

Average cumulative abnormal returns on bank stocks by country using country-level market indices. This figure is based on the bank stock sample and provides country-level averages of cumulative abnormal returns, CAR_c, across banks, CAR_i, for the three different events separately. CAR_i is the sum over abnormal returns for bank i, $AR_{i,t}$, over the event window $[-7, 7]$. $AR_{i,t}$ is estimated from the market model in Eq. 2 using the estimation window $[T_0, T_1] = [-192, -8]$ for each event separately. $r_{m,t}$ is based on a country-level total market return index (for details see Section 3). The three columns of subplots represent the three events indicated by vertical lines in each subplot: announcement, 1st cash settlement, and 2nd cash settlement of the three-year LTROs on December 8, 2011, December 22, 2011, and March 1, 2012, respectively. The vertical line at December 1, 2011 in the first column of subplots represents the ECB's first indication of large-scale help for banks. Panel A covers large Eurozone countries (Germany and France) as well as peripheral countries (except for Greece). Panels B and C cover non-peripheral and peripheral countries, respectively.

7 Appendix

Supplementary Table A-1

Comparison of abnormal returns on equally-weighted portfolios of bank stocks on event versus non-event days per country. This table compares estimated abnormal returns on event to those on non-event days for the equally-weighted bank stock portfolio sample by country. Numbers are in percentage points. Countries are classified into non-peripheral and peripheral countries as indicated in the table. Each of the three panels provides sample means, medians, standard deviations, and number of observations on event days and non-event days. In each panel and for each country the table shows two-sample t-tests for equal means, Kruskal-Wallis χ^2-tests for equal medians, and variance-ratio F-tests for equal variances comparing event and non-event day abnormal returns. Abnormal returns are estimated with the market model in Eq. 2 (by replacing subscript i by subscript c) using the estimation window $[T_0, T_1] = [-192, -8]$ for each event (panel) separately. $r_{m,t}$ is based on a country-level total market return index (see Section 3). For each country in each panel the tests are based on a total of $[-192, 7] = 200$ days: $[-7, 7] = 15$ event days and $[-192, -8] = 185$ non-event days. In Panel A, $t = 0$ is the announcement of the three-year LTROs on December 8, 2011. In Panel B (C), $t = 0$ represents the first (second) three-year LTRO cash settlement on December 22, 2011 (March 1, 2012). Test statistics and corresponding means, medians, and/or variances that are significant at the level of at least 10% are marked in bold. a, b, and c next to the test statistics denote significance at the levels of 1%, 5%, and 10%, respectively.

		Non-peripheral countries							Peripheral countries				
		Austria	Belgium	Finland	France	Germany	Malta	Netherl.	Greece	Italy	Portugal	Spain	Cyprus
Panel A: December 8, 2011 (announcement of three-year LTROs)													
Event	Mean	0.332	0.234	0.248	0.060	0.183	0.435	0.041	**-2.717**	**0.638**	0.425	**1.021**	0.768
days	Med	**0.675**	-0.463	0.562	0.127	0.242	0.344	-0.072	**-2.200**	**0.700**	-0.007	**0.101**	0.196
	SD	1.268	1.824	1.059	0.831	0.925	2.206	1.116	4.054	0.668	3.440	2.039	2.277
	Obs	15	15	15	15	15	15	15	15	15	15	15	15
Non-	Mean	0.000	0.000	-0.000	0.000	0.000	-0.000	-0.000	**0.000**	**0.000**	-0.000	**-0.000**	0.000
event	Med	**-0.001**	0.068	-0.034	0.037	-0.002	-0.036	0.053	**-0.209**	**-0.012**	0.054	**-0.039**	0.128
days	SD	0.917	0.972	0.897	0.606	1.064	2.490	0.766	4.826	0.625	1.830	0.787	2.532
	Obs	185	185	185	185	185	185	185	185	185	185	185	185
Event vs non-event days:		*Test for equal*											
means	TT t-stat	-0.992	-0.491	-0.881	-0.275	-0.729	-0.727	-0.140	**2.458**^{b}	**-3.571**^{a}	-0.473	**-1.928**^{c}	-1.245
	TT p-val	0.337	0.631	0.392	0.787	0.476	0.477	0.891	0.025	0.003	0.643	0.074	0.230
meds	KW χ^2-stat	**3.066**^{c}	0.154	1.891	0.069	1.255	0.926	0.500	**6.123**^{b}	**11.829**^{a}	0.361	**2.890**^{c}	0.814
	KW p-val	0.080	0.695	0.169	0.793	0.263	0.336	0.479	0.013	0.001	0.548	0.089	0.367
vars	VR F-stat	**0.523**^{c}	**0.284**^{a}	0.718	**0.531**^{c}	1.324	1.273	**0.471**^{b}	1.417	0.875	**0.283**^{a}	**0.149**^{a}	1.236
	VR p-val	0.055	0.000	0.319	0.061	0.568	0.632	0.025	0.466	0.647	0.000	0.000	0.683

Table to be continued

Table A-1 – continued

		Non-peripheral countries							Peripheral countries				
		Austria	Belgium	Finland	France	Germany	Malta	Netherl.	Greece	Italy	Portugal	Spain	Cyprus
Panel B: December 22, 2011 (first three-year LTRO cash settlement)													
Event	Mean	0.155	0.280	0.201	0.036	0.267	0.421	-0.053	-0.962	0.253	0.429	0.074	0.647
days	Med	0.156	0.139	0.347	0.042	0.277	0.369	-0.112	-1.367	0.332	0.616	-0.231	0.071
	SD	0.760	1.364	0.756	0.502	0.762	1.895	0.419	3.892	0.611	3.021	1.027	3.396
	Obs	15	15	15	15	15	15	15	15	15	15	15	15
Non-	Mean	-0.000	0.000	0.000	0.000	0.000	0.000	-0.000	-0.000	0.000	0.000	-0.000	0.000
event	Med	0.016	0.038	-0.022	0.032	0.024	-0.066	0.051	-0.090	-0.028	-0.003	-0.094	0.078
days	SD	0.893	1.064	0.924	0.629	1.049	2.482	0.797	4.903	0.658	1.965	0.972	2.564
	Obs	185	185	185	185	185	185	185	185	185	185	185	185
Event vs non-event days: Test for equal													
means	TT t-stat	-0.747	-0.777	-0.974	-0.262	-1.262	-0.806	0.429	0.901	-1.533	-0.541	-0.268	-0.721
	TT p-val	0.465	0.449	0.344	0.796	0.223	0.431	0.672	0.379	0.144	0.597	0.792	0.482
meds	KW χ^2-stat	0.865	0.568	1.318	0.047	1.265	2.061	0.180	1.361	2.393	1.517	0.267	0.277
	KW p-val	0.352	0.451	0.251	0.829	0.261	0.151	0.671	0.243	0.122	0.218	0.605	0.599
vars	VR F-stat	1.383	0.609	1.491	1.569	1.895	1.716	**3.614**^{a}	1.587	1.161	**0.423**^{a}	0.895	**0.570**^{c}
	VR p-val	0.501	0.143	0.398	0.337	0.170	0.247	0.009	0.324	0.796	0.010	0.690	0.097
Panel C: March 1, 2012 (second three-year LTRO cash settlement)													
Event	Mean	0.096	0.206	0.056	0.122	0.133	-0.240	-0.122	-0.240	-0.066	**-0.734**	0.009	-0.530
days	Med	0.193	0.127	0.101	0.155	-0.056	-0.007	-0.049	-0.552	0.098	-0.448	-0.432	-1.757
	SD	0.979	0.520	0.605	0.550	1.103	1.080	0.693	5.100	0.654	1.438	1.163	7.716
	Obs	15	15	15	15	15	15	15	15	15	15	15	15
Non-	Mean	0.000	0.000	-0.000	-0.000	-0.000	0.000	0.000	-0.000	-0.000	**-0.000**	0.000	-0.000
event	Med	0.000	-0.016	-0.060	0.000	-0.020	-0.118	-0.020	-0.229	-0.084	-0.082	-0.084	0.001
days	SD	0.952	1.218	0.972	0.701	1.112	1.595	0.865	5.322	0.772	2.418	1.016	3.154
	Obs	185	185	185	185	185	185	185	185	185	185	185	185
Event vs non-event days: Test for equal													
means	TT t-stat	-0.368	-1.279	-0.325	-0.810	-0.451	0.793	0.643	0.175	0.372	**1.783**^{c}	-0.030	0.264
	TT p-val	0.718	0.211	0.749	0.429	0.658	0.437	0.529	0.864	0.715	0.089	0.976	0.795
meds	KW χ^2-stat	0.395	1.244	0.200	0.773	0.047	0.030	0.143	0.575	0.000	2.524	0.035	2.480
	KW p-val	0.530	0.265	0.654	0.379	0.829	0.862	0.705	0.448	0.990	0.112	0.851	0.115
vars	VR F-stat	0.946	**5.482**^{a}	**2.581**^{b}	1.627	1.017	**2.182**^{c}	1.559	1.089	1.392	**2.828**^{b}	0.763	**0.167**^{a}
	VR p-val	0.800	0.001	0.046	0.298	0.945	0.096	0.344	0.919	0.491	0.030	0.409	0.000

Supplementary Table A-2

Comparison of abnormal returns on bank stocks on event versus non-event days using "STOXX Europe 600" as the market index. This table compares estimated abnormal returns on event to those on non-event days for the bank stock sample by country. Numbers are in percentage points. Countries are classified into non-peripheral and peripheral countries as indicated in the table. Each of the three panels provides sample means, medians, standard deviations, and number of observations on event days and non-event days. In each panel and for each country the table shows two-sample t-tests for equal means, Kruskal-Wallis χ^2-tests for equal medians, and variance-ratio F-tests for equal variances comparing event and non-event day abnormal returns. Abnormal returns are estimated with the market model in Eq. 2 using the estimation window $[T_0, T_1] = [-192, -8]$ for each event (panel) separately. $r_{m,t}$ is, for each country, based on the STOXX Europe 600 index. For each country in each panel the tests are based on a total of $[-192, 7] = 200$ days: $[-7, 7] = 15$ event days and $[-192, -8] = 185$ non-event days. In Panel A, $t = 0$ is the announcement of the three-year LTROs on December 8, 2011. In Panel B (C), $t = 0$ represents the first (second) three-year LTRO cash settlement on December 22, 2011 (March 1, 2012). Test statistics and corresponding means, medians, and/or variances that are significant at the level of at least 10% are marked in bold. a, b, and c next to the test statistics denote significance at the levels of 1%, 5%, and 10%, respectively.

		Non-peripheral countries							Peripheral countries				
		Austria	Belgium	Finland	France	Germany	Malta	Netherl.	Greece	Italy	Portugal	Spain	Cyprus
Panel A: December 8, 2011 (announcement of three-year LTROs)													
Event	Mean	0.379	0.147	-0.237	-0.063	0.028	0.241	0.217	**-2.208**	**0.634**	0.453	**1.028**	0.764
days	Med	0.454	-0.167	-0.012	0.014	-0.201	0.234	0.040	**-1.737**	**0.323**	-0.530	**0.664**	0.208
	SD	3.110	3.640	1.776	2.001	2.966	2.188	2.372	3.333	3.145	5.072	5.344	2.118
	Obs	60	60	60	270	195	15	75	15	390	60	120	15
Non-	Mean	-0.000	-0.000	-0.000	-0.000	-0.000	0.000	0.000	**0.000**	**-0.000**	0.000	**-0.000**	0.000
event	Med	0.051	0.024	0.006	0.054	-0.058	-0.030	-0.013	**-0.239**	**-0.030**	-0.197	**-0.030**	0.048
days	SD	2.276	1.921	1.566	1.747	2.689	2.396	1.584	6.739	2.244	2.582	2.037	3.548
	Obs	740	740	740	3330	2405	185	925	185	4810	740	1480	185
Event vs non-event days: Test for equal													
means	TT t-stat	-0.925	-0.309	1.003	0.504	-0.130	-0.407	-0.777	**2.224**^{b}	**-3.899**^{a}	-0.684	**-2.095**^{b}	-1.261
	TT p-val	0.359	0.758	0.319	0.615	0.897	0.689	0.440	0.036	0.000	0.497	0.038	0.221
meds	KW χ^2-stat	2.520	0.560	0.241	1.262	0.003	0.287	0.614	**3.859**^{b}	**12.976**^{a}	0.007	**16.172**^{a}	0.900
	KW p-val	0.112	0.454	0.623	0.261	0.959	0.592	0.433	0.049	0.000	0.934	0.000	0.343
vars	VR F-stat	**0.536**^{a}	**0.278**^{a}	0.777	**0.762**^{a}	**0.822**^{c}	1.199	**0.446**^{a}	**4.087**^{a}	**0.509**^{a}	**0.259**^{a}	**0.145**^{a}	**2.807**^{b}
	VR p-val	0.000	0.000	0.156	0.002	0.053	0.737	0.000	0.004	0.000	0.000	0.000	0.031

Table to be continued

Table A-2 – continued

		Non-peripheral countries							Peripheral countries				
		Austria	Belgium	Finland	France	Germany	Malta	Netherl.	Greece	Italy	Portugal	Spain	Cyprus
Panel B: December 22, 2011 (first three-year LTRO settlement)													
Event	Mean	**0.526**	0.289	0.295	-0.002	0.190	0.164	0.116	-0.259	0.215	0.683	0.027	1.445
days	Med	**0.241**	0.142	0.078	0.036	-0.023	-0.049	0.014	-0.812	0.012	**0.432**	-0.004	1.215
	SD	1.956	2.479	1.678	1.753	3.424	1.911	1.442	3.943	3.053	4.029	2.679	3.750
	Obs	60	60	60	270	195	15	75	15	390	60	120	15
Non-	Mean	**0.000**	0.000	-0.000	-0.000	-0.000	-0.000	0.000	0.000	0.000	-0.000	0.000	0.000
event	Med	**0.039**	0.008	0.035	0.054	-0.066	-0.039	-0.037	-0.450	-0.034	**-0.226**	-0.064	0.039
days	SD	2.259	2.134	1.590	1.783	2.695	2.392	1.669	6.768	2.347	2.826	2.470	3.576
	Obs	740	740	740	3330	2405	185	925	185	4810	740	1480	185
Event vs non-event days:		*Test for equal*											
means	TT t-stat	**-1.980**^{c}	-0.877	-1.317	0.019	-0.758	-0.313	-0.661	0.229	-1.361	-1.288	-0.107	-1.440
	TT p-val	0.052	0.383	0.192	0.985	0.449	0.758	0.510	0.821	0.174	0.202	0.915	0.169
meds	KW χ^2-stat	**3.174**^{c}	0.718	0.677	0.002	0.093	0.104	0.072	0.172	0.156	**3.106**^{c}	0.159	1.917
	KW p-val	0.075	0.397	0.411	0.965	0.761	0.747	0.789	0.678	0.693	0.078	0.690	0.166
vars	VR F-stat	1.335	**0.741**^{c}	0.898	1.034	**0.619**^{a}	1.567	1.340	**2.946**^{b}	**0.591**^{a}	**0.492**^{a}	0.850	0.909
	VR p-val	0.164	0.091	0.533	0.728	0.000	0.338	0.111	0.024	0.000	0.000	0.204	0.721
Panel C: March 1, 2012 (second three-year LTRO settlement)													
Event	Mean	-0.054	0.276	-0.005	**0.233**	0.165	-0.228	-0.189	-1.438	-0.012	**-0.548**	-0.411	-1.510
days	Med	0.051	0.142	-0.085	**0.145**	0.021	-0.130	-0.126	-2.559	0.027	-0.391	**-0.420**	**-3.403**
	SD	1.833	1.576	1.221	1.492	3.064	0.741	1.357	9.229	2.239	2.227	3.009	8.851
	Obs	60	60	60	270	195	15	75	15	390	60	120	15
Non-	Mean	-0.000	-0.000	0.000	**-0.000**	-0.000	0.000	0.000	-0.000	0.000	**0.000**	0.000	0.000
event	Med	0.081	-0.083	-0.057	**-0.021**	-0.104	-0.086	-0.045	-1.046	-0.093	-0.181	**-0.029**	**0.063**
days	SD	2.569	2.453	1.714	1.899	2.977	1.417	1.770	7.832	2.652	3.379	2.628	4.344
	Obs	740	740	740	3330	2405	185	925	185	4810	740	1480	185
Event vs non-event days:		*Test for equal*											
means	TT t-stat	0.212	-1.239	0.031	**-2.416**^{b}	-0.725	1.049	1.131	0.587	0.098	**1.749**^{c}	1.453	0.654
	TT p-val	0.833	0.219	0.975	0.016	0.469	0.305	0.261	0.566	0.922	0.084	0.149	0.523
meds	KW χ^2-stat	0.270	2.589	0.032	**5.924**^{b}	0.300	0.344	0.289	0.797	0.299	1.840	**6.825**^{a}	**3.987**^{b}
	KW p-val	0.604	0.108	0.858	0.015	0.584	0.557	0.591	0.372	0.584	0.175	0.009	0.046
vars	VR F-stat	**1.964**^{a}	**2.423**^{a}	**1.973**^{a}	**1.620**^{a}	0.944	**3.661**^{a}	**1.703**^{a}	0.720	**1.404**^{a}	**2.302**^{a}	**0.763**^{b}	**0.241**^{a}
	VR p-val	0.002	0.000	0.002	0.000	0.562	0.008	0.004	0.324	0.000	0.000	0.033	0.000

Supplementary Table A-3

Cumulative average abnormal returns on bank stocks by country assessed with Brown and Warner (1980)'s test statistic and using "STOXX Europe 600" as market index. This table provides CAR_c for seven different windows and the three events, as indicated in the table, based on the bank stock sample. Numbers are given in decimals. In Panel A, $t = 0$ is the announcement of the three-year LTROs (December 8, 2011). In Panel B (C), $t = 0$ represents the first (second) three-year LTRO cash settlement on December 22, 2011 (March 1, 2012). CAR_c is calculated as average of CAR_i across banks within a country. CAR_i for each bank is calculated as the sum of $AR_{i,t}$ over the respective time window. Abnormal returns are estimated with the market model in Eq. 2 using the estimation window $[T_0, T_1] = [-192, -8]$ for each event (panel) separately. $r_{m,t}$ is, for each country, based on the STOXX Europe 600 index. Significance is evaluated using the test statistic proposed by Brown and Warner (1980), which is presented in brackets underneath the CAR_c. a, b, and c next to the CAR_c denote significance at the levels of 1%, 5%, and 10%, respectively.

	Non-peripheral countries							Peripheral countries				
	Austria	Belgium	Finland	France	Germany	Malta	Netherl.	Greece	Italy	Portugal	Spain	Cyprus
# of banks	4	4	4	18	13	1	5	1	26	4	8	1
Panel A: December 8, 2011 (announcement of three-year LTROs)												
$[0, 1]$	-0.025	-0.005	0.001	-0.003	0.003	-0.005	-0.012	-0.064	0.001	0.048	-0.012	0.039
	(-1.30)	(-0.35)	(0.08)	(-0.28)	(0.21)	(-0.14)	(-1.01)	(-0.66)	(0.06)	(1.63)	(-0.72)	(0.76)
$[0, 3]$	**-0.072**^{a}	-0.032	-0.018	-0.012	-0.001	0.012	**-0.028**^{c}	-0.176	-0.014	-0.034	-0.030	0.035
	(-2.63)	(-1.52)	(-0.96)	(-0.83)	(-0.05)	(0.25)	(-1.71)	(-1.29)	(-0.66)	(-0.81)	(-1.27)	(0.49)
$[-1, 1]$	-0.009	-0.003	-0.014	-0.001	0.005	0.001	-0.009	-0.076	0.007	**0.067**^{c}	-0.017	0.036
	(-0.37)	(-0.14)	(-0.84)	(-0.08)	(0.26)	(0.02)	(-0.61)	(-0.64)	(0.39)	(1.85)	(-0.80)	(0.59)
$[-1, 3]$	**-0.055**^{c}	-0.029	-0.033	-0.010	0.001	0.018	-0.025	-0.188	-0.008	-0.015	-0.035	0.033
	(-1.81)	(-1.24)	(-1.55)	(-0.62)	(0.02)	(0.33)	(-1.37)	(-1.23)	(-0.33)	(-0.32)	(-1.30)	(0.41)
$[-3, 3]$	-0.028	-0.007	-0.025	0.005	0.008	0.020	0.001	-0.194	0.030	0.026	**0.080**^{b}	0.081
	(-0.77)	(-0.24)	(-0.98)	(0.26)	(0.30)	(0.31)	(0.06)	(-1.08)	(1.09)	(0.48)	(2.52)	(0.86)
$[-5, 5]$	0.034	0.039	-0.017	0.001	0.034	0.028	0.033	-0.171	**0.064**^{c}	0.087	**0.121**^{a}	0.074
	(0.76)	(1.13)	(-0.54)	(0.05)	(0.99)	(0.34)	(1.24)	(-0.76)	(1.84)	(1.26)	(3.05)	(0.63)
$[-7, 7]$	0.057	0.022	-0.036	-0.009	0.004	0.036	0.032	-0.331	**0.095**^{b}	0.068	**0.154**^{a}	0.115
	(1.08)	(0.54)	(-0.96)	(-0.34)	(0.11)	(0.39)	(1.03)	(-1.26)	(2.36)	(0.84)	(3.32)	(0.83)

Table to be continued

Table A-3 – continued

	Non-peripheral countries							Peripheral countries				
	Austria	Belgium	Finland	France	Germany	Malta	Netherl.	Greece	Italy	Portugal	Spain	Cyprus
# of banks	4	4	4	18	13	1	5	1	26	4	8	1
	(1.08)	(0.54)	(-0.96)	(-0.34)	(0.11)	(0.39)	(1.03)	(-1.26)	(2.36)	(0.84)	(3.32)	(0.83)
Panel B: December 22, 2011 (first three-year LTRO settlement)												
$[0,1]$	0.008	-0.022	0.020	-0.007	-0.017	0.002	-0.004	-0.013	-0.002	0.032	-0.013	0.049
	(0.40)	(-1.30)	(1.44)	(-0.67)	(-1.20)	(0.07)	(-0.36)	(-0.13)	(-0.16)	(1.02)	(-0.66)	(0.96)
$[0,3]$	0.022	-0.010	0.008	-0.001	-0.002	-0.002	0.001	0.086	-0.014	**0.122**^{a}	-0.022	**0.119**^{c}
	(0.78)	(-0.43)	(0.41)	(-0.07)	(-0.12)	(-0.03)	(0.06)	(0.63)	(-0.66)	(2.76)	(-0.81)	(1.66)
$[-1,1]$	0.011	-0.025	0.014	0.002	-0.008	0.002	0.008	0.034	0.009	0.042	-0.016	**0.106**^{c}
	(0.46)	(-1.25)	(0.83)	(0.16)	(-0.45)	(0.04)	(0.53)	(0.29)	(0.50)	(1.10)	(-0.69)	(1.70)
$[-1,3]$	0.025	-0.014	0.002	0.008	0.007	-0.002	0.013	0.133	-0.003	**0.132**^{a}	-0.026	**0.176**^{b}
	(0.80)	(-0.53)	(0.11)	(0.49)	(0.30)	(-0.04)	(0.69)	(0.87)	(-0.11)	(2.68)	(-0.84)	(2.19)
$[-3,3]$	0.041	0.016	0.021	0.020	0.012	-0.033	0.021	0.045	0.015	**0.111**^{c}	0.029	**0.208**^{b}
	(1.08)	(0.53)	(0.81)	(0.99)	(0.44)	(-0.52)	(0.95)	(0.25)	(0.52)	(1.90)	(0.80)	(2.18)
$[-5,5]$	0.072	**0.068**^{c}	0.018	0.016	0.006	0.008	0.020	0.037	0.036	**0.189**^{b}	0.017	**0.229**^{c}
	(1.53)	(1.74)	(0.55)	(0.65)	(0.18)	(0.10)	(0.70)	(0.16)	(1.00)	(2.58)	(0.37)	(1.91)
$[-7,7]$	0.079	0.043	0.044	-0.000	0.029	0.025	0.017	-0.039	0.032	0.102	0.004	0.217
	(1.43)	(0.96)	(1.16)	(-0.01)	(0.73)	(0.26)	(0.53)	(-0.15)	(0.77)	(1.20)	(0.08)	(1.55)
Panel C: March 1, 2012 (second three-year LTRO settlement)												
$[0,1]$	0.002	0.007	-0.006	0.002	0.011	0.000	0.005	-0.031	0.025	-0.007	0.020	**0.234**^{a}
	(0.09)	(0.38)	(-0.38)	(0.21)	(0.69)	(0.00)	(0.36)	(-0.27)	(1.43)	(-0.17)	(1.01)	(3.78)
$[0,3]$	-0.005	0.001	-0.009	0.002	-0.012	-0.008	0.005	0.131	0.021	-0.013	0.011	**0.229**^{a}
	(-0.14)	(0.05)	(-0.43)	(0.09)	(-0.56)	(-0.27)	(0.28)	(0.83)	(0.87)	(-0.24)	(0.37)	(2.61)
$[-1,1]$	0.017	0.011	0.006	0.008	0.022	-0.001	-0.010	0.067	0.033	-0.000	0.020	**0.295**^{a}
	(0.59)	(0.49)	(0.33)	(0.52)	(1.19)	(-0.06)	(-0.62)	(0.49)	(1.56)	(-0.00)	(0.81)	(3.88)
$[-1,3]$	0.010	0.005	0.003	0.007	-0.001	-0.009	-0.010	0.229	0.030	-0.006	0.010	**0.289**^{a}
	(0.27)	(0.18)	(0.11)	(0.35)	(-0.03)	(-0.29)	(-0.46)	(1.29)	(1.08)	(-0.10)	(0.32)	(2.96)
$[-3,3]$	0.008	0.016	-0.003	0.010	-0.003	-0.007	-0.007	0.148	0.016	0.013	-0.016	**0.213**^{c}
	(0.19)	(0.45)	(-0.09)	(0.43)	(-0.10)	(-0.19)	(-0.27)	(0.71)	(0.49)	(0.17)	(-0.43)	(1.84)
$[-5,5]$	0.042	0.042	0.001	0.035	0.033	-0.002	-0.010	0.225	0.004	-0.020	-0.058	0.103
	(0.75)	(0.94)	(0.02)	(1.26)	(0.90)	(-0.04)	(-0.33)	(0.86)	(0.09)	(-0.22)	(-1.23)	(0.71)
$[-7,7]$	-0.008	0.041	-0.001	0.035	0.025	-0.034	-0.028	-0.216	-0.002	-0.082	-0.062	-0.227
	(-0.13)	(0.79)	(-0.02)	(1.08)	(0.58)	(-0.62)	(-0.79)	(-0.71)	(-0.04)	(-0.77)	(-1.11)	(-1.34)

Supplementary Table A-4

Cumulative average abnormal returns on bank stocks by country assessed with Kolari and Pynnönen (2010)'s test statistic and using "STOXX Europe 600" as market index. This table provides CAR_c for seven different windows and the three events, as indicated in the table, based on the bank stock sample for sample countries with more than one bank. Numbers are given in decimals. In Panel A, $t = 0$ is the announcement of the three-year LTROs (December 8, 2011). In Panel B (C), $t = 0$ represents the first (second) three-year LTRO cash settlement on December 22, 2011 (March 1, 2012). CAR_c is calculated as average of CAR_i across banks within a country. CAR_i for each bank is calculated as the sum of $AR_{i,t}$ over the respective time window. Abnormal returns are estimated with the market model in Eq. 2 using the estimation window $[T_0, T_1] = [-192, -8]$ for each event (panel) separately. $r_{m,t}$ is, for each country, based on the STOXX Europe 600 index. Significance is evaluated using both the test statistic proposed by Boehmer, Musumeci, and Poulsen (1991) presented in brackets underneath the CAR_c, which controls for event-induced changes in variance, and Kolari and Pynnönen (2010) presented in square brackets underneath Boehmer, Musumeci, and Poulsen (1991)'s test statistic, which controls for both event-induced changes in variance and cross-correlation. a, b, and c next to the CAR_c denote significance levels of 1%, 5%, and 10%, respectively, with the Boehmer, Musumeci, and Poulsen (1991) test statistic and, in square brackets, the Kolari and Pynnönen (2010) test statistic.

	Non-peripheral countries						Peripheral countries		
	Austria	Belgium	Finland	France	Germany	Netherl.	Italy	Portugal	Spain
# of banks	4	4	4	18	13	5	26	4	8
Panel A: December 8, 2011 (announcement of three-year LTROs)									
$[0, 1]$	-0.025	-0.005	0.001	-0.003	0.003	-0.012	0.001	0.048	-0.012
	(-1.44)	(-1.43)	(-0.02)	(-0.78)	(0.56)	(-0.93)	(-0.34)	(1.05)	(0.27)
	[-0.89]	[-1.00]	[-0.01]	[-0.41]	[0.36]	[-0.74]	[-0.13]	[0.41]	[0.10]
$[0, 3]$	**-0.072**$^{b,[\cdot]}$	**-0.032**$^{a,[a]}$	-0.018	-0.012	-0.001	-0.028	-0.014	-0.034	-0.030
	(-2.13)	(-4.63)	(-1.33)	(-1.03)	(0.49)	(-1.61)	(-0.90)	(0.06)	(-0.40)
	[-1.32]	[-3.25]	[-0.82]	[-0.54]	[0.31]	[-1.29]	[-0.35]	[0.02]	[-0.15]
$[-1, 1]$	-0.009	-0.003	-0.014	-0.001	0.005	-0.009	0.007	0.067	-0.017
	(1.00)	(-0.35)	(-0.88)	(0.23)	(1.00)	(-0.06)	(0.69)	(1.05)	(0.04)
	[0.62]	[-0.24]	[-0.54]	[0.12]	[0.64]	[-0.05]	[0.27]	[0.41]	[0.01]
$[-1, 3]$	**-0.055**$^{a,[\cdot]}$	-0.029	-0.033	-0.010	0.001	-0.025	-0.008	-0.015	-0.035
	(-2.64)	(-1.22)	(-1.38)	(-0.39)	(0.81)	(-0.50)	(0.14)	(0.32)	(-0.56)
	[-1.64]	[-0.85]	[-0.86]	[-0.20]	[0.52]	[-0.40]	[0.05]	[0.13]	[-0.21]
$[-3, 3]$	-0.028	-0.007	-0.025	**0.005**$^{a,[\cdot]}$	0.008	**0.001**$^{c,[\cdot]}$	**0.030**$^{a,[\cdot]}$	0.026	**0.080**$^{b,[\cdot]}$
	(-0.09)	(0.17)	(-1.49)	(2.92)	(1.11)	(1.83)	(2.93)	(0.71)	(2.07)
	[-0.06]	[0.12]	[-0.93]	[1.51]	[0.72]	[1.47]	[1.13]	[0.28]	[0.78]
$[-5, 5]$	0.034	0.039	-0.017	0.001	**0.034**$^{a,[c]}$	**0.033**$^{a,[b]}$	**0.064**$^{a,[\cdot]}$	**0.087**$^{c,[\cdot]}$	**0.121**$^{a,[\cdot]}$
	(1.47)	(0.59)	(-0.48)	(0.44)	(2.61)	(3.04)	(3.30)	(1.69)	(3.57)
	[0.91]	[0.41]	[-0.30]	[0.23]	[1.67]	[2.44]	[1.27]	[0.66]	[1.35]
$[-7, 7]$	0.057	0.022	**-0.036**$^{a,[c]}$	**-0.009**$^{b,[\cdot]}$	0.004	**0.032**$^{c,[\cdot]}$	**0.095**$^{b,[\cdot]}$	0.068	**0.154**$^{a,[\cdot]}$
	(1.50)	(-0.26)	(-2.67)	(-2.51)	(0.32)	(1.81)	(2.57)	(0.91)	(2.67)
	[0.93]	[-0.18]	[-1.65]	[-1.30]	[0.20]	[1.45]	[0.99]	[0.36]	[1.02]

Table to be continued

Table A-4 – continued

	Non-peripheral countries						Peripheral countries		
	Austria	Belgium	Finland	France	Germany	Netherl.	Italy	Portugal	Spain
# of banks	4	4	4	18	13	5	26	4	8
Panel B: December 22, 2011 (first three-year LTRO cash settlement)									
$[0, 1]$	0.008	-0.022	0.020	-0.007	**-0.017**$^{a,[c]}$	-0.004	-0.002	0.032	-0.013
	(0.58)	(-1.03)	(0.86)	(-0.65)	(-2.70)	(-0.53)	(-0.05)	(0.90)	(-1.65)
	[0.36]	[-0.72]	[0.49]	[-0.33]	[-1.84]	[-0.37]	[-0.02]	[0.36]	[-0.63]
$[0, 3]$	0.022	-0.010	0.008	-0.001	-0.002	0.001	-0.014	**0.122**$^{c,[\cdot]}$	**-0.022**$^{b,[\cdot]}$
	(1.07)	(-0.42)	(0.77)	(-0.03)	(-1.24)	(0.02)	(-1.30)	(1.86)	(-2.08)
	[0.66]	[-0.30]	[0.44]	[-0.01]	[-0.85]	[0.02]	[-0.50]	[0.74]	[-0.79]
$[-1, 1]$	0.011	**-0.025**$^{c,[\cdot]}$	0.014	0.002	-0.008	**0.008**$^{c,[\cdot]}$	0.009	0.042	**-0.016**$^{c,[\cdot]}$
	(0.43)	(-1.94)	(0.53)	(1.28)	(-0.26)	(1.80)	(0.77)	(0.99)	(-1.77)
	[0.26]	[-1.35]	[0.30]	[0.66]	[-0.18]	[1.26]	[0.29]	[0.40]	[-0.67]
$[-1, 3]$	0.025	-0.014	0.002	**0.008**$^{c,[\cdot]}$	0.007	**0.013**$^{a,[b]}$	-0.003	**0.132**$^{c,[\cdot]}$	**-0.026**$^{b,[\cdot]}$
	(0.81)	(-0.97)	(0.23)	(1.83)	(0.24)	(2.84)	(0.26)	(1.83)	(-2.11)
	[0.50]	[-0.68]	[0.13]	[0.94]	[0.16]	[1.99]	[0.10]	[0.73]	[-0.80]
$[-3, 3]$	**0.041**$^{b,[\cdot]}$	**0.016**$^{c,[\cdot]}$	0.021	**0.020**$^{b,[\cdot]}$	0.012	0.021	0.015	0.111	**0.029**$^{a,[\cdot]}$
	(2.32)	(1.78)	(1.45)	(2.10)	(0.92)	(0.88)	(1.30)	(1.32)	(2.67)
	[1.43]	[1.24]	[0.83]	[1.08]	[0.62]	[0.62]	[0.50]	[0.53]	[1.01]
$[-5, 5]$	**0.072**$^{b,[\cdot]}$	0.068	**0.018**$^{b,[\cdot]}$	0.016	0.006	0.020	0.036	**0.189**$^{a,[c]}$	**0.017**$^{b,[\cdot]}$
	(2.47)	(1.53)	(2.24)	(0.80)	(1.03)	(1.16)	(1.53)	(4.37)	(2.50)
	[1.52]	[1.07]	[1.27]	[0.41]	[0.70]	[0.82]	[0.59]	[1.74]	[0.95]
$[-7, 7]$	**0.079**$^{a,[c]}$	0.043	0.044	-0.000	0.029	0.017	0.032	0.102	0.004
	(3.11)	(0.12)	(1.35)	(-0.86)	(1.31)	(1.21)	(0.64)	(-0.79)	(0.57)
	[1.91]	[0.08]	[0.77]	[-0.44]	[0.89]	[0.85]	[0.24]	[-0.31]	[0.21]

Table to be continued

Table A-4 – continued

	Non-peripheral countries						Peripheral countries		
	Austria	Belgium	Finland	France	Germany	Netherl.	Italy	Portugal	Spain
# of banks	4	4	4	18	13	5	26	4	8
Panel C: March 1, 2012 (second three-year LTRO cash settlement)									
$[0,1]$	0.002	**0.007**$^{c,[\cdot]}$	-0.006	0.002	0.011	0.005	**0.025**$^{a,[\cdot]}$	-0.007	0.020
	(0.52)	(1.92)	(-0.55)	(-0.09)	(0.71)	(0.50)	(4.28)	(-0.51)	(0.31)
	[0.39]	[1.47]	[-0.37]	[-0.04]	[0.47]	[0.41]	[1.65]	[-0.20]	[0.12]
$[0,3]$	-0.005	0.001	-0.009	0.002	-0.012	0.005	**0.021**$^{a,[\cdot]}$	-0.013	0.011
	(0.40)	(1.36)	(-0.59)	(0.08)	(-0.99)	(0.88)	(3.32)	(-0.78)	(-0.60)
	[0.29]	[1.05]	[-0.40]	[0.04]	[-0.66]	[0.72]	[1.27]	[-0.31]	[-0.23]
$[-1,1]$	0.017	0.011	0.006	**0.008**$^{c,[\cdot]}$	**0.022**$^{b,[\cdot]}$	**-0.010**$^{c,[\cdot]}$	**0.033**$^{a,[c]}$	-0.000	0.020
	(1.20)	(1.30)	(0.87)	(1.75)	(2.00)	(-1.83)	(4.34)	(0.44)	(0.32)
	[0.88]	[1.00]	[0.59]	[0.81]	[1.33]	[-1.49]	[1.67]	[0.17]	[0.12]
$[-1,3]$	0.010	0.005	0.003	0.007	-0.001	-0.010	**0.030**$^{a,[\cdot]}$	-0.006	0.010
	(1.41)	(0.85)	(0.63)	(1.60)	(0.82)	(-1.24)	(3.55)	(-0.10)	(-0.54)
	[1.04]	[0.65]	[0.43]	[0.74]	[0.54]	[-1.01]	[1.36]	[-0.04]	[-0.21]
$[-3,3]$	**0.008**$^{c,[\cdot]}$	0.016	-0.003	**0.010**$^{b,[\cdot]}$	-0.003	-0.007	0.016	0.013	**-0.016**$^{c,[\cdot]}$
	(1.81)	(1.57)	(-0.86)	(1.98)	(0.55)	(-0.92)	(-0.02)	(0.34)	(-1.87)
	[1.33]	[1.20]	[-0.59]	[0.91]	[0.36]	[-0.75]	[-0.01]	[0.14]	[-0.72]
$[-5,5]$	**0.042**$^{a,[a]}$	**0.042**$^{a,[b]}$	**0.001**$^{a,[a]}$	**0.035**$^{a,[\cdot]}$	0.033	-0.010	**0.004**$^{c,[\cdot]}$	**-0.020**$^{b,[\cdot]}$	**-0.058**$^{a,[\cdot]}$
	(3.73)	(3.20)	(6.16)	(3.18)	(1.42)	(-0.51)	(-1.80)	(-2.10)	(-4.06)
	[2.75]	[2.45]	[4.19]	[1.47]	[0.94]	[-0.41]	[-0.69]	[-0.83]	[-1.56]
$[-7,7]$	-0.008	**0.041**$^{a,[b]}$	-0.001	**0.035**$^{a,[\cdot]}$	0.025	-0.028	-0.002	**-0.082**$^{a,[c]}$	**-0.062**$^{a,[\cdot]}$
	(-0.49)	(2.73)	(1.33)	(3.52)	(0.21)	(-0.71)	(0.47)	(-4.36)	(-2.66)
	[-0.36]	[2.10]	[0.90]	[1.63]	[0.14]	[-0.57]	[0.18]	[-1.73]	[-1.02]

Supplementary Table A-5

Comparison of abnormal returns on bank indices on event versus non-event days per country. This table compares estimated abnormal returns on event to those on non-event days for the bank index return sample by country. Numbers are in percentage points. Countries are classified into non-peripheral and peripheral countries as indicated in the table. Each of the three panels provides sample means, medians, standard deviations, and number of observations on event days and non-event days. In each panel and for each country the table shows two-sample t-tests for equal means, Kruskal-Wallis χ^2-tests for equal medians, and variance-ratio F-tests for equal variances comparing event and non-event day abnormal returns. Abnormal returns are estimated with the market model in Eq. 2 (by replacing subscript i by subscript c) using the estimation window $[T_0, T_1] = [-192, -8]$ for each event (panel) separately. $r_{m,t}$ is based on a country-level total market return index (see Section 3). For each country in each panel the tests are based on a total of $[-192, 7] = 200$ days: $[-7, 7] = 15$ event days and $[-192, -8] = 185$ non-event days. In Panel A, $t = 0$ is the announcement of the three-year LTROs on December 8, 2011. In Panel B (C), $t = 0$ represents the first (second) three-year LTRO cash settlement on December 22, 2011 (March 1, 2012). Test statistics and corresponding means, medians, and/or variances that are significant at the level of at least 10% are marked in bold. a, b, and c next to the test statistics denote significance at the levels of 1%, 5%, and 10%, respectively.

		Non-peripheral countries							Peripheral countries				
		Austria	Belgium	Finland	France	Germany	Malta	Netherl.	Greece	Italy	Portugal	Spain	Cyprus
Panel A: December 8, 2011 (announcement of three-year LTROs)													
Event	Mean	0.323	0.864	0.515	0.130	0.386	-0.002	**-0.651**	**-1.818**	0.402	-0.496	0.241	-0.159
days	Med	0.263	1.338	**0.525**	-0.428	-0.007	0.020	**-0.879**	**-0.815**	0.264	-0.135	0.158	0.082
	SD	2.191	5.352	1.222	2.381	1.702	0.195	1.380	2.802	0.961	3.392	0.777	2.258
	Obs	15	15	15	15	15	15	15	15	15	15	15	15
Non-	Mean	-0.000	0.000	0.000	-0.000	-0.000	-0.000	**-0.000**	**0.000**	-0.000	-0.000	-0.000	0.000
event	Med	0.096	0.018	**-0.043**	-0.096	-0.142	0.006	**0.064**	**0.006**	-0.067	-0.014	-0.060	0.003
days	SD	1.448	2.315	1.087	2.043	1.704	0.258	1.467	2.889	1.308	2.231	0.637	1.918
	Obs	185	185	185	185	185	185	185	185	185	185	185	185
Event vs non-event days:	*Test for equal*												
means	TT t-stat	-0.561	-0.621	-1.583	-0.206	-0.844	0.032	**1.749**^{c}	**2.412**^{b}	-1.511	0.556	-1.167	0.264
	TT p-val	0.583	0.544	0.133	0.839	0.411	0.975	0.099	0.028	0.148	0.586	0.261	0.795
meds	KW χ^2-stat	0.678	0.292	**3.331**^{c}	0.272	0.773	0.002	**4.562**^{b}	**5.325**^{b}	1.741	0.258	1.982	0.016
	KW p-val	0.410	0.589	0.068	0.602	0.379	0.968	0.033	0.021	0.187	0.612	0.159	0.899
vars	VR F-stat	**0.437**^{b}	**0.187**^{a}	0.791	0.737	1.003	1.762	1.130	1.063	1.851	**0.433**^{b}	0.672	0.721
	VR p-val	0.013	0.000	0.467	0.356	0.916	0.224	0.848	0.967	0.187	0.012	0.238	0.327

Table to be continued

Table A-5 – continued

		Non-peripheral countries							Peripheral countries				
		Austria	Belgium	Finland	France	Germany	Malta	Netherl.	Greece	Italy	Portugal	Spain	Cyprus
Panel B: December 22, 2011 (first three-year LTRO settlement)													
Event	Mean	0.265	-0.399	0.164	-0.473	0.157	0.055	0.553	-0.349	-0.143	1.271	0.068	0.813
days	Med	0.451	-0.027	0.134	-0.720	0.106	0.006	0.114	0.179	-0.128	**1.508**	0.018	0.925
	SD	1.433	1.954	0.652	1.147	0.924	0.360	2.066	1.970	1.244	3.318	0.503	2.713
	Obs	15	15	15	15	15	15	15	15	15	15	15	15
Non-	Mean	0.000	-0.000	0.000	0.000	0.000	-0.000	-0.000	-0.000	0.000	-0.000	-0.000	-0.000
event	Med	0.084	-0.012	-0.069	-0.143	-0.183	0.014	0.043	0.063	-0.063	**0.004**	-0.013	-0.058
days	SD	1.499	2.709	1.088	2.111	1.739	0.254	1.400	2.964	1.319	2.349	0.650	1.981
	Obs	185	185	185	185	185	185	185	185	185	185	185	185
Event vs non-event days: Test for equal													
means	TT t-stat	-0.687	0.735	-0.879	1.415	-0.581	-0.581	-1.018	0.630	0.425	-1.454	-0.489	-1.136
	TT p-val	0.501	0.471	0.389	0.171	0.567	0.570	0.325	0.536	0.676	0.166	0.631	0.274
meds	KW χ^2-stat	0.981	0.372	1.494	1.276	0.701	0.027	0.685	0.184	0.244	**5.092**^{b}	0.230	1.956
	KW p-val	0.322	0.542	0.222	0.259	0.402	0.869	0.408	0.668	0.621	0.024	0.631	0.162
vars	VR F-stat	1.094	1.922	**2.784**^{b}	**3.386**^{b}	**3.543**^{a}	**0.500**^{b}	**0.459**^{b}	**2.264**^{c}	1.126	**0.501**^{b}	1.667	**0.533**^{c}
	VR p-val	0.910	0.161	0.032	0.012	0.010	0.040	0.020	0.082	0.855	0.040	0.274	0.063
Panel C: March 1, 2012 (second three-year LTRO settlement)													
Event	Mean	0.087	0.225	-0.065	-0.084	0.083	0.068	-0.253	-0.275	-0.266	-0.798	-0.034	-0.253
days	Med	-0.109	0.534	0.029	-0.274	0.047	0.036	0.196	-0.252	-0.052	-0.650	-0.057	-0.952
	SD	1.455	1.984	0.739	1.141	1.090	0.516	1.937	2.477	0.903	2.111	0.441	3.317
	Obs	15	15	15	15	15	15	15	15	15	15	15	15
Non-	Mean	0.000	0.000	0.000	0.000	0.000	0.000	0.000	-0.000	0.000	0.000	0.000	-0.000
event	Med	0.048	-0.126	-0.040	-0.147	-0.126	0.002	-0.008	0.158	-0.017	-0.044	-0.033	0.058
days	SD	1.732	3.103	1.051	2.235	1.923	0.261	1.594	3.293	1.575	2.881	0.692	2.426
	Obs	185	185	185	185	185	185	185	185	185	185	185	185
Event vs non-event days: Test for equal													
means	TT t-stat	-0.218	-0.400	0.317	0.249	-0.264	-0.507	0.492	0.403	1.020	1.365	0.274	0.290
	TT p-val	0.830	0.693	0.755	0.805	0.794	0.620	0.629	0.692	0.319	0.189	0.787	0.776
meds	KW χ^2-stat	0.001	0.244	0.071	0.006	0.333	0.098	0.157	0.378	0.455	1.816	0.007	0.865
	KW p-val	0.972	0.621	0.790	0.939	0.564	0.754	0.692	0.539	0.500	0.178	0.932	0.352
vars	VR F-stat	1.418	**2.446**^{c}	2.022	**3.841**^{a}	**3.114**^{b}	**0.256**^{a}	0.677	1.767	**3.044**^{b}	1.863	**2.458**^{c}	**0.535**^{c}
	VR p-val	0.465	0.058	0.132	0.006	0.018	0.000	0.246	0.222	0.021	0.182	0.057	0.065

Supplementary Table A-6

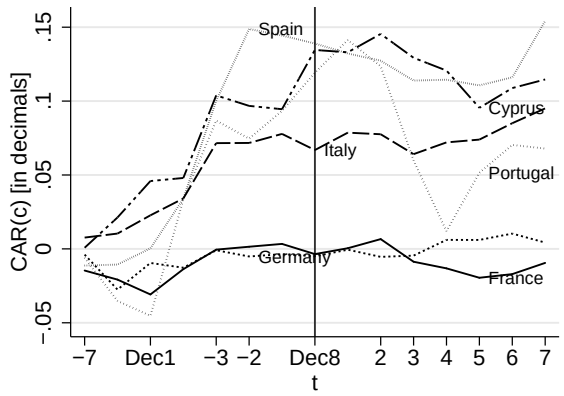
Cumulative average abnormal returns on bank indices by country assessed with Brown and Warner (1980)'s test statistic. This table provides CAR_c for seven different windows and the three events, as indicated in the table, based on country-level bank indices. Numbers are given in decimals. In Panel A, $t = 0$ is the announcement of the three-year LTROs (December 8, 2011). In Panel B (C), $t = 0$ represents the first (second) three-year LTRO cash settlement on December 22, 2011 (March 1, 2012). CAR_c for each bank index is calculated as the sum of $AR_{c,t}$ over the respective time window. Abnormal returns are estimated with the market model in Eq. 2 (by replacing subscript i by subscript c) using the estimation window $[T_0, T_1] = [-192, -8]$ for each event (panel) separately. $r_{m,t}$ is based on a country-level total market return index (see Section 3). Significance is evaluated using the test statistic proposed by Brown and Warner (1980) which is presented in brackets underneath the CAR_c. a, b, and c next to the CAR_c denote significance at the levels of 1%, 5%, and 10%, respectively.

	Non-peripheral countries							Peripheral countries				
	Austria	Belgium	Finland	France	Germany	Malta	Netherl.	Greece	Italy	Portugal	Spain	Cyprus
# of indices	1	1	1	1	1	1	1	1	1	1	1	1
Panel A: December 8, 2011 (announcement of three-year LTROs)												
$[0, 1]$	**-0.036**^{c}	-0.003	0.004	-0.009	-0.002	0.001	0.004	-0.002	-0.003	-0.008	0.000	0.033
	(-1.75)	(-0.08)	(0.26)	(-0.30)	(-0.08)	(0.19)	(0.19)	(-0.05)	(-0.15)	(-0.27)	(0.04)	(1.21)
$[0, 3]$	**-0.082**^{a}	-0.045	-0.003	-0.034	-0.017	-0.002	0.015	-0.089	-0.013	-0.059	-0.007	0.035
	(-2.82)	(-0.97)	(-0.16)	(-0.83)	(-0.49)	(-0.46)	(0.51)	(-1.53)	(-0.51)	(-1.32)	(-0.57)	(0.90)
$[-1, 1]$	-0.023	0.048	-0.010	-0.012	0.007	0.001	0.013	-0.032	-0.003	-0.022	0.002	0.018
	(-0.92)	(1.18)	(-0.51)	(-0.34)	(0.23)	(0.30)	(0.51)	(-0.63)	(-0.14)	(-0.56)	(0.17)	(0.53)
$[-1, 3]$	**-0.069**^{b}	0.005	-0.017	-0.037	-0.008	-0.002	0.024	**-0.119**^{c}	-0.014	-0.073	-0.006	0.019
	(-2.12)	(0.09)	(-0.70)	(-0.81)	(-0.21)	(-0.30)	(0.73)	(-1.83)	(-0.47)	(-1.44)	(-0.40)	(0.45)
$[-3, 3]$	-0.037	0.071	0.007	0.006	-0.015	-0.003	0.018	-0.124	-0.001	-0.070	0.009	0.028
	(-0.97)	(1.16)	(0.25)	(0.11)	(-0.33)	(-0.49)	(0.47)	(-1.61)	(-0.03)	(-1.18)	(0.54)	(0.56)
$[-5, 5]$	0.025	**0.238**^{a}	0.046	0.035	0.074	-0.004	-0.042	**-0.203**^{b}	0.060	-0.040	**0.036**^{c}	0.059
	(0.52)	(3.07)	(1.26)	(0.52)	(1.30)	(-0.41)	(-0.85)	(-2.10)	(1.37)	(-0.54)	(1.70)	(0.91)
$[-7, 7]$	0.048	0.130	**0.077**^{c}	0.020	0.058	-0.000	**-0.098**^{c}	**-0.273**^{b}	0.060	-0.074	0.036	-0.024
	(0.86)	(1.43)	(1.82)	(0.25)	(0.87)	(-0.03)	(-1.70)	(-2.42)	(1.18)	(-0.85)	(1.45)	(-0.32)

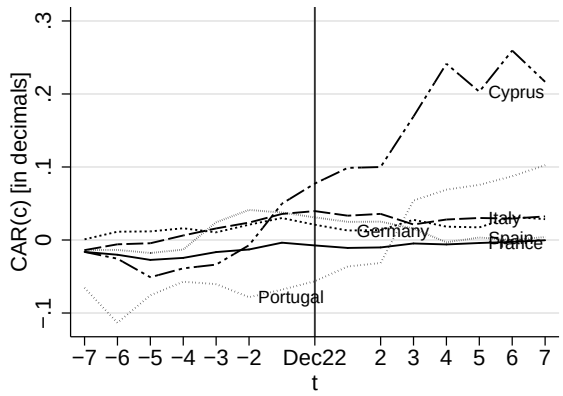
Table to be continued

Table A-6 – continued

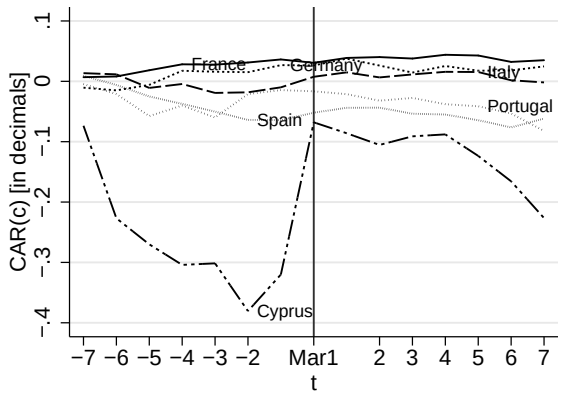
	Non-peripheral countries							Peripheral countries				
	Austria	Belgium	Finland	France	Germany	Malta	Netherl.	Greece	Italy	Portugal	Spain	Cyprus
# of indices	1	1	1	1	1	1	1	1	1	1	1	1
Panel B: December 22, 2011 (first three-year LTRO cash settlement)												
$[0,1]$	0.019	-0.045	0.004	-0.006	0.023	-0.002	**0.046**^{b}	0.007	-0.021	**0.065**^{c}	-0.005	0.035
	(0.90)	(-1.15)	(0.29)	(-0.21)	(0.91)	(-0.60)	(2.29)	(0.18)	(-1.11)	(1.95)	(-0.51)	(1.22)
$[0,3]$	0.031	-0.039	-0.001	-0.020	0.018	-0.008	**0.093**^{a}	0.024	-0.035	**0.165**^{a}	-0.005	0.054
	(1.02)	(-0.72)	(-0.06)	(-0.47)	(0.52)	(-1.52)	(3.29)	(0.40)	(-1.33)	(3.47)	(-0.36)	(1.35)
$[-1,1]$	0.030	-0.050	0.007	-0.020	0.030	0.006	**0.049**^{b}	0.013	-0.023	**0.087**^{b}	-0.004	**0.072**^{b}
	(1.14)	(-1.05)	(0.38)	(-0.54)	(0.98)	(1.36)	(2.01)	(0.26)	(-0.99)	(2.13)	(-0.31)	(2.08)
$[-1,3]$	0.041	-0.044	0.001	-0.033	0.026	0.000	**0.096**^{a}	0.030	-0.037	**0.187**^{a}	-0.004	**0.091**^{b}
	(1.23)	(-0.72)	(0.06)	(-0.70)	(0.66)	(0.08)	(3.05)	(0.45)	(-1.25)	(3.52)	(-0.24)	(2.05)
$[-3,3]$	0.034	-0.043	0.025	-0.018	0.031	0.002	0.055	0.007	-0.014	**0.183**^{a}	0.003	**0.109**^{b}
	(0.84)	(-0.59)	(0.87)	(-0.31)	(0.68)	(0.35)	(1.46)	(0.09)	(-0.41)	(2.93)	(0.17)	(2.06)
$[-5,5]$	0.071	-0.027	0.014	-0.021	0.035	0.005	**0.085**^{c}	0.040	-0.008	**0.259**^{a}	0.021	**0.133**^{b}
	(1.41)	(-0.29)	(0.38)	(-0.30)	(0.60)	(0.63)	(1.82)	(0.40)	(-0.18)	(3.30)	(0.96)	(2.01)
$[-7,7]$	0.040	-0.060	0.025	-0.071	0.024	0.008	0.083	-0.052	-0.021	**0.191**^{b}	0.010	0.122
	(0.68)	(-0.57)	(0.58)	(-0.86)	(0.35)	(0.83)	(1.52)	(-0.45)	(-0.42)	(2.08)	(0.40)	(1.58)
Panel C: March 1, 2012 (second three-year LTRO cash settlement)												
$[0,1]$	0.010	0.024	0.010	0.010	0.012	0.002	-0.023	0.005	0.001	-0.029	0.000	**0.077**^{b}
	(0.40)	(0.54)	(0.65)	(0.31)	(0.45)	(0.58)	(-1.03)	(0.11)	(0.03)	(-0.71)	(0.04)	(2.24)
$[0,3]$	0.007	0.019	-0.004	0.004	0.003	**0.009**^{c}	-0.029	0.048	0.001	-0.025	-0.007	**0.105**^{b}
	(0.20)	(0.30)	(-0.21)	(0.10)	(0.09)	(1.73)	(-0.89)	(0.72)	(0.02)	(-0.44)	(-0.50)	(2.14)
$[-1,1]$	0.048	0.032	0.012	0.015	0.022	0.003	-0.021	0.006	0.008	-0.021	0.006	**0.084**^{b}
	(1.59)	(0.60)	(0.67)	(0.39)	(0.66)	(0.60)	(-0.77)	(0.10)	(0.28)	(-0.41)	(0.48)	(1.97)
$[-1,3]$	0.045	0.027	-0.002	0.010	0.013	0.010	-0.027	0.048	0.008	-0.017	-0.002	**0.111**^{b}
	(1.16)	(0.39)	(-0.08)	(0.19)	(0.31)	(1.65)	(-0.74)	(0.65)	(0.22)	(-0.26)	(-0.11)	(2.03)
$[-3,3]$	0.042	0.038	0.018	0.008	0.007	0.008	-0.009	0.032	0.004	0.004	-0.007	0.085
	(0.90)	(0.45)	(0.62)	(0.13)	(0.13)	(1.17)	(-0.21)	(0.36)	(0.09)	(0.06)	(-0.35)	(1.31)
$[-5,5]$	0.065	0.084	0.012	0.023	0.050	0.002	-0.030	0.047	0.001	-0.050	0.006	0.070
	(1.13)	(0.81)	(0.33)	(0.31)	(0.77)	(0.26)	(-0.57)	(0.43)	(0.03)	(-0.52)	(0.26)	(0.86)
$[-7,7]$	0.013	0.034	-0.010	-0.013	0.012	0.010	-0.038	-0.041	-0.040	-0.120	-0.005	-0.038
	(0.19)	(0.28)	(-0.24)	(-0.14)	(0.17)	(1.00)	(-0.61)	(-0.32)	(-0.65)	(-1.06)	(-0.19)	(-0.40)



Announcement

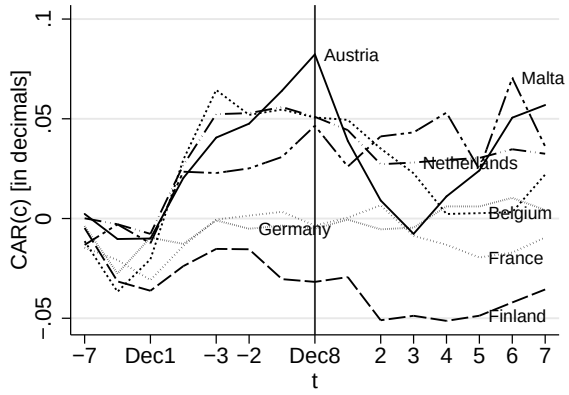


1st cash settlement

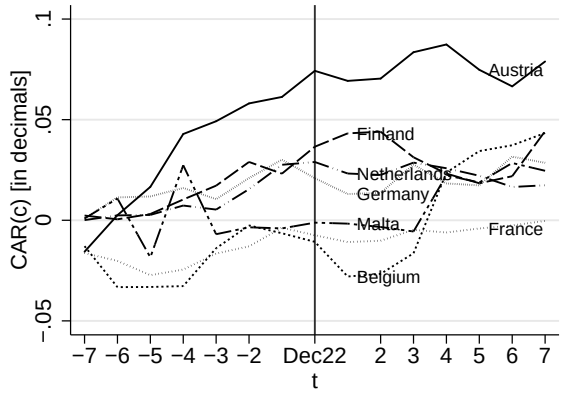


2nd cash settlement

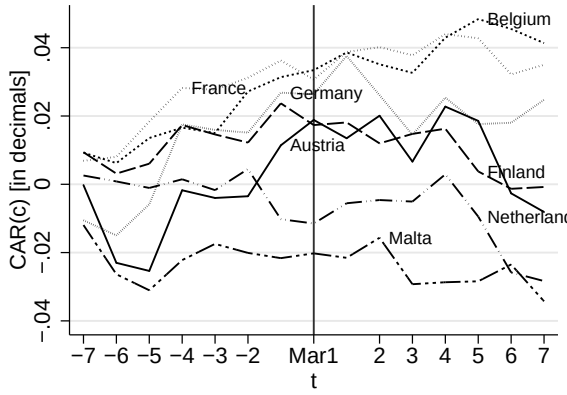
Panel A: Large Eurozone and peripheral countries (except for Greece)



Announcement

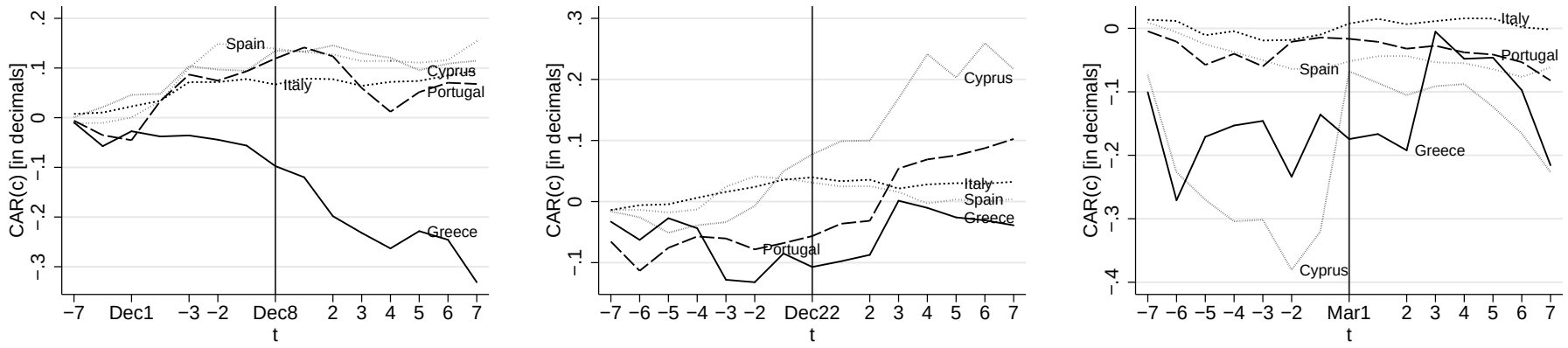


1st cash settlement



2nd cash settlement

Panel B: Non-peripheral countries

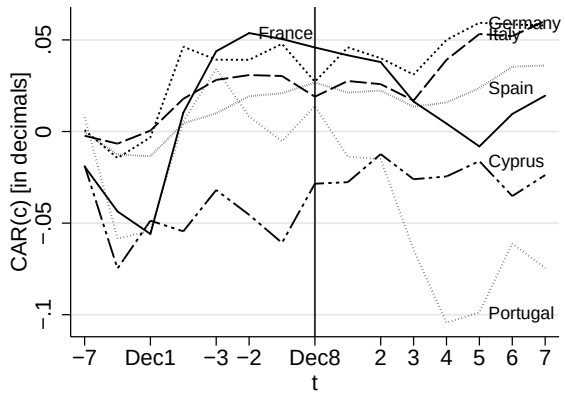


Announcement | 1st cash settlement | 2nd cash settlement

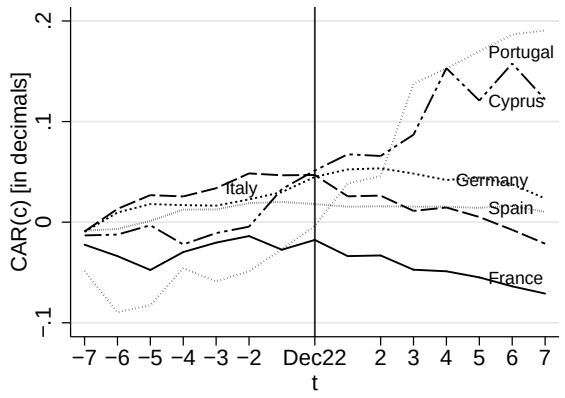
Panel C: Peripheral countries

Supplementary Figure A-1

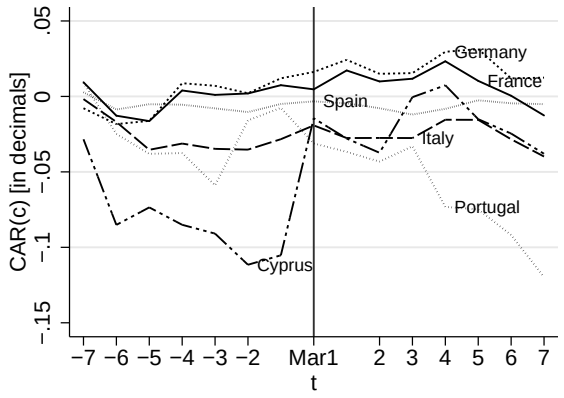
Average cumulative abnormal returns on bank stocks by country using the STOXX Europe 600 index. This figure is based on the bank stock sample and provides country-level averages of cumulative abnormal returns, CAR_c, across banks, CAR_i, for the three different events separately. CAR_i is the sum over abnormal returns for bank i, $AR_{i,t}$, over the event window $[-7, 7]$. $AR_{i,t}$ is estimated from the market model in Eq. 2 using the estimation window $[T_0, T_1] = [-192, -8]$ for each event separately. $r_{m,t}$ is, for each country, based on the STOXX Europe 600 index. The three columns of subplots represent the three events indicated by vertical lines in each subplot: announcement, 1st cash settlement, and 2nd cash settlement of the three-year LTROs on December 8, 2011, December 22, 2011, and March 1, 2012, respectively. The vertical line at December 1, 2011 in the first column of subplots represents the ECB's first indication of large-scale help for banks. Panel A covers large Eurozone countries (Germany and France) as well as peripheral countries (except for Greece). Panels B and C cover non-peripheral and peripheral countries, respectively.



Announcement

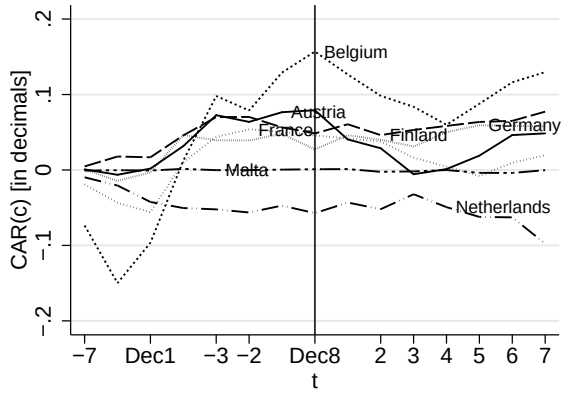


1st cash settlement

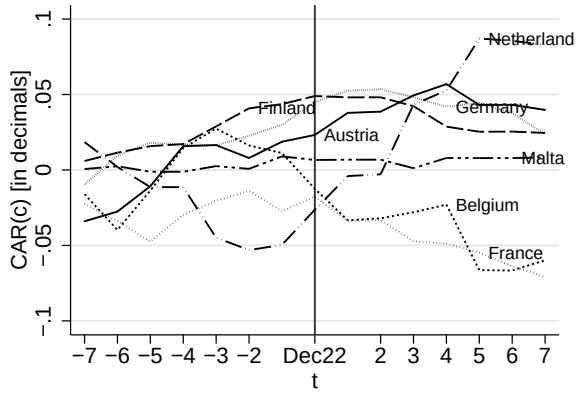


2nd cash settlement

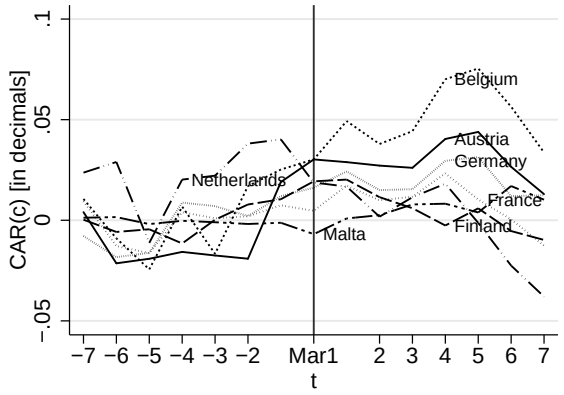
Panel A: Large Eurozone and peripheral countries (except for Greece)



Announcement

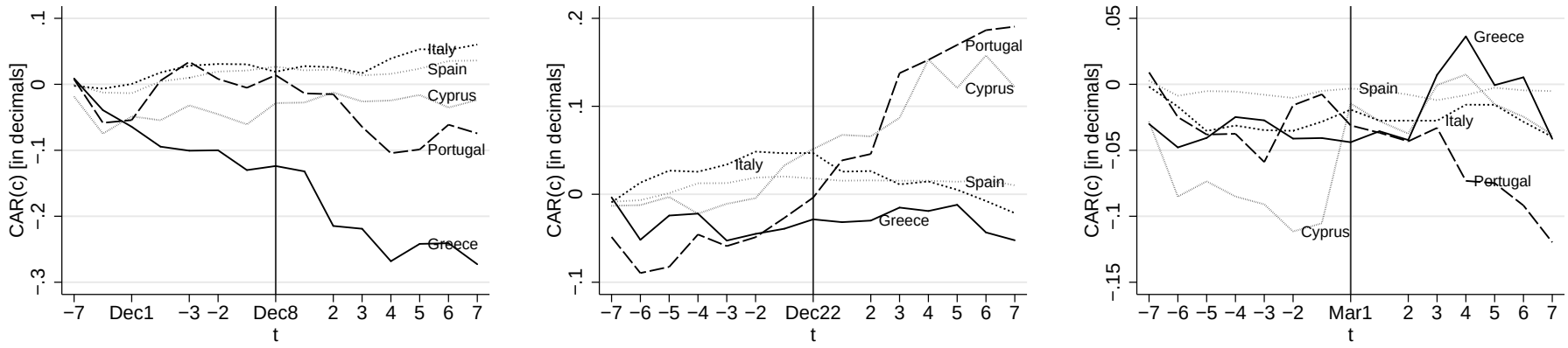


1st cash settlement



2nd cash settlement

Panel B: Non-peripheral countries



Announcement | 1st cash settlement | 2nd cash settlement

Panel C: Peripheral countries

Supplementary Figure A-2

Average cumulative abnormal returns on bank indices by country using country-level market index. This figure is based on the bank index sample and provides cumulative abnormal returns, CAR_c for the three different events separately. CAR_c is the sum over abnormal returns in country c, $AR_{c,t}$, over the event window $[-7, 7]$. $AR_{c,t}$ is estimated from the market model in Eq. 2 but using subscript c instead of i and using the estimation window $[T_0, T_1] = [-192, -8]$ for each event separately. $r_{m,c}$ is based on a country-level total market return index (for details see Section 3). The three columns of subplots represent the three events indicated by vertical lines in each subplot: announcement, 1st cash settlement, and 2nd cash settlement of the three-year LTROs on December 8, 2011, December 22, 2011, and March 1, 2012, respectively. The vertical line at December 1, 2011 in the first column of subplots represents the ECB's first indication of large-scale help for banks. Panel A covers large Eurozone countries (Germany and France) as well as peripheral countries (except for Greece). Panels B and C cover non-peripheral and peripheral countries, respectively.