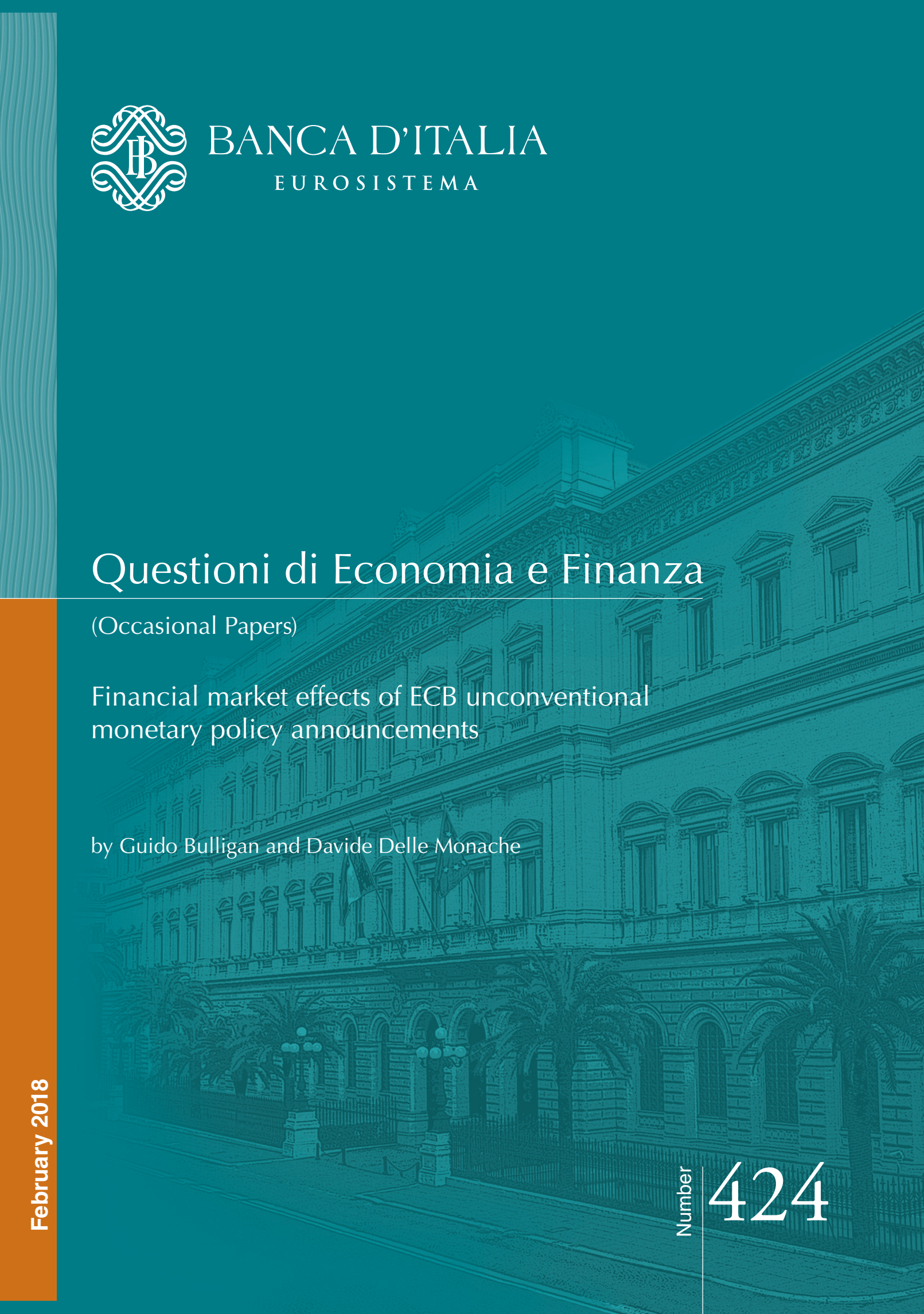

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FINANCIAL MARKET EFFECTS OF ECB UNCONVENTIONAL MONETARY POLICY ANNOUNCEMENTS

by Guido Bulligan* and Davide Delle Monache*

Abstract

This paper provides empirical evidence about the announcement effects of ECB unconventional monetary policies during the period September 2014-July 2017. The variables considered were selected by looking at the various channels through which unconventional measures are transmitted. We find that monetary policy news had significant effects on the exchange rate and long-term sovereign yields, especially in those countries that were most severely hit by the crisis. Unlike previous studies, we look at the impact of announcements over different sub-periods in order to identify time-varying effects of different market conditions, policy instruments and communication strategies. We find that the strongest effects on the exchange rates and on sovereign bonds occurred in the initial phase of the Asset Purchase Programme; instead in the most recent period, a statistically significant rise in inflation expectations was detected.

JEL Classification: E44, E52, E58, E65, G14.
Keywords: monetary policy announcements, event study, financial markets, unconventional monetary policy.

Contents

* Bank of Italy, Economic Outlook and Monetary Policy Directorate.

1 Introduction

The primary objective of the Eurosystem's monetary policy is to maintain price stability, defined as the inflation rate below but close to two per cent on a medium-term horizon. In normal times, the main monetary policy instrument is the interest rate on the main refinancing operations conducted between the Eurosystem and euro-area banks. There is, however, a limit to the central bank's ability to reduce official rates; as the latter approach the zero lower bound (ZLB) their effectiveness decreases and central banks must resort to unconventional monetary policies (UMP) such as the purchase of medium/long-term financial assets and forward guidance. Such policies were introduced by the Bank of Japan for the first time in 2001 and have been pursued by several other central banks since the global financial crisis of 2008. For the euro area in September 2014, the ECB communicated the launch of two private asset purchase programmes (Asset-backed securites (ABSPP), and covered bonds (CBPP3)). In March 2015 purchases were extended to government bonds (PSPP) and then in 2016 further expanded by including corporate bonds (CSPP). All purchase programmes go under the name of Asset Purchase Programmes (APPs) or are often referred to as Quantitative Easing (QE). Empirical studies have found that the UMP has positive effects on asset prices and interest rates in both the US and the UK. The general finding is that both Treasury and corporate bond yields dropped significantly in response to the announcement and to the implementation of such policy measures; see Gagnon et al. (2011), Krishnamurthy and Vissing-Jorgensen (2011), Swanson (2011), Thornton (2013), Hamilton and Wu (2012), Breedon el al. (2012), and D'Amico and King (2013). More recently, a few studies have tried to evaluate the effects of the ECBs policies; see among others Altavilla et al. (2015), Briciu and Lisi (2015), Andrade et al. (2016), De Santis (2016), Ambler and Rumler (2017), Gambetti and Musso (2017) and Bundesbank (2017).

¶ We would like to thank Fabio Busetti, Michele Caivano, Pietro Cova, Stefano Neri for useful comments, any remaining errors are our own. The views expressed herein are those of the authors and do not necessarily reflect those of the Institution they represent.

This paper provides further empirical evidence about the financial market effects of the ECB's announcements carried out during the period September 2014 - July 2017. To this end we adopt an event study approach focusing on the effects on the announcement dates and on other important policy dates.[1] Specifically we look at the cumulative impact of ECB announcements on a sequence of policy events. How-ever, we also document that on some specific event-dates, the announcements have led to unintended tighter financial conditions, as a result of investors' dissatisfac-tion compared with their expectations (i.e. a negative surprise).[2] Overall the UMP announcements had significant effects on financial markets: we find the greatest impact on the exchange rate market and on long-term sovereign bond yields, which spilled over to the stock markets and triggered reductions in corporate bond yields, by means of the portfolio re-balancing channel. In line with Gambetti and Musso (2017) and Bundesbank (2017), we find that the effect on inflation expectations is more contained: nevertheless it is more pronounced and statistically significant in the last part of the sample. In particular, according to our estimates, over the whole sample period September 2014 - July 2017, the ECBs UMP announcements led to: a depreciation of the euro vis-'a-vis the US dollar of 8 percentage points (p.p.) for one-day window and 16 p.p. for the two-day window; a reduction of around 50 basis points (bp) on the (average) euro-area 10-year sovereign bond yield with stronger effects for Italy and Spain; and a reduction in the yields of euro-area corporate bonds by around 50 bp. These results are broadly in line with other em-pirical evidence found in the literature, e.g. Altavilla et al. (2015), Bundesbank (2017), and Gambetti and Musso (2017). Unlike previous studies, however, here we also evaluate the impact of announcements over different sub-periods in order to identify time-varying effects possibly due to different market conditions, policy instruments and communication strategies. We consider three subsamples: (i) the *start* of the APP between September 2014 and March 2015; (ii) the *fine-tuning and*

[1] We consider not only the press conferences following the Governing Council (GC) meetings, but also public speeches by President Draghi or other GC members.

[2] Such a surprise component represents the news, disclosed at the time of the announcement, which was unexpected by the market.

extension of unconventional policies from April 2015 to September 2016, and (iii) the *preparation for normalization* in the interval October 2016 - July 2017. We find that the UMP announcements had their biggest impact on interest rates and exchange rates in the initial phase of the APP (first subsample) which includes the start of the Public Sector Purchase Programme (PSPP). In the central part of the sample, which includes the start of the Corporate Sector Purchase Programme (CSPP), ECB announcements had relatively greater effects on stock returns and corporate yields, although these estimates are in some cases not statistically signif-icant. Finally the most recent period is instead characterized by a positive (and statistically significant) reaction of inflation expectations to policy announcements. The paper is organized as follows: Section 2 describes the event study regression strategy adopted in the paper to conduct the empirical evaluation. Section 3 de-scribes how we selected the relevant events and the main transmission mechanisms we focused on. In Section 4 we present the empirical results and Section 5 concludes the paper.

2 Event study approach

Measuring the effects of monetary policy news on financial markets essentially relies on extracting the surprise component contained in policy announcements. The event study methodology is a well-known statistical tool used to quantify the immediate effects of policy communication and realization. To this extend, it is crucial to identify the 'policy news/surprise' that changes the agents information set and then to isolate the effect on the variable of interest. The main hypothesis is that new information is incorporated into the prices of financial assets immediately and permanently. The other identifying assumption is that monetary policy does not react to financial markets on the day of the announcement so that a causal direction can be established in the observed correlation between financial market movements and the policy announcement.[3] The standard event study regression

[3]For this reason the choice of the size of the time window around the policy news is very important as a larger window increases the risk that the observed financial market movements are

can be represented as follows: $\Delta y_t = \beta \Delta x_t + \gamma z_t + \varepsilon_t$, where Δy_t is the change in the variable of interest, Δx_t represents the surprise (news) of the monetary policy stance, z_t are control variables (if needed), and ε_t is a random shock. In periods of conventional monetary policy the monetary policy stance is well summarized by the level of the short-term nominal interest rate, and the identification of the surprise component is achieved by computing the difference between the central bank's announcement on the main refinancing rate and the corresponding market expectation.[4] With UMP it becomes more difficult to a obtain a synthetic measure of the monetary policy stance and it is even harder to isolate its surprise component. Following a large body of literature, we therefore measure monetary policy news with a dummy variable: i.e. Δx_t takes the value 1 on selected event dates and 0 otherwise. Clearly this allows us to overcome the lack of a synthetic measure of the monetary policy stance but it does not allow us to differentiate the events directly according to the specific policy announced in terms of the size and type of measure. While this issue is partly addressed here by looking at different subsamples that can broadly identify different policy packages, it remains a drawback of the approach adopted. Turning to the issue of isolating policy-related effects from other confounding factors, one strategy proposed in the literature is the use of intra-daily data with an appropriate choice of a narrow time-window around the policy event.[5] In our case we use daily data and we address the endogeneity problem by adding macroeconomic and financial market indicators as control variables in the baseline specification; see Altavilla and Giannone (2015) and Altavilla et al. (2015). Our

driven by other confounding 'news.

[4]With announcements that occur on pre-defined dates, the event study approach introduced by Kuttner (2001) and Bernanke and Kuttner (2003) has been used extensively to assess how financial markets react to monetary policy surprises, as well as to improve the identification of monetary policy shocks in VAR models (Cochrane and Piazzesi, 2002).

[5]Ğurkaynak and Wright (2013) argue that many important macro-finance issues can be properly answered by using an event study with high-frequency financial market data and the appropriate choice of a 20-minute window around the announcement (5 minutes before and 15 minutes after).

benchmark regression model is therefore

$$\Delta y_t = \alpha + \beta_1 D_t + \beta_2 D_{t-1} + \gamma' z_t + \varepsilon_t, \tag{1}$$

where Δy_t is the daily change in a financial asset price, D_t is the policy event variable, D_{t-1} is the lagged policy variable, z_t is a vector of co-variates and ε_t is a random shock.[6] In the vector of controls z_t we include the Citi Economic Surprise Index (CESI) for the euro area and for other economic areas (where necessary), to control for potential interactions between monetary and macroeconomic surprises.[7] For example, the US employment report is usually published the day after the ECB Governing Council announces its policy deliberations; thus an event study regression based on a two-day window will most likely be contaminated by movements due to US macroeconomic developments and an appropriate control is required. The policy event variable D_t is obtained as the sum of k specific dummy variables, in other words D_t is equal to 1 in k event dates and 0 otherwise. Therefore, in our benchmark regression (1) we are assuming that the effect is exactly the same for each announcement and coincides with the average effect. Specifically, β_1 represents the average effect for the one-day window regression, while $(\beta_1 + \beta_2)$ represents the average effect for the two-day window. This assumption allows us to avoid the loss of the degrees of freedom associated with the proliferation of event dates and enables a straightforward computation of the cumulative impact of the ECB announcements by multiplying the estimated average effect by the total number of selected events. Therefore, the cumulative impact for the one-day window is $k\beta_1$, while $k(\beta_1 + \beta_3)$ is the cumulative impact for the two-day window. More realistically, each specific event has a different impact. If we are interested in looking at the effect of a

[6]The lagged variable allows us to measure the effect of policy announcements over a two-day window in order to account for delayed reactions. While the efficient market hypothesis postulates that market prices embed all available information instantaneously, there is empirical evidence on delayed effects in financial markets.

[7]Bloomberg compiles the index as a weighted moving average of data surprises (actual releases versus Bloomberg survey median); a positive reading of the CESI suggests that economic releases have on balance beaten consensus expectations. When analysing the effects on the exchange rate value of the euro we have also included the CESI for the relevant economic counterpart (US, UK and Japan).

specific event, the baseline regression can be augmented by an additional dummy variable that uniquely identifies that event. In particular, model (1) is augmented by $\beta_3 d_\tau$, for the event occurring at time $t = \tau$, and β_3 will measure the marginal effect (additional to the average effect) of the specific event d_τ, while $(\beta_1 + \beta_3)$ is a measure of the total impact of that event. Indeed, in some cases the impact of a specific event has the opposite sign of the average effect. This may happen when the market is 'surprised' and the ECB announcement is perceived as falling short of market expectations.

3 Selection of the events and main transmission channels

Our analysis focuses on the period ranging from September 1st 2014 to July 31st 2017. In line with Altavilla et al. (2015), we select a broad set of events based on the ECBs official communications: we select any announcement about the APP that conveys information about the ECBs policy stance. More specifically, we have selected: (i) all ECB Governing Council monetary policy meetings; (ii) speeches and interviews by the ECB president where important information regarding the APP and other unconventional policies was released; and (iii) other speeches and interviews by Board members on monetary policy themes. Overall we have selected 48 events. The frequency and type of monetary policy-events is not uniform. Out of the 48 events, 18 occurred between September 1st 2014 and March 31st 2015 and are mainly related to the launch of the PSPP; among these 18 events only 6 are press conferences following ECB Governing Council meetings.[8] We then selected 22 event dates between April 1st 2015 and September 30th 2016, mainly related to the fine-tuning of the asset purchase programme (temporal extensions and inclusion of corporate bonds, variations in monthly net purchases of assets) and of other unconventional policies such as negative rates, most of them coinciding with ECB Governing Council meeting days. Finally, we selected 8 events from 1st October

[8]Over this period our selection of events coincides with Altavilla et al (2015).

2016 and 31st July 2017, a period that differently from the two previous ones, is characterized by market speculations about the timing and modalities of the ECBs gradual phasing out of its unconventional policies.

[Table 1 here]

The full list of events, provided in Table 1, is thus characterized by some heterogeneity in the frequency and in the manner of ECB communications during the three different sub-periods. This is not surprising: the launch of the PSPP, being a big paradigm shift, needed to be carefully conveyed to market participants in order to increase its effectiveness and minimize the risk of misinterpretation which could have undermined its credibility. Hence, in the initial phase of the programme the ECB communicated with markets more frequently than usual by increasing its appearances in the media and other outlets. In the subsequent periods, when the ECB was assessing the ongoing effects of its new measures in order to eventually adjust their size and duration, policy events became less frequent and tended to coincide with ECB Governing Council meetings. In the latest part of the sample, with the economic recovery gathering momentum but inflation dynamics still rather weak, the ECBs communication was mainly targeted at managing market expectations about the duration of the programme and the exit strategy. Before turning to the empirical results, we briefly discuss the choice of the variables y_t. Using standard terminology (as in Ferrero and Cova, 2015) the analysis focuses on the main transmission channels f UMP identified as follows: (i) the exchange rate channel by looking at changes in the value of the euro against the US dollar, the UK sterling, the yen and the Swiss franc; (ii) the risk premium signalling channel by looking respectively at the yield on the 10-year German Bund and the spreads of Italian, French and Spanish sovereign bonds vs the German Bund over the same maturity; (iii) the portfolio rebalancing channel by looking at the effects on the stock markets and on private non-financial corporate bond yields;[9] and (iv) the inflation expectations channel (or re-anchoring

[9]Corporate bond yields are also directly affected by the CSPP if the issuer belongs to the investment grade class.

channel) by analyzing changes in the prices of euro-area inflation swap contracts.

4 Empirical results

We first estimate the benchmark regression model (1) to assess the cumulative effect of UMP announcements over the sample September 2014 - July 2017. We then look at the heterogeneity of the impacts of ECB announcements by running the regression over the three different subsamples: the *start* of the APP (September 2014 - March 2015); the *fine-tuning and extension* of unconventional policies (April 2015 - September 2016); and the *preparation for normalization* (October 2016 - July 2017). Finally we present the estimated effects of specific announcements to highlight the degree of heterogeneity behind average effects.

[Table 2 here]

Table 2 shows the cumulative one-day and two-day impact of the ECBs unconventional policies on financial market prices for the full period as well as for the three subperiods. First, our results show that the ECBs policy announcements led to a sizeable depreciation of the euro exchange rate. While the magnitude of the effects for the one-day window is economically important, statistically the coefficients are poorly estimated and are not significantly different from zero at conventional confidence levels. However, when we consider the two-day window that accounts for delayed financial market reactions, the impact on the exchange rate vis-'a-vis the British pound and the US dollar becomes statistically significant and stronger: the cumulative depreciation against the British pound and the US dollar is about 10 pp and 16 pp respectively. Looking across subsamples, it is interesting to see that most of the effects occur at the time of the launch of the PSPP (with a euro depreciation of about 15pp with respect to both the US dollar and the Japanese yen using a two-day window), while the estimated effects are smaller and not statistically significant in the second and third subsamples.[10] Thus, according to our results the exchange

[10]When the samples under investigation overlap, our results are comparable to those obtained in other studies that follow a similar approach. Altavilla et al (2015) find that between September

rate channel has been a crucial transmission mechanism for unconventional policies mainly in the first sub-sample, but subsequently had a minor role. The impact on long-term sovereign bond yields appears to be quite heterogeneous across countries. If we look at the full sample results, we find that the effects are small and not statistically significant for Germany but sizeable (around 100 bp for the sovereign spread in a one-day window) and significant for Italy and Spain. The subsample analysis again provides interesting insights. Over the period of the first subsample which includes the start of the PSPP, German sovereign bond yields were affected in a statistically significant way (with a decrease of about 40 bp); the Italian and Spanish spreads fell (by 60 and 40 bp respectively, one day window), while the French spread showed a smaller and not statistically significant decrease. Since April 2015 no further significant effect has been found on German sovereign bond yields and Italian sovereign spreads, while there has been a mild/slight decrease in French spreads (10 bp) and a more consistent decline for Spanish ones (by 50 bp).[11] As regards the inflation expectations channel, for the full sample analysis we only find a significant response in inflation swap rates at a 5-year horizon. However, when looking at the results over different subsamples, it is interesting to observe that the latest period is characterized by a statistically significant (positive) reaction of market-based measures of expected inflation at all horizons.[12] The response of the stock market is positive but statistically significant only for Italy and Spain (with a rise of about 20 per cent looking at a one-day window). The biggest effects are obtained for the second subsample, characterized by the fine-tuning of the ECBs unconventional policies

2014 and March 2015 the ECBs unconventional policy announcements led to a depreciation of the euro of between 5pp (one- day window) and 12pp (two-day window) vis-'a-vis the US dollar. Bundesbank (2017) finds that between January 2014 and December 2016, ECB policy announcements led to a depreciation of the euro/US dollar exchange rate of 6.5pp (one-day window).

[11] Our results are in line with those found by Altavilla et al (2015). A composite 10-year euro-area bond yield (computed by aggregating country-specific yields with GDP weights) is estimated to have declined by around 50 bp, in line with the findings in De Sanctis (2015) and Andrade et al (2016).

[12] However during the period of the first subsample, we find that the announcement of the start of the PSPP on 22nd January 2015 led to a significant increase in inflation expectations at all horizons (see Appendix).

and the extension of asset purchases to corporate bonds.[13] Finally, our results also show a substantial decrease in corporate bond yields for non-financial corporations suggesting that the portfolio rebalancing channel has been an important transmission mechanism of policy shocks to the real economy.[14] Overall we find a reduction of about 60 bp for Italy and Spain (using a two-day window) and 35 bp for France and Germany. Most of the decrease occurs in the first two samples, although in some cases the figures are not statistically significant. As mentioned when describing the econometric approach, one of the key factors in the analysis is the choice of the control variables. Therefore, to verify whether our results are sensitive to the model's specification we have performed the robustness analysis in two directions. First, we have substituted the CESI with the surprise indices developed by Scotti (2016) for the US, the euro area, Japan and the UK and regularly updated by the Fed. While both indicators are based on the surprise component of news releases (actual reading minus Bloomberg median forecast), the releases considered and their aggregation differ considerably.[15] Second, we have included the 30-day federal fund rate future price as a proxy for market expectations on US monetary policy, this additional control allows us to better account for financial market spillovers from the US to the euro area.

[Table 3 here]

Table 3 confirms that the effects of the ECB's announcements on the euro-dollar exchange rate, sovereign interest rates and on corporate bond yields are very similar to those estimated using benchmark regressions. Furthermore, in the case of market-based inflation expectations, the effects of ECB policy announcements are

[13]The results are in line with the findings in Andrade et al (2016) who suggest that banks' exposure to domestic sovereign bonds is positively correlated with increases in banks valuations and that stock price performance is positively correlated with banks' share in the overall stock market index over the period considered by the authors.

[14]Our data refer to the bond yields at the country and sectoral level constructed by Gilchrist and Mojon (2014).

[15]While the index developed by Scotti exploits information from a narrower set of economic indicators (usually GDP, industrial production, employment or the unemployment rate, a business confidence indicator and retail sales) summarizing economic activity conditions, the CESI index summarizes the impact of a wide spectrum of economic news on the foreign exchange market.

more precisely estimated under the alternative controls, although quantitatively they are very similar.[16] As an additional robustness check, we have also estimated the benchmark regression with a slightly different set of event dates. Specifically, starting from the set of events used for the benchmark exercise (which includes all monetary policy meetings of the ECB Governing Council and other speeches and interviews of board members), we eliminated those policy meetings that saw no release of significant policy news. Table 4 shows that even with a narrower set of events, 32 compared with 48 in the benchmark exercise, the estimated cumulative effects are very similar.[17,18]

[Table 4 here]

As previously mentioned, our benchmark model aims at capturing the cumulative effect of a sequence of announcements regarding the ECB's unconventional policies. To this end, imposing the restriction that the effect is identical across events has no major drawbacks. However, to appreciate the heterogeneous effects of the announcements we may be interested in quantifying the effect of specific events over time with respect to the effect of the overall events. Indeed, there have been instances where market movements around ECB announcements have been in the opposite direction (tighter financial conditions) to that intended. In order to evaluate if and how many of such movements can be attributed to ECB news falling short of market expectations, the baseline regression can be appropriately modified as follows

$$\Delta y_t = \alpha + \beta_1 D_t + \beta_2 D_{t-1} + \beta_3 d_\tau + \beta_4 d_{\tau-1} + \gamma' z_t + \varepsilon_t. \tag{2}$$

As mentioned above, β_3 is a measure of the marginal effect (additional to the average one) of the specific event at time d_τ, while $(\beta_1 + \beta_3)$ will measure the total impact

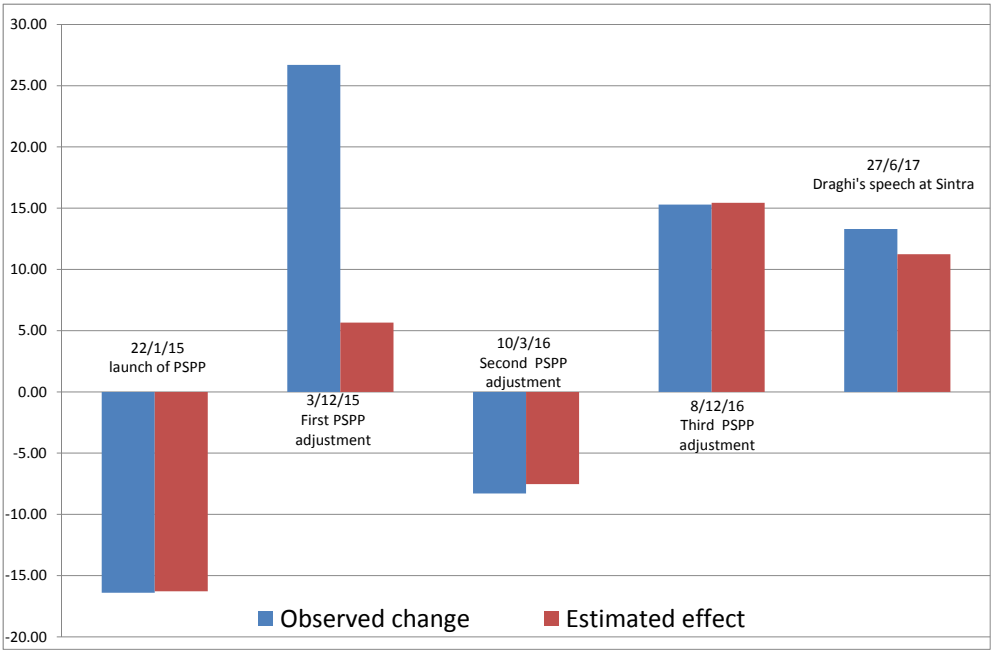
[16] The increased precision of the estimates is due to the inclusion of federal fund rate futures among the controls, suggesting the presence of spillover effects from the US to euro-area financial markets.

[17] Under this alternative criterion the same 18 events are selected in the first subsample, but only 11 events in the second subsample (22 events in the baseline model) and 3 events in the third subsample (8 in the baseline).

[18] Clearly the estimated average effect per single event must be stronger in order to have the same cumulative effect, given a lower number of events.

at $t = \tau$ for the one-day window.[19] Figure 1 shows the effects on the Italian 10-year sovereign spread over a set of selected events. Let us recall from Table 2 that the cumulative effect over the sequence of the 48 events selected was -104 bp, meaning an average effect of -2 bp per event (the average effect is -3 bp for the first subsample). However, the yield fell by about 15 bp when the PSPP was officially announced (22nd January 2015); it increased markedly on 3 December 2015 when the programme was first extended by six months, but controlling for other news only a small part of the rise appears related to the ECB announcement; it then declined again (by 8bp) on the date of a second adjustment of the programme (the increase of monthly purchases from 60 to 80 billion). In the latest part of the sample it rose in reaction to ECB communications that increased the likelihood of a gradual removal of the monetary accommodation.

Figure 1: Italian 10-year sovereign bond yield at selected events



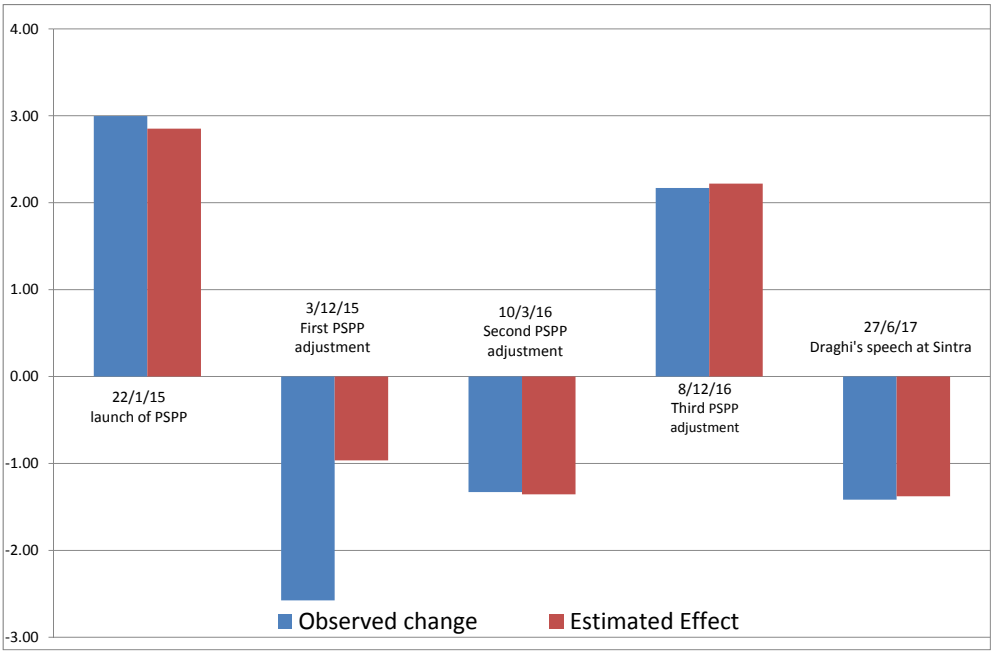
The observed changes refer to the level's variation (basis points) over the two-day window around the specific event. The estimated effects refer to the specific event over the two-day window and are based on the augmented regression (2).

[19] For the two-day window $(\beta_2 + \beta_4)$ quantifies the marginal effect, while the total effect is equal to $\sum_{j=1}^{4} \beta_j$.

Similarly, the degree of heterogeneity across events can be appreciated by looking at the response of the euro/dollar bilateral exchange rate plotted in Figure 2. We recall that the cumulative impact on the exchange rate of the full sequence of 48 events is estimated to be 15pp (see Table 2), meaning an average effect of 0.3 pp per event (0.8 pp for the subsample). However, on 22nd January 2015 the depreciation following the ECB launch of the PSPP is estimated at almost 3 pp. Following the first adjustment to the programme on 3 December 2015, the euro appreciated by 2.5 pp of which nearly 1pp is attributable to the ECB announcement. On 12 December 2016, following the ECB Governing Councils decisions, the euro depreciated by around 2pp. Following Draghi's speech in Sintra, hinting at a forthcoming gradual removal of policy accommodation, the euro appreciated by over 1pp. The analysis performed in figures 1 and 2 should be considered as complementary to the cumulative effects estimated in Table 2; looking at the impact of a subset of events and disentangling the marginal effect from the average one helps us to appreciate the effect of announcements over time.[20]

[20]It may be of interest to look at the effect of a specific announcement across the variables of interest and this is shown in the Appendix for a range of selected events.

Figure 2: The euro/dollar exchange rate at selected events



The observed changes refer to the variation over the two-day window around the specific event. The estimated effects refer to the specific event over the two-day window and are based on the augmented baseline regression (2).

5 Conclusions

This paper has provided empirical evidence regarding the announcement effects of the ECB's unconventional monetary policies carried out during the period September 2014 – July 2017. The variables considered are selected by looking at the main transmission channels through which unconventional measures operate. Overall, we find that monetary policy news had significant effects on the exchange rate and on long-term sovereign yields, especially in those countries most severely hit by the crisis, such as Italy and Spain. Consistently with the portfolio rebalancing channel, this impact spilled over to the stock market and corporate bond yields. The response of market-based inflation expectations to policy announcements appeared muted overall and statistically significant only in the latter part of the sample.

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Tables

Table 1: List of events considered in the baseline model

	First period
04-Sep-14	ECB press conference
12-Sep-14	News conference following meeting of euro area finance ministers
24-Sep-14	Interview with Europe 1
25-Sep-14	Interview with Lituanian business daily
02-Oct-14	ECB press conference
10-Oct-14	Statement at the 30th meeting of IMFC, Washington
24-Oct-14	ECB spokesman reading from Draghi's speaking points at euro area summit, Brussels
06-Nov-14	ECB press conference
17-Nov-14	Introductory remarks at the European Parliament's Economic and Monetary Affairs Committee
21-Nov-14	Speech at the Frankfurt European banking Congress
27-Nov-14	Introductory remarks at the Finnish parliament
04-Dec-14	ECB press conference
02-Jan-15	Interview with Handesblatt, published on 2nd of January 2015
08-Jan-15	Letter to Mr Luke Ming Flanagan (member of the European Parliament)
14-Jan-15	Interview with Die Zeit
22-Jan-15	ECB press conference
05-Mar-15	ECB press conference
09-Mar-15	Start of the APP
	Second period
10-Mar-15	Speech by Benot Cur at the 2nd International Conference on Sovereign Bond Markets, Frankfurt
15-Apr-15	ECB press conference
03-Jun-15	ECB press conference
16-Jul-15	ECB press conference
03-Sep-15	ECB press conference
23-Sep-15	Draghis introductory remarks at the ECON hearing
09-Oct-15	Statement by Mario Draghi at the 32nd meeting of the International Monetary and Financial Committee, Lima
22-Oct-15	ECB press conference
31-Oct-15	Interview with Ilsole24ore
20-Nov-15	Speech by Mario Draghi at the Frankfurt European Banking Congress
03-Dec-15	ECB press conference
04-Dec-15	Speech by Mario Draghi at the Economic Club of New York
21-Jan-16	ECB press conference
01-Feb-16	Introductory statement by Mario Draghi at the European Parliament plenary debate on the ECB Annual Report for 2014
15-Feb-16	Introductory statement by Mario Draghi: Hearing at the European Parliament's Economic and Monetary Affairs Committee
10-Mar-16	ECB press conference
21-Apr-16	ECB press conference
02-Jun-16	ECB press conference
08-Jun-16	Start of CSPP
22-Jun-16	Start of TLTROII
21-Jul-16	ECB press conference
08-Sep-16	ECB press conference
	Third period
20-Oct-16	ECB press conference
08-Dec-16	ECB press conference
19-Jan-17	ECB press conference
09-Mar-17	ECB press conference
27-Apr-17	ECB press conference
08-Jun-17	ECB press conference
27-Jun-17	Introductory speech by Mario Draghi at the ECB Forum on Central Banking, Sintra
20-Jul-17	ECB press conference

Table 2: Cumulative impact of ECB annoncements$^{\diamond}$

		Full sample		First sample		Second sample		Third sample	
		one-day	two-day	one-day	two-day	one-day	two-day	one-day	two-day
Exch.Rates$^{\sharp,\S}$	UK	4.75	9.75*	2.90	5.69	1.32	3.68	-0.03	-0.72
	US	8.14	16.25**	6.05**	14.68**	0.48	0.52	1.34	0.76
	JP	4.89	10.33	9.25*	16.51**	3.70	5.70	2.84	3.97
	CH	1.75	5.22	1.94	13.30	1.83	0.67	0.38	0.32
10Y Sov.Rates$^{\dagger,\flat}$	DE	25.19	0.14	-34.17*	-45.71*	47.81	29.44	10.88	17.61
Spread	IT	-104.10**	-104.31**	-60.32**	-57.82**	-38.29	-31.59	-7.73	-17.04
Spread	FR	-22.13*	-31.01*	-11.236	-16.67	-9.33*	-8.88	-1.66	-5.39
Spread	ES	-99.96**	-83.14**	-41.29*	-31.03	-46.77**	-29.15	-13.14	-24.27
EA Infl.Swap†	2y	26.82	9.33	8.41	2.56	19.24*	3.05	0.08	13.05**
	5y	37.13*	31.08*	16.43	16.81	16.92	5.78	4.98	17.23**
	10y	13.44	4.51	9.83	0.74	3.31	-2.39	3.28	16.41**
	5-10y	-10.06	-22.42	3.16	-15.49	-10.42	-10.63	1.41	15.03**
Stock Market$^{\sharp}$	IT	22.04*	12.19	6.36	1.00	13.85*	9.49	1.60	1.12
	DE	8.43	4.93	-1.27	-0.65	7.75	4.31	1.30	0.34
	FR	6.37	6.60	-0.38	0.82	6.77	6.26	-0.24	-0.76
	ES	17.72*	12.36	2.56	0.23	11.75*	9.03	3.76	4.01
Bond Yield†,‡	IT	9.47	-62.33**	-6.76	-23.84	7.97	-41.64**	-3.85	-6.78
	DE	-3.86	-38.17	-14.36*	-18.96*	9.45	-24.31	0.48	6.11
	FR	-5.87	-32.92	-14.38**	-18.16**	2.23	-23.81	5.39	8.52
	ES	-4.95	-55.73**	-19.92**	-34.92**	10.05	-27.79	2.29	3.75

$\diamond$ Samples: Full is Sep. 14 - Jul. 17, First is Sep. 14 - Mar. 15, Second is Apr. 15 - Sep. 16, Third is Oct. 16 - Jul. 17; $\sharp$ percentage points; § posive value means depreciation; † basis points; $\flat$ for Germany (DE) is the effect on the sovereign interest rate, for the other countries is the effect on the sovereign spread vis-a-vis the German rate; ‡ the corporate bond yield index constructed by Gilchrist and Mojon (2014) for non financial corporation; $*$ significant at 10%; $**$ significant at 5%.

Table 3: Robustness to the control variables$^{\diamond}$

		Full sample		First sample		Second sample		Third sample	
		one-day	two-day	one-day	two-day	one-day	two-day	one-day	two-day
Exch.Rates$^{\sharp,\S}$	UK	4.22	8.68	3.28	6.57	1.38	3.78	-0.06	-0.81
	US	6.87	14.72*	5.93**	14.36**	-0.30	-0.06	1.49	1.05
	JP	1.97	5.67	9.59**	17.42**	-3.46	-5.28	-2.85	-3.99
	CH	-3.38	13.12	1.66	-13.93	-1.85	-0.71	-0.41	-0.39
10Y Sov.Rates$^{\dagger,\flat}$	DE	31.42	5.24	-33.48*	-46.17*	52.78*	34.60	11.46	18.72
Spread	IT	-99.37**	-100.48**	-56.55**	-54.61**	-38.11	-32.13	-5.90	-13.40
Spread	FR	-17.95*	-26.01*	-9.25	-14.81	-7.00	-5.44	-0.44	-2.99
Spread	SP	-98.92**	-84.12**	-37.61*	-27.36*	-48.25**	-31.35**	-12.08	-22.155
EA Infl.Swap†	2y	23.97**	32.27**	8.28	7.43	14.34**	20.72**	1.96	4.52
	5y	24.91**	38.42**	10.22	15.46	12.76**	18.79**	3.61**	7.11**
	10y	15.14**	20.39**	6.96	8.67	7.21	9.03	3.16**	6.73**
	5-10y	5.47	3.50	3.956	2.61	1.86	0.11	2.40**	6.01**
Stock Market$^{\sharp}$	IT	18.33	8.25	6.15	1.05	11.11	6.84	1.32	0.57
	DE	5.65	2.44	-1.48	-0.58	5.62	2.52	1.16	0.08
	FR	3.19	3.42	-0.06	1.51	4.05	3.75	-0.42	-1.10
	SP	14.45	9.47	1.99	-0.22	9.01	6.48	3.50	3.41
Bond Yield†,‡	IT	9.16	-65.65**	-9.15	-28.22*	10.88	-38.32**	7.95	3.96
	DE	-3.85	-38.17**	-16.81*	-22.88*	10.43	-23.16**	1.10	7.31
	FR	-4.79	-33.79*	-16.45**	-21.94**	6.62	-17.74**	6.05	9.81
	SP	-6.17	-61.23**	-23.17**	-39.72**	14.41	-23.14**	2.88	4.85

$\diamond$ Samples: Full is Sep. 14 - Jul. 17, First is Sep. 14 - Mar. 15, Second is Apr. 15 - Sep. 16, Third is Oct. 16 - Jul. 17; $\sharp$ percentage points; § posive value means depreciation; † basis points; $\flat$ for Germany (DE) is the effect on the sovereign interest rate, for the other countries is the effect on the sovereign spread vis-a-vis the German rate; ‡ the corporate bond yield index constructed by Gilchrist and Mojon (2014) for non financial corporation; $*$ significant at 10%; $**$ significant at 5%.

Table 4: Robustness to the events' selection$^{\diamond}$

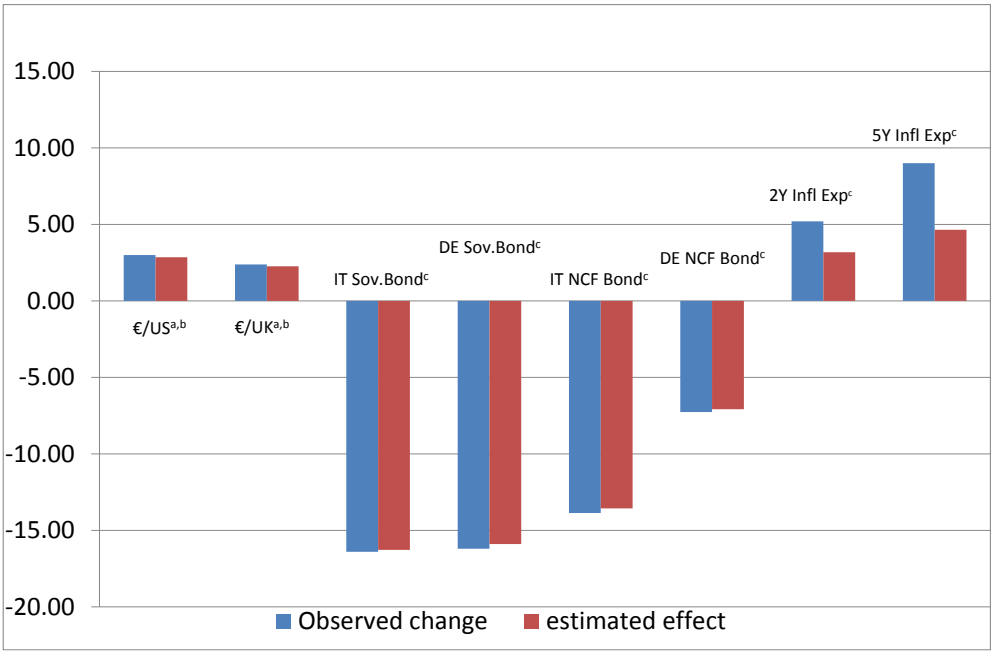
		Full sample		First sample		Second sample		Third sample	
		one-day	two-day	one-day	two-day	one-day	two-day	one-day	two-day
Exch.Rates$^{\sharp,\S}$	UK	4.80	12.21	2.90	5.69	0.12	3.05	1.08	2.07
	US	7.32**	15.21**	6.08**	14.75**	-0.27	-3.51	1.51	0.96
	JP	-5.31	-8.02	-9.22**	-16.46**	1.17	3.52	1.43	2.41
	CH	-1.73	13.95	-1.97	13.22	-0.08	0.32	0.138	0.22
10Y Sov.Rates$^{\dagger,\flat}$	DE	5.45	-24.75	-34.17*	-45.70*	22.06	3.71	17.65**	19.15**
Spread	IT	-65.65**	-71.39**	-60.31**	-57.82**	-17.60	-27.26	11.02**	13.11**
Spread	FR	-13.05	-22.77*	-11.24	-16.672	-5.31	-10.18	3.53	4.44
Spread	SP	-52.29**	-52.18**	-41.67*	-31.82*	-16.51	-20.5161	4.33	-1.16
EA Infl.Swap†	2y	13.97	19.46	13.90*	18.84	1.23	1.69	3.03**	6.86**
	5y	16.42**	25.89**	12.78	20.69	3.82	4.57	2.35*	5.41*
	10y	10.67**	14.15**	9.11	13.06	2.91	2.27	1.59	4.37
	5-10y	4.87	2.97	5.69	6.15	1.66	-0.05	0.92	3.32
Stock Market$^{\sharp}$	IT	13.95	15.34	6.42	1.13	5.51	10.89	1.01	3.34
	DE	1.28	8.97	-1.167	-0.42	0.56	6.30	0.75	0.90
	FR	-0.29	8.78	-0.33	0.93	-0.31	6.31	-0.25	0.28
	SP	7.60	11.97	2.61	0.33	3.42	9.10	1.36	1.99
Bond Yield†,‡	IT	4.57	-59.76**	-6.76	-23.84	5.43	-35.85**	5.84**	0.645
	DE	1.46	-27.76	-14.36*	-18.96*	10.20	-13.96	5.58**	5.58**
	FR	3.48	-19.05	-14.38**	-18.16**	12.70	-9.67062	4.76**	8.13**
	SP	-7.11	-51.08**	-19.92**	-34.91**	4.99	-24.40	5.66	4.61

$\diamond$ Samples: Full is Sep. 14 - Jul. 17, First is Sep. 14 - Mar. 15, Second is Apr. 15 - Sep. 16, Third is Oct. 16 - Jul. 17; $\sharp$ percentage points; § posive value means depreciation; † basis points; $\flat$ for Germany (DE) is the effect on the sovereign interest rate, for the other countries is the effect on the sovereign spread vis-a-vis the German rate; ‡ the corporate bond yield index constructed by Gilchrist and Mojon (2014) for non financial corporation; $*$ significant at 10%; $**$ significant at 5%.

Appendix: the effects of specific events

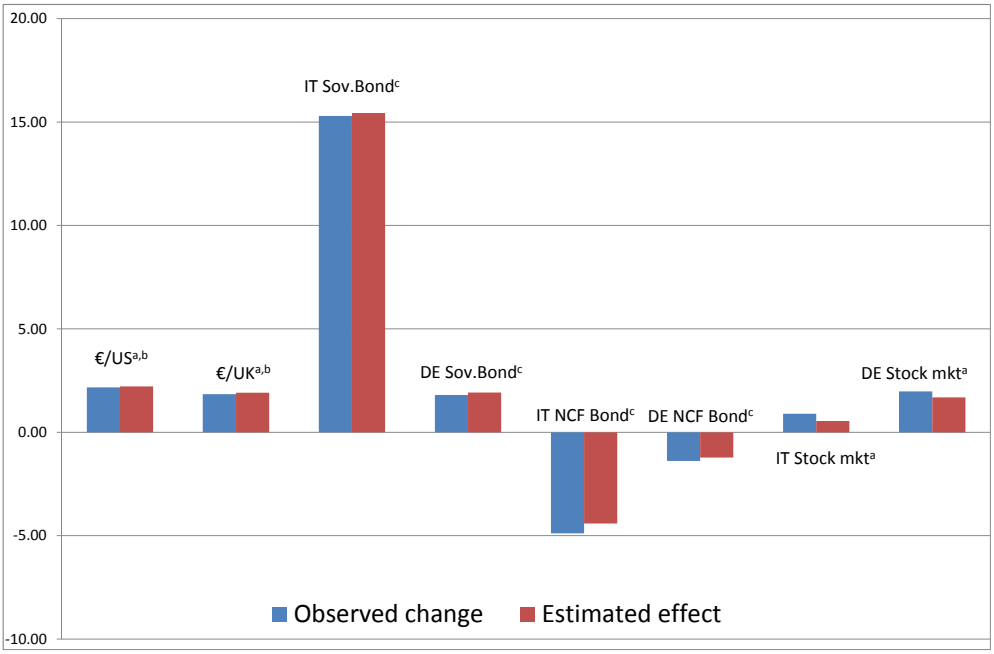
In this section we show the estimated effects of three selected policy-events: the ECB Governing Council on 22nd January 2015, the ECB Governing Council on December 8th 2016 and the speech by ECB President Draghi in Sintra on July 27th 2017. In the first policy event, the start of the Public Sector Purchase Programme was announced. Financial markets reacted in line with more accommodative stance of monetary policy. In particular, the euro depreciated against other currencies, sovereign bond yields declined an so did corporate bond yields. Inflation expectations also reacted in a way that is consistent with a re-anchoring of inflation expectations at all horizons. In the second event the duration of the PSPP was extended to at least the end of 2017 but it was also announced that the size of monthly purchases would be reduced from 80 to 60 billion starting from April 2017. The response of exchange rates, stock market indexes and corporate bond yields, although contained, were consistent with the temporal extension of the APP purchases, despite the monthly reduction; on the other hand peripheral sovereign spread increased substantially, resulting in a tightening of financial conditions. In the third event, all the financial variables moved in a direction consistent with an expected gradual removal of policy accommodation implicitly signaled in the speech. In that occasion Draghi mentioned that 'reflationary forces replaced deflationary forces'.

Figure 3: The ECB announcement on the 22th January 2015



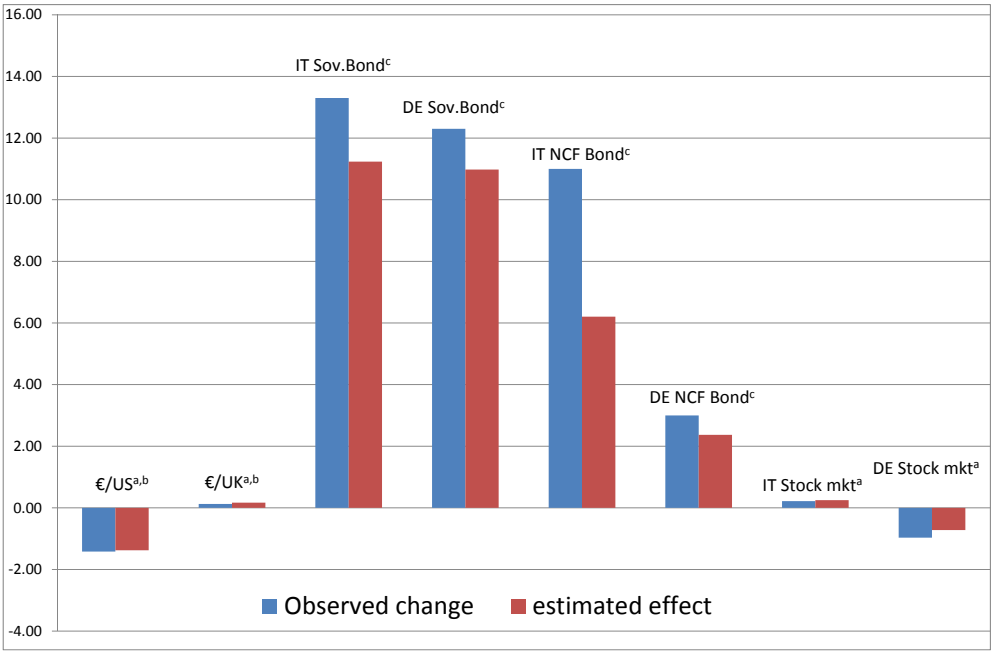
The sovereing bonds refer to the 10y rate. The NCF bonds refer to the corporate bond yield index constructed by Gilchrist and Mojon (2014) for non financial corporation; (a) percentage points; (b) positive values means depreciacion; (c) basis points.

Figure 4: The ECB announcement on the 8th December 2016



The sovereing bonds refer to the 10y rate. The NCF bonds refer to the corporate bond yield index constructed by Gilchrist and Mojon (2014) for non financial corporation; (a) percentage points; (b) positive values means depreciacion; (c) basis points.

Figure 5: Draghi's speech in Sintra on the 27th July 2017



The sovereing bonds refer to the 10y rate. The NCF bonds refer to the corporate bond yield index constructed by Gilchrist and Mojon (2014) for non financial corporation; (a) percentage points; (b) positive values means depreciacion; (c) basis points.