

Charles University

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MASTER'S THESIS

**Do markets believe in austerity? Did they
ever believe?**

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Declaration of Authorship

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Prague, April 30, 2020

Signature

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Abstract

We assess the effects of austerity announcements on investors' perception of the government's solvency across the financial cycle. To do so, we construct a unique news dataset utilizing a newswire database which consists of governmental and parliamentary approvals of austerity measures for 11 European countries. We also follow more regular statements of governmental representatives towards austerity measures. The effects are studied on 10-year sovereign bond yield spreads vis-à-vis Germany during the period 01:2000-12:2019. Implementing pooled OLS regressions, we find significant decreasing effects in the pre-crisis period especially for the GIIPSH group (Greece, Ireland, Italy, Portugal, Spain, and Hungary) and decreasing although not significant effects in the post-crisis period. The crisis period manifests itself with increased surprise effects of announcements. The markets adopted announcements of the GIIPSH group as signals of deteriorating solvency which led to further increases of yield spreads. On the other hand, prudent countries (Czechia, France, Netherlands, Poland, and Slovakia) enjoyed a low sensitivity to their announcements across the cycle. Finally, we find that markets react rather on final announcements of austerity measures than to comments expressed by national representatives.

JEL Classification C23, E32, E43, E62, G01, G14, G15,
H61, H72

Keywords Fiscal policy announcements,
Consolidation measures, Political
communication, Interest spreads, Global
financial crisis

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Abstrakt

V rámci této práce posuzujeme dopady oznámení úsporných opatření na vnímání solventnosti vlády ze strany investorů v průběhu finančního cyklu. Za tímto účelem vytváříme jedinečný datový soubor zpráv využívající zpravodajskou databázi, který se skládá z vládních a parlamentních schválení úsporných opatření pro 11 evropských zemí. Dále sledujeme pravidelnější prohlášení vládních představitelů o úsporných opatřeních. Dopady úsporných opatření jsou studovány na 10letých spreadech výnosů státních dluhopisů vůči Německu v období 01:2000–12:2019. Použitím panelového pooled-OLS přístupu jsme zjistili signifikantní snižující dopady na spready dluhopisů v předkrizovém období zejména pro skupinu GIIPSH (Řecko, Irsko, Itálie, Portugalsko, Španělsko a Maďarsko) a snižující, i když nesignifikantní účinky v období po krizi. Krizové období se projevuje zvýšenými efekty oznámení. Trhy přijaly oznámení skupiny GIIPSH jako signály zhoršující se solventnosti, které vedly k dalšímu nárůstu výnosových spreadů. Oproti tomu obezřetné země (Česko, Francie, Nizozemsko, Polsko a Slovensko) se těšily nízké citlivosti na jejich úsporná oznámení napříč finančním cyklem. Na závěr zjišťujeme, že trhy reagují spíše na finální oznámení úsporných opatření než na připomínky vyjádřené zástupci jednotlivých států.

JEL Classification C23, E32, E43, E62, G01, G14, G15,
H61, H72

Keywords Oznámení fiskální politiky, konsolidační opatření, politická komunikace, úrokové sazby, globální finanční krize

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Acronyms

CDS	Credit default swaps
CZ	Czechia
DE	Germany
ECB	European central bank
EMU	European monetary union
EMU	The country group consisting of France, Greece, Ireland, Italy, Netherlands, Portugal and Spain
ES	Spain
FR	France
GIIPS	Country group consisting of Greece, Ireland, Italy, Portugal and Spain
GIIPSH	The country group consisting of Greece, Ireland, Italy, Portugal, Spain and Hungary
GR	Greece
HU	Hungary
IE	Ireland
IRS	Interest rate swaps
IT	Italy
LTRO	Longer-term refinancing operations
NL	Netherlands
NONEMU	The country group consisting of Czechia, Hungary and Poland
OMT	Outright Monetary Transactions program
PO	Poland
Prudent	The country group consisting of Czechia, France, Netherlands, Poland and Slovakia
PT	Portugal
S&P	Standard & Poor's
SK	Slovakia

Master's Thesis Proposal



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Proposed Topic:

Do markets believe in austerity? Did they ever believe?

Motivation:

The government spending affects the economic growth. Its borrowing capabilities may be particularly precious during recessions in which other sectors may be short of available funding. In such periods, governments may introduce various facilities such as guarantee and bailout schemes and other supporting programs to secure institutions and households against a default.

However, governments themselves are subjects of borrowing constraints since the international market assesses an ability to satisfy their present and future debt obligations. Governments are not risk-free: in turn for the increased risk, creditors demand higher yields for issued bonds. The prime strategy to strengthen their credibility against possible default consists of fiscal consolidations which may be performed in two basic ways: tax increases and reductions of government spending.

The market response to government's austerity signals is important as it shows their attitude towards such actions. This is particularly relevant in crisis periods. If markets are indifferent, governments may rather focus on efforts aiming to stabilize the economy without a special interest to their increased debt.

Based on this conjectures, we will focus on fiscal consolidation (austerity) announcements to study the market reaction for possible policy implications. We are particularly interested whether:

- markets do respond to austerity measures and consequently demand lower yields on issued sovereign bonds
- there are any periods in which markets do respond differently

The process leading to the final legal act takes quite a long time in which markets may adjust their pricings with respect to the expected outcome sooner. The final decision date for austerity measures may be thus insignificant. Therefore, we also find important to study whether more regular comments of governmental representatives have similar effects as the final decisions.

Hypotheses:

1. Austerity announcements do decrease government's yield spreads across countries of EU
2. Austerity announcements are robust against the studied period.
3. More regular comments towards possible austerity measures significantly contribute to the decrease of yield spreads.

Methodology:

In order to capture effects of austerity announcements, we will construct unique news dataset which will consist of governmental announcements for European countries in the period of 2000 – 2019. As such, the dataset will enable us to study different time periods across the economic cycle and capture possible changes in market responses. Furthermore, we will try to decrease the selection bias and study larger set of announcements. More regular news may produce different outcomes than restrictive choice of only most relevant events.

Since we are mainly interested in common market reactions, we will study the effects using panel data in first differences. Thanks to that we will be able to analyze impacts across multiple countries at the same time. To capture possible different effects across each country, we will divide the dataset into various sub-groups.

Expected Contribution:

Using unique news dataset will show how more regular announcements affect yield spreads contrary to existing practice which is very restrictive. Furthermore, we will study a much larger time period which enables us to capture different market responses throughout the economic and financial cycle.

Outline:

1. Introduction
2. Literature review
3. Estimation approach and Data
Used Method
Construction of Announcement Dataset
Control variables selection
4. Results
5. Conclusion

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Introduction

The government spending affects economic growth. Its borrowing capabilities may be particularly important during recessions in which other sectors may be short of available funding. However, governments themselves are subjects of borrowing constraints since the international market assesses an ability to satisfy their present and future debt obligations. Governments are not risk-free: in turn for the increased risk, creditors demand higher yields for issued bonds. The prime strategy to strengthen the government's credibility against possible default consists of fiscal consolidations which lead to strengthening the soundness of their budgets.

The market responses to the government's austerity signals are important as they show their immediate perceptions towards such actions. This is particularly relevant in crisis periods. If markets are indifferent, governments may rather focus on efforts to stabilize the economy without a special interest in their increased debt. On the other hand, sensitive reactions reveal increased needs to pay attention to the timing of introduced measures.

To study the market reactions, we construct a unique news dataset from a newswire database which consists of governmental and parliamentary approvals of austerity measures for 11 European countries. Since the market may incorporate intentions of governments earlier than in the day of the final announcement, we also follow more regular statements of governmental representatives towards austerity measures. The effects are studied on domestic bond yield spreads vis-à-vis Germany on daily frequency.

Contrary to De Jong (2018), Falagiarda and Gregori (2015), Beetsma et al. (2013), and Afonso and Strauch (2007), our analysis differs in four important aspects. First, it is performed for a long time period from the beginning of 2000 to the end of 2019. This enables us to study different time periods of the financial and business cycle and to search for various viewpoints towards austerity decisions and comments. Second, the approach to news selection does not rely so heavily on the author's judgments since we collect relevant articles based on carefully chosen search terms necessary to appear in the title of the article. We do it to lower the selection bias established from the intentional selection of only those articles which are checked to be significant in the correct direction. Third, our variables are constructed in a different manner since they represent the final decisions and wider set of comments and fourth, we are interested

primarily in general reaction and thus we study the effects using groups of countries. This may be also seen as a drawback of our analysis since reactions of the market may be more dependent on country specifics.

Using a country unrestricted dataset, our initial results provide support to claim that markets respond rather positively to austerity announcements since *comments* and *decisions* in the pre-crisis period are significant and decreasing the yield spreads. Furthermore, announcements after the crisis period in 2009-2012 produce rather decreasing responses, too although they are not significant on the standard scale. Limited effects are found using the whole timespan, which supports our expectations that the environment in which the market is situated plays an important role. Yet, we find significant decreasing effects of rating changes that support findings of previous research.

The crisis period manifests itself with increased surprise effects of announcements. Markets did pay more attention to austerity signals and evaluated them more negatively. In the case of the *GIIPSH* group (Greece, Ireland, Italy, Spain, and Hungary), markets adopted announcements as signals of deteriorating solvency which led to further increases in yield spreads. Although we do not find the resulting significance robust against the equation specification, the effects were still very strong, and increasing yield spreads. On the other hand, *prudent* countries enjoyed preserving credibility across the periods which was manifested through low sensitivity to announcements of their officials and insignificance towards their comments. Finally, we find that markets react rather on final announcements of austerity measures than to comments expressed by national representatives.

The remainder of this paper is organized as follows: in Chapter 2, we discuss government borrowing constraints and ways of how existing literature approaches effects measurement of fiscal strengthening actions. Chapter 3 presents our estimation approach and it is divided into sections *i)* news dataset creation, *ii)* estimation framework, and *iii)* control variables used to filter out other effects. Results are provided in Chapter 4 and Chapter 5 where the former one presents results for baseline specifications and the latter one the further divisions to different time periods and country groups. At the end of the chapter, we provide a summary of the results. Chapter 6 is devoted to additional robustness checks which focus on only the most important results. Finally, the last chapter provides conclusions to our analysis.

1 Literature Review

The aim of this chapter is to describe topics related to the research questions stated in the Introduction. The chapter is organized as follows. First, we discuss reasons why governments are important especially in the crisis periods and how they served as “lenders of last resort” in the global financial crisis in 2007-2009. Next, we show that they face borrowing constraints and thus solvency must be preserved to ensure the continued achievement of governmental objectives and commitments. To do so, austerity measures may be implemented to enhance the credit reliability. Its macroeconomic effectiveness is discussed as the next topic. In the end of this chapter, we present existing literature concerning market reactions to austerity and other important aspects using variables of our interest.

1.1 Governments as “lenders of last resort”

Governments do affect the economic growth. Their borrowing capabilities are particularly relevant during recessions in which other sectors may be short of available funding. In such periods, governments may introduce various facilities such as guarantee and bailout schemes and other supporting programs to secure institutions and households against default.

This proved again to be important in the last global financial crisis in 2007-2009 where governments presented unambiguously strong interventions especially regards financial system which suffered the most. The overall liability guarantees provided to the banks reached EUR 855 billion in Ireland, EUR 571 billion in UK and EUR 339 billion in Germany over the years 2008-2013. Furthermore, asset injections were provided. In Europe, the highest amounts were supplied in Germany (EUR 144 billion), UK (EUR 123 billion) and Spain (EUR 88 billion) (Gerhardt and Vennet 2017).

However, the crisis and the following recovery schemes took its price. The public deficit of the Eurozone reached 6.2% of GDP in 2009 and 6.2% the year after (Table 1). Greece, Ireland, Portugal, Spain and the UK fall under the 9% in 2009 and 2010. But the UK, contrary to GIIPS, had a significant advantage being able to depreciate its own currency. This was not a solution for GIIPS since they share the euro. In 2011, the deficits started to decline in Europe up to 2.9% in 2014.

Table 1: The general government deficit/surplus for chosen countries

	2008	2009	2010	2011	2012	2013	2014
Greece	-10.2	-15.1	-11.2	-10.3	-8.9	-13.2	-3.6
Ireland	-7	-13.8	-32.1	-12.8	-8.1	-6.2	-3.6
United Kingdom	-5.2	-10.1	-9.3	-7.5	-8.1	-5.3	-5.3
Spain	-4.4	-11	-9.4	-9.6	-10.5	-7	-6
Portugal	-3.8	-9.8	-11.2	-7.4	-5.7	-4.8	-7.2
Hungary	-3.7	-4.5	-4.5	-5.4	-2.4	-2.6	-2.6
Italy	-2.6	-5.2	-4.2	-3.7	-2.9	-2.9	-3
EU (28 countries)	-2.5	-6.6	-6.4	-4.6	-4.3	-3.3	-2.9
Euro area (18 countries)	-2.2	-6.2	-6.2	-4.2	-3.7	-3.1	-2.5
Czechia	-2	-5.5	-4.2	-2.7	-3.9	-1.2	-2.1
Germany	-0.2	-3.2	-4.2	-1	0	-0.1	0.6
Cyprus	0.9	-5.4	-4.7	-5.7	-5.6	-5.1	-9

Source: Eurostat

The gross debt (cumulative debt versus GDP) of the Euro area managed to increase from 68.9% in 2008 to its peak 92.2% in just 6 years (Table 2). After 2014, which is however not provided, the debt started to decline as the overall recovery in European economies begun to build up steadily. The provided Table 2 reveals that not only GIIPS countries were suffering from high debt rates. In 2012, Belgium reached 104.3% and France 90.6% of gross debt.

Table 2: Debt-to-GDP ratio for chosen countries

	2008	2009	2010	2011	2012	2013	2014
Greece	109.4	126.7	146.2	172.1	159.6	177.4	178.9
Italy	102.4	112.5	115.4	116.5	123.4	129	131.8
Belgium	92.5	99.5	99.7	102.6	104.3	105.5	107.5
Portugal	71.7	83.6	96.2	111.4	126.2	129	130.6
Euro area (18 countries)	68.9	79.4	84.9	87	90.1	92	92.2
Germany	65.2	72.6	81.8	79.4	80.7	78.2	75.3
EU (28 countries)	60.7	73.3	79	81.6	84	85.8	86.6
United Kingdom	49.7	63.7	75.2	80.8	84.1	85.2	87
Cyprus	45.6	54.3	56.8	66.2	80.1	103.1	108
Ireland	42.4	61.5	86	110.9	119.9	119.7	104.1
Spain	39.5	52.8	60.1	69.5	85.7	95.5	100.4
Czechia	28.3	33.6	37.4	39.8	44.5	44.9	42.2

Source: Eurostat

1.2 Borrowing constraints: why yields are important

Increased budget deficits and overall debt ratios, however, impose pressure to governments as they need to *i)* raise additional money to fund their rescue or other policies and *ii)* keep the debt service under sustainable threshold to stay solvent. Although there are various ways governments raise funding (e.g. tax collections), we stress the channel via issuing and selling sovereign bonds to the international market. It is the fastest way as the legislative process towards the tax increases and its collection takes considerable time and particularly in crisis periods, time is what matters the most.

However, governments are subjects of market's credit risk assessment, which provides the funding in turn for demanded bond yield. The credit risk is one of the most important components of the bond yield. Thus, the government must preserve credibility in the eyes of the market to "receive" such a price which would be "acceptable" also for the issuer.

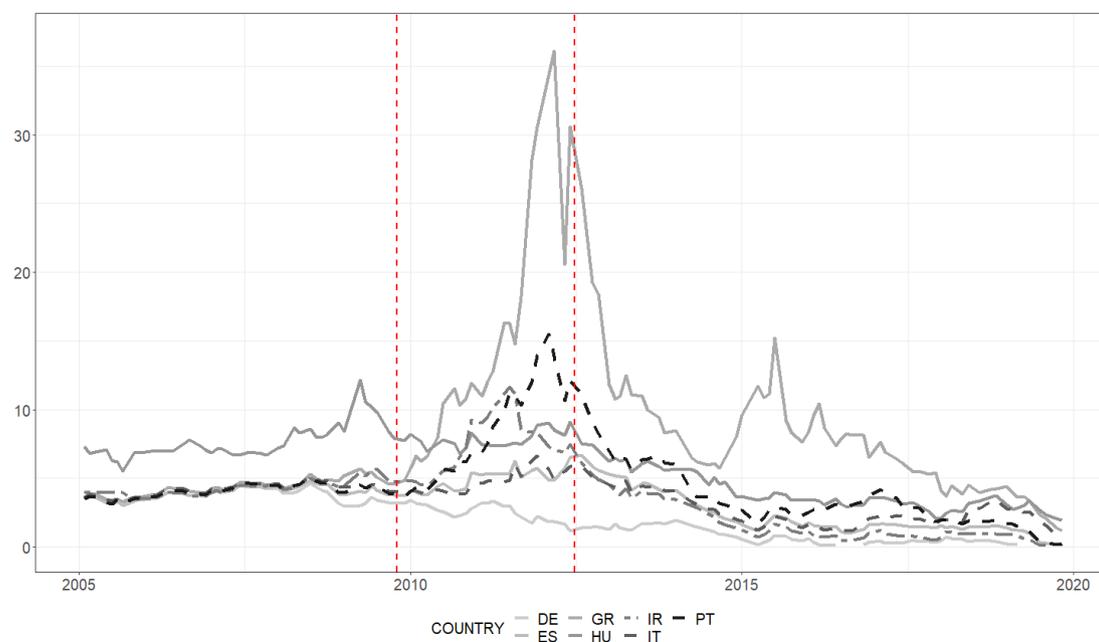
There is a rich literature which aims to explain the credit premium demanded by the market. Usual approach consists of usage of fundamentals as debt-to-GDP, government deficits/surpluses, inflation, exchange rate and other variables alike (Maltritz and Molchanov 2013; Poghosyan 2014; Costantini et al. 2014; or Caggiano and Greco 2012). Other studies also add some other variables, too as Jeanneret (2018). He studies additional effects as an efficiency to collect fiscal revenues and suggests that more effective governments have fewer incentives to default and thus benefit from narrower credit spreads. Fundamentals may be also studied on daily frequency although they represent rather a market sentiment and changes in risk factors – a representative example may be Silvapulle et al. (2016). Some literature concerns the effects of corrections in fundamentals as Afonso and Nunes (2015) or government spending news (Yong and Dingming, 2019).

The second branch focuses on the fragility hypothesis on the European bond market. It suggests that sovereign debt markets in a monetary union without a lender-of-last-resort are vulnerable to self-fulfilling dynamics fueled by pessimistic investor sentiments that can trigger default. Thus, fundamentals are less important than the current market sentiments in crisis periods. De Grauwe (2012), De Grauwe and Ji (2013), Saka et al. (2015), Berger and Pukthuanthong (2016) and Koulovatianos et al. (2018) show in various analyses that the fragility did occur during the subsequent sovereign crisis as markets changed their perceptions with respect to governments fundamentals. Moreover, Saka et al. (2015) suggest that after the Outright Monetary Transactions (OMT) program announcement, the market cooled down.

In the extreme case when the market loses its belief that the government will meet its present and future obligations, issued bond's value vanishes and the traded volume decreases. In such cases governments are asked for too high yields on the primary market and governments rather turn to international institutions as IMF or Troika to seek temporary and exceptional funding. Thus, governments face borrowing constraints and the credit risk is observable through demanded bond yields and traded volumes on the secondary market.

The last crisis has shown that the perceived credibility of government's solvency may be a deadly issue. As the real economy shrunk, the fundamental values deteriorated, and self-fulfilling fears spread out. Figure 1 depicts the development of benchmark long-term bond yields for GIIPS, Germany and the UK. As shown, bond yields in depicted European countries started to rise in the second half of 2009 and their values cumulated in 2012. In this period, yields of Greece reached 29.2%, Portugal 13.85%, Ireland 12.45%, Italy 6.54% and Spain around 6%. On the contrary, German bond yield stayed relatively low as the market perceived it as a safe-haven investment.

Figure 1: Monthly long-term interest rates for chosen countries



Note: Red dashed lines depict the split into periods. First from the left side refers to Papakonstantinou's announcement on 20 October 2009 and the second from the left side the Draghi's "what-ever it takes" announcement on 26 July 2012. Data were obtained from Datastream.

The breakthrough with respect to a stabilization on the bond market is generally determined by Draghi's announcement in mid-2012, the famous "whatever it takes", and subsequent OMT program announcement in September 2012. After the introduced intervention scheme by ECB yield spreads declined to stabilized boundaries. Broader

palette of reasons is provided by Strauch et al. (2016). Authors argue that the deciding actions to ease bond yield spreads have additionally depended also on necessary fiscal austerity, international help and steady communication with creditors and rating agencies.

During the crisis, some European countries were unable to stay sufficiently credible for the market which subsequently asked for high bond yields. Thus, some governments applied for financial assistance at international institutions in turn for fiscal austerity measures and legislative changes. The first bailout package for Greece was announced on 11 April 2010 and consisted of EUR 30 billion in bilateral loans. The economic adjustment program for Ireland was formally agreed in December 2010 and it included a joint financing package of EUR 85 billion for the period 2010-2013.

In total, 7 countries received financial assistance from the European programs during 2007-2014 mostly via EFSF and EFSM. In mid-2010, G20 reacted on the state of public finances with the statement: “recent events highlight the importance of sustainable public finances and the need for our countries to put in place credible, properly phased and growth-friendly plans to deliver fiscal sustainability, differentiated for and tailored to national circumstances. Those countries with serious fiscal challenges need to accelerate the pace of consolidation.”¹

The above-mentioned statement stresses the importance of austerity measures necessary to act against deteriorating credibility of government’s solvency on the international market. We find it important as governments can strengthen their credibility via consolidation schemes and solid and stable approach against the adverse conditions in the economy.

1.3 Strengthening solvency: austerity effectiveness from a macroeconomic point of view

The most straightforward way to strengthen the solvency is an introduction of austerity measures. They may be conducted in two ways: *i) tax increases ii) decrease of government spending*. There is an extensive economic literature concerning the effects of these two types of austerity measures. The discussion follows the general issue, which of them leads to more sustainable economic environment and whether austerity does not yield more harm than good to the economy, which means, whether it is not better to just spend more. We do not want to discuss this matter deeply since we are

¹ “The G-20 Toronto Summit Declaration” on 27 July 2010, available at: <http://www.g20.utoronto.ca/2010/to-communiqué.html>

more interested in bond yields and their responses, but for a broader understanding of our aims, it is suitable to mention basic points.

Austerity effectiveness can be assessed in terms of effective decrease of debt-to-GDP ratio which is perceived as a long-term fundamental determining solvency of the government. Alesina and Ardagna (2009) suggest that fiscal adjustments based upon spending cuts are more likely to reduce deficits and debt ratio than those based upon tax increases. Their analysis is based on OECD countries from 1970 to 2007. Attinasi and Metelli (2017) extend the analysis for the period between 2000-2012. They argue that aims to reduce the debt ratio partially failed if the transmission via tax increases was used. On the other hand, after an initial increase of the debt rate, spending reduction resulted in a positive outcome. Their conclusions silently suggest a double-dip as a consequence of the spending cuts which is also the conclusion presented by Heimberger (2017) or Wolf (2015). In their cases, however, the assessment concerned not only countries under stress but the austerity in the perspective of the whole euro area. As Jadhav, Neelankavil and Andrews (2013) point out, the increase in national debt can stimulate the economy in the recessionary periods, however beyond an optimum level of debt, the rate of growth diminishes. Giuliadori et al. (2015) studied effects of fiscal consolidation announcements on consumer and business confidence and found out that spending-based consolidations may create increases of confidence during booms, while tax increases downgrade the sentiment during the depression.

Antelo and Peón (2014) stress out that Neoclassical and Keynesian approaches, although using different transmission mechanisms, rather agree that “consolidations based on public spending cuts are more effective² than those based on tax increases.” Having this in mind, the result of Creel and Ducoudre (2015) is kind of contrary. Utilizing the iAGS theoretical model, they showed that the spending-based consolidations were less effective than tax-based scenarios and more expensive in terms of the economic growth. However, the model lacks an important feature of stressed countries as it does not assume any form of tax collection inefficiency or corruption. This is rectified by Pappa et al. (2015). Based on Bayesian VARs, the authors show that a labor tax shock strongly increases the shadow employment and thus negatively affects the raise of public revenues. Furthermore, they build a New Keynesian DSGE model with involuntary unemployment, informal sector and corruption in a public sector, which amplifies the negative effect of the labor tax shock while mitigates the effects of the spending cuts.

² Owing to public spending consolidation effectiveness.

In any case, countries facing the fiscal stress do not have much space for choosing just one type of austerity measures. Moreover, Cyprus, Spain and Ireland had enough space for further tax increases as Gayer (2012) cautiously claims.

1.4 Market reactions to austerity measures

We stressed earlier that bond yields provide solid information about credibility and credit riskiness of governments perceived by the market. Thus, we may also study markets reactions to introduced austerity measures via changes of bond yields. Although we showed that not all strategies used to perform austerity measures yield the same outcome from the macroeconomic point of view, still both types lead to a stabilization of governmental budgets.

Next, we discuss how existing literature measures impacts of austerity and rating changes on governmental credit riskiness and what impacts are found. The topic is covered using two main dependent variables which matter the most. Thus, we divide the section into two parts. The first discusses effects observable on credit default swaps (CDS) which consist solely of credit premia of the underlying security. The second part follows literature which exploits bond yield reactions. Since we are more interested in announcements effects, we do primarily follow a literature which assess the effects from the high-frequency point of view.

1.4.1 Credit default swaps reactions

Using dynamic panel regressions, Bergman and Hutchison (2019) study several types of news for GIIPS during the crisis: *i) ECB policy actions, ii) EU programs and iii) domestic austerity measures*. Utilizing daily data of CDS spreads changes, they find “very little” immediate impact on the sovereign or bank bond market risk assessments for domestic austerity measures. Still, it has a decreasing effect on spreads. More significant results were confirmed regarding the ECB policy actions. Actions designed to shore up sovereign markets were often found to lower risk assessments in bank bond markets. Policies designed to ensure the safety and soundness of the European banking system in some cases significantly impacted sovereign debt markets. In their fixed effects model, they use a relatively unusual set of control variables consisting of VIX index, probability of simultaneous default of two or more banks, global risk aversion indicator and 10-year Treasury constant maturity rate.

The same frequency and dependent variable was used by Büchel (2013). He aimed to find effects resulting from speeches of important European representatives regarding GIIPS countries. He divides a large news dataset to “*dovish*” and “*hawkish*”

statements. Utilizing EGARCH framework for the period between 2009 and 2011, he finds that the CDS spreads react more intensively to negative comments that indicate a limited commitment of ECB, EU and EMU representatives to support the GIIPS countries and protect its creditors. Supporting comments yields weaker pattern, on the other hand, they still decrease CDS spreads.

The same model framework was used by Kim et al. (2015). Studying daily data for the period from November 2007 to March 2012, they estimate impacts of scheduled macroeconomic announcements and their spillover effects. They find relatively consistent results where positive announcements do reduce changes of CDS spreads whilst negative ones increase them.

Spillover effects and related co-movements and contagion effects got special attention in the literature. Ters and Urban (2018) find co-movements in CDS spreads in the Visegrad group and strong contagion in GIIPS during the crisis. Drago and Gallo (2016) studied the announcement spillover effects towards rating changes on CDS spreads. Credit ratings are important indicators of credit riskiness of underlying securities. According to their results, the CDS market reacts on rating changes but not on warning (outlook and review) announcements. The size of the negative announcement effect is influenced by the country's previous rating announcements, financial instability, monetary policy, event country macroeconomic and financial determinants and non-event country banking system stability. Their results also show that international bank flows among EMU Member States are a relevant transmission channel of the spillover effect. Other papers inspecting the topic are Silvapulle et al. (2016), Goujard (2017), Poghosyan (2014) or Ehrmann and Fratzscher (2017).

An important link between CDS and bond spreads was found by Calice, Chen and Williams (2013). They claim that the upward trend in bond spreads was driven by movements in liquidity spreads of the CDS market.

1.4.2 Bond yields reactions

To measure the announcement effects, literature uses rather bond yields and their spreads as the dependent variable. This has quite a practical motive, as CDSs suffer from lower liquidity as they are usually traded over the counter (OTC). Furthermore, during the sovereign crisis in Europe, some of them were not traded at all which complicate the estimation utterly. Thus, bond yields are more popular, although they are also driven by other than credit risk factors.

Falagiarda and Gregori (2015) studied the fiscal announcement effects on long-term bond spreads of Italy using daily data. Utilizing GARCH model, they divide 201 news

to 3 administration periods (from 2009 to 2013) and find a significant effect only made by members of Monti's cabinet for both types: budget improvements and budget deteriorations. They retrieve the fiscal policy announcements from ECB Real Time Information System and classify them according to their signaling content about future budget developments to a dummy variable with positive, negative and neutral sentiment. Control variables used consist of a volatility index, total stock market index, TED spread and CDS of Greece. They suggest that the credibility gap of governments in power plays a role.

Similar research was done by De Jong (2018) for Dutch spreads although he focuses on direct changes and not on volatility effects. He finds that announcements indicating an improvement of the budget significantly lower the yield spreads in the Dutch case. His approach to news acquisition is however different since he filters retrieved announcements from Dutch newspapers heavily. From 10 000 initially gained news only 144 are kept for further analysis. They represent rather the negotiation process of consolidation packages rather than final agreements. Furthermore, he mentions that the results may be inflated because they were estimated over a period of high market sensitivity (2008-2014).

Beetsma et al. (2013) study daily effects using pooled OLS for groups of countries divided between *i) GIIPS and ii) other*. Contrary to previously presented papers, they employ another approach to the effect estimation since they use word count, amount of news and other similar explanatory variables in their estimation. They find that more news on average raises the domestic interest spread of GIIPS countries since September 2009.

Since not only fiscal announcements may increase the country's credibility towards the solvency, announcements of other relevant participants may be important, too. We may divide them into several thematic groups as they can shift the credibility from different perspectives. The prime focus may be dedicated to rating changes which directly indicate the credit state of a country. Next, actions of central banks play an important role since they set a policy towards accepted collaterals and values of haircuts. Furthermore, they may also set special facilities and programs which change "the rules of the game". Other important thematic group is the international community and their opinions which help rather with the market sentiment. Finally, special events may play a role.

As the last thematic group may be a little bit vaguely described, we start with a representative study by Gregori and Sacchi (2019). They studied effects of Grexit news on European countries' sovereign bond yields using 64 000 daily news in the period

between December 2014 and October 2015. The modelling framework used was the GARCH one. They found that more news on Grexit drove up the government bond yields of peripheral countries, i.e. for Italy, Spain and Portugal.

Afonso and Strauch (2007) employ unusual utilization of interest swap spreads changes while studying market responses on Stability and Growth Pact announcements regarding surveillance procedures in 2002. Utilizing seemingly unrelated regression framework they found limited market reactions.

Further, ratings are found to be important, too. Afonso, Gomes and Taamouti (2014) used large-scale EGARCH modelling for both bond and stock market returns in 21 countries. They collected 345 announcements from three largest rating agencies and observed same patterns for both types, but more significant with respect to bond market volatility. The contagion is present, and sovereign rating announcements create interdependence among European financial markets with upgrades (downgrades) in one country leading to a decrease (increase) in volatility in other countries.

Paiardini (2014) focused on the Italian bond market, following 68 regularly scheduled macroeconomic announcements and ECB's monetary policy statements during the three-year period (2004-2006). Using intra-day data, she found that macroeconomic news about GDP, business confidence, CPI index or consumer spending have a significant effect on the Italian bond return. The deciding direction varies with respect to formed expectations against the reality if the release is not surprising (Glick and Leduc, 2012). Within half hour, the accommodation can be already completed (Paiardini, 2014).

The effects of macroeconomic announcements towards bond yields are studied, too. Ramchander et al. (2005) find the majority of used news as significantly influential using US bond yields. Andritzky et al. (2007) find that bonds of emerging economies rather react to US policy reactions. Boffelli and Urga (2015) use tick-by-tick data and study jumps and co-jumps using Tobit-GARCH model for EMU countries bond spreads. Macro-announcements as retail sales or GDP are found to be important drivers for both the mean and variance of spreads in pre- and post-announcement levels, but not the only ones. Forward-looking indexes (confidence indicators and purchase manager indexes) also play its role. On the other hand, some monetary news were found to be irrelevant.

The effects of central bank announcements are also intensively discussed as the short-term interest rate adjustments directly affect the whole yield curve (Fiser, 2018). Kinateder and Wagner (2017) use panel regression approach and find out that the

unconventional monetary policy had the spread decreasing effect. Afonso et al. (2019) find that the EC releases of the excessive deficit procedure significantly affect the yield spreads. The EC releases of higher debt and better budget balance forecasts contribute to the rise and the decline of spreads, respectively. Moreover, they find that the announcements of the ECB's key interest rates together with the LTRO and the first covered bond purchase program negatively affect sovereign yield spreads.

2 Estimation Approach and Data

The analysis aims to study the effects of fiscal austerity decisions on government's long-term yield spreads against the German risk-free rate. To do so, we construct a new announcement dataset with a large time span from the beginning of 2000 to the end of 2019 for 11 European countries using the FACTIVA newswire database. Retrieved news are carefully filtered and manually sorted into two groups where the first one contains positive decisions of governments or parliaments on austerity measures and the second one contains comments of national representatives towards the austerity measures. Contrary to existing literature we aim to lower the selection bias as possible and include all thematically relevant news. We do so as we believe that excessive filtering inflates the resulting coefficients of studied variables as in De Jong (2018). Next, we include rating changes as another variable of our interest to compare our austerity variables with something broadly understood and intelligible. To filter out the effects of market sentiments and other risks, we use standard variables used in available literature. Since we are primarily interested in the overall effects of austerity announcements, we follow Beetsma et al. (2013) and estimate our models on a broad set of countries with subsequent divisions to specifically defined groups. To capture different regimes on the market, we estimate regressions on three periods, too.

2.1 Constructing announcement dataset

To test the surprise effects of fiscal austerity announcements, we need to collect relevant news for our analysis. The following sections present the methods that yielded the final dataset.

Austerity announcements are usually understood as final decisions triggering the fiscal austerity behavior. However, the process leading to the final legal act takes quite a long time in which markets may adjust their pricing with respect to the expected outcome based on available information. The final decision dates may be thus insignificant. It is therefore worthy to also study the process itself and especially comments in which the representatives share their attitudes towards the austerity measures. They can be accepted as a proxy for feasibility to trigger the austerity legislation.

2.1.1 News of interest

We find it important to review not only the austerity decisions but also the comments of governmental representatives. These two types are however not the only ones that

may be studied. There is always an initial trigger that starts the debate over the change of government's fiscal behavior. It may be of an internal or external character, but usually, the external one. In the context of the EU, the Stability and Growth Pact serves these purposes as it is an instrument aiming to pursue sound public finances. Yet, its "preventive" and "corrective" arm is forward-looking meaning that the eventual excessive budget is not usually realized as Member states obey the Excessive Deficit Procedure in good times. The trigger may also arise from installation of a new government with different beliefs, or the pure fact, that the state representatives fear insolvency or illiquidity. As we find those reasons quite heterogenous, we do not include them in the analysis, even though they may be crucial in low frequency analysis.

Given the above-mentioned reasons, we split the news dataset obtained with steps in 2.1.2 into two dummy variables, where

- *comments* represent the positive / negative attitudes and proclamations of the representatives towards the upcoming (or already launched) austerity and
- *decision* represents the final announcement by a government or approvals by a parliament.

Other approaches may be using "hawkish" and "dovish" statements division employed by Büchel (2013). In his paper, the division is done by using approving and disapproving statements. Alternatively, De Jong (2018) uses "Major" and "Minor" dummy variables where the first one concerns measures or events explicitly aiming to bring about or leading to a change in a government's solvency position and the latter one the announcements on fiscal measures (or the absence of them) implemented to stick to the initial targets. Our approach is rather a combination of both of these approaches, as the variable *comments* is similar to the approach used by Büchel (2013) and the variable *decision* more so to the analysis of De Jong (2018).

The dummy variable *comments* for country i and time t takes values $\{-1,0,1\}$ where -1 stands for the negative attitude of the representatives and 1 for positive one. The dummy variable *decision* takes only 0,1 values where 1 stands for announcement of the austerity measures approval.

$$COMMENTS_{i,t} \begin{cases} -1 & \text{if title suggests negative attitude to austerity} \\ 0 & \text{if no announcement} \\ +1 & \text{if title suggests positive attitude to austerity} \end{cases}$$

$$DECISION_{i,t} \begin{cases} 0 & \text{if no announcement} \\ +1 & \text{if title suggests fiscal austerity approval} \end{cases}$$

To characterize our two dummy variables in detail, we present Table 5 where examples of positive and negative *comments* and *decisions* are presented. The summary statistics of gained data based on filtering methods in 2.1.2 is available in Table 4.

2.1.2 Approach to news search and filtering techniques

Our approach to news announcement selection sticks with the current practice although it differs in some aspects. Usually, there are two ways existing literature approaches the selection. The first one favors only specific and widely recognized events³ and tests their impacts on the dependent variable (Glick and Leduc 2012; Falagiarda and Reitz 2015; Krieger et al. 2015; Ambler and Rumler 2019). The second approach builds on (more or less efficiently) a “blind” selection to present a stylized effect of specific event types (Beetsma et al. 2013; Falagiarda and Gregori 2015; De Jong 2018 etc.) In both approaches, one may model either expected or unexpected outcomes in various time frequencies. Given that we are interested in the effects of austerity announcements and respective comments, we employ the latter approach to capture not only a few important timestamps during the sovereign crisis but the common attitude of the market towards the austerity decisions.

Moreover, our specific aim is to lower the selection bias of news employed to the analysis to the minimum. We find “blind” selections that retrieve only a few percents of the starting dataset and without any prespecified and unexplained filtering procedure dubious, although it is clear that a lot of filtering (as described further in this chapter) must be done anyway. Honoring this concept, we employ the following methodology to receive variables of our interest.

To collect relevant news announcements, we stick with the FACTIVA database run by Dow Jones & Company, which gathers articles from a wide range of relevant sources. Thus, we do not depend only on the leading information agencies as Thomson Reuters. Moreover, FACTIVA offers a comprehensive tool for a news search which we exploited to decrease the selection bias in our dataset. To do so, we tried to find such a wording specification that would collect all relevant articles without extensive manual separation. Our approach is as follows. We decided to search for 4 basic wording types: *i) what, ii) institution, iii) country, and iv) activity* which must be found in the title of the article. The first one defines the budgetary wordings searched in the databases, the second one defines the relation to the concrete institution, the third one the country

³ To this type we can also include analyses using meetings which happen regularly and in prespecified time. Thanks to that one may employ high-frequency analyses. Widely studied announcements effects are those of FOMC meetings as in Gau and Wu (2017).

which the article is related to, and the last one a verb to specify necessary action or a commitment. These 4 wording types were further elaborated to specify all relevant forms of references on the possible austerity or fiscal consolidating budget. Table 3 shows the wordings and logical operators used for each wording type. As visible from Table 3, our prime interest was to reach the positive *decision* of the fiscal consolidations however news for the variable *comments* with positive or negative connotations got sufficient wording space to be found, too. We also used various setups for some of the types as trying to reach wider heterogeneity of results.

With this method, we were able to retrieve 2 963 news reaching almost all searched countries. Though we aim to keep the selection bias low as possible, we still had to clean the results in various ways. The first step was to manually remove all nonsense and identical results and news concerning other topics. Then, we sorted the news into two separate groups as news concerning “positive” or “negative” *comments* and news identified as *decision* (for further details, see section 2.1.1).

During the manual check, we also found news regarding public unrest as a result of austerity measures, comments of representatives of other governments and international institutions, and economic analyses of other individuals in our dataset. These were omitted as we focus on national government announcements. They also did not represent a significant proportion enabling the addition to the final dataset. We further removed some of the searched countries from our analysis as they did not reach set threshold⁴ for a number of articles (7 countries). After described filtering, we register 1 781 news.

The next step was to decide correctly to which day the announcement should be assigned. As news appear throughout the whole day, we assumed (where it was possible as not all articles had a timestamp of the release) that the effect may arise until 16:58 hours of the working day. For news released after this threshold, they were accounted for the next working day. This is also applied by Büchel (2013). News published during the weekend were moved to the next working day as well. It was also manually checked for both types of displacements, whether the same news had not already been published before the threshold hour or working day. In such cases, they were shifted to the correct day. Further, we decided to lower the number of news

⁴ The threshold was set on 30 articles.

agencies publishing in our news dataset since many of those with a lower number of news only repeated information already available by another agency.⁵

Table 3: Wording types used for news search and combinations

Wording type: What?	
SETUP 1:	(fiscal <i>or</i> budget <i>or</i> deficit <i>or</i> budget deficit <i>or</i> payment <i>or</i> payments) <i>and</i> (consolidation <i>or</i> stabilization <i>or</i> adjustment <i>or</i> restraint <i>or</i> restraintor <i>or</i> reduction <i>or</i> tightening <i>or</i> cut <i>or</i> cuts <i>or</i> decrease <i>or</i> decreases) <i>or</i> (austerity <i>or</i> tax increase <i>or</i> tax increases)
Wording type: Institution	
SETUP 1:	(pm <i>or</i> prime minister <i>or</i> finmin <i>or</i> fin min <i>or</i> finance minister <i>or</i> tax-minister <i>or</i> government <i>or</i> gov <i>or</i> govt <i>or</i> state)
SETUP 2:	(parliament <i>or</i> mps <i>or</i> deputies)
Wording type: Activity	
SETUP 1:	(say <i>or</i> says <i>or</i> tell <i>or</i> tells <i>or</i> announce <i>or</i> announces <i>or</i> claim <i>or</i> claims <i>or</i> approve <i>or</i> approves <i>or</i> support <i>or</i> supports <i>or</i> back <i>or</i> backs <i>or</i> pass <i>or</i> passes <i>or</i> passed <i>or</i> cut <i>or</i> cuts <i>or</i> target <i>or</i> targets <i>or</i> accept <i>or</i> accepts)
SETUP 2:	(said <i>or</i> told <i>or</i> announced <i>or</i> claimed <i>or</i> approved <i>or</i> supported <i>or</i> backed <i>or</i> passed <i>or</i> targeted <i>or</i> accepted)
Wording type: Where?	
AT - Austria	(Austria <i>or</i> Austrian <i>or</i> Austrians)
BE - Belgium	(Belgium <i>or</i> Belgian <i>or</i> Belgians)
CZ - Czech Republic	(Czech Republic <i>or</i> Czechia <i>or</i> Czech <i>or</i> Czechs)
DK - Denmark	(Denmark <i>or</i> Danish <i>or</i> Danes)
ES - Spain	(Spain <i>or</i> Spanish <i>or</i> Spaniards)
FI - Finland	(Finland <i>or</i> Finnish <i>or</i> Finns)
FR - France	(France <i>or</i> French <i>or</i> Frenchmen)
GB - United Kingdom	(United Kingdom <i>or</i> Great Britain <i>or</i> British <i>or</i> Brits <i>or</i> Briton)
GR - Greece	(Greece <i>or</i> Greek <i>or</i> Greeks)
HU - Hungary	(Hungary <i>or</i> Hungarian <i>or</i> Hungarians)
IE - Ireland	(Ireland <i>or</i> Irish)
IT - Italy	(Italy <i>or</i> Italian <i>or</i> Italians)
NL - Netherlands	(Netherlands <i>or</i> Dutch <i>or</i> Dutchmen <i>or</i> Netherlanders)
PO - Poland	(Poland <i>or</i> Polish <i>or</i> Poles)
PT - Portugal	(Portugal <i>or</i> Portuguese)
RO - Romania	(Romania <i>or</i> Romanian <i>or</i> Romanians)
SE - Sweden	(Sweden <i>or</i> Swedish <i>or</i> Swedes)
SI - Slovenia	(Slovenia <i>or</i> Slovenian <i>or</i> Slovenians <i>or</i> Slovenes)
SK - Slovakia	(Slovakia <i>or</i> Slovak <i>or</i> Slovaks)

⁵ This approach is in line with Büchel (2013) although we employed another methodology for the decision. A full list of remaining information agencies is provided in Annex.

Finally, we decided whether the announcement day belongs to *decision* or *comments* (for details, see section 2.1.1). We assumed that the former one should have absolute priority over the *comments* and thus, having both types of news in one day, only the austerity announcement was considered. For positive and negative *comments* found on the same day, we omitted that day from our sample. This is in line with De Jong (2018). With the above-mentioned filtering methods, we gained 1 132 news that account for 521 unique “comment” days and 151 “decision” days of final countries considered. Table 4 presents the resulting news dataset with respect to countries to which it is applied. Due to our initial setup for news search, there are only 56 cases the negative *comments*, i.e. only 8.3% of the total news dataset. This is however a stylized problem in our approach even using a less restrictive method at the beginning of the dataset construction. Due to the low number of negative *comments* we do not separate them into two variables as in Büchel (2013).

Table 4: Summary statistics of reached announcements

Country / Dummy announcement type	COMMENTS	COMMENTS	DECISION	Total
	-1	1	1	
PO	3	53	9	65
CZ	2	33	15	50
ES	3	39	14	56
FR	5	66	8	79
GR	18	57	33	108
HU	1	61	13	75
IE	4	32	3	39
IT	8	41	19	68
NL	4	20	8	32
PT	8	37	21	66
SK		26	8	34
Total	56	465	151	672

Source: Factiva, own computations

To shed more light on the titles in the final dataset, we present randomly chosen news for each dummy variable in Table 5. We also provide graphical representations of both variables with respect to time and country in next sections of our analysis.

Table 5: Examples of news in dataset

COMMENTS (+1)		
News title	Country	Date
<i>France aiming to cut deficit as fast as possible-PM.</i>	FR	2002-05-24
<i>Czech govt leaders back deficit reduction goal.</i>	CZ	2004-04-06
<i>Hungary PM says will not soften budget cuts in 2009</i>	HU	2006-07-04
<i>Greece Aims To Cut Deficit To 9.4% Of GDP - Fin Min</i>	GR	2009-11-05
<i>Portugal might raise taxes to cut deficit: finance minister</i>	PT	2010-05-11
<i>Irish PM: social welfare payments may be cut further</i>	IE	2010-11-24
<i>Portugal To Cut Budget Deficit To 3% Of GDP In '12 -Fin Min</i>	PT	2011-03-11
<i>Greek finmin Venizelos says ready to assume political cost for austerity</i>	GR	2011-10-14
<i>Rutte urges Dutch MPs to back austerity package</i>	NL	2012-04-24
<i>French President François Hollande's Budget Cuts Force Mayors to Adjust; Government Slashes Financial Support for Towns and Regions by \$13.8 Billion</i>	FR	2014-11-06
COMMENTS (-1)		
News title	Country	Date
<i>Italian Govt Divided Over Budget Cuts</i>	IT	2006-09-05
<i>Irish Deputy PM says expects lower fiscal adjustment</i>	IE	2013-09-10
<i>Greek PM against early elections, says no new austerity measures</i>	GR	2013-08-05
<i>Greece Finmin:Does Not Detail How Will Cut '10 Deficit To 8.7%</i>	GR	2009-12-18
<i>France Finmin: Can't Cut Deficit, Do Recovery Plan Same Time</i>	FR	2009-11-13
DECISION (+1)		
News title	Country	Date
<i>Czech government coalition agrees to cut proposed 2003 state budget</i>	CZ	2002-10-21
<i>Dutch government agrees fresh budget cuts.</i>	NL	2004-07-12
<i>Hungary's parliament approves austerity measures aimed to reduce huge state budget gap</i>	HU	2006-07-11
<i>Greek parliament approves austerity bill</i>	GR	2010-03-05
<i>Portuguese parliament approves austerity budget</i>	PT	2010-03-15
<i>Italy's Govt Approves 2011-14 Budget Cuts</i>	IT	2011-07-01
<i>Italy PM's Austerity Plan Backed By Lower House Of Parliament</i>	IT	2011-12-19
<i>World stock markets rise after Greek parliament passes harsh austerity package</i>	GR	2012-02-13

Source: Factiva, own computations

2.2 General estimation approach

Next, we discuss the approach which is used to measure effects from collected news. It is valid to assume that positive signs towards fiscal prudence should lower demanded government yields for bonds and CDSs as it may lower the probability of a country's default. As shown in the Literature Review, many studies analyzing periods slightly before and during the crisis show that concrete announcements did decrease demanded yields or volatility. However, not many of them run their analysis for a larger time span and they do not follow more regular comments of representatives which may build expectations of market participants towards possible austerity measures. Our goal is to measure overall surprise elements of market participants which manifest themselves with changes of bond or CDSs yields in their credit risk components.

To capture the surprise elements from collected news, it is desired to use such a frequency of data that enables to capture the immediate market reaction. Our framework allows us to employ the daily frequency analysis. Unfortunately, fiscal announcements do not appear on prespecified times and dates which would enable to employ even higher, intraday, frequency as shown in Boffelli and Urga (2015). Also, using such a long period as we do and for so many countries, it would be necessary to deal with basic problems such as simple data collection or estimation of the market reaction lags in the intraday analysis. As we aim to study the overall attitude of markets towards announced actions, the highest employable frequency is a daily one. Described issues also favor a usage of bond yield time series. Although they are driven also by other than credit risk components, CDSs suffer from low market liquidity and trading interruptions. Their daily changes (especially during the crisis period) would not represent the reactions fully.

Further, the methodological approach to the estimation must be wisely considered with respect to our goals. As such we find suitable to exploit panel estimations with the first difference approach. This method is favored over the other ones as it captures the general perspective towards announcement effects. The usage of the first difference approach cancels-out the country-specific constant term (as shown in Eq. 1) and increases the short-term frequencies magnitude of analyzed data. To be consistent with this approach, we do assume that announcement surprise effects are incorporated into the bond pricing at least on the day of the news release.

The first difference approach is also beneficial because it filters out short-term effects appearing in previous days. This is particularly important as the credit premium of bond yields depend on the fiscal situation of a government. As fiscal conditions of a government deteriorate, the credit premia increase. However, using the first

differencing may positively contribute to the expected credit riskiness as the positive effect of the austerity decision should be present. Besides, long-term effects (e.g. the introduction of the OMT program) should be also decreased. However, we admit that the second moment of the process shows that quite a long time is necessary to calm uncertainty on markets.

$$\Delta y_{i,t} = \Delta c_i + (\Delta x_{i,t})' \beta + \epsilon_{i,t} - \epsilon_{i,t-1} = (\Delta x_{i,t})' \beta + u_{i,t} \quad (1)$$

To estimate the above-mentioned setup, we utilize the panel data approach using pooled OLS method despite Breusch-Pagan Lagrange Multiplier test suggestions favoring random effects method. Other tests (Honda and King-Wu specifications) however confirmed our choice. To be sure that we did not leave unexplained parameters in residuals, we also run regressions using random effects approach. Yet, regression results do not deviate (only on the third or fourth decimal place after transformations presented in section 2.6) and we do not find any change in the significance of estimated parameters.⁶

Based on existing theoretical literature concerning panel data estimation (e.g. Greene, 2012), one may also employ dynamic panel data models with lagged dependent variable. A popular method often used is by Arellano and Bond (1991). The approach introduces autocorrelation into the estimation and thus GMM methods must be used to gain unbiased estimates. Yet, the bias decreases with additional t included in the estimation (Henningsen and Henningsen, 2019, p. 389). With this reasoning, Bergman et al. (2019) decided to estimate the dynamic panel data model only with the fixed effects methods. Our initial testing for various estimation techniques showed that the dynamic panel data models do not yield significantly better results compared to the baseline regressions without the lagged dependent variable. Thus, we did not use this estimation technique.

2.3 Dependent variable and its form

As we have already stated, the bond yields are suitable to the estimation of news effects. They are driven by several risk factors that must be taken into account during the analysis to gain consistent estimates. Kučera et al. (2017) identify four observable components of sovereign bond yields: *i) risk-neutral yield, ii) term-risk premium, iii) credit-risk premium and iv) a portfolio effect*. These premia are demanded by market

⁶ To save space, we do not provide the regressions using random effects models.

participants to accept risks that are associated with sovereign bonds. Additionally, we find it important to stress the premiums stemming from *i) interest rate risk ii) inflation risk, iii) liquidity risk, and eventually iv) exchange rate risk* for some market participants. The decision for the austerity measures should primarily influence the credit risk premium component as we assume that the decrease of a government deficit also decreases expected probability of default. Thus, other premia should be controlled away in the model or eventually filtered out.

We use both techniques in the analysis. The filtration technique is employed in a two-fold approach. The first one exploits the properties of the sovereign bonds with the long maturity which do not suffer so heavily by movements of other risk components. We chose the bond benchmark with 10y maturity as it is the most liquid one and possesses the longest available time span. Still, effects of other risk factors as inflation risk premium or interest rate premium should be present. The second one consists of a transformation to sovereign bond yield spreads with the underlying “risk-free” rate.⁷ It is a stylized procedure to use the German bond yield with the same maturity. The latter approach is particularly efficient for EMU countries as they share common currency and monetary environment with Germany. Our dependent variable thus gets following form:

$$Spread_{i,t}^{10y} = yield_{i,t}^{10y} - yield_{DE,t}^{10y} \quad (2)$$

We could also use the swap spread (the difference between the interest rate swap and the bond yield, where for the interest rate swap the standard ISDAFIX / ICE form is used) as described in Afonso and Strauch (2007). However, this approach is not standard, and it suffers from lack of data for requested frequency and time period.

To increase the sensitivity of bond spreads to developments on the market, we prefer to use its bid yields rather than ask yields. This materializes particularly during the crisis periods as bonds suffer by decreased market liquidity. We also use end day values of respective variables as they facilitate the work with the news announcements which effects are already incorporated in their prices.

⁷ There are also other ways to extract the credit risk premium using specific filtering techniques as shown e.g. in Kučera et al. (2017) or Theobald and Tober (2019). We are nevertheless limited by three major reasons: *i) large number of analyzed countries, ii) relatively long time period and iii) the usage of daily data*. Furthermore, our approach is widely used in similar studies.

2.4 Control variables

The evolution of the dependent variable is further subject of current sentiment on the market and risks which are also present after the transformation. We can particularly stress the market risk premia. Those effects must be controlled out. To do so, we follow an existing literature as Afonso et al. (2019); Falagiarda and Gregori (2015); De Jong (2018) etc. Thus, we employ variables which control for market risk, market uncertainty, liquidity risk and current negative sentiments.⁸ Concrete variables are available in the section 2.5.

Stock market indices

Stock market indices carry important information about the current state of the market risk. As equity markets falls, traders close their speculative positions to counter cumulating losses, which may lead to fire sales. This spills-over to the bond market, where some sovereign bonds are considered less risky than others (this is also the argument to use German bonds in the transformation as accepted as risk-free rate). An appropriate proxy to deal with the behavior described above is to use stock market indices with enough liquidity to be able to react to changes on the market with enough speed.

Moreover, other authors exploit indices using two of them together: *i) using national stock indices and ii) using overall index*. The reason is that sovereign bonds are traded on various markets (the MTS platform may be labelled the biggest one). Further they may also appear on national bond markets as e.g. on Prague Stock Exchange in case of the Czech government bonds. The origin of market participants and their portfolios also plays the role as they face different sets of risks. We follow the stylized approach and include both versions of stock market indices.

Implied volatility index

Next variable to tackle the market risks is the implied volatility index. Contrary to realized volatility, it is forward-looking variable computed from options prices. It is designed to reflect the market expectations of near-term up to long-term volatility by

⁸ We do not include variables to control for interest rate and exchange rate risk since we use the yield spread with German bonds. Those effects should be therefore cancelled out for EMU countries as the effects are symmetrical for both bonds in the pair. For non-EMU countries, we suppose that the effects are non-symmetrical but still partially cancelled out. Furthermore, bonds with the long-term maturity should be not so sensitive to those effects.

measuring the square root of the implied variance across all options of a given time to expiration.

Thus, it serves also as variable to capture the market sentiment. Moreover, implied volatility is also used to control for common risk factors as bonds spreads usually move together. Longstaff et al. (2011) show that VIX index is a good proxy for global risk factors utilizing the PCA analysis of CDS spreads.

Unlike in case of stock market indices, we do not employ implied volatility indices for national stock markets as necessary data are usually not available.

Bid-ask spread

To capture the effects of liquidity changes on the market, we include the bid-ask spread for every country i and time t in the dataset. Higher bid-ask spread is a standard measure of a market liquidity as it is directly dependent on instruments available for trade.

Rating changes

The final variable used in our analysis is the rating value. We include it primarily to receive a direct comparison of our results with respect to a dummy variable of interest as they directly represent the credit state of given country. Information about the approach to construction of respective variable is available in the next section.

2.5 Data

The time span of our analysis is unique as the literature regarding austerity announcements concerns primarily only the crisis period. We base our study on the period between 2000 and 2019 using daily frequency. This puts high demand on data collection as not many series possess such a time span. Therefore, we had to collect our variables outlined in previous section from several sources and to calculate them in specific cases. It was also necessary to decide which concrete indices will be used and how to construct the rating variable.

2.5.1 Government bonds

Since Datastream does not provide bid-ask spreads for desired period, we use two separate sources for governmental bonds: bid yields are obtained from Datastream and bid-ask spreads from Thomson Reuters Eikon. Further, bid-ask spreads had to be calculated as the system does not offer the final series. For some countries data were exceptionally incomplete either from the bid or from the ask side and thus we filled the missing observations with the final value from the previous date. This problem arises also for bid yields by Datastream as not all countries are offered in the desired period.

For those, no transformation was applied and thus we do have an unbalanced panel for our estimation. This however does not create an issue for applied estimation technique. Table 6 provides summary of variables used in the analysis.

Table 6: List of used government bonds

Country	Data source: Datastream		Data source: Thomson Reuters Eikon	
	First available date	Mnemonic	First available date	RIC
CZ	10.04.2000	TRCZ10T	10.05.2000	CZ10YT=RR
DE	31.12.1999	TRBD10T	31.12.1999	DE10YT=RR
ES	31.12.1999	TRES10T	31.12.1999	ES10YT=RR
FR	31.12.1999	TRFR10T	31.12.1999	FR10YT=RR
GR	31.12.1999	TRGR10T	31.12.1999	GR10YT=RR
HU	31.12.1999	TRHN10T	26.08.2003	HU10YT=RR
IE	31.12.1999	TRIE10T	02.01.2003	IE10YT=RR
IT	31.12.1999	TRIT10T	04.12.2001	IT10YT=RR
NL	31.12.1999	TRNL10T	31.12.1999	NL10YT=RR
PO	31.12.1999	TRPO10T	31.12.1999	PL10YT=RR
PT	31.12.1999	TRPT10T	31.12.1999	PT10YT=RR
SK	06.01.2004	TRSK10T	31.05.2007	SK10YT=RR

Source: Datastream, Thomson Reuters Eikon

2.5.2 Indices

The stock market indices were collected from Datastream which provides cleaned data for all searched working days. Our intention was to pick such a set that would be sufficiently liquid to provide daily reactions on the market. For this reason, the set of indices is based on blue chip or prime equity indices for each country in the dataset. A majority was also used by Conrad and Zumbach (2016). Warsaw general index and ISWQ all share index yet do not fulfill stated condition as they represent wider range of stock on the local market. Still, we believe that they represent the market reactions sufficiently.

To capture the overall state on markets, we chose the EURO STOXX® index for stock markets and the VSTOXX® for the implied volatility. The latter one reflects the investor sentiment and overall economic uncertainty by measuring the 30-day implied volatility of the EURO STOXX 50®. Table 7 provides detailed information about the chosen indices.

Table 7: List of used equity stock market indices and implied volatility index

Country	Name	First available date	Data source	Mnemonic / RIC
FR	FRANCE CAC 40	31.12.1999	Datastream	FRCAC40
IT	FTSE MIB INDEX	31.12.1999	Datastream	FTSEMIB
GR	FTSE/ATHEX LARGE CAP	31.12.1999	Datastream	FTASE20
ES	IBEX 35	31.12.1999	Datastream	IBEX35I
IE	ISEQ ALL SHARE INDEX	31.12.1999	Datastream	ISEQUIT
NL	AEX INDEX (AEX)	31.12.1999	Datastream	AMSTEOE
HU	BUDAPEST (BUX)	31.12.1999	Datastream	BUXINDEX
PT	PORTUGAL PSI-20	31.12.1999	Datastream	POPSI20
CZ	PRAGUE SE PX	31.12.1999	Datastream	CZPXID
SK	SLOVAKIA SAX 16	31.12.1999	Datastream	SXSAX16
PL	WARSAW GENERAL INDEX	31.12.1999	Datastream	POLWIGI
	V2TX	03.01.2000	Thomson Reuters Eikon	V2TX
	STOXXE	03.01.2000	Thomson Reuters Eikon	STOXXE

Source: Datastream, Thomson Reuters Eikon

2.5.3 Ratings

For the variable ratings we collect changes announced by Standard & Poor's credit rating agency. We include not only the usual rating level, but we use the comprehensive credit rating including rating warnings issued by the agency. We decided to use ratings issued by this agency as some previous studies found that Standard & Poor's updates its ratings more frequently, usually preceding the other one (Ismailescu and Kazemi, 2010). S&P's seems to also have greater focus on reputational credibility among market participants (Alsakka et al. 2014).

The applied transformation of ratings is inspired by Drago and Gallo (2016) as well as by Ismailescu and Kazemi (2010). For each rating and rating warning there is a value assigned as shown in Table 8. In our approach, on the day of a rating change the variable receives a difference between the previous rating (including the rating warnings) and the newly assigned value. Table 8 provides numerical values assigned for each rating and rating warning. Moreover, Drago and Gallo (2016) show that the announcement effects of rating changes are not anticipated by the market as they are significant only in days of their announcement. Thus, we do not employ wider announcement windows for the rating changes.

Table 8: Numerical values assigned to S&P's ratings

Rating typology	Numerical value
Ratings	
AAA	17
AA+	16
AA	15
AA-	14
A+	13
A	12
A-	11
BBB+	10
BBB	9
BBB-	8
BB+	7
BB	6
BB-	5
B+	4
B	3
B-	2
CCC+	1
CCC	1
CCC-	1
CC	0
SD	-1
n/a	0
Rating warnings	
Positive	0.5
Positive watch	0.25
Stable	0
Negative watch	-0.25
Negative	-0.5

2.6 Regression equations

Finally, we present equations used for the estimation of surprise effects. They get the following form:

$$\Delta SPREAD_{i,t}^{10y} = \alpha + \beta COMMENTS_{i,t} + \gamma DECISION_{i,t} + \sum_{z=1}^4 \delta_z X_{z,i,t} + RATING_{i,t} \quad (3)$$

For the dependent variable we use first differences of yield spread for country i and time t . The variable *comments* consists of announced attitudes of governmental representatives towards possible austerity measures, the variable *decision* is a vector for announced austerity measures by a government or accepted by a parliament in time t . For both variables, we expect a negative sign of their coefficients since provided literature indicates rather decreasing effect of positive austerity announcements on yield spreads. The variable X is a matrix of control variables, which consists of log first differenced bid-ask spreads for respective country i and time t , national and European stock market indices and implied volatility indices in log first differenced forms for country i and time t . The last used variable is the *rating*, which is a vector of rating changes on announced days t for country i . We expect a negative sign of the rating change coefficient, as ratings decrease government spreads when an increase of a credit quality is announced. All first differenced variables are multiplied by 100.

We also use alternative setups where the matrix of control variables is used with a lag $\sum_{z=1}^4 \delta_z X_{z,i,t-1}$. Furthermore, the variable *bid-ask spread* showed persistent significance for additional four lags without a major sign of overfitted behavior and the adjusted coefficient of determination suggested its inclusion. Thus, we also run regressions with five lags for *bid-ask spread*. To save space, we do not provide the results for those additional lags, we only label regressions where the setup was used. Additional lags for other control variables were not included for their insignificance and parsimony reasons. In our regressions, we also test for equations including weekday dummy variables. Thus, the largest regression employed gets following form:

$$\begin{aligned} \Delta SPREAD_{i,t}^{10y} = & \alpha + \beta COMMENTS_{i,t} + \gamma DECISION_{i,t} + \sum_{z=1}^4 \delta_z X_{z,i,t} \\ & + \sum_{z=1}^4 \delta_z X_{z,i,t-1} + \sum_{\omega=2}^5 \Delta \log (BIDASK_{i,t-\omega}) + RATING_{i,t} \\ & + WEEKDAY_t \end{aligned} \quad (4)$$

3 Results for baseline specifications

3.1 Basic setup

With the specifications described in 2.6, we start our analysis using the full available period for all countries in the dataset. Regressions were estimated using the R software utilizing the *plm* package by Croissant and Millo (2008). Outputs were created with a help of the R package *stargazer* by Hlavac (2018).

To tackle the presence of heteroscedasticity, for all regressions we use robust standard errors which are obtained using procedure by Arellano (1987). They are implemented to *plm* package methods. Arellano's method is also particularly suitable for long time series as in our case. Contrary to other methods, the estimation of the heteroscedasticity-consistent covariance matrix is fully robust also to serial correlation (Henningsen and Henningsen 2019) although we were able to control it out with used variables and their respective lags even without a usage of dynamic panel data modelling.

Results of the baseline regression specifications are provided in Table 9. Dummy variables *comments* and *decision* are insignificant in all regression types. Furthermore, contrary to our expectations, the variable *decision* has a robustly positive, although insignificant, sign. Next, control variables show quite expected behavior as *BIDASK* contributes positively and significantly to the yield spread estimation and its lags follow the same pattern. Variable *ESTOXX* was estimated with resulting negative sign, however, insignificant. Its national counterparty variable *NATSTOCK* is negative with the expected and robust significance which provokes one to be suspicious about the collinearity of the variables. However, the correlation between the variables is bearable ($\text{corr}(\text{NATSTOCK}; \text{ESTOXX})=65.9\%$). The implied volatility variable *VSTOXX* also behaves according to our expectations as the uncertainty on markets pushes its participants to safe-haven instruments. For the last variable *RATING* (except weekday dummies), we find strong and negative impacts with respect to the yield spreads. This also corresponds with our expectations, as an increase of rated credit quality leads to the re-evaluation of credit component of the underlying national bond against German risk-free rate.

Table 9: Regression results for period 2000-2019 for all countries

<i>Dependent variable:</i> Δ YIELD SPREAD 10Y						
	(1)	(2)	(3)	(4)	(5)	(6)
BIDASK	0.799*** (0.114)	0.884*** (0.12)	0.899*** (0.118)	0.799*** (0.114)	0.884*** (0.12)	0.899*** (0.12)
BIDASK [-1]		0.271*** (0.045)	0.308*** (0.043)		0.271*** (0.045)	0.308*** (0.04)
ESTOXX	-0.304 (0.315)	-0.303 (0.326)	-0.309 (0.326)	-0.292 (0.317)	-0.293 (0.327)	-0.298 (0.33)
ESTOXX [-1]		-0.103 (0.107)	-0.096 (0.11)		-0.103 (0.102)	-0.097 (0.11)
VSTOXX	0.071*** (0.014)	0.070*** (0.013)	0.069*** (0.013)	0.074*** (0.016)	0.073*** (0.014)	0.072*** (0.01)
VSTOXX [-1]		-0.014 (0.017)	-0.014 (0.017)		-0.013 (0.016)	-0.015 (0.02)
NATSTOCK	-1.261*** (0.469)	-1.250*** (0.48)	-1.253*** (0.482)	-1.262*** (0.47)	-1.251*** (0.481)	-1.254*** (0.48)
NATSTOCK [-1]		-0.448*** (0.149)	-0.466*** (0.166)		-0.448*** (0.148)	-0.466*** (0.17)
COMMENTS	-1.217 (1.271)	-1.174 (1.247)	-1.103 (1.193)	-1.215 (1.268)	-1.172 (1.245)	-1.102 (1.19)
DECISION	1.552 (1.822)	1.498 (1.603)	1.413 (1.45)	1.548 (1.832)	1.494 (1.606)	1.41 (1.46)
RATING	-2.042*** (0.744)	-1.949** (0.786)	-2.218*** (0.699)	-2.048*** (0.738)	-1.954** (0.781)	-2.224*** (0.69)
TUE				0.112 (0.259)	0.079 (0.172)	0.104 (0.18)
WED				0.165 (0.319)	0.139 (0.258)	0.16 (0.26)
THU				0.253 (0.354)	0.206 (0.298)	0.206 (0.27)
FRI				0.224 (0.214)	0.2 (0.19)	0.2 (0.18)
Constant	0.009 (0.006)	0.008 (0.008)	0.008 (0.008)	-0.142 (0.212)	-0.116 (0.163)	-0.126 (0.16)
BIDASK Lag (2:5)	No	No	Yes	No	No	Yes
Observations	53,902	53,891	53,847	53,902	53,891	53,847
R ²	0.218	0.24	0.254	0.218	0.24	0.254
Adjusted R ²	0.218	0.24	0.254	0.218	0.24	0.253
F Statistic	2,148.3***	1,549.576***	1,220.129***	1,367.319***	1,136.444***	963.324***

Note: i) Comments variable represents austerity comments of national representatives. The positive coefficient indicates an increase of yield spread after positive attitude expressed towards austerity. *ii) Decision* variable represents austerity announcements of governments or approvals by parliaments. The positive coefficient indicates an increase of yield spread after austerity announcement. *iii) Rating* variable represents rating changes. The positive coefficient indicates an increase of yield spread after a credit rating increase. *iv) ** significant at 10%, **** significant at 5%, ***** significant at 1%.

As we stated before, variables of our interest are insignificant and not consistent with our expectations. Our baseline results contradict with carried out analyses stated in the Literature Review in general. However, results may be accepted since we use a long time span, which consists from various economic cycles. During the period 2000-2019,

financial markets experienced the Dot-com crisis, economic recovery, the financial and the subsequent sovereign crisis and again an economic recovery (although one may say a flimsy one). This may be also observable from wide robust standard errors of variables of our interest. Using the robust covariance matrix, wide standard errors indicate that it may be wise to split the dataset into several groups or periods. This is also in line with performed stability tests for time and individual effects.

Thus, we cannot conclude, that there are surprise effects with respect to austerity measures. Decisions towards austerity could be insignificant, as markets may anticipate the outcome before its final approval. In that case however, the variable comments should still play a role. On the other hand, it must be taken into consideration that our aim is to use a broader set of announcements (contrary to existing literature) which may dis-inflate resulting effects. Based on the results, we cannot support the hypothesis that markets do care for austerity in general at all. Still, the wide standard errors indicate that there may be strong market responses although with mixed outcomes depending on other variables.

3.2 Split into groups

In the previous setup, we found individual effects present, which indicates that resulting coefficients may vary among countries and thus there may be various responses on austerity measures. To overcome this problem, we searched for such a group division that would tackle this problem while maintaining the general picture for announcement surprise effects. We find suitable to split the dataset into two groups where the first one consists of “prudent” countries which did not receive financial assistance by international organizations (Troika or World Bank) and the second one consisting from GIIPS countries (which may be a first pick) and Hungary.

As such, Hungary suffered by a serious market turbulence especially during the first stage of the financial crisis. In the first half of October 2008, its representatives applied to the EU, the IMF and the World Bank for financial assistance due to difficulties in refinancing its government debt. In the consequent package, Hungary received EUR 14.2 billion loan to counter its payment issues during the next two years. Hungary also applied for a second assistance program on 21 November 2011, however, in the end its realization did not take place in the end, as it was no longer needed.

Due to the expressed reasons, we find the inclusion of Hungary to GIIPS group justifiable. Yet, we feel it is necessary to also test for more types of divisions such as

GIIPS group without Hungary, EMU⁹ countries and non-EMU countries as the unobserved effect may be explained better using other division. However, we want to spare place and thus, we do not report those divisions in full detail. Yet, in cases of significant differences with the chosen set, we do comment the comparisons with other possible group divisions. Furthermore, resulting coefficients of variables of our interest with respect to other group divisions are shown in section 4.4 (Summary of results). For the next analysis, let us label established groups as *i) prudent* to illustrate their resilience to the financial turbulence and *ii) GIIPSH* which is a combination of standard label GIIPS with additional letter for Hungary.

Estimated regressions for both groups are provided in Table 10 and Table 11. We first discuss results for the *GIIPSH* group and then for the *prudent* one.

Results for the *GIIPSH* group show persistent behavior with the similar structure as in the baseline setup. We find only minor changes in the coefficient magnitudes and their significance. The model itself is slightly better in the explanation of the yield spread's variance as the adjusted coefficient of determination increased to 0.289 in setup number (6). That is an increase of 30 b.p. contrary to models with unrestricted country group. Furthermore, austerity variables stay insignificant with unexpected sign for variable *decision* and rating changes strongly negative and significant.

For the *prudent* group specification, results do not show such robust outcomes against the baseline specification. The model itself does not explain the variance of yield spread's much; adjusted R^2 reaches only 0.065 in the best specification. Further, rating changes are not significant. This however may happen as we register low number of downward credit rating changes which may create greater impact to yield spreads.

Table 11 shows their evolvement for Prudent countries. There are only two cases in which they experienced strong re-evaluation downwards¹⁰ issued by Standard & Poor's. Next, other control variables show unexpected significant signs in some specifications. The *BIDASK [-1]* variable shows negative contribution (although very

⁹ We must however remind that group for EMU countries consist primarily from GIIPS countries with addition of Netherlands and France.

¹⁰ For the proper interpretation of the, we stress that the methodology for rating changes considers also rating warnings. Thus, although e.g. Netherlands experienced Standard & Poor's downgrade from AAA to AA+ on 29 November 2013, the resulting negative impact measured is only - 0.5 because there was a negative warning in previous announcement.

small) to the yield spread in specifications (3) and (6). Further, the European stock market index outperformed the national counterparties which suggests that included countries may be more sensitive to the common market movements if the full time period is used.

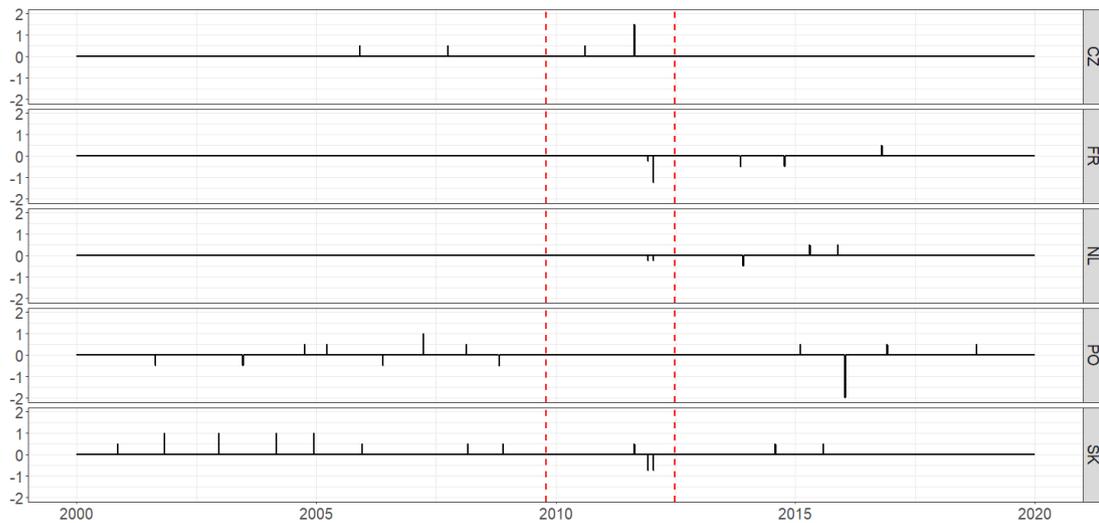
Table 10: Regression results for period 2000-2019, country group GIIPSH

<i>Dependent variable:</i>						
Δ YIELD SPREAD 10Y						
	(1)	(2)	(3)	(4)	(5)	(6)
BIDASK	0.864*** (0.07)	0.949*** (0.075)	0.962*** (0.073)	0.864*** (0.07)	0.949*** (0.074)	0.962*** (0.073)
BIDASK [-1]		0.288*** (0.033)	0.323*** (0.032)		0.288*** (0.033)	0.323*** (0.032)
ESTOXX	-0.063 (0.361)	-0.054 (0.368)	-0.069 (0.374)	-0.034 (0.355)	-0.029 (0.364)	-0.043 (0.37)
ESTOXX [-1]		-0.179 (0.17)	-0.157 (0.17)		-0.182 (0.164)	-0.163 (0.165)
VSTOXX	0.095*** (0.017)	0.095*** (0.015)	0.093*** (0.017)	0.104*** (0.021)	0.102*** (0.018)	0.100*** (0.019)
VSTOXX [-1]		-0.014 (0.031)	-0.014 (0.03)		-0.014 (0.028)	-0.015 (0.027)
NATSTOCK	-1.98*** (0.392)	-1.962*** (0.414)	-1.970*** (0.412)	-1.980*** (0.395)	-1.965*** (0.416)	-1.974*** (0.414)
NATSTOCK [-1]		-0.615*** (0.127)	-0.652*** (0.145)		-0.614*** (0.127)	-0.650*** (0.145)
COMMENTS	-2.184 (1.928)	-2.067 (1.884)	-1.945 (1.805)	-2.19 (1.936)	-2.073 (1.89)	-1.953 (1.813)
DECISION	2.182 (2.419)	2.201 (2.077)	2.021 (1.852)	2.181 (2.447)	2.192 (2.087)	2.015 (1.865)
RATING	-2.076** (0.841)	-2.016** (0.889)	-2.300*** (0.763)	-2.077** (0.829)	-2.018** (0.881)	-2.303*** (0.747)
TUE				0.377 (0.457)	0.254 (0.295)	0.296 (0.292)
WED				0.499 (0.578)	0.427 (0.466)	0.469 (0.47)
THU				0.667 (0.62)	0.557 (0.524)	0.534 (0.465)
FRI				0.477 (0.34)	0.416 (0.294)	0.422 (0.271)
Constant	0.005 (0.018)	-0.001 (0.024)	-0.001 (0.024)	-0.399 (0.382)	-0.331 (0.297)	-0.345 (0.278)
BIDASK Lag (2:5)	No	No	Yes	No	No	Yes
Observations	29,846	29,840	29,816	29,846	29,840	29,816
R ²	0.248	0.273	0.289	0.248	0.273	0.289
Adjusted R ²	0.248	0.273	0.289	0.248	0.273	0.289
F Statistic	1,408.1***	1,019.9***	808.074***	896.620***	748.226***	638.169***

Note: i) *Comments* variable represents austerity comments of national representatives. The positive coefficient indicates an increase of yield spread after positive attitude expressed towards austerity. ii) *Decision* variable represents austerity announcements of governments or approvals by parliaments. The positive coefficient indicates an increase of yield spread after austerity announcement. iii) *Rating* variable represents rating changes. The positive coefficient indicates an increase of yield spread after a credit rating increase. iv) * significant at 10%, ** significant at 5%, *** significant at 1%.

Finally, variables of our interest remain insignificant yet with changed signs contrary to *GIIPSH* group. Thus, both setups are supporting the conclusions from the baseline setup as they do not prove on standard significance scale that the austerity announcements would be considered by markets. It seems however, that there may be additional effects which we do not control for in presented setup.

Figure 2: Timeline of rating changes for Prudent group



Note: *i)* Vertical lines depict rating changes of Standard & Poor's on the day of their announcement for each country. Their magnitudes characterize a size of the change based on Drago and Gallo (2016) approach. An increase (decrease) of a credit rating obtains a positive (negative) value. *ii)* Dashed lines depict the split into periods used in the analysis. The first line from the left side refers to the Papakonstantinou's announcement on 20 October 2009 and the second line from the left side to the Draghi's "whatever it takes" announcement on 26 July 2012.

Table 11: Regression results for period 2000-2019, country group Prudent

<i>Dependent variable:</i> Δ YIELD SPREAD 10Y						
	(1)	(2)	(3)	(4)	(5)	(6)
BIDASK	0.200*** (0.063)	0.194*** (0.058)	0.205*** (0.065)	0.200*** (0.063)	0.194*** (0.058)	0.205*** (0.065)
BIDASK [-1]		-0.012 (0.013)	0.010* (0.006)		-0.013 (0.013)	0.009* (0.006)
ESTOXX	-0.805*** (0.159)	-0.816*** (0.157)	-0.816*** (0.156)	-0.804*** (0.154)	-0.816*** (0.153)	-0.815*** (0.152)
ESTOXX [-1]		-0.164*** (0.043)	-0.154*** (0.048)		-0.159*** (0.041)	-0.149*** (0.045)
VSTOXX	0.033*** (0.005)	0.034*** (0.005)	0.033*** (0.005)	0.033*** (0.005)	0.034*** (0.006)	0.034*** (0.006)
VSTOXX [-1]		-0.017* (0.009)	-0.016* (0.009)		-0.015 (0.009)	-0.014 (0.009)
NATSTOCK	0.033 (0.238)	0.053 (0.234)	0.051 (0.233)	0.032 (0.238)	0.053 (0.234)	0.051 (0.233)
NATSTOCK [-1]		-0.015 (0.037)	-0.023 (0.041)		-0.016 (0.037)	-0.023 (0.041)
COMMENTS	0.21 (0.324)	0.226 (0.332)	0.216 (0.333)	0.202 (0.325)	0.218 (0.333)	0.208 (0.334)
DECISION	-0.052 (0.374)	-0.069 (0.373)	-0.063 (0.38)	-0.057 (0.382)	-0.072 (0.381)	-0.065 (0.388)
RATING	-1.512 (1.245)	-1.514 (1.221)	-1.52 (1.215)	-1.456 (1.236)	-1.46 (1.213)	-1.465 (1.207)
TUE				-0.092 (0.149)	-0.073 (0.151)	-0.073 (0.149)
WED				-0.133 (0.105)	-0.128 (0.098)	-0.136 (0.101)
THU				-0.144 (0.165)	-0.143 (0.157)	-0.141 (0.16)
FRI				0.113 (0.201)	0.115 (0.194)	0.114 (0.196)
Constant	-0.004 (0.009)	-0.004 (0.008)	-0.004 (0.009)	0.047 (0.128)	0.042 (0.121)	0.043 (0.124)
BIDASK Lag (2:5)	No	No	Yes	No	No	Yes
Observations	24,056	24,051	24,031	24,056	24,051	24,031
R ²	0.064	0.065	0.065	0.064	0.065	0.065
Adjusted R ²	0.063	0.064	0.064	0.064	0.065	0.064
F Statistic	233.835***	151.639***	111.078***	149.539***	111.719***	88.107***

Note: i) Comments variable represents austerity comments of national representatives. The positive coefficient indicates an increase of yield spread after positive attitude expressed towards austerity. *ii) Decision* variable represents austerity announcements of governments or approvals by parliaments. The positive coefficient indicates an increase of yield spread after austerity announcement. *iii) Rating* variable represents rating changes. The positive coefficient indicates an increase of yield spread after a credit rating increase. *iv) ** significant at 10%, **** significant at 5%, ***** significant at 1%.

4 Split into groups and periods

The long period used in our estimation suffers by regime switching which emanates itself with time effects present for all three specifications shown previously. This is also quite expected since we use “high-frequency” data with very long time span. To solve this problem properly one may use FGLS estimation technique, which is robust against the time effects. However, it is also quite computationally demanding and usually not used in the topic of our interest. Thus, we prefer instead to split the dataset to more periods and estimate them separately.

To choose the right dates for a cut, we first check for structural breaks in different country specific yield spread time series. We look for two breaks as it would be optimal to divide the dataset into three periods where the first consists of pre-crisis period, the second for period of the main financial turbulence and the third for post-crisis period. However, the results were not conclusive and thus we apply rather a narrative approach which is based on empirical findings of an existing literature. Although this may cause a misspecification for some announcements which would be assigned to other regime, robust evidence for announcement effects should overcome this problem.

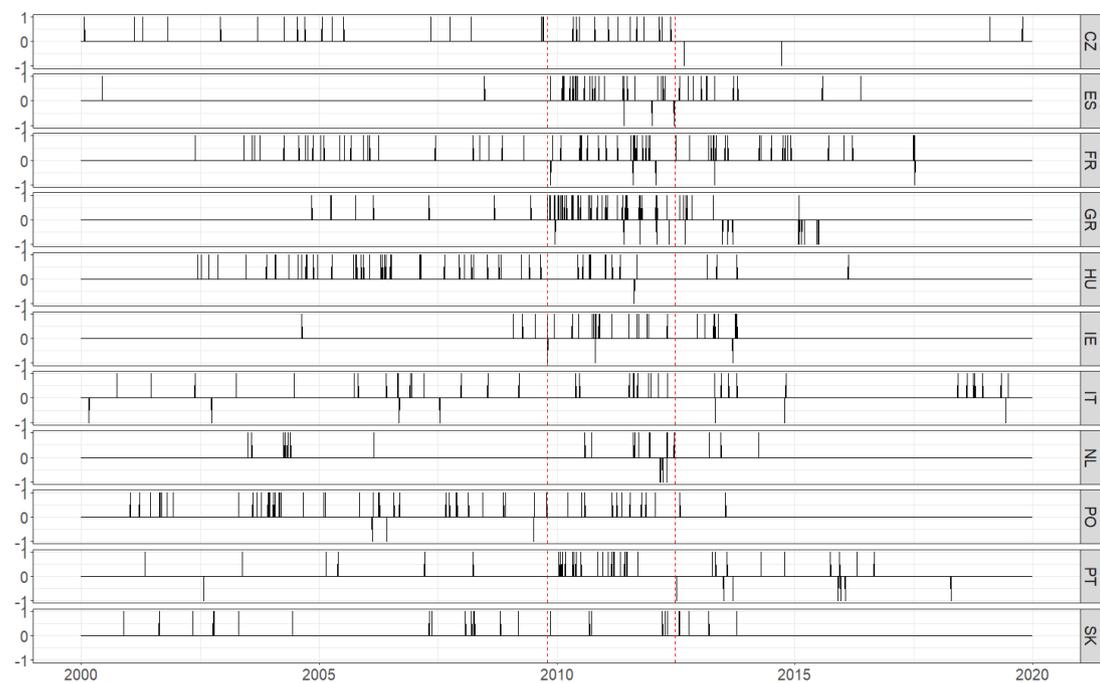
Smolik et al. (2019) studied a comovement and a disintegration process of sovereign bond markets during the crisis. In the analysis they find significant changes in coherence structure after the fall of Lehman Brothers and the announcement of Greek finance minister Papakonstantinou regarding “higher budget deficit than expected”, although concrete effects differ across countries. Their conclusion is particularly valuable for our purposes as they provide two events which had a large-scale significant effect on behavior of bond yields. We prefer to use the Greek announcement to determine the division between pre-crisis and crisis period since the fall of Lehman Brothers had no direct effect to levels of European bond spreads.

For the second break we choose the date of the famous “whatever it takes” announcement by Mario Draghi. The decision for this date consists of two arguments: *i)* the announcement led to a decrease of bond market uncertainty which led to slow but persistent decrease of yield spreads and *ii)* the immediate positive effect was found in some analyses (e.g. Jäger and Grigoriadis, 2017). Using this cut, we also get relatively acceptable number of events for the last post-crisis period.

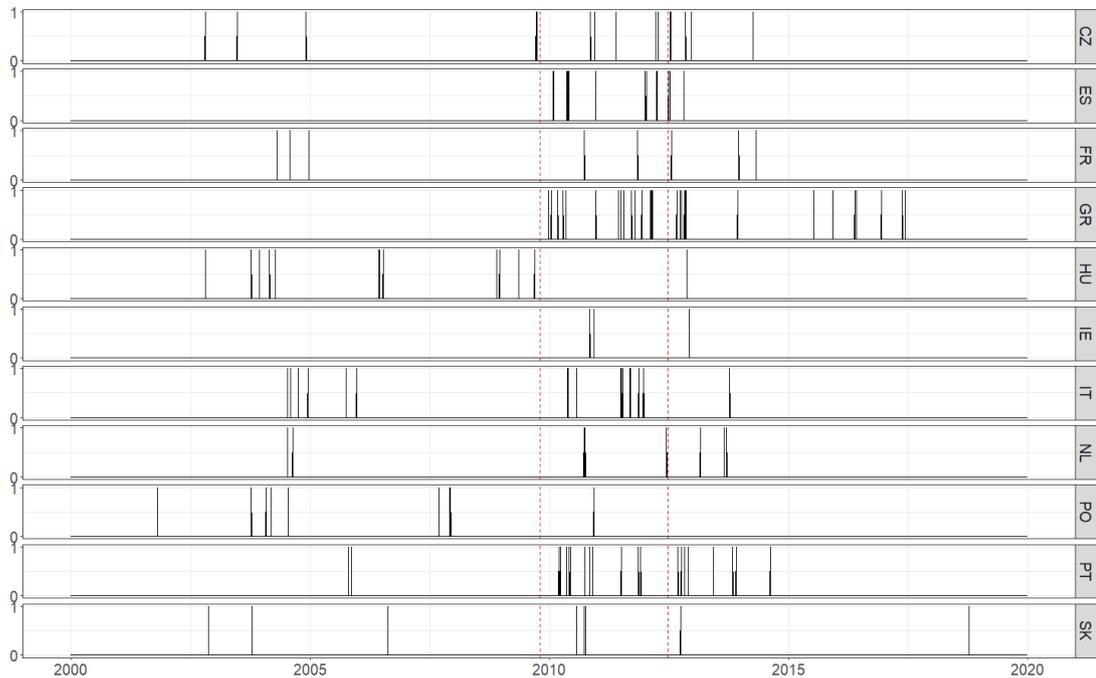
Based on stated arguments, we use Papakonstantinou’s announcement on 20 October 2009 to divide between pre-crisis and crisis period, and the “whatever it takes” announcement on 26 July 2012 for the division between the pre-crisis, the crisis and the post-crisis period.

Since we addressed all splits which will be used, we find appropriate to provide now an overview of the announcement days of variables *comments* and *decision* with respect to all periods and countries used. As such we can see from provided Figure 3 and Figure 4 that the “crisis management” of governments did take place mainly in the “crisis” period as most of news are squeezed to relatively short time span. This is quite obvious as countries suffered by decreased access to markets which they need to finance not only their previous debt, but also additional bailouts and guaranties provided to the real economy.

Figure 3: Timeline of comments variable with respect to time and country



Note: *i)* Vertical lines depict days in which *comments* of national representatives appear. Positive (negative) news towards austerity measures receive 1 (-1). *ii)* Dashed lines depict the split into periods used in the analysis. The first line from the left side refers to the Papakonstantinou’s announcement on 20 October 2009 and the second line from the left side to the Draghi’s “whatever it takes” announcement on 26 July 2012.

Figure 4: Timeline of decision variable with respect to time and country

Note: *i)* Vertical lines depict days of austerity announcements by government or austerity approvals by parliament for each country. The announcement day receives value 1. *ii)* Dashed lines depict the split into periods used in the analysis. The first line from the left side refers to the Papakonstantinou's announcement on 20 October 2009 and the second line from the left side to the Draghi's "whatever it takes" announcement on 26 July 2012.

4.1 Announcement effects in pre-crisis period

The pre-crisis period spans through first nine years of our analysis from the beginning of 2000 to 20 October 2009. We provide results for each of the analyzed country group and for all countries without a restriction. The results for all countries are reported primarily to present a robust comparison against chosen group division. Further, we have shown in previous setups that the results are quite robust against the equation specification. Thus, to save space, we provide outputs for only some specifications and mention cases if results differ for omitted specifications.

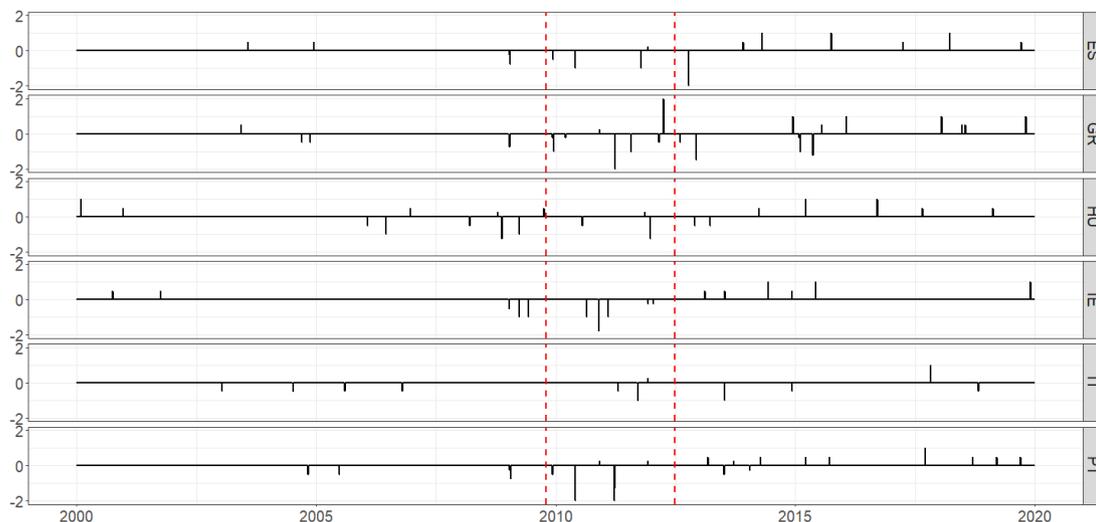
Table 12 shows regression results for undivided country group. We find low explained variance of yield spread changes and wide range of insignificant control variables in this period. This applies for the variable *BIDASK* and control variables for stock markets. Only the implied volatility index remains significant, persistent and with expected behavior from the set. *Rating* received the parameter with an unexpected yet insignificant sign. We think that this is due to non-symmetrical responses on positive

rating changes of the market. To sketch rating changes also for the GIIPSH group, we provide the Figure 5.

Yet, variables of our interest do show expected behavior which is in the case of *comments* also robust against equation specification. Variable *decision* is also assigned with expected sign, however, not significant for all setups (although significant for setups with higher adj. R^2). This is an important result as we find similar behavior as in an existing literature. Thus, we find some support for our hypothesis as at least in the case of pre-crisis period there were positive responses regarding a reevaluation of yield spreads on the market. Furthermore, because both variables are rather significant, it seems that markets do not fully adjust towards austerity measures in the process of their discussions and subsequent executed form. Moreover, *comments* play an important role in the creation of expectations as they have larger effect than *decisions* themselves. Next, we test the robustness of our results towards the country group division. Table 13 provides results for *GIIPSH* and *prudent* groups together.

Results for *GIIPSH* group are in some aspects counterintuitive because the variable *BIDASK* received negative and strongly significant sign. Still, *comments* are significant with a correct direction. This also applies for the variable *decision* although the significance is lower. Variable *rating* is however positive and insignificant. We compare the setup also with a group division which includes only GIIPS countries. In that case, *rating* gets expected sign and significant parameter. Furthermore, *comments* and *decision* remain negative and significant and the counterintuitive results for *BIDASK* are lowered, however they are still present. This suggests that rating changes for Hungary affected the yield spread in the opposite than expected way in the pre-crisis period. Negative significant effects of the variable *decision* are also found using the non-EMU group which indicates further the significance of pre-crisis announcements on market. Despite of described imperfections, effects of austerity announcements are robust not only for *GIIPSH* group specification, but they are significant in larger set of groups.

Control variables of *prudent* countries show better behavior than in the *GIIPSH* setup since the directions are correct. However, *comments* and *decision* variables are insignificant although with a correct sign.

Figure 5: Timeline of rating changes for GIIPSH group

Note: i) Vertical lines depict rating changes of Standard & Poor's on the day of their announcement for each country. Their magnitudes characterize a size of the change based on Drago and Gallo (2016) approach. An increase (decrease) of a credit rating obtains a positive (negative) value. ii) Dashed lines depict the split into periods used in the analysis. The first line from the left side refers to the Papakonstantinou's announcement on 20 October 2009 and the second line from the left side to the Draghi's "whatever it takes" announcement on 26 July 2012.

Table 12: Regression results for pre-crisis period for all countries

	<i>Dependent variable:</i> Δ YIELD SPREAD 10Y					
	(1)	(2)	(3)	(4)	(5)	(6)
BIDASK	0.097 (0.11)	0.08 (0.113)	0.088 (0.126)	0.097 (0.11)	0.079 (0.112)	0.088 (0.125)
BIDASK [-1]		-0.049 (0.042)	-0.029 (0.064)		-0.05 (0.042)	-0.03 (0.064)
ESTOXX	-0.147 (0.11)	-0.185* (0.107)	-0.177 (0.11)	-0.132 (0.108)	-0.17 (0.105)	-0.161 (0.108)
ESTOXX [-1]		-0.341*** (0.075)	-0.339*** (0.076)		-0.340*** (0.069)	-0.338*** (0.07)
VSTOXX	0.034*** (0.011)	0.036*** (0.011)	0.036*** (0.011)	0.039*** (0.013)	0.042*** (0.013)	0.041*** (0.013)
VSTOXX [-1]		-0.043** (0.017)	-0.043** (0.017)		-0.042** (0.017)	-0.042** (0.017)
NATSTOCK	-0.306 (0.19)	-0.262 (0.177)	-0.264 (0.176)	-0.308 (0.191)	-0.263 (0.178)	-0.265 (0.177)
NATSTOCK [-1]		-0.143 (0.107)	-0.148 (0.107)		-0.144 (0.107)	-0.149 (0.107)
COMMENTS	-0.847* (0.448)	-0.777* (0.44)	-0.765* (0.434)	-0.860* (0.445)	-0.790* (0.438)	-0.777* (0.432)
DECISION	-1.285 (0.803)	-1.200* (0.714)	-1.195 (0.729)	-1.267 (0.773)	-1.183* (0.686)	-1.178* (0.7)
RATING	1.008 (2.09)	1.238 (2.219)	1.231 (2.268)	1 (2.093)	1.22 (2.214)	1.217 (2.266)
TUE				0.047 (0.151)	0.109 (0.159)	0.098 (0.159)

<i>Dependent variable:</i>						
Δ YIELD SPREAD 10Y						
	(1)	(2)	(3)	(4)	(5)	(6)
WED				-0.008 (0.096)	0.007 (0.091)	0.002 (0.102)
THU				-0.047 (0.158)	-0.059 (0.156)	-0.061 (0.16)
FRI				0.475* (0.248)	0.495** (0.252)	0.491** (0.25)
Constant	0.024 (0.015)	0.016 (0.013)	0.016 (0.013)	-0.069 (0.122)	-0.094 (0.123)	-0.09 (0.126)
BIDASK Lag (2:5)	No	No	Yes	No	No	Yes
Observations	24,632	24,621	24,577	24,632	24,621	24,577
R ²	0.021	0.03	0.03	0.022	0.031	0.031
Adjusted R ²	0.021	0.029	0.029	0.022	0.03	0.03
F Statistic	75.496***	68.326***	50.802***	50.573***	52.124***	41.692***

Note: i) Comments variable represents austerity comments of national representatives. The positive coefficient indicates an increase of yield spread after positive attitude expressed towards austerity. *ii) Decision* variable represents austerity announcements of governments or approvals by parliaments. The positive coefficient indicates an increase of yield spread after austerity announcement. *iii) Rating* variable represents rating changes. The positive coefficient indicates an increase of yield spread after a credit rating increase. *iv) ** significant at 10%, **** significant at 5%, ***** significant at 1%.

Table 13: Regression results for pre-crisis period, country groups GIIPSH, Prudent

<i>Dependent variable:</i>						
Δ YIELD SPREAD 10Y						
	COUNTRY GROUP: GIIPSH			COUNTRY GROUP: PRUDENT		
	(1)	(2)	(3)	(4)	(5)	(6)
BIDASK	-0.240*** (0.069)	-0.268*** (0.081)	-0.269*** (0.08)	0.209*** (0.045)	0.232*** (0.049)	0.232*** (0.049)
BIDASK [-1]	-0.099* (0.052)	-0.143** (0.058)	-0.144** (0.058)	-0.003 (0.024)	0.049* (0.024)	0.048** (0.024)
ESTOXX	-0.028 (0.09)	-0.007 (0.096)	0.016 (0.1)	-0.375*** (0.129)	-0.374*** (0.13)	-0.362*** (0.118)
ESTOXX [-1]	-0.359*** (0.128)	-0.367*** (0.128)	-0.367*** (0.121)	-0.308*** (0.06)	-0.293*** (0.059)	-0.291*** (0.048)
VSTOXX	0.034** (0.017)	0.037** (0.018)	0.045** (0.022)	0.042*** (0.016)	0.040*** (0.015)	0.045*** (0.016)
VSTOXX [-1]	-0.043* (0.024)	-0.044* (0.023)	-0.043** (0.02)	-0.047** (0.023)	-0.046** (0.022)	-0.046* (0.024)
NATSTOCK	-0.403 (0.275)	-0.409 (0.28)	-0.414 (0.282)	-0.088 (0.212)	-0.092 (0.212)	-0.09 (0.211)
NATSTOCK [-1]	-0.225 (0.154)	-0.222 (0.149)	-0.221 (0.15)	-0.016 (0.061)	-0.026 (0.065)	-0.03 (0.065)
COMMENTS	-1.410*** (0.427)	-1.393*** (0.436)	-1.396*** (0.437)	-0.182 (0.456)	-0.203 (0.469)	-0.228 (0.469)
DECISION	-1.960* (1.099)	-2.027* (1.089)	-1.979* (1.034)	-0.349 (0.374)	-0.408 (0.404)	-0.431 (0.417)
RATING	1.517 (3.185)	1.553 (3.225)	1.487 (3.199)	1.645 (3.842)	1.578 (3.775)	1.737 (3.922)

<i>Dependent variable:</i>						
Δ YIELD SPREAD 10Y						
	COUNTRY GROUP: GIIPSH			COUNTRY GROUP: PRUDENT		
	(1)	(2)	(3)	(4)	(5)	(6)
TUE			0.146*** (0.026)			0.089 (0.362)
WED			0.011 (0.056)			0.063 (0.207)
THU			0.08 (0.062)			-0.175 (0.376)
FRI			0.555* (0.29)			0.468 (0.424)
Constant	0.033* (0.019)	0.034* (0.02)	-0.124*** (0.048)	-0.009 (0.012)	-0.008 (0.013)	-0.097 (0.282)
BIDASK	No	Yes	Yes	No	Yes	Yes
Lag (2:5)						
Observations	13,874	13,850	13,850	10,747	10,727	10,727
R ²	0.047	0.052	0.053	0.044	0.045	0.046
Adjusted R ²	0.046	0.051	0.052	0.043	0.044	0.044
F Statistic	62.121***	50.159***	40.752***	44.737***	33.695***	27.263***

Note: *i)* *Comments* variable represents austerity comments of national representatives. The positive coefficient indicates an increase of yield spread after positive attitude expressed towards austerity. *ii)* *Decision* variable represents austerity announcements of governments or approvals by parliaments. The positive coefficient indicates an increase of yield spread after austerity announcement. *iii)* *Rating* variable represents rating changes. The positive coefficient indicates an increase of yield spread after a credit rating increase. *iv)* * significant at 10%, ** significant at 5%, *** significant at 1%.

4.2 Announcement effects during the crisis

Although chosen crisis period is relatively short, it enables us to study market responses in most turbulent time in which governments must continue to finance their debt service. Before the presentation of results, we want to address several additional points regarding the period.

During the crisis it became apparent that some countries were not able to finance themselves on international markets. This may affect market views on austerity decisions as they may understand it as a signal of financial difficulties which may lead to default. This is logical, yet, not frequently shown in the available literature. Thus, austerity measures may cause further increases of yield spreads. The next element which may lead to such effect is the political stability in each country. In a case the electorate does not support austerity measures, their credibility is in danger as next potential government may stop their execution in future.¹¹ To be concrete, this was a

¹¹ Falagiarda and Gregori (2015) show that the austerity announcement effects can vary for each government in power using Italian yield spreads.

real problem in case of Greece in which the government faced several serious protests against austerity measures and next governments tried to soften them.

Regression results for the crisis period are provided in Table 14 and Table 15. Contrary to the pre-crisis period, established models behave in much better way as they explain the variance of yield spread changes in larger scale. Control variables fulfill our expectations although not for all setups. Further, the setup which includes all countries does not show significant effects neither for the variable *comments* nor *decision*. Moreover, they suggest rather positive effect. This suspicion materializes as we look on results for GIIPSH countries, where the variable *decision* is for all presented equation specifications significant. Such result must be put however for additional robustness checks. Excluding Hungary from the dataset, we reject the parameter for *decision* variable on $p=0.11$ for setup (2) of Table 15. Still, we can find such a specification, which yields more significant results. This can be found e.g. using a dynamic panel data model estimated by pooled OLS with robust standard errors in setup (2) of Table 15. Under this setup, we reject the null with $p\text{-value} = 0.097$. Other equation setups yielded however less significant outcomes. Thus, we conclude that the positive effect of *decision* variable for *GIIPSH* countries is not robust although there is still quite high probability that the announcements further increased the yield spreads. Rating changes are also insignificant, although with a right direction.

Concerning results for the *prudent* group, we do not find significant effects neither for the variable *comments* nor for the variable *decision*. Changes of rating are however significant and with a correct sign.

Table 14: Regression results for crisis period for all countries

<i>Dependent variable:</i>						
Δ YIELD SPREAD 10Y						
	(1)	(2)	(3)	(4)	(5)	(6)
BIDASK	0.956*** (0.036)	1.042*** (0.037)	1.050*** (0.035)	0.955*** (0.036)	1.042*** (0.036)	1.049*** (0.035)
BIDASK [-1]		0.300*** (0.022)	0.328*** (0.021)		0.300*** (0.021)	0.328*** (0.02)
ESTOXX	-1.775*** (0.46)	-1.708*** (0.477)	-1.733*** (0.491)	-1.761*** (0.417)	-1.712*** (0.449)	-1.741*** (0.463)
ESTOXX [-1]		0.138 (0.3)	0.201 (0.322)		0.076 (0.241)	0.138 (0.259)
VSTOXX	0.056* (0.031)	0.016 (0.051)	0.011 (0.05)	0.065*** (0.02)	0.019 (0.033)	0.013 (0.034)
VSTOXX [-1]		0.019 (0.103)	0.019 (0.101)		0.004 (0.086)	0.003 (0.084)
NATSTOCK	-2.035*** (0.509)	-2.264*** (0.611)	-2.325*** (0.623)	-2.024*** (0.505)	-2.253*** (0.606)	-2.315*** (0.618)
NATSTOCK [-1]		-0.635***	-0.755***		-0.632***	-0.751***

<i>Dependent variable:</i> Δ YIELD SPREAD 10Y						
	(1)	(2)	(3)	(4)	(5)	(6)
COMMENTS	0.112 (1.286)	(0.139) -0.059 (1.481)	(0.189) 0.104 (1.344)	0.146 (1.212)	(0.133) -0.037 (1.417)	(0.18) 0.106 (1.307)
DECISION	4.718 (3.468)	4.864 (3.415)	4.074 (2.912)	4.783 (3.47)	4.915 (3.366)	4.14 (2.889)
RATING	-0.984 (2.927)	-1.066 (2.875)	-1.077 (2.735)	-0.988 (3.025)	-1.094 (2.949)	-1.113 (2.796)
TUE				1.072 (1.778)	0.804 (1.204)	0.819 (1.21)
WED				1.033 (1.763)	0.743 (1.288)	0.796 (1.373)
THU				1.081 (1.913)	0.751 (1.444)	0.588 (1.167)
FRI				0.298 (1.558)	-0.0005 (1.142)	-0.026 (1.042)
Constant	0.384** (0.18)	0.335** (0.153)	0.364** (0.149)	-0.313 (1.217)	-0.126 (0.849)	-0.073 (0.796)
BIDASK Lag (2:5)	No	No	Yes	No	No	Yes
Observations	7,700	7,689	7,645	7,700	7,689	7,645
R ²	0.331	0.359	0.381	0.331	0.359	0.381
Adjusted R ²	0.331	0.358	0.38	0.33	0.358	0.38
F Statistic	544.238***	390.934***	313.289***	346.457***	286.696***	247.338***

Note: *i) Comments* variable represents austerity comments of national representatives. The positive coefficient indicates an increase of yield spread after positive attitude expressed towards austerity. *ii) Decision* variable represents austerity announcements of governments or approvals by parliaments. The positive coefficient indicates an increase of yield spread after austerity announcement. *iii) Rating* variable represents rating changes. The positive coefficient indicates an increase of yield spread after a credit rating increase. *iv) ** significant at 10%, **** significant at 5%, ***** significant at 1%.

Table 15: Regression results for crisis period, country groups

GIIPSH and Prudent

<i>Dependent variable:</i> Δ YIELD SPREAD 10Y						
	COUNTRY GROUP: GIIPSH			COUNTRY GROUP: PRUDENT		
	(1)	(2)	(3)	(4)	(5)	(6)
BIDASK	1.061*** (0.02)	1.067*** (0.019)	1.067*** (0.019)	0.135 (0.108)	0.104 (0.11)	0.103 (0.11)
BIDASK [-1]	0.305*** (0.018)	0.333*** (0.017)	0.333*** (0.016)	-0.024 (0.025)	-0.076*** (0.022)	-0.079*** (0.021)
ESTOXX	-2.218*** (0.794)	-2.277*** (0.831)	-2.224*** (0.717)	-2.066*** (0.25)	-2.067*** (0.246)	-2.101*** (0.246)
ESTOXX [-1]	-0.111 (0.425)	-0.027 (0.44)	-0.173 (0.31)	-0.09 (0.098)	-0.102 (0.11)	-0.079 (0.102)
VSTOXX	-0.039 (0.08)	-0.043 (0.079)	-0.022 (0.048)	0.033*** (0.012)	0.034*** (0.013)	0.023 (0.016)
VSTOXX [-1]	0.039 (0.19)	0.037 (0.187)	0.007 (0.154)	0.007 (0.025)	0.004 (0.025)	0.009 (0.022)

<i>Dependent variable:</i>						
Δ YIELD SPREAD 10Y						
	COUNTRY GROUP: GIIPSH			COUNTRY GROUP: PRUDENT		
	(1)	(2)	(3)	(4)	(5)	(6)
NATSTOCK	-3.035*** (0.365)	-3.092*** (0.377)	-3.077*** (0.376)	0.344 (0.258)	0.342 (0.253)	0.333 (0.255)
NATSTOCK [-1]	-0.690*** (0.129)	-0.839*** (0.142)	-0.811*** (0.143)	0.095 (0.085)	0.083 (0.089)	0.084 (0.088)
COMMENTS	-0.924 (2.069)	-0.702 (1.852)	-0.742 (1.863)	0.959 (0.744)	0.997 (0.757)	0.929 (0.788)
DECISION	6.487* (3.875)	5.517* (3.274)	5.583* (3.259)	0.01 (1.427)	-0.144 (1.351)	-0.054 (1.326)
RATING	-0.56 (3.013)	-0.582 (2.839)	-0.525 (2.963)	-4.591*** (1.623)	-4.697*** (1.605)	-4.629*** (1.717)
TUE			1.831 (2.187)			-0.39 (0.321)
WED			1.997 (2.509)			-0.544** (0.239)
THU			1.488 (2.155)			-0.613** (0.286)
FRI			1.006 (1.87)			-0.590* (0.327)
Constant	0.546** (0.253)	0.579** (0.241)	-0.683 (1.47)	0.044*** (0.017)	0.066*** (0.021)	0.493** (0.206)
BIDASK	No	Yes	Yes	No	Yes	Yes
Lag (2:5)						
Observations	4,194	4,170	4,170	3,495	3,475	3,475
R ²	0.372	0.395	0.396	0.228	0.233	0.234
Adjusted R ²	0.371	0.393	0.393	0.226	0.23	0.23
F Statistic	225.576***	181.038***	142.939***	93.698***	70.005***	55.597***

Note: *i) Comments* variable represents austerity comments of national representatives. The positive coefficient indicates an increase of yield spread after positive attitude expressed towards austerity. *ii) Decision* variable represents austerity announcements of governments or approvals by parliaments. The positive coefficient indicates an increase of yield spread after austerity announcement. *iii) Rating* variable represents rating changes. The positive coefficient indicates an increase of yield spread after a credit rating increase. *iv) ** significant at 10%, **** significant at 5%, ***** significant at 1%.

4.3 Announcement effects in post-crisis period

The post-crisis period begins with the famous “whatever it takes” announcement on 26 July 2012. The period however does not consist only from the post-crisis period itself because it took more time to calm the market and there was a shorter period in which yield spreads widened again. The reason for such behavior may be found mainly in signals from the Greek electorate which pushed to austerity regime softening which culminated in bailout referendum few days before the third bailout agreement. However, the period is important mainly for Greece. For majority of countries, the time span does not represent a crisis period comparable to a previous evolvement in which markets did suffer from high uncertainty and increased credit risks of the sovereign

bond component. To control for the “Greek effect”, we run additional regressions without Greece in the dataset.

Results for group unrestricted dataset show insignificant parameters for both types of austerity announcements again. It is however disputable if there should be significant effect present at all since *i)* OMT strengthened beliefs that ECB will use all available tools to keep the euro area together including operations on secondary market, *ii)* the period of costly bailouts and guaranties by governments to real economy faded out and *iii)* as economies recovered, fundamentals as debt/GDP improved.

Under standard procedure, insignificant results are found also applying the division to *prudent* and *GIIPSH* countries and other mentioned divisions in section 3.2. We also tested setups without Greece which showed insignificant parameters, too. However, the null for variable *comments* was rejected at $p=0.183$ and variable *decision* with $p=0.242$, which is not much different to our results. It also suggests that although there is not decisive direction of yield spread shifts based on austerity announcements, they have rather mild but positive effect in post-crisis period.

Next, models behave according to our expectations, as they appear with expected signs and with significant parameters. To be concrete about the *rating* variable, we find that the rating change has negative and significant sign for unrestricted model and the model for *GIIPSH* countries, which indicates that ratings do help markets to assess the credit risk for bond yields.

Table 16: Regression results for post-crisis period for all countries

<i>Dependent variable:</i>						
Δ YIELD SPREAD 10Y						
	(1)	(2)	(3)	(4)	(5)	(6)
BIDASK	0.282*** (0.058)	0.365*** (0.071)	0.433*** (0.083)	0.281*** (0.058)	0.365*** (0.072)	0.433*** (0.084)
BIDASK [-1]		0.208*** (0.05)	0.364*** (0.079)		0.208*** (0.049)	0.364*** (0.079)
ESTOXX	-1.060** (0.414)	-1.044** (0.408)	-0.980** (0.411)	-1.066*** (0.412)	-1.050*** (0.406)	-0.983** (0.407)
ESTOXX [-1]		0.176 (0.207)	0.127 (0.208)		0.183 (0.209)	0.136 (0.21)
VSTOXX	-0.048*** (0.018)	-0.043*** (0.014)	-0.037*** (0.013)	-0.050*** (0.019)	-0.044*** (0.014)	-0.038*** (0.013)
VSTOXX [-1]		-0.003 (0.019)	-0.005 (0.019)		-0.001 (0.02)	-0.003 (0.019)
NATSTOCK	-2.229*** (0.841)	-2.190*** (0.795)	-2.158*** (0.779)	-2.230*** (0.84)	-2.191*** (0.794)	-2.159*** (0.779)
NATSTOCK [-1]		-0.609*** (0.198)	-0.577*** (0.183)		-0.610*** (0.199)	-0.578*** (0.183)
COMMENTS	-4.304	-3.939	-3.848	-4.301	-3.936	-3.847

<i>Dependent variable:</i> Δ YIELD SPREAD 10Y						
	(1)	(2)	(3)	(4)	(5)	(6)
DECISION	(3.334) -0.412 (0.476)	(2.968) -0.752 (0.677)	(2.89) -0.706 (0.603)	(3.33) -0.458 (0.494)	(2.966) -0.801 (0.699)	(2.888) -0.748 (0.621)
RATING	-3.611* (2.146)	-3.339* (2.015)	-2.944* (1.722)	-3.521* (2.082)	-3.254* (1.949)	-2.877* (1.655)
TUE				-0.288*** (0.081)	-0.322*** (0.09)	-0.300*** (0.094)
WED				0.096 (0.194)	0.112 (0.204)	0.121 (0.203)
THU				0.09 (0.124)	0.101 (0.148)	0.115 (0.145)
FRI				-0.313 (0.277)	-0.281 (0.256)	-0.202 (0.237)
Constant	-0.137** (0.067)	-0.128** (0.061)	-0.121** (0.057)	-0.054 (0.09)	-0.049 (0.092)	-0.068 (0.092)
BIDASK Lag (2:5)	No	No	Yes	No	No	Yes
Observations	21,570	21,559	21,515	21,570	21,559	21,515
R ²	0.113	0.123	0.126	0.113	0.124	0.126
Adjusted R ²	0.112	0.123	0.126	0.113	0.123	0.126
F Statistic	391.387***	275.910***	207.001***	249.768***	202.895***	163.789***

Note: i) Comments variable represents austerity comments of national representatives. The positive coefficient indicates an increase of yield spread after positive attitude expressed towards austerity. *ii) Decision* variable represents austerity announcements of governments or approvals by parliaments. The positive coefficient indicates an increase of yield spread after austerity announcement. *iii) Rating* variable represents rating changes. The positive coefficient indicates an increase of yield spread after a credit rating increase. *iv) ** significant at 10%, **** significant at 5%, ***** significant at 1%.

Table 17: Regression results for post-crisis period, country groups

GIIPSH and Prudent

<i>Dependent variable:</i> Δ YIELD SPREAD 10Y						
	COUNTRY GROUP: GIIPSH			COUNTRY GROUP: PRUDENT		
	(1)	(2)	(3)	(4)	(5)	(6)
BIDASK	0.366*** (0.069)	0.440*** (0.077)	0.440*** (0.078)	0.203** (0.082)	0.191** (0.091)	0.191** (0.091)
BIDASK [-1]	0.221*** (0.036)	0.388*** (0.053)	0.387*** (0.052)	-0.029** (0.011)	-0.059** (0.026)	-0.060** (0.025)
ESTOXX	-1.511** (0.602)	-1.407** (0.595)	-1.407** (0.601)	-0.990*** (0.14)	-0.977*** (0.14)	-0.978*** (0.136)
ESTOXX [-1]	-0.102 (0.496)	-0.165 (0.489)	-0.153 (0.495)	0.193* (0.105)	0.157 (0.099)	0.162* (0.097)
VSTOXX	-0.060*** (0.019)	-0.051*** (0.019)	-0.052*** (0.02)	-0.005** (0.002)	-0.004* (0.002)	-0.004*** (0.001)
VSTOXX [-1]	-0.022 (0.031)	-0.024 (0.031)	-0.02 (0.032)	0.025* (0.013)	0.023* (0.013)	0.024* (0.013)
NATSTOCK	-2.867*** (0.604)	-2.827*** (0.592)	-2.830*** (0.59)	0.089 (0.125)	0.093 (0.123)	0.092 (0.123)

<i>Dependent variable:</i>						
Δ YIELD SPREAD 10Y						
	COUNTRY GROUP: GIIPSH			COUNTRY GROUP: PRUDENT		
	(1)	(2)	(3)	(4)	(5)	(6)
NATSTOCK [-1]	-0.684*** (0.124)	-0.636*** (0.116)	-0.639*** (0.116)	0.016 (0.053)	0.024 (0.058)	0.023 (0.057)
COMMENTS	-5.608 (4.044)	-5.444 (3.95)	-5.464 (3.966)	0.173 (0.227)	0.205 (0.247)	0.194 (0.251)
DECISION	-1.052 (1.044)	-1.006 (0.86)	-1.072 (0.884)	-0.118 (0.888)	-0.114 (0.925)	-0.105 (0.914)
RATING	-3.757* (2.181)	-3.298* (1.89)	-3.141* (1.765)	-0.784 (0.667)	-0.785 (0.718)	-0.783 (0.717)
TUE			-0.373*** (0.134)			-0.131 (0.09)
WED			0.461 (0.33)			-0.171** (0.076)
THU			0.316 (0.242)			-0.014 (0.121)
FRI			-0.248 (0.386)			-0.062 (0.119)
Constant	-0.241** (0.106)	-0.228** (0.101)	-0.259* (0.142)	-0.025 (0.02)	-0.027 (0.021)	0.048 (0.09)
BIDASK Lag (2:5)	No	Yes	Yes	No	Yes	Yes
Observations	11,760	11,736	11,736	9,799	9,779	9,779
R ²	0.158	0.161	0.161	0.064	0.063	0.063
Adjusted R ²	0.157	0.16	0.16	0.063	0.061	0.061
F Statistic	200.254***	149.766***	118.682***	60.761***	43.692***	34.632***

Note: *i) Comments* variable represents austerity comments of national representatives. The positive coefficient indicates an increase of yield spread after positive attitude expressed towards austerity. *ii) Decision* variable represents austerity announcements of governments or approvals by parliaments. The positive coefficient indicates an increase of yield spread after austerity announcement. *iii) Rating* variable represents rating changes. The positive coefficient indicates an increase of yield spread after a credit rating increase. *iv) ** significant at 10%, **** significant at 5%, ***** significant at 1%.

4.4 Summary of results

To summarize the results of this chapter in a compact way, we provide Table 18. In previous results, we found various effects with respect to used periods and group specifications. The significance and average directions of variables coefficients differ, too. Thus, we find suitable rather to present the intervals (standard deviations on both sides of the average value) which show 68% of coefficients distribution. This provides a better overview of expected effects of austerity announcements. Furthermore, we provide results not only for country groups which were discussed previously but also for benchmark sets (*EMU*, *NONEMU*, *GIIPS*) introduced in section 3.2.

Table 18: Summary of results for variables of interest using standard errors

COUNTRY GROUP	PERIOD	COMMENTS	DECISION	RATING
ALL	PRE-CRISIS	(-1.2, -0.3)*	(-1.9, -0.5)*	(-1, 3.5)
	CRISIS	(-1.2, 1.4)	(1.3, 7)	(-3.9, 1.7)
	POST-CRISIS	(-6.7, -1)	(-1.4, -0.1)	(-4.5, -1.2)*
	WHOLE TIME SPAN	(-2.3, 0.1)	(0, 2.9)	(-2.9, -1.5)***
GIIPSH	PRE-CRISIS	(-1.8, -1)***	(-3, -0.9)*	(-1.7, 4.7)
	CRISIS	(-2.6, 1.1)	(2.3, 8.8)*	(-3.5, 2.4)
	POST-CRISIS	(-9.4, -1.5)	(-2, -0.2)	(-4.9, -1.4)*
	WHOLE TIME SPAN	(-3.8, -0.1)	(0.2, 3.9)	(-3.1, -1.6)***
PRUDENT	PRE-CRISIS	(-0.7, 0.2)	(-0.8, 0)	(-2.2, 5.7)
	CRISIS	(0.1, 1.7)	(-1.4, 1.3)	(-6.3, -2.9)***
	POST-CRISIS	(-0.1, 0.4)	(-1, 0.8)	(-1.5, -0.1)
	WHOLE TIME SPAN	(-0.1, 0.5)	(-0.5, 0.3)	(-2.7, -0.3)
EMU	PRE-CRISIS	(-1.1, -0.1)	(0, 0.7)	(-3.7, -2.5)***
	CRISIS	(-2.2, 1)	(1.6, 8.3)	(-4.2, 2)
	POST-CRISIS	(-7.7, -1.3)	(-1.9, -0.5)*	(-5.2, -1.4)*
	WHOLE TIME SPAN	(-3.2, 0.1)	(0.6, 4.1)	(-3.7, -2.3)***
NONEMU	PRE-CRISIS	(-1.3, -0.2)	(-2.6, -1)**	(0.9, 7.5)
	CRISIS	(-1.1, 1.3)	(-2, -1.2)***	(-1.1, 8.5)
	POST-CRISIS	(0.9, 4)	(-0.1, 1)	(-3.6, -1.3)**
	WHOLE TIME SPAN	(-0.7, 0.2)	(-2.1, -0.6)*	(-0.2, 3.1)
GIIPS	PRE-CRISIS	(-2.1, -0.5)*	(-0.2, 0.1)	(-3.6, -2.4)***
	CRISIS	(-3.2, 0.7)	(2.1, 8.8)	(-4.1, 2.2)
	POST-CRISIS	(-10.3, -2)	(-2.1, -0.5)	(-5.2, -1.4)*
	WHOLE TIME SPAN	(-4.5, -0.1)	(1, 4.7)	(-3.6, -2.2)***

Note: *i*) Depicted intervals show one standard error of resulting average coefficients value on each side with respect to estimated period and country group. Full results are provided in Annex. *ii*) *prudent* group consists of following countries: Netherlands, France, Slovakia, Czechia, and Poland. The remaining countries studied are in GIIPSH group. It consists from Greece, Ireland, Italy, Portugal, Spain and Hungary. For EMU group, Slovakia was not included as it stayed for almost half of the used period outside the EMU. *iii*) Pre-crisis period: 1.1.2000-20.10.2009, crisis-period: 20.10.2009-26.6.2012, post-crisis period: 26.6.2012-31.12.2019. *iv*) *Comments* variable represents austerity comments of national representatives. The positive value indicates an increase of yield spread after a positive attitude expressed towards austerity. *v*) *Decision* variable represents austerity announcements of governments or approvals by parliaments. The positive value indicates an increase of yield spread after austerity announcement. *vi*) *Rating* variable represents rating changes. The positive value indicates an increase in yield spread after a credit rating increase. *vii*) Results were obtained using the largest equation specification described in the equation (4). *viii*) * significant at 10%, ** significant at 5%, *** significant at 1%.

Using an unrestricted dataset, we find support to claim that markets respond rather positively to austerity announcements collected from the news in non-crisis periods since *comments* and *decisions* in the pre-crisis period are significant and decreasing the yield spreads. Furthermore, announcements after the crisis period in 2009-2012 produce rather decreasing responses although they are not significant on the standard scale.

Measuring the effects across the cycle however did not yield satisfactory results as the effects are mixed and indecisive. Such findings support our expectations that the financial cycle is an important factor for our type of analysis and more attention should be paid to the problem in future studies.

Furthermore, the resulting coefficients of previous studies may be inflated using only a few important announcements without special attention to different regimes. We find support for such claim as a broader set of announcements did reveal rather pessimistic market reactions towards *decisions* and *comments* as they led to further increases of yield spreads in the crisis period. Moreover, such results are also intuitive. The markets were also more sensitive to austerity measures in terms of coefficients magnitudes and their standard errors during the crisis period.

It seems that the pre-crisis results are driven primarily by positive sentiments towards the *GIIPSH* group. They benefited from established credibility from shared currency, hence austerity measures were positively viewed by the market resulting in decreasing effects on yield spreads. This group is the only one with significantly negative announcements coefficients since even though we do find a similar pattern across all groups, it is merely not significant at least at 10%. Furthermore, the *GIIPSH* group also indicates rather decreasing effects of announcements in the post-crisis period similarly to a broad set of other group divisions.

We stated in previous sections that *prudent* countries do not show significant results on the standard scale. Comparing sizes of effects with other groups, the results indicate they are less sensitive to their *decision* and *comments* announcements. Based on those findings, we suppose that more solvent countries benefit from their credibility status and markets do not find their budget strengthening actions so important. This also holds in the crisis period where the effects of austerity decisions are almost zero on average with a lower standard deviation in comparison with other groups. Still, responses are stronger which indicates that markets were more cautious towards statements of representatives and their decisions. In the non-crisis period, *decisions* of *prudent* countries rather lowered the spread.

On the contrary, the *GIIPSH* group is much more sensitive to statements of their representatives in all studied periods as the resulting coefficients are much stronger. A different perception of the market towards austerity announcements is observed during the crisis period. This is particularly an issue for the *GIIPSH* group. We find inverted and partially significant effects of revealed announcements during the crisis. We suppose that markets adopted announcements as a signal of deteriorating solvency

of those countries which led to further increases of yield spreads. Other group divisions also show that *comments* and *decisions* got more sensitive during the crisis period.

The final *decisions* towards austerity are found more important than the *comments* of governmental representatives even though they generally receive the same directions as the *decision* variable. This indicates that signals from governmental representatives are not so important to market and it rather relies on the final settlement. Next, this result may weaken our expectations about the market efficiency. Since we did not divide *comments* into more specific groups which would represent the process of concrete austerity legislation preparation, such suggestions are however unjustified.

In our analysis, we also studied market reactions to rating changes. In general, we find rather decreasing effects although the coefficients and their significance vary across the periods and country groups. In general, the post-crisis period is linked with their higher significance as rating increases signaled strengthened resilience against the credit risk. Similar to austerity announcements, they did not lead to significant decreases or increases in the crisis period for the majority of country groups. An important exception is the *prudent* group, which experienced a very strong lowering effect during the crisis. This further supports our suggestions about the *prudent* group that markets found them more solvent.

To sum up we may set a few policy implications from our findings. Based on previously shown results, we suggest that governments should introduce austerity programs in times of relative stability on the market since the announcement would be accepted rather positively. Another strategy could be to gain a strong commitment of the central bank towards stability preservation (results in the post-crisis period), which sends a strong positive signal to the market participants that the security will not lose its value.

In a time of large uncertainty on the market, governments should focus on other goals than austerity measures (if possible) since those programs do not provide significant and positive effects towards the decrease in financing cost via lower bond yields. If the government balances on the edge of its solvency, markets will probably understand the announcement as a signal of solvency issues leading to a fire sale and consequently to self-fulfilling prophecies.

5 Additional robustness checks

Our analysis revealed the significance of announcements towards the yield spread primarily in case of pre-crisis period for *GIIPSH* countries. In addition to already mentioned robustness checks, results are subject of additional robustness testing. We follow some methods used by De Jong (2018) and test the significance of results using different dependent variables and their transformations. First, we regress the results without the employment of German bund which serves as a risk-free rate. Such an approach should, however, lead to a decrease of a significance in respective maturity since we do not filter out other components of the bond yield. Next, we also use other maturities to find possible robustness failures with respect to primarily chosen variable. One may further expect that the significance should be increasing with maturity duration as bonds with higher maturity should carry primary the credit risk.

To do so, we use bonds with a maturity of 3, 5 and 15 years which are retrieved from Datastream database. Other maturities are unfortunately not accessible for the range of countries used. Still, we believe that it provides at least some new insight about the effects of our interest. Outlined maturities were used in both modifications of the dependent variable, i.e. using first differences of bond spreads and spreads alone.

Results are provided in Table 19 and Table 20. Overall, described estimations yield positive results, as we find for the majority of specifications significant and negative coefficients for *decision*. This is in line with our initial results. However, some cases are quite unintuitive. Although the estimation for 10y bond yield led to decrease of p-values and magnitudes of announcement coefficients, regression based on 3y benchmark bond yields show positive and significant one for *comments*. We argue that since we register a relatively low number of observations in this period, other unobserved effects in lower liquid dependent variable may override their significance. Furthermore, with an increase of the maturity, the magnitude of *decision* coefficients for bond yields decreases.

Table 19: Robustness check, multiple maturities of bond changes

	<i>Dependent variable:</i>			
	Δ YIELD 3Y	Δ YIELD 5Y	Δ YIELD 10Y	Δ YIELD 15Y
	(1)	(2)	(3)	(4)
ESTOXX	0.827*** (0.307)	1.210*** (0.121)	0.867*** (0.127)	0.331 (0.209)
ESTOXX [-1]	-0.011 (0.097)	-0.082 (0.116)	-0.207** (0.104)	-0.237** (0.104)
VSTOXX	-0.004 (0.003)	0.004 (0.007)	0.01 (0.009)	0.009 (0.01)
VSTOXX [-1]	0.016 (0.025)	-0.013 (0.014)	-0.016 (0.013)	-0.035 (0.021)
NATSTOCK	-0.535 (0.47)	-0.467 (0.345)	-0.345 (0.214)	0.021 (0.107)
NATSTOCK [-1]	-0.391* (0.221)	-0.465* (0.255)	-0.214 (0.152)	-0.021 (0.027)
COMMENTS	1.557*** (0.529)	-0.694 (0.715)	-0.601 (0.562)	-0.181* (0.107)
DECISION	-5.487* (2.814)	-3.635** (1.725)	-1.836* (0.939)	0.068 (0.083)
RATING	-1.549*** (0.409)	-3.636 (4.018)	-0.507 (2.291)	-2.093 (1.53)
Constant	0.003 (0.053)	-0.111 (0.074)	-0.178*** (0.044)	-0.121*** (0.036)
WEEKDAY DUMMY	Yes	Yes	Yes	Yes
Observations	11,082	12,775	15,329	11,239
R ²	0.02	0.04	0.033	0.016
Adjusted R ²	0.018	0.039	0.032	0.015
F Statistic	16.991***	40.618***	40.013***	13.883***

Note: *i)* *Comments* variable represents austerity comments of national representatives. The positive coefficient indicates an increase of yield spread after positive attitude expressed towards austerity. *ii)* *Decision* variable represents austerity announcements of governments or approvals by parliaments. The positive coefficient indicates an increase of yield spread after austerity announcement. *iii)* *Rating* variable represents rating changes. The positive coefficient indicates an increase of yield spread after a credit rating increase. *iv)* * significant at 10%, ** significant at 5%, *** significant at 1%.

Table 20: Robustness check, results for 3Y and 5Y maturity of bond spread

	<i>Dependent variable:</i>	
	Δ YIELD SPREAD 3Y	Δ YIELD SPREAD 5Y
	(1)	(2)
ESTOXX	0.057 (0.307)	-0.083 (0.121)
ESTOXX [-1]	-0.099 (0.097)	-0.157 (0.116)
VSTOXX	-0.001 (0.003)	0.011 (0.007)
VSTOXX [-1]	0.002 (0.025)	-0.011 (0.014)
NATSTOCK	-0.73 (0.47)	-0.564 (0.345)
NATSTOCK [-1]	-0.328 (0.221)	-0.431* (0.255)
COMMENTS	0.607 (0.529)	-1.563** (0.715)
DECISION	-5.362* (2.814)	-3.223* (1.725)
RATING	-0.281 (0.409)	-2.793 (4.018)
Constant	0.172*** (0.053)	0.052 (0.074)
WEEKDAY DUMMY	Yes	Yes
Observations	11,084	12,775
R ²	0.02	0.031
Adjusted R ²	0.018	0.03
F Statistic	17.000***	31.544***

Note: *i)* *Comments* variable represents austerity comments of national representatives. The positive coefficient indicates an increase of yield spread after positive attitude expressed towards austerity. *ii)* *Decision* variable represents austerity announcements of governments or approvals by parliaments. The positive coefficient indicates an increase of yield spread after austerity announcement. *iii)* *Rating* variable represents rating changes. The positive coefficient indicates an increase of yield spread after a credit rating increase. *iv)* * significant at 10%, ** significant at 5%, *** significant at 1%.

6 Conclusion

The aim of this thesis was to discover whether announcements regarding austerity measures do decrease sovereign bonds yields and thus whether markets perceive austerity measures as a positive sign towards the stability of fiscal budgets.

To do so, we constructed a unique news dataset which consists of governmental and parliamentary approvals of austerity measures for 11 European countries. Since we assumed that the effects may be incorporated to the price earlier than on the day of the final announcement, we also followed more regular statements of governmental representatives towards austerity measures to capture the process of expectation creation on the market. Furthermore, we aimed to lower the selection bias of news in the dataset because the results of previous works may yield inflated coefficients since authors usually pick only a few important announcements. Thus, we relied on careful wording selection of news and their titles available in the FACTIVA database.

To capture the surprise effects in their glance, we employed an estimation utilizing daily data. Contrary to existing literature, our analysis was performed on a long time period from the beginning of 2000 to the end of 2019. This enabled us to study different time periods of the financial and business cycle and search for various viewpoints towards austerity decisions and comments. To provide a straightforward benchmark to announcement variables, we included rating changes into our analysis, too.

Initial regressions for the whole time period and all countries showed limited effects of austerity announcements for both types of established variables, the comments, and the decisions of governmental representatives. Yet, we found significant and negative effects of rating changes which supports findings of existing literature.

Next, we studied effects with respect to three time periods which may be labeled as pre-crisis, crisis, and post-crisis ones. Such setups show that the market reactions depend on the state in which the market is situated, its perceptions, and uncertainty concerning government solvency. In the pre-crisis period, markets did positively respond to austerity measures finding both established variables significant. Similar effects were also found in the post-crisis period although they were not significant on the standard scale. The crisis period manifests itself with increased and mixed surprise effects of announcements. Markets did pay more attention to austerity signals and evaluated them more negatively. Resulting coefficients were however not significant.

Since we suggested that the announcements may depend on the solvency of analyzed countries, we further divided the dataset into several country-specific groups. The prime division followed the country's ability to withstand financial turbulence during the crisis.

For the *GIIPSH* group (Greece, Ireland, Italy, Spain, and Hungary), we found robust negative responses for both austerity variables in the pre-crisis period. In the crisis, however, markets adopted announcements as signals of deteriorating solvency which led to further increases of yield spreads. Although we do not find the significance robust against the equation specification, they were still very strong, and increasing yield spreads. On the other hand, *prudent* countries enjoyed preserving credibility across the periods which was manifested through low sensitivity to announcements of their officials and insignificance towards their comments.

Finally, we found that markets rather react on final announcements of austerity measures than to comments expressed by national representatives. On top of that, rating changes did not prove to be considered significant for each period. Although they are more robust contrary to our announcement variables, the crisis periods revealed mixed effects since in the case of the *GIIPSH* group they were stronger but with both positive and negative effects.

Annex

Table A.21: News agencies included

News agency name
Reuters News
Market News International
Associated Press Newswires
Dow Jones International News
Agence France Presse
Xinhua News Agency
The Telegraph Online
Dow Jones Global Equities News
The Wall Street Journal Online
Dow Jones Institutional News
IHS Global Insight Daily Analysis
BBC Monitoring European
Dow Jones Chinese Financial Wire

Table A.22: Results for GIIPS country group

<i>Dependent variable:</i>				
Δ YIELD SPREAD 10Y				
	PERIOD: PRE-CRISIS	CRISIS	POST-CRISIS	WHOLE TIME SPAN
	(1)	(2)	(3)	(4)
BIDASK	-0.117** (0.056)	1.070*** (0.016)	0.516*** (0.016)	0.997*** (0.038)
BIDASK [-1]	0.003 (0.016)	0.335*** (0.014)	0.418*** (0.025)	0.337*** (0.018)
ESTOXX	-0.058 (0.042)	-2.034** (0.95)	-1.105 (0.848)	0.283 (0.295)
ESTOXX [-1]	-0.270*** (0.024)	-0.197 (0.394)	-0.187 (0.653)	-0.015 (0.099)
VSTOXX	0.024* (0.012)	-0.04 (0.051)	-0.039* (0.021)	0.109*** (0.021)
VSTOXX [-1]	-0.022*** (0.006)	0.026 (0.183)	-0.03 (0.037)	0.001 (0.027)
NATSTOCK	-0.090*** (0.027)	-3.269*** (0.375)	-3.128*** (0.385)	-2.147*** (0.415)
NATSTOCK [-1]	-0.044* (0.023)	-0.681*** (0.127)	-0.656*** (0.073)	-0.579*** (0.17)
COMMENTS	-1.329* (0.801)	-1.251 (1.986)	-6.136 (4.121)	-2.327 (2.19)
DECISION	-0.08 (0.144)	5.489 (3.346)	-1.316 (0.813)	2.84 (1.867)
RATING	-2.981*** (0.627)	-0.928 (3.128)	-3.344* (1.9)	-2.887*** (0.687)
TUE	0.171*** (0.03)	2.288 (2.581)	-0.334** (0.155)	0.396 (0.328)
WED	0.068*** (0.025)	3.16 (2.746)	0.438 (0.4)	0.705 (0.504)
THU	0.031 (0.046)	1.758 (2.582)	0.544*** (0.165)	0.685 (0.535)
FRI	0.246*** (0.088)	0.91 (2.229)	-0.447 (0.392)	0.196 (0.211)
Constant	-0.085** (0.042)	-0.964 (1.735)	-0.315* (0.169)	-0.417 (0.331)
BIDASK Lag (2:5)	Yes	Yes	Yes	Yes
Observations	12,252	3,475	9,780	25,557
R ²	0.034	0.397	0.176	0.309
Adjusted R ²	0.032	0.394	0.175	0.308
F Statistic	22.398***	119.863***	109.843***	600.056***

Note: i) Presented results are obtained using the largest equation specification from eq. 4. ii) *Comments* variable represents austerity comments of national representatives. The positive coefficient indicates an increase of yield spread after positive attitude expressed towards austerity. iii) *Decision* variable represents austerity announcements of governments or approvals by parliaments. The positive coefficient indicates an increase of yield spread after austerity announcement. iv) *Rating* variable represents rating changes. The positive coefficient indicates an increase of yield spread after a credit rating increase. v) * significant at 10%, ** significant at 5%, *** significant at 1%.

Table A.23: Results for EMU country group

<i>Dependent variable:</i> Δ YIELD SPREAD 10Y				
PERIOD:	PRE-CRISIS	CRISIS	POST-CRISIS	WHOLE TIME SPAN
	(1)	(2)	(3)	(4)
BIDASK	-0.106*** (0.038)	1.068*** (0.019)	0.528*** (0.016)	0.988*** (0.046)
BIDASK [-1]	0.007 (0.011)	0.334*** (0.015)	0.429*** (0.032)	0.337*** (0.019)
ESTOXX	-0.034 (0.027)	-0.955 (0.967)	-0.147 (0.767)	0.569* (0.324)
ESTOXX [-1]	-0.262*** (0.02)	0.037 (0.377)	0.039 (0.457)	0.046 (0.115)
VSTOXX	0.026*** (0.009)	-0.037 (0.039)	-0.031* (0.016)	0.089*** (0.019)
VSTOXX [-1]	-0.020*** (0.005)	0.013 (0.13)	-0.023 (0.028)	-0.003 (0.019)
NATSTOCK	-0.034 (0.039)	-3.174*** (0.387)	-3.061*** (0.432)	-1.872*** (0.475)
NATSTOCK [-1]	-0.028 (0.02)	-0.723*** (0.166)	-0.657*** (0.089)	-0.536*** (0.177)
COMMENTS	-0.622 (0.518)	-0.579 (1.594)	-4.511 (3.196)	-1.562 (1.677)
DECISION	0.355 (0.318)	4.913 (3.346)	-1.203* (0.692)	2.328 (1.756)
RATING	-3.116*** (0.626)	-1.139 (3.109)	-3.259* (1.901)	-2.990*** (0.714)
TUE	0.163*** (0.022)	1.489 (1.893)	-0.320*** (0.119)	0.273 (0.243)
WED	0.072*** (0.02)	1.924 (2.068)	0.237 (0.298)	0.416 (0.384)
THU	-0.029 (0.049)	0.904 (1.897)	0.295 (0.189)	0.366 (0.416)
FRI	0.269*** (0.066)	0.287 (1.625)	-0.44 (0.289)	0.078 (0.159)
Constant	-0.081*** (0.03)	-0.435 (1.274)	-0.144 (0.15)	-0.238 (0.25)
BIDASK Lag (2:5)	Yes	Yes	Yes	Yes
Observations	6,605	4,865	13,692	35,981
R ²	0.084	0.391	0.157	0.298
Adjusted R ²	0.081	0.388	0.156	0.297
F Statistic	31.827***	163.557***	133.764***	802.668***

Note: i) Presented results are obtained using the largest equation specification from eq. 4. ii) *Comments* variable represents austerity comments of national representatives. The positive coefficient indicates an increase of yield spread after positive attitude expressed towards austerity. iii) *Decision* variable represents austerity announcements of governments or approvals by parliaments. The positive coefficient indicates an increase of yield spread after austerity announcement. iv) *Rating* variable represents rating changes. The positive coefficient indicates an increase of yield spread after a credit rating increase. v) * significant at 10%, ** significant at 5%, *** significant at 1%.

Table A.24: Results for NON-EMU country group

<i>Dependent variable:</i> Δ YIELD SPREAD 10Y				
PERIOD:	PRE-CRISIS	CRISIS	POST-CRISIS	WHOLE TIME SPAN
	(1)	(2)	(3)	(4)
BIDASK	0.134 (0.141)	0.461*** (0.143)	0.129** (0.059)	0.179** (0.086)
BIDASK [-1]	-0.086 (0.104)	0.058 (0.046)	0.066 (0.042)	-0.031 (0.034)
ESTOXX	-0.692*** (0.088)	-2.259*** (0.236)	-1.417*** (0.298)	-1.202*** (0.231)
ESTOXX [-1]	-0.629* (0.37)	0.262** (0.118)	0.252** (0.118)	-0.281 (0.225)
VSTOXX	0.062** (0.028)	0.083*** (0.022)	-0.02 (0.013)	0.030*** (0.003)
VSTOXX [-1]	-0.131*** (0.038)	-0.00003 (0.021)	0.032*** (0.01)	-0.052*** (0.017)
NATSTOCK	-0.834*** (0.295)	-1.502*** (0.497)	-0.366*** (0.046)	-0.864*** (0.271)
NATSTOCK [-1]	-0.409 (0.253)	-0.699 (0.543)	-0.157** (0.062)	-0.408 (0.258)
COMMENTS	-0.723 (0.546)	0.087 (1.183)	2.469 (1.55)	-0.231 (0.436)
DECISION	-1.800** (0.76)	-1.622*** (0.391)	0.463 (0.541)	-1.371* (0.759)
RATING	4.192 (3.264)	3.676 (4.795)	-2.437** (1.119)	1.464 (1.677)
TUE	0.453 (0.305)	-1.008*** (0.266)	-0.062 (0.112)	-0.035 (0.205)
WED	0.042 (0.322)	-1.675*** (0.643)	0.105 (0.316)	-0.235 (0.176)
THU	0.306 (0.299)	-0.238 (0.408)	-0.12 (0.138)	0.067 (0.178)
FRI	1.412** (0.599)	-0.209 (0.848)	0.361 (0.29)	0.767* (0.436)
Constant	-0.395 (0.286)	0.732*** (0.17)	-0.099 (0.147)	-0.084 (0.17)
BIDASK Lag (2:5)	Yes	Yes	Yes	Yes
Observations	6,605	2,085	5,868	14,588
R ²	0.084	0.323	0.079	0.109
Adjusted R ²	0.081	0.316	0.076	0.108
F Statistic	31.827***	51.787***	26.284***	93.835***

Note: i) Presented results are obtained using the largest equation specification from eq. 4. ii) *Comments* variable represents austerity comments of national representatives. The positive coefficient indicates an increase of yield spread after positive attitude expressed towards austerity. iii) *Decision* variable represents austerity announcements of governments or approvals by parliaments. The positive coefficient indicates an increase of yield spread after austerity announcement. iv) *Rating* variable represents rating changes. The positive coefficient indicates an increase of yield spread after a credit rating increase. v) * significant at 10%, ** significant at 5%, *** significant at 1%.

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