The Impact of the Monetary Policy Interventions on the Insurance Industry

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Abstract

This paper investigates the effect of the conventional and unconventional (e.g. Quantitative Easing) monetary policy intervention on the insurance industry. We first analyse the impact on the stock performances of 166 (re)insurers of the last Quantitative Easing programme launched by the ECB by constructing an event study around the announcement date. Then we enlarge the scope by looking at the monetary policy surprise effects on the same sample of (re)insurers over a timeframe of 8 years. Our evidences suggest that a single intervention extrapolated from the comprehensive strategy cannot be utilized to estimate the effect of the monetary policy intervention on the market. On the impact of monetary policies we show how the effect of interventions changes over time. The expansionary monetary policy interventions, when generating an instantaneous reduction of interest rates, had an immediate positive effect on the stock market and on the insurance industry from

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2008 till 2013. However, the effect fades away in 2014-2015. This period includes the last ECB QE intervention and it is characterized by already extreme low interest rates shows statistically non-significant effects on the (re)insurers stock returns.

Introduction and literature review

To contrast the economic stagnation affecting Europe, the European Central Bank (ECB) is enforcing since 2013 a series of conventional and unconventional expansionary monetary intervention, including Quantitative Easing (last QE announced in January 2015).[37] These expansionary interventions, in addition to the welcomed stimulus on the economy, result in extremely low interest rates exacerbating the problems arising from the low yield environment.

The persistent low yield environment is heavily affecting the EU financial services industry and it is becoming a severe threat for the life insurers in terms of solvency and sustainability of their business models.

From a policymakers' perspective an increasing attention on the stability and profitability of life insurers is expressed by EIOPA. These constantly rank the low yield environment as the major source of risk for the life insurers (EIOPA, 2013, 2014 and 2015). Concerns are specifically addressed towards companies with a relevant outstanding portfolio of products entailing guaranteed rates of return and profit participation features. The lack of sufficiently remunerable rated assets on the market substantially reduce the capability for (re)insurers to match by a return and duration perspective the outstanding portfolio of guaranteed policies underwritten in high-yield years. Concerns are shared by the national authorities overseeing markets traditionally active on saving products with minimum guaranteed returns such as Germany. For instance, Deutsche Bundesbank (2013), from the 2013 stress test exercise inferred that a persistent low yield environment would heavily affect the solvency situation of German insurers. Moreover, the report concluded that under particularly adverse conditions more than 30 per cent of the German life insurers won't meet Solvency II capital requirements by 2023. Comparable results are obtained by Berdin and Gruendel (2014) in their model based analysis on a stylised German life insurer's solvability under the Solvency II regime. Wedow and Kablau (2011) analyse the German market once more and reached less pessimistic conclusions. As a matter of fact they empirically conclude that given the outstanding stock of guaranteed products the solvency situation will be threatened only in

[37] See: European Central Bank (2015).

extremely adverse scenarios. Nevertheless, the authors argue that a prolonged low yield scenario would progressively worsen the solvency capability of insurance companies offering minimum guaranteed products. In the literature there is a common understanding in considering these kinds of products as the most exposed to the drop in the interest rates. In particular duration mismatches between assets and liability are considered to be the vulnerable point of these products, as qualitatively shown by Holsboer (2000) and theoretically expressed by Lee and Stock (2000). In addition to the minimum guaranteed benefits, the profit participation component seems to cause trouble to insurers as pointed out by Grosen and Lochte Jorgensen (2000) in their theoretical work. Profit distribution policies have been empirically investigated by Kling et al. (2007a) both by a general and local perspective (Kling et al. 2007b). An additional element of vulnerability of the life insurers exposed to a persistent low yield environment comes from surrender options potentially embedded in the contracts. Gatzert (2008) and Albizzati and Geman (1994) explain how in periods of low profit sharing returns, policyholders can opt for more attractive investments enhancing the lapse risk.

All these studies investigate the issue from a theoretical point of view of a numerical simulation; with this work we aim to shed light on the empirical evidence related to stock market evaluation of the impact of unconventional monetary policies on the insurance industry.

In fact, if on the one hand there is a common understanding on the relation between monetary interventions and the interest rate term structure, on the other hand the effect on conventional and unconventional expansionary monetary policy on the market does not provide conclusive elements, especially in a low or negative yields environment.

The impacts of the monetary policy on market valuations have been vastly investigated. Specifically, the role of monetary policy announcements on asset pricing is well documented (see Cook and Hahn (1989), Bernanke and Kuttner (2005), Gurkaynak, Sack, and Swanson (2005), Ehrmann and Fratzscher (2004), Bjornland and Leitemo (2009) and Ippolito, Ozdagli, and Perez (2015), among others). However, the literature on Quantitative Easing and near-zero rates is still in its initial phase and has thus far mainly concentrated on measuring the effects of unconventional monetary policies on aggregates such as inflation and GDP (see Chen, Curdia, and Ferrero (2012), Chung et al. (2012), Gambacorta, Hofmann and Peersman (2014), and Kapetanios et al. (2012) amid others). A number of papers

investigates the effect of unconventional policies on financial markets, with a focus on interest rates and equities in the U.S. and developed European countries. Instances for works in this area are Krishnamurthy and Vissing-Jorgensen (2011), D'Amico et al. (2012), D'Amico and King (2013), Banerjee, Latto, and McLaren (2014), Li and Wei (2013) and Pericoli and Veronese (2016).

It is worth mentioning various studies that implement the event-study methodology in order to properly investigate the effects of unconventional monetary policies. Regarding the Eurozone, Luciu and Lisi (2015) have identified announcements that can be considered as complete surprises: they then simply added up the jumps in asset prices in short-time windows bracketing these announcements. Nevertheless, complete surprises do not account for market expectations. A way to bypass this issue is offered by Joyce et al. (2011) and Cahill et al. (2014), by normalising data looking at the surveys periodically conducted by financial institutions such as bank and insurances, with the purpose to measure in a more realistic manner the market surprise to monetary policy announcements. However, due to the limited availability of surveys, this measure does not represent a viable alternative for many fields. A more effective approach, proposed by Rogers, Scotti and Wright (2014), turned out to be helpful in order to measure the effects of monetary measures on different asset prices relatively to changes in government bond yields and relies on a particular definition of monetary policy surprise centred on the intraday changes in government bond yields right after the announcement.

Despite the ample sources, no analysis has been specifically devoted to the insurance industry. We therefore focus our attention on how and to what extent the 2015 ECB QE and the convention and unconventional expansionary monetary policy strategy deployed by Central Banks impact the market performances of the (re)insurers.

Our approach is twofold. The first part of the analyses elaborates over a simple event study bases on a market model (Mackinlay, 1997) around the last ECB QE announcement (22 January 2015). Subsequently, we extend the analysis to a broader sample of announcements by following the approach of Pericoli and Veronese (2016) who compare monetary policy announcement and non-announcements days in different sub-periods. In this second part, our paper builds on the latter intuition. The idea underlying this approach is that the periods are characterised by different "structural parameters", in the spirit of Rigobon (2003). Within these periods, estimates of impacts obtained by separately pooling announcement and non-announcement days.

The paper is structured in five sections. At first this introduction provides a review of the main related researches and presents the overall content of the study. We devote section two and three to present the applied methodology and to describe the utilised dataset respectively. Section four summarises the empirical evidences on the effect of monetary policies on the insurance industry. The article concludes with the presentation of the main findings and of the further implications (Section five).

Methodology

To evaluate the effect of the non-conventional monetary policy interventions enforced by the ECB we focus on the QE program launched on the 22nd of January 2015. More specifically we design an event study based on a market model around the announcement of the QE program.[38] The Cumulative Abnormal Returns of insurers are computed against different samples in order to insulate the effect of the QE on the broad insurance market and on a set of subsamples defined according to geographical areas and sizes defined in term of total assets. In detail we split the full sample by a geographical perspective into: i) US (re)insurers, ii) EU (re)insurers, iii) EMU (re)insurers and iv) EU-non EMU (re)insurers. Size-wise we dissect the sample into big and small (re)insurers. It is worth noting that in this article we utilise the notation "big and small" in a relative extent. The sample includes large listed (re)insurers, nevertheless to understand whether and to what extent size acts as determinant of the impacts of monetary policy intervention on insurers. We use the following divide: threshold of EUR 50bn used by FMI and IAIS as a size criteria to identify G-SII insurers (IAIS, 2016).

We compute for each group the Cumulative Abnormal Returns (CAR) around the announcement date using a two-day event window as in Chen et.al. (2014) as follows: [39]

$$CAR_{i,t} = \sum_{j=1}^{t} AR_{i,j} \qquad (1)$$

where i represents the institution and j represents the time. The Abnormal Return (AR) of an institution i is computed according to equation (2).

$$AR_{i,t} = OR_{i,t} - \mathrm{IR}_{i,t} \qquad (2)$$

[38] For a more detailed treatment of the applied event study methodology and of the strength and weaknesses of the market based approach refer to MacKinlay (1997).

[39] The use of a longer window does not allow insulating the effect of the analysed event as other elements may generate movements in the stock prices.

where the OR express the observed market return of the institution$i$, whereas IR expresses the implied return of the same institution. We compute implied returns on the (re)insurer i on an estimation windows spanning form 26 August, 2013 to 20 January, 2015 according to equation 3.

$$\mathrm{IR_{i,t}} = \hat{\beta}_i * \mathrm{ORt}_{i,t} \tag{3}$$

where $\hat{\beta}_i$ is derived via OLS according to equation 4:

$$\mathrm{Return}_{i,t} = \alpha_i + \beta_i * \mathrm{market}_t + \varepsilon_{i,t} \tag{4}$$

In the second part of our analyses, in order to identify the causal relationship of the monetary policy, we estimate an ordinary least square regression of daily returns of the (re)insurance companies on monetary policy surprises. Based on the fact that at a first instance conventional and unconventional monetary policies affect the risk free rate term structure, we define, according to Kuttner (2001) and Rogers et al. (2014), the monetary policy surprise as the linear combination of the changes on the whole term structures of the interest rates. We then estimate the impact of the monetary policy surprise on the market returns of a panel of listed companies via OLS regressions according to equation 5.

$$\Delta y_t = \alpha + \beta * \Delta RFR^{FED}_{t=t_{aFED}} + \gamma * \Delta RFR^{ECB}_{t=t_{aECB}} + \sum_j \phi_j * X_{t,j} + u_t \tag{5}$$

where Δy_t is the change in the market return, $RFR^{FED}_{t=t_{aFED}}$ and $\Delta RFR^{ECB}_{t=t_{aECB}}$ are the Fed and ECB monetary-policy surprises (defined as the first principal component factor – PCA – of the changes in 2-year, 3-year, 5-year, 7-year and 10-year zero-coupon interest rates).[40] In line with Pericoli and Veronese (2016) we use a set of control variables represented by $X_{t,j}$, namely the US Citi Economic Surprise Index (CESI), the Euro-area CESI and the VIX. Equation (5) is estimated only on ECB ($t = t_{aECB}$) or Fed ($t = t_{aFED}$) announcement days split into four periods: as follows.

1st period, from January 1, 2002 to July 31, 2007. We define it as a tranquil period characterised by conventional monetary policies conducted both by ECB and Fed.

2nd period, from August 01, 2007 to December 31, 2009. We define it as the period of the US sub-prime crisis and its subsequent global spillover. The Troubled Asset Relief Program (TARP) process and conventional and

[40] For the EU we utilise the zero-coupon interest rate implied in government bonds irrespective of their rating (ECB computation). For the US we utilize the FED zero-coupon rate.

unconventional monetary policies (QE1 announced in November 2008 and ceased in March 2010) enforced by the Fed reduced the US at near-zero interest rate. The ECB stared in October 2008 the progressive reduction of the interest rates to a near-zero level complemented by unconventional policy as Long Term Refinancing Operations (LTRO) announced in May 2009 and Asset Purchases Programme (APP).

3rd period, from January 01, 2010 to May 31, 2013. The focus moved from the US to Europe. The period is characterised by the severe tensions on the EURO originated by speculative attacks to the currency and by the sovereign debt crisis of the peripheral countries of the euro area. The nearly default of Greece represents the peak of this crisis. The ECB reaction was anticipated in the "Whatever it takes" London speech of President Draghi and enforced by conventional monetary policy interventions (reduction of interest rate on deposit facilities to 0 per cent) and unconventional monetary policy intervention (the launch of Outright Monetary Transactions - OMT). In order to contrast the US economy downturn, the Fed proceeded along the path of conventional expansionary monetary policy complemented by unconventional monetary policies launching in November 2010 the QE2 and in September 2012 the QE3.

4th period, from June 01, 2013 to September 15, 2015. The low yield environment is the key topic to be mentioned. In order to contrast the prolonged stagnation of the economy in the euro area and to fulfil its mandate of keeping the inflation close to 2 per cent, the ECB launched in April 2014 the Quantitative Easing program which was extended in 2015 further. TLTROs initiatives complemented the set of enforced unconventional monetary policies. Interest rate on deposit facilities turned to negative from June 2014 onwards. In the US, the recovery of the economy led to a first increase on the Fed Funds rate at the end of 2015 (outside our period of observation).

This specification allows to investigate whether conventional and unconventional monetary policies have been effective over time in fostering favourable conditions for the (re)insurers when policy rates were stuck at the zero lower bound, and if their transmission operated through a decrease in term premia benefit the insurance industry.

Dataset

We conduct the event study on a panel of 96 US and 70 European listed insurers selected among the largest in term of total assets.[41] Data consist of the total return index and market capitalisation retrieved via Thomson Reuters Datastream® of the (re)insurers over a time window of 370 trading days from August 26, 2013 to January 24, 2015. We use as an estimation panel a set of indices for each geographical area containing all relevant listed companies, namely excluding all the small caps and the (re)insurers encompassed in our panel (i.e. only the largest companies that jointly account for 80 per cent of the total market capitalisation were used to compute the country level market indices). Additionally, we remove all insurance companies and all companies which had less than 120 active trading days in any year. Based on end year market capitalisation figures, we compute weighted country market returns.

We then build a set of country based indices based on the market capitalization of the companies in order to scrutinize the effect of the QE i) at European and US level and ii) at a country level. Also we split the sample according to the size of the insurers to understand whether and to what extent size acts as a determinant of the impacts of monetary policy intervention on insurers.[42] Table 1 provides a detail of the sample of the (re)insurers.

Table 1: Descriptive Statistics (Event Study)

Sample	Obs (#)	Mean (%)	Std. Dev. (%)	Min (%)	Max (%)
All companies	166	-0.90	6.80	-71.20	19.30
US companies	96	-1.50	8.10	-71.20	19.30
EU companies	55	0.10	3.50	-8.70	12.70
EMU companies	29	-0.10	3.60	-8.70	9.80
EU non EMU companies	26	0.40	3.40	-3.80	12.70
Big companies	41	-1.00	3.40	-15.10	3.00
Small companies	125	-0.80	7.60	-71.20	1.73

Note: This table reports the summary statistics for the Total Return Index (TR) of the (re)insurers included in the different sample for the period from 26/08/2013 to 20/01/2015. Subsamples are created according to geography and size. Data downloaded from Thomson Reuters Datastream® on 08/06/2015.

For the second part of our analyses, we complement the returns of the (re)insurers with the change in the risk free rate term structure and the list of the monetary policy days built on the scheduled and unscheduled central bank board meetings as well as

[41] Total assets observed at end-2014. Data retrieved via SNL Financial®.

[42] Our sample consists of large insurance groups therefore to dissect the panel according to the size we use the threshold of EUR 50bn defined by FMI and IAIS as a size criteria to identify G-SII insurers (IAIS, 2016).

on those days when relevant news on monetary policies were disclosed (Table 2 displays the summary statistics of the returns).[43]

Table 2: Descriptive Statistics (Market returns)

Period 1															
	ECB annnouncement days					Fed annnouncement days					Other days				
Δy (%)	Obs(#)	Mean	Std. Dev.	Min	Max	Obs(#)	Mean	Std. Dev.	Min	Max	Obs(#)	Mean	Std. Dev.	Min	Max
ALL	335	-0.12	1.19	-3.08	4.68	305	0.16	0.88	-1.75	2.51	6,640	0.05	1.03	-4.99	7.63
EU	201	-0.21	1.86	-5.40	5.35	183	0.29	1.12	-2.90	4.10	3,984	0.04	1.58	-8.18	9.00
EMU	67	-0.24	2.18	-7.03	7.04	61	0.34	1.26	-2.91	5.04	1,328	0.03	1.68	-8.67	9.62
EUnonEMU	67	-0.06	0.97	-3.79	1.78	61	0.17	1.05	-2.78	2.77	1,328	0.13	0.98	-6.31	7.07
US	67	-0.09	1.02	-3.05	4.41	61	0.09	0.95	-2.39	2.23	1,328	0.05	0.98	-4.25	6.97
Period 2															
	ECB annnouncement days					Fed annnouncement days					Other days				
Δy (%)	Obs(#)	Mean	Std. Dev.	Min	Max	Obs(#)	Mean	Std. Dev.	Min	Max	Obs(#)	Mean	Std. Dev.	Min	Max
ALL	165	-0.66	2.33	-7.91	4.60	190	0.45	3.33	-7.75	7.67	2,815	0.04	2.14	-7.69	13.14
EU	99	-0.51	2.50	-8.78	5.99	114	0.34	3.46	-6.90	11.48	1,689	0.02	2.24	-8.20	12.86
EMU	33	-0.48	2.57	-7.77	6.81	38	0.26	3.50	-7.21	10.39	563	0.00	2.26	-8.44	12.29
EUnonEMU	33	-0.41	1.84	-5.74	2.14	38	0.20	2.19	-4.33	5.81	563	-0.01	1.68	-9.09	6.05
US	33	-0.78	2.49	-7.14	3.20	38	0.49	4.20	-9.79	9.23	563	0.04	2.58	-10.35	16.14
Period 3															
	ECB annnouncement days					Fed annnouncement days					Other days				
Δy (%)	Obs(#)	Mean	Std. Dev.	Min	Max	Obs(#)	Mean	Std. Dev.	Min	Max	Obs(#)	Mean	Std. Dev.	Min	Max
ALL	230	0.24	1.45	-3.91	3.11	205	0.27	1.43	-3.17	5.02	4,020	0.06	1.25	-6.63	7.28
EU	138	0.35	1.76	-3.41	4.98	123	0.15	1.48	-2.35	5.63	2,412	0.05	1.49	-5.72	9.85
EMU	46	0.33	1.93	-3.58	4.65	41	0.13	1.70	-2.74	6.49	804	0.04	1.65	-6.43	11.58
EUnonEMU	46	0.23	1.07	-2.48	2.46	41	-0.07	1.13	-5.54	2.28	804	0.09	1.00	-5.48	6.41
US	46	0.16	1.52	-4.36	3.08	41	0.38	1.81	-4.49	7.34	804	0.06	1.31	-8.37	6.03
Period 4															
	ECB annnouncement days					Fed annnouncement days					Other days				
Δy (%)	Obs(#)	Mean	Std. Dev.	Min	Max	Obs(#)	Mean	Std. Dev.	Min	Max	Obs(#)	Mean	Std. Dev.	Min	Max
ALL	140	0.40	0.65	-0.75	1.94	130	0.21	0.80	-0.95	1.93	2,715	0.04	0.79	-4.19	2.70
EU	84	0.45	1.00	-1.91	2.37	78	0.08	0.80	-1.28	2.09	1,629	0.04	0.94	-3.92	2.96
EMU	28	0.43	1.14	-2.31	2.47	26	0.07	0.86	-1.44	2.36	543	0.04	1.03	-3.68	3.37
EUnonEMU	28	0.09	0.83	-2.05	1.71	26	0.20	0.81	-2.28	1.99	543	0.07	0.91	-4.62	3.46
US	28	0.36	0.74	-0.94	2.31	26	0.29	0.99	-1.80	2.17	543	0.04	0.87	-4.33	3.20

Note: The table reports the summary statistics of the total return of the stocks of the insurance companies included in the sample. Statistics are reported for the ECB announcement days, the Fed announcement days and the other days of the observation window.

The OLS regression includes also the VIX, the CEIS and the CEIS US as control variables. Table 3 displays the summary statistics of the regressors.

[43] The full list of monetary policy days divided between US and EU is provided in Appendix A and is from the Pericoli and Veronese (2016) paper. The lists are divided into 2 periods of observation with the oldest slots that only reports scheduled meetings and the more recent ones that complement scheduled meetings with unscheduled meetings and relevant speeches.

Table 3: Descriptive Statistics (Monetary Policy Surprise)

Period 1	ECB annnouncement days					Fed annnouncement days					Other days				
Variable	**Obs**	**Mean**	**Std. Dev.**	**Min**	**Max**	**Obs**	**Mean**	**Std. Dev.**	**Min**	**Max**	**Obs**	**Mean**	**Std. Dev.**	**Min**	**Max**
CESIEur	41	27.67	62.14	-105.20	146.50	34	25.94	60.24	-100.40	147.30	826	25.35	58.95	-119.70	162.50
CESIUsd	41	-0.98	39.68	-104.40	72.90	34	1.01	38.39	-102.50	73.10	816	-0.14	39.58	-110.50	73.50
VIXX	41	13.51	1.96	10.44	18.35	34	13.22	2.29	10.23	20.34	796	13.65	2.35	9.89	24.17
$\Delta RFR^{ECB}_{t=t_{aECB}}$	67	-0.71	28.06	-64.64	54.37	61	1.84	20.97	-101.77	46.21	1,322	-0.50	23.24	-130.72	76.15
$\Delta RFR^{FED}_{t=t_{aFED}}$	67	-2.65	21.37	-75.41	48.24	61	1.39	26.40	-60.76	59.00	1,322	-0.12	23.23	-183.82	89.67
Period 2															
	ECB annnouncement days					**Fed annnouncement days**					**Other days**				
Variable	**Obs**	**Mean**	**Std. Dev.**	**Min**	**Max**	**Obs**	**Mean**	**Std. Dev.**	**Min**	**Max**	**Obs**	**Mean**	**Std. Dev.**	**Min**	**Max**
CESIEur	32	-25.05	76.69	-188.60	88.10	38	-36.27	75.10	-186.50	77.40	545	-25.34	73.94	-185.30	94.30
CESIUsd	32	-5.36	53.89	-120.30	73.60	38	-11.64	54.81	-136.10	76.90	545	-7.00	51.37	-140.60	83.20
VIXX	33	30.46	12.91	18.44	63.68	37	33.44	14.38	18.53	69.96	543	30.29	12.53	16.12	80.86
$\Delta RFR^{ECB}_{t=t_{aECB}}$	33	1.06	41.42	-101.41	65.37	38	14.20	37.02	-69.93	110.91	557	0.30	31.92	-144.82	114.18
$\Delta RFR^{FED}_{t=t_{aFED}}$	33	-0.66	28.54	-70.87	52.37	38	8.32	47.28	-102.35	141.07	557	0.56	30.22	-167.72	132.78
Period 3															
	ECB annnouncement days					**Fed annnouncement days**					**Other days**				
Variable	**Obs**	**Mean**	**Std. Dev.**	**Min**	**Max**	**Obs**	**Mean**	**Std. Dev.**	**Min**	**Max**	**Obs**	**Mean**	**Std. Dev.**	**Min**	**Max**
CESIEur	46	7.29	54.34	-91.70	121.20	41	4.49	54.35	-104.20	110.30	789	5.43	52.77	-103.40	131.00
CESIUsd	46	4.40	45.16	-98.20	86.10	41	-2.69	48.10	-98.50	77.30	790	4.18	44.72	-117.20	97.50
VIXX	46	20.27	6.07	13.06	36.27	41	20.90	6.26	12.67	37.32	771	20.57	6.59	11.30	48.00
$\Delta RFR^{ECB}_{t=t_{aECB}}$	46	1.67	31.15	-86.56	69.27	41	-3.22	29.29	-126.94	55.76	798	0.74	25.25	-131.11	95.75
$\Delta RFR^{FED}_{t=t_{aFED}}$	46	0.20	17.02	-44.14	44.94	41	-0.98	18.06	-56.86	43.31	798	0.60	14.86	-82.51	54.09
Period 4															
	ECB annnouncement days					**Fed annnouncement days**					**Other days**				
Variable	**Obs**	**Mean**	**Std. Dev.**	**Min**	**Max**	**Obs**	**Mean**	**Std. Dev.**	**Min**	**Max**	**Obs**	**Mean**	**Std. Dev.**	**Min**	**Max**
CESIEur	28	0.48	31.95	-54.10	55.30	26	1.25	27.18	-41.10	51.70	536	1.03	29.86	-57.30	64.90
CESIUsd	28	-3.99	33.34	-55.00	63.90	26	-5.63	31.79	-71.90	50.70	536	-2.86	33.21	-73.30	72.70
VIXX	27	14.54	2.82	10.32	25.61	26	14.25	2.19	10.61	20.44	524	14.95	3.43	10.62	40.74
$\Delta RFR^{ECB}_{t=t_{aECB}}$	28	-0.83	20.67	-47.31	34.68	26	0.95	13.58	-39.19	27.02	538	-0.02	15.39	-122.25	49.84
$\Delta RFR^{FED}_{t=t_{aFED}}$	28	-2.01	11.86	-29.19	14.64	26	0.32	23.46	-42.91	48.69	538	-0.40	15.03	-74.45	41.67

Note: The table reports the summary statistics of: i) the control variables – CEIS EUR, CEIS US and VIX; ii) the first principal component of the change in 2-year, 3-year, 5-year, 7-year and 10-year zero-coupon interest rate for the US and the EU. Statistics are reported for the ECB announcement days, the Fed announcement days and the other days of the observation window.

The ECB announcement days had a different impact on the interest rates according to the periods of observation. Period 1 and period 4 display an average decrease of the rates in the announcement days with an average of interest rate changes of -0.71bp and -0.83bp respectively with a significant variations from -64.64bp to +54.37bp. Period 2 and period 3 show the opposite reaction of the rates with on average a positive change in the interest rates (+1.06bp and +1.67bp) with a significant variations from -101.41bp to 69.27bp. The behaviour can be explained by the fact that the intervention either was in the direction of an increase of the interest rates or, despite being for a reduction of interest rates, did not match the expectation of the market that reacted in the opposite direction.

Empirical evidence

In this section we report the application of the approach explained in the section two. At first we show the results of the event study centred on the ECB announcement of the last QE (22/01/2015) on the defined samples of (re)insurers. Subsequently, with the aim of scrutinizing the general effect of a series of several interrelated monetary policy interventions, we display the outcome of the analysis on the monetary policy surprise effect by enlarging the timeframe of our analysis and the number of interventions announced by the Central Banks.

Event Study

We design the event study on a -2/+2 days event window (see shaded cells in Table 3 below). We select a 4-day event window because we want to capture the expectation effect that shall be reflected in prices in the few days before the announcement on the one hand the adjustments subsequent the announcement on the other hand. A longer event window would be prone to capture spurious effects originated by other events that may happen in the market. According to this specification the QE has a significant negative impact on the return of the full sample of (re)insurers (column "Total"). The same can be observed regarding the different geographical and size-based subsamples. In this respect, however, the level of significance is insufficient. The only exception is represented by the US subsample (column "US"). This subsample reports still small but higher significant impacts in comparison to the full sample. The result cannot be explained from the information available. It also cannot be connected to the ECB intervention. Therefore, it may be related to other concurrent events and hence deserves further analyses. The evolution of the Cumulative Abnormal Returns over time for the country based subsamples is provided in Appendix B.

Table 4: Event Study

Parameters		Cumulative Abnormal Return									
		Total		mean(small)-		EU		EMU		US	
event window (days)	estimation window (days)	Value (%)	Sig.	Value (%)	Sig.	Value (%)	Sig.	Value (%)	Sig.	Value (%)	Sig.
-2/+2	100	**-1.376**	*	-0.588	-	0.124	-	0.028	-	**-2.456**	*
-2/+2	250	**-0.854**	*	0.220	-	0.140	-	-0.075	-	**-1.530**	**
-2/+2	350	**-0.836**	**	0.386	-	-0.011	-	-0.223	-	**-1.397**	***
-1/+1	100	-0.017	-	0.752	-	-0.031	-	**-0.603**	*	-0.053	-
-1/+1	250	0.338	-	1.291	-	-0.016	-	**-0.683**	*	0.536	-
-1/+1	350	0.337	-	1.394	-	-0.140	-	**-0.770**	*	0.622	-
0/0	100	**0.460**	*	-0.299	-	0.245	-	0.420	-	0.494	-
0/0	250	**0.573**	*	-0.040	-	0.272	-	0.324	-	**0.656**	*
0/0	350	**0.551**	***	-0.017	-	0.213	-	0.290	-	**0.656**	*
0/+1	100	0.148	-	0.791	-	-0.014	-	-0.521	-	0.098	-
0/+1	250	0.382	-	1.151	-	-0.020	-	-0.639	-	0.495	-
0/+1	350	0.376	-	**1.208**	*	-0.110	-	-0.701	-	0.544	-
0/+2	100	-0.133	-	0.404	-	0.048	-	-0.240	-	-0.487	-
0/+2	250	0.199	-	0.930	-	0.011	-	-0.404	-	0.117	-
0/+2	350	0.197	-	**1.012**	*	-0.091	-	-0.495	-	0.179	-
0/+3	100	-0.025	-	0.146	-	-0.001	-	-0.278	-	-0.336	-
0/+3	250	0.457	-	0.797	-	-0.001	-	-0.380	-	0.515	-
0/+3	350	**0.496**	*	0.911	-	-0.120	-	-0.487	-	**0.665**	*

*Note: The table reports for the different combinations of event and estimation windows' length the mean of the cumulative abnormal returns of the (re)insurers under the different samples. Significance of the parameter expressed via T-statistics *=10% level, **=5%level, ***2.5%level.*

As a robustness check we tested other specifications of the event windows without obtaining statistically significant results. Furthermore, the direction and the significance of the impacts of the QE announcement are strongly dependent form the parameters of the event study, namely the size of the event window and of the estimation window (see Table 4 above in the non-shaded cells). In fact, when restricting the event window to the day of the announcement (-0/+0), the empirical evidence offer the same picture although the sign is the other way round and the magnitude lower. The smaller coefficients, despite their significance, show how the market reflected the expected monetary action in the previous days leaving some adjustments for the day of the announcement.

From the event study we are not able to infer a clear-cut indication on the impact of the last ECB QE announcement on the (re)insurers. The limited and somehow contradictory evidences suggest that the 2015 QE was not well received by the insurance market. However, the limited magnitude and the volatility of the sign of the impact claim for a wider approach that evaluates the general monetary policy strategy encompassing several interventions enforced by the Central Banks.

Monetary Policy Surprise

Monetary policy interventions cannot be considered on as standalone actions, they are at the same time the cause and consequence of complex and interrelated macroeconomic circumstances. The analysis of a standalone event (e.g. a QE announcement) excerpted from the larger set of monetary policy actions

encompassed in the overall monetary policy strategy, may lead to partial and potentially misleading results.

In order to overcome this, we propose an identification approach that takes direct inspiration from Rogers, Scotti and Wright (2014) and Pericoli and Veronese (2016). According to the authors, the monetary policy interventions are transmitted to the market through the variation in yields over the whole interest rate term structure. The effect of the Central Banks' announcements is signalled by a statistically significant higher monetary policy surprise during the event days compared to the non-event days. These evidences can be observed on each of the 4 periods (Table 4 – Monetary Policy Surprise - Volatility of the first component of the interest rate term structure). Also market returns of (re)insurers and other listed institutions reflect the announcement events but with a statistically significant increase in the volatility only in two specific periods (Table 4 – Insurers' return and Other financials' return).

Table 4: Monetary Policy Surprise - Volatility of the first component of the interest rate term structure

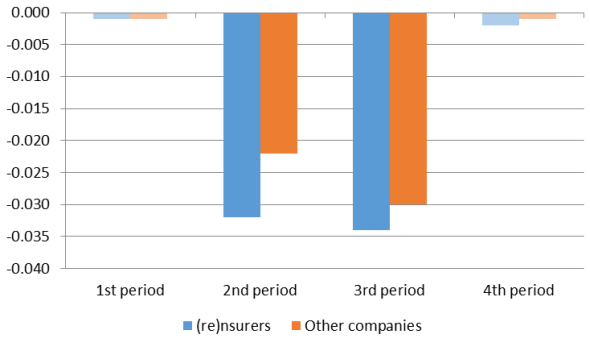
		ECB			Fed		
	Period	σ_{event}	$\sigma_{no-event}$	***p-val***	σ_{event}	$\sigma_{no-event}$	***p-val***
Monetary Policy Surprise	1	27.85	23.08	0.00	26.19	23.08	0.00
	2	40.81	32.25	0.00	46.67	29.81	0.00
	3	30.82	25.35	0.00	17.85	14.92	0.00
	4	20.31	15.22	0.00	23.02	14.81	0.00
Insurers' return	1	2.18	1.98	0.00	2.01	1.99	0.04
	2	3.33	3.57	0.98	4.30	3.51	0.00
	3	2.39	2.12	0.00	2.25	2.13	0.03
	4	1.46	1.49	0.68	1.54	1.49	0.17
Other financials' return	1	1.48	1.34	0.00	1.25	1.35	1.00
	2	2.21	2.12	0.09	2.96	2.06	0.00
	3	1.58	1.45	0.00	1.34	1.47	1.00
	4	1.38	1.30	0.63	1.62	1.39	0.00

Note: The table reports the volatility of i) the first PCA factor using the 2-year, 3-year, 5-year, 7-year and 10-year bond yield dissected for the Euro area and the US and for the different periods of observations; ii) the market returns of the (re)insurers included in the sample and iii) the market returns of the indices of the financial services deducted by the (re)insurers. Additionally the P-value for the one sided F-test of difference in variances is reported, namely H_0: σ_(event)>σ_(no-event).

Expansionary monetary policy interventions that generate an immediate reduction of interest rates, tested via equation 5, seem to be positively received by the markets especially during crises periods (the opposite for an increase of interest rates) i.e. period 2 and 3 in our analysis (ref. Figure 1). As a matter of fact sensitivity of stock returns to the monetary policy surprise interest rate change, when statistically significant, is always associated to negative signs (Detailed results are provided in Appendix C). These negative coefficients indicate that, when the monetary policy announcement generates a positive change in the interest rates, stock returns

decreases; when instead it generates a negative change in the interest rates (i.e. a reduction of the interest rates) stock returns increases. The negative coefficient is even larger for (re)insurance companies indicating that insurance stock returns reacts more to monetary policy announcements with respect to the rest of the market. Even in this case, when the announcement has an immediate positive effect on the interest rates (interest rates increases) stock returns are negative, when the announcement generates an immediate reduction of the interest rates stock returns are positive. However, Figure A1.1 also shows that, the effect of expansionary monetary policy intervention on stock returns tend to fade away in the fourth period. This could be due to the fact that markets are somehow "addicted", therefore having already included in the stock price all further enforcement of the monetary policy. On the other side, it could be interpreted as the fact that, in the fourth period, the positive impact of a reduction of interest rates on the asset side of the insurance balance sheet is largely offset by the negative impact on the liability side in a period of ultra-low interest rates. Unfortunately, with the current approach we cannot provide a clear-cut interpretation on that.

Figure A1.1: ECB coefficient over time – Full sample



Note: This figure graphically represents the coefficient of the monetary policy surprise explanatory variables as described in equation (5) and reported in Appendix A). Transparent bars represent non-significant coefficients (T-statistics > 10% level).

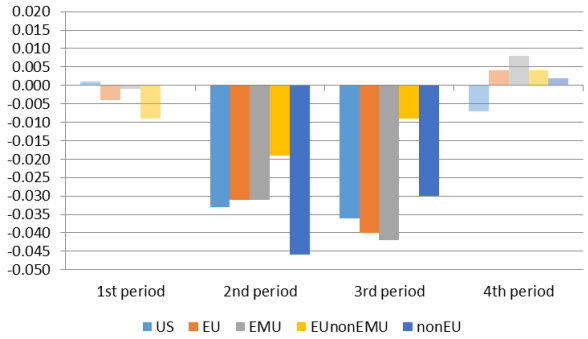
The results are confirmed when we analyse geographical subsamples based on macro-areas but with some distinctions. Beside the confirmation of the significance of the second and third period, the evidences show how the impact of ECB monetary policies on the EMU institutions is higher than the one on the other geographical subsamples. The relatively small difference in the coefficients can be explained by the cross-border nature of the business run by the institutions included in the analysis. Indeed we are investigating the impacts of monetary interventions on listed groups operating globally. Therefore, despite to some extent geographical criteria is respected (EMU and US subsamples for ECB and Fed interventions respectively), any action on specific

currency only partially affects the returns of those institutions. Interestingly, the sign of the coefficients observed in the fourth period turns to positive confirming the negative impact both on the (re)insurers and on the other companies of the sample. Even when the expansionary monetary interventions by ECB lead to a decrease in the interest rates observed in the announcement days, these movements are reflected by negative returns on the market. This finding is in line with the evidences obtained by the event study.

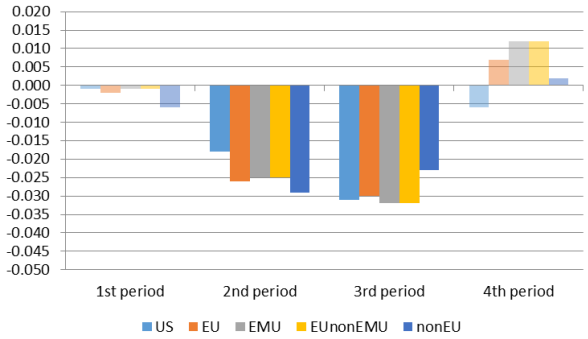
The actions taken by Fed and ECB do not produce the same effects on the markets. According to our evidences, the Fed interventions' impacts, despite the higher magnitude of the (positive) coefficients of the monetary policy surprise both on (re)insurers (1.830) and non-insurers (1.406), appear limited to the US market and focused on the first time-window. These considerations can be extended to both (re)insurers and other listed companies but with some distinctions (Figure A1.2).

Figure A1.2: ECB coefficient over time – Full sample

a) (re)insurers



b) other listed companies



Note: These figures graphically represent the coefficient of the monetary policy surprise explanatory variables as described in equation (5) and reported in Appendix A). Transparent bars represent non-significant coefficients (T-statistics > 10% level).

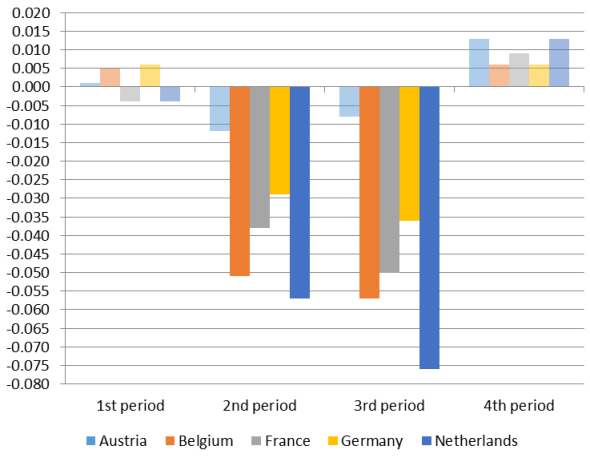
Despite ECB coefficients maintaining the same sign, (re)insurers are more affected by the monetary policy actions than other listed companies. According to our analysis, the expansionary monetary policy interventions, independently by the impact on the interest rates in the day of the announcement (positive in period 2 and 3, negative in 1 and 4), negatively affect the market return of (re)insurers. The long term structure of the liabilities and the asset-liability mismatch characterize the insurance industry, therefore the market does not welcome any intervention aimed at reducing the term structure of the risk free rate independently by the immediate effects they can have. Hence, all over the period of observation of our analysis, the negative effects that originate from the potentially harmful consequences of a long period of negative

interest rate on insurers (low profitability, contraction of the solvency margin, potential reinvestment risk) seem to prevail.

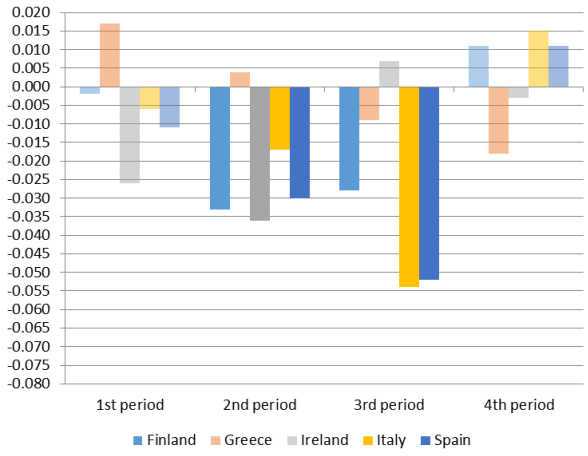
The local perspective confirms the general outcomes (Figure A1.3). The most significant results are provided by period number two and three. Belgium, Germany, Finland, show very close coefficients between the second and third period, around -0.03. Spain, Italy, France and Netherlands experience an increase in the magnitude of the coefficient from the second to the third period. This can be due to the less stable inner financial situation of these countries, which have likely benefit of many easing efforts from the ECB. Ireland shows impact only in the second period, while Greece shows no impact at all. This is coherent with the period of severe stress shown by the Greek market in several periods of the recent years, with more than one default and several doubts about Greece's Euro-reversibility. The comparison among industries does not report homogeneous indications. In fact, countries like Belgium, France, Italy, Germany and Spain show a lover impact on (re)insurers than on non-insurers and countries like Austria, Finland and Denmark behave oppositely. At this stage we are not able to provide a meaningful explanation to the different reactions.

Figure A1.3: ECB intervention monetary policy surprise: country based impact on (re)insurers

a) core euro area



b) peripheral euro area



Note: These figures graphically represent the coefficient of the monetary policy surprise explanatory variables as described in equation (5) and reported in Appendix A). Transparent bars represent non-significant coefficients (T-statistics > 10% level).

In the replication of the Pericoli and Veronese approach, our findings substantially depart form their results on the market returns, in particular when referring to the impacts on the stock market indexes of Germany, France, Italy, the US, and the UK. Specifically, Pericoli and Veronese obtain positive statistically significant coefficients

associated to the ECB monetary policy surprise in their first two periods of observation and negative non-significant coefficient in the third period. Even if the time-windows we defined do not perfectly match the ones used by Pericoli and Veronese we can by large state that our empirical evidences point in the opposite direction with negative significant coefficient in the central periods and positive coefficient in period 1 and 4.

Concluding about (re)insurances, we recognize that, by a global perspective, all companies in the Eurozone seem to move in the same direction of markets. Differences in magnitude of impacts are pretty thin. It is not easy to say to which extent these differences are due to actual consideration made on insurance fundamentals or simply to a more pronounced portfolio effect driven by the positive spillovers that QE and very accommodating financing conditions should have on financial companies such as banks and insurance companies. For the moment, the effects produced by the monetary policy intervention, independently by their immediate effect on the interest rates seems to negatively affect (re)insurers.

Conclusion and way forward

In this paper we investigate the impact of conventional and unconventional monetary policies on the insurance industry by looking at the impact of the actions taken by the ECB on the market returns of (re)insurers.

We investigate it via a twofold approach. At first we run an event study on the announcement date of the last ECB Quantitative Easing program. We scrutinize the cumulative abnormal return of a sample of 166 (re)insurers split into different subsamples according to size and geographical criteria comparing it with the behaviour of the other market participants. Subsequently, with the aim of understanding the impact of the general enforced monetary policy strategy and not of a single event, we enlarge the scope of our analysis by investigating the effects on the markets in general and on insurers in particular, of a series of announcements made by the ECB and the Fed. To do so we replicate the approach proposed by Rogers, Scotti, and Wright (2014) and Pericoli and Veronese (2016) analysing how and to what extent the Central Banks' announcements are signalled by the markets via changes in the term structure of the risk free rate.

The event study suggests a moderate negative effect of the QE on the insurance industry. The different specifications we tested show how the outcomes of the event study are strongly dependent to the observation periods. Furthermore, we do not obtain statistically significant results for the subsamples.

By applying the monetary policy surprise based model, we document i) how the effect of monetary policy interventions on interest rates in the announcement days changes over time and ii) the subsequent impact of the expansionary monetary policy interventions on the market in general and on the insurance industry in particular. For the two periods from 2008 till 2013 we find that when the monetary policy announcement generates an immediate reduction in the interest rates, the stock market returns increases and the effect on the insurance industry is even stronger and positive. One potential explanation of this result could be that the asset/liability structure of the insurance companies, serves as justification for the slight larger impact of the expansionary monetary policy actions on the (re)insurers. However, in the fourth period, when ECB started the QE program, the impact of monetary policy announcements on stock returns is not statistically significant.

The two applied models return consistent results. Nevertheless this work shows how a single intervention extrapolated from the comprehensive strategy should be utilized with caution to estimate the effect of the monetary policy intervention on the market.

We run our analysis without taking into account the characteristics of the (re)insurers, therefore we plan to complement this paper with additional researches aimed at understanding if and to what extent the fundamentals of an insurer, namely the composition of the assets and liability side, are significant determinants for the reaction to monetary policy. Additional effort shall be devoted to understand the behaviour of statistically non-significant companies: what are the rationales that detach these companies from the general reaction of the market to the monetary policy actions? Additionally, we do not provide a clear-cut explanation to the documented scarce effectiveness of the ECB intervention in the last period of observation: does it come from the negative interest rate environment or from the prolonged application of these interventions over time?

We believe that this work provides an initial valuable contribution to the literature on the analyses of the monetary policy enriching it with a specific focus on the insurance industry. Also, the evidence we provide can be of interest for policymakers offering them a wider perspective on the impacts that monetary policy actions have on a specific sector.

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Appendix A

ECB Monetary Policy Days (Detailed - from 08.2008 onwards)

Date	Event
2-Aug-07	GC meeting
09. Aug 07	Special fine tuning operations
22-Aug-07	Supplementary LTRO (announcement)
23-Aug-07	Supplementary LTRO (allotment)
6-Sep-07	GC meeting
4-Oct-07	GC meeting
8-Nov-07	GC meeting
6-Dec-07	GC meeting
10-Jan-08	GC meeting
7-Feb-08	GC meeting
6-Mar-08	GC meeting
28-Mar-08	introduce 6-m LTROs
10-Apr-08	GC meeting
8-May-08	GC meeting
5-Jun-08	GC meeting
3-Jul-08	GC meeting, MRO increased to 4.25%
7-Aug-08	GC meeting
4-Sep-08	GC meeting
8-Oct-08	GC meeting, MRO decreased to 3.75%, , Fixed-rate full allotment (FRFA) on MRO
6-Nov-08	GC meeting, MRO decreased to 3.25%
4-Dec-08	GC meeting, MRO decreased to 2.50%
15-Jan-09	GC meeting, MRO decreased to 2.00%
5-Feb-09	GC meeting
5-Mar-09	GC meeting, MRO decreased to 1.50%
2-Apr-09	GC meeting, MRO decreased to 1.25%
7-May-09	GC meeting, MRO decreased to 1.00%, 3year LTROs, CBPP
4-Jun-09	GC meeting, CBPP details announced
2-Jul-09	GC meeting
6-Aug-09	GC meeting
3-Sep-09	GC meeting
8-Oct-09	GC meeting
5-Nov-09	GC meeting
3-Dec-09	GC meeting, Phasing out of 6m LTROs, indexation of 1y LTROs
14-Jan-10	GC meeting
4-Feb-10	GC meeting
4-Mar-10	GC meeting, Phasing out of 3m LTROs, indexation of 6m LTROs
8-Apr-10	GC meeting
6-May-10	GC meeting
9-May-10	GC meeting, Securities Market Programme (SMP)
10-Jun-10	GC meeting
8-Jul-10	GC meeting
28-Jul-10	Collateral rules tightened, revised haircuts
5-Aug-10	GC meeting
2-Sep-10	GC meeting
7-Oct-10	GC meeting
4-Nov-10	GC meeting
2-Dec-10	GC meeting
13-Jan-11	GC meeting
3-Feb-11	GC meeting
3-Mar-11	GC meeting, FRFA extended to July 2011
7-Apr-11	GC meeting, MRO increased to 1.25%
5-May-11	GC meeting
9-Jun-11	GC meeting
7-Jul-11	GC meeting, MRO increased to 1.50%
4-Aug-11	GC meeting, SMP covers Spain and Italy
7-Aug-11	SMP on Italy and Spain acknowledged by ECB
8-Sep-11	GC meeting
6-Oct-11	GC meeting, CBPP2 launched
3-Nov-11	GC meeting, MRO decreased to 1.25%
8-Dec-11	GC meeting, Two 3-year LTROs, reserve ratio to 1%, MRO rate decreased to 1%
21-Dec-11	Results of first 3-year LTRO
12-Jan-12	GC meeting
9-Feb-12	GC meeting, ECB approved criteria for credit claims for 7 NCBs
28-Feb-12	Results of second 3-year LTRO
8-Mar-12	GC meeting
4-Apr-12	GC meeting
3-May-12	GC meeting
6-Jun-12	GC meeting
5-Jul-12	GC meeting, MRO rate decreased to 0.75%, deposit facility rate to 0
26-Jul-12	"Whatever it takes" London speech
2-Aug-12	GC meeting, OMT
6-Sep-12	GC meeting, OMT details
4-Oct-12	GC meeting
8-Nov-12	GC meeting
6-Dec-12	GC meeting
10-Jan-13	GC meeting
7-Feb-13	GC meeting
7-Mar-13	GC meeting
22-Mar-13	Collateral rule changes for some uncovered gov-guaranteed bank bonds
4-Apr-13	GC meeting
2-May-13	GC meeting, MRO rate decreased to 0.5%, FRFA extended to July 2014
6-Jun-13	GC meeting
4-Jul-13	GC meeting, forward guidance: 'expects the key ECB interest rates to remain at present or lower levels for an extended period of time'
1-Aug-13	GC meeting
5-Sep-13	GC meeting
2-Oct-13	GC meeting
7-Nov-13	GC meeting, MRO rate decreased to 0.25%
5-Dec-13	GC meeting
9-Jan-14	GC meeting
6-Feb-14	GC meeting
6-Mar-14	GC meeting
25-Mar-14	QE announcement Draghi (Science Po - Paris): A consistent strategy for a sustained recovery
3-Apr-14	GC meeting
24-Apr-14	QE announcement Draghi (NDL Conf - Amsterdam): Monetary policy communication in turbulent times
8-May-14	GC meeting
5-Jun-14	GC meeting, MRO rate decreased to 0.15%, announcement of TLTROs
3-Jul-14	GC meeting, details of TLTROs
7-Aug-14	GC meeting
4-Sep-14	GC meeting, MRO rate decreased to 0.05%, announcement of CCBP3 & ABSPP
2-Oct-14	GC meeting, details of ABSPP CBPP3
6-Nov-14	GC meeting
4-Dec-14	GC meeting, introduction of the QE-PSPP - Draghi: 'More stimulus is likely on the way, but the final decision won't be taken until early next year'
22-Jan-15	GC meeting, announcement of PSPP
9-Mar-15	start of the PSPP purchases
5-Mar-15	GC meeting
15-Apr-15	GC meeting
3-Jun-15	GC meeting
16-Jul-15	GC meeting
3-Sep-15	GC meeting, possible extension of QE program (Draghi)
22-Oct-15	GC meeting
03-Nov-15	Draghi: willing and able to act by using all instruments within its mandate

ECB Monetary Policy Days (Synntetic - from 01.1999 to 07.2007)

Date	Event
14-Jan-99	GC meeting
04-Feb-99	GC meeting
04-Mar-99	GC meeting
08-Apr-99	GC meeting
06-May-99	GC meeting
02-Jun-99	GC meeting
01-Jul-99	GC meeting
29-Jul-99	GC meeting
09-Sep-99	GC meeting
07-Oct-99	GC meeting
04-Nov-99	GC meeting
02-Dec-99	GC meeting
05-Jan-00	GC meeting
03-Feb-00	GC meeting
02-Mar-00	GC meeting
30-Mar-00	GC meeting
05-May-00	GC meeting
08-Jun-00	GC meeting
06-Jul-00	GC meeting
03-Aug-00	GC meeting
31-Aug-00	GC meeting
05-Oct-00	GC meeting
02-Nov-00	GC meeting
30-Nov-00	GC meeting
04-Jan-01	GC meeting
01-Feb-01	GC meeting
01-Mar-01	GC meeting
11-Apr-01	GC meeting
10-May-01	GC meeting
07-Jun-01	GC meeting
05-Jul-01	GC meeting
02-Aug-01	GC meeting
30-Aug-01	GC meeting
11-Oct-01	GC meeting
08-Nov-01	GC meeting
06-Dec-01	GC meeting
03-Jan-02	GC meeting
07-Feb-02	GC meeting
07-Mar-02	GC meeting
04-Apr-02	GC meeting
02-May-02	GC meeting
06-Jun-02	GC meeting
04-Jul-02	GC meeting
01-Aug-02	GC meeting
12-Sep-02	GC meeting
10-Oct-02	GC meeting
07-Nov-02	GC meeting
05-Dec-02	GC meeting
09-Jan-03	GC meeting
06-Feb-03	GC meeting
06-Mar-03	GC meeting
03-Apr-03	GC meeting
08-May-03	GC meeting
05-Jun-03	GC meeting
10-Jul-03	GC meeting
31-Jul-03	GC meeting
04-Sep-03	GC meeting
02-Oct-03	GC meeting
06-Nov-03	GC meeting
04-Dec-03	GC meeting
08-Jan-04	GC meeting
05-Feb-04	GC meeting
04-Mar-04	GC meeting
01-Apr-04	GC meeting
06-May-04	GC meeting
03-Jun-04	GC meeting
01-Jul-04	GC meeting
05-Aug-04	GC meeting
02-Sep-04	GC meeting
07-Oct-04	GC meeting
04-Nov-04	GC meeting
02-Dec-04	GC meeting
13-Jan-05	GC meeting
03-Feb-05	GC meeting
03-Mar-05	GC meeting
07-Apr-05	GC meeting
05-May-05	GC meeting
02-Jun-05	GC meeting
07-Jul-05	GC meeting
04-Aug-05	GC meeting
01-Sep-05	GC meeting
06-Oct-05	GC meeting
03-Nov-05	GC meeting
01-Dec-05	GC meeting
12-Jan-06	GC meeting
02-Feb-06	GC meeting
02-Mar-06	GC meeting
06-Apr-06	GC meeting
04-May-06	GC meeting
08-Jun-06	GC meeting
06-Jul-06	GC meeting
03-Aug-06	GC meeting
31-Aug-06	GC meeting
05-Oct-06	GC meeting
02-Nov-06	GC meeting
07-Dec-06	GC meeting
11-Jan-07	GC meeting
08-Feb-07	GC meeting
08-Mar-07	GC meeting
12-Apr-07	GC meeting
10-May-07	GC meeting
06-Jun-07	GC meeting
05-Jul-07	GC meeting

Fed Monetary Policy Days (Detailed - from 10.2008 onwards)

Date	Event	Date	Event
8-Oct-08	Joint Statement by Central Banks, FOMC decrease fed funds rate by 0.5% pp to 1.50%	25-Apr-12	FOMC meeting
29-Oct-08	FOMC meeting	20-Jun-12	FOMC meeting
25-Nov-08	Fed announces results of auction of $150 billion in 13-day credit	1-Aug-12	FOMC meeting
1-Dec-08	Federal Reserve announces results of auction of $150 billion in 84-day credit	31-Aug-12	Ben Bernanke Jackson Hole speech
16-Dec-08	FOMC meeting	13-Sep-12	FOMC meeting
28-Jan-09	FOMC meeting	24-Oct-12	FOMC meeting
18-Mar-09	FOMC meeting	12-Dec-12	FOMC meeting
29-Apr-09	FOMC meeting	30-Jan-13	FOMC meeting
24-Jun-09	FOMC meeting	20-Mar-13	FOMC meeting - Bernanke warns of 'premature tightening' in monetary policy (taper tantrum)
12-Aug-09	FOMC meeting	1-May-13	FOMC meeting
23-Sep-09	FOMC meeting	22-May-13	Bernanke warns of 'premature tightening' in monetary policy (taper tantrum)
4-Nov-09	FOMC meeting	19-Jun-13	FOMC meeting - Bernanke warns of taper tantrum again
16-Dec-09	FOMC meeting	31-Jul-13	FOMC meeting
27-Jan-10	FOMC meeting	18-Sep-13	FOMC meeting
16-Mar-10	FOMC meeting	16-Oct-13	unscheduled FOMC meeting
28-Apr-10	FOMC meeting	30-Oct-13	FOMC meeting
9-May-10	unscheduled FOMC meeting	18-Dec-13	FOMC meeting
23-Jun-10	FOMC meeting	29-Jan-14	FOMC meeting
10-Aug-10	FOMC meeting	4-Mar-14	unscheduled FOMC meeting
27-Aug-10	Ben Bernanke Jackson Hole speech	19-Mar-14	FOMC meeting
21-Sep-10	FOMC meeting	30-Apr-14	FOMC meeting
15-Oct-10	unscheduled FOMC meeting	18-Jun-14	FOMC meeting
3-Nov-10	FOMC meeting	15-Jul-14	Semiannual Monetary Policy Report to the Congress
14-Dec-10	FOMC meeting	30-Jul-14	FOMC meeting
26-Jan-11	FOMC meeting	22-Aug-14	Janet Yellen Jackson Hole speech
15-Mar-11	FOMC meeting	17-Sep-14	FOMC meeting
27-Apr-11	FOMC meeting	29-Oct-14	FOMC meeting
22-Jun-11	FOMC meeting	17-Dec-14	FOMC meeting
1-Aug-11	unscheduled FOMC meeting	28-Jan-15	FOMC meeting
9-Aug-11	FOMC meeting	24-Feb-15	Semiannual Monetary Policy Report to the Congress
26-Aug-11	Ben Bernanke Jackson Hole speech	18-Mar-15	FOMC meeting
21-Sep-11	FOMC meeting	29-Apr-15	FOMC meeting
2-Nov-11	FOMC meeting	17-Jun-15	FOMC meeting
28-Nov-11	unscheduled FOMC meeting	29-Jul-15	FOMC meeting
13-Dec-11	FOMC meeting	17-Sep-15	FOMC meeting
25-Jan-12	FOMC meeting	28-Oct-15	FOMC meeting
13-Mar-12	FOMC meeting	16-Dec-15	FOMC meeting

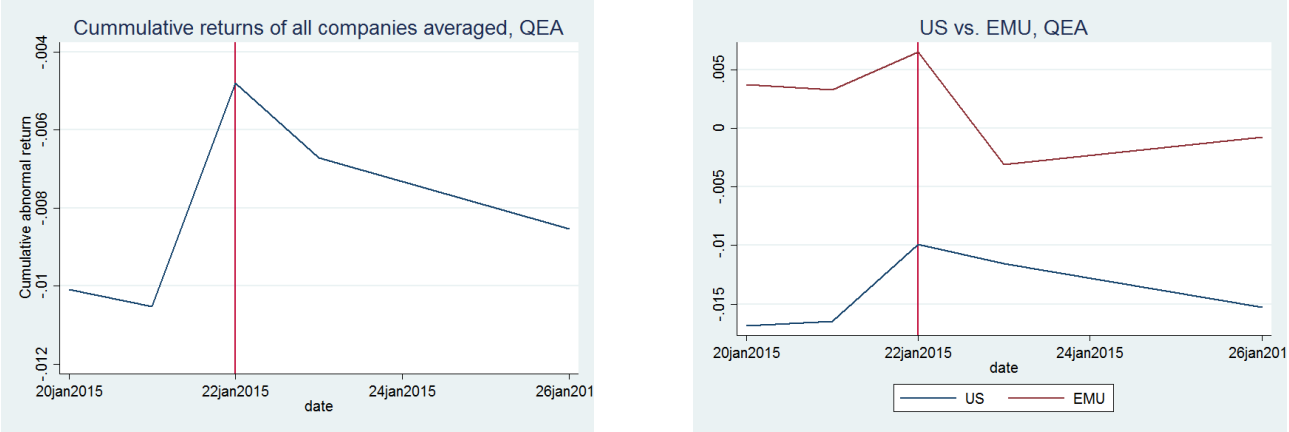
Fed Monetary Policy Days (Synntetic - from 05.1999 to 10.2008)

Date	Event	Date	Event
30-Mar-99	FOMC meeting	28-Jan-04	FOMC meeting
18-May-99	FOMC meeting	11-Feb-04	FOMC meeting
30-Jun-99	FOMC meeting	16-Mar-04	FOMC meeting
22-Jul-99	FOMC meeting	04-May-04	FOMC meeting
24-Aug-99	FOMC meeting	30-Jun-04	FOMC meeting
05-Oct-99	FOMC meeting	20-Jul-04	FOMC meeting
16-Nov-99	FOMC meeting	10-Aug-04	FOMC meeting
21-Dec-99	FOMC meeting	21-Sep-04	FOMC meeting
02-Feb-00	FOMC meeting	10-Nov-04	FOMC meeting
17-Feb-00	FOMC meeting	14-Dec-04	FOMC meeting
21-Mar-00	FOMC meeting	02-Feb-05	FOMC meeting
16-May-00	FOMC meeting	16-Feb-05	FOMC meeting
28-Jun-00	FOMC meeting	22-Mar-05	FOMC meeting
20-Jul-00	FOMC meeting	03-May-05	FOMC meeting
22-Aug-00	FOMC meeting	30-Jun-05	FOMC meeting
03-Oct-00	FOMC meeting	20-Jul-05	FOMC meeting
15-Nov-00	FOMC meeting	09-Aug-05	FOMC meeting
19-Dec-00	FOMC meeting	20-Sep-05	FOMC meeting
03-Jan-01	FOMC meeting	01-Nov-05	FOMC meeting
31-Jan-01	FOMC meeting	13-Dec-05	FOMC meeting
13-Feb-01	FOMC meeting	31-Jan-06	FOMC meeting
20-Mar-01	FOMC meeting	15-Feb-06	FOMC meeting
11-Apr-01	FOMC meeting	28-Mar-06	FOMC meeting
18-Apr-01	FOMC meeting	10-May-06	FOMC meeting
15-May-01	FOMC meeting	29-Jun-06	FOMC meeting
27-Jun-01	FOMC meeting	19-Jul-06	FOMC meeting
18-Jul-01	FOMC meeting	08-Aug-06	FOMC meeting
21-Aug-01	FOMC meeting	20-Sep-06	FOMC meeting
13-Sep-01	FOMC meeting	25-Oct-06	FOMC meeting
17-Sep-01	FOMC meeting	12-Dec-06	FOMC meeting
02-Oct-01	FOMC meeting	31-Jan-07	FOMC meeting
06-Nov-01	FOMC meeting	14-Feb-07	FOMC meeting
11-Dec-01	FOMC meeting	21-Mar-07	FOMC meeting
30-Jan-02	FOMC meeting	09-May-07	FOMC meeting
27-Feb-02	FOMC meeting	28-Jun-07	FOMC meeting
19-Mar-02	FOMC meeting	18-Jul-07	FOMC meeting
07-May-02	FOMC meeting	07-Aug-07	FOMC meeting
26-Jun-02	FOMC meeting	10-Aug-07	FOMC meeting
16-Jul-02	FOMC meeting	16-Aug-07	FOMC meeting
13-Aug-02	FOMC meeting	18-Sep-07	FOMC meeting
24-Sep-02	FOMC meeting	31-Oct-07	FOMC meeting
06-Nov-02	FOMC meeting	06-Dec-07	FOMC meeting
10-Dec-02	FOMC meeting	11-Dec-07	FOMC meeting
29-Jan-03	FOMC meeting	09-Jan-08	FOMC meeting
11-Feb-03	FOMC meeting	21-Jan-08	FOMC meeting
18-Mar-03	FOMC meeting	30-Jan-08	FOMC meeting
25-Mar-03	FOMC meeting	27-Feb-08	FOMC meeting
01-Apr-03	FOMC meeting	10-Mar-08	FOMC meeting
08-Apr-03	FOMC meeting	18-Mar-08	FOMC meeting
16-Apr-03	FOMC meeting	30-Apr-08	FOMC meeting
06-May-03	FOMC meeting	25-Jun-08	FOMC meeting
25-Jun-03	FOMC meeting	15-Jul-08	FOMC meeting
15-Jul-03	FOMC meeting	24-Jul-08	FOMC meeting
12-Aug-03	FOMC meeting	05-Aug-08	FOMC meeting
15-Sep-03	FOMC meeting	16-Sep-08	FOMC meeting
16-Sep-03	FOMC meeting	29-Sep-08	FOMC meeting
28-Oct-03	FOMC meeting	07-Oct-08	FOMC meeting
09-Dec-03	FOMC meeting		

Appendix B

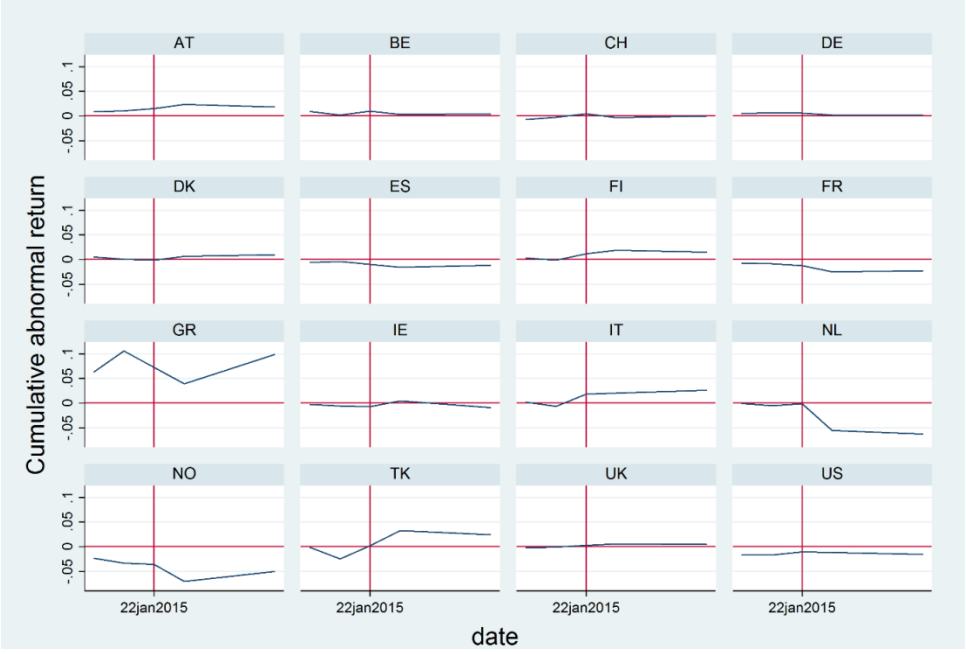
Figure A1.4: The impact of the announcement of Quantitative Easing on the insurance sector

(a) *(b)*



Note: The averaged cumulative abnormal return is plotted against time. The red vertical on 22/01/2015 indicates the event, i.e. the announcement of Quantitative Easing by the European Central Bank. It was averaged for firms based in the US and in the European Monetary Union (EMU).

Figure A1.5: The impact of the announcement of Quantitative Easing on the insurance sector - EU Country level breakdown



Note: The cumulative abnormal return is plotted against time. It was averaged for each country. The red vertical on 22/01/2015 indicates the event, i.e. the announcement of Quantitative Easing by the European Central Bank.

Impact of monetary policy surprise

		1st period						2nd period						3rd period						4th period					
		FED	sig	R^2	ECB	sig	R^2	FED	sig	R^2	ECB	sig	R^2	FED	sig	R^2	ECB	sig	R^2	FED	sig	R^2	ECB	sig	R^2
ALL	Insurances	**0.012**	*	0.202	-0.001	-	0.141	0.007	-	0.130	**-0.032**	***	0.508	0.016	-	0.049	**-0.034**	***	0.535	0.003	-	0.086	-0.002	-	0.071
	No Insurances	0.010	-	0.118	-0.001	-	0.199	-0.001	-	0.204	**-0.022**	***	0.511	0.014	-	0.079	**-0.030**	***	0.518	0.005	-	0.131	-0.001	-	0.056
EU	Insurances	0.006	-	0.060	-0.004	-	0.167	-0.005	-	0.058	**-0.031**	**	0.380	0.009	-	0.011	**-0.040**	***	0.489	0.011	-	0.155	0.004	-	0.113
	No Insurances	0.005	-	0.053	-0.002	-	0.166	-0.002	-	0.115	**-0.026**	**	0.524	0.006	-	0.019	**-0.030**	***	0.488	0.004	-	0.117	0.007	-	0.142
EMU	Insurances	0.006	-	0.042	-0.001	-	0.153	-0.003	-	0.062	**-0.031**	**	0.384	0.011	-	0.014	**-0.042**	***	0.463	0.007	-	0.119	0.008	-	0.102
	No Insurances	0.008	-	0.056	-0.001	-	0.190	0.001	-	0.153	**-0.025**	**	0.476	0.008	-	0.022	**-0.032**	***	0.439	0.004	-	0.165	0.012	-	0.124
EUnonEMU	Insurances	0.006	-	0.079	-0.009	-	0.190	-0.004	-	0.116	**-0.019**	**	0.279	0.000	-	0.024	**-0.009**	*	0.076	0.005	-	0.125	0.004	-	0.041
	No Insurances	0.008	-	0.056	-0.001	-	0.190	0.001	-	0.153	**-0.025**	**	0.476	0.008	-	0.022	**-0.032**	***	0.439	0.004	-	0.165	0.012	-	0.124
US	Insurances	**1.830**	**	0.260	0.001	-	0.069	1.574	-	0.144	**-0.033**	***	0.499	3.049	-	0.095	**-0.036**	***	0.521	-0.219	-	0.077	-0.007	-	0.052
	No Insurances	**1.406**	**	0.168	-0.001	-	0.091	-0.100	-	0.191	**-0.018**	***	0.386	2.001	-	0.099	**-0.031**	***	0.514	0.730	-	0.141	-0.006	-	0.046
Austria	Insurances	0.317	-	0.094	0.001	-	0.147	0.704	-	0.290	-0.012	-	0.247	2.458	-	0.113	-0.008	-	0.038	-0.087	-	0.310	0.013	-	0.041
	No Insurances	0.531	-	0.033	-0.002	-	0.166	0.871	-	0.141	**-0.036**	**	0.370	1.658	*	0.066	**-0.028**	***	0.269	-0.927	-	0.150	0.010	-	0.171
Belgium	Insurances	0.372	-	0.045	0.005	-	0.075	-2.468	-	0.128	**-0.051**	**	0.344	3.712	*	0.146	**-0.057**	***	0.323	1.969	-	0.055	0.006	-	0.106
	No Insurances	**0.842**	*	0.132	-0.011	-	0.096	0.301	-	0.118	**-0.025**	***	0.312	-0.117	-	0.022	**-0.022**	***	0.295	0.179	-	0.137	0.004	-	0.008
Denmark	Insurances	0.607	-	0.030	-0.011	-	0.196	-0.247	-	0.106	**-0.019**	**	0.260	-0.236	-	0.015	-0.009	-	0.058	0.574	-	0.153	0.003	-	0.050
	No Insurances	**1.494**	**	0.162	-0.003	-	0.112	-0.311	-	0.095	**-0.028**	***	0.498	1.175	*	0.118	**-0.016**	***	0.210	0.115	-	0.115	0.009	-	0.340
Finland	Insurances	0.927	-	0.043	-0.002	-	0.170	-0.338	-	0.120	**-0.033**	**	0.283	1.057	-	0.035	**-0.028**	***	0.268	0.610	-	0.023	0.011	-	0.143
	No Insurances	1.347	-	0.091	-0.004	-	0.126	0.248	-	0.123	-0.030	-	0.275	1.043	-	0.095	**-0.034**	***	0.396	1.178	-	0.169	0.005	-	0.074
France	Insurances	0.700	-	0.060	-0.004	-	0.115	-0.239	-	0.069	**-0.038**	*	0.418	0.789	-	0.015	**-0.050**	***	0.417	0.861	-	0.154	0.009	-	0.048
	No Insurances	0.055	-	0.036	0.000	-	0.113	0.189	-	0.062	**-0.023**	**	0.479	0.492	-	0.010	**-0.034**	***	0.429	0.205	-	0.086	0.006	-	0.047
Germany	Insurances	0.220	-	0.021	0.006	-	0.189	-0.131	-	0.038	**-0.029**	**	0.259	1.795	-	0.045	**-0.036**	***	0.406	0.190	-	0.081	0.006	-	0.111
	No Insurances	0.205	-	0.002	0.002	-	0.172	-0.365	-	0.442	**-0.021**	*	0.336	1.159	-	0.025	**-0.028**	***	0.353	-0.175	-	0.122	0.009	-	0.102
Greece	Insurances	0.166	-	0.137	0.017	-	0.109	-0.398	-	0.254	0.004	-	0.177	-3.752	-	0.061	-0.009	-	0.034	**4.231**	*	0.213	-0.018	-	0.129
	No Insurances	**1.770**	***	0.152	0.007	-	0.081	-0.386	-	0.074	-0.016	-	0.225	0.622	-	0.135	**-0.019**	***	0.084	-4.213	-	0.262	-0.008	-	0.084
Ireland	Insurances	-0.236	-	0.029	-0.026	-	0.104	**-3.083**	*	0.182	**-0.036**	***	0.305	-0.621	-	0.022	0.007	-	0.023	-1.928	-	0.164	-0.003	-	0.066
	No Insurances	0.965	-	0.132	-0.006	-	0.112	-1.763	-	0.160	**-0.032**	***	0.440	2.009	**	0.111	**-0.015**	***	0.137	0.891	-	0.263	0.008	-	0.052
Italy	Insurances	0.791	-	0.043	-0.006	-	0.123	-0.412	-	0.039	**-0.017**	*	0.355	0.529	-	0.017	**-0.054**	***	0.407	1.083	-	0.123	0.015	-	0.119
	No Insurances	0.637	-	0.054	0.003	-	0.184	0.614	-	0.051	**-0.027**	**	0.516	0.344	-	0.025	**-0.046**	***	0.497	0.476	-	0.112	0.020	-	0.186
Netherlands	Insurances	**2.115**	**	0.171	-0.004	-	0.115	0.379	-	0.169	**-0.057**	**	0.291	3.138	-	0.064	**-0.076**	***	0.411	1.657	-	0.191	0.013	-	0.173
	No Insurances	0.712	-	0.101	0.000	-	0.165	0.017	-	0.092	**-0.034**	***	0.605	0.050	-	0.014	**-0.023**	***	0.389	-0.037	-	0.054	0.005	-	0.086
Norway	Insurances	-0.462	-	0.051	0.001	-	0.166	1.217	-	0.399	**-0.039**	***	0.354	1.587	-	0.019	**-0.047**	***	0.388	0.314	-	0.121	-0.032	-	0.315
	No Insurances	-0.016	-	0.047	-0.001	-	0.150	-0.166	-	0.183	**-0.036**	**	0.443	0.812	-	0.039	**-0.026**	***	0.341	0.117	-	0.002	0.009	-	0.165
Spain	Insurances	0.251	-	0.013	-0.011	-	0.052	1.573	-	0.113	**-0.030**	**	0.398	0.042	-	0.003	**-0.052**	***	0.336	0.591	-	0.047	0.011	-	0.225
	No Insurances	0.833	-	0.112	-0.006	-	0.116	-0.003	-	0.057	**-0.023**	*	0.426	0.576	-	0.038	**-0.045**	***	0.397	0.535	-	0.156	0.010	-	0.089
Switzerland	Insurances	**1.697**	*	0.109	-0.001	-	0.108	1.068	-	0.121	**-0.043**	***	0.412	0.415	-	0.015	**-0.044**	***	0.492	0.558	-	0.129	-0.002	-	0.159
	No Insurances	-0.633	-	0.043	-0.004	-	0.158	0.114	-	0.127	**-0.024**	***	0.539	-0.658	-	0.029	**-0.021**	***	0.388	-0.243	-	0.113	0.000	-	0.053
Turkey	Insurances	0.393	-	0.017	-0.006	-	0.202	1.134	-	0.139	**-0.026**	**	0.312	1.471	-	0.046	**-0.016**	**	0.125	0.022	-	0.064	0.011	-	0.146
	No Insurances	0.272	-	0.079	-0.012	-	0.160	0.243	-	0.172	**-0.029**	***	0.273	1.825	-	0.089	**-0.023**	***	0.219	-1.430	-	0.115	0.000	-	0.015
UK	Insurances	0.190	-	0.092	-0.014	-	0.164	-1.298	-	0.059	**-0.038**	**	0.235	0.127	-	0.001	**-0.040**	***	0.437	1.951	-	0.183	-0.004	-	0.144
	No Insurances	-0.139	-	0.039	-0.002	-	0.147	-0.327	-	0.080	**-0.025**	**	0.540	0.176	-	0.010	**-0.030**	***	0.543	0.455	-	0.026	0.000	-	0.170

*The table reports the coefficients of equation 5. Significance of the parameter expressed via T-statistics *=10% level, **=5%level, ***2.5%level.*