A Tale of Two Eurozones: Banks's Funding, Sovereign Risk Unconventional Monetary Policies

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Banks's Funding, Sovereign Risk & Unconventional Monetary Policies

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Abstract

The admission by the Greek government on October 18, 2009, of large-scale accounting fraud in its national accounts sparked an unprecedented sovereign debt crisis that rapidly spread to the Eurozone's weakest member states. As the crisis increasingly drove a wedge between a seemingly resilient Eurozone core and its faltering periphery, its first collateral victims were the private banks of the hardest-hit sovereigns. They were rapidly followed by the rest of the Eurozone's banks as a result of their large exposure to not only their home country's sovereign debt, but also to the debt securities of other member states. Measuring each bank's precise exposure to every sovereign issuer became a key issue for credit analysis in the attempt to assess the potential impact of a selective sovereign default if worse came to worst. Yet finding that information in a timely manner is hardly an easy task, as banks are not required to disclose it. Building on the efficient market hypothesis in the presence of informed traders, we tested the sensitivity of each of the largest Eurozone private banks' CDSs to sovereign CDSs using a simple autoregressive model estimated by time-series regressions and panel regressions, comparing the results to news releases to assess its reliability. Eventually, we used the Oaxaca Blinder decomposition to measure whether the unconventional monetary policies, namely the LTRO and the OMT, that the ECB has implemented to stem the crisis have helped banks directly or whether banks were actually helped by the reduction in sovereign CDS spreads.

Keywords: Private Banks, Central Banks, Sovereign Debt Risk, OMT, LTRO, Non-Conventional Monetary Policies, Eurozone's Sovereign Debt Crisis, Oaxaca-Blinder Decomposition.

JEL classification: C58, D82, E52, G01, G14, G15, G21, G24, N14.

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Contents

Introduction:

Had the European Central Bank (ECB) not staged a massive intervention, the tenth anniversary of the Eurozone could easily have coincided with the implosion of the single currency. Few economists still doubt the actions of the ECB were both appropriate and sufficient. In fact, the ECB's announcement of massive long term refinancing operations in December 2011 is the most likely cause of the ensuing significant decrease of sovereign CDS spreads, which had spiked to unprecedented levels. This signaled, if not the end of the crisis, then at least the end of its most acute phase. Over the course of the following months, further easing of collateral requirements and the announcement of a whole new set of unconventional measures on secondary sovereign debt markets firmly reinstated the belief that the euro had truly been made "irreversible", as stated by ECB President Mario Draghi when providing details on the *Outright Monetary Transaction* (OMT) mechanism later that year (Draghi, 2012).

Yet the apparent resolution of the sovereign debt scare propelled another interesting debate into the public sphere: had the ECB's interventions been more helpful to the Treasuries of peripheral Eurozone member states or to private banks holding vast amounts of government bonds. In other words, were taxpayers again at risk of bailing out large financial institutions less than two years after the whole sector had been either recapitalized or fully nationalized by states and therefore by taxpayers' money? As austerity bites down on some of the hardest-hit countries in the Eurozone's periphery, this interesting economic discussion gained a whole new dimension in the public sphere. This paper investigates this issue.

Banks are affected by a deterioration in the creditworthiness of their home countries in more than one way, as evidenced by (Panetta, et al., 2011): the first one is that corporate CDS are mostly traded as spreads on their home country sovereign debt, thus upward movement on the base CDS generally affects the spreads of all the securities based on them. Secondly, states offer implicit guaranties for the bank creditors ("too big to fail" or "too interconnected too fail") as the sequence of crises in the last decade starkly reminded us. Thus, an apparent decrease in the creditworthiness of the state is interpreted as a reduction in the value of the insurance, thus also a decrease in the creditworthiness of the bank incorporated in that country. And it is possible that, as we recently witnessed in Cyprus with the failure of *Laiki Bank* and the bail-in/bail-out of *Bank of Cyprus*, some banks hoard vast quantities of government bonds from their home state (Zoli, 2013) and (Bofondi, Carpinelli, & Sette, 2012), or from abroad (Greece in the case of Cypriot banks) for which the value decreases as their mark-to-market values adjust to movements in the discount rates or in the expected recovery rates. In the most extreme cases, debt renegotiations such as those for Greece (Petrakis & Christie, 2012) can directly imperil the principal of those securities (even if it usually implies a narrowing of the CDS spread and thus a reduction of the associated discount factor).

To this day, there is no requirement for private banks to disclose their exposure to foreign sovereign bonds. Information about bank holdings of various government bonds is thus the result of either voluntarily disclosure or exceptional disclosures, as occurred during the EU-wide bank stress tests sponsored by the *European Banking Authority* (EBA), *European Central Bank* (ECB) and national supervisory bodies in July 2010 and July 2011, or during the capital exercises in December 2011 (Bischof & Daske, 2012). Assessing the sovereign risk embedded in individual banks is thus a difficult exercise. Yet there is probably a large pool of informed traders dealing in CDS markets, which should thus signal to it the relative sensitivity of individual banks to a given sovereign credit risk. Following the work of (Maloney & Mulherin, 2003) on price formation in the presence of informed traders, we investigate this intuition using a very simple autoregressive (AR) model to test the market-implied sensitivities of banks' CDSs to sovereign CDSs.

Out of simplicity considerations, in this study we chose to measure bank risk and sovereign risk using CDS spreads as in (Chiaramontea & Casu, 2012), even if there is an active academic debate on whether bond and CDS markets share the same information as in (Arce, Mayordomo, & Peña, 2012), (O'Kane, 2012) or (Palladini & Portes, 2011). However, in this paper we chose to focus on the largest European banks, which are precisely those that have the most liquid CDSs according to (Markit). We should thus expect liquidity problems to have a lesser distortionary impact on our sensitivity measurements.

This paper addresses two main research questions: firstly, do informed traders enable us to extract sovereign risk sensitivities for individual banks from market quotations, thus giving us hints regarding their real exposure to individual sovereign risks? Secondly, building upon the sensitivity analysis conducted in the first step, can we break down the impact of unconventional monetary policies implemented by the ECB into, on the one hand, the "pure impact" of the ECB's measures (i.e. independent from sovereign risk considerations) and, on the other hand, the relaxation of their funding stress attributable to relaxation in sovereign funding? In other words, did the ECB's action help banks directly, or indirectly by relaxing sovereign funding conditions?

To address the first research question, we calibrated a conventional autoregressive model of order one AR(1) in the manner of that is usually used for sovereign CDS spreads, like (Sgherri & Zoli, 2009) or (Schuknecht, Hagen, & Wolswijk, 2011), assuming a relatively strong stationary hypothesis unlike the non-stationary co-integrated panel model used by (Giordano, Pericoli, & Tommasino, 2012). The calibration of the autoregressive parameter upholds this hypothesis, as we can consistently reject the integration hypothesis – except for the Greek banks without the inclusion of the Greek sovereign CDS – thus leading us to believe that we can assume the data to be sufficiently stationary for the purpose of this paper, consistently with prior literature on the subject of determinants of CDS spreads. We then compare the results of the calibration, namely the parameters that are statistically significant with both information that was public at the time regarding sovereign asset holdings and a map of their known wholly owned foreign retail banking subsidiaries inside the Eurozone. Overall, the results we get seem consistent with both controls.

Using the model calibrated previously, we then proceed in the manner of (Giordano, Pericoli, & Tommasino, 2012) following the model established by (Eichengreen & Mody,

2000) to disaggregate the role of *"Pure", "Shift"* and *"Wake-up-Call"* contagions in emerging economies. The "*Shift"* contagions arise from changes in the level of fundamental explanatory variables assuming constant sensitivities. The "*Wake-up-Call*" contagion is due to changes in the sensitivity towards explanatory exogenous variables of the model. Lastly, the residual "*Pure*" contagion cannot be attributed in any way to changes in the level of or sensitivities to the exogenous variables in the model. In our case, we know that the ECB's actions acted as a "reverse contagion", but we partially ignore the channel through which it operated, which brings us back to our research question regarding whether the observed reduction in bank funding costs immediately after the announcement of the LTRO and OMT operations is attributable to either "*Pure*" or "*Wake-up-Call*' reverse contagion, or whether it should be attributed to "*Shift*" reverse contagion. The first two types of effects would uphold the belief that unconventional monetary policies had a direct impact on bank funding stress, while the last one would tend to uphold the indirect channel hypothesis.

The calibration of the modified model to perform the *Oaxaca-Blinder* decomposition as in (Giordano, Pericoli, & Tommasino, 2012) requires a very large number of parameters to be estimated. Achieving statistical significance with the Matlab routines used, we had to include a minimum of 300 trading days (roughly a year) before and after the LTRO event. This had two major unintended consequences: firstly, the 600 trading-day window was too large to establish the effect of the LTRO, which seemed to have been much shorted according to a basic analysis of CDS data. Secondly, our dataset does not extend a year after the announcement of the OMT, thus making it difficult for us to perform the computation on this event.

To circumvent partially this time-window and data-availability problem, in a second step we proceed to a pooled OLS estimation of our model, which allowed us to focus on a one- to three-month data sample window. This approach has its own caveats: firstly, for short horizons, disentangling the noise of daily data from fundamental CDS movements seems more arduous, thus leading to weak parameter estimates except the firm-specific effects. Secondly, by using a homogeneous assumption regarding the value of the sensitivities of bank CDSs to sovereign CDSs and financial market proxies, we lose greatly in terms of model precision, thus also in terms of parameter determination, which could be detrimental to the strength of our findings.

The paper is constructed as following: the first part presents the dataset used to perform the analysis, the second one presents the model and estimates it in Time Series format. Lastly, a third part addresses the panel-data approach to compute an Oaxaca-Blinder decomposition over a shorter horizon. A discussion of the main results concludes.

1. Data:

1.1. Bank CDS

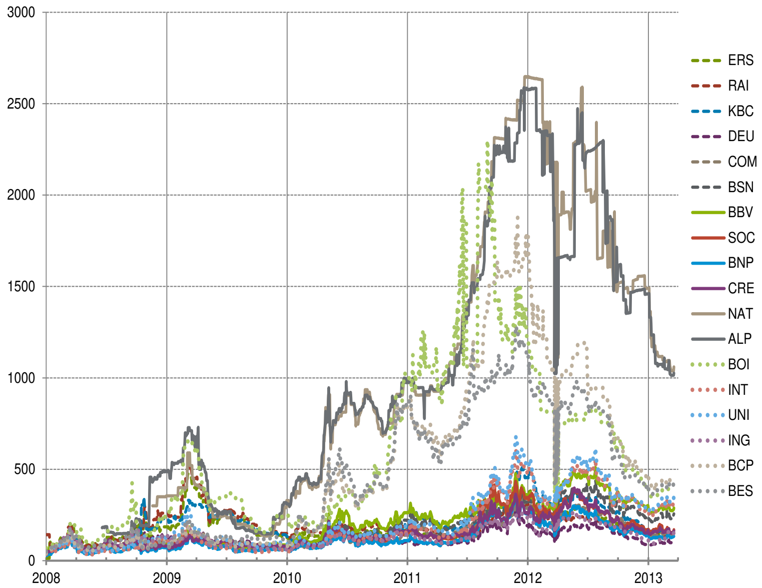
We tried to achieve the most comprehensive Eurozone bank dataset possible. Since we are investigating the role of international linkages, in particular the reverse contagion from peripheral Eurozone sovereigns to core private banks, we aimed to include the most systematically important financial institutions (SIFIs): those institutions are particularly active on the global financial markets and have liquid CDSs and equity stock prices. To avoid selection bias, we referred to the EBA's assessment of the Eurozone SIFIs (EBA, 2011). The downsizing of investment banks throughout Europe has lead a significant proportion of those banks to drop off the list, but since the current sovereign crisis and resultant banking crisis was caused by investment decisions taken prior to those restructuring events, we chose to take the list of banks that were significant at that time.

Table 1: Bank CDS's Characteristics

Shorthand	Full Bank Name	Home Country		#Obs.	CDS Type
ERS	ERSTE GROUP BANK AG	Austria	(AT)	1369	SNR MM 5Y E - CDS PREM. MID
RAI	RAIF ZNTRLBK OSTER AG		(AT)	1369	SNR MM 5Y E - CDS PREM. MID
KBC	KBC BANK	Belgium	(BE)	1369	SNR MM 5Y E - CDS PREM. MID
DEU	DEUTSCHE BANK AG	Germany	(DE)	1369	SNR MM 5Y E - CDS PREM. MID
COM	COMMERZBANK AG		(DE)	1369	SNR MM 5Y E - CDS PREM. MID
BSN	BANCO SANTANDER, SA	Spain	(SP)	1369	SNR XR 5Y E - CDS PREM. MID
BBV	BBV ARGENTARIA SA		(SP)	1369	SNR MM 5Y E - CDS PREM. MID
SOC	SOCIETE GENERALE	France	(FR)	1369	SNR MM 5Y E - CDS PREM. MID
BNP	BNP PARIBAS		(FR)	1369	SNR MM 5Y E - CDS PREM. MID
CRE	CREDIT AGRICOLE SA		(FR)	1369	SNR MM 5Y E - CDS PREM. MID
NAT	NAT BK OF GREECE SA	Greece	(GR)	852	SNR MM 5Y E - CDS PREM. MID
ALP	ALPHA BANK A.E.		(GR)	852	SNR MM 5Y E - CDS PREM. MID
BOI	THE GOVERNOR AND CO BOI	Ireland	(IE)	1369	SNR MM 5Y E - CDS PREM. MID
INT	INTESA SANPAOLO SPA	Italy	(IT)	1369	SNR CR 5Y E - CDS PREM. MID
UNI	UNICREDITO ITALIANO SPA		(IT)	1369	SNR MM 5Y E - CDS PREM. MID
ING	ING BANK N.V.	Netherlands	(NL)	1369	SNR CR 5Y E - CDS PREM. MID
BCP	BANCO COMR PORTUGUES SA	Portugal	(PT)	1369	SNR MM 5Y E - CDS PREM. MID
BES	BANCO ESPIRITO SANTO SA		(PT)	1369	SNR MM 5Y E - CDS PREM. MID

Out of the EBA's list of 30 financial institutions, we immediately excluded the seven non-Eurozone incorporated banks. Of the remaining 23 banks, we further excluded the three public or non-listed banks present in the sample: the *Bayerishe Landesbank* (Germany), the *Caixa General de Depositos* (Portugal) and *Rabobank* (Netherlands). Major debt restructuring, government guarantees or outright default lead to a lack of data available and forced us to exclude four other banks: *Dexia* (France), *Anglo Irish Bank* (Ireland), *Caixa de Barcelona (Spain)* and *Eurobank EFG* (Greece) had to be removed. Reflecting its national SIFIs status, the *Banco Espirito Santo* (Portugal) was added to the sample. We therefore have a sample of 16 large, private, Eurozone incorporated banks for which daily data is available on our entire test period ranging from January 2008 to April 2013. Since Greece technically defaulted in February 2012, we were not able to include the Greek SIFIs in our sample. We nonetheless created a supplementary restricted sample from November 2008 to February 2012, which includes both *Alpha Bank* (in place of *Eurobank EFG*) and *National Bank*. The five-year Senior CDS premia for all banks in the sample were retrieved in daily close format from *Thomson Reuters DataStream*. Most of these CDS were for the "*Modified Modified Restructuring*" (MM) type of credit events except for *Intesa Sanpaolo* and *ING Bank* which were for "*Full Restructure*" (CR) and *Banco Santander* which was for "*No Restructure*" (XR).

Figure 1: Five-Year CDS for the Eurozone's Large Private Banks

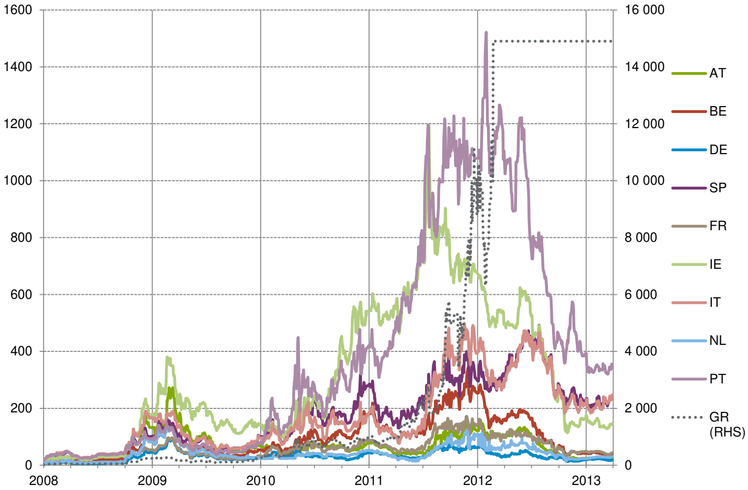


Source: Datastream.

1.2. Explanatory Variables: Sovereign CDS:

Since our model tries to estimate the impact of sovereign credit deteriorations throughout the Eurozone on bank funding conditions, and in particular to disentangle the LTRO's impact on their refinancing, the main explanatory variable of our model consists in the sovereign CDS spreads of the main Eurozone economies. We again chose the five-year sovereign CDS spreads of a selected group of sovereigns. Out of the current Eurozone 17-member club, we selected 11 by excluding *Finland*, *Luxembourg*, *Cyprus, Slovenia* and *Malta* because of their very small sovereign debt and *Slovakia* and *Estonia* because they joined the club only in the first half of the sample period (2011). It thus includes the five "core" economies (*Austria*, *Belgium*, *Germany*, *France* and the *Netherlands*) and the five "peripheral" countries (*Portugal*, *Ireland*, *Italy*, *Greece* and *Spain*) that have come to be known pejoratively as Europe's "*PIIGS"*. We thus collected again from *Thomson Reuters DataStream* the daily closes of the five-year CDS for all countries except Greece from January 2008 to April 2013. CDSs for Greece stopped trading on February 22, 2012, when it restructured its sovereign debt.

Figure 2: Eurozone's Sovereign CDS

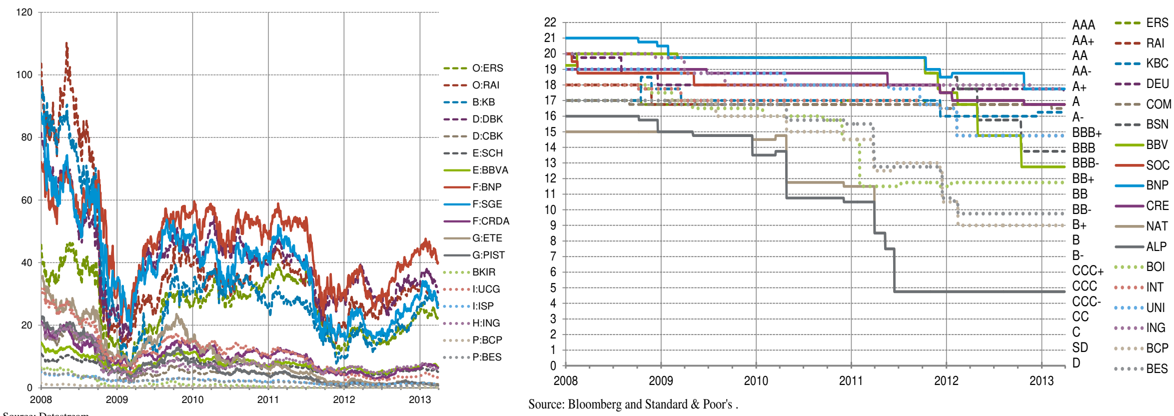


Source: Datastream.

1.3. Explanatory and Control Variables:

To control for firm-specific characteristics, we included in our analysis two control variables: its *Share Price* and its *Senior Debt Long Term Rating*. Daily closes of the share prices were downloaded from *Thomson Reuters DataStream* and so were *Standard & Poor's* long-term rating. To include this variable in the regression, we transformed the letter indicators into numeric input by linearly linking from D to AAA numbers from 1 to 22. To account for the rating outlook, we enhanced the rating by ¼ point for a "*Positive Outlook*" and by a ½ point for a "*Positive Watch*". Symmetrically, ratings were reduced by a ¼ point for "*Negative Outlook"* and by a ½ point for "*Negative Watch*".

Figure 3: Bank's share prices and S&P's long term ratings

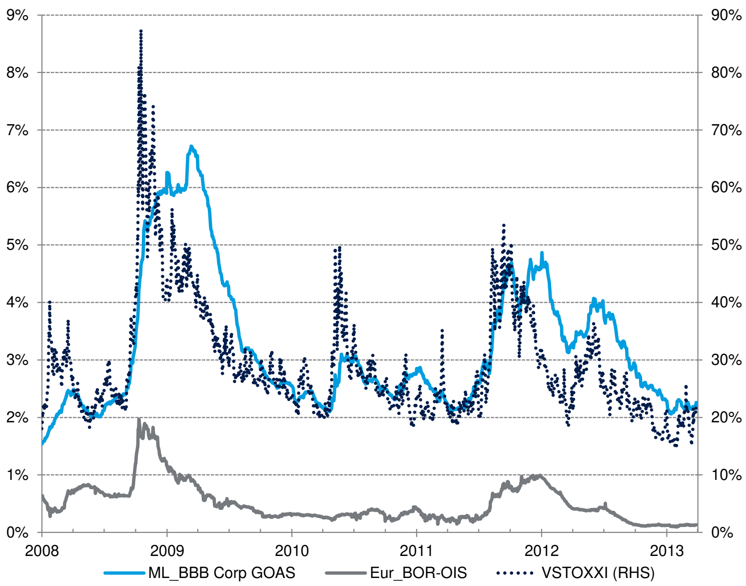


Source: Datastream.

Source: Bloomberg and Standard & Poor's .

As (Moody 2009) showed, the CDS spreads of both corporates and sovereigns in the pre-crisis era were determined mostly by global risk-aversion factors such as the VIX index (Chicago CBOE index on implied volatility on S&P500 Options), itself closely influencing credit markets. To focus explicitly on the Eurozone, we chose to control for *Global Risk Aversion* using the *VSTOXX* index (*STOXX* index of implied volatility on *EUROSTOXX 50* options). To account for the global credit risk-aversion factor, we included the *Meryl Lynch Euro BBB Corporate Government Option Adjusted Spread* (Er40_GOAS) in our analysis. To account for the state of the Eurozone's interbank market, we included the Euro's BOR-OIS Spread (Hull White), which is considered a good proxy. We obtained it by subtracting the three-month Euro-OIS from the three-month *Euribor* rate. All of these control variables were retrieved in daily close format from *Thomson Reuters DataStream*.

Figure 4: Global Risk Aversion, Credit Risk and Interbank Market confidence proxies:



Source: Datastream.

Eventually, we introduced our three specific-event dummy variables: the first one being the currently commonly accepted beginning of the Eurozone's sovereign crisis, that is, the official reckoning by the Greek government of massive accounting frauds on October 18, 2009. The second event-specific dummy we introduced was the announcement of the launch of LTROs by the ECB on December 8, 2011. Thirdly, we added a dummy to account for the ECB's change of policy announced on August 2, 2012, regarding OMT transactions. Unreported tests on different event-specific dummies proved inconclusive: the effect of LTROs might have been enhanced by including the two effective operation dates (December 20, 2011, and February 28, 2012) or the Greek technical sovereign default (or debt renegotiation) on March 9, 2012. The closeness of all those events leads to a restricted choice of only three: the G (Greek dummy), L (LTRO dummy) and the O (OMT dummy). All of the dummy variables are worth zero before the triggering event and 1 after it.

2. Time Series Regressions:

2.1. Time Series Model:

In accordance with the current financial literature, we wish to fit on our data the following AR(1) model:

$$CDS_{i,t}^{Bank} = \alpha_i \underbrace{\begin{pmatrix} 1 \\ CDS_{i,t-1}^{Bank} \end{pmatrix}}_{AR(1)\ Factor} + \beta_i \underbrace{\begin{pmatrix} CDS_{t,1}^{Svgn} \\ \vdots \\ CDS_{t,N}^{Svgn} \end{pmatrix}}_{Explanatory} + \gamma_i \underbrace{\begin{pmatrix} VSTOXX_t \\ BOROIS_t \\ BBB^{GOAS}{}_t \end{pmatrix}}_{Common\ Factors} + \delta_i \underbrace{\begin{pmatrix} ShareP_{i,t} \\ Rating_{i,t} \end{pmatrix}}_{Firm\ Specific\ Factors} + \theta_i \underbrace{\begin{pmatrix} \mathbb{G}_t \\ \mathbb{L}_t \\ \mathbb{O}_t \end{pmatrix}}_{Dummies} + \varepsilon_{i,t}$$

We ran two different regressions according to our sample period: in the first one we excluded Greek banks and the Greek sovereign from our dataset and we then ran a specific regression for the Greek banks on the restricted sample previously exposed, trivially omitting the OMT's dummy variable.

In order for our model to be stable (stationary), we need the estimated coefficients to respect the boundary condition:

$$\forall i, |\alpha_i| < 1$$

Since Greek banks' CDSs were available in a much larger sample than the Greek sovereign's, we could have included Greek banks but excluded the Greek sovereign on a much larger dataset. Yet, unsurprisingly, the specificity of the Greek sovereign CDS is so large that if we omitted it, the autoregressive parameter α_i would reach a value significantly higher than 1 (reassuringly for our model). We thus excluded both from our main study.

We thus fitted on the Greek banks' CDS data the following reduced model without the $\mathbb{O}$ dummy variable since our sample does not extend up to the triggering event:

$$CDS_{i,t}^{Bank} = \alpha_i \underbrace{\begin{pmatrix} 1 \\ CDS_{i,t-1}^{Bank} \end{pmatrix}}_{AR(1)\ Factors} + \beta_i \underbrace{\begin{pmatrix} CDS_{t,1}^{Svgn} \\ \vdots \\ CDS_{t,N}^{Svgn} \end{pmatrix}}_{Explanatory} + \gamma_i \underbrace{\begin{pmatrix} VSTOXX_t \\ BOROIS_t \\ BBB^{GOAS}{}_t \end{pmatrix}}_{Common\ Factors} + \delta_i \underbrace{\begin{pmatrix} ShareP_{i,t} \\ Rating_{i,t} \end{pmatrix}}_{Firm\ Specific\ Factors} + \theta_i \underbrace{\begin{pmatrix} \mathbb{G}_t \\ \mathbb{L}_t \end{pmatrix}}_{Dummies} + \varepsilon_{i,t}$$

2.2. Time Series Results:

First of all, in order to be able to use our model, we must conduct a test on our boundary condition for our autoregressive parameters: since our estimated coefficients are close to one, we clearly have a near-integrated process. We ran a Fisher test on whether the estimated coefficients are significantly different from one. The results for both of our datasets are presented in Tables 6 & 7 and in Table 8. Reassuringly, the estimated coefficients are statistically always significantly different from 1 for all banks tested in both of our datasets. We can thus apply our model to study the impact of the LTRO on the refinancing of private banks.

The first obvious comment that arises from the analysis of the longer dataset excluding Greek banks is that the $\mathbb{G}$ dummy coefficient is statistically significant for all the banks present in the sample at the 99% level and negative. This first result is in itself not surprising considering the importance of the impact of this single triggering event. The second conclusion we can draw from this regression is that for all the banks incorporated in one of the four-week sovereigns included in the sample, the home-sovereign-CDS parameter was always significant at the 99% level and positive. For SOC (French), the Belgian and both of the Austrian banks, it was also positive and highly significant. For the Dutch, German and two of the French banks (BNP & CRE) it was not significantly different from zero.

The most probable explanation for these phenomena is that, on the one hand, the deterioration of the perception of the creditworthiness of the peripheral sovereigns led to a contagion to the banks incorporated on their territories, thus linking the CDSs of sovereigns and private banks. On the other hand, banks incorporated in countries where creditworthiness was not significantly altered during the "*sovereign crisis*", such as France or Germany, but where private banks' financial health were severely threatened by the rapid deterioration of the Eurozone's peripheral countries, gained little from the stability of their home sovereign but were negatively impacted by the deterioration of the peripheral sovereigns. For example, French, German and Dutch banks all have a significant and positive coefficient on at least Italy (some also have significantly positive coefficients on Spain, Portugal or Ireland). This is clearly not the case for the Belgian or Austrian banks. The answer to this question must therefore lie in the composition of their books and in their respective footprints in core versus peripheral countries.

While the Greek crisis dummy had an unquestionable effect on all of the Eurozone banks in the sample, thus highlighting its systemic nature, this is clearly not the case for the $\mathbb{L}$ dummy: on the one hand, the LTRO's dummy coefficient for the Austrian, Belgian and Portuguese banks was not significant and it was barely so (90% significance only) for the Irish banks. On the other hand, the LTRO's dummy coefficient for Spanish, Italian, Dutch, and French banks (albeit with a lower 95% significance for BNP) was highly significant. As for German banks, interestingly so, the coefficient is not significant for DEU, while it is highly significant for COM.

These results should really come as no surprise: the banks whose head offices were incorporated in countries where sovereigns were the worst affected by the crisis, like Ireland or Portugal (and Greece), and where the banking sector was already either receiving massive international aid, like the Greek bank's *Hellenic Financial Stability Fund,* or had already been recapitalized by their home-country states therefore had little to gain from these refinancing operations. Meanwhile, banks incorporated in countries where sovereigns were slightly less affected by the crisis and which were still able to issue without guarantees on the market, albeit with some restrictions, like Spain or Italy, were the ideal candidates to tap the ECB's new facility and thus enhance their creditworthiness as a result. Importantly, the ECB's facility was aimed at bailing out banks not only in the periphery of the Eurozone, but also in its core: French, Dutch and German banks all possibly had good reasons to use the ECB's facility. Indeed, the motives for using the ECB's facility could be twofold: firstly, by using the ECB's facility as a credit line to invest in government bonds yielding a positive carry (typically Italian BTPs) and secondly to help refinance banks that were put in a precarious situation as a result of the sovereign crisis due to their exposure to either (or both) their investment portfolio earning a negative carry as a result of surging funding costs or because of difficulties refinancing their branches operating in the periphery.

Spanish and Italian banks have benefited massively from the LTROs (Reuters, 2012), and it is interesting to note that, for those countries in particular, it is known that a significant fraction of those funds went directly into government securities carrying a significant positive carry (Reuters, 2012). INT's Chairman Andrea Beltratti was explicit: "*The new funds, which come with a 1% interest rate, will be used in part "for a profitable trading strategy regarding Italian government bonds,"* (Enrich, 2012).

While COM seems to have clearly benefited from the LTRO, its national peer DEU did not. The most probable answer is that COM and DEU were in very different financial positions at the time of the LTRO announcement: while the latter seemed to be in a strong financial position, the former seemed closer to distress, as attested by the fact that barely a few days before the first LTRO round, COM was facing outright nationalization (Wiesmann & Wilson, 2011) as a result of a €5.3bn capital gap identified a few days before by regulators during the EBA's 2011 stress tests (Jenkins & Atkins, European banks have €115bn shortfall, 2012). Furthermore, as DEU's then-Chairman Ackermann put it: "*The fact that we have never taken any money from the government has made us, from a reputational point of view, so attractive to so many clients in the world that we would be very reluctant to give that up*". He also rejected the ECB-sponsored sovereign carry trade "*I'm normally not a friend of carry trades, and I don't think that we would borrow money to buy sovereign risks even if there is an attractive spread."* (Comfort & Kirchfeld, 2012). Yet, those arguments failed to prevent DEU from participating in the second auction (Jenkins, 2013).

Why has the LTRO had no impact on the Austrian and Belgian banks? The basic explanation should lie in the fact that both of the banks in the sample made very limited use of the new facility: RAI didn't participate in the first round and tapped the facility for a very limited amount in the second round (Global Banking News, 2012). ERS seemed to have participated in both LTRO rounds but also took only a limited amount from it (Dow Jones Newswires Reporters, 2012). The most probable explanation lies in the fact that, though highly internationally diversified, Austrian banks have limited exposure to peripheral Eurozone countries (most of their foreign exposure is in the CEE/CIS region) as is attested by (Moody's, 2013).

KBC did participate in both of the LTRO rounds, yet indicated that most of it had been to refinance its Irish subsidiary. Moreover, it used Irish collateral for the operation (KBC , 2013). That might explain why its global creditworthiness at the group level remained pretty much unchanged, thus yielding an insignificant LTRO dummy coefficient.

It is particularly interesting to note that the significance of sensitivity to sovereign CDSs of individual banks in Tables 6 & 7 closely reflects the mapping of their foreign subsidiaries. Table 2 was constructed using the latest annual report of each bank to pinpoint the localization of their wholly-owned retail-banking subsidiaries. As a caveat, we must mention that the definition might not be entirely consistent EU-wise and some significant exposure to a given country might have gone unnoticed: for example, some banks seem to have large wholesale corporate lending activities in specific countries where they do not necessarily have a large retail footprint, which are thus harder to track compared to retail activities.

Table 2 : Matrix of foreign wholly-owned retail subsidiaries.

	ERS	RAI	KBC	DEU	COM	BSN	BBV	SOC	BNP	CRE	NAT	ALP	BOI	INT	UNI	ING	BCP	BES
AT	Yes	Yes	-	-	-	-	-	-	-	-	-	-	-	-	Yes	-	-	-
BE	-	-	Yes	-	-	-	-	-	Yes	Yes	-	-	-	-	-	Yes	-	-
DE	-	-	-	Yes	Yes	-	-	-	-	-	-	-	-	-	Yes	Yes	-	-
ES	-	-	-	-	-	Yes	Yes	-	-	Yes	-	-	-	-	-	-	-	Yes
FR	-	-	-	-	-	-	-	Yes	Yes	Yes	-	-	-	-	-	-	-	Yes
GR	-	-	-	-	-	-	-	Yes *	-	Yes **	Yes	Yes	-	-	-	-	Yes	-
IE	-	-	Yes	-	-	-	-	-	-	-	-	-	Yes	-	-	-	-	-
IT	-	-	-	-	-	-	-	-	Yes	Yes	-	-	-	Yes	Yes	-	-	-
NL	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Yes	-	-
PT	-	-	-	-	-	Yes	-	-	-	-	-	-	-	-	-	-	Yes	Yes

*: Untill 14-Dec-2012. **: Untill 1-Feb-2013.

Importantly, those findings are consistent with the BIS report on the "*Euro area bank use of ECB facilities*" (BIS, 2012):

- It appeared that the largest users of the two LTRO facilities provided by the ECB were Italian and Spanish banks, followed by Belgian and French banks. Inversely, Finnish, German and Luxembourg banks continued to stay away from those facilities while Greek, Irish and Portuguese banks, which had largely benefited from the previous refinancing operations, did not appear to have engaged any further in the two exceptional ones. The lack of additional available assets to pledge at the ECB is but one hypothesis.

- It also appeared that after the two rounds of refinancing, the Finnish, German and Luxembourg banks greatly increased their deposits at the ECB, while Belgian, French, Italian and Spanish banks did so on a much more modest scale. Greek, Irish and Portuguese bank deposits at the ECB remained close to nil.

- Furthermore, there is also evidence in the report that, between the two LTRO rounds, the banking sector shorted their German and French government bond positions and greatly increased their Spanish and Italian government debt holdings. A small increase was also measured for holdings of Irish government debt securities.

2.3. Oaxaca-Blinder Decomposition for Time Series:

Going back to our AR(1) model:

$$CDS_{i,t}^{Bank} = \alpha_i \underbrace{\begin{pmatrix} 1 \\ \\ CDS_{i,t-1}^{Bank} \end{pmatrix}}_{AR(1)\ Factor} + \beta_i \underbrace{\begin{pmatrix} CDS_{t,1}^{Svgn} \\ \vdots \\ CDS_{t,N}^{Svgn} \end{pmatrix}}_{Explanatory} + \gamma_i \underbrace{\begin{pmatrix} VSTOXX_t \\ BOROIS_t \\ BBB^{GOAS}{}_t \end{pmatrix}}_{Common\ Factors} + \underbrace{\delta_i \begin{pmatrix} ShareP_{i,t} \\ \\ Rating_{i,t} \end{pmatrix}}_{Firm\ Specific\ Factors} + \underbrace{\theta_i \begin{pmatrix} \mathbb{G}_t \\ \mathbb{L}_t \\ \mathbb{O}_t \end{pmatrix}}_{Dummys} + \varepsilon_{i,t}$$

Which we will modify in the following way:

Let $\mathbb{L}$ be the LTRO dummy and remove the $\mathbb{G}$ and $\mathbb{O}$ dummies, which are constant throughout our period:

$$CDS_{i,t}^{Bank} = \alpha_i \begin{pmatrix} 1 \\ \mathbb{L}_t \\ CDS_{i,t-1}^{Bank} \end{pmatrix} + (\beta_i + \beta_i^L \mathbb{L}_t) \begin{pmatrix} CDS_{t,1}^{Svgn} \\ \vdots \\ CDS_{t,N}^{Svgn} \end{pmatrix} + (\gamma_i + \gamma_i^L \mathbb{L}_t) \begin{pmatrix} VSTOXX_t \\ BOROIS_t \\ BBB^{GOAS}{}_t \end{pmatrix} + (\delta_i + \delta_i^L \mathbb{L}_t) \begin{pmatrix} ShareP_{i,t} \\ \\ Rating_{i,t} \end{pmatrix} + \varepsilon_{i,t}$$

Taking the conditional expectation of the CDS innovations according to our LTRO dummy variable, it yields:

Let $\varphi_{i,t}^{Bank}$represents the innovation at date t of the bank I CDS's:

$$\varphi_{i,t}^{Bank} = CDS_{i,t}^{Bank} - \alpha_{1\ i}\, CDS_{i,t-1}^{Bank}$$

$$\mathbb{E}_t\left(\varphi_{i,t}^{Bank} \middle| \mathbb{L}_t = 0\right) = \alpha_{0\ i} + +\beta_i \mathbb{E}_t\left(\begin{matrix} CDS_{t,1}^{Svgn} \\ \vdots \\ CDS_{t,N}^{Svgn} \end{matrix} \middle| \mathbb{L}_t = 0 \right) + \gamma_i \mathbb{E}_t\left(\begin{matrix} VSTOXX_t \\ BOROIS_t \\ BBB^{GOAS}{}_t \end{matrix} \middle| \mathbb{L}_t = 0 \right) + \delta_i \mathbb{E}_t\left(\begin{matrix} ShareP_{i,t} \\ \\ Rating_{i,t} \end{matrix} \middle| \mathbb{L}_t = 0 \right)$$

And:

$$\mathbb{E}_t\left(\varphi_{i,t}^{Bank} \middle| \mathbb{L}_t = 1\right) = \alpha_{0\ i} + \alpha^{L}_{0\,i} + (\beta_i + \beta_i^L)\mathbb{E}_t\left(\begin{matrix} CDS_{t,1}^{Svgn} \\ \vdots \\ CDS_{t,N}^{Svgn} \end{matrix} \middle| \mathbb{L}_t = 1 \right) + (\gamma_i + \gamma_i^L)\mathbb{E}_t\left(\begin{matrix} VSTOXX_t \\ BOROIS_t \\ BBB^{GOAS}{}_t \end{matrix} \middle| \mathbb{L}_t = 1 \right) + (\delta_i + \delta_i^L)\mathbb{E}_t\left(\begin{matrix} ShareP_{i,t} \\ \\ Rating_{i,t} \end{matrix} \middle| \mathbb{L}_t = 1 \right)$$

By independence of the errors,

$$\mathbb{E}_t\left(\varepsilon_{i,t} \middle| \mathbb{L}_t = x\right) = \mathbb{E}_t\left(\varepsilon_{i,t}\right) = 0$$

Combining both equations, we can rewrite our problem in the following way:

$$\mathbb{E}_t\left(\varphi_{i,t}^{Bank} \middle| \mathbb{L}_t = 1\right) - \mathbb{E}_t\left(\varphi_{i,t}^{Bank} \middle| \mathbb{L}_t = 0\right) = A + B + C$$

With

$A = \alpha^{L}_{0_i}$

$$B = \beta_i \left\{ \mathbb{E}_t \left(\begin{matrix} CDS^{Svgn}_{t,1} \\ \vdots \\ CDS^{Svgn}_{t,N} \end{matrix} \middle| \mathbb{L}_t = 1 \right) - \mathbb{E}_t \left(\begin{matrix} CDS^{Svgn}_{t,1} \\ \vdots \\ CDS^{Svgn}_{t,N} \end{matrix} \middle| \mathbb{L}_t = 0 \right) \right\} + \gamma_i \left\{ \mathbb{E}_t \left(\begin{matrix} VSTOXX_t \\ BOROIS_t \\ {BBB^{GOAS}}_t \end{matrix} \middle| \mathbb{L}_t = 1 \right) - \mathbb{E}_t \left(\begin{matrix} VSTOXX_t \\ BOROIS_t \\ {BBB^{GOAS}}_t \end{matrix} \middle| \mathbb{L}_t = 0 \right) \right\} + \delta_i \left\{ \mathbb{E}_t \left(\begin{matrix} ShareP_{i,t} \\ \\ Rating_{i,t} \end{matrix} \middle| \mathbb{L}_t = 1 \right) - \mathbb{E}_t \left(\begin{matrix} ShareP_{i,t} \\ \\ Rating_{i,t} \end{matrix} \middle| \mathbb{L}_t = 0 \right) \right\}$$

$$C = \beta_i^L \mathbb{E}_t \left(\begin{matrix} CDS^{Svgn}_{t,1} \\ \vdots \\ CDS^{Svgn}_{t,N} \end{matrix} \middle| \mathbb{L}_t = 1 \right) + \gamma_i^L \, \mathbb{E}_t \left(\begin{matrix} VSTOXX_t \\ BOROIS_t \\ {BBB^{GOAS}}_t \end{matrix} \middle| \mathbb{L}_t = 1 \right) + \delta_i^L \mathbb{E}_t \left(\begin{matrix} ShareP_{i,t} \\ \\ Rating_{i,t} \end{matrix} \middle| \mathbb{L}_t = 0 \right)$$

In the following specification, focusing only on the exogenous innovations part, we can explain the three factors in the following way:

- A represents the "*Pure*" LTRO effect that cannot be attributed to any exogenous explanatory variable or coefficient changes.
- B represents the "*Shift*" effect of the LTRO on the exogenous variables.
- C represents the "*Wake-up-Call*" effect of the LTRO on sensitivities to our exogenous variables and controls.

Under this specification, B should represent the way bank funding were enhanced by the LTRO through a relaxation of the sovereign scare, while A and C should represent the direct impact of the LTRO on bank funding.

2.4. Time Series Decomposition Results:

The TS approach we tried as a first step falls short of a severe caveat, namely the dimension problem: the numerous dummy variables included to measure the LTRO's effect require a high number of observations to achieve a reasonable statistical significance. In practice, considering our 30 explanatory regressors, we measured the minimal sample of 600 points. Such a lengthy horizon would more than span the LTRO's maximum effectiveness period: considering that Eurozone bank CDSs spiked in December 2011, at the time of our sample period, going 300 points (roughly a year) before and after that date should give us a measurement of the LTRO's effectiveness. Yet, barely a quarter after the LTRO became effective, bank CDSs shot back upward as a result of resurging sovereign default fears triggered by Spain's predicted budgetary deficit slippage and increasing contestation of austerity measures around Europe, thus complicating measurement of the LTRO's long-term effect, which by the look of the TS results appears short-lived.

Table 3: Oaxaca-Blinder Time Series Decomposition Factor Estimation for the LTRO

Effect	Pure	Changes with Cst. Coefficients				New Coefficients post LTRO				Total
	A	**B**	*BS*	*BC*	*BP*	**C**	*CS*	*CC*	*CP*	**A+B+C**
Bank	**LTRO +/- 300 Trading Days (≈ 12M)**									
ERS	492.23	12.19	*3.82*	*-2.48*	*10.84*	-496.96	*-6.94*	*15.10*	*-505.13*	7.46
RAI	121.60	1.78	*-0.11*	*-1.03*	*2.91*	-120.84	*-8.23*	*27.94*	*-140.56*	2.54
KBC	202.09	-3.01	*-5.59*	*-2.99*	*5.58*	-191.18	*-7.07*	*12.42*	*-196.54*	7.90
DEU	-274.88	11.78	*14.71*	*-6.83*	*3.91*	267.16	*-31.72*	*46.03*	*252.85*	4.07
COM	-309.25	1.84	*-4.51*	*-6.06*	*12.40*	317.49	*-15.36*	*49.54*	*283.31*	10.08
BSN	-172.62	37.67	*5.24*	*-2.40*	*34.83*	168.61	*-37.04*	*53.44*	*152.21*	33.66
BBV	-22.25	37.77	*17.03*	*-3.31*	*24.05*	14.24	*-43.57*	*17.17*	*40.64*	29.76
SOC	-97.67	0.82	*3.48*	*-8.78*	*6.12*	121.98	*-16.31*	*29.45*	*108.84*	25.13
BNP	73.95	8.44	*15.96*	*-7.06*	*-0.46*	-64.10	*-26.69*	*30.28*	*-67.69*	18.28
CRE	-85.66	14.25	*14.96*	*-9.58*	*8.86*	94.56	*-16.68*	*32.99*	*78.25*	23.15
BOI	-3 200.66	58.77	*3.32*	*-15.84*	*71.29*	3 095.27	*-201.94*	*194.42*	*3 102.79*	-46.63
INT	651.82	-61.37	*20.52*	*-7.52*	*-74.38*	-550.12	*-30.79*	*52.47*	*-571.80*	40.33
UNI	139.32	7.14	*26.79*	*-8.24*	*-11.41*	-118.89	*-44.93*	*44.88*	*-118.85*	27.56
ING	-488.23	-1.39	*1.11*	*-3.02*	*0.52*	499.01	*-20.80*	*-3.56*	*523.37*	9.39
BCP	109.21	-9.92	*-1.17*	*-2.86*	*-5.89*	-92.01	*-77.53*	*58.64*	*-73.12*	7.28
BES	59.53	35.38	*16.68*	*-2.98*	*21.67*	-93.11	*-85.50*	*48.73*	*-56.35*	1.79

Overall, the Oaxaca-Blinder decomposition of the time series data in Table 3 yields a large "*Pure*" effect and an equivalently large but contradictory "*Wake-up-Call*" effect. The "*Shift*" effect appears negligible. In terms of aggregate effects, only the BOI's average CDS level diminished after the LTRO. The Sovereign "*Wake-up-Call*" effect (CS) is interestingly always negative and large for the banks, which in the prior regression analysis had proved to have a significant LTRO or OMT dummy. Considering the above-mentioned caveats, any further interpretation of the results in terms of the ways of action of the LTRO would seem farfetched. In order to at least partially overcome those caveats, we proceed to an analysis in panel in the next section.

3. Panel Data Analysis:

3.1. Pooled OLS regression:

Since the estimation of the *Least-Square Dummy Variable* model (LSDV) previously proposed to perform the estimation of the Oaxaca-Blinder decomposition requires a sample period for which the length greatly exceeds our target range (300 trading days versus 25 to 150), we proceed to an analysis in panel. Going back to the AR(1) model previously used for our time series regressions:

$$CDS_{i,t}^{Bank} = \alpha_i \begin{pmatrix} 1 \\ \mathbb{L}_t \\ CDS_{i,t-1}^{Bank} \end{pmatrix} + (\beta_i + \beta_i^L \mathbb{L}_t) \begin{pmatrix} CDS_{t,1}^{Svgn} \\ \vdots \\ CDS_{t,N}^{Svgn} \end{pmatrix} + (\gamma_i + \gamma_i^L \mathbb{L}_t) \begin{pmatrix} VSTOXX_t \\ BOROIS_t \\ {BBB^{GOAS}}_t \end{pmatrix}$$
$$+ (\delta_i + \delta_i^L \mathbb{L}_t) \begin{pmatrix} ShareP_{i,t} \\ \\ Rating_{i,t} \end{pmatrix} + \varepsilon_{i,t}$$

We modify it by adding a firm-specific fixed effect (ξ_i) through the use of a set of dummy variables ($\mathbb{F}_i$):

$$CDS_{i,t}^{Bank} = \alpha_i \begin{pmatrix} 1 \\ \mathbb{L}_t \\ CDS_{i,t-1}^{Bank} \end{pmatrix} + (\beta_i + \beta_i^L \mathbb{L}_t) \begin{pmatrix} CDS_{t,1}^{Svgn} \\ \vdots \\ CDS_{t,N}^{Svgn} \end{pmatrix} + (\gamma_i + \gamma_i^L \mathbb{L}_t) \begin{pmatrix} VSTOXX_t \\ BOROIS_t \\ BBB^{GOAS}{}_t \end{pmatrix} + (\delta_i + \delta_i^L \mathbb{L}_t) \begin{pmatrix} ShareP_{i,t} \\ \\ Rating_{i,t} \end{pmatrix} + (\xi_i + \xi_i^L \mathbb{L}_t)\, \mathbb{F}_i + \varepsilon_{i,t}$$

Since our estimation windows can be narrowed to 25-150 trading days, in this panel framework we can also estimate the Oaxaca-Blinder decomposition around the OMT event, which was previously impossible:

$$CDS_{i,t}^{Bank} = \alpha_i \begin{pmatrix} 1 \\ \mathbb{O}_t \\ CDS_{i,t-1}^{Bank} \end{pmatrix} + (\beta_i + \beta_i^L \mathbb{O}_t) \begin{pmatrix} CDS_{t,1}^{Svgn} \\ \vdots \\ CDS_{t,N}^{Svgn} \end{pmatrix} + (\gamma_i + \gamma_i^L \mathbb{O}_t) \begin{pmatrix} VSTOXX_t \\ BOROIS_t \\ BBB^{GOAS}{}_t \end{pmatrix} + (\delta_i + \delta_i^L \mathbb{O}_t) \begin{pmatrix} ShareP_{i,t} \\ \\ Rating_{i,t} \end{pmatrix} + (\xi_i + \xi_i^L \mathbb{O}_t)(\mathbb{F}_i)_{1:15} + \varepsilon_{i,t}$$

3.2. Fixed effects pooled OLS results:

The results from the pooled-OLS regressions for the LTRO and the OMT are presented respectively in Table 11 and Table 12. Consistently with the prior time-series regression we performed as a first step, we presented the results of the calibration of our model centered on the LTRO dummy trigger date, with a sample size of +/- 25, 75 and 150 trading days, which roughly represent one, three and six months before and after the event.

The one-month-sampling calibration exercise aimed to establish the most immediate short-term effect of the LTRO on an aggregated sample of 816 points. Yet, even if we have a relatively low autoregressive parameter (0.62) and a relatively good R^2 (99.66%), the only significant parameters at this stage are the firm-specific control variables and only those without the LTRO dummy multiplier). It is relatively unsurprising that with such a short calibration horizon there would be a high level of heterogeneity in the sensitivities to sovereign credit risk, thus a weak significance parameter.

The three-month and six-month sampling calibration exercises yield a more balanced picture as some sovereign risks like AT, SP, IE and PT, respectively DE, SP, IE and IT, achieve statistical significance with various levels of confidence, although the firm-specific dummy variables still dominates. Those results would tend to confirm that the LTRO had a systematic effect on at least some of the sovereign risk sensitivities over a slightly longer period.

The results of the calibration exercises centered on the OMT announcement, with the same sample sizes as before, are much clearer regardless of the horizon: even though the control variables, both the firm-specific ones and the general risk-factor ones, have a consistently high statistical significance, the sovereign risk dummies, both with and without the OMT dummy multiplier, achieve a high level of statistical significance. We should thus be able to have a reliable horizon-dependent analysis of the OMT's effect with the Oaxaca-Blinder Decomposition as the OMT's effect on sovereign-risk sensitivities appears systematic compared to the LTRO's effect which appeared, at least in the very short term, to be highly firm-specific and thus more difficult to measure reliably with a pooled regression approach.

3.3. Oaxaca-Blinder decomposition on panel data

To account for the fixed effect, we modify the A factor by including the firm fixed-effect coefficient ξ_i^L:

$$A = \alpha_{0_i}^{L} + \xi_i^L$$

Thus, the B and C factors previously introduced in the Oaxaca-Blinder decomposition should be affected only by sensitivities towards systematic risk components. Firm-specific sensitivities should only be reflected in the A factor. Nonetheless, the B and C factors are not purely systematic as the value of the firm-specific control variables (share price and long-term rating) are by definition idiosyncratic: the BP and CP sub-factors are thus partly firm-specific because of the common sensitivities used in their computation. The results for the Oaxaca-Binder decomposition around the LTRO and OMT events for our three sample sizes previously introduced are presented respectively in Table 9 and Table 10.

For the LTRO, and because of the previously exposed caveats regarding the significance of the sensitivities to sovereign risks, the results of the one-month exercise should be discarded. At the three-month level, the "*Pure*" effect is still strongly negative while the "*Wake-up-Call*" and "*Shift*" effects are positive. At the six-month level, the "*Pure*" effect diminished greatly in absolute value and becomes positive in sign. The "*Wake-up-Call*" effect diminished and remains positive. Interestingly, the "*Shift*" effect becomes dominant and negative. Moreover, the sub-components leading to the negative values are firstly those of the sovereign shift (CS) and secondly of the control variables (CP). We should thus conclude that, for the LTRO, we have weak evidence that initially the channel through which it reduced bank funding stress was not intrinsically linked to a reduction in perceived sovereign risk (on the contrary) but rather a reduction in the banks' perceived idiosyncratic risk. Later, the dominating channel becomes the reduction in the sensitivities to sovereign risk, consistently with the findings of (Acharya, Drechsler, & Schnabl, 2011).

As for the OMT, regardless of the horizon considered, the "*Pure*" effect is consistently large and negative. Inversely, the "*Wake-up-Call*" effect is also consistently positive and large. The "*Shift*" effect is also significant and negative, and its size shrinks as the maturity lengthens. The "*Sovereign-Shift*" (BS) sub-effect is consistently negative, but its size reduces as the maturity increases. Interestingly, the "*Sovereign Wake-up-Call*" sub-effect (CS) is initially positive and then becomes negative. Overall, the OMT's effect is strongest in the short term and then diminishes with maturity. At the six–month horizon, the only large effects left are those for the Irish and Portuguese banks. It is somewhat unsurprising since the OMT action plan requires that the country undergoes an EU-commission plan before the ECB is allowed to intervene in the secondary sovereign bond markets of that country. Considering that both Portugal and Ireland are the only countries under a joint EU-Commission/ECB/IMF ("Troika") assistance plan, they are the two countries most susceptible to benefit from the OMT in the short term. As for the channel of action, in the case of the OMT, it seems that both the idiosyncratic reduction in perceived bank risk and the reduction in sovereign risk (also in terms of both sensitivities and levels) were effective, with the latter kicking in after the former.

Conclusion:

The dramatic events of the last five years have led to a complete redesign of the rulebook of central banking all over the world as the macro-prudential stability objective seemed to have become the driving factor for essentially every central bank's policy decisions of late. As central banks took the front stage to spearhead the initial fight against the banking crisis then the sovereign debt scare contagion, the traditional objectives of price stability – and employment for some – seemed to have moved backstage. This new course in policy has been probably driven by a mix of imperatives and pragmatism as central banks rediscovered the full extent of the notion of "*lender of last resort*" when interbank markets froze in 2008, or when the sovereign funding channels dried up in 2010 and the specter of a cascade of outright sovereign defaults in advanced economies surfaced in the Eurozone, thereby jeopardizing the very existence of the single-currency monetary union.

Of all the unconventional monetary policies implemented during those difficult years, none was more controversial than the long-term refinancing operations of private banks: at a time when Europe's hardest-hit countries were feeling the full extent of the austerity measures imposed either by international creditors trying to shore up the public finances of several Eurozone members or by the governments of other member states desperately trying to avoid suffering the same fate as Greece, public resentment against the banks accused of having wrecked the economy was rife. These unconventional monetary policies have led to a string of existential controversies both inside and outside of central banks, but it was nowhere as acute as within the European Central Bank: the relatively young institution had to navigate treacherous waters, balancing the heritage of northern hawks with the pressing needs of its peripheral members, eventually edging toward a major board reshuffling to accompany the change in course set by its new pragmatic president Mario Draghi.

As the debate moved from policy-makers to commentators and politicians, many researchers both in academia and in the industry have started to work on those complex issues and this work follows their steps. The main objective of the paper was to establish whether the unconventional monetary policies implemented by the ECB in the wake of the Eurozone's sovereign crisis, namely the LTRO and the OMT, had benefited banks directly or indirectly through a relaxation of the sovereign credit-risk scare. As a minor objective, this paper looked at whether the market perception of bank credit risk accurately reflected public information on their exposures to sovereign risk, thereby potentially providing both a market-based information set on banks' exposure to sovereign risks. Most importantly it provides an operational framework in which we could run the procedure in order to disentangle the various contributions of the relaxation in bank funding conditions and thus provide an answer to our main research question.

By running a dummy variable least-square regression on each of the time series of the CDSs of the most important private banks of the Eurozone on which public data was available, we measured the explanatory power and significance of the estimated parameters of the sensitivities to individual sovereign risk measured also by their respective CDSs.

Included in the analysis were conventional control variables on both firm-specific characteristics and more general market-level factors. Dummy variables were included to sort out the direct impact of three specific events: the onset of the sovereign scare and the announcement of both the LTROs and the OMT. The analysis of the results seems strongly consistent with both news releases and the map of banks' retail operations in the countries present in our sample, our control for direct operational exposure to given sovereign risks. This is different from the financial asset holding exposure, on which much less information is available even if there is potentially a strong link between both. Overall, those results support the use of the model to proceed with the Oaxaca-Blinder decomposition.

Following the paper of (Giordano, Pericoli, & Tommasino, 2012) using the decomposition technique of (Eichengreen & Mody, 2000) to study the channels of "*contagion*" of the Eurozone sovereign debt crisis sparked by the surprise Greek admission of window dressing of their national accounts, we endeavor to establish the "*reverse-contagion*" channels stemming from the unconventional monetary actions undertaken by the ECB. The model allows us to filter the "*reverse contagion*" between the "*Pure*" effect, the "*Shift*" in the levels of the explanatory variables (i.e. the sovereign CDSs and the control variables) and the "*Wake-up-Call*" effect of changes in the sensitivities toward the explanatory variables. Out of the three principal factors, the "Shift" effect directly exposes the indirect channel of relaxation of bank funding conditions, while the other two mostly reflect the direct effect of the operations.

The results of the Oaxaca-Blinder decomposition performed on individual banks' time series of CDSs could not reveal much, as the length of the sample required to calibrate the model exceeds one year before and after the critical date, which is much longer than the effective impact of the LTRO. The OMT's impact could not even be assessed because of data availability issues, even though it probably lasted sufficiently long for the time-series methodology to be effective. To overcome that issue, we proceeded in a panel data approach using a pooled-OLS regression methodology and obtained the following results for both operations:

At an aggregate level, the LTRO's impact on bank funding conditions appears to have followed a two-step dynamic, consistently with (Acharya, Drechsler, & Schnabl, 2011). Initially, the "*Pure*" factor leads the fall in banks' CDS levels while the other two factors slow the reduction. As we increase the horizon at which the effect is measured, we observe a reversal of the factors: the "Shift" effect dominates while the other two are smaller and positive. Moreover, the leading negative sub-factor is the "*Sovereign Shift*". We can thus conclude that the effect of the LTRO on easing bank funding stress had initially been direct, and thus independent of any sovereign risk consideration, and then became indirect as the transmission channel became the source of the reduction of sovereign risks.

For the OMT's impact, the effect seems relatively horizon-independent: the "*Wake-up-Call*" is consistently large and positive while the other two effects are negative. The "*Shift*" effect does decrease over time. It should be noted that overall the aggregate effect also decreases with time and only remains outsized for the Irish and the Portuguese banks.

In terms of transmission channels, we can thereby conclude that the indirect effect of the OMT decreases over time while the direct effect dominates.

In a nutshell, we cannot definitively affirm that the dominant channel of action for the ECB's unconventional monetary policies has been either the direct or the indirect channel. Both have clearly been active as banks benefited from both an exogenous enhancement of their credit perception by the market and from the relaxation of the sovereign funding stress. The most surprising result has been that even though the LTRO was enacted primarily to stem the bank funding stress while the OMT was primarily directed at reducing sovereign funding stress, the effect has been relatively equivalent in terms of sovereign funding impact on banks. Even more surprising, the OMT seems to have had a longer lasting "*pure*" impact on bank funding conditions, independently of any sovereign funding considerations.

In terms of potential improvements, we can already identify the following, clearly non-exhaustive, list: to enhance the significance of the sensitivities and thus the power of the decomposition, a more firm-specific parsimonious model could have been implemented by, for example, omitting all the variables that appear not to be insignificant at the individual bank level in a second-stage regression. It would also have been interesting to test our model on public banks, for which state support is even more immediate, even if it would require adjustments in the control variables as share prices, for example, are rarely available for such banks. Also, it could have been interesting to identify firm-specific breakpoints in the sensitivities arising from mergers, acquisitions or divestment by running the time-series regression with a reduced timespan to account for changes in the sensitivities, which are here averaged because of our time-constant restrictive assumption. Those issues are left for future research.

The logical conclusion that should be drawn from the results of this paper is that from the central bank's point of view, it appears virtually impossible to act on bank funding or on sovereign funding conditions alone without simultaneously affecting the other. The unconventional monetary policies undertaken by the ECB, regardless of their intended targets, have been mutually beneficial over the medium to long term. It would be wise to remember this when future interventions are debated, regardless of the politically damaging but rapidly subsiding short-term differentiating effect, which seemed to have benefited banks more than sovereign issuers. The symbiotic responses of states and banks to central bank interventions identified in this paper strongly uphold the EU's proposed *Banking Union,* which would have banks supervised by the ECB (Asmussen, 2013).

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Appendix

Table 4: Testing the unit boundary condition for the AR(1) parameter for all private banks except Greeks.

AR(1) Unit Root test for near-integreted series			
ERS	0.945 ***	-7.772	7.59458E-15
RAI	0.933 ***	-8.497	2.54378E-17
KBC	0.942 ***	-7.159	6.63567E-13
DEU	0.876 ***	-12.652	4.65847E-35
COM	0.908 ***	-10.519	3.16313E-25
BSN	0.820 ***	-17.244	1.11114E-60
BBV	0.828 ***	-18.001	2.08836E-65
SOC	0.804 ***	-18.638	1.76279E-69
BNP	0.820 ***	-16.849	2.89835E-58
CRE	0.821 ***	-17.602	6.70642E-63
BOI	0.903 ***	-8.415	4.95107E-17
INT	0.849 ***	-16.043	1.87855E-53
UNI	0.878 ***	-14.400	3.8081E-44
ING	0.924 ***	-9.437	8.10489E-21
BCP	0.918 ***	-9.929	8.95957E-23
BES	0.909 ***	-13.515	1.97009E-39

*/**/***: Denote the significance at the 90%/95%/99% level.

Table 5: Testing the unit boundary condition for the AR(1) parameter for the Greek banks

AR(1) Unit Root test for near-integreted series			
Bk.	**AR(1)**	**T-stat**	**p-value**
NAT	0.934 ***	-6.248	7.30845E-12
ALP	0.827 ***	-10.270	7.24337E-16

*/**/***: Denote the significance at the 90%/95%/99% level.

Table 6 : All banks except Greeks and without Greek sovereign

Bank	#Obs.	AdjR²	Fisher	Itr.	Lg1	AT	BE	DE	SP	FR	IE	IT	NL	PT	SPi	RTi	VSX	BOI	BBB	GD	LD	OD
ERS	1369	98.88%	6 682.15 +++	-49.88	0.94 ***	0.08 ***	0.03	0.02	-0.01	0.04	0.00	0.02 *	-0.01	0.00 *	4.39	-0.33 ***	0.18 ***	-2.87	-0.05 ***	-7.27 ***	0.77	1.71
				-0.80	133.22	3.79	1.52	0.32	-1.16	1.07	0.77	1.81	-0.32	-1.77	1.17	-3.20	3.35	-1.62	-5.56	-5.62	0.43	1.15
				42.108%	0.000%	0.016%	12.947%	75.116%	24.692%	28.588%	43.968%	6.984%	74.592%	7.736%	24.243%	0.143%	0.083%	10.580%	0.000%	0.000%	66.530%	24.838%
RAI	1369	98.92%	6 955.39 +++	-66.02 **	0.93 ***	0.12 ***	0.02	0.05	-0.01	0.00	0.00	0.01	-0.02	-0.01 **	4.66 **	-0.10 **	0.14 ***	-4.68 ***	-0.02 ***	-3.96 ***	1.40	3.35 **
				-2.26	118.39	6.29	1.34	0.98	-1.02	-0.06	1.12	1.24	-0.67	-2.01	2.57	-2.55	2.68	-2.64	-2.61	-3.03	0.90	2.57
				2.380%	0.000%	0.000%	18.004%	32.779%	30.780%	94.890%	26.442%	21.663%	50.497%	4.456%	1.015%	1.102%	0.739%	0.829%	0.916%	0.252%	36.649%	1.022%
KBC	1369	99.21%	9 523.89 +++	73.41 ***	0.94 ***	0.01	0.09 ***	0.03	0.00	-0.07	0.01 *	0.02	0.00	-0.01 ***	-3.66 **	-0.12 ***	0.25 ***	0.69	-0.03 ***	-6.79 ***	3.61	0.66
				2.66	116.74	0.58	4.07	0.54	-0.11	-1.60	1.86	1.49	-0.01	-2.60	-2.24	-3.77	4.54	0.34	-2.98	-4.96	1.56	0.44
				0.790%	0.000%	56.481%	0.005%	59.161%	91.294%	10.886%	6.273%	13.630%	98.914%	0.931%	2.537%	0.017%	0.001%	73.752%	0.296%	0.000%	11.999%	66.119%
DEU	1369	98.04%	3 805.70 +++	26.29 **	0.88 ***	0.03 **	0.01	-0.06	0.01 **	0.06 **	-0.01 **	0.03 ***	-0.02	0.00	-1.05	0.02	0.32 ***	-4.68 ***	-0.02 ***	-5.81 ***	-1.78	0.63
				2.14	89.76	2.22	0.75	-1.59	2.03	2.09	-2.42	4.08	-0.65	0.49	-1.50	0.41	8.65	-3.60	-3.61	-6.12	-1.46	0.59
				3.260%	0.000%	2.657%	45.479%	11.207%	4.289%	3.685%	1.557%	0.005%	51.848%	62.133%	13.495%	67.847%	0.000%	0.033%	0.031%	0.000%	14.513%	55.765%
COM	1369	99.02%	7 715.91 +++	-64.79	0.91 ***	-0.01	0.06 ***	0.04	0.02 **	-0.01	0.01 *	0.03 ***	-0.06 *	0.00	4.31	-0.07	0.24 ***	-6.27 ***	-0.02 ***	-7.76 ***	5.25 ***	0.53
				-1.21	103.37	-0.47	3.51	0.92	2.04	-0.33	1.86	2.94	-1.80	-1.47	1.32	-0.43	5.35	-3.88	-2.75	-6.21	3.14	0.40
				22.472%	0.000%	64.118%	0.046%	36.019%	4.184%	73.849%	6.330%	0.332%	7.255%	14.118%	18.562%	66.673%	0.000%	0.011%	0.611%	0.000%	0.174%	68.624%
BSN	1369	99.29%	10 657.94 +++	32.42 ***	0.82 ***	-0.02	0.08 ***	-0.05	0.10 ***	-0.11 ***	0.00	0.03 ***	0.04	0.00	1.21 **	-3.91 ***	0.22 ***	-4.53 ***	-0.07 ***	-6.08 ***	7.22 ***	3.04 *
				3.31	78.55	-0.80	4.29	-1.03	8.04	-2.61	-0.82	3.11	1.20	-1.19	2.44	-7.36	4.17	-2.81	-8.48	-5.49	3.79	1.65
				0.095%	0.000%	42.482%	0.002%	30.391%	0.000%	0.926%	41.320%	0.190%	22.884%	23.573%	1.485%	0.000%	0.003%	0.508%	0.000%	0.000%	0.015%	9.906%
BBV	1369	99.51%	15 569.64 +++	33.03 ***	0.83 ***	0.02	0.11 ***	-0.14 ***	0.12 ***	-0.11 **	0.00	0.03 ***	0.02	0.00	0.56	-2.33 ***	0.31 ***	-7.79 ***	-0.06 ***	-6.27 ***	7.53 ***	3.79 **
				3.33	86.77	0.87	5.33	-2.69	9.14	-2.57	-0.70	2.75	0.55	-1.60	1.22	-6.40	6.05	-4.75	-7.47	-5.80	3.61	2.04
				0.089%	0.000%	38.656%	0.000%	0.725%	0.000%	1.038%	48.672%	0.611%	58.563%	11.053%	22.361%	0.000%	0.000%	0.000%	0.000%	0.000%	0.032%	4.189%
SOC	1369	99.34%	11 426.91 +++	62.97 ***	0.80 ***	-0.01	0.12 ***	-0.12 ***	-0.03 ***	0.10 ***	0.00	0.09 ***	-0.11 ***	0.00	-1.65 **	-0.29 ***	0.49 ***	-9.64 ***	-0.04 ***	-11.13 ***	6.05 ***	-0.42
				3.97	76.62	-0.56	6.69	-2.59	-2.73	2.83	-1.37	9.14	-3.18	1.62	-2.04	-4.06	10.40	-5.94	-6.21	-9.92	3.77	-0.33
				0.007%	0.000%	57.604%	0.000%	0.973%	0.644%	0.474%	17.155%	0.000%	0.153%	10.491%	4.125%	0.005%	0.000%	0.000%	0.000%	0.000%	0.017%	74.503%
BNP	1369	99.28%	10 542.19 +++	-1.69	0.82 ***	0.01	0.07 ***	-0.09 **	-0.01	0.04	-0.01 **	0.08 ***	-0.05 *	0.00 **	0.85	-0.09 **	0.32 ***	-10.23 ***	-0.03 ***	-7.28 ***	3.39 **	0.36
				-0.14	76.81	0.95	4.75	-2.30	-0.65	1.27	-2.12	9.34	-1.72	2.12	1.38	-2.13	8.54	-7.52	-4.59	-8.05	2.48	0.31
				88.856%	0.000%	34.304%	0.000%	2.167%	51.409%	20.596%	3.388%	0.000%	8.478%	3.386%	16.705%	3.357%	0.000%	0.000%	0.000%	0.000%	1.321%	75.704%
CRE	1369	99.14%	8 780.14 +++	-56.01 **	0.82 ***	0.03	0.07 ***	-0.07	0.06 ***	0.00	-0.01 ***	0.05 ***	-0.07 **	0.01 ***	4.06 ***	-0.33 **	0.42 ***	-13.68 ***	-0.03 ***	-10.65 ***	8.96 ***	-2.30
				-2.13	81.01	1.44	3.90	-1.49	5.92	-0.07	-3.08	5.76	-2.23	2.77	2.85	-2.03	9.46	-9.19	-5.34	-10.50	4.76	-1.52
				3.346%	0.000%	15.008%	0.010%	13.566%	0.000%	94.816%	0.210%	0.000%	2.594%	0.562%	0.443%	4.209%	0.000%	0.000%	0.000%	0.000%	0.000%	12.835%
BOI	1369	98.24%	4 248.67 +++	132.89 ***	0.90 ***	0.14	0.15	0.40	0.09	0.26	0.12 ***	-0.05	-0.72 ***	-0.03	-8.00 ***	2.77	0.02	8.97	-0.01	-24.20 **	-21.65 *	20.25 *
				2.88	78.72	0.96	1.05	1.05	1.20	0.88	3.68	-0.68	-2.64	-1.23	-2.92	1.01	0.07	0.78	-0.26	-2.25	-1.65	1.78
				0.403%	0.000%	33.526%	29.362%	29.478%	23.119%	38.026%	0.024%	49.544%	0.839%	22.029%	0.354%	31.333%	94.762%	43.476%	79.361%	2.471%	9.863%	7.536%
INT	1369	99.57%	17 712.58 +++	27.17	0.85 ***	0.00	0.10 ***	-0.04	0.01	-0.12 ***	0.01 **	0.15 ***	0.06	0.00	-1.24	0.07	0.36 ***	-5.07 **	-0.05 ***	-9.55 ***	8.81 ***	7.37 ***
				1.48	90.46	-0.07	4.35	-0.57	1.01	-2.60	2.00	10.75	1.40	-1.45	-1.09	0.40	6.26	-2.49	-5.97	-6.24	3.81	3.90
				13.798%	0.000%	94.378%	0.001%	56.816%	31.092%	0.940%	4.552%	0.000%	16.147%	14.614%	27.396%	68.570%	0.000%	1.286%	0.000%	0.000%	0.015%	0.010%
UNI	1369	99.58%	18 203.94 +++	13.15	0.88 ***	0.03	0.08 ***	-0.01	0.02	-0.18 ***	0.01 **	0.15 ***	0.06	-0.01 *	0.25	-2.01 *	0.40 ***	-5.61 ***	-0.07 ***	-10.85 ***	7.21 ***	4.05 **
				0.72	103.76	1.21	3.49	-0.11	1.32	-3.79	2.45	9.75	1.43	-1.92	0.24	-1.95	6.76	-2.89	-7.91	-7.66	3.04	1.98
				47.348%	0.000%	22.634%	0.049%	91.579%	18.614%	0.016%	1.434%	0.000%	15.269%	5.533%	80.673%	5.152%	0.000%	0.387%	0.000%	0.000%	0.244%	4.798%
ING	1369	99.03%	7 765.17 +++	-60.36 ***	0.92 ***	0.01	0.03 **	-0.09 ***	0.00	0.06 **	0.00	0.02 ***	0.00	0.00	3.84 ***	-0.42 ***	0.21 ***	-6.33 ***	-0.02 ***	-2.17 **	3.10 ***	-0.01
				-4.98	113.95	0.82	2.09	-2.71	0.41	2.47	1.15	2.67	0.16	-1.60	5.27	-2.67	5.67	-5.11	-4.34	-2.31	2.82	-0.02
				0.000%	0.000%	41.195%	3.684%	0.675%	68.052%	1.362%	25.048%	0.763%	87.379%	11.018%	0.000%	0.759%	0.000%	0.000%	0.002%	2.113%	0.483%	98.743%
BCP	1369	99.77%	33 317.78 +++	-36.59 *	0.92 ***	-0.16 ***	0.22 ***	0.04	0.01	0.11	0.03 ***	0.07 **	-0.07	0.05 ***	2.61 *	-4.09	0.23	-4.83	-0.04 *	-9.02 ***	-1.68	17.51 ***
				-1.67	110.64	-2.73	3.49	0.29	0.33	0.97	2.94	2.45	-0.65	5.67	1.92	-0.63	1.64	-1.12	-1.89	-2.61	-0.27	3.84
				9.501%	0.000%	0.642%	0.050%	76.854%	73.994%	33.329%	0.331%	1.450%	51.756%	0.000%	5.482%	52.815%	10.034%	26.105%	5.926%	0.917%	78.743%	0.013%
BES	1369	99.82%	41 389.06 +++	-36.76 **	0.91 ***	-0.14 ***	0.22 ***	0.14	0.17 ***	-0.20 ***	0.02 **	-0.04 **	0.07	0.04 ***	3.59 ***	-3.68 ***	0.20 **	-2.67	-0.05 ***	-9.37 ***	-1.21	13.47 ***
				-2.57	135.20	-3.61	5.65	1.54	8.56	-2.81	2.35	-2.45	1.03	7.71	4.33	-2.72	2.18	-0.94	-4.00	-4.12	-0.33	4.23
				1.015%	0.000%	0.032%	0.000%	12.311%	0.000%	0.500%	1.890%	1.442%	30.200%	0.000%	0.002%	0.660%	2.921%	34.662%	0.007%	0.004%	74.102%	0.002%

Table 7: All banks except Greeks and without Greek sovereign (Only significant parameters left)

Bank	#Obs.	AdjR^2	Fisher	p-Value	Itr.	Lg1	AT	BE	DE	SP	FR	IE	IT	NL	PT	SPi	RTi	VSX	BOI	BBB	GD	LD	OD
ERS	1369	98.88%	6 682.15 +++	0.00		0.94 ***	0.08 ***						0.02 *		0.00 *		-0.33 ***	0.18 ***		-0.05 ***	-7.27 ***		
						133.22	3.79						1.81		-1.77		-3.20	3.35		-5.56	-5.62		
							0.02%						6.98%		7.74%		0.14%	0.08%		0.00%	0.00%		
RAI	1369	98.92%	6 955.39 +++	0.00	-66.02 **	0.93 ***	0.12 ***								-0.01 **	4.66 **	-0.10 **	0.14 ***	-4.68 ***	-0.02 ***	-3.96 ***		3.35 **
					-2.26	118.39	6.29								-2.01	2.57	-2.55	2.68	-2.64	-2.61	-3.03		2.57
					2.38%		0.00%								4.46%	1.01%	1.10%	0.74%	0.83%	0.92%	0.25%		1.02%
KBC	1369	99.21%	9 523.89 +++	0.00	73.41 ***	0.94 ***		0.09 ***				0.01 *			-0.01 ***	-3.66 **	-0.12 ***	0.25 ***		-0.03 ***	-6.79 ***		
					2.66	116.74		4.07				1.86			-2.60	-2.24	-3.77	4.54		-2.98	-4.96		
					0.79%			0.01%				6.27%			0.93%	2.54%	0.02%	0.00%		0.30%	0.00%		
DEU	1369	98.04%	3 805.70 +++	0.00	26.29 **	0.88 ***	0.03 **			0.01 **	0.06 **	-0.01 **	0.03 ***					0.32 ***	-4.68 ***	-0.02 ***	-5.81 ***		
					2.14	89.76	2.22			2.03	2.09	-2.42	4.08					8.65	-3.60	-3.61	-6.12		
					3.26%		2.66%			4.29%	3.68%	1.56%	0.00%					0.00%	0.03%	0.03%	0.00%		
COM	1369	99.02%	7 715.91 +++	0.00		0.91 ***		0.06 ***		0.02 **		0.01 *	0.03 ***	-0.06 *				0.24 ***	-6.27 ***	-0.02 ***	-7.76 ***	5.25 ***	
						103.37		3.51		2.04		1.86	2.94	-1.80				5.35	-3.88	-2.75	-6.21	3.14	
								0.05%		4.18%		6.33%	0.33%	7.25%				0.00%	0.01%	0.61%	0.00%	0.17%	
BSN	1369	99.29%	10 657.94 +++	0.00	32.42 ***	0.82 ***		0.08 ***		0.10 ***	-0.11 ***		0.03 ***			1.21 **	-3.91 ***	0.22 ***	-4.53 ***	-0.07 ***	-6.08 ***	7.22 ***	3.04 *
					3.31	78.55		4.29		8.04	-2.61		3.11			2.44	-7.36	4.17	-2.81	-8.48	-5.49	3.79	1.65
					0.09%			0.00%		0.00%	0.93%		0.19%			1.49%	0.00%	0.00%	0.51%	0.00%	0.00%	0.02%	9.91%
BBV	1369	99.51%	15 569.64 +++	0.00	33.03 ***	0.83 ***		0.11 ***	-0.14 ***	0.12 ***	-0.11 **		0.03 ***				-2.33 ***	0.31 ***	-7.79 ***	-0.06 ***	-6.27 ***	7.53 ***	3.79 **
					3.33	86.77		5.33	-2.69	9.14	-2.57		2.75				-6.40	6.05	-4.75	-7.47	-5.80	3.61	2.04
					0.09%			0.00%	0.72%	0.00%	1.04%		0.61%				0.00%	0.00%	0.00%	0.00%	0.00%	0.03%	4.19%
SOC	1369	99.34%	11 426.91 +++	0.00	62.97 ***	0.80 ***		0.12 ***	-0.12 ***	-0.03 ***	0.10 ***		0.09 ***	-0.11 ***		-1.65 **	-0.29 ***	0.49 ***	-9.64 ***	-0.04 ***	-11.13 ***	6.05 ***	
					3.97	76.62		6.69	-2.59	-2.73	2.83		9.14	-3.18		-2.04	-4.06	10.40	-5.94	-6.21	-9.92	3.77	
					0.01%			0.00%	0.97%	0.64%	0.47%		0.00%	0.15%		4.13%	0.01%	0.00%	0.00%	0.00%	0.00%	0.02%	
BNP	1369	99.28%	10 542.19 +++	0.00		0.82 ***		0.07 ***	-0.09 **			-0.01 **	0.08 ***	-0.05 *	0.00 **		-0.09 **	0.32 ***	-10.23 ***	-0.03 ***	-7.28 ***	3.39 **	
						76.81		4.75	-2.30			-2.12	9.34	-1.72	2.12		-2.13	8.54	-7.52	-4.59	-8.05	2.48	
								0.00%	2.17%			3.39%	0.00%	8.48%	3.39%		3.36%	0.00%	0.00%	0.00%	0.00%	1.32%	
CRE	1369	99.14%	8 780.14 +++	0.00	-56.01 **	0.82 ***		0.07 ***		0.06 ***		-0.01 ***	0.05 ***	-0.07 **	0.01 ***	4.06 ***	-0.33 **	0.42 ***	-13.68 ***	-0.03 ***	-10.65 ***	8.96 ***	
					-2.13	81.01		3.90		5.92		-3.08	5.76	-2.23	2.77	2.85	-2.03	9.46	-9.19	-5.34	-10.50	4.76	
					3.35%			0.01%		0.00%		0.21%	0.00%	2.59%	0.56%	0.44%	4.21%	0.00%	0.00%	0.00%	0.00%	0.00%	
BOI	1369	98.24%	4 248.67 +++	0.00	132.89 ***	0.90 ***						0.12 ***		-0.72 ***		-8.00 ***					-24.20 **	-21.65 *	20.25 *
					2.88	78.72						3.68		-2.64		-2.92					-2.25	-1.65	1.78
					0.40%							0.02%		0.84%		0.35%					2.47%	9.86%	7.54%
INT	1369	99.57%	17 712.58 +++	0.00		0.85 ***		0.10 ***			-0.12 ***	0.01 **	0.15 ***					0.36 ***	-5.07 **	-0.05 ***	-9.55 ***	8.81 ***	7.37 ***
						90.46		4.35			-2.60	2.00	10.75					6.26	-2.49	-5.97	-6.24	3.81	3.90
								0.00%			0.94%	4.55%	0.00%					0.00%	1.29%	0.00%	0.00%	0.01%	0.01%
UNI	1369	99.58%	18 203.94 +++	0.00		0.88 ***		0.08 ***			-0.18 ***	0.01 **	0.15 ***		-0.01 *		-2.01 *	0.40 ***	-5.61 ***	-0.07 ***	-10.85 ***	7.21 ***	4.05 **
						103.76		3.49			-3.79	2.45	9.75		-1.92		-1.95	6.76	-2.89	-7.91	-7.66	3.04	1.98
								0.05%			0.02%	1.43%	0.00%		5.53%		5.15%	0.00%	0.39%	0.00%	0.00%	0.24%	4.80%
ING	1369	99.03%	7 765.17 +++	0.00	-60.36 ***	0.92 ***		0.03 **	-0.09 ***		0.06 **		0.02 ***			3.84 ***	-0.42 ***	0.21 ***	-6.33 ***	-0.02 ***	-2.17 **	3.10 ***	
					-4.98	113.95		2.09	-2.71		2.47		2.67			5.27	-2.67	5.67	-5.11	-4.34	-2.31	2.82	
					0.00%			3.68%	0.68%		1.36%		0.76%			0.00%	0.76%	0.00%	0.00%	0.00%	2.11%	0.48%	
BCP	1369	99.77%	33 317.78 +++	0.00	-36.59 *	0.92 ***	-0.16 ***	0.22 ***				0.03 ***	0.07 **		0.05 ***	2.61 *				-0.04 *	-9.02 ***		17.51 ***
					-1.67	110.64	-2.73	3.49				2.94	2.45		5.67	1.92				-1.89	-2.61		3.84
					9.50%		0.64%	0.05%				0.33%	1.45%		0.00%	5.48%				5.93%	0.92%		0.01%
BES	1369	99.82%	41 389.06 +++	0.00	-36.76 **	0.91 ***	-0.14 ***	0.22 ***		0.17 ***	-0.20 ***	0.02 **	-0.04 **		0.04 ***	3.59 ***	-3.68 ***	0.20 **		-0.05 ***	-9.37 ***		13.47 ***
					-2.57	135.20	-3.61	5.65		8.56	-2.81	2.35	-2.45		7.71	4.33	-2.72	2.18		-4.00	-4.12		4.23
					1.01%		0.03%	0.00%		0.00%	0.50%	1.89%	1.44%		0.00%	0.00%	0.66%	2.92%		0.01%	0.00%		0.00%

Table 8 : Greek Bank Restricted Sample Regression

Bank	#Obs.	AdjR²	Fisher	Itr.	Lg1	AT	BE	DE	SP	FR	GR	IE	IT	NL	PT	SPi	RTi	VSX	BOI	BBB	GD	LD
NAT	852	99.9%	41 341.06 +++	68.59 ***	0.93 ***	-0.05	0.17 ***	0.31	-0.03	-0.08	0.00 *	-0.03 *	0.16 ***	-0.23 *	0.06 ***	-3.42 **	-0.71	-0.21	4.24	0.00	0.14	13.96 *
				2.47	89.12	-0.67	1.98	1.52	-0.55	-0.44	-1.77	-1.95	3.03	-1.80	3.39	-2.40	-1.45	-0.85	0.53	0.08	0.03	1.67
				1.381%	0.000%	50.098%	4.810%	12.931%	58.285%	65.976%	7.757%	5.131%	0.256%	7.181%	0.074%	1.660%	14.875%	39.822%	59.440%	93.631%	97.829%	9.499%
ALP	852	99.8%	18 975.78 +++	158.55 ***	0.83 ***	-0.13	0.18	0.11	-0.07	0.40	0.01 ***	-0.02	0.10	0.01	0.07 ***	-8.64 ***	-4.72 ***	0.09	2.83	0.07 *	15.89 **	10.34
				4.30	48.96	-1.33	1.47	0.39	-1.01	1.60	5.28	-0.94	1.47	0.08	2.83	-3.94	-3.50	0.26	0.26	1.82	2.28	0.89
				0.002%	0.000%	18.236%	14.103%	69.502%	31.377%	11.044%	0.000%	34.501%	14.228%	93.499%	0.482%	0.009%	0.049%	79.119%	79.375%	6.957%	2.264%	37.227%

Table 9 : Oaxaca-Blinder Decomposition Factor Estimation for the LTRO

Effect	Pure	Changes with Cst. Coefficients				New Coefficients post LTRO				Total
	A	**B**	*BS*	*BC*	*BP*	**C**	*CS*	*CC*	*CP*	**A+B+C**
Bank					**LTRO +/- 25 Trading Days (≈ 1M)**					
ERS	-141.67	128.10	*-9.89*	*131.71*	*6.28*	6.35	*66.37*	*37.47*	*-97.49*	-7.23
RAI	-138.56	134.28	*-9.89*	*131.71*	*12.46*	4.57	*66.37*	*37.47*	*-99.27*	0.29
KBC	-99.15	111.20	*-9.89*	*131.71*	*-10.62*	9.96	*66.37*	*37.47*	*-93.88*	22.01
DEU	-140.05	122.94	*-9.89*	*131.71*	*1.12*	-2.02	*66.37*	*37.47*	*-105.86*	-19.13
COM	-135.68	120.71	*-9.89*	*131.71*	*-1.11*	9.91	*66.37*	*37.47*	*-93.93*	-5.06
BSN	-130.18	55.25	*-9.89*	*131.71*	*-66.57*	14.42	*66.37*	*37.47*	*-89.42*	-60.52
BBV	-123.31	38.32	*-9.89*	*131.71*	*-83.50*	19.83	*66.37*	*37.47*	*-84.01*	-65.16
SOC	-123.94	107.61	*-9.89*	*131.71*	*-14.21*	1.36	*66.37*	*37.47*	*-102.48*	-14.97
BNP	-126.57	115.52	*-9.89*	*131.71*	*-6.29*	-3.99	*66.37*	*37.47*	*-107.83*	-15.04
CRE	-133.82	99.15	*-9.89*	*131.71*	*-22.67*	7.68	*66.37*	*37.47*	*-96.16*	-26.99
BOI	-224.17	121.34	*-9.89*	*131.71*	*-0.48*	38.06	*66.37*	*37.47*	*-65.78*	-64.76
INT	-143.51	80.23	*-9.89*	*131.71*	*-41.59*	19.07	*66.37*	*37.47*	*-84.77*	-44.20
UNI	-152.13	82.35	*-9.89*	*131.71*	*-39.47*	19.53	*66.37*	*37.47*	*-84.31*	-50.25
ING	-134.55	121.13	*-9.89*	*131.71*	*-0.69*	2.04	*66.37*	*37.47*	*-101.80*	-11.38
BCP	-145.25	37.65	*-9.89*	*131.71*	*-84.17*	51.92	*66.37*	*37.47*	*-51.92*	-55.68
BES	-161.69	58.23	*-9.89*	*131.71*	*-63.59*	48.06	*66.37*	*37.47*	*-55.79*	-55.41
					LTRO +/- 75 Trading Days (≈ 3M)					
ERS	-161.49	62.63	*53.11*	*10.75*	*-1.23*	97.14	*25.03*	*75.72*	*-3.61*	-1.72
RAI	-158.45	61.50	*53.11*	*10.75*	*-2.36*	98.64	*25.03*	*75.72*	*-2.11*	1.69
KBC	-150.37	56.15	*53.11*	*10.75*	*-7.71*	97.52	*25.03*	*75.72*	*-3.23*	3.30
DEU	-159.81	60.21	*53.11*	*10.75*	*-3.64*	99.08	*25.03*	*75.72*	*-1.66*	-0.51
COM	-157.30	63.59	*53.11*	*10.75*	*-0.27*	94.27	*25.03*	*75.72*	*-6.47*	0.57
BSN	-148.74	41.39	*53.11*	*10.75*	*-22.47*	95.27	*25.03*	*75.72*	*-5.47*	-12.08
BBV	-144.60	35.36	*53.11*	*10.75*	*-28.50*	95.84	*25.03*	*75.72*	*-4.91*	-13.40
SOC	-158.97	54.88	*53.11*	*10.75*	*-8.97*	100.10	*25.03*	*75.72*	*-0.64*	-3.98
BNP	-156.81	56.09	*53.11*	*10.75*	*-7.77*	97.26	*25.03*	*75.72*	*-3.49*	-3.46
CRE	-151.18	57.15	*53.11*	*10.75*	*-6.71*	94.78	*25.03*	*75.72*	*-5.97*	0.74
BOI	-216.92	63.70	*53.11*	*10.75*	*-0.16*	96.04	*25.03*	*75.72*	*-4.71*	-57.17
INT	-159.32	52.67	*53.11*	*10.75*	*-11.19*	95.31	*25.03*	*75.72*	*-5.44*	-11.35
UNI	-160.09	50.69	*53.11*	*10.75*	*-13.17*	94.92	*25.03*	*75.72*	*-5.83*	-14.48
ING	-157.15	63.17	*53.11*	*10.75*	*-0.69*	94.58	*25.03*	*75.72*	*-6.17*	0.60
BCP	-185.97	39.47	*53.11*	*10.75*	*-24.39*	97.03	*25.03*	*75.72*	*-3.72*	-49.47
BES	-161.17	45.53	*53.11*	*10.75*	*-18.33*	96.88	*25.03*	*75.72*	*-3.87*	-18.76
					LTRO +/- 150 Trading Days (≈ 6M)					
ERS	22.21	37.79	*31.62*	*6.21*	*-0.04*	-70.75	*-64.40*	*22.87*	*-29.22*	-10.75
RAI	21.49	37.80	*31.62*	*6.21*	*-0.04*	-70.04	*-64.40*	*22.87*	*-28.51*	-10.75
KBC	26.20	35.09	*31.62*	*6.21*	*-2.74*	-69.47	*-64.40*	*22.87*	*-27.94*	-8.18
DEU	22.18	37.06	*31.62*	*6.21*	*-0.78*	-71.48	*-64.40*	*22.87*	*-29.94*	-12.24
COM	23.49	37.74	*31.62*	*6.21*	*-0.09*	-72.06	*-64.40*	*22.87*	*-30.53*	-10.83
BSN	35.11	26.69	*31.62*	*6.21*	*-11.14*	-70.05	*-64.40*	*22.87*	*-28.52*	-8.25
BBV	37.37	23.79	*31.62*	*6.21*	*-14.04*	-68.14	*-64.40*	*22.87*	*-26.61*	-6.98
SOC	25.03	34.97	*31.62*	*6.21*	*-2.87*	-69.75	*-64.40*	*22.87*	*-28.22*	-9.75
BNP	28.35	34.75	*31.62*	*6.21*	*-3.09*	-73.45	*-64.40*	*22.87*	*-31.92*	-10.36
CRE	31.13	34.82	*31.62*	*6.21*	*-3.02*	-72.27	*-64.40*	*22.87*	*-30.74*	-6.31
BOI	-60.17	37.98	*31.62*	*6.21*	*0.14*	-63.05	*-64.40*	*22.87*	*-21.52*	-85.24
INT	30.30	32.38	*31.62*	*6.21*	*-5.46*	-68.76	*-64.40*	*22.87*	*-27.23*	-6.09
UNI	30.29	30.61	*31.62*	*6.21*	*-7.22*	-68.95	*-64.40*	*22.87*	*-27.41*	-8.04
ING	26.31	37.66	*31.62*	*6.21*	*-0.17*	-73.94	*-64.40*	*22.87*	*-32.41*	-9.97
BCP	-5.19	26.81	*31.62*	*6.21*	*-11.03*	-58.51	*-64.40*	*22.87*	*-16.98*	-36.90
BES	9.35	29.37	*31.62*	*6.21*	*-8.47*	-59.68	*-64.40*	*22.87*	*-18.15*	-20.96

Table 10 : Oaxaca-Blinder Decomposition Factor Estimation for the OMT

Effect	Pure	Changes with Cst. Coefficients				New Coefficients post OMT				Total
	A	**B**	*BS*	*BC*	*BP*	**C**	*CS*	*CC*	*CP*	**A+B+C**
Bank					**OMT +/- 25 Trading Days (≈ 1M)**					
ERS	-75.37	-58.68	*-66.22*	*-7.74*	*15.28*	61.53	*25.89*	*71.29*	*-35.65*	-72.52
RAI	-86.23	-63.10	*-66.22*	*-7.74*	*10.86*	68.75	*25.89*	*71.29*	*-28.42*	-80.57
KBC	-89.04	-53.79	*-66.22*	*-7.74*	*20.17*	65.27	*25.89*	*71.29*	*-31.91*	-77.57
DEU	-78.58	-56.77	*-66.22*	*-7.74*	*17.19*	67.86	*25.89*	*71.29*	*-29.31*	-67.49
COM	-71.39	-75.41	*-66.22*	*-7.74*	*-1.45*	46.36	*25.89*	*71.29*	*-50.82*	-100.44
BSN	-87.56	-120.65	*-66.22*	*-7.74*	*-46.69*	56.88	*25.89*	*71.29*	*-40.30*	-151.34
BBV	-93.98	-119.69	*-66.22*	*-7.74*	*-45.73*	60.78	*25.89*	*71.29*	*-36.39*	-152.89
SOC	-106.89	-51.56	*-66.22*	*-7.74*	*22.40*	76.93	*25.89*	*71.29*	*-20.25*	-81.53
BNP	-91.48	-74.14	*-66.22*	*-7.74*	*-0.18*	61.88	*25.89*	*71.29*	*-35.30*	-103.74
CRE	-76.53	-73.22	*-66.22*	*-7.74*	*0.74*	49.56	*25.89*	*71.29*	*-47.62*	-100.19
BOI	-101.00	-73.91	*-66.22*	*-7.74*	*0.05*	60.72	*25.89*	*71.29*	*-36.46*	-114.19
INT	-97.16	-71.54	*-66.22*	*-7.74*	*2.43*	54.18	*25.89*	*71.29*	*-43.00*	-114.52
UNI	-108.77	-73.29	*-66.22*	*-7.74*	*0.67*	52.30	*25.89*	*71.29*	*-44.87*	-129.76
ING	-63.39	-75.33	*-66.22*	*-7.74*	*-1.37*	46.83	*25.89*	*71.29*	*-50.34*	-91.89
BCP	-98.76	-73.92	*-66.22*	*-7.74*	*0.04*	69.24	*25.89*	*71.29*	*-27.93*	-103.43
BES	-103.15	-73.25	*-66.22*	*-7.74*	*0.71*	67.48	*25.89*	*71.29*	*-29.69*	-108.92
					OMT +/- 75 Trading Days (≈ 3M)					
ERS	-50.56	-26.18	*-67.21*	*40.42*	*0.61*	81.22	*-64.45*	*121.92*	*23.75*	4.48
RAI	-54.82	-26.20	*-67.21*	*40.42*	*0.59*	85.84	*-64.45*	*121.92*	*28.37*	4.82
KBC	-52.43	-26.20	*-67.21*	*40.42*	*0.59*	81.83	*-64.45*	*121.92*	*24.36*	3.21
DEU	-56.44	-26.32	*-67.21*	*40.42*	*0.47*	88.04	*-64.45*	*121.92*	*30.57*	5.28
COM	-42.96	-26.66	*-67.21*	*40.42*	*0.13*	71.36	*-64.45*	*121.92*	*13.89*	1.75
BSN	-46.98	-22.86	*-67.21*	*40.42*	*3.93*	71.59	*-64.45*	*121.92*	*14.12*	1.75
BBV	-48.61	-22.83	*-67.21*	*40.42*	*3.96*	71.31	*-64.45*	*121.92*	*13.84*	-0.12
SOC	-63.47	-25.13	*-67.21*	*40.42*	*1.66*	91.32	*-64.45*	*121.92*	*33.85*	2.72
BNP	-56.93	-24.22	*-67.21*	*40.42*	*2.57*	85.20	*-64.45*	*121.92*	*27.73*	4.04
CRE	-48.69	-26.11	*-67.21*	*40.42*	*0.68*	73.80	*-64.45*	*121.92*	*16.33*	-1.00
BOI	-52.95	-26.79	*-67.21*	*40.42*	*0.00*	66.80	*-64.45*	*121.92*	*9.33*	-12.94
INT	-49.08	-26.69	*-67.21*	*40.42*	*0.10*	70.95	*-64.45*	*121.92*	*13.49*	-4.81
UNI	-51.07	-26.76	*-67.21*	*40.42*	*0.03*	69.76	*-64.45*	*121.92*	*12.29*	-8.07
ING	-44.70	-26.29	*-67.21*	*40.42*	*0.50*	74.90	*-64.45*	*121.92*	*17.43*	3.92
BCP	-64.96	-26.79	*-67.21*	*40.42*	*0.00*	64.61	*-64.45*	*121.92*	*7.14*	-27.13
BES	-58.54	-26.76	*-67.21*	*40.42*	*0.03*	65.57	*-64.45*	*121.92*	*8.10*	-19.73
					OMT +/- 150 Trading Days (≈ 6M)					
ERS	-56.13	-16.42	*-9.12*	*-6.03*	*-1.27*	66.69	*-40.55*	*81.26*	*25.99*	-5.85
RAI	-59.49	-16.57	*-9.12*	*-6.03*	*-1.42*	71.67	*-40.55*	*81.26*	*30.96*	-4.39
KBC	-58.40	-17.34	*-9.12*	*-6.03*	*-2.19*	67.34	*-40.55*	*81.26*	*26.63*	-8.40
DEU	-62.02	-15.59	*-9.12*	*-6.03*	*-0.44*	74.06	*-40.55*	*81.26*	*33.36*	-3.55
COM	-46.04	-15.03	*-9.12*	*-6.03*	*0.12*	56.07	*-40.55*	*81.26*	*15.37*	-4.99
BSN	-53.14	-8.53	*-9.12*	*-6.03*	*6.62*	56.27	*-40.55*	*81.26*	*15.56*	-5.41
BBV	-53.87	-8.58	*-9.12*	*-6.03*	*6.57*	55.94	*-40.55*	*81.26*	*15.23*	-6.51
SOC	-68.02	-16.90	*-9.12*	*-6.03*	*-1.75*	77.57	*-40.55*	*81.26*	*36.87*	-7.34
BNP	-61.49	-15.30	*-9.12*	*-6.03*	*-0.15*	71.01	*-40.55*	*81.26*	*30.30*	-5.79
CRE	-51.57	-15.13	*-9.12*	*-6.03*	*0.02*	58.70	*-40.55*	*81.26*	*18.00*	-8.00
BOI	-58.80	-15.19	*-9.12*	*-6.03*	*-0.05*	51.04	*-40.55*	*81.26*	*10.33*	-22.95
INT	-48.43	-14.50	*-9.12*	*-6.03*	*0.65*	55.59	*-40.55*	*81.26*	*14.88*	-7.34
UNI	-48.19	-14.40	*-9.12*	*-6.03*	*0.75*	54.30	*-40.55*	*81.26*	*13.59*	-8.29
ING	-49.18	-15.00	*-9.12*	*-6.03*	*0.15*	59.91	*-40.55*	*81.26*	*19.21*	-4.26
BCP	-69.88	-14.44	*-9.12*	*-6.03*	*0.71*	48.62	*-40.55*	*81.26*	*7.91*	-35.70
BES	-63.69	-14.75	*-9.12*	*-6.03*	*0.40*	49.67	*-40.55*	*81.26*	*8.96*	-28.77

Table 11: Pooled OLS results for the LTRO's effect.

LTRO +/- 25 Trading Days (≈ 1M)

#Obs.	Itr.	AT	BE	DE	SP	FR	IE	IT	NL	PT	SPi	RTi	VSX	BOI	BBB	
816	418.98	0.64	0.39	-0.99	-0.26	1.07 **	-0.24	0.11	-0.39 *	-0.10	22.48 ***	1.34	-2.48	-210.24 **	0.22	
	1.61	1.58	1.11	-0.65	-0.80	2.22	-0.59	0.29	-1.78	-1.23	3.39	0.82	-1.29	-2.40	0.76	
	10.706%	11.346%	26.707%	51.859%	42.620%	2.684%	55.217%	77.329%	7.551%	22.059%	0.075%	41.009%	19.598%	1.686%	44.848%	
AdjR²	Lg1	lAT	lBE	lDE	lSP	lFR	lIE	lIT	lNL	lPT	lSPi	lRTi	lVSX	lBOI	lBBB	
99.66%	0.62 ***	-0.69	-0.15	-1.15	0.63	-1.55 **	0.50	-0.12	0.34	-0.09	-5.61	-0.20	4.06	387.03 *	-0.62	
	20.87	-0.87	-0.13	-0.49	1.20	-2.24	0.90	-0.26	1.13	-0.31	-1.52	-0.22	1.63	1.83	-1.37	
	0.000%	38.724%	89.373%	62.751%	23.149%	2.565%	37.007%	79.141%	25.787%	75.930%	13.013%	82.706%	10.312%	6.821%	17.026%	
Fisher	LD	F1	F2	F3	F4	F5	F6	F7	F8	F9	F10	F11	F12	F13	F14	F15
2 163.90	-161.69	-405.96 ***	-437.30 ***	-391.48 ***	-502.74 ***	-420.97 ***	-453.28 ***	-428.99 ***	-458.43 ***	-492.16 ***	-449.33 ***	97.72 ***	-340.08 ***	-310.88 ***	-476.39 ***	181.58 ***
+++	-0.43	-9.93	-9.65	-9.77	-8.27	-11.09	-9.51	-9.40	-7.41	-8.88	-10.20	7.97	-9.86	-9.38	-10.47	10.47
	66.963%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
p-Value		F1-l	F2-l	F3-l	F4-l	F5-l	F6-l	F7-l	F8-l	F9-l	F10-l	F11-l	F12-l	F13-l	F14-l	F15-l
0		20.02	23.13	62.54 ***	21.63	26.01	31.51	38.38 *	37.75	35.11 *	27.87	-62.48 ***	18.18	9.56	27.14	16.43
		1.18	1.25	3.74	0.92	1.43	1.43	1.88	1.55	1.65	1.40	-4.21	1.05	0.53	1.34	1.28
		23.762%	21.019%	0.020%	35.639%	15.186%	15.424%	6.100%	12.133%	9.929%	16.236%	0.003%	29.407%	59.890%	18.092%	20.217%

LTRO +/- 75 Trading Days (≈ 3M)

#Obs.	Itr.	AT	BE	DE	SP	FR	IE	IT	NL	PT	SPi	RTi	VSX	BOI	BBB	
2416	149.32 ***	0.18 **	0.03	-0.15	0.36 ***	-0.06	-0.12 ***	0.00	-0.09	-0.05 *	6.52 **	-0.38	1.86 ***	-23.54	-0.31 ***	
	3.12	1.78	0.29	-0.53	3.35	-0.25	-3.42	-0.06	-0.56	-1.68	2.26	-0.72	3.90	-0.94	-5.13	
	0.185%	7.596%	77.382%	59.781%	0.082%	80.048%	0.063%	95.056%	57.537%	9.266%	2.394%	47.397%	0.010%	34.477%	0.000%	
AdjR²	Lg1	lAT	lBE	lDE	lSP	lFR	lIE	lIT	lNL	lPT	lSPi	lRTi	lVSX	lBOI	lBBB	
99.28%	0.87 ***	-0.67 **	0.27	-0.32	0.28	-0.42	0.07	-0.20 *	0.23	0.04	-0.40	0.17	0.05	163.64 ***	0.05	
	100.15	-2.06	1.46	-0.56	1.57	-1.41	0.89	-1.76	1.18	1.20	-0.17	0.26	0.06	3.48	0.34	
	0.000%	3.992%	14.468%	57.400%	11.750%	15.900%	37.431%	7.873%	23.695%	23.156%	86.516%	79.301%	95.427%	0.051%	73.364%	
Fisher	LD	F1	F2	F3	F4	F5	F6	F7	F8	F9	F10	F11	F12	F13	F14	F15
5 531.67	-161.17 **	-114.77 ***	-119.82 ***	-112.22 ***	-134.69 ***	-128.73 ***	-139.82 ***	-133.24 ***	-116.07 ***	-139.19 ***	-135.02 ***	44.24 ***	-104.20 ***	-101.73 ***	-141.64 ***	64.65 ***
+++	-2.52	-7.29	-7.18	-7.30	-6.57	-8.93	-6.95	-6.76	-5.49	-6.48	-7.85	5.94	-7.56	-7.14	-8.13	9.29
	1.173%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
p-Value		F1-l	F2-l	F3-l	F4-l	F5-l	F6-l	F7-l	F8-l	F9-l	F10-l	F11-l	F12-l	F13-l	F14-l	F15-l
0		-0.31	2.72	10.80	1.36	3.87	12.43	16.57	2.21	4.36	9.99	-55.75 ***	1.85	1.08	4.02	-24.80 ***
		-0.03	0.21	1.00	0.08	0.32	0.83	1.18	0.13	0.30	0.78	-5.71	0.17	0.09	0.31	-3.17
		97.794%	83.420%	31.575%	93.433%	74.698%	40.489%	24.001%	90.051%	76.545%	43.480%	0.000%	86.255%	92.571%	75.959%	0.154%

LTRO +/- 150 Trading Days (≈ 6M)

#Obs.	Itr.	AT	BE	DE	SP	FR	IE	IT	NL	PT	SPi	RTi	VSX	BOI	BBB	
4816	69.14 *	0.07	-0.04	0.46 *	0.30 ***	-0.18	-0.07 ***	0.13 *	-0.09	0.02	3.01	-0.09	0.50 *	-15.15	-0.28 ***	
	1.91	0.69	-0.39	1.80	4.26	-1.13	-3.86	1.85	-0.54	0.82	1.14	-0.39	1.70	-0.71	-4.72	
	5.645%	48.787%	69.920%	7.146%	0.002%	25.829%	0.012%	6.428%	59.220%	41.191%	25.320%	69.994%	8.836%	47.849%	0.000%	
AdjR²	Lg1	lAT	lBE	lDE	lSP	lFR	lIE	lIT	lNL	lPT	lSPi	lRTi	lVSX	lBOI	lBBB	
98.68%	0.90 ***	-0.13	0.33 **	-0.61	0.08	-0.42 *	0.04	-0.24 **	0.29	-0.03	-1.84	0.08	1.74 ***	164.04 ***	-0.24 **	
	146.62	-0.66	2.35	-1.38	0.71	-1.80	0.85	-2.22	1.48	-1.07	-0.78	0.15	3.42	5.23	-2.10	
	0.000%	50.787%	1.877%	16.905%	47.781%	7.230%	39.615%	2.679%	13.881%	28.612%	43.686%	87.944%	0.064%	0.000%	3.576%	
Fisher	LD	F1	F2	F3	F4	F5	F6	F7	F8	F9	F10	F11	F12	F13	F14	F15
6 010.81	9.35	-85.26 ***	-87.61 ***	-80.50 ***	-96.37 ***	-88.32 ***	-92.85 ***	-88.18 ***	-84.48 ***	-96.79 ***	-92.60 ***	58.42 ***	-76.48 ***	-73.76 ***	-97.12 ***	37.32 ***
+++	0.21	-6.31	-6.52	-6.11	-5.84	-7.26	-5.02	-4.81	-4.98	-4.96	-6.12	8.66	-6.20	-5.52	-6.41	7.16
	83.430%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
p-Value		F1-l	F2-l	F3-l	F4-l	F5-l	F6-l	F7-l	F8-l	F9-l	F10-l	F11-l	F12-l	F13-l	F14-l	F15-l
0		12.86	12.14	16.85	12.82	14.13	25.75 *	28.01 *	15.68	18.99	21.78 *	-69.52 ***	20.94 *	20.94 *	16.96	-14.54 **
		1.09	0.91	1.49	0.76	1.22	1.66	1.85	0.92	1.19	1.67	-7.63	1.95	1.77	1.28	-2.10
		27.708%	36.524%	13.542%	44.468%	22.114%	9.664%	6.469%	35.854%	23.403%	9.443%	0.000%	5.082%	7.760%	20.079%	3.609%

Table 12: Pooled OLS results for the OMT's effect.

OMT +/- 25 Trading Days (≈ 1M)

#Obs.	Itr.	AT	BE	DE	SP	FR	IE	IT	NL	PT	SPi	RTi	VSX	BOI	BBB	
816	0.00 ***	0.69 **	-0.11	-2.34 ***	0.67 ***	-1.07 ***	0.13	-0.29	0.46 *	-0.02	35.76 ***	2.48 ***	1.27 **	109.30 **	-0.20	
	0.00	1.70	-0.33	-2.65	2.74	-3.95	1.00	-0.96	1.87	-0.16	3.96	2.91	2.07	2.26	-0.74	
	0.000%	8.884%	73.936%	0.818%	0.636%	0.009%	31.546%	33.833%	6.172%	87.559%	0.008%	0.374%	3.923%	2.420%	46.221%	
AdjR²	Lg1	lAT	lBE	lDE	lSP	lFR	lIE	lIT	lNL	lPT	lSPi	lRTi	lVSX	lBOI	lBBB	
99.66%	0.45 ***	-3.18 ***	-0.36	3.76 ***	-0.84 **	1.03 **	0.39	0.99 **	-3.15 ***	0.01	-3.11 **	0.78 *	1.42	284.29 *	0.01	
	14.01	-2.72	-0.68	2.63	-2.37	2.09	1.31	2.29	-3.71	0.06	-2.33	1.91	1.33	1.77	0.01	
	0.000%	0.672%	49.952%	0.868%	1.819%	3.651%	19.078%	2.202%	0.022%	95.421%	2.030%	5.607%	18.252%	7.705%	98.858%	
Fisher	OD	F1	F2	F3	F4	F5	F6	F7	F8	F9	F10	F11	F12	F13	F14	F15
16 561.99	-103.15	-609.56 ***	-649.29 ***	-542.09 ***	-700.84 ***	-552.02 ***	-473.28 ***	-401.34 ***	-630.50 ***	-686.69 ***	-561.67 ***	-80.82 ***	-376.31 ***	-343.24 ***	-644.05 ***	75.24 ***
+++	-0.82	-8.71	-8.98	-8.64	-8.65	-8.04	-8.06	-8.18	-8.49	-7.85	-7.95	-4.33	-7.75	-7.16	-8.00	8.51
	41.299%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.002%	0.000%	0.000%	0.000%	0.000%
p-Value		F1-l	F2-l	F3-l	F4-l	F5-l	F6-l	F7-l	F8-l	F9-l	F10-l	F11-l	F12-l	F13-l	F14-l	F15-l
0		27.78 ***	16.92 *	14.11 *	24.57 **	31.76 ***	15.59 *	9.17	-3.74	11.67	26.62 ***	2.15	5.99	-5.62	39.76 ***	4.39
		3.28	1.70	1.74	2.42	3.25	1.92	1.28	-0.31	1.11	2.78	0.38	0.81	-0.72	3.82	0.82
		0.109%	8.915%	8.154%	1.581%	0.121%	5.559%	19.921%	75.600%	26.782%	0.549%	70.069%	42.007%	46.960%	0.014%	41.202%

OMT +/- 75 Trading Days (≈ 3M)

#Obs.	Itr.	AT	BE	DE	SP	FR	IE	IT	NL	PT	SPi	RTi	VSX	BOI	BBB	
2416	157.04 ***	0.58 ***	-0.44 ***	-1.30 ***	0.15 **	-0.33 ***	0.15 ***	0.12	0.35 ***	0.01	-2.44 *	0.10 ***	0.73 ***	192.69 ***	-0.78 ***	
	5.01	4.08	-3.61	-4.87	2.40	-2.75	3.32	1.60	3.15	0.80	-1.82	0.28	2.61	6.43	-8.52	
	0.00%	0.00%	0.03%	0.00%	1.64%	0.60%	0.09%	10.93%	0.16%	42.46%	6.82%	77.73%	0.91%	0.00%	0.00%	
AdjR²	Lg1	lAT	lBE	lDE	lSP	lFR	lIE	lIT	lNL	lPT	lSPi	lRTi	lVSX	lBOI	lBBB	
99.58%	0.92 ***	0.08	0.82 ***	1.54 ***	-0.46 ***	0.68 ***	-0.35 ***	0.46 ***	-1.82 ***	-0.11 ***	0.79	0.50	-0.62	68.05	0.49 ***	
	114.33	0.23	4.07	3.48	-3.72	3.53	-5.57	3.62	-6.96	-5.78	0.81	1.39	-1.26	1.16	3.57	
	0.000%	81.58%	0.005%	0.050%	0.021%	0.042%	0.000%	0.030%	0.000%	0.000%	41.75%	16.46%	20.90%	24.77%	0.036%	
Fisher	OD	F1	F2	F3	F4	F5	F6	F7	F8	F9	F10	F11	F12	F13	F14	F15
9 477.56	-58.54 *	-31.69 ***	-35.01 ***	-27.69 ***	-35.69 **	-27.56 ***	-22.87 ***	-19.52 ***	-28.41 **	-27.02 **	-24.82 **	0.89	-16.38 **	-12.09 *	-29.92 ***	10.75 ***
+++	-1.67	-2.91	-2.76	-2.79	-2.47	-2.75	-2.60	-2.60	-2.10	-2.06	-2.45	0.26	-2.28	-1.70	-2.59	3.62
	9.59%	0.36%	0.58%	0.54%	1.35%	0.60%	0.93%	0.93%	3.59%	3.96%	1.44%	79.64%	2.29%	8.95%	0.97%	0.03%
p-Value		F1-l	F2-l	F3-l	F4-l	F5-l	F6-l	F7-l	F8-l	F9-l	F10-l	F11-l	F12-l	F13-l	F14-l	F15-l
0		7.98	3.71	6.11	2.09	15.58 **	11.55 **	9.93 **	-4.93	1.60	9.85	5.59	9.46 *	7.47	13.84 *	-6.42 *
		1.42	0.50	1.13	0.26	2.24	2.12	2.14	-0.53	0.23	1.53	1.50	1.91	1.41	1.94	-1.79
		15.64%	61.52%	25.79%	79.67%	2.52%	3.38%	3.27%	59.30%	81.66%	12.69%	13.31%	5.65%	15.75%	5.25%	7.34%

OMT +/- 150 Trading Days (≈ 6M)

#Obs.	Itr.	AT	BE	DE	SP	FR	IE	IT	NL	PT	SPi	RTi	VSX	BOI	BBB	
4816	93.72 ***	0.02	0.19 ***	-0.11	0.37 ***	-0.52 ***	-0.08 ***	-0.09 **	0.20 ***	0.01	-2.62 ***	-0.24	1.51 ***	141.18 ***	-0.47 ***	
	6.44	0.33	4.45	-0.80	9.86	-8.67	-4.08	-2.00	4.56	1.24	-4.12	-1.30	8.75	14.71	-8.93	
	0.000%	74.147%	0.001%	42.616%	0.000%	0.000%	0.005%	4.555%	0.001%	21.669%	0.004%	19.339%	0.000%	0.000%	0.000%	
AdjR²	Lg1	lAT	lBE	lDE	lSP	lFR	lIE	lIT	lNL	lPT	lSPi	lRTi	lVSX	lBOI	lBBB	
99.56%	0.93 ***	0.94 ***	-0.02	-0.23	-0.39 ***	0.48 ***	-0.03	0.30 ***	-0.94 ***	-0.07 ***	0.87	0.54 **	-1.28 ***	-141.03 ***	0.50 ***	
	208.18	4.19	-0.13	-0.70	-5.38	3.54	-0.92	4.33	-4.67	-4.63	1.18	2.31	-4.59	-4.50	7.83	
	0.000%	0.003%	89.836%	48.531%	0.000%	0.041%	35.553%	0.002%	0.000%	0.000%	23.656%	2.103%	0.000%	0.001%	0.000%	
Fisher	OD	F1	F2	F3	F4	F5	F6	F7	F8	F9	F10	F11	F12	F13	F14	F15
18 009.58	-63.69 ***	-21.61 ***	-21.31 ***	-18.73 ***	-20.87 ***	-25.08 ***	-17.19 ***	-15.21 ***	-13.72 *	-16.72 **	-20.62 ***	-0.74	-17.34 ***	-15.69 ***	-23.78 ***	8.52 ***
+++	-3.87	-3.96	-3.33	-3.74	-2.73	-5.13	-3.51	-3.50	-1.87	-2.52	-4.14	-0.36	-4.53	-4.15	-4.25	4.12
	0.011%	0.008%	0.087%	0.019%	0.635%	0.000%	0.045%	0.046%	6.108%	1.175%	0.004%	72.133%	0.001%	0.003%	0.002%	0.004%
p-Value		F1-l	F2-l	F3-l	F4-l	F5-l	F6-l	F7-l	F8-l	F9-l	F10-l	F11-l	F12-l	F13-l	F14-l	F15-l
0		7.57	4.20	5.29	1.67	17.65 ***	10.55 **	9.82 ***	-4.33	2.20	12.12 **	4.89 *	15.26 ***	15.50 ***	14.51 **	-6.19 **
		1.53	0.71	1.11	0.24	3.26	2.44	2.59	-0.59	0.37	2.36	1.78	3.76	3.64	2.54	-2.28
		12.602%	47.748%	26.529%	80.665%	0.113%	1.472%	0.950%	55.616%	71.252%	1.844%	7.532%	0.017%	0.027%	1.126%	2.278%