The Financial and Macroeconomic Effects of SMP, LTRO and OMT Announcements

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Abstract

The term *Non-Conventional Monetary Policies* refers to the Central Banks and indicates the possibility that they may implement policies of extraordinary nature. The motivation behind such a move may lie in the fact that conventional policies have temporarily lost their effectiveness. The events of the financial crisis of 2007 – 2009 are a good example to explain the use of an unconventional approach by the Central Banks. Previously, the monetary policies of many countries seemed to follow the Taylor rule, according to which the Central Banks (in reference to an inflation target) varied the nominal interest rate in response to changes in inflation and GDP. The financial crisis of 2007 has led the Monetary Authorities of the major countries to no longer consider the conventional criteria on which they had always based their interventions, pushing them towards these exceptional measures.

This study evaluates the macroeconomic effects of three different *Non-Conventional Monetary Policies* in the financial and bond markets. Securities Market Programme (SMP), Long Term Refinancing Operation (LTRO) and Outright Monetary Transaction (OMT) represent the announcements of the European Central Bank (ECB) that have been evaluated.

This paper will argue that the markets examined (France, Germany, Spain and Italy) have shown significant growth in terms of real activity, credit and prices, for the SMP and OMT announcement, whereas LTRO has displayed relatively muted results.

Keywords: Securities Market Programme, Long Term Refinancing Operation, Outright Monetary Transaction, event study.

Introduction

The financial crisis of 2007-2009 represents a good example to explain the use of an unconventional approach by the Central Banks. To understand what they consist of, recalling that the actions of Monetary Policy are transmitted to the economy through two channels: the interest rates and the bank stocks that, in turn, influence the supply of credit.

There are several situations in which the rate and credit channels lose importance, for instance when the reference rates tend to zero, or at very low levels in order to be further reduced, bringing the conventional policy of the Central Banks to lose its effectiveness. Therefore, the possibility of influencing the expectations of the operators through the change in rates is minimised. It should be noted that during the crisis, especially since October 2008, the central bank reference rates were rapidly brought to their minimum levels.

Another case is when the economic crisis and uncertainty make investors more likely to hold cash than to buy medium to long-term securities. If this happens, the operation of the rates, through the lowering of the reference rates, and therefore more generally the short-term rates, does not produce any effect; in particular, the lowering of the long portion of the rate structure ("liquidity trap") does not occur.

On the other hand, if banks are in crisis the credit channel is ineffective: they have suffered capital losses and therefore they are unable to grant new credits; the interbank market is blocked and therefore the liquidity situation remains critical. These conditions developed violently during the crisis of 2007. In this situation the Central Banks can move towards the use of unconventional policies, which can be summarized in three main points.

i. The massive creation of liquidity (quantitative easing), due to the purchase of cash in the market, with the hope that traders are committed to buy their excess cash stocks.

ii. The slope of the structure for the expiry of rates (influencing economic prices represents the main goal).

iii. The outlet of the credit market, in which the purpose concerns the credit reactivation in the economy and this can be done through the refinancing operations of the Central Bank, which accepts as guarantee, the securities issued by private individuals.

The first effect of the unconventional monetary policies concerns the length, in which the balance sheet grows in a special way. In the case of the ECB the increment of the balance sheet was of 60%; in other cases, as for the FED, it has exceeded 100%.

The second effect concerns the composition of the items, especially the assets. The need to reactivate the credit market leads Central Banks to implement financing transactions, which do not have government bonds as goal, as in the conventional scheme, but securities of private issuers (commercial paper, corporate bonds, etc.).

The Central Banks of the major developed countries, in response to the extreme criticality of the economic and financial crisis, have adopted non-conventional monetary policies. Previously, the monetary policies of many countries seemed to follow the Taylor rule, according to which the Central Bank varied the nominal interest rate in response to changes in inflation and GDP, with an inflation target as a reference. The financial crisis of 2007 has led the Monetary Authorities of the major countries to no longer consider the conventional criteria on which they had always based their interventions, pushing them to adopt exceptional measures called non-conventional policies. The US Central Bank was urged to resort to unconventional measures, not only because of the severity of the crisis, but also because the traditional instruments could no longer be used, as the Fed Funds Rate was already at minimum levels (close to 0). Therefore, the Federal Reserve has developed innovative tools, that were not used previously, to alleviate the tensions on the money market and reduce the repercussions on the real one. These instruments were introduced at an early stage of the crisis and subsequently upgraded following the bankruptcy of Lehman Bank. The FED adopted quantitative easing measures to facilitate the access to credit and stimulate economic growth. An operation the bank acts as an investor of its economy. Hence, FED ordered the purchase of securities for a total of $ 40 billion per month by introducing the Term Auction Facility (TAF), which provides liquidity after one month through an auction mechanism and against a broader category of guarantees. Moreover, since 2009, FED began (in accordance with the Treasury) buying medium and long-term treasuries, debt securities of federal agencies and mortgage-backed securities issued by federal agencies. Since 2011 the TWIST program has begun to lengthen the maturity of government securities by purchasing around 400 billion of government bonds at 6/30 years and selling 400 billion of short-term government securities. The ECB also adopted policies, in line with the extraordinary FED ones to front the crisis. In particular, since 2008 the total assets in the ECB's balance sheet have doubled to around 3,000 billion of euros towards the end of 2011. However, the two banks faced the crisis with different instruments considering the different structure of the financial markets and the different role of banks in financing the economy. While the FED had begun actions aimed to ensure the direct disbursement of credit to households and businesses, the ECB favoured the bank's liquidity proposal to counter the credit contraction, implementing the so-called credit easing. Thus, since 2008 the ECB has conducted refinancing operations through fixed rate auctions with full adjudication of amounts and has increased long-term refinancing operations, increasing the size of assets. Moreover, since 2009 it has intervened directly in some securities markets. The absence of a traditional QE, like that of the Federal Reserve, is explained by two reasons:

i. The difficulty of the ECB, that represented 18 countries, of buying government bonds without creating political tensions.
ii. In the euro area, most of the funding is linked to the bank credit, so credit easing (in principle) is the most appropriate instrument.

In the Eurozone, the injection of liquidity to reduce the cost of money passed through the banks, with low rates and huge loans to banks (refinancing operations).

The New Monetary Policy of European Central Bank

The FED and the ECB have faced the crisis by using different instruments. While the FED has undertaken direct actions aimed to ensure the direct disbursement of credit and has launched plans to purchase public and private securities, the ECB has favoured the supply of liquidity to banks in order to contain the contraction of the supply of credit and has always sterilized the unconventional measures of Monetary Policy, giving rise to the so-called Credit Easing.

Securities Markets Programme (SMP)

Since October 2008, the ECB has conducted all the refinancing operations through fixed rate auctions with the full awarding of the amounts, ensuring in this way an unlimited liquidity offer. Unlike the usual practice, the financial institutions were awarded the full amount of liquidity required, that was designed to meet the short-term needs of banks in order to facilitate the provision of credit. The central bank has extended the types of assets eligible for collateral in open market operations, while it has also increased the number and the frequency of long-term refinancing operations, thereby increasing the size of assets. The refinancing operations were, before 2008, mostly constituted by "short-term" refinancing operations, whereas at the beginning of 2012 were almost exclusively composed of "long-term" refinancing operations. Since 2009 the ECB has intervened directly in some securities markets:

i. The first intervention concerned the Covered Bonds, in fact between 2009 and 2012 the ECB bought € 68 millions of them through two purchase programs: The Covered Bond Purchasing Program (CBPP and CBPP2), in order to look after the financing conditions of the banks and the firms. The aim of the program was to support a specific segment of the financial market, important for the proper financing operation of the bank, which had been particularly affected by the financial crisis.
ii. The second intervention concerned the Securities Markets Program (SMP) relating to the sector of government bonds. It provided the purchase, on the secondary markets, of government bonds

accepted by the ECB as collateral in the refinancing operations. The program initially concerned Greece, Ireland and Portugal; subsequently, in August 2011, it was extended to Spain and Italy too.

The program concerned the purchase of securities on the secondary markets for a value of € 219 million from 2010 to 2012, with the aim of correcting the serious malfunctions of the market of debt securities in several countries of the euro zone and of safeguarding the effectiveness of the transmission of Monetary Policy. The impact of the program on the spreads of government bonds was immediate. The spread between Greek and German government bonds recorded a fall of 400 point and in the Italian and Spanish case, the fall touched the 100 points. The long-term effect on returns was significant too, a reduction between 0.1 and 7 basis points for 10-year bonds has been estimated for every € 100 million of securities purchased. Similar results were found for 5-year Italian bonds. According to De Santis et al (2013), the effects of the SMP could even be around 200 basis points on Italian 2 and 10-year bonds. Finally, ECB purchases appear to have significantly reduced the volatility of government bonds.

Long Term Refinancing Operation (LTRO)

In December 2011 and February 2012, two Bank refinancing operations were activated: the 3-year Long Term Refinancing Operation (LTRO) that allowed liquidity to the Euro-zone for more of 1,000 MLD of € avoiding the risk of a looming crisis. Through the LTROs the Euro-zone Banks obtained liquidity at a rate of 1%, One quarter of which funds were given to Italian banks. The two 3-year auctions have added additional liquidity of about € 523 million to the system. The possibility of early reparation of the liquidity obtained in the auctions was largely used by Italian banks. In the first few months of 2014, funds amounting to € 60 million were returned. At the end of 2013, Italian banks held 232 MLD of LTRO funds with a 15% restitution rate compared to 39% of the Euro area. LTRO liquidity injections have been estimated to have reduced interest rates on the interbank market by 70-100 basis points. Most of the funds that the Italian banks obtained in the LTROs were used to buy domestic debt securities, bringing the total public bonds held to 386 MLD (between 2011-2013 purchases were 150 MLD of €). The share of assets held by credit institutions in government bonds went from 6% to 10% of these purchases, more than 80% of bonds with a fixed term of up to 5 years.

Outright Monetary Transaction (OMT)

In September 2012 the ECB Board of Directors announced that the bank might engage in Outright Monetary Transaction (OMT), through which the ECB undertook to buy government bonds on the secondary market

without restrictions. It was a plan aiming at reducing the pressures arising from the spread and allaying fears on the international markets. The OMT is summarized in the following points:

i. The ECB does not set ex ante quantitative limits on the securities it buys
ii. The government securities in question are the short span ones (1-3 years)
iii. Transactions take place on the secondary market; the market for outstanding securities.
iv. The liquidity created by the OMT plan will be sterilized, to avoid the plan becoming a way to introduce liquidity with consequent inflationary tensions
v. In order to receive aid from the OMT program, the cross-compliance program must be signed.

Therefore, the subscription by the State to a Program of the European Stability Mechanism Fund (EMS) represents a necessary condition for receiving the OMT plan. The cross-compliance program concerns the supervision of budgets and the application of structural reforms.
The OMT program is a security measure to protect investors, which sees the ECB as the guarantor of the Euro system. On 4 September 2014, the Governing Council of the ECB decided to launch a new program to purchase covered bonds (CBPP 3) which, together with the program to purchase securities issued for securitization transactions and longer-term refinancing operations term (LTRO), had the purpose to facilitate the orientation of the ECB's monetary policy, also facilitating the provision of credit in the euro area. The covered bonds are considered suitable if they meet some conditions (such as a credit rating of at least grade 3, equal to a BBB rating, and the 70% limit of the issue regarding the total share held by the Central Bank) in addition to what was required in the previous programs.

Event Study

To assess the effects of the SMP policy announcement on financial markets, the behaviour of share prices has been analysed on the day of the announcement of the referred policy. In particular, the work focuses on four main European indices: DAX for the Frankfurt Stock Exchange, CAC 40 for the Paris Stock Exchange, IBEX - 35 for the Madrid Stock Exchange and FTSE MIB for the Milan Stock Exchange. The following model has been used for each index, where the sampling period starts on the 1st of January 2007 and ends on the 31st of December 2014 with a total of 2,029 observations:

$$\Delta y_t = c + \sum_{j=1}^{J} \alpha_j D_{jt} + \varepsilon_t$$

The model refers to the daily variation of the closing prices of each index, Δ represents the first difference operator, y_t is the financial variable of interest, D_{jt} are the dummy variables that assume the value of 1 on

the day of the announcement and on the $j-1$ days following the date, and value 0 in the remaining sampling days; ε_t is a random error with zero mean and constant variance, while c and α_j are parameters to be estimated. The algebraic sum of the α_j parameters represents the total variation of y_t due to the policy, which takes into account the reaction of the markets that occurred on the day of the announcement and in the $K-1$ following days.

Firstly, a two-day window was taken into consideration; The reason for this is that, in a period of low liquidity, index prices can react slowly in response to an announcement. The dummies reflect the only announcement associated with the Securities Market Program on May 9, 2010. The estimate was obtained through standard regression techniques. However, the change in yt is also caused by events other than the announcement of the policy, therefore implicitly it is assumed that the monetary policy considered is the most important event that occurred in those days. However, Altavilla et al. (2014) estimated the impact of the OMT policy on the yields of 2 and 10-year bonds in Germany, France, Italy and Spain, (extending the model with the inclusion of an additional $\beta Newst$ variable that contains all the possible news available on a data set in Bloomberg that had influenced the model in any way) showing that the results remain substantially unchanged when the model also takes into account the effect exerted by other information flowed to the markets in the days of the announcement of the policy itself. Therefore, the analysis will focus on the starting model.

The Standard Tests can be used to evaluate if the sum of the dummies coefficients is statistically different from zero. The joint significance of the dummies can be verified through a Test F. More precisely, given the hypothesis system

$$\begin{cases} H_0: \alpha_i = 0, \;\; i = 1, \dots, K \\ H_1: \text{at least one } \; \alpha_i \neq 0 \end{cases}$$

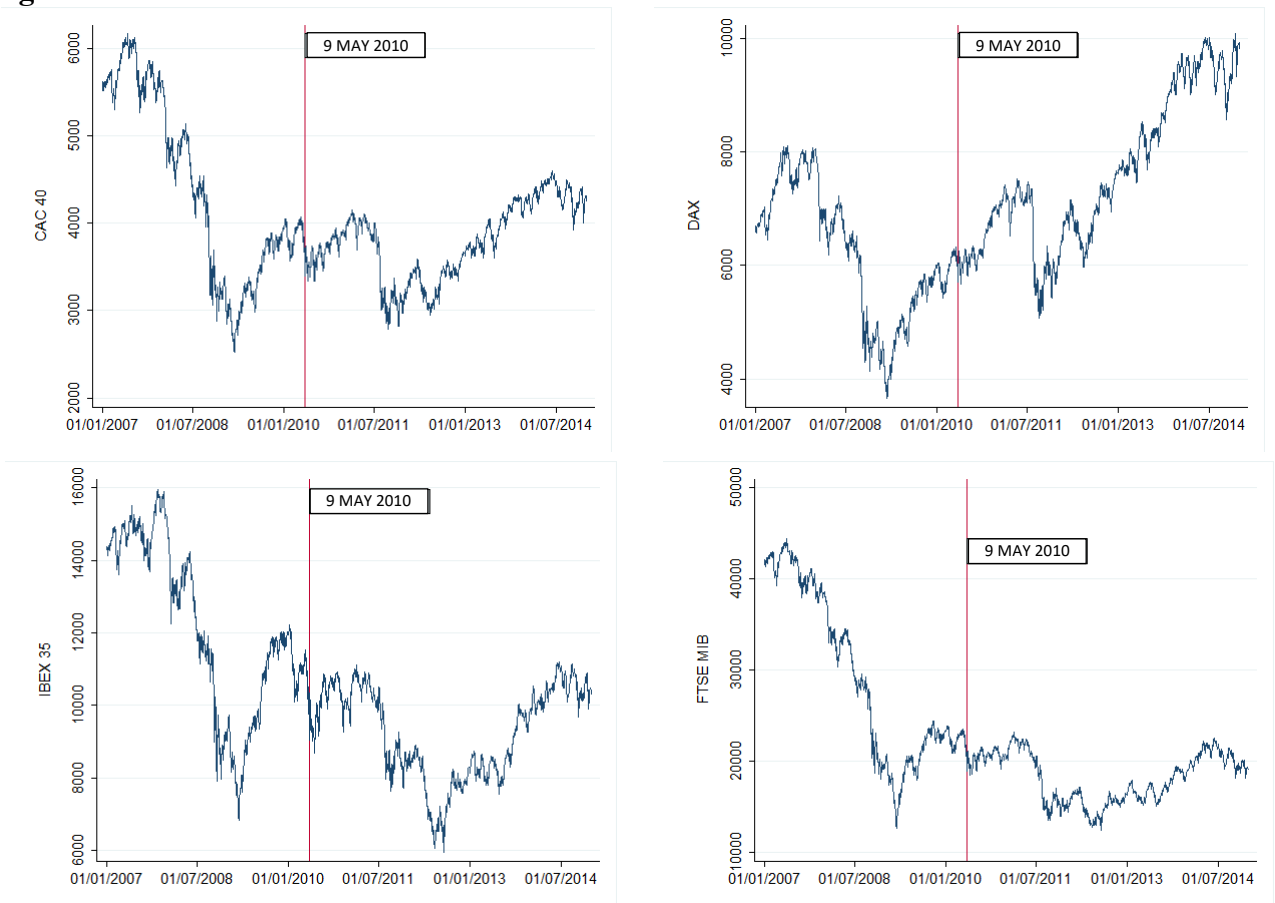
The F-statistic is expressed as:

$$F = \frac{(RSS_0 - RSS)/J}{RSS/(N-K)} \sim F_{J,N-K}$$

In which, RSS_0 is the sum of the squared residuals of the restricted model, RSS is the sum of the squared residuals of the unrestricted model, J is the number of restrictions, N is the number of observations, K is the number of parameters and $F_{J,N-p-1}$ represents the distribution of Fisher F with J and $N-K$ degrees of freedom. In this case the restricted model contains only the intercept, so that RSS coincides with the deviance of the dependent variable. The number of restrictions, J is equal to the number of dummies included in the model and $K = J + 1$. The test statistic, under the null hypothesis, is distributed as a Fisher F with J and $N-K$ degrees of freedom.

For J = 1 the model contains only one dummy and therefore the reaction of the markets is supposed to be ended on the day of the announcement; for J = 2 the model contains two dummies, that means it is assumed that the reaction occurred on the day of the announcement and in the next, and so on for higher values of J. The model was estimated with Ordinary Least Squares for values of J from 1 to 5 and therefore considering the impact of the SMP policy announcement for up to 5 days. The following graphs show the time series of the four indices in the period considered highlighting the date of announcement of the SMP policy, that was on May 9, 2010:

Figure 1: SMP



Note: the figure reports the distribution of the four indexes over time, highlighting the day of the announcement.

The Standard test results are displayed in the following table:

Table 1: Effect of SMP announcement on stock indexes (basis points)

2-day window

Index	Announcement		Total
	10/05/2010	11/05/2010	
CAC 40	328.53	-26.26	302.26***
DAX	301.44	18.42	319.85***
IBEX 35	1308.29	-340.81	967.48***
FTSE MIB	2137.36	-84.14	2053.21***

Note: The table shows the results (relating to the closing price) of the day of the announcement (it was taken into consideration on the 10th, since the day 9/05/2010 was the closing day of the exchange) and the following day, the last column shows the algebraic sum of the variations always based on a two-day window and the result of the Test F. *, **, *** represent the significance of the Test F at intervals of 10%, 5%, 1%.

Based on the results it can be said that the policy has had a significant impact of 1% on all four markets. In fact, in Piazza Affari, FTSE MIB closes at 11.3% gaining 2,053 points, 302 in Paris where CAC 40 earns the 9.6%, IBEX 35, Madrid's most important index, showed a 14% growth with 967 points and finally DAX scored a 5.3% growth gaining 320 points. The different dimension of the absolute variation depends on the average level of the four indices.

In any case, the greatest impact is displayed on the day of the announcement except for the DAX, in which the signs are negative in the second day. This can be explained by the tendency of the operators to realize the profits achieved in the first day, with a consequent fall in the prices of the shares (and therefore of the index) in the following days. A significant result especially for Piazza Affari; the second biggest boom ever. The raise has been determined by a mix of factors, first of all the maxi-plan launched during the week-end to protect the Euro: a package of measures to guarantee a financial stability in Europe which provided bilateral loans from Eurozone countries for 440 billion, 60 of funds from the EU budget and up to 250 billion of "substantial" IMF contributions (equal to one third of the total).

This package, in fact, has been interpreted by the markets as a defense of the credit institutions; the most exposed ring to the possible sovereign debt crisis. Therefore, as the banks had slashed the price lists on the previous weekend, after seven days they took them into orbit. It is not a coincidence that in Milan market the bundle of blue chips rose to a higher level than the general index of the list (Ftse all share, + 9.16%), or it can not be surprising that the French Stock Exchange, whose financial sector had been hardly hit in the previous Friday, rebounded more than in London (+ 4.57%) and Frankfurt (+ 5.3%); the euphoria did not last long. The following day, the European stock exchanges, after a decisively declined opening, widened in the middle of the session, recovered at the end, behind the wake of Wall Street that, after having fluctuated above and below the parity, archives the day with the following result: the Dow Jones lost the 0.43% and the S & P 500 the 0.34%. Nevertheless, with the exception of the Frankfurt index, the rest of the exchanges closed in negative (all the Δy_t are negative, apart from the German one, which however remained at very low levels compared to the previous day one) since the operators feared that the EU aid plan would not be able to stabilize the euro area. For this reason, the single currency became to fall down, even if it did not reach the minimum levels of the previous week, when it stopped just above $ 1.25.

The total impact was strongly positive for the markets. The Italian results is considerably greater due to the simple fact that the FTSE MIB has a much higher average quotation than the others (also visible on the vertical axis of graphs shown).

The studies obtained, could lead us to hypothesize that the effects of the policies are persistent, but this hypothesis could not stand, especially if considered in periods of severe financial turbulence. Therefore, to verify if the studies have had only a temporary impact on the prices of the indexes, the window has been increased to five consecutive days, so the model will be estimated for values of J from 1 to 5.

Table 3: Prices reaction (basis points)

1-5-day window

Index	Day 1	Day 2	Day 3	Day 4	Day 5
CAC 40	328.54	302.26	343.82	342.33	171.58
DAX	301.43	319.85	464.47	531.77	334.74
IBEX 35	1308.46	967.48	1051.3	941.31	279.36
FTSE MIB	2137.4	2053.21	2220.62	2082.08	994.17

Note: The table shows the results of the day of the announcement and the 4 following days

In this case a dummy of value 1 is added to every single day after 10/05/2010 (for instance in case of 3 days, the dummies of the days 10/05/2010, 11/05/2010, 12/05/2010 assume a value of 1, while in the remaining days 0 and so on).

It can be noticed that the overall impact shows a certain persistence for 4 days from the announcement. Over a period of 5 days, the trend shows a considerably reduction, signaling a profit taking (a negative impact) on the fifth day. In any case, independently from the index considered, the most important result occurs on the first day. The only exception is the DAX for which the effect increases with the increase in the width of the window, except for what has been said about the fifth day.

Therefore, it can be seen that after 3 days the impact is still positive: in fact, on 12/05 the main European prices closed sharply: they welcomed the austerity plan announced by the head of the Spanish government, Jose Luis Rodriguez Zapatero. In Milan FTSE BIB earned 0.74%, Paris closed at + 1.10%, Madrid at + 0.81% and finally the Frankfurt exploits: + 2.41%. From the 4th day something changed, the pressures came from the ECB asking for greater commitment to the Eurozone governments to restore public finances. In fact, it is stated in the Monthly Bulletin, that in order to correct the large imbalances, it would generally be necessary to intensify the efforts. The consolidation would have to "substantially exceed the structural adjustment of 0.5% of GDP on an annual basis established as a minimum requirement in the Stability and Growth Pact". Contrasting the session of European indexes: Piazza Affari and Madrid were the only ones to close at a loss weighed down by bankers; the German index remained very lively (+ 1%).

The 5th day was really tense in the Eurozone: the depreciation of the euro against the dollar continued. In one session, the single currency firstly fell to 1.25 and then below 1.24 against the US currency. The euro also weakened against the yen and the pound, while it remained stable compared to the Swiss franc. Sales started at the opening of the European markets and were advantaged in the news the then French president French Nicholas Sarkozy, threatened the exit of France from the monetary union if Germany had not accepted the Greek aid plan, forcing the German chancellor, Angela Merkel, to support the Greek bailout. Some US macroeconomic data (in which the better health state of the US economy emerged, compared to the euro area one) determined the loss in value of the euro. This led operators to forecast an increase in interest rates on the part of the Fed and therefore to move capital in dollar.

In the case of Monetary Policy Long Term Refinancing Operation (LTRO), the analysis was planned to focus on two different dates relating to the two refinancing operations of the banks, so as to understand how

the four equity indices reacted in the two different occasions. The model structure is the same, with the only difference that two groups of dummy variables are now considered, one for each announcement:

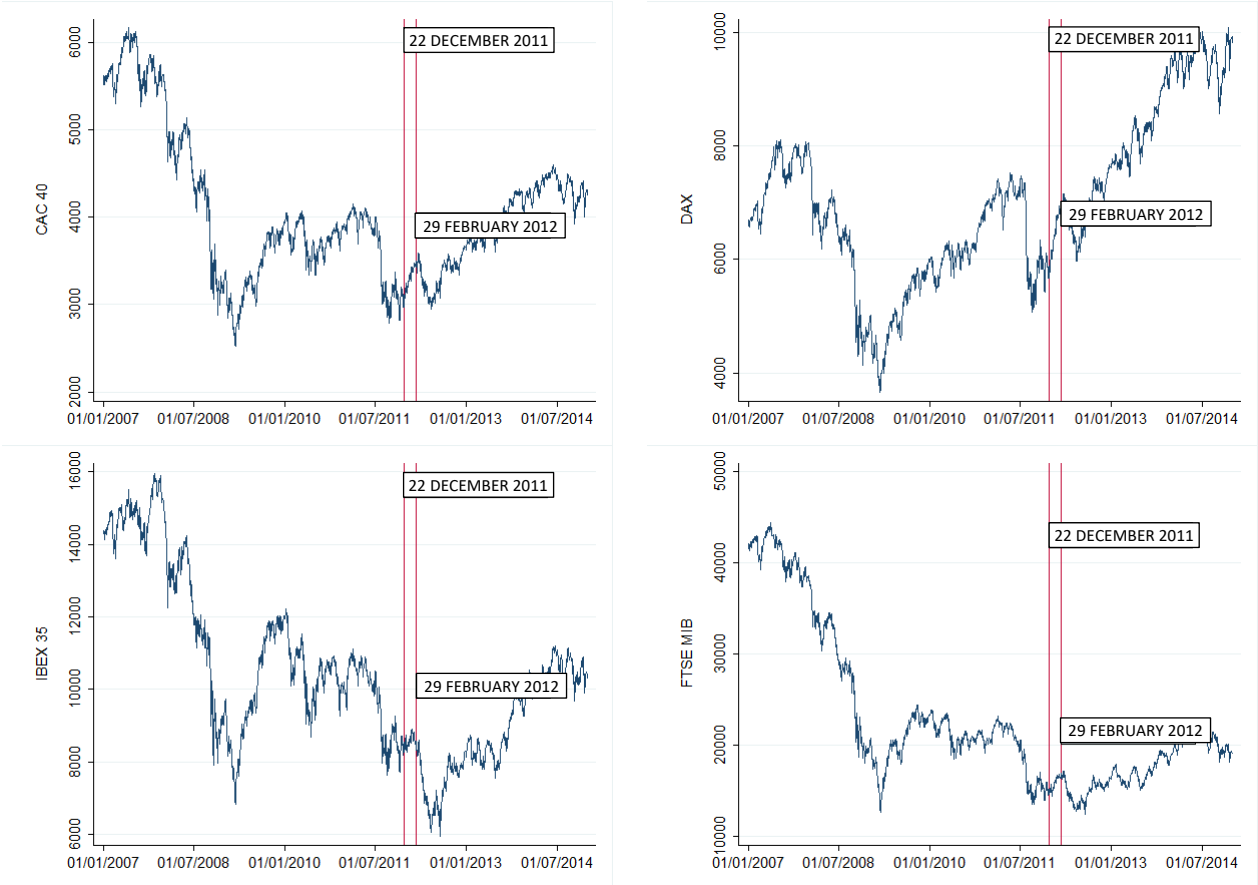
$$\Delta y_t = c + \sum_{j=1}^{J} \alpha_j D_{jt} + \sum_{j=1}^{J} \beta_j E_{jt} + \varepsilon_t$$

Therefore, for $J = 2$, the model takes the form of:

$$\Delta y_t = c + \alpha_1 D_{1t} + \alpha_1 D_{1t} + \beta_1 E_{1t} + \beta_2 E_{2t} + \varepsilon_t$$

Where D_{1t}, D_{2t}, E_{1t}, E_{2t} represent the dummies related to the following days: 22/12/2011, 23/12/201, 29/2/2012 and 1/3/2012.

Figure 2: LTRO



Note: the figure reports the distribution of the four indexes over time, highlighting the two days of the announcements.

The Standard test results are displayed in the following tables:

Table 4: Effect of LTRO announcement on stock indexes (basis points)

2-day window

Index	Announcement I		Announcement II		Total
	22/12/2011	23/12/2011	29/02/2012	01/03/2012	
CAC 40	42.07	31.03	-0.80	48.02	120.30
DAX	59.18	25.28	-33.02	84.22	135.64
IBEX 35	86.61	81.91	-58.69	83.91	193.74
FTSE MIB	219.23	58.33	17.83	490.93	786.33

Note: The table shows the results of the two days of the announcement and the following day

In this case, the table will no longer have one column, but two, where the dummies take the value of 1 in correspondence with the two dates specified above. After making the algebraic sum of the two dates associated with the following days, on the basis of Statistics F, it can be seen that for this policy the results were not significant.

In fact, despite the long-awaited day, the markets remained lukewarm on one hand because of the semi-freezing of the interbank market - with institutions that refuse to grant loans to each other, preferring the safest deposits with the ECB – and on the other because of the recessionary effect that budget containment policies were producing on the national economic systems. The latter has caused an effect that was fueled by the credit crunch too. Citizens, in brief, paid more taxes, remained with more probability unemployed and consumed less. Whereas companies, already subject to the consequences of the declined demand, were struggling to be financed by banks. Finally, the distrust increased the yields of sovereign bonds by increasing the pressure on public debts in a clear vicious circle.

The pressure exerted by the Basel Committee, which imposes more stringent capital requirements on institutions, favored the increase in the amount on deposit, playing a role in favor of the credit crunch. Therefore, only a small part of the available funds went into the coffers of the states, making the pressure of public deficits light. Therefore, the uncertainty remained evident, the large amount of loans of the ECB did not largely convince the main European stock exchanges, that closed in negative. The negative closing is also due to the worrying statements of Fitch, which exactly put under observation the debt of six European nations including France and Germany, which boasted a triple A. According to a spokesman of the rating agency in fact, the probability of a cut in the French rating over the next two years exceeded 50%.

The second announcement had poor effects too. In fact, the goal was to normalize the credit parameters in the Eurozone and avoid a credit crunch: the banks were essentially encouraged to buy back part of the European sovereign debt, that displayed too high rates especially in peripheral Europe. A significant portion of these loans was, however, used by banks to buy back their bonds and to restructure their capital in view of the application of the strictest requirements of the European Banking Authority, which required the consolidation of the European credit system.

As before, the same regressive test over a broader time horizon (5 days) has been performed. It has been shown that politics have had insignificant effects even on a broader horizon:

Table 5: Prices reaction (basis points)

1-5-day window

Index	Day 1	Day 2	Day 3	Day 4	Day 5
CAC 40	41.18	120.30	124.25	79.89	12.49
DAX	26.04	135.64	123.09	-53.97	-213.73
IBEX 35	27.76	193.74	200.58	-77.39	-231.6
FTSE MIB	236.52	786.33	731.53	511.27	75.21

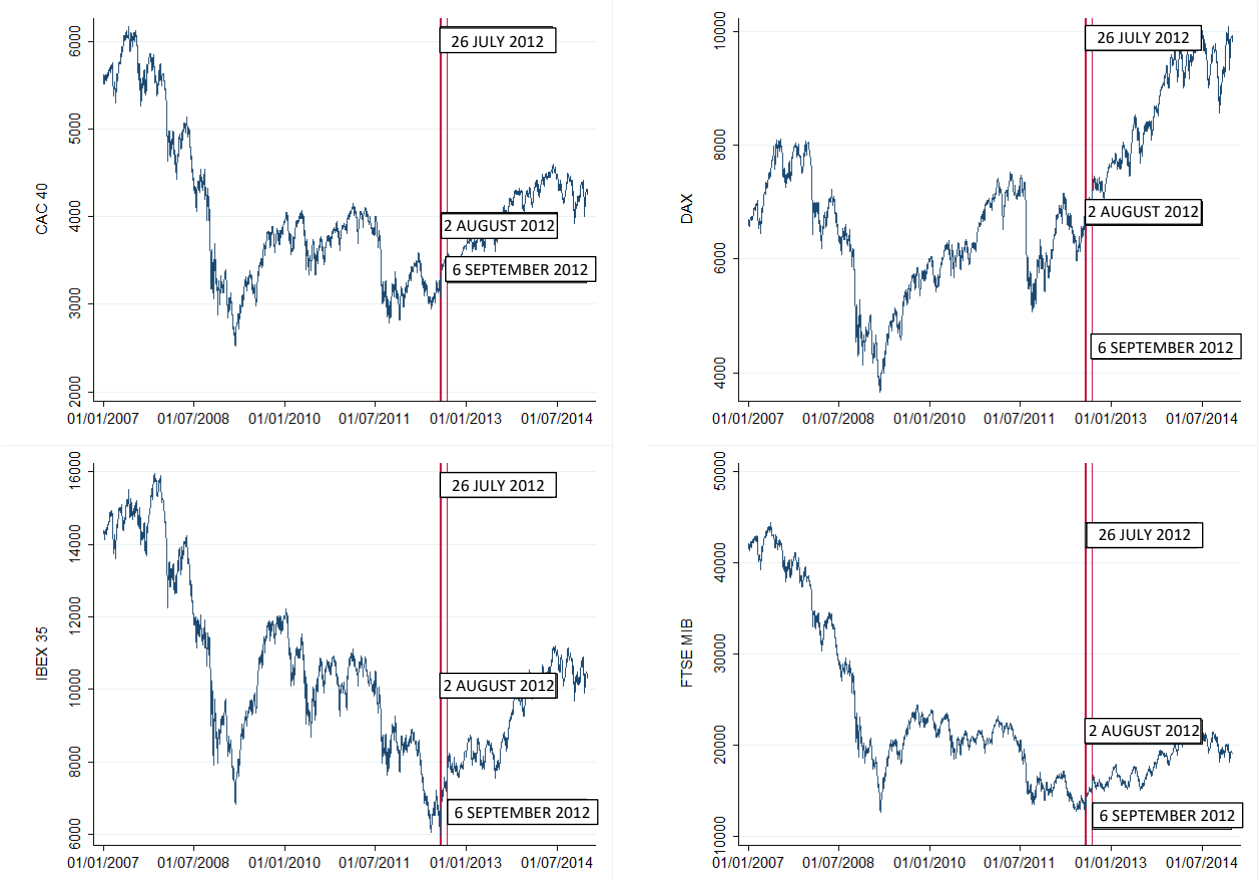
Note: The table shows the results of the day of the announcement and the 4 following days

In case of 5-day window, a certain optimism is displayed, but after some days the prices fall down.
In the last analysis (concerning the financial markets), the Outright Monetary Transactions (OMT) policy has been evaluated. There are three announcement dates that have been taken into consideration, so the model has been structured as follows:

$$\Delta y_t = c + \sum_{j=1}^{J} \alpha_j D_{jt} + \sum_{j=1}^{J} \beta_j E_{jt} + \sum_{j=1}^{J} \gamma_j F_{jt} + \varepsilon_t$$

This time, there are three different announcements in the market on the following dates:
26/07/2012 - 2/08/2012 - 6/09/2012. Therefore, three columns have been analyzed to study the trend of share prices (each of which will have a dummy with a value of 1 corresponding to the date of analysis).
The graphs in Figure 2 have now three red vertical axes that will identify the behavior of the title on the date under examination.
In the case of two-day window, like with the SMP announcement, the F test indicates that the values are highly significant for a range of values equal to 1%. The results are very clear. 26/07 was the day when Mario Draghi announced: "The ECB will do as much as possible and believe me it will be enough". The president affirmed this at the Global Investment Conference in London on the eve of the opening ceremony of the Olympics. It was enough to overturn the indices of half the world. On the 2nd of August the markets disappointed, there were no purchases from the ECB and therefore they lost ground, but immediately the next day the head of the Euro tower opened to the availability about the acquisition of securities. The announcements of the ECB on 06/09 burst at the Democratic convention and on Wall Street, where the Down Jones closed at +230 points and the European indices automatically closed in positive too.

Figure 2: OMT



Note: the figure reports the distribution of the four indexes over time, highlighting the three days of the announcements.

Table 6: Effect of OMT announcement on stock indexes (basis points)

2-day window

Index	Announcement I		Announcement II		Announcement III		Total
	26/07/2012	27/07/2012	02/08/2012	03/08/2012	06/09/2012	07/09/2012	
CAC 40	126.239	73.929	-88.241	142.589	104.949	10.029	369.49***
DAX	175.213	105.213	-149.597	258.343	201.413	45.943	636.53***
IBEX 35	366.433	251.333	-344.067	384.833	370.533	23.333	1052.40***
FTSE MIB	715.799	399.399	-633.601	854.899	664.699	342.499	2343.70***

Note: The table shows the results of the three days of the announcement and the following day

The impact of the five-day policy is shown in table 7, where, unlike the previous cases, optimism was growing until day 5. In fact, on 31/07 the ECB President confirmed that those of the previous week were not just words and the BC was ready to buy private bonds as well.

Table 7: Prices reaction (basis points)

1-5-day window

Index	Day 1	Day 2	Day 3	Day 4	Day 5
CAC 40	142.61	369.49	427.22	484.13	508.43
DAX	226.42	636.53	770.36	911.56	922.18
IBEX 35	391.92	1052.40	1519.07	1694.9	1686.09
FTSE MIB	744.53	2343.70	2963.95	3365.94	3647.43

Note: The table shows the results of the day of the announcement and the 4 following days

Conclusion

The announcements of the three non-standard monetary policies have had a sizable impact on financial and obligation markets. It has been shown that the SMP and OMT announcements have led to a significant increase to the closed prices in the four most important European markets, bringing a large wave of optimism. Whereas, the LTRO announcement has displayed light effects due to the distrust on the same markets, which has led to an increasing pressure on public debts resulting in a clear vicious circle.

The study highlighted the trend of the markets in the day of each announcement and in the following five days, taking into consideration each policy as the only variable able to explain the effects. Even though this hypothesis may be lacking in terms of robustness, Altavilla et al. (2014) showed that also in case of other information, the absolute value of the effect is very close.

Thus, because a measured return to a normal phase has been displayed in the refinancing of the Euro area, the findings of this work attribute a part of these improvements to the unconventional monetary policies program.

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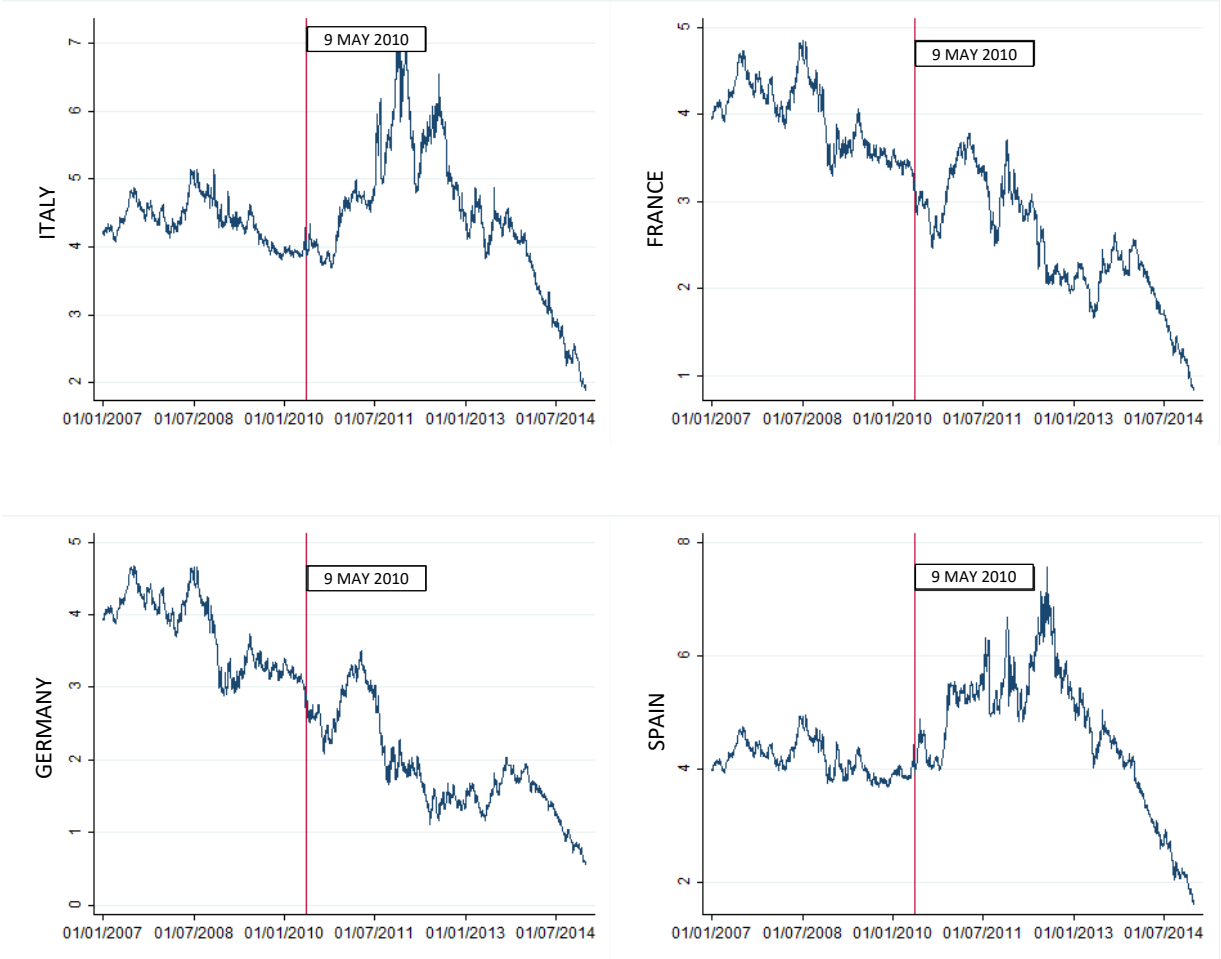
Appendix

A. Event study: bond markets

Figures A.1 reports interest rates on 10-year government bonds in Italy, France, Germany and Spain during the sample period of the event study analysis, from January 2007 to December 2014 like in the stock market case. Vertical red lines denote the SMP announcement day.

Figure A.1: SMP



Tables B.1 and B.2 report the effect of the SMP announcement on two-day window and on five-day window respectively.

Table B.1: 2-day window

Variable	Announcement		Total	P - Value
	10/05/2010	11/05/2010		
IT	-0.34	-0.01	-0.35***	0.00
FR	0.08	-0.01	0.08	0.17
DE	0.17	-0.01	0.16***	0.00
ES	-0.50	0.01	-0.49***	0.00

According to table B.1, it can be inferred that it is necessary to reject the null hypothesis of joint significance of the dummies for a range of values equal to 1%, so the values (with the exception of France) are highly significant.

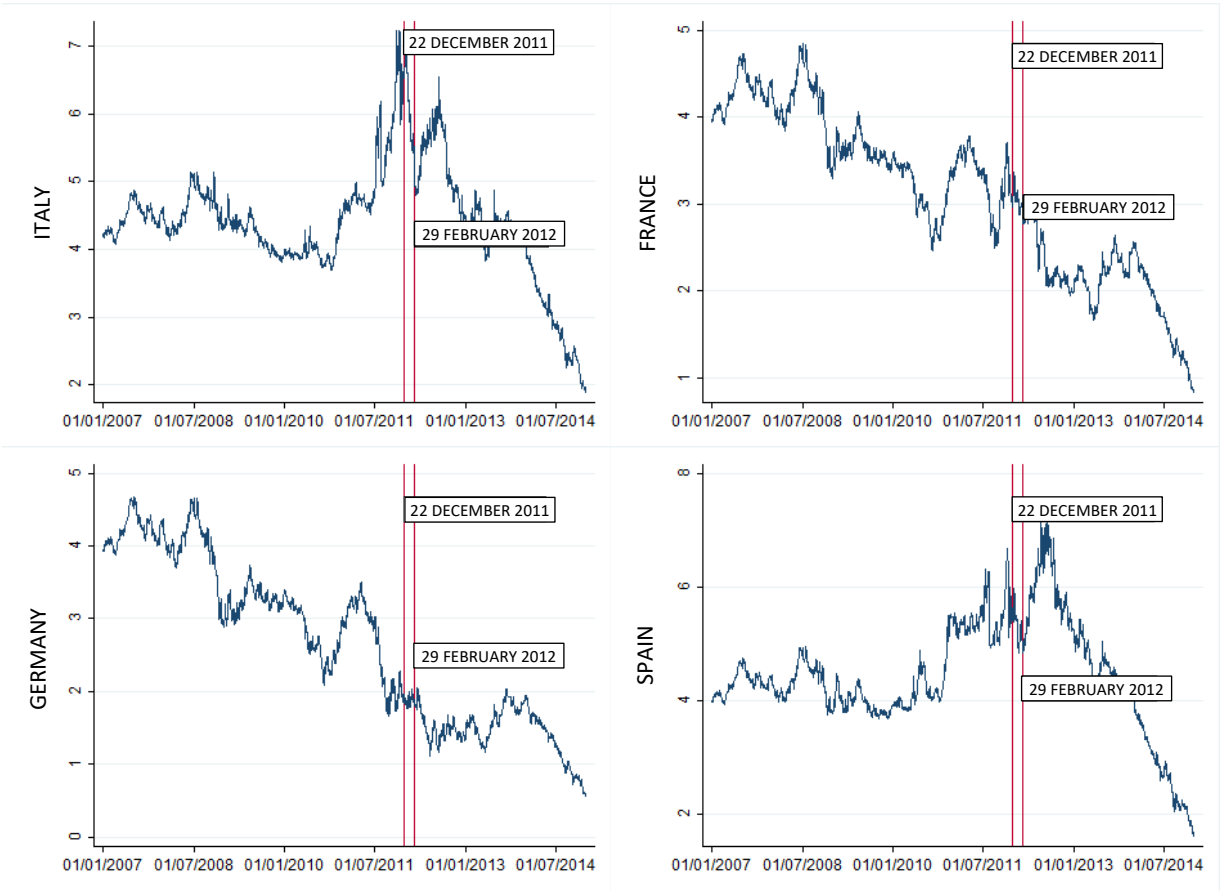
Table B.2: 5-day window

Variable	Day 1	Day 2	Day 3	Day 4	Day 5
IT	-0.34	-0.35	-0.38	-0.41	-0.39
FR	0.08	0.08	0.07	0.05	-0.02
DE	0.17	0.16	0.17	0.18	0.10
ES	-0.50	-0.49	-0.51	-0.50	-0.48

The overall impact shows a certain persistence up to 4 days from the announcement, with the exception of France in which returns decrease over time; however, the most important part of the announcement effect occurs on the first day.

From the LTRO side, the following results have been obtained:

Figure A.2: LTRO



Vertical red lines denote the LTRO announcement days. Tables B.3 and B.4 report the effect of the LTRO announcements on a two-day window & a five-day window respectively.

Table B.3: 2-daywindow

Variable	Announcement I		Announcement II		Total	P - Value
	22/12/2011	23/12/2011	29/02/2012	01/03/2012		
IT	0.13	0.12	-0.16	-0.24	-0.15***	0.00
FR	-0.04	-0.08	-0.04	-0.11	-0.27**	0.03
DE	0.01	0.02	0.02	0.05	0.11	0.78
ES	0.08	0.00	-0.05	-0.14	-0.10	0.31

In this case, the results are highly significant for the Italian bonds in both the announcements, but less for France.

Table B.4: 5-day window

Variable	Day 1	Day 2	Day 3	Day 4	Day 5
IT	-0.03	-0.15	-0.21	-0.12	-0.07
FR	-0.08	-0.27	-0.26	-0.23	-0.19
DE	0.03	0.11	0.04	0.03	-0.03
ES	0.03	-0.10	-0.05	-0.02	-0.05

According to the Table B.4, the impact is much more significant in the two-day window, with a decrease in the following days (it displays the same results that have been obtained on the stock market).
From the OMT side, the following results have been obtained.
The red line in Figure A.3 denotes the OMT announcement days, whereas Tables B.5 and B.6 display the effect of OMT announcements in two-days and five-days respectively.
In general, OMT announcements have been much more significant in Italy, Spain and Germany than in France. Clearly, even in this case the hypothesis of a two-day window may not hold up and expanding the window up to five-days, the results suggest, with the exception of France that the impact of the announcements has been very persistent with signs of possible rebound in the following days. The OMTs contributed to a statistically significant reduction in the spreads of Italian and Spanish government bond yields (short and long term) against the German one, allowing a more equitable ECB accommodating monetary policy on euro area countries.

Figure A.3: OMT

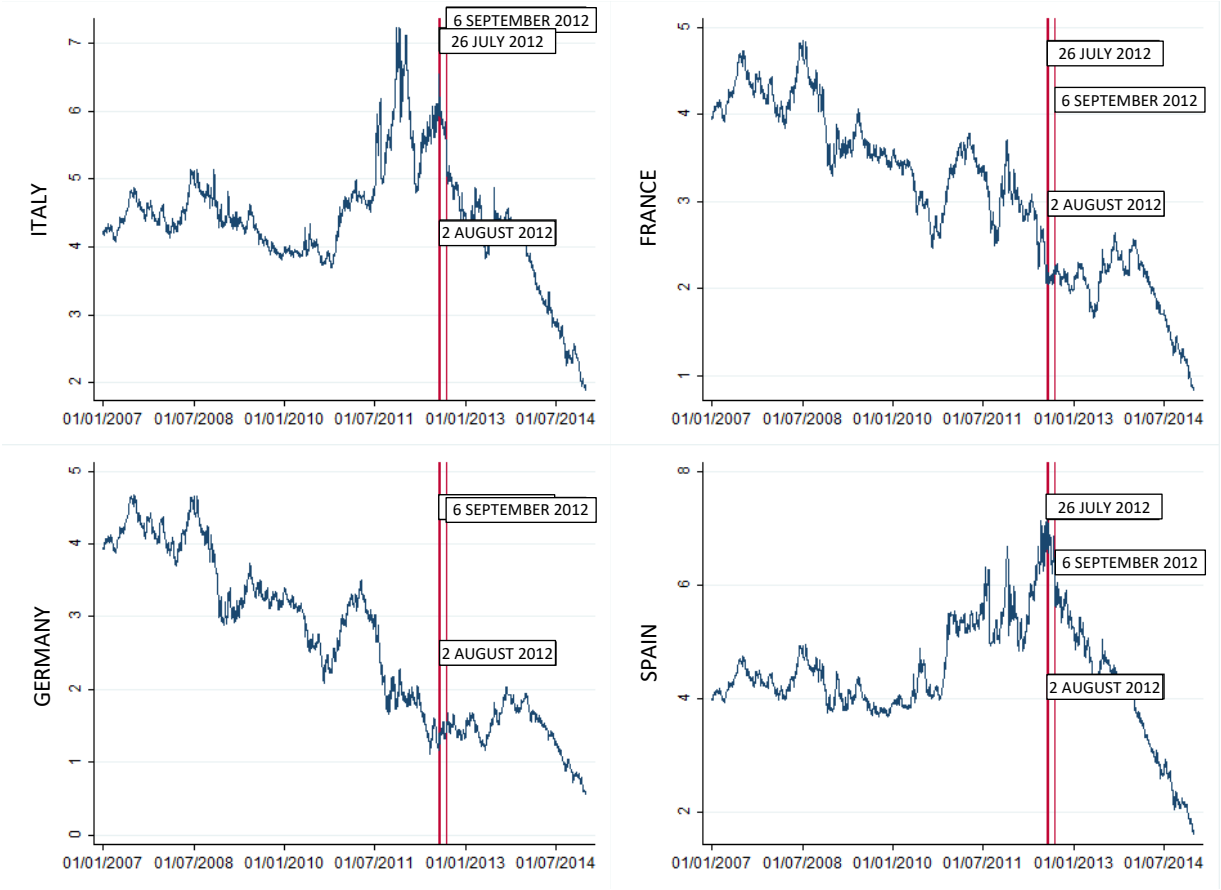


Table B.5: 2-day window

Variable	Announcement I		Announcement II		Announcement III		Total	P-Value
	26/07/2012	27/07/2012	02/08/2012	03/08/2012	06/09/2012	07/09/2012		
IT	-0.402	-0.115	0.287	-0.166	-0.209	-0.233	-0.840***	0.000
FR	-0.066	0.014	-0.043	0.044	0.022	-0.042	-0.068	0.526
DE	0.065	0.074	-0.119	0.161	0.113	-0.042	0.251***	0.000
ES	-0.467	-0.183	0.397	-0.269	-0.384	-0.387	-1.296***	0.000

Table B.6: 5-day window

Variable	Day 1	Day 2	Day 3	Day 4	Day 5
IT	-0.32	-0.84	-0.77	-0.79	-1.08
FR	-0.09	-0.07	-0.07	-0.22	-0.17
DE	0.06	0.25	0.25	0.24	0.37
ES	-0.45	-1.30	-1.49	-1.23	-1.30