Sovereign bond market spillovers from crisis-time developments in Greece

This paper demonstrates that events in Greece worsened euro area countries' tail risks during the sovereign debt crisis.

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Keywords: Crisis; Events; Narrative; Sovereign bonds; Spillovers; Tail risks

JEL codes: C22; G01; G15; F36

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1 Introduction

The systemic importance of a country is a crucial component in the assessment of requests for official-sector financial assistance in the euro area. The European Stability Mechanism (ESM), the institution responsible for providing financial assistance to euro area countries experiencing or threatened by severe financing problems, may only act when necessary to safeguard the financial stability of the euro area as a whole and of ESM members. However, uncovering evidence of the effect of developments in one country on others is difficult in practice. This is especially the case in real time.

We evaluate the systemic importance of Greece in the run up to their three financial assistance programmes using empirical methods that are easily updatable in real time.[1] We find that changes in Greek sovereign bond market *tail risks* resulted in immediate and significant cross-market spillovers to other euro area sovereign bond returns. Our sample includes three of the four other euro area countries that sought official-sector financial assistance during the sovereign debt crisis (Ireland, Portugal, Spain), as well as the bloc's safest (Germany) and most liquid (Italy) sovereign bond markets. We believe it is therefore quite representative of what constitutes a "systemic" effect of Greece. Although Greece had somewhat decoupled by the time of the third financial assistance programme, tail-risk spillovers from Greece to the other sovereign bond markets were present in the lead up to each of the three Greek financial assistance programmes.

Our focus on tail risks more accurately represents periods of market stress, when the pricing of risk can deviate from (country-specific) economic fundamentals and the amplifying effects of spillovers are more likely to play a larger role. We represent variation in tail risks through the movements in conditional quantiles of the estimated 1% Value at Risk (VaR), derived using the VAR-for-VaR approach (White et al., 2015). The VaR is a standard metric used to measure investors' exposure to time-varying extreme tail-risks, with a more negative VaR representing larger expected losses. We demonstrate the dynamic response of euro area sovereign bond return VaRs to shocks from Greece, identified using the cross-effect restrictions proposed by Chavleishvili and Manganelli (2017). We assess expected bond returns other euro area

[1] There are many possible definitions of what constitutes a "systemic" effect. We consider the presence of statistically significant spillovers to a group of countries, representing a sufficiently large portion of the euro area, as indicative of a systemic effect from Greece. Our sample of countries represents roughly 60% of aggregate euro area GDP. We focus on Greece, as it is the country most synonymous with the European sovereign debt crisis, with three financial assistance programmes spread over eight years.

sovereigns, conditional on a tail event in the Greek market, by estimating the Marginal Expected Shortfall, or MES (Brownlees and Engle, 2017). This is an oft-used indicator of the exposure of a financial institution to systemic risk (Acharya et al., 2017).

Being able to assess in real time whether distress in a given sovereign bond market is spreading to others is crucial. Policy makers require an analytical base to establish whether, and what type of, official sector intervention could isolate problems that have the potential to threaten euro area financial stability if unaddressed. The advantage of the VAR-for-VaR and MES is that they are *ex-ante* measures of outcomes under extreme market circumstances. We demonstrate that real-time estimates of spillovers from Greece show that country's increasing systemic importance in the lead up to each of its three financial assistance programmes.

We complement our tail-risk analyses by linking them to a newly developed intra-day event database for Greece. We establish the precise time of news arrival to demonstrate a causal effect from market-relevant Greek events on German, Irish, Italian, Spanish and Portuguese sovereign bond return VaR in the run-up to the three Greek financial assistance programmes. We confirm this causal effect using sovereign bond spreads (relative to Germany) instead of the estimated 1% VaR. This has the advantage of avoiding econometric issues related to the use of a generated dependant variable (Feenstra and Hanson, 1999). It also enhances the communicability of our results by providing a more intuitive quantification of the size of spillovers. We find that negative Greek events caused statistically significant increases in sovereign bond spreads, averaging around five basis points (bps) across all three Greek financial assistance programmes. Spillovers related to positive Greek events were smaller, and were only statistically significant in the periods prior to the first and third programmes. This is likely because the escalation of country-specific concerns dampened the positive effect on spreads from good news coming from Greece in the run up to the second financial assistance programme. Our narrative results are robust to the inclusion of a battery of variables that attempt to capture global (US 10-year sovereign bond yields and the euro-dollar exchange rate), euro area aggregate (the euro area monetary policy event database produced by Altavilla et al. (2019)) and country-specific events in the recipient countries (constructed using the same process as the Greek events).

We structure our paper as follows. We next discuss the related literature before describing the empirical methodologies and datasets used for our examination of Greek spillovers in Section 3. We provide the results of our analysis in Section 4 before we conclude in Section 5.

2 Literature review

Our paper relates more generally to the literature on cross-market spillovers, and more specifically to those studies focusing on the European sovereign debt crisis.[2] In times of distress, policymakers might find it desirable to reduce or even completely eliminate the transmissions of shocks across sovereign debt markets by ring-fencing a distressed country (Ehrmann and Fratzscher, 2017). However, to facilitate such a policy action, it is of utmost importance to identify which countries are the source of disturbances.[3] Identification of spillovers is challenging, with a large variety of empirical techniques employed in the literature. This diffuse range of techniques may be a factor in the wide range of estimates for spillovers in euro area sovereign bond markets.

Studies that find evidence in support of the existence of spillovers amongst euro area sovereign bond markets largely pinpoint countries in the periphery as the sources, in particular Greece, Ireland and Portugal (Afonso et al., 2012; Fernandez-Rodriguez et al., 2015). Silvapulle et al. (2016) supports this finding for contagion. Contagion tends to increase during moments of uncertainty regarding financial assistance packages (Mink and De Haan, 2013; Claeys and Vašíček, 2014) and it is generally smaller from the euro area periphery to the core than amongst the periphery countries themselves (Kalbaska and Gatkowski, 2012; Metiu, 2012; Philippas and Siriopoulos, 2013). Similarly, Antonakakis and Vergos (e.g. 2013); Galariotis et al. (e.g. 2016) provide evidence of larger spillovers among periphery countries. Lucas et al. (2014), for example, demonstrate that credit market participants perceived Ireland and Portugal as more affected by a possible Greek credit event than other euro area countries. However, some studies argue that crisis-time increases in cross-country correlations are not due to more contagion but instead can be attributed to larger shocks and heteroskedasticity in the data (Pragidis et al., 2015; Caporin et al., 2018) or to the failure to appropriately control for own-country changes (Aizenman et al.,

[2]This literature uses both the terms *spillovers* and *contagion*. Spillovers are more broad and are generally defined as situations whereby an extraordinary development in a specific market is transmitted to one or several other markets (De Santis, 2014). In contrast, the most widely used definitions of contagion are more restrictive. It may be thought of as the transmission of shocks across countries or markets (Allen and Gale, 2000); a significant and positive change in the transmission mechanism (Forbes and Rigobon, 2002); a strengthening in the transmission of shocks (Bekaert et al., 2005, 2014) or a purely foreign financial shock that affects domestic sovereign bond yields without changing the investors' perceptions of the fundamentals (Corsetti et al., 2005). We use the term spillovers as the aim of our paper is to assess whether developments in Greece had an effect on other euro area countries, and not whether any such effects were excessive (relative to macroeconomic fundamentals).

[3]In line with the empirical evidence (Ang and Longstaff, 2013), our analysis focuses on financial markets rather than macroeconomic fundamentals as the source of spillovers in systemic sovereign risk. Many studies highlight banking system interconnectedness as a primary reason (and transmission channel) for cross-market spillovers (Alter and Beyer, 2014; Betz et al., 2016; Kallestrup et al., 2016).

2013). These diverse findings of the literature highlight that even more than a decade after the onset of the European sovereign debt crisis, there is no consensus on the effect of developments in a given euro area country on others.[4]

Our empirical strategy combines several approaches common in the literature. Suh (2015) proposes variants of the value-at-risk and expected shortfall measures we employ to look specifically at contagion during the European sovereign debt crisis. Clancy et al. (2019) assess tail-risk and liquidity interdependencies in the German, Italian and Spanish sovereign bond markets using VAR-for-VaRs, quantile impulse response functions (QIRFs) and MES. Foglia and Angelini (2020) analyse tail-risk spillovers between euro area sovereigns and banks using VAR-for-VaRs and QIRFs. Our emphasis on the real-time usefulness of our methodologies relates to Weller (2019), who developed a novel tail-risk measure that serves as a real-time barometer of (U.S. stock) market risks. Perea et al. (2019) use a VAR-for-VaR and MES to provide indications of the magnitude of spillovers between different tranches of sovereign bond-backed securities (Brunnermeier et al., 2016, 2017) in their exposure to tail risks. We follow Beetsma et al. (2013), Mink and De Haan (2013), De Santis (2014) in using the narrative approach to examine the effect of developments in euro area countries on each other, with key differences being our use of intra-day data and the empirical technique proposed by Altavilla et al. (2019). These studies all find evidence of cross-market effects stemming from Greece during the sovereign debt crisis. Bahaj (2020) reaches a similar conclusion using an intra-day event series to identify shocks.

Our paper contributes to the literature in three ways. First, we examine spillovers from Greece in the run-up to all three of its financial assistance programmes, spanning the entirety of the European sovereign debt crisis rather than only investigating earlier or peak periods of the crisis. Second, we demonstrate the real-time information our measures would have delivered to policymakers during the crisis, rather than a purely ex-post assessment of spillovers. Finally, we combine two distinct empirical approaches and demonstrate their complementarities in assessing cross-market spillovers.

[4] Briciu et al. (2020) find that country-specific factors are more important, and therefore spillover risks are smaller, in the post-crisis years (2015-2019).

3 Empirical strategy

3.1 Data

We collect intra-day (5-minute intervals) data on German, Irish, Italian, Portuguese and Spanish 10-year sovereign bond prices and yields from Refinitiv.[5] We compute continuously compounded log returns, defined as 100 times the difference of the log of the mid prices in each five-minute interval, for each sovereign bond series.[6] Our sample includes three of the other four countries that received official-sector financial assistance, as well as the euro area's safest and most liquid sovereign bond markets. We believe that this sample is sufficient to demonstrate the systemic importance of Greece via their spillovers to these sovereign bond markets.

Our use of high-frequency data mitigates some of the endogeneity concerns that arise using lower frequency data (Ghysels et al., 2017) and allows us to provide a causal interpretation of how events in Greece affect the sovereign bond markets of other euro area economies. Using intra-day data is particularly important when examining tail risks. Clancy et al. (2019) find that using daily averages obscures sudden extreme events and can produce misleading results.

We focus on the periods *prior* to the provision of all three Greek financial assistance programmes. Our sample allows us to assess whether Greece was systemically important when it received financial assistance. It also facilitates an examination of how spillovers from Greece evolved as the European sovereign debt crisis progressed. We remove weekends and public holidays where no trading took place. We also omit the first (08:00-08:30) and last (16:30-17:00) half hours of trading. After these adjustments, we retain 32,786 observations for the period prior to the first programme (January 2009 to May 2010), 43,262 observations for the period prior to the second programme (June 2010 to February 2012) and 17,952 observations for the period prior to the third programme (December 2014 to August 2015).

[5] Refinitiv, like Bloomberg, provides composite price and yield information from many different sources. We use the last tick in each five-minute interval as the selected value. To ensure consistency, we adjust our dataset to Greenwich Mean Time. This is important for comparability with our intra-day narrative Greek news dataset (see Section 3.4).

[6] This transformation ensures the stationarity of our data, an important precondition for VAR-for-VaR.

3.2 VAR-for-VaR

We first assess Greece's systemic importance in the periods prior to their financial assistance programmes by estimating the effect on other euro area sovereign bond markets' tail risks due to developments in Greece. We calculate these cross-market interdependencies by estimating the (time-varying) quantiles of sovereign bond returns through a VAR-for-VaR (White et al., 2015). This approach, which interprets the VaR as the quantile of future portfolio (or individual asset) returns conditional on current information, delivers more accurate estimates of the VaR by directly modelling the quantile of interest rather than the entire distribution.[7] Estimates of the 1% VaR are derived from bivariate vector autoregressions that include own- and cross-market lagged quantiles and returns.[8, 9]

Each bivariate VAR-for-VaR includes shocks to the absolute value of own- and cross-market returns, allowing for an assessment of the dynamic response of the conditional VaR to these structural shocks. Identification is achieved via a Cholesky decomposition of the covariance matrix of returns, implying a causal ordering from one VaR to the other. However, the assumption that these shocks are uncorrelated with their own lags and each other is unlikely to hold. There is, for example, a higher probability of a run of large consecutive shocks than is typical for an uncorrelated case. Therefore, we follow Chavleishvili and Manganelli (2017)'s suggested modification to this identification approach and introduce restrictions on the cross effects included in the VAR-for-VaR specification:

$$VaR_{GR,t} = c_1 + a_{11}|y_{GR,t-1}| + b_1 VaR_{GR,t-1}, \tag{1}$$

$$VaR_{i,t} = c_2 + a_{21}|y_{GR,t-1}| + a_{22}|y_{i,t-1}| + b_2 VaR_{i,t-1}, \qquad i = \{DE, ES, IE, IT, PT\}$$

[7] GARCH-implied VaR estimates usually rely on normally-distributed returns. This assumption greatly constrains quantile estimates. Instead, the greater flexibility of semi-parametric quantile regressions are useful for the modelling of extreme conditional VaR (Chernozhukov and Umantsev, 2001) and also capture the clustering of volatility that occurs in many financial time series (Engle and Manganelli, 2004). Using an optimisation strategy based on Koenker and Bassett (1978), White et al. (2015) choose a quantile value and a categorisation of returns that produces the appropriate number of exceedances of the quantile by fitting a parameterised smoothed step function of predetermined variables.

[8] The autoregressive terms ensure that the quantile changes smoothly over time. Since the VaR is only affected by lags, the VAR-for-VaR framework does not permit an estimate of *contemporaneous* tail interdependence. Although the framework is capable of jointly modelling different quantile levels, we only consider a common quantile (e.g. 1%) for each distribution.

[9] Theoretically, we could model all countries together as the VAR-for-VaR allows for it. However, computationally it may not be possible. For this reason the literature sticks to bilateral pairings.

where $VaR_{GR,t}$ is the time-varying quantile (Value at Risk) of the returns of Greek sovereign bonds, $VaR_{i,t}$ is the VaR of the German, Irish, Italian, Portuguese or Spanish sovereign bond returns, while $|y_{GR,t}|$ and $|y_{i,t}|$ are absolute returns of, respectively, Greece and country i. Hence, the parameter on the Greek absolute return a_{21} in the equation for the conditional VaR of country i represents the cross effect, with all other (i.e. non-Greek) developments in the current time interval captured by a_{22}.[10]

Including only one cross effect reduces the number of highly correlated variables in the VAR and greatly tightens the standard errors of the pseudo impulse response functions with little loss in richness of the permitted dynamics.[11] Importantly, our model specification assumes that the quantile of Greek sovereign bond return contemporaneously affects the VaR of the other countries' sovereign bond returns, but not the other way around. Our use of high-frequency data in the VAR-for-VaR estimates and our analysis using the narrative approach supports the plausibility of this assumption (see Section 3.4 for details).

3.3 Marginal Expected Shortfall

We next assess Greece's systemic importance in the periods prior to their financial assistance programmes by estimating the expected return on other euro area sovereign bonds, conditional on a tail event in Greece (i.e. a change in Greek sovereign bond returns more negative than its 1% VaR). We evaluate this relation using the MES (Brownlees and Engle, 2017), an approach developed to examine the expected returns of individual financial institutions given a market-wide tail event but easily generalised to consider the expected shortfall in one asset based on the probability of a tail event in another (Perea et al., 2019). More precisely, the MES of country i's sovereign bond return is given by:

$$\begin{aligned} MES_{i,t} &= E_t\left(y_{i,t+1}|y_{GR,t+1} < C\right), \qquad (2) \\ &= \sigma_{i,t}\rho_{i,t}E_t\left(\varepsilon_{GR,t+1}|\varepsilon_{GR,t+1} < C/\sigma_{GR,t}\right) + \sigma_{i,t}\sqrt{1-\rho_{i,t}^2}E_t\left(\varepsilon_{i,t+1}|\varepsilon_{GR,t+1} < C/\sigma_{GR,t}\right), \end{aligned}$$

[10] The $|y_{GR,t}$ and $|y_{i,t}$ terms should capture any movements caused by common drivers of changes in sovereign bond returns, such as global or aggregate euro area events. In Section 4.3, we explicitly control for such common effects and demonstrate that Greek spillovers are robust to their inclusion.

[11] Because the data generating process is not fully specified in quantile regression models, White et al. (2015) use the term *pseudo* impulse response functions. They assume that a one-off intervention is given to the observable variable of interest (only at time t) rather than the error term, as occurs in standard impulse response analysis.

where $i = \{DE, ES, IE, IT, PT\}$, C is the constant empirical 1% VaR of standardised Greek sovereign bond returns $\varepsilon_{GR,t}$, $\varepsilon_{i,t}$ are the standardised sovereign bond returns of country i and $\sigma_{GR,t}$, $\sigma_{i,t}$ and $\rho_{i,t}$ denote Greek and country i's sovereign bond return volatility and correlation. We estimate these conditional volatilities and correlations using an asymmetric DCC-GJR-GARCH process (see, Glosten et al. (1993)).[12] Perea et al. (2019) note that an advantage of this approach is that it allows for a leptokurtic distribution in sovereign bond returns and captures common financial time series characteristics such as volatility clustering. We measure conditional tail expectations using a kernel estimation method as in Scaillet (2005). This approach uses a cumulative normal density function to produce probability-based weightings on observations where the weights are greatest for the most extreme standardised sovereign bond return observations.

3.4 Narrative approach

We enrich our reduced-form tail-risk estimates with a complementary empirical approach that permits a more intuitive quantification of Greek spillovers. Although we document a causal relation between extreme movements in Greek sovereign bond returns and the VaR of some other euro area sovereign bond returns, we cannot precisely ascertain the drivers of these changes. Relevant economic and political events in Greece and other types of events could affect the sovereign bond markets in Greece and other euro area countries at the same time. These other factors include euro area-wide and global events or the fact that Greece entered three financial assistance programmes, which gradually affected their market presence and the correct pricing of their bonds on the secondary markets.

Precision in the timing of the Greek news is crucial in determining causality. We follow the empirical approach of Altavilla et al. (2019) by constructing a Greek news-event database and studying the drivers of the 1% VaR estimated using the VAR-for-VaR approach. We narratively identify a list of (both positive and negative) relevant Greece-related events in the periods ahead of the three Greek programmes, recording the precise time the news appears on Bloomberg.[13]

[12] Estimation of the MES therefore requires a two-step procedure. First, derive time-varying volatility and correlation using a DCC-GJR-GARCH. This step ensures the normalisation of returns prior to the identification of a given VaR threshold (in our case, the 1% VaR). Second, model codependence in the tails of the normalised return series using kernel smoothing. This step uses the integrals of the fitted marginal density to estimate the marginal expected shortfall. See Engle (2009) for more details on this estimation procedure.

[13] Examples of negative events include Greek credit rating downgrades and the announcement of worse-than-expected Greek public deficits. Examples of positive events include announcements of agreements on financial

To identify the relationship between the Greek events and the estimated 1% VaR for German, Irish, Italian, Portuguese and Spanish sovereign bond returns, we compute the change in the VaR during a "window" around the Greek events. More precisely, we subtract the median VaR in the 60 minutes starting half an hour after Greek events, from the median VaR in the 60 minutes ahead of the half hour preceding Greek events. We provide a visual explanation of this process in Figure 4. Our approach therefore transforms our dataset from an intraday to a daily frequency, where each daily observation represents the change in the VaR within the window surrounding the Greek events.

When an event happens during non-trading hours or days, we take the change in the VaR from the last 60 minutes of the trading day ahead of the news and the 60 minutes of the first trading day afterwards. Consistent with our tail-risk measures, we always exclude the first and last half an hour of trading every day in order to avoid spikes related to opening and closing of the markets. On the days without major Greek news, we compute the change in the VaR around the centre of (a standard time of) the day using the same process as for days when there are Greek events.[14] Finally, we build a dummy variable that takes value of one on days when a negative Greek event happens, and zero otherwise. We estimate the relation between the estimated 1% VaR for the euro area countries in our sample and the Greek events in our dataset via Ordinary Least Squares (OLS):

$$\delta VaR_{i,j} = \alpha + \gamma D + \beta X_i + \epsilon_{i,j} \tag{3}$$

where $\delta VaR_{i,j}$ is the change in the estimated 1% VaR of the sovereign bond return of country i during the windows surrounding Greek events, represented by the dummy variable D. Our set of control variables X_i includes 10-year US bond yields, the euro-dollar exchange rate, and dummies for monetary policy and country-specific (positive and negative) events.[15] We collect data on US 10-year sovereign bond yields and the euro-dollar exchange rate from Refinitiv. The

assistance programmes and on the eligibility of Greek sovereign bonds for monetary policy operations. See Appendix A for a complete list of our Greek events. When regressing these events on the estimated 1% VaR we only examine the impact of negative events because they are more related to the left tail of the sovereign bond returns distribution. Positive Greek news events instead are related to the 99% VaR of other euro area sovereign bond returns. For our analysis using sovereign bond spreads, we examine the impact of both positive and negative Greek events.

[14] In each of the periods prior to the three Greek financial assistance programmes, the average change in the estimated 1% VaR during the time windows when no news arrived was statistically indistinguishable from zero.

[15] We could not use the VIX as a control for global events, as it is traded on US time and therefore is not available throughout the full day in our sample. Other countries' news events are not as detailed as for Greece and, as in De Santis (2014), largely relate to credit rating changes.

euro area monetary policy event-study database is from Altavilla et al. (2019).

We also use our intraday narrative dataset to examine the causal effect of developments in Greece on other euro area sovereign bond spreads. An advantage of this approach is that it avoids econometric issues related to the use of a generated dependant variable. This allows us to both confirm the existence of spillovers from Greece to other euro area sovereign bond markets, and to provide a more intuitive quantification of the size of these spillovers.[16]

4 Results

We first present the conditional 1% VaR of the German, Greek, Irish, Italian, Portuguese and Spanish sovereign bond returns in the periods prior to the three Greek financial assistance programmes in Figure 1.[17] This provides an initial indication of the comovements of the sovereign bond return 1% VaR for our sample countries. A more negative VaR indicates larger expected losses. It is quite obvious that Greece has the largest expected losses of all countries from the vast majority of the periods prior to all three programmes.[18] The worsening of the Greek VaR in advance of the request for assistance in early-May 2010 is associated with particularly large drops in Irish and Portuguese sovereign bond return 1% VaR. This is unsurprising given these countries were the next two to request official-sector financial assistance.

The worsening of the European sovereign debt crisis is apparent in the estimated 1% VaR in the period prior to the second Greek financial assistance programme. Although Greece still

[16] For the analysis using spreads, we examine the impact of both positive and negative Greek events. Therefore, in eqs 3 we replace D with D_j, where j represents whether the event is positive or negative. The transformation of intra-day spreads to a daily observation follows the same procedure as for the 1% VaR. We also examined whether the effect of Greek events on other sovereign bond spreads hold at the daily frequency. We find mixed evidence at this frequency, regardless of whether we use end-of-day or average spreads. This demonstrates that an intra-day frequency is required to identify a causal effect. The results using data at the daily frequency are available upon request.

[17] As we use the time series of Greek sovereign bond returns and of a different country's sovereign bond returns for each estimation, the bivariate regressions all use a different information set. This leads to different estimates of the Greek sovereign bond return VaR. To save space, we only plot the Greek VaR estimated using the bivariate regression with Germany. However, the estimates are very similar across all bivariate specifications (the correlation across Greek VaR estimates from all bivariate specifications is never lower than $\rho = 0.98$ and are generally above 0.99). The results are available upon request. Moreover, because of the information set-specific nature of the results, White et al. (2015) caution that naive comparisons across bivariate pairs can be misleading. They note that a multivariate setting using a common information set is the proper context for comparing sensitivities and pseudo IRFs. These important caveats notwithstanding, White et al. (2015) argue that averaging across the bivariate results can still provide useful summary information and suggest general features of the results.

[18] In all three periods there is some tentative evidence of a calming effect from the requests for official-sector financial assistance. There are marked improvements in the estimated VaR just before the end of each of the periods prior to the three Greek financial assistance programmes. We leave a formal investigation for future research.

has the largest expected losses, Ireland and Portugal also experienced large downward spikes in their estimated 1% VaRs, with Italy and Spain also experiencing some turmoil at times in early 2012. There are substantially more pronounced cross-country differences prior to the third programme request, suggesting that Greece was far more decoupled from the other euro area countries in 2015. The large downward spike in the Greek 1% VaR in early-July 2015 coincides with the referendum on the financial assistance programme and the heightened possibility of Greece exiting the euro area.

The estimated 1% VaR for all countries pass the relevant statistical (DQ) tests (Engle and Manganelli, 2004) in the periods prior to the first and third Greek financial assistance programmes and therefore we have confidence these 1% quantiles are well estimated (Table 1).[19] However, the substantial volatility in the period directly prior to the second Greek financial assistance programme poses challenges for the reliable estimation of the 1% VaR.[20]

4.1 Quantile impulse response functions

We next assess the dynamic effect on the 1% VaR of euro area sovereign bond returns from a shock to Greek absolute returns. This is a direct measure of spillovers from Greece to other euro area sovereign bond markets. An increase in the volatility of Greek returns induces a worsening in the 1% VaR (i.e. larger expected losses) of the sovereign bond returns of all countries we consider in the periods prior to all three Greek financial assistance programmes (Figure 2).[21] The horizontal axis measures the time (expressed in five-minute intervals), while the vertical axis measures the change in the 1% quantiles of the non-Greek sovereigns (expressed in percentage returns) in response to a Greek shock.

The spillovers are largest in Germany and Italy on impact, but the effect is much more persistent in Ireland, Portugal and (to a lesser extent) Spain in the period prior to the first Greek programme (left column). The point estimates for Germany and Italy are lower but far more persistent and still statistically significant during the period prior to the second Greek programme (middle column). This could be because the escalating European sovereign bond crisis

[19] The DQ test assesses whether the probability of exceeding the VaR in each period is independent of all past information. A statistically significant p-value indicates a rejection of the iid assumption.

[20] In Table 1, we demonstrate that our estimates of the 1% VaR using 15-minute intervals pass the DQ test. This is likely due to the substantially smoother time series for our continuously compounded log returns. In Appendix C we show that our tail-risk results are qualitatively robust to the use of this alternative frequency.

[21] See Section 4.3 for evidence, using a different empirical approach, that events in Greece drive changes in our estimated cross-market tail-risk interdependencies.

meant that euro-area aggregate and country-specific factors played a larger role in these countries during this period. However, the point estimates for Ireland, Portugal and Spain are substantially larger indicating the presence of sizable spillovers from Greece.

The results from the period prior to the third financial assistance programme (right column of Figure 2) show that this period generally had the smallest spillovers. Italy and Portugal experienced the largest effect on impact, but the spillovers are absorbed quite quickly. The spillovers to the Irish and Spanish sovereign bond markets were of a similar magnitude, but the effect on Ireland is much more persistent. Finally, the German response is relatively muted, albeit quite persistent. This is in line with empirical evidence of a regime shift in the pricing of euro area sovereign bonds after the announcement of the Outright Monetary Transactions (OMT) programme in August 2012 (Blasques et al., 2016; Afonso et al., 2018).

4.2 MES

We next examine the MES of our sample countries' sovereign bond returns, conditional on a tail event in the Greek sovereign bond market. A negative value means that a tail event in Greece increases expected losses. A positive value indicates that the expected returns of the asset in question *exceed* their average during a Greek tail event and therefore serve as a "safe haven" from Greek-related developments. Figure 3 contains our estimated MES in the periods prior to the three Greek financial assistance programmes.[22]

In the period prior to the first financial assistance programme (top row), the Irish sovereign bond returns are consistently the most vulnerable to developments in Greece. The Portuguese sovereign bond returns become highly exposed as the programme is finalised. The Italian and Spanish markets are also very exposed at times, while even the German Bund has some downward spikes. There is greater cross-country heterogeneity during the period prior to the second financial assistance programme. German Bunds gradually become a safe haven from tail events in Greece, although the MES remains subject to large Greek-related swings.[23] Italy and Spain experience substantially larger MES at times, in particular during July and November 2011. The Irish and Portuguese MES is generally much larger than those of the other countries.

[22] We test the adequacy of the DCC-GJR-GARCH specification by testing for autocorrelation in squared standardised returns.

[23] Von Hagen et al. (2011) also find that the German Bund became a safe haven during the European sovereign debt crisis.

The results in the period prior to the third financial assistance programme are quite consistent across time in all countries except Portugal, which still experienced considerable variation in the estimated MES (bottom row). The overall level of exposure is lower than in the period prior to the first financial assistance programme, with only Portugal experiencing consistently large exposure to Greece. The Italian and Spanish exposure increases as the Greek crisis escalates, before returning to normal just before the enactment of the programme. The German market serves as a safe haven throughout this period, while the Irish market is also in positive territory at times.

4.3 Narrative Results

We report the estimates of the relation between the Greek events and the 1% VaR for the euro area countries in our dataset in Table 2. In the period prior to the first Greek financial assistance programme, *negative* Greece-related events worsened the 1% VaR for Ireland, Italy, Portugal and Spain, while it had no effect on the German bund return 1% VaR. During the run-up to the second Greek programme, we find evidence of spillovers from negative Greek events in Germany, Ireland, Italy and Spain, while for Portugal we do not observe a significant effect from Greek events on the sovereign bond returns 1% VaR.

However, this period was quite turbulent for Ireland and Portugal, which included both countries entering into financial assistance programmes with the EFSF. If instead we estimate the relation up to the start of their respective financial assistance programmes, we observe that for Ireland the effect becomes stronger, while for Portugal we still do not find a significant relation. We identify the end of October 2010 (which coincided with the approval of a particularly austere budget in Portugal) as the moment when the situation for Portugal began to deteriorate. If we estimate the effect of Greek events on the Portuguese 1% VaR on a sample up to end-October 2010, we observe that the coefficient becomes statistically significant and that negative Greek events increase the expected losses on the Portuguese sovereign bond returns.

Finally, we also uncover spillovers from Greek events to some of the euro area countries' 1% VaR in our sample, although with a smaller size. We observe that the effect is highly significant for Germany, Ireland and Portugal, slightly weaker for Spain and insignificant for Italy. Overall, these results show that negative events regarding the Greek economic and political environment affected the investors' perception of expected losses on other euro area countries' sovereign

bonds. This also holds true for the German sovereign bonds, amongst the safest assets in Europe, suggesting that Greece was also systemic during the run-up to the second (EFSF) and third (ESM) programmes.

To provide a more intuitive quantification of Greek spillovers, we regress our (positive and negative) Greek news events on the other countries sovereign bond spreads (relative to Germany). Table 3 provides the results for all three Greek financial assistance programmes.[24] In the period prior to the first Greek financial assistance programme, *negative* Greece-related news increased Italian and Spanish spreads by three basis points (bps) on impact, and Irish and Portuguese spreads by four and five bps respectively. There is some evidence of an asymmetry, with the Italian and Spanish spreads falling by two bps and Portuguese spreads by four bps following *positive* Greek news. The reaction of Irish spreads is symmetric.

During the run-up to the second Greek programme, we estimate spillovers from negative Greek news in Spain and Portugal of five bps and six bps in Ireland and Italy. Because Ireland and Portugal entered into financial assistance programmes during this period, we also estimate the spillovers to these countries in the periods prior to their entry into their respective programmes. This increases the size of negative Greek news spillovers to Irish spreads to twelve bps (May 2010 to November 2010) and Portuguese spread to six bps (May 2010 to April 2011). A further examination shows that spillovers from Greek news to Portuguese spreads were largest (nine bps) in the period before their enactment of an austere budget in December 2010.

Differently from the run-up to the first programme, positive Greek news had little effect on the sovereign bond spreads of the other countries in the period prior to the second programme.[25] This is likely because these countries were all, albeit to different extents, experiencing a crisis during this period. Positive news from Greece was insufficient to reduce their sovereign bond spreads. The larger asymmetry between the size of positive and negative spillovers compared to the periods prior to the first (and third) Greek financial assistance programmes supports this interpretation.

Finally, we also uncover sizable and statistically significant spillovers from (both positive and negative) Greek news in the period prior to the third financial assistance programme. This is

[24] The full regression results, which include the estimated coefficients on all included controls, are displayed in Appendix B.

[25] Only Portugal experienced a statistically significant decrease in spreads. This result only holds during the entire sample period, not in the sub-samples related to their entry into a financial assistance programme or their enactment of an austere budget.

despite ECB intervention on the secondary markets through the Public Sector Purchases Programme (PSPP). Negative Greek events caused an increase in spreads of seven bps in Portugal, five bps in Italy and two bps in Ireland and Spain. Positive Greek events decreased spreads by six bps in Portugal, four bps in Italy and two bps in Ireland and Spain.

5 Conclusion

We evaluate the systemic importance of Greece in the run-up to their three financial assistance programmes using empirical methods that provide ex-ante measures of risk exposure. We find that changes in Greek sovereign bond market tail risks resulted in immediate and significant cross-market spillovers to the 1% VaR of other euro area sovereign bond returns. Our sample includes three of the four countries that sought official-sector financial assistance (Ireland, Portugal, Spain), as well as the euro area's safest (Germany) and most liquid (Italy) sovereign bond markets, and is therefore quite representative of what constitutes a "systemic" effect of Greece. Although Greece had somewhat decoupled by the time of the third financial assistance programme, tail-risk spillovers from Greece to the other sovereign bond markets were present in the lead-up to each of the three Greek financial assistance programmes.

We complement our tail-risk analysis by linking it to a newly developed intra-day event database for Greece. We use the precise timing of news arrival to identify a causal effect from developments in Greece, such as changes in the sovereign credit rating and relevant political or economic news developments related to the Greek crisis and its management, on the estimated 1% VaR of the other euro area sovereign bond returns. We also use our intraday narrative dataset to examine the causal effect of developments in Greece on other euro area sovereign bond spreads. An advantage of this approach is that it avoids econometric issues related to the use of a generated dependant variable. This allows us to both confirm the existence of spillovers from Greece to other euro area sovereign bond markets, and to provide a more intuitive quantification of the size of these spillovers. We find that negative Greek events worsened the secondary market for other euro area sovereign bonds, resulting in an increase in spreads of around five bps across the three programmes. Significant spillovers related to positive Greek news only occurred in the periods prior to the first and third programmes. This is likely because the escalation of country-specific concerns dampened the positive effect on spreads from good news coming from

Greece in the run-up to the second financial assistance programme.

Our Greek event results are robust to the inclusion of a battery of control variables that capture global (US 10-year sovereign bond yields and the euro-dollar exchange rate), euro area aggregate (the euro area monetary policy event database produced by Altavilla et al. (2019)) and country-specific news in the recipient countries (constructed using the same process as the Greek news). This analysis provides confirmation of our tail risk results, using a very different empirical approach, with the spillovers from Greece at their largest in the period prior to the second programme and weakest (although still statistically significant) prior to the third programme.

We demonstrate that these measures provide a useful snapshot of the degree of tail-risk interdependencies at given points in time, with a clear evolution in real-time estimates in each period as we get closer to the agreement of the financial assistance programmes. However, determining the extent to which these measures are useful as early warning signals requires further work. White et al. (2015) demonstrate the VAR-for-VaR has decent out-of-sample performance.[26] Brownlees and Engle (2017) use the MES to construct SRISK, a measure of the systemic risk contribution of a financial firm. They use a number of predictive evaluation exercises to demonstrate the usefulness of this measure for real-time systemic-risk monitoring. However, Idier et al. (2014) find that some standard balance-sheet ratios were better predictors than the MES of large equity losses in a sample of large US during the global financial crisis. As with any model-based assessment, expert judgement and qualitative market intelligence should complement the use of this empirical framework for real-time monitoring of sovereign bond interdependencies.

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[26]The out-of-sample DQ tests both whether the number of exceedances is close to the VaR confidence level *and* whether these exceedances are not correlated over time.

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Table 1: **VAR-for-VaR model diagnostics**

First programme

	GR-DE	**GR-ES**	**GR-IE**	**GR-IT**	**GR-PT**
5-min intervals	0.172	0.495	0.155	0.206	0.477
15-min intervals	0.118	0.005	0.093	0.128	0.113

Second programme

	GR-DE	**GR-ES**	**GR-IE**	**GR-IT**	**GR-PT**
5-min intervals	0.000	0.000	0.000	0.000	0.000
15-min intervals	0.330	0.474	0.399	0.645	0.272

Third programme

	GR-DE	**GR-ES**	**GR-IE**	**GR-IT**	**GR-PT**
5-min intervals	0.288	0.681	0.677	0.663	0.657
15-min intervals	0.830	0.946	0.945	0.857	0.950

Note: This table contains the p-values for the DQ test (Engle and Manganelli, 2004) from our bivariate VAR-for-VaR estimates between Greek (GR) and German (DE), Irish (IE), Italian (IT), Spanish (ES) and Portuguese (PT) 10-year sovereign bond returns. The first, second and third panels contain the results for the model estimates in the periods *prior* to each of the three financial assistance programmes. The first row in each panel contains the result for our estimates using 5-minute intervals, upon which we conduct our main analysis. The second row in each panel contains a robustness check using estimates at 15-minute intervals. See Appendix C for evidence that our tail-risk results are qualitatively robust to this alternative frequency. Samples: 01/01/2009 - 03/05/2010 (32786 observations for 5-minute intervals, 11154 observations for 15-minute intervals); 10/05/2010 - 21/02/2012 (43262 observations for 5-minute intervals, 15246 observations for 5-minute intervals); 01/12/2014 - 31/08/2015 (17945 observations for 5-minute intervals, 6105 observations for 15-minute intervals).

Table 2: *Overview of the impact of Greek negative events on other countries' 1% VaR over different time periods*

Negative Greek events effect on 1% VaR	**Spain**	**Italy**	**Ireland**	**Portugal**	**Germany**
January 2009 - May 2010	-0.04*	-0.03**	-0.08***	-0.12***	0.00
	(0.02)	(0.01)	(0.03)	(0.04)	(0.01)
June 2010 - February 2012	-0.01*	-0.04***	-0.09***	-0.03	-0.02***
	(0.00)	(0.01)	(0.03)	(0.05)	(0.00)
June 2010 up to the programme			-0.13***	-0.03	
			(0.04)	(0.05)	
June 2010 up to October 2010				-0.11**	
				(0.05)	
December 2014 - August 2015	-0.00*	-0.00	-0.01***	-0.01***	-0.01***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)

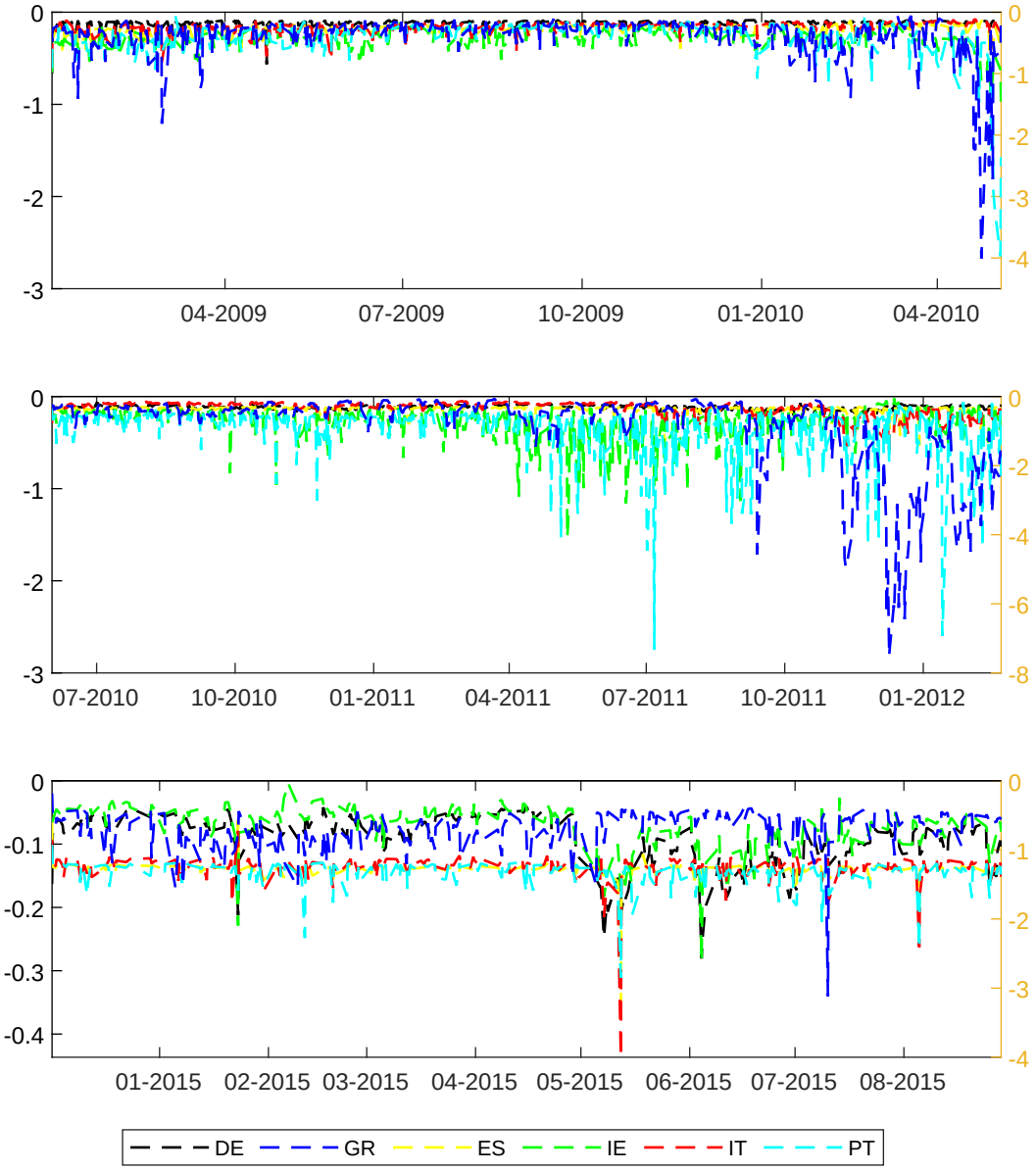
Notes: The response variables are the Spanish, Italian, Irish, Portuguese and German 1% VaR, respectively. We estimate our 1% VaR using univariate CAViaR Engle and Manganelli (2004) estimates as starting values in the optimisation routine and initialising the remaining parameters at zero. The substantial volatility during May 2010 means that we must start our sample for the period prior to the second Greek financial assistance programme in June 2010 to ensure convergence of the VAR-for-VaR using 5-minute intervals. The estimation method is OLS. See Section 3.4 for details of the empirical approach. Standard errors in parentheses. Significance levels: *** p-value < 0.01, ** p-value < 0.05, * p-value < 0.1.

Table 3: *Overview of the impact of Greek positive and negative events on other countries' 10Y bond yield spreads to Germany over different time periods*

Negative Greek events effect on spreads (bps)	**Spain**	**Italy**	**Ireland**	**Portugal**
January 2009 - May 2010	0.03***	0.03***	0.04***	0.06***
	(0.00)	(0.01)	(0.01)	(0.01)
May 2010 - February 2012	0.05***	0.06***	0.06***	0.05***
	(0.01)	(0.01)	(0.01)	(0.02)
May 2010 up to the programme			0.12***	0.06***
			(0.02)	(0.02)
May 2010 up to October 2010				0.09***
				(0.03)
December 2014 - August 2015	0.05***	0.05***	0.02***	0.07***
	(0.01)	(0.01)	(0.00)	(0.01)
Positive Greek events effect on spreads (bps)	**Spain**	**Italy**	**Ireland**	**Portugal**
January 2009 - May 2010	-0.02***	-0.02***	-0.04***	-0.04***
	(0.00)	(0.00)	(0.01)	(0.01)
May 2010 - February 2012	-0.01	0.01	-0.01	-0.04**
	(0.01)	(0.01)	(0.02)	(0.02)
May 2010 up to the programme			-0.00	-0.01
			(0.02)	(0.02)
May 2010 up to October 2010				-0.01
				(0.02)
December 2014 - August 2015	-0.04***	-0.04***	-0.02***	-0.06***
	(0.01)	(0.01)	(0.00)	(0.01)

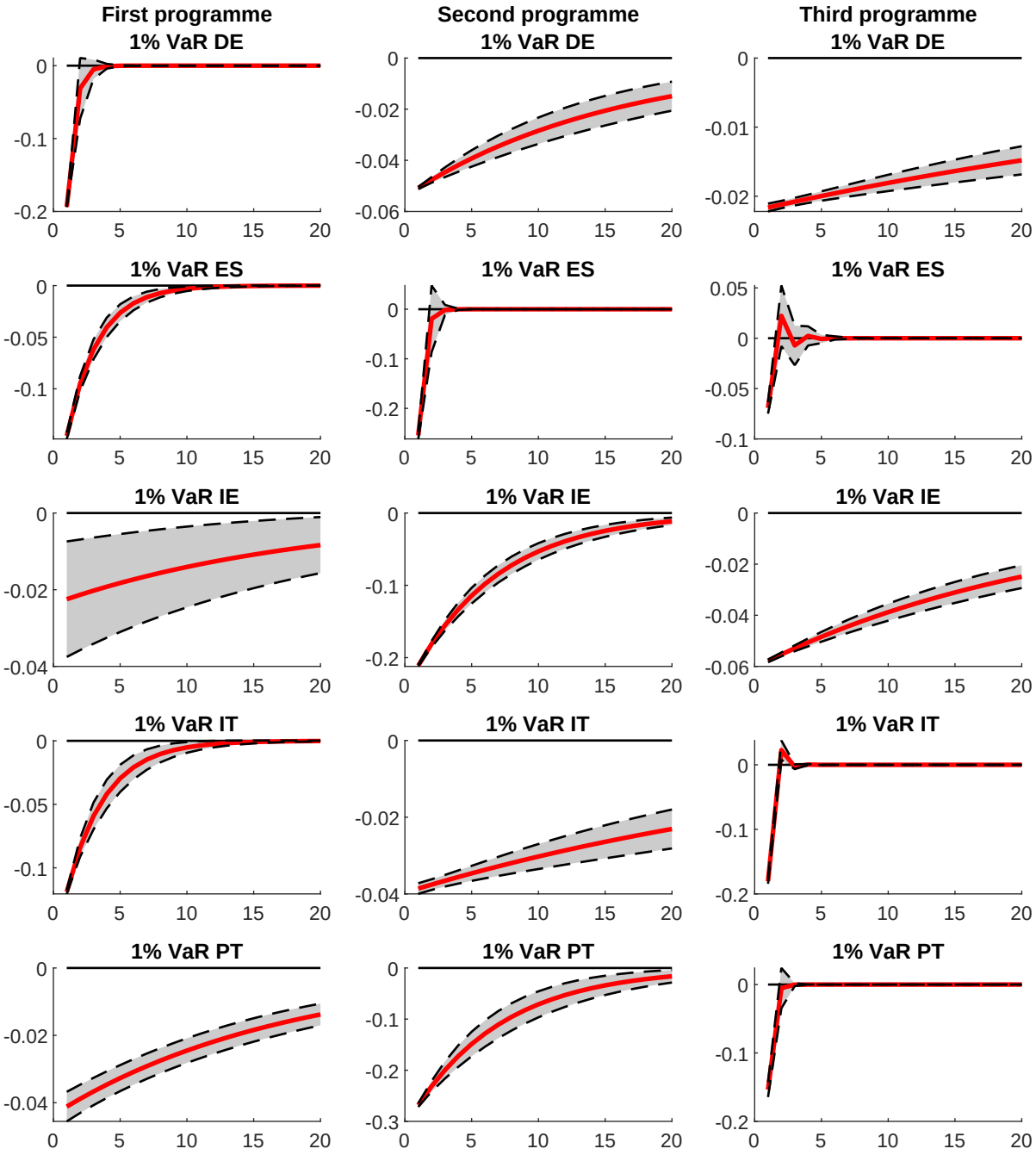
Notes: The response variables are the Spanish, Italian, Irish and Portuguese 10Y bond yield spreads to Germany, respectively. The estimation method is OLS. See Section 3.4 for details of the empirical approach. Standard errors in parentheses. Significance levels: *** p-value < 0.01, ** p-value < 0.05, * p-value < 0.1.

Figure 1: **Estimated 1% VaR prior to the Greek financial assistance programmes**



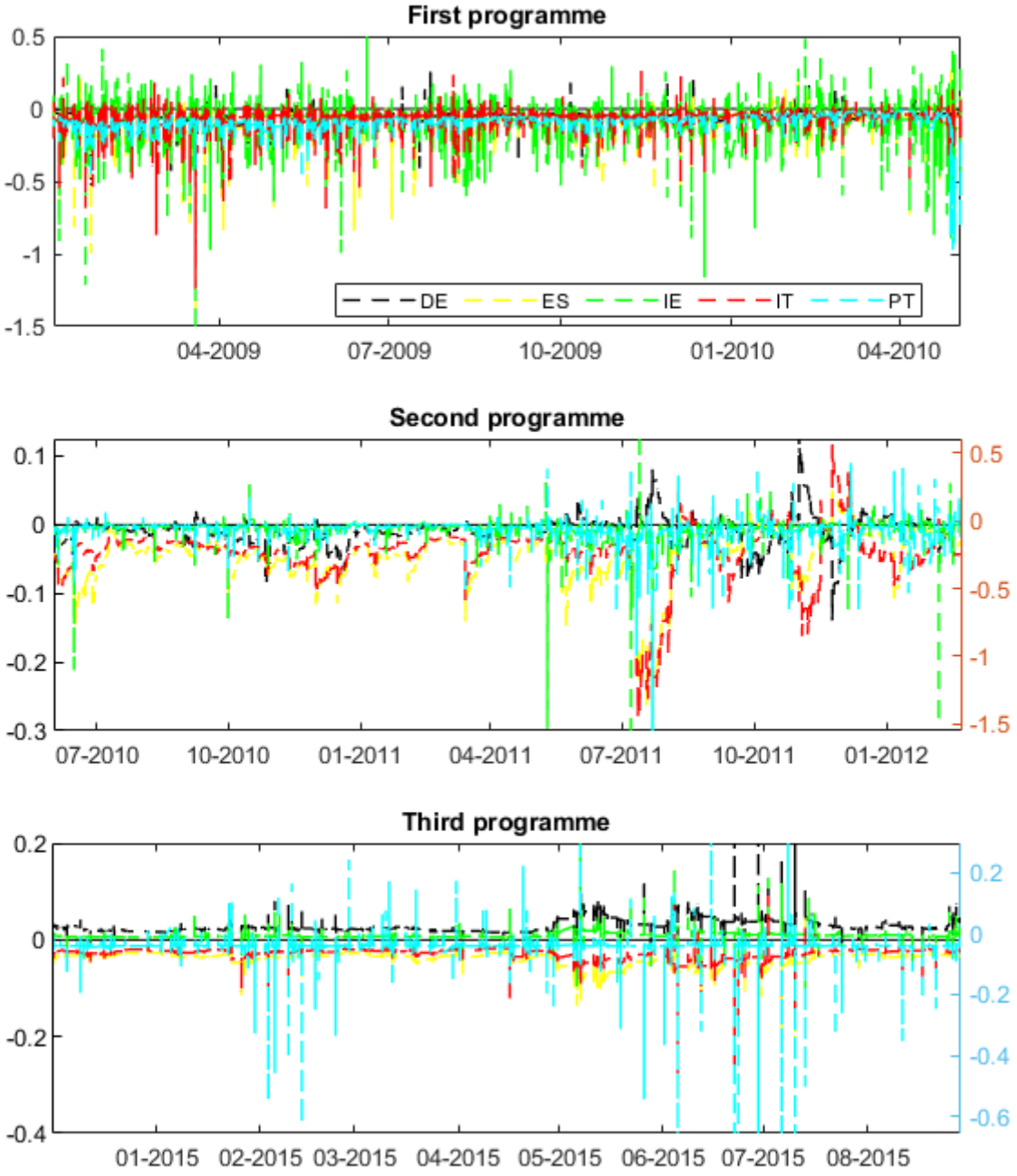
Note: This figure displays our estimated 1% Value at Risk (VaR) for German (DE), Greek (GR), Irish (IE), Italian (IT), Spanish (ES) and Portuguese (PT) 10-year sovereign bond returns in the periods *prior* to the first (top row), second (middle row) and third (bottom row) financial assistance programmes. We display the Greek results on the right-hand y-axis. We compute the 1% VaRs by estimating five separate bivariate VAR-for-VaR models, allowing the VaR on Greek sovereign bonds to affect the VaR of the other countries' bond returns. See Section 3.2 for details. Sample: 01/01/2009 - 03/05/2010 (32786 observations); 01/06/2010 - 21/02/2012 (43262 observations); 01/12/2014 - 31/08/2015 (17945 observations).

Figure 2: **Estimated QIRFs prior to the Greek financial assistance programmes**



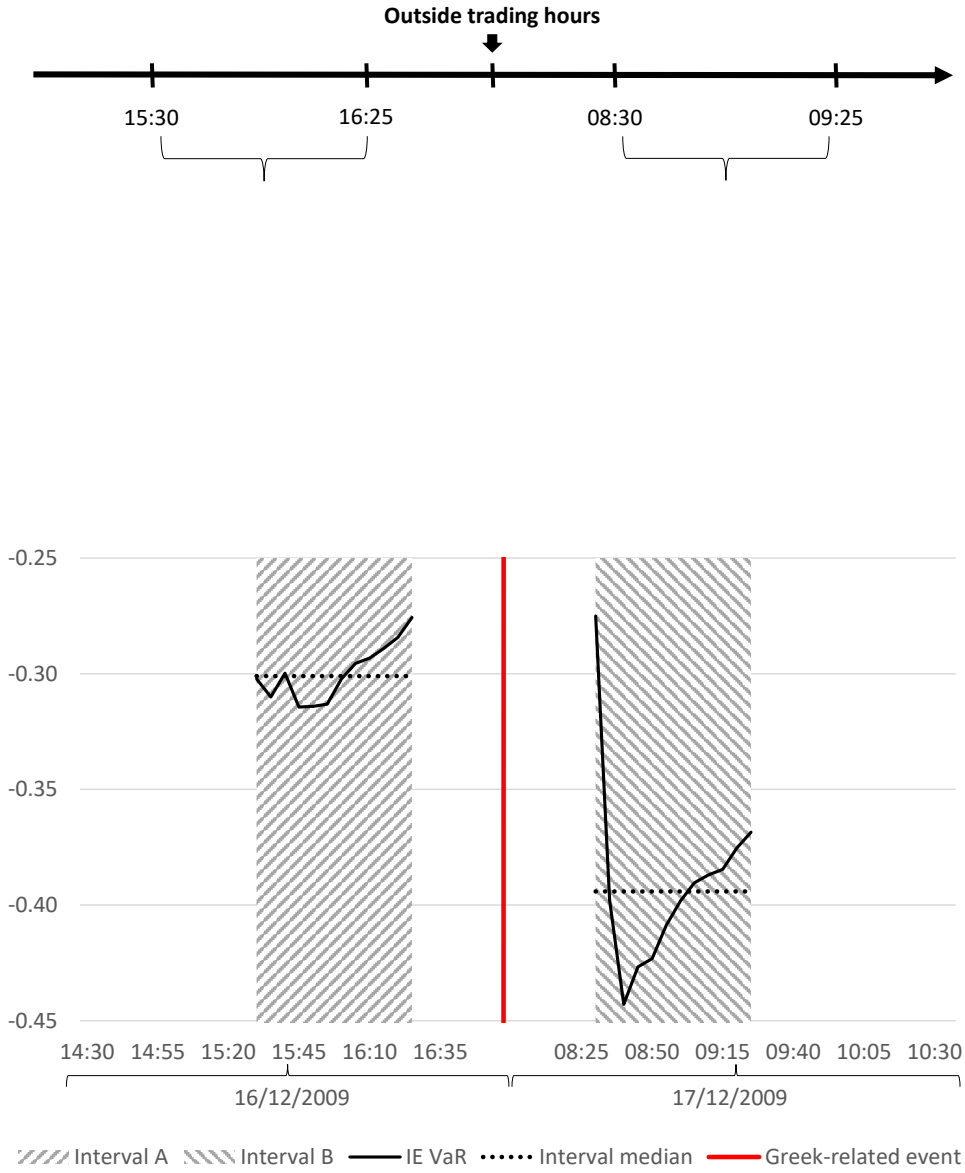
Note: This figure displays our estimated quantile impulse response functions (QIRFs) for German (DE), Irish (IE), Italian (IT), Spanish (ES) and Portuguese (PT) 10-year sovereign bond return 1% VaR from a unitary shock to Greek absolute returns in the periods *prior* to the first (left column), second (middle column) and third (right column) financial assistance programmes. We estimate the QIRFs using a VAR-for-VaR model and identify the shock using restrictions on the permitted cross effects. See Section 3.2 for details. The x-axis represents the number of 5-minute intervals, while the y-axis represents percentage returns. Samples: 01/01/2009 - 03/05/2010 (32786 observations); 01/06/2010 - 21/02/2012 (43262 observations); 01/12/2014 - 31/08/2015 (17945 observations).

Figure 3: **Estimated MES prior to the Greek financial assistance programmes**



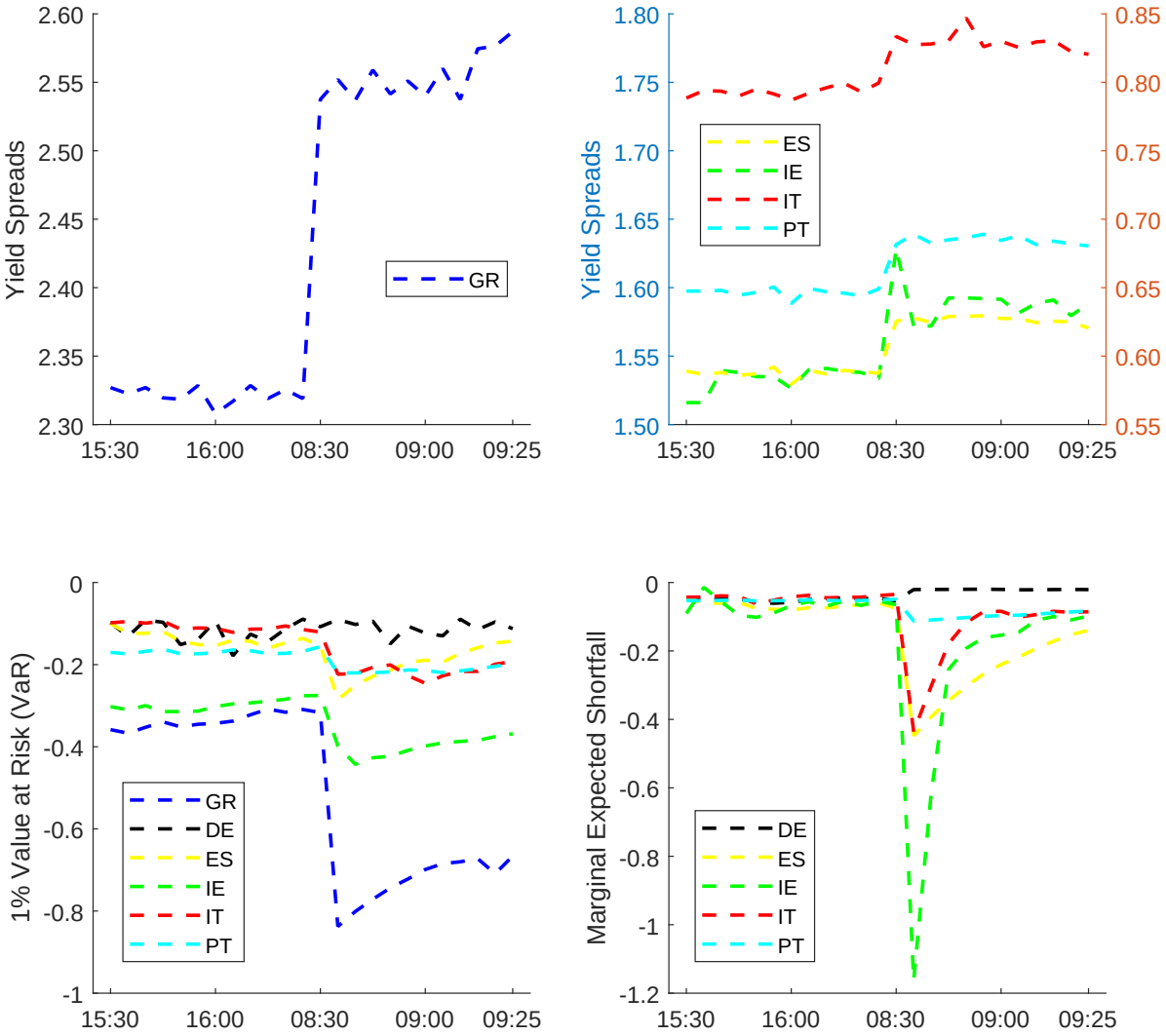
Note: This figure shows the Marginal Expected Shortfall (MES) of the German (DE), Irish (IE), Italian (IT), Spanish (ES) and Portuguese (PT) 10-year sovereign bond returns in the periods prior to the first (top row), second (middle row) and third (bottom row) financial assistance programmes. We display the Irish and Portuguese results on the right-hand y-axis. We compute the MES by using conditional volatilities and correlations estimated with a DCC-GJR-GARCH, assuming that the Greek returns are at the 1% quantiles. See Section 3.3 for details. Samples: 01/01/2009 - 03/05/2010 (32786 observations); 01/06/2010 - 21/02/2012 (43262 observations); 01/12/2014 - 31/08/2015 (17945 observations).

Figure 4: **Transformation of intraday data**



Note: This figure illustrates how we transform our dataset from intra-day to daily frequency. We use S&P's decision to cut Greece's sovereign credit rating to BBB+ on the evening of 16 December 2009 as an example of a (negative) Greek event. Each daily observation represents the change in the Irish (as an example) sovereign bond return 1% VaR within a window surrounding Greek events. The daily observation represents the difference between the median VaR in the 60 minutes starting half an hour after the Greek events and the median VaR in the 60 minutes ahead of the half hour before the Greek events. As this event occurred outside of trading hours, we take the change in the spreads from the last 60 minutes of the trading day ahead of the news and the 60 minutes of the first trading day afterwards. We always exclude the first and last half an hour of trading every day, in order to avoid spikes related to opening and closing of the markets. On the days without major Greek news, we compute the change in the VaR around the centre of the day using the same process as for days when there are Greek events, but centered at a standard time.

Figure 5: **Narrative and tail-risk complementarities**



Note: This figure illustrates the complementarities between our tail-risk and narrative empirical measures, using S&P's decision to cut Greece's sovereign credit rating to BBB+ on the evening of 16 December 2009 as an example. The top left chart shows that Greek spreads rose substantially at market opening the next morning, with spread increases also observed in Ireland, Italy, Portugal and Spain (top right chart). The bottom left chart shows that this decision resulted in a worsening in the Value at Risk of the sovereign bond returns of all countries except Germany. The bottom right chart indicates the greater exposure of all countries except Germany to Greek events (i.e. a more negative marginal expected shortfall) after the rating cut. We estimated our tail-risk measures over the full period prior to the first Greek programme. We provide evidence of the statistically significant effect of our Greek event dummies on the estimated 1% VaR in Table 2. Sample: 01/01/2009 - 03/05/2010 (32786 observations).

Appendix A Greek news events

A key contribution of our analysis is the construction of an intra-day narrative dataset of Greek news. The use of high frequency (five-minute interval) data allows us to better identify events in Greece and their impact on sovereign bond spreads in other euro area economies. This section provides more details on the events we identify and use in our empirical analysis.

Table 4: *Greek negative events: January 2009 - May 2010*

Date	**Event**	**Time (GMT)**	**Time windows studied**			**Weekday**
			Pre-event	*Event*	*Post-event*	
14/01/2009	GREECE'S SOVEREIGN CREDIT RATING CUT TO A-/A-2 BY S&P	13:39	12:10-13:05	13:40	14:10-15:05	Wednesday
20/10/2009	ALMUNIA MENTIONS STATISTICAL DISCREPANCIES ON GREEK DEFICIT FIGURES	Outside trading hours	15:30-16:25	Outside trading hours	08:30-09:25	Tuesday
08/12/2009	GREECE DOWNGRADED TO 'BBB+' AT FITCH; OUTLOOK NEGATIVE	Outside trading hours	15:30-16:25	Outside trading hours	08:30-09:25	Tuesday
17/12/2009	GREECE'S LONG-TERM SOVEREIGN CREDIT RATING CUT TO BBB+ BY S&P	Outside trading hours	15:30-16:25	Outside trading hours	08:30-09:25	Thursday
12/01/2010	EU REPORT CITES SEVERE IRREGULARITIES IN GREEK NOTIFICATIONS	09:40/10:00	16:10-16:25; 08:30-09:05	09:40	10:30-11:25	Tuesday
14/01/2010	TRICHET: ECB WON'T CHANGE COLLATERAL FRAMEWORK FOR ANY COUNTRY	13:50	12:20-13:15	13:50	14:20-15:15	Thursday
09/04/2010	GREECE'S DEBT RATINGS CUT BY FITCH FROM BBB+ to BBB-; OUTLOOK NEGATIVE	15:29	14:00-14:55	15:30	16:00-16:25; 08:30-08:55	Friday
22/04/2010	GREECE'S 2009 BUDGET DEFICIT TOTALED 13.6% OF GDP, EU SAYS	10:00	08:30-09:25	10:00	10:30-11:25	Thursday
22/04/2010	GREECE'S SOVEREIGN RATINGS CUT TO A3 BY MOODY'S	15:32	14:00-14:55	15:30	16:00-16:25; 08:30-08:55	Thursday
27/04/2010	GREECE SOVEREIGN CREDIT RATINGS CUT TO JUNK BY S&P	16:23	14:55-15:50	16:25	08:30-09:25	Tuesday

Notes: Source: Bloomberg. We round the time of events to the closest 5-minute mark. When a window includes two time intervals, this means that in order to have twelve 5-minutes observations we had to go back (forward) to the previous (next) day. When the event happens outside trading hours (which could be at night, at weekends or holidays) we place the event on the next trading day and the pre-event window will use the last hour of data from the last trading day. The last column on the right shows the day of the week corresponding to the date in the first column. If the event is outside trading hours and the day is a Monday, then the event happened during a weekend. If it is another workday apart from Monday, then the event happened between 16:30 and 08:30 (GMT), or in the first available workday going backwards.

Table 5: *Greek positive events: January 2009 - May 2010*

Date	**Event**	**Time (GMT)**	**Time windows studied**			**Weekday**
			Pre-event	*Event*	*Post-event*	
03/02/2010	PAPANDREOU SAYS NO RAISES FOR PUBLIC SERVANTS IN 2010 (multiple news close to each other)	18:37(t-1)/10:45	15:30-16:25	18:37(t-1)/10:45	11:15-12:10	Wednesday
09/02/2010	MINISTER OF ECONOMICS PAPAKONSTANTINOU ANNOUNCES PACKAGE OF MEASURES INCLUDING SALARY REDUCTIONS AND BENEFIT CUTS IN PUBLIC SECTOR, TAX MEASURES AND NEW TAX SCALES	08:55	15:30-16:25	08:55	09:25-10:20	Tuesday
10/02/2010	REHN SAYS EU CAN SUPPORT GREECE 'IN BROAD SENSE OF THE WORD'	16:45	15:15-16:10	16:45	08:30-09:25	Wednesday
	GERMANY CONSIDERING AID TO GREECE, CDU GOVERNMENT LAWMAKER SAYS	Outside trading hours		17:20		Saturday
11/02/2010	EU LEADERS ANNOUNCE THAT THEY "WILL TAKE DETERMINED AND COORDINATED ACTION, IF NEEDED, TO SAFEGUARD FINANCIAL STABILITY IN THE EURO AREA." IMF OFFERS TO PROVIDE "EXPERTISE AND SUPPORT AS NECESSARY."	Outside trading hours	15:30-16:25	Outside trading hours	08:30-09:25	Thursday
11/02/2010	VAN ROMPUY SAYS GREECE HASN'T REQUESTED FINANCIAL SUPPORT	12:20	10:50-11:45	12:20/ 12:47	13:15-14:10	Thursday
	EU'S BARROSO SAYS ACCORD ON GREECE HAS BEEN REACHED (multiple news close to each other)	12:47				Saturday
01/03/2010	LAGARDE HAS 'NO DOUBT' GREECE WILL GET REFINANCING IN SHORT RUN	Outside trading hours	15:30-16:25	Outside trading hours	08:30-09:25	Monday
03/03/2010	GREECE TO CUT SPENDING BY ADDITIONAL EU2.4 BLN, MINISTER SAYS	09:20	16:10-16:25/08:30-08:45	09:20	09:50-10:45	Wednesday
03/03/2010	AUTHORITIES DO NOT RULE OUT HELP FORM THE IMF	14:26	12:55-13:50	14:25	14:55-15:50	Wednesday
16/03/2010	EUROGROUP AGREEMENT ON MECHANISM FOR POSSIBLE GREEK BAILOUT	Outside trading hours	15:30-16:25	Outside trading hours	08:30-09:25	Tuesday
25/03/2010	ECB'S WELLINK SUPPORTS POSSIBLE IMF STANDBY FACILITY FOR GREECE	12:00	10:30-11:25	12:00	12:30-13:25	Thursday
26/03/2010	BARROSO SAYS EU ACCORD ON GREECE 'A GREAT RESULT'	09:00	15:30-16:25	09:00	09:30-10:25	Friday
09/04/2010	ECB HEAD: GR WILL NOT BE ALLOWED TO DEFAULT	Outside trading hours	15:30-16:25	Outside trading hours	08:30-09:25	Friday
09/04/2010	GREECE'S DEBT RATINGS CUT BY FITCH; OUTLOOK NEGATIVE	Outside trading hours	15:30-16:25	Outside trading hours	08:30-09:25	Friday

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Table 5: *Greek positive events: January 2009 - May 2010 (continued)*

Date	**Event**	**Time (GMT)**	**Time windows studied**			**Weekday**
			Pre-event	*Event*	*Post-event*	
11/04/2010	IMF, EU, ECB OFFICIALS STILL WORKING ON DETAILS ON THE GR AID PLAN	Outside trading hours	15:30-16:25	Outside trading hours	08:30-09:25	Sunday
15/04/2010	GR REQUESTS DISCUSSIONS WITH ECB, EU, IMF ON AID MECHANISM	13:10	11:40-12:35	13:10	13:40-14:35	Thursday
23/04/2010	GREECE PLANS TO REQUEST EU AID TODAY, OFFICIAL SAYS	08:45	15:30-16:25	08:45	09:20-10:15	Friday
02/05/2010	EUROGROUP APPROVES €80BN LOAN FOR GREECE (€110BN INCLUDING THE IMF)	Outside trading hours	15:30-16:25	Outside trading hours	08:30-09:25	Sunday

Notes: Source: Bloomberg. We round the time of events to the closest 5-minute mark. When a window includes two time intervals, this means that in order to have twelve 5-minutes observations we had to go back (forward) to the previous (next) day. When the event happens outside trading hours (which could be at night, at weekends or holidays) we place the event on the next trading day and the pre-event window will use the last hour of data from the last trading day. The last column on the right shows the day of the week corresponding to the date in the first column. If the event is outside trading hours and the day is a Monday, then the event happened during a weekend. If it is another workday apart from Monday, then the event happened between 16:30 and 08:30 (GMT), or in the first available workday going backwards.

Table 6: *Greek negative events: May 2010 - February 2012*

Date	**Event**	**Time (GMT)**	**Time windows studied**			**Weekday**
			Pre-event	*Event*	*Post-event*	
14/06/2010	MOODY'S DOWNGRADES GREECE FROM A3 TO BA1	Outside trading hours	15:30-16:25	Outside trading hours	08:30-09:25	Monday
26/07/2010	THE RESULTS OF THE FIRST PAN-EUROPEAN STRESS TESTS OF THE BANKING SYSTEM ARE PUBLISHED. ONLY SEVEN BANKS FAIL THE STRESS TESTS, WITH AN AGGREGATE CAPITAL SHORTFALL OF €3.5BN.	16:08	14:40-15:35	16:10	08:30-09:25	Monday
07/09/2010	PRIME MINISTER PAPANDREOU RESHUFFLES GOVERNMENT	Outside trading hours	15:30-16:25	Outside trading hours	08:30-09:25	Tuesday
15/11/2010	THE ESTIMATED 2009 FISCAL DEFICIT WAS REVISED FROM 13.5 TO 15.5 PERCENT OF GDP BY THE EUROSTAT.	10:00	08:30-09:25	10:00	10:30 - 11:25	Monday
17/01/2011	FITCH DOWNGRADES GREECE TO 'BB+'; OUTLOOK NEGATIVE	Weekend	15:30-16:25	Weekend	08:30-09:25	Monday
07/03/2011	GREECE DOWNGRADED TO B1 FROM BA1 AT MOODY'S INVESTORS SERVICE	08:40	15:30-16:25	08:40	09:10-10:05	Monday
17/05/2011	MERKEL REJECTS GREEK DEBT RESTRUCTURING	Outside trading hours	15:30-16:25	Outside trading hours	08:30-09:25	Tuesday
20/05/2011	FITCH DOWNGRADES GREECE FROM BB+ TO B	16:32	15:00-15:55	16:30	08:30-09:25	Friday
02/06/2011	GREECE CUT TO Caa1 FROM B1 BY MOODY'S, OUTLOOK NEGATIVE	Outside trading hours	15:30-16:25	Outside trading hours	08:30-09:25	Thursday
14/06/2011	S&P CUTS GREECE LT RATING TO 'CCC'; OUTLOOK NEGATIVE	Outside trading hours	15:30-16:25	Outside trading hours	08:30-09:25	Tuesday
04/07/2011	GREECE DEBT ROLLOVER PLAN MAY PUT IT IN SELECTIVE DEFAULT: S&P	Outside trading hours	15:30-16:25	Outside trading hours	08:30-09:25	Monday
14/07/2011	GREECE L-T ISSUER DEFAULT RATING CUT TO CCC FROM B+ BY FITCH	Outside trading hours	15:30-16:25	Outside trading hours	08:30-09:25	Thursday
25/07/2011	GREECE CUT TO Ca FROM Caa1 BY MOODY'S; DEVELOPING OUTLOOK	Outside trading hours	15:30-16:25	Outside trading hours	08:30-09:25	Monday
02/09/2011	TROIKA MISSION IN ATHENS SUSPENDED	10:10	08:40-09:35	10:10	10:40-11:35	Friday
21/09/2011	VENIZELOS SAYS NEED TO TAKE SUPPLEMENTARY MEASURES	08:30	15:30-16:25	08:30	09:00-09:55	Wednesday
21/10/2011	GREECE DEEPER PRIVATE SECTOR INVOLVEMENT 'VITAL,' TROIKA SAYS	16:40	15:15-16:10	16:40	08:30-09:25	Friday

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Table 6: *Greek negative events: May 2010 - February 2012 (continued)*

Date	**Event**	**Time (GMT)**	**Time windows studied**			**Weekday**
			Pre-event	*Event*	*Post-event*	
01/11/2011	PRIME MINISTER PAPANDREOU ANNOUNCES THAT HE WILL HOLD A REFERENDUM OVER THE NEW LOAN AGREEMENT AND GREECE PARTICIPATION IN THE EUROZONE	Outside trading hours	15:30-16:25	Outside trading hours	08:30-09:25	Tuesday
01/11/2011	FITCH: GREEK REFERENDUM NEGATIVE FOR EURO AREA FINANCIAL STABILITY	12:45	11:15-12:10	12:45	13:15-14:10	Tuesday
02/11/2011	GREEK GOVERNMENT SPOKESMAN TOLKAS SAYS REFERENDUM TO GO AHEAD	Outside trading hours	15:30-16:25	Outside trading hours	08:30-09:25	Wednesday
09/11/2011	GREEK PRIME MINISTER PAPANDREOU RESIGNS	09:05	15:40-16:25; 08:30-08:35	09:05	09:40-10:35	Wednesday
25/01/2012	GERMAN CHANCELLOR MERKEL CASTS DOUBTS FOR EUROPE'S CHANCES TO SAVE GREECE	11:51	10:20-11:15	11:50	12:20-13:15	Wednesday
07/02/2012	GREECE, TROIKA STILL TO AGREE ON EU600 MLN 2012 MEASURES	Outside trading hours	15:30-16:25	Outside trading hours	08:30-09:25	Tuesday
10/02/2012	GREEK MINISTERS QUIT OVER AUSTERITY MEASURES VOTING. THE RIGHT-WING PARTY LAOS THAT PARTICIPATES IN THE INTERIM COALITION GOVERNMENT REMOVES ITS SUPPORT FROM THE GOVERNMENT.	11:07	09:40-10:35	11:05	11:40-12:35	Friday
16/02/2012	GREEK PRESIDENT SLAMS GERMAN 'INSULTS' AS BAILOUT TALKS STALL	Outside trading hours	15:30-16:25	Outside trading hours	08:30-09:25	Thursday

Notes: Source: Bloomberg. We round the time of events to the closest 5-minute mark. When a window includes two time intervals, this means that in order to have twelve 5-minutes observations we had to go back (forward) to the previous (next) day. When the event happens outside trading hours (which could be at night, at weekends or holidays) we place the event on the next trading day and the pre-event window will use the last hour of data from the last trading day. The last column on the right shows the day of the week corresponding to the date in the first column. If the event is outside trading hours and the day is a Monday, then the event happened during a weekend. If it is another workday apart from Monday, then the event happened between 16:30 and 08:30 (GMT), or in the first available workday going backwards.

Table 7: *Greek positive events: May 2010 - February 2012*

Date	**Event**	**Time (GMT)**	**Time windows studied**			**Weekday**
			Pre-event	*Event*	*Post-event*	
18/05/2010	EUROPEAN COMMISSION DISBURSES €14.5BN TO GREECE (1ST INSTALMENT)	10:29	09:00-09:55	10:30	10:00-10:55	Tuesday
17/06/2010	IMF PUBLISHES STATEMENT BY THE EC, ECB, AND IMF ON THE INTERIM REVIEW MISSION TO GREECE	12:33	11:05-12:00	12:35	13:05-14:00	Thursday
05/08/2010	EC/IMF/ECB CONCLUDE MISSION TO GREECE	Outside trading hours	15:30-16:25	Outside trading hours	08:30-09:25	Thursday
19/08/2010	EUROPEAN COMMISSION PUBLISHES FIRST GREEK ECONOMIC ADJUSTMENT PROGRAMME FIRST REVIEW	10:08	08:40-09:35	10:10	10:40-11:35	Thursday
13/09/2010	IMF COMPLETES FIRST REVIEW AND DISBURSES €2.57BN TO GREECE (2ND INSTALMENT)	Outside trading hours	15:30-16:25	Outside trading hours	08:30-09:25	Monday
20/12/2010	IMF COMPLETES SECOND REVIEW AND DISBURSES €2.5BN TO GREECE (3RD INSTALMENT)	Outside trading hours	15:30-16:25	Outside trading hours	08:30-09:25	Monday
14/03/2011	LOWER RATES FOR GREECE BACKED BY MERKEL AND EU	Outside trading hours	15:30-16:25	Outside trading hours	08:30-09:25	Monday
15/03/2011	IMF APPROVES 4.1 BILLION-EURO DISBURSEMENT TO GREECE	Outside trading hours	15:30-16:25	Outside trading hours	08:30-09:25	Tuesday
17/06/2011	SARKOZY SAYS MEETING SHOWS FRANCO-GERMAN AGREEMENT ON GREECE AND PSI	12:06	10:35-11:30	12:05	12:35-11:30	Friday
24/06/2011	GREECE REACHES AGREEMENT ON 5-YEAR AUSTERITY PLAN, REUTERS SAYS	Outside trading hours	15:30-16:25	Outside trading hours	08:30-09:25	Friday
29/06/2011	PAPANDREOU'S GOVERNMENT WINS APPROVAL OF GREEK AUSTERITY BILL	15:05	13:35-14:30	15:05	15:35-16:25; 08:30	Wednesday
01/07/2011	GREECE TO GET UP TO EU85 BLN IN NEW RESCUE FUNDS, OFFICIAL SAYS	12:00	10:30-11:25	12:00	12:30-13:25	Friday
04/07/2011	EURO-AREA MINISTERS APPROVE FIFTH TRANCHE OF GREEK AID PACKAGE	Outside trading hours	15:30-16:25	Outside trading hours	08:30-09:25	Monday
11/07/2011	GREECE GAINS APPROVAL FOR EUR3.2 BILLION DISBURSEMENT FROM IMF	Outside trading hours	15:30-16:25	Outside trading hours	08:30-09:25	Monday
22/07/2011	EU SAYS GREECE TO RECEIVE OFFICIAL AID WORTH EU109 BILLION	Outside trading hours	15:30-16:25	Outside trading hours	08:30-09:25	Friday
24/10/2011	EURO-AREA FINANCE CHIEFS APPROVE AID PAYMENT TO GREECE	Outside trading hours	15:30-16:25	Outside trading hours	08:30-09:25	Monday
26/10/2011	GREEK PARLIAMENT GIVES FINAL APPROVAL ON AUSTERITY BILL	Outside trading hours	15:30-16:25	Outside trading hours	08:30-09:25	Wednesday

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Table 7: *Greek positive events: May 2010 - February 2012 (continued)*

Date	**Event**	**Time (GMT)**	**Time windows studied**			**Weekday**
			Pre-event	*Event*	*Post-event*	
01/11/2011	BANKS BACK EU GREEK DEBT	13:55	12:25-13:20	13:55	14:25-15:20	Tuesday
10/11/2011	NEWS ON THE APPOINTMENT OF A NEW PRIME MINISTER LEAK	11:10	09:40-10:35	11:10	11:40-12:35	Thursday
01/12/2011	AID PAYMENT APPROVED BY EURO AREA FINANCE MINISTERS	Outside trading hours	15:30-16:25	Outside trading hours	08:30-09:25	Thursday
06/12/2011	IMF EXECUTIVE BOARD COMPLETES THE FIFTH REVIEW OF GREECE'S PERFORMANCE UNDER THE SBA SUPPORTED PROGRAM AND APPROVES DISBURSEMENT OF €2.2BN.	Outside trading hours	15:30-16:25	Outside trading hours	08:30-09:25	Tuesday
09/01/2012	MERKEL SAYS 'VERY CLOSE AGREEMENT' BETWEEN FRANCE, GERMANY	13:45	12:15-13:10	13:45	14:15-15:10	Monday
09/02/2012	GREECE REACHES AUSTERITY DEAL	13:06	11:35-12:30	13:06	13:35-14:30	Thursday
13/02/2012	PARLIAMENT APPROVES NEW AUSTERITY MEASURES TO SECURE THE €130BN BAILOUT, AMID MASSIVE DEMONSTRATIONS AND VIOLENT RIOTS	Outside trading hours	15:30-16:25	Outside trading hours	08:30-09:25	Monday
21/02/2012	EURO FINANCE MINISTERS SAID TO REACH AGREEMENT ON GREEK BAILOUT	Outside trading hours	15:30-16:25	Outside trading hours	08:30-09:25	Tuesday

Notes: Source: Bloomberg. We round the time of events to the closest 5-minute mark. When a window includes two time intervals, this means that in order to have twelve 5-minutes observations we had to go back (forward) to the previous (next) day. When the event happens outside trading hours (which could be at night, at weekends or holidays) we place the event on the next trading day and the pre-event window will use the last hour of data from the last trading day. The last column on the right shows the day of the week corresponding to the date in the first column. If the event is outside trading hours and the day is a Monday, then the event happened during a weekend. If it is another workday apart from Monday, then the event happened between 16:30 and 08:30 (GMT), or in the first available workday going backwards.

Table 8: *Greek negative events: December 2014 - August 2015*

Date	**Event**	**Time (GMT)**	**Time windows studied**			**Weekday**
			Pre-event	*Event*	*Post-event*	
09/12/2014	GREEK BAILOUT TO BE EXTENDED BY TWO MONTHS	Outside trading hours	15:30-16:25	Outside trading hours	08:30-09:25	Tuesday
05/02/2015	ECB SAYS IT LIFTS WAIVER ON GREEK GOVERNMENT DEBT AS COLLATERAL	Outside trading hours	15:30-16:25	Outside trading hours	08:30-09:25	Thursday
09/02/2015	GREECE RATINGS CUT TO B- FROM B BY S&P; MAY BE CUT FURTHER	Outside trading hours	15:30-16:25	Outside trading hours	08:30-09:25	Monday
17/02/2015	EU MEETING ENDS AFTER GREECE SAYS WON'T TAKE ORDERS ON BAILOUT	Outside trading hours	15:30-16:25	Outside trading hours	08:30-09:25	Tuesday
20/02/2015	GERMAN-LED BLOC WILLING TO LET GREECE LEAVE EURO, SCICLUNA SAYS	12:11	10:40-11:35	12:10	12:40-13:35	Friday
09/03/2015	GREEK CASH MAY LAST FOR 3 WEEKS; OUTLOOK UNCLEAR: EU OFFICIAL	14:16	12:45-13:40	14:15	14:45-15:40	Monday
30/03/2015	GREECE'S ISSUER DEFAULT RATINGS CUT TO CCC FROM B BY FITCH	Outside trading hours	15:30-16:25	Outside trading hours	08:30-09:25	Monday
16/04/2015	GREECE CUT TO CCC+ BY S&P; OUTLOOK NEGATIVE	Outside trading hours	15:30-16:25	Outside trading hours	08:30-09:25	Thursday
24/04/2015	DIJSSELBLOEM SAYS NO CHANCE OF AID WITHOUT COMPREHENSIVE DEAL	10:33	09:05-10:00	10:35	11:05-12:00	Friday
30/04/2015	GREECE GOVT BOND RTG CUT TO Caa2 BY MOODY'S, OUTLOOK NEGATIVE	Outside trading hours	15:30-16:25	Outside trading hours	08:30-09:25	Thursday
05/06/2015	GREECE SAID TO REQUEST DEFERRING JUNE 5 IMF PAYMENT	Outside trading hours	15:30-16:25	Outside trading hours	08:30-09:25	Friday
15/06/2015	EU: BRUSSELS TALKS BETWEEN GREECE, CREDITORS DID NOT SUCCEED	Outside trading hours	15:30-16:25	Outside trading hours	08:30-09:25	Monday
24/06/2015	TSIPRAS SAYS CREDITORS DIDN'T ACCEPT GREEK PROPOSALS: OFFICIAL	09:36	15:05-16:25; 08:30-09:00	09:35	10:5-11:00	Wednesday
26/06/2015	GREECE SAID TO REJECT EU15.5B BAILOUT EXTENSION PROPOSAL	14:22	12:50-13:45	14:20	14:50-15:45	Friday
29/06/2015	GREEK GOVERNMENT ISSUES CAPITAL CONTROL DECREE, SHUTS BANKS	Outside trading hours	15:30-16:25	Outside trading hours	08:30-09:25	Monday
30/06/2015	GREECE CUT TO CCC- FROM CCC BY S&P, OUTLOOK NEGATIVE	Outside trading hours	15:30-16:25	Outside trading hours	08:30-09:25	Tuesday
01/07/2015	TSIPRAS CALLS FOR 'NO' VOTE IN JULY 5 REFERENDUM	14:37	13:05-14:00	14:35	14:05-15:00	Wednesday
06/07/2015	GREEK REFERENDUM: NO AHEAD WITH 61% IN EARLY PROJECTION	Outside trading hours	15:30-16:25	Outside trading hours	08:30-09:25	Monday

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Table 8: *Greek negative events: December 2014 - August 2015 (continued)*

Date	**Event**	**Time (GMT)**	**Time windows studied**			**Weekday**
			Pre-event	*Event*	*Post-event*	
07/07/2015	ECB ADJUSTS HAIRCUTS ON ELA COLLATERAL FOR GREECE	Outside trading hours	15:30-16:25	Outside trading hours	08:30-09:25	Tuesday

Notes: Source: Bloomberg. We round the time of events to the closest 5-minute mark. When a window includes two time intervals, this means that in order to have twelve 5-minutes observations we had to go back (forward) to the previous (next) day. When the event happens outside trading hours (which could be at night, at weekends or holidays) we place the event on the next trading day and the pre-event window will use the last hour of data from the last trading day. The last column on the right shows the day of the week corresponding to the date in the first column. If the event is outside trading hours and the day is a Monday, then the event happened during a weekend. If it is another workday apart from Monday, then the event happened between 16:30 and 08:30 (GMT), or in the first available workday going backwards.

Table 9: *Greek positive events: December 2014 - August 2015*

Date	**Event**	**Time (GMT)**	**Time windows studied**			**Weekday**
			Pre-event	*Event*	*Post-event*	
22/01/2015	DRAGHI: ECB COULD BUY GREEK DEBT FROM JULY AFTER SMP REDEMPTION	14:24	12:55-13:50	14:25	14:55-15:50	Thursday
23/02/2015	EUROGROUP SPOKESPERSON SAYS AGREEMENT REACHED ON GREECE	Outside trading hours	15:30-16:25	Outside trading hours	08:30-09:25	Monday
10/07/2015	GREECE SEEKS AT LEAST EU53.5B IN BAILOUT LOANS: PARLIAMENT BILL + REFORM PROPOSAL READY	Outside trading hours	15:30-16:25	Outside trading hours	08:30-09:25	Friday
13/07/2015	EURO SUMMIT HAS UNANIMOUSLY REACHED AGREEMENT ON GREECE	Outside trading hours	15:30-16:25	Outside trading hours	08:30-09:25	Monday
16/07/2015	GREEK GOVERNMENT HAS VOTES TO APPROVE BAILOUT BILL, TALLY SHOWS	Outside trading hours	15:30-16:25	Outside trading hours	08:30-09:25	Thursday
23/07/2015	GREEK GOVERNMENT HAS VOTES TO APPROVE BAILOUT BILL, TALLY SHOWS (2)	Outside trading hours	15:30-16:25	Outside trading hours	08:30-09:25	Thursday
11/08/2015	GREECE, CREDITORS AGREE ON TERMS FOR THIRD BAILOUT: EU OFFICIAL	Outside trading hours	15:30-16:25	Outside trading hours	08:30-09:25	Tuesday
13/08/2015	GREEK ECONOMY GREW 0.8% IN 2Q; MEDIAN EST. 0.5% CONTRACTION	09:08	15:40-16:25; 08:30-08:35	09:10	09:40-10:35	Thursday
19/08/2015	GREECE RAISED TO CCC FROM CC BY FITCH	Outside trading hours	15:30-16:25	Outside trading hours	08:30-09:25	Wednesday

Notes: Source: Bloomberg. We round the time of events to the closest 5-minute mark. When a window includes two time intervals, this means that in order to have twelve 5-minutes observations we had to go back (forward) to the previous (next) day. When the event happens outside trading hours (which could be at night, at weekends or holidays) we place the event on the next trading day and the pre-event window will use the last hour of data from the last trading day. The last column on the right shows the day of the week corresponding to the date in the first column. If the event is outside trading hours and the day is a Monday, then the event happened during a weekend. If it is another workday apart from Monday, then the event happened between 16:30 and 08:30 (GMT), or in the first available workday going backwards.

Appendix B Regression results

Our main results are summarised in Table 3. In this appendix, we provide the full regression output for each model specification. For the period prior to each Greek financial assistance programme, we examine the effect of positive and negative Greek-related news on other euro area sovereign bond spreads.

Tables 10-13 contain our regression results on the size of spillovers from negative Greek news on Spanish, Italian, Irish and Portuguese sovereign bond spreads in the period prior to the first Greek financial assistance programme. The results from positive Greek news during this period are in Tables 14-17. The results from negative and positive Greek news in the period prior to the second Greek financial assistance programme are in Tables 18-21 and Tables 22-25 respectively. The results from negative and positive Greek news in the period prior to the third Greek financial assistance programme are in Tables 26-29 and Tables 30-33 respectively.

Overall, our estimates are robust to the inclusion of a set of control variables that could confound the effects from Greek news. To control for external/global developments, we include the US 10-year bond yield and the EUR/USD exchange rate. We capture the effect of changes in euro area monetary policy using the event study database produced by Altavilla et al. (2019). Finally, we attempt to control for country-specific developments in our recipient bond markets by identifying some of the main negative and positive events in the same way that we identify Greek news. As in De Santis (2014), our identified events for the other countries mainly relate to credit rating changes. Adding these controls one by one or all together has little effect on our estimated spillovers. The maximum size of the change in the estimated spillovers across all our model specifications is one basis point. We believe this is because our use of an intraday frequency enables us to precisely identify Greek-specific events.

Table 10: *Impact of Greek negative events on Spanish 10Y bond yield spreads to Germany over the period of January 2009 - May 2010*

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
Variables	Dependent: Spanish 10Y bond yield spread to Germany												
Greek negative event	0.03***	0.02***	0.03***	0.03***	0.03***	0.03***	0.02***	0.03***	0.02***	0.02***	0.02***	0.02***	0.02***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
EUR USD exchange rate		-1.12***							-1.12***	-1.13***	-1.08***		-1.08***
		(0.24)							(0.25)	(0.25)	(0.24)		(0.24)
US 10Y yield			0.00						0.00	-0.00	-0.00		-0.00
			(0.00)						(0.00)	(0.00)	(0.00)		(0.00)
Monetary policy dummy				0.00						0.00		0.00	0.00
				(0.00)						(0.00)		(0.00)	(0.00)
Spanish news					-0.01			-0.02**			-0.02***	-0.02**	-0.02***
					(0.01)			(0.01)			(0.01)	(0.01)	(0.01)
Irish news						-0.01		-0.01			-0.00	-0.01	-0.00
						(0.01)		(0.00)			(0.00)	(0.00)	(0.00)
Portuguese news							0.03***	0.03***			0.03***	0.03***	0.03***
							(0.01)	(0.01)			(0.01)	(0.01)	(0.01)
Constant	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Observations	340	340	339	340	340	340	340	340	339	339	339	340	339
R-squared	0.08	0.14	0.08	0.09	0.09	0.09	0.14	0.16	0.14	0.14	0.21	0.16	0.21

Notes: The response variable is the Spanish 10Y bond yield spread to Germany. The estimation method is OLS. Standard errors in parentheses. Significance levels: *** p-value < 0.01, ** p-value < 0.05, * p-value < 0.1.

Table 11: *Impact of Greek negative events on Italian 10Y bond yield spreads to Germany over the period of January 2009 - May 2010*

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
Variables	Dependent: Italian 10Y bond yield spread to Germany												
Greek negative event	0.03***	0.02***	0.03***	0.03***	0.03***	0.03***	0.03***	0.03***	0.02***	0.02***	0.02***	0.03***	0.02***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
EUR USD exchange rate		-1.30***							-1.30***	-1.32***	-1.33***		-1.34***
		(0.27)							(0.27)	(0.27)	(0.27)		(0.27)
US 10Y yield			-0.01**						-0.01**	-0.01***	-0.01**		-0.01***
			(0.00)						(0.00)	(0.00)	(0.00)		(0.00)
Monetary policy dummy				0.00						0.01		0.00	0.01*
				(0.00)						(0.00)		(0.00)	(0.00)
Spanish news					-0.02***			-0.03***			-0.03***	-0.03***	-0.03***
					(0.01)			(0.01)			(0.01)	(0.01)	(0.01)
Irish news						-0.01		-0.01			-0.01	-0.01	-0.01
						(0.01)		(0.01)			(0.01)	(0.01)	(0.01)
Portuguese news							0.01*	0.02**			0.01**	0.02**	0.01**
							(0.01)	(0.01)			(0.01)	(0.01)	(0.01)
Constant	0.00	-0.00	0.00	-0.00	0.00	0.00	-0.00	0.00	0.00	-0.00	0.00	0.00	0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Observations	340	340	339	340	340	340	340	340	339	339	339	340	339
R-squared	0.07	0.13	0.08	0.07	0.09	0.07	0.08	0.11	0.14	0.15	0.18	0.11	0.19

Notes: The response variable is the Italian 10Y bond yield spread to Germany. The estimation method is OLS. Standard errors in parentheses. Significance levels: *** p-value < 0.01, ** p-value < 0.05, * p-value < 0.1.

Table 12: *Impact of Greek negative events on Irish 10Y bond yield spreads to Germany over the period of January 2009 - May 2010*

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
Variables	Dependent: Irish 10Y bond yield spread to Germany												
Greek negative event	0.04***	0.03***	0.04***	0.04***	0.04***	0.04***	0.04***	0.04***	0.03***	0.03***	0.03***	0.04***	0.03***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
EUR USD exchange rate		-1.84***							-1.84***	-1.84***	-1.79***		-1.79***
		(0.48)							(0.48)	(0.48)	(0.48)		(0.48)
US 10Y yield			0.00						-0.00	0.00	-0.00		-0.00
			(0.01)						(0.01)	(0.01)	(0.01)		(0.01)
Monetary policy dummy				-0.00						-0.00		-0.00	-0.00
				(0.01)						(0.01)		(0.01)	(0.01)
Irish news					0.00			0.00			0.00	0.00	0.00
					(0.01)			(0.01)			(0.01)	(0.01)	(0.01)
Spanish news						-0.00		-0.01			-0.01	-0.01	-0.01
						(0.02)		(0.02)			(0.02)	(0.02)	(0.02)
Portuguese news							0.04***	0.04***			0.04***	0.04***	0.04***
							(0.01)	(0.01)			(0.01)	(0.01)	(0.01)
Constant	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00*	-0.00	-0.00*
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Observations	340	340	339	340	340	340	340	340	339	339	339	340	339
R-squared	0.05	0.09	0.05	0.05	0.05	0.05	0.08	0.08	0.09	0.09	0.12	0.08	0.12

Notes: The response variable is the Irish 10Y bond yield spread to Germany. The estimation method is OLS. Standard errors in parentheses. Significance levels: *** p-value < 0.01, ** p-value < 0.05, * p-value < 0.1.

Table 13: *Impact of Greek negative events on Portuguese 10Y bond yield spreads to Germany over the period of January 2009 - May 2010*

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
Variables	Dependent: Portuguese 10Y bond yield spread to Germany												
Greek negative event	0.05***	0.05***	0.05***	0.05***	0.05***	0.05***	0.05***	0.05***	0.05***	0.05***	0.04***	0.05***	0.04***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
EUR USD exchange rate		-1.81***							-1.81***	-1.83***	-1.80***		-1.82***
		(0.44)							(0.44)	(0.44)	(0.41)		(0.41)
US 10Y yield			-0.00						-0.00	-0.00	-0.00		-0.01
			(0.01)						(0.01)	(0.01)	(0.01)		(0.01)
Monetary policy dummy				0.01						0.01		0.01	0.01
				(0.01)						(0.01)		(0.01)	(0.01)
Portuguese news					0.06***			0.07***			0.07***	0.07***	0.07***
					(0.01)			(0.01)			(0.01)	(0.01)	(0.01)
Spanish news						-0.04***		-0.06***			-0.06***	-0.06***	-0.06***
						(0.01)		(0.01)			(0.01)	(0.01)	(0.01)
Irish news							-0.00	0.00			0.00	0.00	0.00
							(0.01)	(0.01)			(0.01)	(0.01)	(0.01)
Constant	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Observations	340	340	339	340	340	340	340	340	339	339	339	340	339
R-squared	0.10	0.14	0.10	0.10	0.18	0.12	0.10	0.22	0.14	0.15	0.26	0.22	0.26

Notes: The response variable is the Portuguese 10Y bond yield spread to Germany. The estimation method is OLS. Standard errors in parentheses. Significance levels: *** p-value < 0.01, ** p-value < 0.05, * p-value < 0.1.

Table 14: *Impact of Greek positive events on Spanish 10Y bond yield spreads to Germany over the period of January 2009 - May 2010*

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
Variables	Dependent: Spanish 10Y bond yield spread to Germany												
Greek positive event	-0.02***	-0.02***	-0.02***	-0.02***	-0.02***	-0.02***	-0.02***	-0.02***	-0.02***	-0.02***	-0.02***	-0.02***	-0.02***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
EUR USD exchange rate		-0.59***							-0.59***	-0.60***	-0.64***		-0.65***
		(0.21)							(0.21)	(0.21)	(0.21)		(0.21)
US 10Y yield			0.00						-0.00	-0.00	-0.00		-0.00
			(0.00)						(0.00)	(0.00)	(0.00)		(0.00)
Monetary policy dummy				0.00						0.00		0.00	0.00
				(0.00)						(0.00)		(0.00)	(0.00)
Spanish news					-0.01*			-0.01**			-0.02**	-0.01**	-0.02**
					(0.01)			(0.01)			(0.01)	(0.01)	(0.01)
Irish news						0.00		0.00			0.00	0.00	0.00
						(0.00)		(0.00)			(0.00)	(0.00)	(0.00)
Portuguese news							0.00	0.01			0.01	0.01	0.01
							(0.01)	(0.01)			(0.01)	(0.01)	(0.01)
Constant	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Observations	341	341	340	341	341	341	341	341	340	340	340	341	340
R-squared	0.12	0.14	0.12	0.12	0.13	0.12	0.12	0.13	0.14	0.14	0.15	0.13	0.16

Notes: The response variable is the Spanish 10Y bond yield spread to Germany. The estimation method is OLS. Standard errors in parentheses. Significance levels: *** p-value < 0.01, ** p-value < 0.05, * p-value < 0.1.

Table 15: *Impact of Greek positive events on Italian 10Y bond yield spreads to Germany over the period of January 2009 - May 2010*

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
Variables	Dependent: Italian 10Y bond yield spread to Germany												
Greek positive event	-0.02***	-0.02***	-0.02***	-0.02***	-0.02***	-0.02***	-0.02***	-0.02***	-0.02***	-0.02***	-0.02***	-0.02***	-0.02***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
EUR USD exchange rate		-0.84***							-0.84***	-0.85***	-0.91***		-0.92***
		(0.26)							(0.25)	(0.25)	(0.25)		(0.25)
US 10Y yield			-0.01**						-0.01***	-0.01***	-0.01***		-0.01***
			(0.00)						(0.00)	(0.00)	(0.00)		(0.00)
Monetary policy dummy				0.00						0.01*		0.00	0.01*
				(0.00)						(0.00)		(0.00)	(0.00)
Spanish news					-0.02***			-0.02***			-0.02***	-0.02***	-0.02***
					(0.01)			(0.01)			(0.01)	(0.01)	(0.01)
Irish news						-0.00		-0.00			-0.00	-0.00	-0.00
						(0.01)		(0.00)			(0.00)	(0.00)	(0.00)
Portuguese news							-0.01*	-0.01			-0.01	-0.01	-0.01
							(0.01)	(0.01)			(0.01)	(0.01)	(0.01)
Constant	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.00	0.00	0.00	0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Observations	341	341	340	341	341	341	341	341	340	340	340	341	340
R-squared	0.07	0.10	0.09	0.07	0.09	0.07	0.08	0.10	0.12	0.13	0.15	0.10	0.16

Notes: The response variable is the Italian 10Y bond yield spread to Germany. The estimation method is OLS. Standard errors in parentheses. Significance levels: *** p-value < 0.01, ** p-value < 0.05, * p-value < 0.1.

Table 16: *Impact of Greek positive events on Irish 10Y bond yield spreads to Germany over the period of January 2009 - May 2010*

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
Variables	Dependent: Irish 10Y bond yield spread to Germany												
Greek positive event	-0.04***	-0.04***	-0.04***	-0.04***	-0.04***	-0.04***	-0.04***	-0.04***	-0.04***	-0.04***	-0.04***	-0.04***	-0.04***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
EUR USD exchange rate		-0.90**							-0.90**	-0.89*	-0.87*		-0.86*
		(0.45)							(0.45)	(0.46)	(0.46)		(0.46)
US 10Y yield			-0.00						-0.00	0.00	-0.00		0.00
			(0.01)						(0.01)	(0.01)	(0.01)		(0.01)
Monetary policy dummy				-0.00						-0.00		-0.00	-0.00
				(0.01)						(0.01)		(0.01)	(0.01)
Irish news					-0.00			-0.00			0.00	-0.00	0.00
					(0.01)			(0.01)			(0.01)	(0.01)	(0.01)
Spanish news						0.01		0.01			0.01	0.01	0.01
						(0.01)		(0.01)			(0.01)	(0.01)	(0.01)
Portuguese news							-0.00	-0.00			-0.00	-0.00	-0.00
							(0.01)	(0.01)			(0.01)	(0.01)	(0.01)
Constant	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Observations	341	341	340	341	341	341	341	341	340	340	340	341	340
R-squared	0.08	0.09	0.08	0.08	0.08	0.08	0.08	0.08	0.09	0.09	0.09	0.08	0.09

Notes: The response variable is the Irish 10Y bond yield spread to Germany. The estimation method is OLS. Standard errors in parentheses. Significance levels: *** p-value < 0.01, ** p-value < 0.05, * p-value < 0.1.

Table 17: *Impact of Greek positive events on Portuguese 10Y bond yield spreads to Germany over the period of January 2009 - May 2010*

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
Variables	Dependent: Portuguese 10Y bond yield spread to Germany												
Greek positive event	-0.04***	-0.04***	-0.04***	-0.04***	-0.04***	-0.04***	-0.04***	-0.04***	-0.04***	-0.04***	-0.04***	-0.04***	-0.04***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
EUR USD exchange rate		-1.09***							-1.09***	-1.10***	-1.24***		-1.25***
		(0.40)							(0.40)	(0.40)	(0.39)		(0.39)
US 10Y yield			-0.00						-0.00	-0.01	-0.00		-0.01
			(0.01)						(0.01)	(0.01)	(0.01)		(0.01)
Monetary policy dummy				0.01						0.01		0.01	0.01
				(0.01)						(0.01)		(0.01)	(0.01)
Portuguese news					0.04***			0.05***			0.05***	0.05***	0.05***
					(0.01)			(0.01)			(0.01)	(0.01)	(0.01)
Spanish news						-0.03***		-0.04***			-0.05***	-0.04***	-0.05***
						(0.01)		(0.01)			(0.01)	(0.01)	(0.01)
Irishe news							0.00	0.00			0.00	0.00	0.00
							(0.01)	(0.01)			(0.01)	(0.01)	(0.01)
Constant	0.00	-0.00	0.00	-0.00	-0.00	0.00	0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Observations	341	341	340	341	341	341	341	341	340	340	340	341	340
R-squared	0.12	0.14	0.12	0.13	0.16	0.14	0.12	0.19	0.14	0.15	0.22	0.20	0.22

Notes: The response variable is the Portuguese 10Y bond yield spread to Germany. The estimation method is OLS. Standard errors in parentheses. Significance levels: *** p-value < 0.01, ** p-value < 0.05, * p-value < 0.1.

Table 18: *Impact of Greek negative events on Spanish 10Y bond yield spreads to Germany over the period of May 2010 - February 2012*

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
	Dependent: Spanish 10Y bond yield spread to Germany													
Greek negative event	0.05***	0.04***	0.04***	0.05***	0.05***	0.05***	0.05***	0.05***	0.05***	0.03***	0.03***	0.03***	0.05***	0.03***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
EUR USD exchange rate		-4.35***								-3.08***	-3.12***	-3.03***		-3.07***
		(0.49)								(0.47)	(0.48)	(0.48)		(0.48)
US 10Y yield			-0.83***							-0.70***	-0.69***	-0.69***		-0.69***
			(0.07)							(0.07)	(0.07)	(0.07)		(0.07)
Monetary policy dummy				-0.01							-0.01		-0.01	-0.01
				(0.01)							(0.01)		(0.01)	(0.01)
Spanish news					-0.01				-0.01			-0.00	-0.02	-0.00
					(0.01)				(0.01)			(0.01)	(0.01)	(0.01)
Irish news						0.02*			0.02*			0.01	0.02*	0.01
						(0.01)			(0.01)			(0.01)	(0.01)	(0.01)
Italian news							0.02		0.02			0.01	0.02	0.01
							(0.01)		(0.01)			(0.01)	(0.01)	(0.01)
Portuguese news								0.00	0.00			-0.00	0.00	-0.00
								(0.01)	(0.01)			(0.01)	(0.01)	(0.01)
Constant	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Observations	463	463	457	463	463	463	463	463	463	457	457	457	463	457
R-squared	0.06	0.19	0.28	0.06	0.06	0.07	0.06	0.06	0.07	0.34	0.34	0.34	0.07	0.34

Notes: The response variable is the Spanish 10Y bond yield spread to Germany. The estimation method is OLS. Standard errors in parentheses. Significance levels: *** p-value < 0.01, ** p-value < 0.05, * p-value < 0.1.

Table 19: *Impact of Greek negative events on Italian 10Y bond yield spreads to Germany over the period of May 2010 - February 2012*

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
Variables	Dependent: Italian 10Y bond yield spread to Germany													
Greek negative event	0.06***	0.05***	0.05***	0.06***	0.06***	0.06***	0.06***	0.06***	0.06***	0.04***	0.04***	0.04***	0.06***	0.04***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
EUR USD exchange rate		-5.17***								-3.91***	-3.95***	-3.90***		-3.94***
		(0.54)								(0.53)	(0.53)	(0.53)		(0.53)
US 10Y yield			-0.87***							-0.69***	-0.69***	-0.69***		-0.69***
			(0.08)							(0.08)	(0.08)	(0.08)		(0.08)
Monetary policy dummy				-0.01							-0.01		-0.01	-0.01
				(0.01)							(0.01)		(0.01)	(0.01)
Italian news					0.02				0.02			0.00	0.02	0.00
					(0.02)				(0.02)			(0.01)	(0.02)	(0.01)
Spanish news						-0.01			-0.01			0.00	-0.01	0.00
						(0.01)			(0.01)			(0.01)	(0.01)	(0.01)
Irish news							0.02		0.02			0.00	0.02	0.00
							(0.01)		(0.01)			(0.01)	(0.01)	(0.01)
Portuguese news								0.00	0.00			-0.00	0.00	-0.00
								(0.01)	(0.01)			(0.01)	(0.01)	(0.01)
Constant	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Observations	463	463	457	463	463	463	463	463	463	457	457	457	463	457
R-squared	0.07	0.23	0.26	0.07	0.07	0.07	0.07	0.07	0.08	0.34	0.35	0.34	0.08	0.35

Notes: The response variable is the Italian 10Y bond yield spread to Germany. The estimation method is OLS. Standard errors in parentheses. Significance levels: *** p-value < 0.01, ** p-value < 0.05, * p-value < 0.1.

Table 20: *Impact of Greek negative events on Irish 10Y bond yield spreads to Germany over the period of May 2010 - February 2012*

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
Variables	Dependent: Irish 10Y bond yield spread to Germany													
Greek negative event	0.06***	0.05***	0.06***	0.06***	0.06***	0.06***	0.06***	0.06***	0.06***	0.05***	0.05***	0.05***	0.06***	0.05***
	(0.01)	(0.01)	(0.02)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.02)	(0.02)	(0.02)	(0.01)	(0.02)
EUR USD exchange rate		-4.79***								-4.15***	-4.27***	-4.09***		-4.22***
		(0.83)								(0.87)	(0.87)	(0.87)		(0.88)
US 10Y yield			-0.57***							-0.40***	-0.38***	-0.40***		-0.38***
			(0.13)							(0.13)	(0.13)	(0.13)		(0.13)
Monetary policy dummy				-0.01							-0.02		-0.02	-0.02
				(0.02)							(0.02)		(0.02)	(0.02)
Irish news					0.04*				0.04*			0.03	0.04*	0.03
					(0.02)				(0.02)			(0.02)	(0.02)	(0.02)
Spanish news						-0.01			-0.01			0.00	-0.01	0.00
						(0.02)			(0.02)			(0.02)	(0.02)	(0.02)
Italian news							-0.00		-0.00			-0.01	-0.00	-0.02
							(0.02)		(0.02)			(0.02)	(0.02)	(0.02)
Portuguese news								0.01	0.01			0.01	0.01	0.00
								(0.02)	(0.02)			(0.02)	(0.02)	(0.02)
Constant	-0.00	-0.00	-0.00	-0.00	-0.01	-0.00	-0.00	-0.00	-0.01	-0.00	-0.00	-0.00	-0.00	-0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Observations	449	449	443	449	449	449	449	449	449	443	443	443	449	443
R-squared	0.04	0.11	0.08	0.04	0.05	0.04	0.04	0.04	0.05	0.13	0.13	0.13	0.05	0.14

Notes: The response variable is the Irish 10Y bond yield spread to Germany. The estimation method is OLS. Standard errors in parentheses. Significance levels: *** p-value < 0.01, ** p-value < 0.05, * p-value < 0.1.

Table 21: *Impact of Greek negative events on Portuguese 10Y bond yield spreads to Germany over the period of May 2010 - February 2012*

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
	Dependent: Portuguese 10Y bond yield spread to Germany													
Greek negative event	0.05***	0.03**	0.04**	0.05***	0.04***	0.05***	0.04**	0.04***	0.04**	0.03**	0.03**	0.03	0.04**	0.03
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
EUR USD exchange rate		-4.59***								-3.30***	-3.30***	-3.04***		-3.03***
		(0.89)								(0.91)	(0.92)	(0.91)		(0.91)
US 10Y yield			-0.83***							-0.69***	-0.69***	-0.67***		-0.67***
			(0.13)							(0.14)	(0.14)	(0.14)		(0.14)
Monetary policy dummy				-0.00							0.00		-0.00	0.00
				(0.02)							(0.02)		(0.02)	(0.02)
Portuguese news					0.03				0.02			0.01	0.02	0.01
					(0.02)				(0.02)			(0.02)	(0.02)	(0.02)
Spanish news						0.00			-0.00			0.00	-0.00	0.00
						(0.02)			(0.02)			(0.02)	(0.02)	(0.02)
Italian news							0.09***		0.09***			0.08***	0.09***	0.08***
							(0.02)		(0.02)			(0.02)	(0.02)	(0.02)
Irish news								0.02	0.02			0.01	0.02	0.01
								(0.02)	(0.02)			(0.02)	(0.02)	(0.02)
Constant	-0.00	-0.00	0.00	0.00	-0.00	-0.00	-0.00	-0.00	-0.00	0.00	0.00	-0.00	-0.00	-0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Observations	463	463	457	463	463	463	463	463	463	457	457	457	463	457
R-squared	0.02	0.07	0.10	0.02	0.02	0.02	0.05	0.02	0.05	0.12	0.12	0.15	0.05	0.15

Notes: The response variable is the Portuguese 10Y bond yield spread to Germany. The estimation method is OLS. Standard errors in parentheses. Significance levels: *** p-value < 0.01, ** p-value < 0.05, * p-value < 0.1.

Table 22: *Impact of Greek positive events on Spanish 10Y bond yield spreads to Germany over the period May 2010 - February 2012*

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
	Dependent: Spanish 10Y bond yield spread to Germany													
Greek positive event	-0.01	-0.01	-0.02**	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01*	-0.01*	-0.01*	-0.01	-0.01*
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
EUR USD exchange rate		-4.07***								-2.99***	-3.01***	-2.97***		-3.00***
		(0.53)								(0.50)	(0.50)	(0.50)		(0.50)
US 10Y yield			-0.76***							-0.66***	-0.65***	-0.66***		-0.65***
			(0.07)							(0.07)	(0.07)	(0.07)		(0.07)
Monetary policy dummy				-0.01							-0.00		-0.01	-0.00
				(0.01)							(0.01)		(0.01)	(0.01)
Spanish news					-0.01				-0.01			-0.00	-0.01	-0.00
					(0.01)				(0.01)			(0.01)	(0.01)	(0.01)
Irish news						0.02			0.02			0.01	0.02	0.01
						(0.01)			(0.01)			(0.01)	(0.01)	(0.01)
Italian news							-0.01		-0.01			-0.01	-0.01	-0.01
							(0.01)		(0.01)			(0.01)	(0.01)	(0.01)
Portuguese news								-0.00	-0.00			-0.01	-0.01	-0.01
								(0.01)	(0.01)			(0.01)	(0.01)	(0.01)
Constant	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Observations	462	462	456	462	462	462	462	462	462	456	456	456	462	456
R-squared	0.00	0.12	0.21	0.01	0.01	0.01	0.00	0.00	0.01	0.27	0.27	0.27	0.01	0.27

Notes: The response variable is the Spanish 10Y bond yield spread to Germany. The estimation method is OLS. Standard errors in parentheses. Significance levels: *** p-value < 0.01, ** p-value < 0.05, * p-value < 0.1.

Table 23: *Impact of Greek positive events on Italian 10Y bond yield spreads to Germany over the period May 2010 - February 2012*

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
Variables	Dependent: Italian 10Y bond yield spread to Germany													
Greek positive event	0.01	0.02*	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
EUR USD exchange rate		-5.06***								-3.96***	-4.01***	-3.82***		-3.87***
		(0.56)								(0.53)	(0.54)	(0.53)		(0.53)
US 10Y yield			-0.80***							-0.66***	-0.65***	-0.66***		-0.65***
			(0.08)							(0.08)	(0.08)	(0.07)		(0.07)
Monetary policy dummy				-0.01							-0.01		-0.01	-0.01
				(0.01)							(0.01)		(0.01)	(0.01)
Italian news					-0.04**				-0.04**			-0.04***	-0.04**	-0.04***
					(0.02)				(0.02)			(0.01)	(0.02)	(0.01)
Spanish news						-0.00			-0.00			0.01	-0.00	0.01
						(0.01)			(0.01)			(0.01)	(0.01)	(0.01)
Irish news							0.04***		0.04***			0.03**	0.04***	0.03**
							(0.01)		(0.01)			(0.01)	(0.01)	(0.01)
Portuguese news								0.00	0.00			-0.00	-0.00	-0.00
								(0.01)	(0.01)			(0.01)	(0.01)	(0.01)
Constant	0.00	0.00	0.00	0.00	0.00	0.00	-0.00	0.00	-0.00	0.00	0.00	0.00	0.00	0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Observations	462	462	456	462	462	462	462	462	462	456	456	456	462	456
R-squared	0.00	0.15	0.19	0.00	0.01	0.00	0.02	0.00	0.03	0.28	0.28	0.30	0.04	0.30

Notes: The response variable is the Italian 10Y bond yield spread to Germany. The estimation method is OLS. Standard errors in parentheses. Significance levels: *** p-value < 0.01, ** p-value < 0.05, * p-value < 0.1.

Table 24: *Impact of Greek positive events on Irish 10Y bond yield spreads to Germany over the period May 2010 - February 2012*

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
Variables	Dependent: Irish 10Y bond yield spread to Germany													
Greek positive event	-0.01	-0.00	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.00	-0.01	-0.01	-0.00
	(0.02)	(0.01)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
EUR USD exchange rate		-4.23***								-3.67***	-3.80***	-3.51***		-3.64***
		(0.91)								(0.93)	(0.94)	(0.94)		(0.94)
US 10Y yield			-0.47***							-0.37***	-0.35***	-0.36***		-0.34***
			(0.13)							(0.13)	(0.13)	(0.13)		(0.13)
Monetary policy dummy				-0.02							-0.02		-0.02	-0.02
				(0.02)							(0.02)		(0.02)	(0.02)
Irish news					0.05***				0.05**			0.04**	0.05***	0.04**
					(0.02)				(0.02)			(0.02)	(0.02)	(0.02)
Spanish news						-0.00			-0.00			0.00	-0.00	0.00
						(0.02)			(0.02)			(0.02)	(0.02)	(0.02)
Italian news							0.01		0.01			0.01	0.01	0.01
							(0.02)		(0.02)			(0.02)	(0.02)	(0.02)
Portuguese news								0.02	0.01			0.01	0.01	0.01
								(0.02)	(0.02)			(0.02)	(0.02)	(0.02)
Constant	-0.00	-0.01	-0.00	-0.00	-0.01*	-0.00	-0.00	-0.01	-0.01*	-0.00	-0.00	-0.01*	-0.01	-0.01
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Observations	448	448	442	448	448	448	448	448	448	442	442	442	448	442
R-squared	0.00	0.05	0.03	0.00	0.02	0.00	0.00	0.00	0.02	0.06	0.07	0.08	0.02	0.08

Notes: The response variable is the Irish 10Y bond yield spread to Germany. The estimation method is OLS. Standard errors in parentheses. Significance levels: *** p-value < 0.01, ** p-value < 0.05, * p-value < 0.1.

Table 25: *Impact of Greek positive events on Portuguese 10Y bond yield spreads to Germany over the period May 2010 - February 2012*

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
Variables	Dependent: Portuguese 10Y bond yield spread to Germany													
Greek positive event	-0.04**	-0.03*	-0.04***	-0.04**	-0.04**	-0.04**	-0.04***	-0.04**	-0.04***	-0.04**	-0.04**	-0.04***	-0.04***	-0.04***
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
EUR USD exchange rate		-4.25***								-3.25***	-3.24***	-3.27***		-3.25***
		(1.00)								(1.02)	(1.03)	(1.02)		(1.03)
US 10Y yield			-0.71***							-0.60***	-0.61***	-0.60***		-0.60***
			(0.14)							(0.14)	(0.15)	(0.14)		(0.14)
Monetary policy dummy				-0.00							0.00		-0.00	0.00
				(0.02)							(0.02)		(0.02)	(0.02)
Portuguese news					0.02				0.02			0.01	0.02	0.01
					(0.02)				(0.02)			(0.02)	(0.02)	(0.02)
Spanish news						0.00			-0.00			-0.00	-0.00	-0.00
						(0.02)			(0.02)			(0.02)	(0.02)	(0.02)
Italian news							0.08***		0.08***			0.08***	0.08***	0.08***
							(0.03)		(0.03)			(0.03)	(0.03)	(0.03)
Irish news								0.02	0.02			0.00	0.02	0.00
								(0.02)	(0.02)			(0.02)	(0.02)	(0.02)
Constant	0.00	0.00	0.00	0.00	0.00	0.00	-0.00	0.00	-0.00	0.00	0.00	-0.00	-0.00	-0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Observations	462	462	456	462	462	462	462	462	462	456	456	456	462	456
R-squared	0.01	0.05	0.06	0.01	0.01	0.01	0.03	0.01	0.03	0.09	0.09	0.11	0.03	0.11

Notes: The response variable is the Portuguese 10Y bond yield spread to Germany. The estimation method is OLS. Standard errors in parentheses. Significance levels: *** p-value < 0.01, ** p-value < 0.05, * p-value < 0.1.

Table 26: *Impact of Greek negative events on Spanish 10Y bond yield spreads to Germany over the period December 2014 - August 2015*

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
	Dependent: Spanish 10Y bond yield spread to Germany												
Greek negative event	0.05***	0.05***	0.04***	0.05***	0.05***	0.05***	0.05***	0.05***	0.04***	0.04***	0.04***	0.05***	0.04***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
EUR USD exchange rate		0.08							-0.71	-0.62	-0.70		-0.60
		(0.68)							(0.65)	(0.65)	(0.67)		(0.67)
US 10Y yield			-0.45***						-0.47***	-0.46***	-0.47***		-0.46***
			(0.09)						(0.09)	(0.09)	(0.09)		(0.09)
Monetary policy dummy				-0.02						-0.01		-0.02	-0.01
				(0.01)						(0.01)		(0.01)	(0.01)
Italian news					0.01			0.03			0.01	0.03	0.01
					(0.03)			(0.04)			(0.03)	(0.04)	(0.03)
Irish news						-0.00		-0.01			-0.01	-0.01	-0.01
						(0.02)		(0.02)			(0.02)	(0.02)	(0.02)
Portuguese news							0.01	0.01			0.00	0.00	0.00
							(0.03)	(0.03)			(0.03)	(0.03)	(0.03)
Constant	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Observations	179	179	179	179	179	179	179	179	179	179	179	179	179
R-squared	0.23	0.23	0.33	0.24	0.23	0.23	0.23	0.23	0.34	0.34	0.34	0.24	0.34

Notes: The response variable is the Spanish 10Y bond yield spread to Germany. The estimation method is OLS. Standard errors in parentheses. Significance levels: *** p-value < 0.01, ** p-value < 0.05, * p-value < 0.1.

Table 27: *Impact of Greek negative events on Italian 10Y bond yield spreads to Germany over the period December 2014 - August 2015*

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
Variables	Dependent: Italian 10Y bond yield spread to Germany												
Greek negative event	0.05***	0.05***	0.03***	0.04***	0.05***	0.05***	0.05***	0.05***	0.03***	0.03***	0.03***	0.04***	0.03***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
EUR USD exchange rate		0.14							-0.61	-0.58	-0.58		-0.55
		(0.62)							(0.60)	(0.60)	(0.61)		(0.62)
US 10Y yield			-0.43***						-0.45***	-0.45***	-0.45***		-0.44***
			(0.08)						(0.08)	(0.08)	(0.08)		(0.08)
Monetary policy dummy				-0.01						-0.00		-0.01	-0.00
				(0.01)						(0.01)		(0.01)	(0.01)
Italian news					0.01			0.02			0.01	0.02	0.01
					(0.03)			(0.03)			(0.03)	(0.03)	(0.03)
Irish news						-0.00		-0.01			-0.01	-0.01	-0.01
						(0.02)		(0.02)			(0.02)	(0.02)	(0.02)
Portuguese news							0.00	0.00			0.00	0.00	0.00
							(0.03)	(0.03)			(0.03)	(0.03)	(0.03)
Constant	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Observations	179	179	179	179	179	179	179	179	179	179	179	179	179
R-squared	0.21	0.21	0.32	0.21	0.21	0.21	0.21	0.21	0.32	0.32	0.32	0.21	0.32

Notes: The response variable is the Italian 10Y bond yield spread to Germany. The estimation method is OLS. Standard errors in parentheses. Significance levels: *** p-value < 0.01, ** p-value < 0.05, * p-value < 0.1.

Table 28: *Impact of Greek negative events on Irish 10Y bond yield spreads to Germany over the period December 2014 - August 2015*

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
Variables	Dependent: Irish 10Y bond yield spread to Germany												
Greek negative event	0.02***	0.02***	0.02***	0.02***	0.02***	0.02***	0.02***	0.02***	0.02***	0.02***	0.02***	0.02***	0.02***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
EUR USD exchange rate		0.20							-0.16	-0.13	-0.15		-0.12
		(0.30)							(0.29)	(0.29)	(0.30)		(0.30)
US 10Y yield			-0.21***						-0.21***	-0.21***	-0.21***		-0.21***
			(0.04)						(0.04)	(0.04)	(0.04)		(0.04)
Monetary policy dummy				-0.01						-0.00		-0.01	-0.00
				(0.01)						(0.01)		(0.01)	(0.01)
Irish news					0.01			-0.00			-0.00	-0.00	-0.00
					(0.01)			(0.01)			(0.01)	(0.01)	(0.01)
Italian news						0.02		0.02			0.01	0.02	0.01
						(0.01)		(0.02)			(0.02)	(0.02)	(0.02)
Portuguese news							0.00	0.00			-0.00	0.00	-0.00
							(0.01)	(0.01)			(0.01)	(0.01)	(0.01)
Constant	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Observations	179	179	179	179	179	179	179	179	179	179	179	179	179
R-squared	0.21	0.21	0.32	0.22	0.21	0.22	0.21	0.22	0.32	0.32	0.33	0.22	0.33

Notes: The response variable is the Irish 10Y bond yield spread to Germany. The estimation method is OLS. Standard errors in parentheses. Significance levels: *** p-value < 0.01, ** p-value < 0.05, * p-value < 0.1.

Table 29: *Impact of Greek negative events on Portuguese 10Y bond yield spreads to Germany over the period December 2014 - August 2015*

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
	Dependent: Portuguese 10Y bond yield spread to Germany												
Greek negative event	0.07***	0.07***	0.06***	0.07***	0.07***	0.07***	0.07***	0.07***	0.05***	0.05***	0.05***	0.07***	0.05***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
EUR USD exchange rate		-0.48							-1.56**	-1.50**	-1.52**		-1.45*
		(0.79)							(0.73)	(0.74)	(0.75)		(0.76)
US 10Y yield			-0.60***						-0.65***	-0.64***	-0.65***		-0.64***
			(0.10)						(0.10)	(0.10)	(0.10)		(0.10)
Monetary policy dummy				-0.02						-0.01		-0.02	-0.01
				(0.01)						(0.01)		(0.01)	(0.01)
Portuguese news					-0.00			-0.00			-0.00	-0.00	-0.00
					(0.04)			(0.04)			(0.03)	(0.04)	(0.03)
Italian news						0.01		0.03			0.01	0.03	0.01
						(0.04)		(0.04)			(0.04)	(0.04)	(0.04)
Irish news							-0.01	-0.02			-0.01	-0.02	-0.01
							(0.02)	(0.03)			(0.02)	(0.03)	(0.02)
Constant	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Observations	179	179	179	179	179	179	179	179	179	179	179	179	179
R-squared	0.29	0.29	0.41	0.30	0.29	0.29	0.29	0.30	0.43	0.43	0.43	0.30	0.43

Notes: The response variable is the Portuguese 10Y bond yield spread to Germany. The estimation method is OLS. Standard errors in parentheses. Significance levels: *** p-value < 0.01, ** p-value < 0.05, * p-value < 0.1.

Table 30: *Impact of Greek positive events on Spanish 10Y bond yield spreads to Germany over the period December 2014 - August 2015*

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
Variables	Dependent: Spanish 10Y bond yield spread to Germany												
Greek positive events	-0.04***	-0.04***	-0.03***	-0.04***	-0.04***	-0.04***	-0.04***	-0.04***	-0.03***	-0.03***	-0.03***	-0.04***	-0.03***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
EUR USD exchange rate		-0.27							-0.80	-0.80	-0.80		-0.80
		(0.53)							(0.51)	(0.52)	(0.53)		(0.53)
US 10Y yield			-0.33***						-0.36***	-0.36***	-0.36***		-0.35***
			(0.08)						(0.08)	(0.08)	(0.08)		(0.08)
Monetary policy dummy				0.01						0.00		0.01	0.00
				(0.01)						(0.01)		(0.01)	(0.01)
Italian news					0.01			0.03			0.02	0.03	0.02
					(0.03)			(0.03)			(0.03)	(0.03)	(0.03)
Irish news						-0.00		-0.01			-0.01	-0.01	-0.01
						(0.02)		(0.02)			(0.02)	(0.02)	(0.02)
Portuguese news							0.01	0.01			0.01	0.01	0.01
							(0.03)	(0.03)			(0.03)	(0.03)	(0.03)
Constant	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Observations	179	179	179	179	179	179	179	179	179	179	179	179	179
R-squared	0.08	0.08	0.17	0.08	0.08	0.08	0.08	0.08	0.18	0.18	0.18	0.09	0.18

Notes: The response variable is the Spanish 10Y bond yield spread to Germany. The estimation method is OLS. Standard errors in parentheses. Significance levels: *** p-value < 0.01, ** p-value < 0.05, * p-value < 0.1.

Table 31: *Impact of Greek positive events on Italian 10Y bond yield spreads to Germany over the period December 2014 - August 2015*

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
Variables	Dependent: Italian 10Y bond yield spread to Germany												
Greek positive events	-0.04***	-0.04***	-0.03***	-0.04***	-0.04***	-0.04***	-0.04***	-0.04***	-0.03***	-0.03***	-0.03***	-0.04***	-0.03***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
EUR USD exchange rate		0.09							-0.42	-0.40	-0.40		-0.38
		(0.46)							(0.45)	(0.45)	(0.46)		(0.46)
US 10Y yield			-0.33***						-0.34***	-0.34***	-0.34***		-0.34***
			(0.07)						(0.07)	(0.07)	(0.07)		(0.07)
Monetary policy dummy				0.01						0.01		0.01	0.01
				(0.01)						(0.01)		(0.01)	(0.01)
Italian news					0.01			0.02			0.02	0.02	0.02
					(0.02)			(0.03)			(0.03)	(0.03)	(0.03)
Irish news						-0.00		-0.01			-0.01	-0.01	-0.01
						(0.01)		(0.02)			(0.02)	(0.02)	(0.02)
Portuguese news							0.00	0.00			0.00	0.00	0.00
							(0.02)	(0.02)			(0.02)	(0.02)	(0.02)
Constant	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Observations	179	179	179	179	179	179	179	179	179	179	179	179	179
R-squared	0.12	0.12	0.23	0.13	0.12	0.12	0.12	0.12	0.23	0.23	0.23	0.13	0.24

Notes: The response variable is the Italian 10Y bond yield spread to Germany. The estimation method is OLS. Standard errors in parentheses. Significance levels: *** p-value < 0.01, ** p-value < 0.05, * p-value < 0.1.

Table 32: *Impact of Greek positive events on Irish 10Y bond yield spreads to Germany over the period December 2014 - August 2015*

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
Variables	Dependent: Irish 10Y bond yield spread to Germany												
Greek positive events	-0.02***	-0.02***	-0.02***	-0.03***	-0.02***	-0.02***	-0.02***	-0.02***	-0.02***	-0.02***	-0.02***	-0.02***	-0.02***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
EUR USD exchange rate		-0.17							-0.48*	-0.47*	-0.49*		-0.48*
		(0.27)							(0.26)	(0.26)	(0.26)		(0.26)
US 10Y yield			-0.20***						-0.21***	-0.21***	-0.21***		-0.21***
			(0.04)						(0.04)	(0.04)	(0.04)		(0.04)
Monetary policy dummy				0.01						0.00		0.01	0.00
				(0.01)						(0.01)		(0.01)	(0.01)
Irish news					0.01			-0.00			0.00	-0.00	0.00
					(0.01)			(0.01)			(0.01)	(0.01)	(0.01)
Italian news						0.02		0.02			0.01	0.02	0.01
						(0.01)		(0.02)			(0.02)	(0.02)	(0.02)
Portuguese news							0.00	0.00			0.00	0.00	0.00
							(0.01)	(0.01)			(0.01)	(0.01)	(0.01)
Constant	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Observations	179	179	179	179	179	179	179	179	179	179	179	179	179
R-squared	0.12	0.12	0.23	0.13	0.12	0.13	0.12	0.13	0.25	0.25	0.25	0.14	0.26

Notes: The response variable is the Irish 10Y bond yield spread to Germany. The estimation method is OLS. Standard errors in parentheses. Significance levels: *** p-value < 0.01, ** p-value < 0.05, * p-value < 0.1.

Table 33: *Impact of Greek positive events on Portuguese 10Y bond yield spreads to Germany over the period December 2014 - August 2015*

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
	Dependent: Portuguese 10Y bond yield spread to Germany												
Greek positive events	-0.06***	-0.06***	-0.05***	-0.06***	-0.06***	-0.06***	-0.06***	-0.06***	-0.05***	-0.04***	-0.05***	-0.06***	-0.04***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
EUR USD exchange rate		-0.09							-0.81	-0.86	-0.77		-0.82
		(0.63)							(0.60)	(0.60)	(0.61)		(0.61)
US 10Y yield			-0.46***						-0.49***	-0.51***	-0.49***		-0.50***
			(0.09)						(0.09)	(0.09)	(0.09)		(0.09)
Monetary policy dummy				-0.00						-0.01		-0.00	-0.01
				(0.01)						(0.01)		(0.01)	(0.01)
Portuguese news					-0.00			-0.00			-0.00	-0.00	-0.00
					(0.03)			(0.03)			(0.03)	(0.03)	(0.03)
Italian news						0.01		0.03			0.02	0.03	0.01
						(0.03)		(0.04)			(0.04)	(0.04)	(0.04)
Irish news							-0.01	-0.02			-0.01	-0.02	-0.01
							(0.02)	(0.02)			(0.02)	(0.02)	(0.02)
Constant	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Observations	179	179	179	179	179	179	179	179	179	179	179	179	179
R-squared	0.14	0.14	0.26	0.14	0.14	0.14	0.14	0.15	0.26	0.27	0.27	0.15	0.27

Notes: The response variable is the Portuguese 10Y bond yield spread to Germany. The estimation method is OLS. Standard errors in parentheses. Significance levels: *** p-value < 0.01, ** p-value < 0.05, * p-value < 0.1.

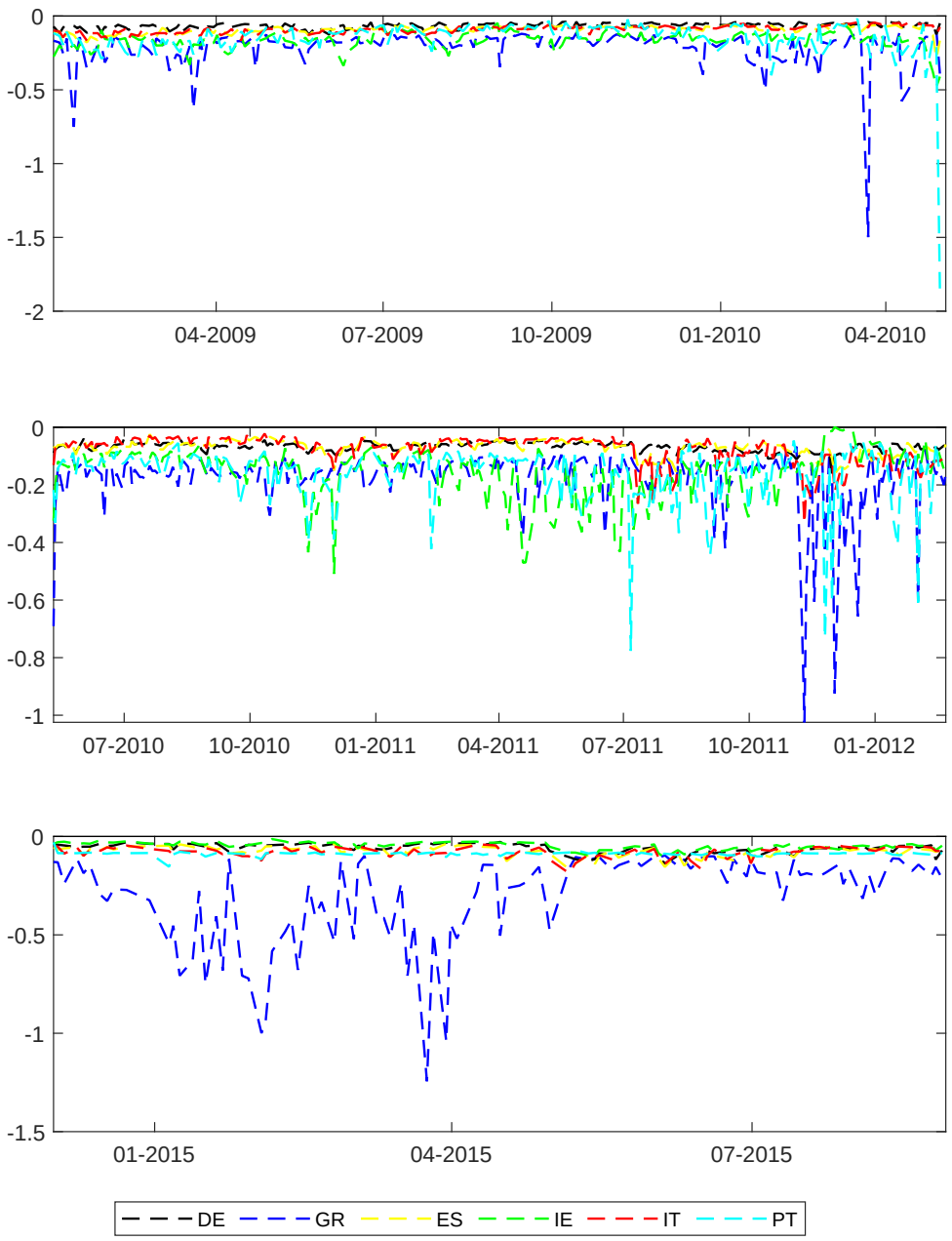
Appendix C Robustness checks

In this section, we provide the results from some robustness checks of our main results. We first assess the robustness of our Value at Risk, quantile IRFs and Marginal Expected Shortfall estimates to alternative time-interval frequency. In the main analysis, we use 5-minute intervals. While our 1% VaR estimates for the periods prior to the first and third Greek financial assistance programmes pass the relevant statistical test, the estimates for the period prior to the second financial assistance programme does not. This is likely due to the enormous volatility during this period. Although our narrative analysis demonstrates that there is value in these estimates, we use 15-minute intervals to somewhat smooth out this extreme volatility. We use the *median* value from each interval in order to avoid outliers affecting the reliability of our estimated time-varying VaR quantiles. This approach leads to substantially smoother time series.

We plot our results for the estimated 1% VaR, quantile IRFs and MES in Figures 6, 7 and 8 respectively. It is clear that our findings are qualitatively similar. The smoother time series give rise to more accurate estimation of the 1% quantile during the period prior to the first Greek financial assistance programme, as indicated by the DQ test statistics (Table 1).

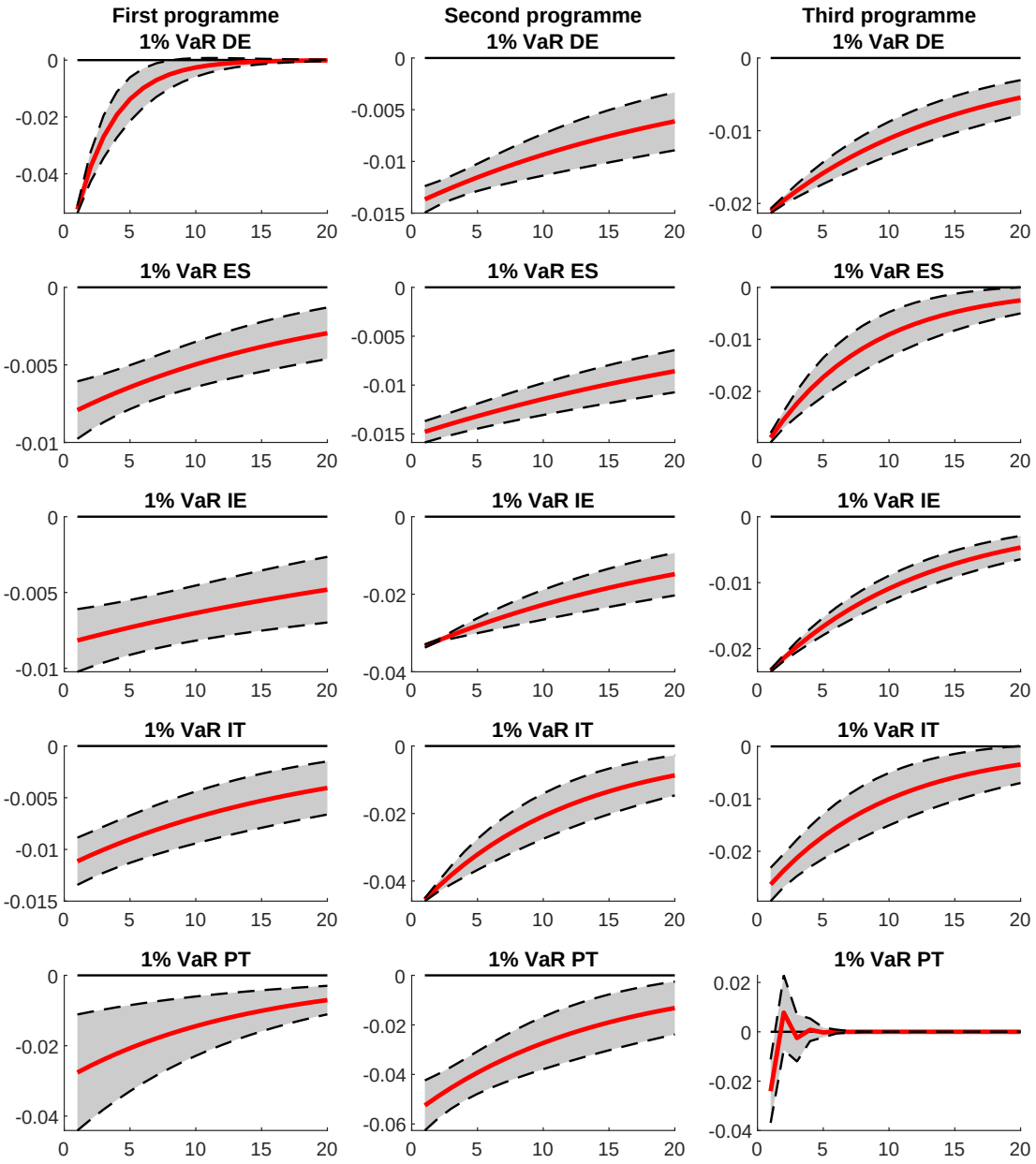
We also assess the effect of Greek news on Irish and Portuguese sovereign bond spreads in shorter windows. More specifically, we examine whether the results are materially different if we examine only the periods prior to the Irish (December 2010) and Portuguese (April 2011) financial assistance programmes. We further consider whether ending our sample period after the Portuguese government's announcement of an austere budget (October 2010) has an effect on the Portuguese results. Tables 34, 35 and 36 contain the results from *negative* Greek news while the results from *positive* Greek news are in Tables 37, 38 and 39.

Figure 6: **Estimated 1% VaR prior to the Greek financial assistance programmes**



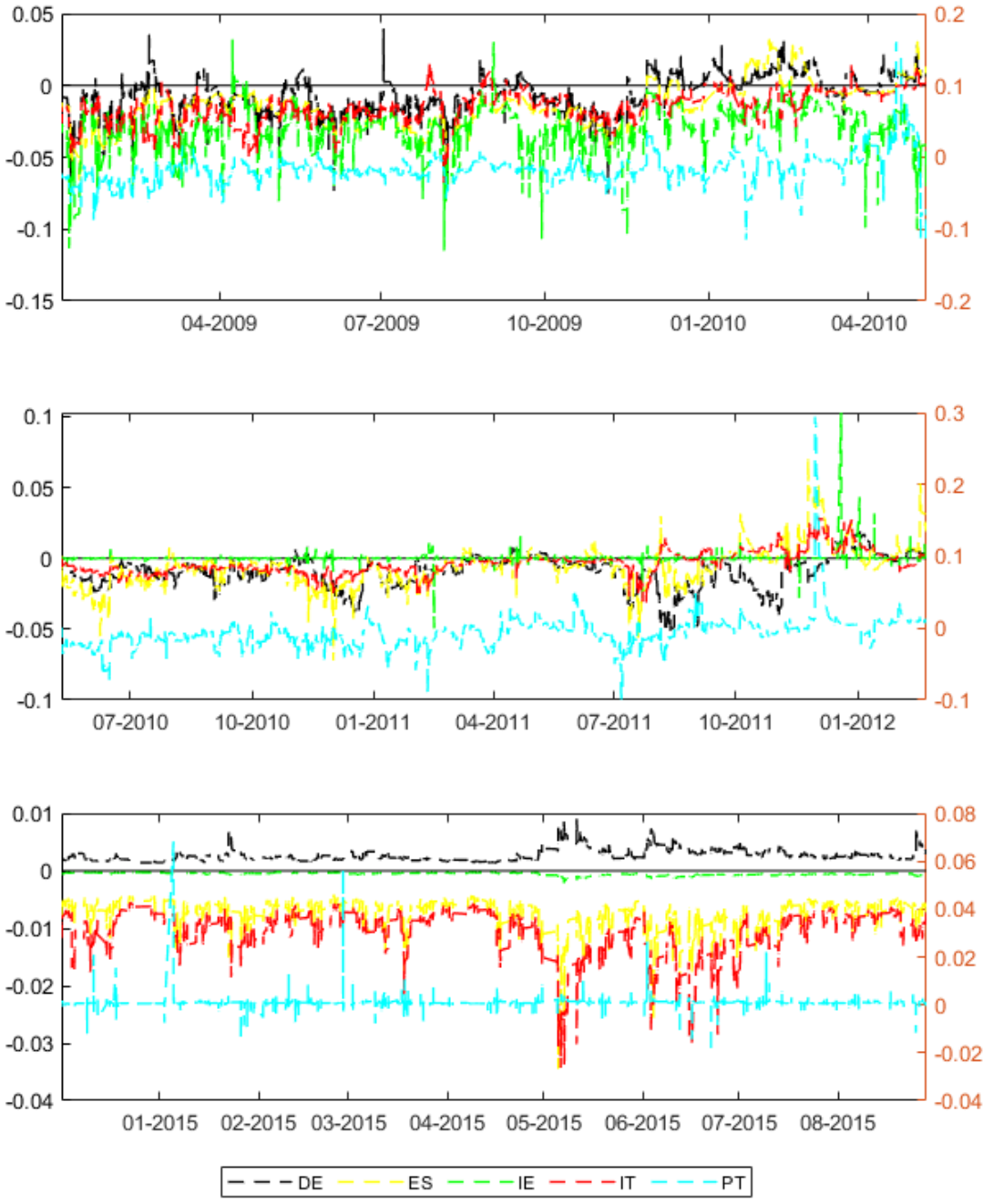
Note: This figure displays our estimated 1% Value at Risk (VaR) for German (DE), Irish (IE), Italian (IT), Spanish (ES) and Portuguese (PT) 10-year sovereign bond returns in the periods *prior* to the first (top row) and third (bottom row) financial assistance programmes. We compute the 1% VaRs by estimating five separate bivariate VAR-for-VaR models, allowing the VaR on Greek sovereign bonds to affect the VaR of the other countries' bond returns. See Section 3.2 for details. We use the *median* value from each 15-minute interval in order to avoid outliers affecting the reliability of our estimated time-varying VaR quantiles. This approach leads to substantially smoother time series. Sample: 01/01/2009 - 03/05/2010 (11154 observations); 10/05/2010 - 21/02/2012 (15246 observations); 01/12/2014 - 31/08/2015 (6105 observations).

Figure 7: **Estimated QIRFs prior to the Greek financial assistance programmes**



Note: This figure displays our estimated quantile impulse response functions (QIRFs) for German (DE), Irish (IE), Italian (IT), Spanish (ES) and Portuguese (PT) 10-year sovereign bond return 1% VaR from a unitary shock to Greek absolute returns in the periods *prior* to the first (left column) and third (right column) financial assistance programmes. We estimate the QIRFs using a VAR-for-VaR model and identify the shock using restrictions on the permitted cross effects. See Section 3.2 for details. The x-axis represents the number of 15-minute intervals. We use the *median* value from each 15-minute interval in order to avoid outliers affecting the reliability of our estimated time-varying VaR quantiles. This approach leads to substantially smoother time series. Sample: 01/01/2009 - 03/05/2010 (11154 observations); 10/05/2010 - 21/02/2012 (15246 observations); 01/12/2014 - 31/08/2015 (6105 observations).

Figure 8: **Estimated MES prior to the Greek financial assistance programmes**



Note: This figure shows the Marginal Expected Shortfall (MES) of the German (DE), Irish (IE), Italian (IT), Spanish (ES) and Portuguese (PT) 10-year sovereign bond returns in the periods prior to the first (top row) and third (bottom row) financial assistance programmes. We compute the MES by using conditional volatilities and correlations estimated with a DCC GARCH, assuming that the Greek returns are at the 1% quantiles. See Section 3.3 for details. We use the *median* value from each 15-minute interval in order to avoid outliers affecting the reliability of our estimated time-varying VaR quantiles. This approach leads to substantially smoother time series. Sample: 01/01/2009 - 03/05/2010 (11154 observations); 10/05/2010 - 21/02/2012 (15246 observations); 01/12/2014 - 31/08/2015 (6105 observations).

Table 34: *Impact of Greek negative events on Irish 10Y bond yield spreads to Germany over the period from May 2010 until the start of the Irish program*

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
Variables	Dependent: Irish 10Y bond yield spread to Germany													
Greek negative event	0.12***	0.11***	0.11***	0.12***	0.12***	0.12***	0.12***	0.12***	0.12***	0.10***	0.10***	0.10***	0.12***	0.10***
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
EUR USD exchange rate		-2.00*								-1.68	-1.69	-1.81*		-1.81*
		(1.07)								(1.06)	(1.06)	(1.07)		(1.07)
US 10Y yield			-0.36***							-0.33**	-0.33**	-0.31**		-0.31**
			(0.13)							(0.13)	(0.13)	(0.13)		(0.14)
Monetary policy dummy				-0.00							0.00		-0.01	-0.00
				(0.02)							(0.02)		(0.02)	(0.02)
Irish news					0.04				0.03			0.03	0.04*	0.03
					(0.02)				(0.02)			(0.02)	(0.02)	(0.02)
Spanish news						-0.01			-0.01			-0.01	-0.01	-0.01
						(0.02)			(0.02)			(0.02)	(0.02)	(0.02)
Portuguese news								0.00	0.00			0.02	0.00	0.02
								(0.04)	(0.04)			(0.04)	(0.04)	(0.04)
Constant	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Observations	125	125	125	125	125	125	125	125	125	125	125	125	125	125
R-squared	0.15	0.18	0.20	0.15	0.17	0.16	0.15	0.15	0.17	0.22	0.22	0.23	0.18	0.23

Notes: The response variable is the Irish 10Y bond yield spread to Germany. The estimation method is OLS. Standard errors in parentheses. Significance levels: *** p-value < 0.01, ** p-value < 0.05, * p-value < 0.1.

Table 35: *Impact of Greek negative events on Portuguese 10Y bond yield spreads to Germany over the period from May 2010 until the start of the Portuguese program*

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
Variables	Dependent: Portuguese 10Y bond yield spread to Germany													
Greek negative event	0.06***	0.05***	0.06***	0.06***	0.06***	0.06***	0.06***	0.06***	0.06***	0.06***	0.06***	0.06***	0.06***	0.06***
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
EUR USD exchange rate		-2.12**								-1.94**	-2.00**	-1.94**		-2.02**
		(0.92)								(0.88)	(0.88)	(0.89)		(0.89)
US 10Y yield			-0.57***							-0.55***	-0.56***	-0.55***		-0.56***
			(0.11)							(0.11)	(0.11)	(0.11)		(0.11)
Monetary policy dummy				0.01							0.02		0.01	0.02
				(0.01)							(0.01)		(0.01)	(0.01)
Portuguese news					0.01				0.01			0.00	0.01	0.00
					(0.02)				(0.02)			(0.02)	(0.02)	(0.02)
Spanish news						-0.01			-0.01			-0.01	-0.01	-0.00
						(0.02)			(0.02)			(0.02)	(0.02)	(0.02)
Irish news								0.00	0.00			-0.00	0.00	-0.00
								(0.01)	(0.01)			(0.01)	(0.01)	(0.01)
Constant	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Observations	232	232	230	232	232	232	232	232	232	230	230	230	232	230
R-squared	0.04	0.07	0.15	0.05	0.04	0.05	0.04	0.04	0.05	0.17	0.18	0.17	0.05	0.18

Notes: The response variable is the Portuguese 10Y bond yield spread to Germany. The estimation method is OLS. Standard errors in parentheses. Significance levels: *** p-value < 0.01, ** p-value < 0.05, * p-value < 0.1.

Table 36: *Impact of Greek negative events on Portuguese 10Y bond yield spreads to Germany over the period from May 2010 until the start of the Irish program*

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
Variables	Dependent: Portuguese 10Y bond yield spread to Germany													
Greek negative event	0.09***	0.08***	0.07***	0.09***	0.09***	0.09***	0.09***	0.09***	0.09***	0.07***	0.07***	0.07***	0.09***	0.07***
	(0.03)	(0.03)	(0.02)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.02)	(0.02)	(0.03)	(0.03)	(0.03)
EUR USD exchange rate		-1.88*								-1.47	-1.48	-1.56		-1.56
		(1.10)								(1.07)	(1.07)	(1.08)		(1.09)
US 10Y yield			-0.45***							-0.42***	-0.43***	-0.42***		-0.43***
			(0.13)							(0.13)	(0.14)	(0.14)		(0.14)
Monetary policy dummy				0.00							0.01		-0.00	0.01
				(0.02)							(0.02)		(0.02)	(0.02)
Portuguese news					0.00				0.00			0.02	0.00	0.02
					(0.04)				(0.04)			(0.04)	(0.04)	(0.04)
Spanish news						-0.02			-0.02			-0.02	-0.02	-0.02
						(0.02)			(0.02)			(0.02)	(0.02)	(0.02)
Irish news								0.02	0.02			0.01	0.02	0.01
								(0.02)	(0.02)			(0.02)	(0.02)	(0.02)
Constant	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Observations	125	125	125	125	125	125	125	125	125	125	125	125	125	125
R-squared	0.09	0.11	0.16	0.09	0.09	0.09	0.09	0.09	0.09	0.18	0.18	0.18	0.09	0.18

Notes: The response variable is the Portuguese 10Y bond yield spread to Germany. The estimation method is OLS. Standard errors in parentheses. Significance levels: *** p-value < 0.01, ** p-value < 0.05, * p-value < 0.1.

Table 37: *Impact of Greek positive events on Irish 10Y bond yield spreads to Germany over the period from May 2010 until the start of the Irish program*

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
Variables	Dependent: Irish 10Y bond yield spread to Germany													
Greek positive event	-0.00	0.00	0.00	0.00	0.00	-0.00	-0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
EUR USD exchange rate		-0.91								-0.76	-0.77	-0.88		-0.86
		(1.12)								(1.11)	(1.12)	(1.12)		(1.13)
US 10Y yield			-0.27**							-0.27**	-0.27**	-0.24*		-0.24*
			(0.13)							(0.13)	(0.13)	(0.13)		(0.14)
Monetary policy dummy				-0.01							0.00		-0.01	-0.00
				(0.02)							(0.02)		(0.02)	(0.02)
Irish news					0.04*				0.04*			0.03	0.04*	0.03
					(0.02)				(0.02)			(0.02)	(0.02)	(0.02)
Spanish news						-0.01			-0.01			-0.01	-0.01	-0.01
						(0.02)			(0.02)			(0.02)	(0.02)	(0.02)
Portuguese news								0.00	0.00			0.01	0.00	0.01
								(0.04)	(0.04)			(0.04)	(0.04)	(0.04)
Constant	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Observations	125	125	125	125	125	125	125	125	125	125	125	125	125	125
R-squared	0.00	0.01	0.03	0.00	0.02	0.00	0.00	0.00	0.03	0.04	0.04	0.06	0.03	0.06

Notes: The response variable is the Irish 10Y bond yield spread to Germany. The estimation method is OLS. Standard errors in parentheses. Significance levels: *** p-value < 0.01, ** p-value < 0.05, * p-value < 0.1.

Table 38: *Impact of Greek positive events on Portuguese 10Y bond yield spreads to Germany over the period from May 2010 until the start of the Portuguese program*

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
Variables	Dependent: Portuguese 10Y bond yield spread to Germany													
Greek positive event	-0.01	-0.00	-0.02	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.02	-0.02	-0.02	-0.01	-0.02
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
EUR USD exchange rate		-2.33**								-1.96**	-2.06**	-1.96**		-2.07**
		(0.97)								(0.93)	(0.93)	(0.94)		(0.95)
US 10Y yield			-0.57***							-0.55***	-0.57***	-0.55***		-0.56***
			(0.11)							(0.11)	(0.11)	(0.11)		(0.11)
Monetary policy dummy				0.01							0.02		0.01	0.02
				(0.02)							(0.01)		(0.02)	(0.01)
Portuguese news					0.01				0.01			0.00	0.01	0.00
					(0.02)				(0.02)			(0.02)	(0.02)	(0.02)
Spanish news						-0.01			-0.01			-0.01	-0.01	-0.01
						(0.02)			(0.02)			(0.02)	(0.02)	(0.02)
Irish news								0.00	0.00			-0.00	0.00	-0.00
								(0.02)	(0.02)			(0.01)	(0.02)	(0.01)
Constant	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Observations	232	232	230	232	232	232	232	232	232	230	230	230	232	230
R-squared	0.00	0.03	0.11	0.00	0.00	0.00	0.00	0.00	0.01	0.12	0.13	0.12	0.01	0.13

Notes: The response variable is the Portuguese 10Y bond yield spread to Germany. The estimation method is OLS. Standard errors in parentheses. Significance levels: *** p-value < 0.01, ** p-value < 0.05, * p-value < 0.1.

Table 39: *Impact of Greek positive events on Portuguese 10Y bond yield spreads to Germany over the period from May 2010 until the start of* ***the austerity budget***

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
Variables	Dependent: Portuguese 10Y bond yield spread to Germany													
Greek positive event	-0.01	-0.00	-0.00	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.00	-0.00	-0.00	-0.01	-0.00
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
EUR USD exchange rate		-1.09								-0.86	-0.88	-0.94		-0.96
		(1.18)								(1.15)	(1.16)	(1.17)		(1.18)
US 10Y yield			-0.42***							-0.41***	-0.42***	-0.41***		-0.41***
			(0.14)							(0.14)	(0.14)	(0.14)		(0.14)
Monetary policy dummy				-0.01							0.00		-0.01	0.00
				(0.02)							(0.02)		(0.02)	(0.02)
Portuguese news					0.00				0.00			0.01	0.00	0.01
					(0.04)				(0.04)			(0.04)	(0.04)	(0.04)
Spanish news						-0.02			-0.02			-0.02	-0.02	-0.02
						(0.02)			(0.02)			(0.02)	(0.02)	(0.02)
Irish news								0.02	0.02			0.01	0.02	0.01
								(0.02)	(0.02)			(0.02)	(0.02)	(0.02)
Constant	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Observations	125	125	125	125	125	125	125	125	125	125	125	125	125	125
R-squared	0.00	0.01	0.07	0.00	0.00	0.01	0.00	0.01	0.01	0.08	0.08	0.08	0.01	0.08

Notes: The response variable is the Portuguese 10Y bond yield spread to Germany. The estimation method is OLS. Standard errors in parentheses. Significance levels: *** p-value < 0.01, ** p-value < 0.05, * p-value < 0.1.

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