Political Uncertainty and Sovereign Bond Markets

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Abstract

This paper analyzes the effects of political uncertainty on prices and liquidity of sovereign bonds. We focus on the time period of the European sovereign debt crisis and on Italian government bonds. We study the effect of Euro, G8 and G20 summits together with relevant elections. Focusing on Italy allows us to analyze a major European government bond market based on detailed transaction data, which was highly affected by the sovereign debt crisis. In line with the theoretical literature, we find a significant drop in prices in combination with high illiquidity and sell-side pressure before the event. Prices and trading activity start to recover approximately one month after the event when the impact uncertainty of policy changes resolves. The effects are stronger when uncertainty - measured by the EPU index - is high and the economic conditions are perceived as being weak.

JEL-Classification: G01, G12, G14
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1 Introduction

Political news about government policies and reactions represents important information for investors around the world suggesting that uncertainty about the outcomes of the political decision-making process is relevant for asset prices and trading activity. The recent theoretical literature provides guidance to understand these asset pricing implications. In particular, the model presented in Pastor and Veronesi (2013) shows that investors demand a risk-premium for political uncertainty, i.e., a compensation for being exposed to the stream of political news around important events, such as elections. The theoretical literature has focused on potential policy changes affecting firms and has primarily modeled stock price reactions. However, government policies affect many risk factors, determining the general economic conditions. Thus, the effects are not limited to stock markets and, in particular, will be very relevant for financial instruments directly linked to the activities of governments, such as sovereign bonds.

In this paper, we study whether political uncertainty indeed affects prices and liquidity in government bond markets. We explore the time period of the European sovereign debt crisis, as it is an ideal laboratory for such an analysis, because investors were exposed to significant political uncertainty and many political events at this time, where almost exclusively focusing on policies handling this crisis. In this episode, sovereign bonds represented the most directly affected financial instruments and understanding their price reactions offers significant insides, enriching the results presented for stock and option markets in the empirical literature so far, see e.g. Kelly, Pastor, and Veronesi (2016). Furthermore, these results allow us to quantify the additional financing costs for sovereign debt resulting from the degree of political uncertainty during the issuance process.

In our empirical study we focus on the Italian sovereign bond market. With a notional amount outstanding of around two trillion EUR the Italian market is a major European bond market, comparable in size with Germany and France. Furthermore, Italian government bonds are traded on the MTS platform and, thus, detailed transaction data is available. This provides us with representative high-frequency data on quotes and transactions which enables us to calculate a variety of liquidity measures and conduct an in-depth investigation of price movements. Based on additional tests, we present results for other highly affected countries as well, i.e., Greece, Ireland, Portugal and Spain, however, based on less detailed data. Sovereign bonds issued by all these countries offer a unique opportunity to study political uncertainty. First, all countries experienced severe distress during

the crisis which led to significant default risk associated with their sovereign debt, in turn this made the prices of the bonds very susceptible to changes in the economic or political framework. In contrast, bonds issued by the core eurozone countries did not show a similar development and remained relatively stable throughout the crisis. In addition, the European sovereign debt crisis was very political in nature. All participants were constantly facing the possible exit of one or more countries from the eurozone while trying to coordinate a response to the crisis on a multinational level and several key political decisions marked the crisis, e.g., the creation of the European Financial Stability Facility (EFSF) or the 2012 Greek elections.

We define a list of relevant events similar to Kelly, Pastor, and Veronesi (2016), covering the peak of the European sovereign debt crisis from 2010 to 2013. The list includes political summits (Euro, G8 and G20) and relevant elections. In our analysis, we focus on a time window of 60 trading days before and after the event day. We distinguish between political and impact uncertainty as defined by Pastor and Veronesi (2013). In this respect, we focus on price and liquidity effects before the event, analyzing the effect of political uncertainty. Furthermore, we explore price and liquidity changes directly around the event and after the event. This allows to analyze the immediate impact of potential policy changes and the effect of resolving the uncertainty about the effect of the new policy after the event, modeled in the theoretical literature. We provide a regression analysis to explore whether the observed effects can be linked to the EPU index measuring political uncertainty based on newspaper articles (see Baker, Bloom, and Davis, 2016) and to the economic conditions at the time of the event, while controlling for bond characteristics.

We find strong negative price reactions of Italian government bonds before the events showing that political uncertainty affects prices. On average, prices fall by around 1% in the time window 20 days before the event compared to the beginning of the 60 days window. This effect is highly significant in statistical and economic terms. We observe negative price reactions whether we calculate returns or abnormal returns with respect to maturity-matched German government bonds. Directly around the event (i.e., three days before/after the event) we find significant positive price impacts of around 0.4%. Thus, we observe a positive effect as soon as the political uncertainty is resolved and, potentially, a new policy is implemented. However, prices do not further recover for the next 20 trading days showing that a significant impact uncertainty remains in the market. Within 60 days after the events, prices basically fully recover to pre-event levels indicating that this impact uncertainty is resolved. We find similar effects for government bonds issued by Greece, Ireland,

Portugal and Spain. Overall, these results are in line with the discussed theoretical literature.

In addition, we study trading activity measures representing liquidity measures related to transaction costs and volume based measures. The liquidity measures cover bid-ask spreads, as well as, the Roll, Amihud and price dispersion measure. We find that all these measures indicate higher illiquidity shortly before the event when prices tend to fall, with the highest illiquidity being observed directly around the event, e.g., the price dispersion measure increase from 15 bp to 20 bp. The trading costs return to previous levels after 60 days in line with the observed price recovery. Analyzing the trading volume, we observe a significant higher volume of around 5% before the event. This coincides with a much higher sell-side trading activity, in particular three days before the events. Thus, we can show that the observed price movements coincide with sell-side pressure. Our analysis reveals that a short-term trading strategy around the event might not be profitable given the high transaction costs. However, a long-term strategy buying the bond before the event and holding it 60 days would be profitable even after considering transaction costs.

In our regression analysis, we relate the observed pre-event, event and post-event returns to variables measuring political uncertainty and representing the economic conditions at the time of the event. As a direct measure of political uncertainty we use the EPU index and as an indirect measure we include the VIX index. The economic conditions are represented by GDP and inflation and by considering the CDS spread of Italy as a market-based measure. In addition, we include the 3M Euribor, representing short-term interest rates, bond-specific characteristics and our liquidity measures. We find a significant effect of the EPU index for pre-event returns where a higher increase in uncertainty indicates a stronger fall in bond prices. In addition, weaker economic conditions are related to stronger price reductions. Interestingly, the effect of the EPU index fades out and is not present in the post-event returns indicating that prices only react to political uncertainty in the context of upcoming events and not unconditionally at all times.

Based on our results, we explore how much notional volume was issued by the Italian government in the period 20 days before the events, when prices are severely affected. In these periods, 193 billion EUR of notional volume were issued, thereof 176.5 billion EUR as seasoned bond offerings. In our analysis, we find direct costs of 3.28 billion EUR for exposing primary dealers and investors to political uncertainty. Thus, we find significant costs stemming from these issuing activities. These results show that political uncertainty related to political events should be considered in

the issuance policy of debt management offices, as such costs could potentially be avoided by more active cash management.

Overall, the results in this paper foster our understanding of the effect of political uncertainty. We present price effects for sovereign debt markets, which have not been considered by the empirical literature so far. However, the price reactions of these financial instruments are important when analyzing political uncertainty, as these instruments are directly linked to the activities of governments and, thus, are closely related to political uncertainty. This is particularly true for our considered time period, in which events where almost exclusively focusing on policies handling the European debt crisis. Furthermore, we quantify and analyze the trading activity around the events and these results further increase our understanding of the price reactions. The remainder of the paper is structured in the following way: Section 2 reviews the literature. Section 3 explains the data set and Section 4 presents our hypotheses and methodology. Our results are discussed in Section 5. Section 6 concludes.

2 Literature Review

This paper is related to various strands of the literature. First, we consider the recent theoretical literature studying political uncertainty and providing guidance on its asset pricing implications. We review the corresponding empirical literature, which is focused on stock and option markets. Our paper further relates to the literature studying European sovereign bonds based on MTS data and analyzing bond market liquidity in general.

Concerning the effects of political uncertainty in the context of asset pricing, Pastor and Veronesi (2012) and Pastor and Veronesi (2013) make important theoretical contributions. In Pastor and Veronesi (2012) the uncertainty about government policies and its effects on stock prices are modeled in a general equilibrium framework. Investors are exposed to potential policy changes by the government. Although, the government maximizes investors' welfare, it also takes into account noneconomic objectives, i.e., political costs (or benefits) incurred by changing the policy. Investors do not know this cost and, thus, cannot fully anticipate policy changes. This leads to political uncertainty. After a policy change investors' beliefs are reset and they are exposed to uncertainty concerning the impact of the new policy. Pastor and Veronesi (2012) focus on announcement returns and show that the unconditional risk premium is positive. However, returns conditional on a policy change can be positive or negative and tend to be positive after long and severe eco-

nomic downturns. Building on these results, Pastor and Veronesi (2013) introduce the possibility for investors to learn about the political costs associated with the introduction of potential new policies. This introduces political shocks triggered by political news and leads investors to revise their beliefs concerning the probability of policy changes. Pastor and Veronesi (2013) show that investors demand a risk premium for being exposed to the stream of purely political news around major events. This risk premium is larger when there is more political uncertainty, signals are more precise and in severe economic downturns. Thus, in contrast to their first paper, these theoretical results establish a price reaction triggered by political uncertainty before the actual announcement.[1]

In their empirical example, Pastor and Veronesi (2013) use the S&P 500 index to show that investors indeed demand a risk premium for political uncertainty, by relating the observed returns to the EPU index. In addition, the results show that the effect is stronger in weak economic conditions, measured by various proxies, e.g., recession period dummies and credit spreads. However, they do not directly relate the returns to political events in this exercise. Kelly, Pastor, and Veronesi (2016) empirically analyze the pricing of political uncertainty in the option market. They isolate political uncertainty by studying its variation for important political events, such as national elections and global summits. They find that options that mature after such events are on average more expensive since they protect investors against the risk caused by these events. Similar to the previous paper, this effect is more pronounced when the economy is in a weak condition and the political uncertainty is higher, measured by poll spreads related to elections. Considering municipal bond markets, Gao and Qi (2013) isolate uncertainty around U.S. gubernatorial elections and study how it affects the offering yield of newly issued bonds. They find that yields of municipal bonds increase before elections. Stronger movements can be observed during economic downturn and for elections with low predictability. They find similar evidence based on secondary market bond index yields. In addition, they provide first evidence that the trading activity is affected by political uncertainty by reporting a lower number of net buy orders before the elections.[2]

[1] In a related theoretical contribution, Sialm (2006) studies the effect of stochastic taxation on asset prices in a dynamic general equilibrium model, showing that tax changes result in price adjustments and that the effect is stronger for assets with a longer duration. Concerning bond markets, Ulrich (2013) models the uncertainty about future government spending and shows that this uncertainty is a first-order risk factor in the bond market.

[2] In earlier work, Erb, Harvey, and Viskanta (1996) show that the International Country Risk index, which includes political uncertainty, is correlated with future equity returns. In addition, Pantzalis, Stangeland, and Turtle (2000) and Li and Born (2006) find abnormal returns prior to elections and Boutchkova, Doshi, Durnev, and Molchanov (2012) link global and political risk to industry return volatility.

Papers measuring political uncertainty either make use of poll data to identify elections with uncertain outcomes or make use of uncertainty indices. Baker, Bloom, and Davis (2016) provide such an important index called economic policy uncertainty (EPU) index. This index is based on the relative frequency of newspaper articles containing keywords representing policy uncertainty. They focus on the United States, but they also provide indices for France, Germany, Italy and Spain. The paper analyzes the relation of the EPU index to firm-level data and finds that policy uncertainty is associated with greater stock price volatility and leads to a reduction of investment and employment. They further show that the index is related to macro-economic variables in the U.S. and in 12 other major economies. There is a growing empirical literature using the EPU index: Manzo (2013) shows that an increase in the European EPU index leads to higher sovereign credit spreads in Europe. Brogaard and Detzel (2015) also use this index and show that it positively forecasts log excess market returns.[3]

There are several papers dealing with the MTS dataset and European sovereign bonds. Most of these papers explore the relation of credit and liquidity risk and analyze the impact of ECB interventions during the financial and European sovereign debt crisis. Dufour and Skinner (2010) provide a summary of the dataset, discussing specific aspects of the market structure. Beber, Brandt, and Kavajecz (2009) analyze whether bond investors demand credit quality or liquidity, showing that in times of market stress investors focus on liquidity. Pelizzon, Subrahmanyam, Tomio, and Uno (2016) show that during the European sovereign debt crisis starting in 2010 credit risk drives the liquidity of the overall market and that this effect was weakened after the ECB started intervening in the market with their longer-term refinancing operations program. Eser and Schwaab (2016) study the effect of the securities markets programme in five different sovereign bond markets in the eurozone from 2010 to 2011. In their study they find large announcement effects and lower bond yield volatility on intervention days. Finally, in one of the most recent papers Schlepper, Hofer, Riordan, and Schrimpf (2017) quantify the price impact of the public sector purchase programme in the German bund market. They find 10-minute price impacts that are larger when market liquidity is low.

Regarding liquidity measures, various proxies are commonly used in the context of fixed-income markets. Following Schestag, Schuster, and Uhrig-Homburg (2016), one can distinguish between transaction cost measures and price impact measures. The most well-known transaction cost measure is the Roll (1984) measure. It uses

[3]Other indices include the index by Azzimonti (2014) which measures the degree of partisan conflict or the state level measure by Shoag and Veuger (2016), for example. However, both are only U.S. specific.

the negative covariance of consecutive daily returns, caused by bid-ask bounce, to proxy for liquidity.[4] A price impact measure was first proposed by Amihud (2002). The Amihud measure is the daily ratio of the absolute return to the trading volume. Subsequently with the availability of detailed transaction data, these originally low-frequency proxies were adapted to high-frequency measures. For example, in their analysis Dick-Nielsen, Feldhütter, and Lando (2012) use an intraday version of the Roll measure and also the Amihud measure can be adapted similarly, as was done by Goyenko, Holden, and Trzcinka (2009), for example. A high-frequency measure specific for dealer markets is the price dispersion measure proposed by Jankowitsch, Nashikkar, and Subrahmanyam (2011). It is based on the idea that dealers face inventory risk and, thus, prices might deviate from the expected market valuation to compensate them for the risk. Hence, the dispersion around the market valuation can be seen as a transaction cost measure. Another measure for dealer markets is the imputed round-trip measure by Feldhütter (2012). The measure analyzes prices of trades that happened in short succession and have the same volume. In these cases a dealer might already have a matched buyer and seller and, thus, the difference is a proxy for round-trip costs.[5]

3 Data

3.1 Political Events

We hand-collect a list of events strongly related to political uncertainty during the European sovereign debt crisis, similar to Kelly, Pastor, and Veronesi (2016). The list includes summits and elections in the time window from the beginning of 2010 to the end of 2013. This time period covers the height of the European sovereign debt crisis, which started in late 2009 with Greece acknowledging misleading accounting practices, increasing Greek debt to 113% of GDP. These tumults affected several European countries including Italy by severely increasing their refinancing costs. In the case of Italy, investors became very nervous in mid 2011 given a debt level of 120% and a budget deficit second only to Greece in the eurozone, resulting in a downgrade in September 2011 and a negative outlook for the third largest economy in the eurozone. This situation worsened in November 2011 when Berlusconi lost his parliamentary majority on a budget vote. In March 2012 Greek defaulted on its

[4] Other proxies in this category are the Bayesian Gibbs measure proposed by Hasbrouck (2009) and the high-low estimator by Corwin and Schultz (2012), who argue that the high-low ratio reflects the variance and the bid-ask spread.

[5] Friewald, Jankowitsch, and Subrahmanyam (2017) provide a comprehensive comparison of these various liquidity measures.

sovereign debt allowing to erase around 100 billion EUR. In 2012 several elections followed increasing the political uncertainty concerning the future of the eurozone. The whole crisis was accompanied by many rescuing initiatives, resulting in the European Stability Mechanism (ESM) and European Financial Stability Facility (EFSF), which were officially established by the end of 2012. In August 2013 the eurozone official emerged from recession, marking the end of the most severe period of the crisis for most countries. In particular, Italy started out with 10-year bond yields of around 4% in 2009, which spiked at 7.5% in November 2011 and after reducing to 5% returned to 6.5% by mid 2012. By the end of 2013, these yields returned to around 4%.

Our list of relevant events covers all Euro summits, i.e., the meetings of the heads of governments of the eurozone members. The main topic of these summits during those years was to coordinate a common crisis response within the eurozone, making them the main set of events for our analysis. In addition, we include G8 and G20 summits that were held during that time period if the European sovereign debt crisis or another relevant economic topic was the main part on the agenda of the respective summits.[6] As we focus on Italy, we include Italian parliamentary elections and, in addition, the Greek 2012 elections as there was substantial risk that the election results could lead to Greece leaving the eurozone with severe consequences for all other countries. Table 1 shows the full list of events with the main topics on the agenda and an indicator if it is included or was omitted due to not focusing on an economic topic or being too close to an already included event, i.e., within seven days of a previous event. We consider 17 events resulting in roughly 4 events per year.

This set of events offers an ideal laboratory to study political uncertainty. In most circumstances, political events are considered with many different aspects concerning various policies, e.g., in the case of regular elections. However, in the case of the European sovereign debt crisis most political events at this time, where almost exclusively focusing on policies handling this crisis. This allowed investors to receive more precise signals compared to regular times. This is especially true for the Euro summits, which, in addition, were held frequently compared to regular elections. In addition, the level of political uncertainty was high and all countries experienced severe distress during this crisis leading to significant default risk associated with their sovereign debt, in turn this made the prices of the bonds very susceptible to changes in the economic or political framework.

[6]We exclude EU summits as most were held in combination with a Euro summit or were held very close to these summits.

3.2 Bond Data

Our bond dataset represents MTS transaction data for Italian sovereign bonds from the beginning of 2010 to the end of 2013. This dataset contains high-frequency data on transactions, i.e., traded price (clean price) and volume with time stamp and buy/sell indicator, as well as intra-day quotations (best-bid and best-ask). MTS covers bonds issued by several different European countries and similar issuers. The overall dataset contains various MTS interdealer markets, i.e., EuroMTS, EuroCredit MTS and the domestic MTS markets. The EuroMTS serves as a reference market for European benchmark bonds as well as bonds with an outstanding amount greater than 5 billions. Other bonds are covered by EuroCredit MTS or one of the domestic MTS markets. The dataset was established in April 2003 and originally contained information on bonds of 11 different eurozone countries: Austria, Belgium, Finland, France, Germany, Greece, Ireland, Italy, The Netherlands, Portugal and Spain. We focus on the Italian sovereign bond market as, in contrast to most other countries, the vast majority of transactions happens via the MTS system.[7] This provides us with representative high-frequency data on quotes and transactions.

In our analysis we focus on short- and long-term bonds issued by the Italian government: Buoni Ordinari del Tesoro (BOT) represent short-term discount bonds with a maturity of up to one year, Certificato del Tesoro Zero-coupon (CTZ) are short-term discount bonds with a maturity of two years and Buoni del Tesoro Poliennali (BTP) are long-term coupon bonds with a maturity of 3, 5, 10, 15 or 30 years. We exclude index-linked securities and floating rate notes from our sample, which represent only 12% of the outstanding volume and are likely to show different price reactions than regular bonds. Overall we cover 229 bonds. Out of those bonds roughly two thirds are short-term zero-coupon bonds (BOT and CTZ) and one third consists of longer-term coupon bonds (BTP). Table 2 shows summary statistics of our sample, i.e., the number of bonds included and information on the amount issued, coupon and maturity. The information is presented for the whole sample as well as split into coupon and zero-coupon bonds. We find an average issuing size of 20 billion EUR for coupon bonds, which is roughly 2.5 times larger compared to zero-coupon bonds. The average maturity of the short-term bonds is close to one year, whereas coupon bonds have an average of around 11 years and an average coupon of 4.2%.

We filter out erroneous entries for both transactions and quotes. Concerning the

[7] Primary dealers estimate that around 75% to 80% of all transactions are covered by MTS in the case of Italian government bonds, whereas this percentage is much lower for other countries.

transactions, we apply similar filters as Dick-Nielsen (2009) adapting these filters to the context of the MTS dataset.[8] In particular, we control for high intra-day price variation, i.e., if any price shows a 10% percent deviation compared to the median price on that day, it is considered as erroneous. In addition, we eliminate transactions if any price changes between two consecutive trades are greater than 5%.[9] Concerning quotations, we first apply filters based on the observed intra-day spreads between best-ask and best-bid quote. We winsorize the intra-day spreads of each bond on every day, by setting the top and bottom 2.5% percent to the respective quantiles.[10] In addition, we filter out the highest percent of daily average bid-ask spreads in our sample period across bonds.[11]

Based on this filtered dataset, we consider only the transactions and quotations in a time window starting 60 days before and ending 60 days after the events (see Section 3.1). Overall, we obtain 1,307 bond-event observations (see Table 3). To ensure a minimum level of trading activity of the bonds around the events, we consider only observations with at least five trades before and after the event with a total trading volume of at least 100 million EUR. These restrictions result in 1,280 remaining bond-event observations. Table 3 shows that in the time window around the events the considered bonds were traded 775,518 times which corresponds to an average of 5 trades per day and bond. Similarly, the total trading volume is 4.3 trillion EUR or 28 million EUR per day and bond.

In addition, to extend our analysis of price effects to other countries that were highly affected by the European sovereign debt crisis, i.e., Greece, Ireland, Portugal and Spain, we obtain zero-coupon yield curves from Bloomberg for these countries for our sample period. The yield curves include rates from 3 months to 30 years, allowing us to study synthetic zero-bond prices with matched durations compared to the Italian bonds. In addition, we obtain zero-coupon yields for Germany from Bloomberg, which we use as a eurozone benchmark in our analysis.

[8] Dick-Nielsen (2009) provides filters for the TRACE dataset representing transactions in the U.S. corporate bond market.

[9] Note, that the MTS transaction dataset in the case of Italian government bonds is much cleaner compared to the U.S. corporate bond market as a significantly lower number of instruments and more liquid bonds are involved. Thus, we had to eliminate less than ten observations based on these transaction filters.

[10] Dealers in this market quote very high spreads at certain trading times, e.g., at the end of day, when they are not interested in attracting trades. Furthermore, stale quotes can lead to negative spreads. Thus, we adjust these unrepresentative quotes.

[11] For particular bonds on days with no trading activity only very high spreads are observable which are not representing real potential trading costs, but rather indicate that dealers do not want to attract any trades.

3.3 Uncertainty Index and Economic Variables

In our analysis, we consider the effects of political uncertainty and economic conditions. As a relevant measure of political uncertainty we obtain the Italian version of the EPU index from the homepage of Baker, Bloom and Davis,[12] which provides us with monthly data. As an indirect measure of uncertainty, we include the VIX index as a daily measure retrieved from Bloomberg. Measuring the economic condition, we consider several variables, which represent either market-based data or cover general macroeconomic information. In particular, we include the 5 Year Italian CDS spread, as a direct measure of credit risk. As macroeconomic indicators, we consider the 3 month Euribor rate, the monthly year-to-year inflation in Italy, and quarterly Italian year-to-year GDP growth data. All these variables are downloaded from Bloomberg.

4 Methodology

4.1 Hypotheses

We formulate three hypotheses based on the theoretical literature, see Section 2. These hypotheses are related to the different phases of political events. Before the event prices will be driven by political uncertainty, the event itself reveals whether a policy change occurred and the time window after the event is dominated by learning about the potential new policy and resolving its impact uncertainty:

Hypothesis 1: Investors are exposed to a stream of political news before the event increasing the risk of significant bond price changes. This risk leads to overall lower price levels and, thus, political uncertainty is priced in the sovereign bond market.

Hypothesis 2: Directly after the event political uncertainty resolves and the unconditional price reaction following the policy decision, i.e., keeping the existing policy or implementing a new policy, is positive. However, impact uncertainty about the potential policy change affects prices negatively. Thus, prices do not fully recover on average.

Hypothesis 3: The impact uncertainty resolves after the event, leading to a positive price reaction with potentially a full recovery.

[12] See http://www.policyuncertainty.com/.

Based on the theoretical literature, we expect that the price effects are stronger in periods of higher political uncertainty and when the economic conditions are weak. In addition, we assume that long-term coupon bonds are more strongly affected than short-term zero-bonds given their significantly longer duration.

4.2 Price and Trading Activity Variables

In order to measure the price and trading activity effects, we focus on daily measures. Thus, we calculate the daily average price for each bond and we measure its daily trading volume and net-bid volume, representing the difference between sell-side and buy-side initiated transactions. In addition, we study several daily bond-specific transaction cost measures. In particular, we provide the bid-ask spread based on quotations, as well as three transaction-based liquidity measures: the Roll, Amihud and price dispersion measure.

Volume-Weighted Average Daily Price

We calculate a volume-weighted price, placing more weight on transactions with higher volume and, thus, reducing the potential noise of small unrepresentative trades, see e.g. Bessembinder et al. (2009). The daily volume-weighted price for bond i on day t is given by:

$$P_{i,t} = \frac{\sum_{k=1}^{K_{i,t}} p_{i,t,k} v_{i,t,k}}{\sum_{k=1}^{K_{i,t}} v_{i,t,k}}$$

where $K_{i,t}$ denotes the number of trades, $p_{i,t,k}$ the prices of these trades and $v_{i,t,k}$ the volumes.

Trading Activity

We measure trading activity by the daily trading volumes of the considered bonds. The cumulative trading volume for bond i on day t is given by:

$$V_{i,t} = \sum_{k=1}^{K_{i,t}} v_{i,t,k}$$

In addition, we calculate the difference between sell-side and buy-side initiated transactions. The net-bids for bond i on day t is defined as:

$$\text{Net-Bid}_{i,t} = \sum_{b=1}^{B_{i,t}} v_{i,t,b} - \sum_{a=1}^{A_{i,t}} v_{i,t,a}$$

where $B_{i,t}$ denotes the number of trades where the initiator wanted to sell and $A_{i,t}$ the number of trades where the initiator wanted to buy.

Transaction Costs

We estimate transaction costs based on quotations by calculating the daily bid-ask spread of bond i on day t and relate this spread to the average observed price:

$$\text{Bid-Ask Spread}_{i,t} = \frac{\sum_{q=1}^{Q_{i,t}} \text{Best-Ask}_{i,t,q} - \text{Best-Bid}_{i,t,q}}{Q_{i,t} \cdot \text{P}_{i,t}}$$

where $Q_{i,t}$ is the number of intra-day quotations represented by a best-ask and best-bid quote. In addition, we employ the Roll measure (see Roll, 1984) based on intra-day transaction similar to Dick-Nielsen, Feldhütter, and Lando (2012). The Roll measure for bond i on day t is defined as:

$$\text{Roll}_{i,t} = 2 \cdot \sqrt{-Cov(\Delta p_{i,t,k}; \Delta p_{i,t,k-1})}/P_{i,t}$$

where $\Delta p_{i,t,k}$ denotes the intra-day change of the consecutive prices k and $k-1$. We estimate this measure for every bond and day with at least four transactions and standardize the measure with the respective average price. Furthermore, we calculate an intra-day version of the Amihud measure (see Amihud, 2002), which relates the absolute return of consecutive transactions to the observed trading volume. The measure is defined as

$$\text{Amihud}_{i,t} = \sum_{k=1}^{K_{i,t}} \frac{|p_{i,t,k} - p_{i,t,k-1}|}{v_{i,t,k}}$$

The measure allows us to analyze by how much consecutive prices change given a certain trading volume. Thus, small price changes after a high volume transaction indicate high liquidity. We estimate this measure if at least two transactions are available. As a third transaction-based measure, we calculate the price dispersion measure by Jankowitsch, Nashikkar, and Subrahmanyam (2011) by taking the square root of the mean squared differences between the traded prices of a bond and its market valuation. The dispersion measure for bond i is:

$$\text{Price Dispersion}_{i,t} = \sqrt{\frac{1}{\sum_{k=1}^{K_{i,t}} v_{i,t,k}} \sum_{k=1}^{K_{i,t}} (p_{i,t,k} - m_{i,t})^2 \cdot v_{i,t,k}}$$

This measure assumes that price fluctuations around the fundamental price represent deviations caused by trading costs. The fundamental price is approximated by the average mid price $m_{i,t}$ based on the observed quotations. Thus, this measure can be computed even with one available transaction.

4.3 Price and Trading Activity Effects

We measure changes in price and trading activity variables across various time windows to analyze effects in the pre-event, event and post-event period. In particular, we consider the following time windows: $(-60, -40)$, $(-20, -1)$, $(-3, -1)$, $(0, 3)$, $(1, 20)$ and $(40, 60)$, where 0 is the event day and all other numbers represent the trading days relative to the event day. For each time window, we calculate the bond-specific average value of the price and trading activity variables. Based on these averages, we compute the price return and the change in trading activity variables across various combinations of two different time windows. In particular, we compare the time windows $(-60, -40)$ and $(-20, -1)$ to measure the pre-event effect, $(-3, -1)$ and $(0, 3)$ to explore the event effect and $(1, 20)$ and $(40, 60)$ to analyze the post-event period. We focus the pre-event effect on a time window starting 20 trading days before the event, because in most cases the agenda of the summits is made public four weeks before the event. The three day period around the event is simply chosen to consider enough trading information, which would otherwise not be available based on a shorter time window for all bonds. The post-event is again focused on 20 days after the event, because many press releases commenting the summit results are published in this time period. The periods from 40 up to 60 days are chosen to assure that these time windows are not affected by the events. Our results are robust to alternative specifications of these time windows.

Concerning prices, we estimate three different price returns. First, we simply calculate returns based on the average reported (clean) prices, i.e., representing a return without deterministic coupon effects. In addition, we add accrued interest and coupon payments when calculating the average prices and, thus, provide returns based on the total (dirty) prices. Furthermore, we calculate abnormal returns by adjusting these price returns for market returns, represented by duration-matched returns based on synthetic German zero-coupon bonds. Concerning the trading activity variables, we provide the changes across time periods based on the calculate averages, to analyze potential effects. As trading costs can be very low for very liquid instruments, we do not employ relative changes, as small changes in absolute terms could be translated into unreasonable high relative changes.

4.4 Regression Analysis

We run pooled regressions to explore whether the observed price changes across event windows can be relate to variables measuring political uncertainty and economic conditions. The dependent variable represents the total price returns based on all bond-event combinations for either the pre-event, event or post-event period. The regression specification modelling the returns y for bond i in the event t for a particular period is given by

$$\begin{aligned} y_{i,t} = \alpha &+ \beta(\Delta\text{Uncertainty Measures})_t \\ &+ \gamma(\Delta\text{Economic Variables})_t \\ &+ \delta(\Delta\text{Liquidity})_{i,t} \\ &+ \zeta(\text{Bond Characteristics})_{i,t} + \epsilon_{i,t} \end{aligned}$$

where we employ the EPU and VIX index as uncertainty measures, and inflation, GDP growth, Italian 5Y CDS spread and 3M Euribor rate as characteristics measuring the economic condition. In addition, we include liquidity represented by the price dispersion measure and bond-specific characteristics, i.e., the coupon and time-to-maturity.[13] Some measures are not available on a daily basis, e.g., GDP growth. Thus, we define the employed variables in the following way: if the variables are observable in the relevant two time windows of the considered period (e.g., $(-60, -40)$ and $(-20, -1)$ in the case of the pre-event period), we take the average across all available observations within the two individual time windows. If no observations are available we take the closest value before the first time window and the closest value after the second time window. Based on these two values, we calculate the change in the considered variables across time windows. As bond prices tend to behave similarly around a specific event we follow the approach by Petersen (2009) and calculate standard errors corrected for heteroscedasticity and clustered at event level.[14]

5 Results

In this section we present our results starting with a graphical analysis and descriptive statistics of the price and trading activity effects around the political events. The main analysis provides tests concerning price returns and changes in trading

[13] Using one of the other available liquidity variables provides the same results. However, we include only one metric as the different measures are highly correlated.

[14] In an additional analysis, we also included bond fixed effects which lead to very similar results.

activity in the pre-event, event and post-event period focusing on the presented hypotheses. In addition, we present our regression analysis relating the price and liquidity effects to measures of political uncertainty and economic conditions.

5.1 Impact of Political Uncertainty

We provide a first overview of price and trading activity effects around political events in Figure 1, showing the average reported prices and price dispersion measures around the events, based on all Italian bonds in our sample. We find that prices start around 100% and begin to drop roughly 40 days before the event and reach a low of around 99% before the event. The price effects show a short-term reversal on the event day. However, prices stay on a low level and are quite volatile. Event prices start to increase again 20 days after the event and reach roughly their pre-event level 60 days after the event. Concerning the liquidity of the bonds, we find that the price dispersion measure is quite volatile in the whole time-series, increasing before the event and peaking directly around the event. Thereafter, the trading cost measure is very high for the next 20 days and then returns slowly to its pre-event level.

Based on the defined time windows (see Section 4), we analyze the price returns in the pre-event, event and post-event periods. We focus again on Italian government bonds. Table 4 presents the results for the long-term coupon bonds and Table 5 for the short-term zero-coupon bonds. In addition, we analyze the results of other affected sovereign bond markets, as a robustness test. Analyzing the results for the Italian coupon bonds presented in Table 4, we find statistical significant negative returns when comparing the time windows $(-60, -40)$ and $(-20, -1)$. We find an average return of -0.98% based on the reported prices, the total price return (including accrued interest and coupon payments) is -0.45% and the abnormal return with respect to the German government bond market is even -1.41%, on average.[15] Thus, we find a significant price drop before the event indicating a risk premium for political uncertainty as stated in Hypothesis 1. Analyzing the time periods directly around the event, i.e., $(-3, -1)$ and $(0, 3)$, we find a statistical significant price increase of around 0.4% in all three specifications.[16] Thus, the resolution of the political uncertainty and the potential policy decisions lead to a positive price effect, in line with Hypothesis 2. After the event represented by the returns between the windows $(0, 20)$ and $(40, 60)$, we find statistical significant positive returns, e.g.,

[15] All the results are significant at the 1% level based on t-values of paired t-tests and pseudo medians of paired Wilcoxon tests.

[16] These results are significant at the 1% level.

1.16% based on reported prices.[17] Thus, prices stay on the event level for 20 days and return to pre-event levels after 60 days, as indicated by Hypothesis 3. In particular, the abnormal returns with respect to German bonds indicate that the results of the Euro summits and elections are not affecting price factors relevant for all eurozone countries, but concern rescue policies relevant for the most affected countries. Thus, in particular decisions affecting the general level of short-term interest rates, e.g., by the ECB monetary policy, cannot be the driver of these results, as such effects would impact all government bond markets.

These findings are strengthened by the results concerning other highly affected countries (i.e., Greece, Ireland, Portugal and Spain in our analysis). As indicated in Section 3, these results are not based on detailed trading data, but represent the returns of theoretical bond prices based on the observed time-series of zero-coupon yields. In Table 4, we present the returns and abnormal returns based on equally weighting the returns of the four countries for the defined time windows. Focusing, on the abnormal returns, we find very similar results compared to Italian government coupon bonds, i.e., returns of -1.06% before the event, 0.31% during the event and 1.67%. All these results are highly statistical significant. In addition, we analyze the price effects for Italian short-term zero-coupon bonds. Overall we find similar effects but weaker in magnitude, as expected (see Table 5). We observe small positive pre-event returns. However, if we exclude implicit time-to-maturity effects we find slightly negative returns close to zero.[18] The results show a positive price jump of 0.05% around the event and high returns after the event of 0.5%. The main difference to the coupon bonds is obtained when analyzing the hypothetical bonds issued by the combination of Greece, Ireland, Portugal and Spain, where no effect related to the event can be found, i.e., the returns across periods are roughly the same. This is mainly driven by special price changes of short-term Greek bonds.

In our second analysis, we investigate the changes in liquidity by studying our various trading activity variables in the specific time windows. Table 6 presents the descriptive statistics for the liquidity measures based on the Italian government coupon bonds. We find that most measures are lowest in the windows $(-60, -40)$ and $(40, 60)$, as these periods are least affected by the political events. The measures are slightly higher closer to the event based on $(-20, -1)$ and $(1, 20)$ and have their highest value right around the event represented by the time windows $(-3, -1)$ and $(1, 3)$. The transaction costs measures based on trading data (i.e., Roll, Amihud

[17] This result is significant at the 1% level.

[18] Note that zero-coupon bond prices show a pull-to-par effect over time (similar to mechanic price increases due to accrued interest effects for coupon bonds) and returns were adjusted for these deterministic price moves.

and price dispersion measure) indicate the same magnitude of around 20 bp. For example, the price dispersion measure starts with 15.3 bp, has its maximum directly after the event with 20.5 bp and returns to 16 bp at the end of our time window. The trading costs represented by bid-ask spreads based on quotations show a similar behavior, but are much higher in magnitude with around 50 bp. The period before the event shows an increase of trading activity from 36.5 million to 38.2 million EUR. Interestingly, this increase is directly related to the increase in sell-side activity, measured by net-bids. Directly after the event, the trading volume is still high, but we find on average more buy-side activity. Thus, some investors might sell to avoid political risk before the event and reverse this after the event. Thereafter, the trading volume returns to lower levels with a more balanced trading activity. Table 7 presents the differences between the individual periods and provides statistical tests for these difference. As discussed, we find that the measures representing trading costs based on transactions slightly increase in the period right before the event, this is accompanied by an increase in trading volume, which is driven by an increase of sell-side activity. Given the high volatility of the measures in general, we find only marginal statistical significance for these effects. Directly around the event, we find a sharp increase of transaction costs, with significantly more buy-side activity. These differences are all highly significant. After the event, transaction costs and trading activity returns to pre-event levels, also these changes are highly significant. Overall, these results are in line with our price effects. The price drop before the event is associated with higher illiquidity and more sell-side activity. The price reversal around the event itself is related to high transaction costs and buy-side activity. Thereafter, prices and liquidity return to pre-event levels.

Concerning the short-term zero-coupon bonds, Table 8 shows that the overall liquidity level is much higher, with the transaction costs being only a fraction of that of their longer-term counterparts. The transaction cost measures show the same reactions to the political events as seen for the coupon bonds, however, we find much smaller absolute reactions in the different time windows, in line with the price reactions. The trading activity measures based on volume show also a similar reaction. However, it has to be considered that the overall trading activity of short-term instruments is much more influenced by the transition of these instruments from the primary to the secondary market after the issuance given the short maturities, i.e., investors buy their positions after the issuance on the secondary market from primary market dealers. Therefore, we can observe a general decline over time in the trading volume and significant buy-side activity. However, these trends reverse directly before and after the event. With significant sell-side activity before

the event and no reduction in trading volumes after the event. Table 9 presents the differences across periods and provides statistical tests. Overall, the results indicate that the price effects are accompanied by significant effects concerning trading costs and volume.

5.2 Regression Analysis

In this section, we present the results of our regression analysis. We focus on explaining pre-event returns representing potential effects of political uncertainty. However, we also discuss results for event and post-event returns. We are particularly interested whether measures of political uncertainty and economic variables are related to the observed price effects. In this first analysis, we focus on Italian government coupon bonds.

Table 10 shows regression results for these pre-event returns. We focus on three different groups of explanatory variables: political uncertainty measures, economic variables and bond characteristics. We present three sets of regressions, each based only on the variables of one group. The first regression shows the results based on changes in the EPU and VIX index. The second regression represents changes in inflation, GDP growth, CDS spread and 3M Euribor. The third regression includes time-to-maturity, coupon and liquidity of the bonds. In Regression 4 all variables are included. We focus our discussion on Regression 4. The resulting parameters and significance levels are very similar compared to Regression 1 to 3, indicating that no multi-collinearity issues are present. We find that the coefficient of the EPU Index is negative and significant at the 1% level, i.e., if uncertainty increases before a political event we expect a price decline. The effect is very strong in economic terms, a one-standard deviation increase in political uncertainty reduces the prices by 0.74%. Compared to the observed average price reductions of roughly 1%, this effect is very significant, showing that political uncertainty is an important driver of pre-event returns. The VIX index is not significant in this specification. Analyzing the economic variables, we find insignificant results for inflation and significant results for GPD growth, CDS spread and 3M Euribor. The market-based CDS spread shows the strongest effect with a one-standard deviation move resulting in a return of -1.84%. Thus, this result shows that the EPU index is not simply picking up an increase in credit risk, but results in a risk premium over and above the credit risk premium. The 3M Euribor has an economic effect based on a one-standard deviation move of -0.83%, showing that the results are also not driven by changes in the risk-free rate. The GPD growth variable indicates lower price reaction when GDP growth increases, but on a lower scale (0.62% in economic terms). Overall,

these results indicate that we can expect higher price effects in times of weakening economic conditions. Our bond characteristics confirm the importance of liquidity, showing a return of -1.03% for a one-standard deviation increase in illiquidity. In addition, we find a significant coupon effect. Overall, these results show that our price effects can be related to changes in the political uncertainty and in the underlying economic conditions.

In addition, we provide regressions based on all variables for the event and post-event returns. These results are presented in Table 11.[19] For the event returns, we find that the two most important variables are again the EPU index and CDS spread. The economic effect based on a one standard deviation move is -0.32% and -0.86%, respectively. Thus, we find that political uncertainty is important during the event. Considering that the event will reduce the political uncertainty, this effects basically represents an average price increase given a reduction in the EPU index. Thus, we find that prices increase after the resolution of political uncertainty, however, not reaching a full recovery. Credit risk remains an important price factor during the event. Analyzing the post-event returns reveals interesting results as well. The parameter of political uncertainty is now insignificant. Thus, after the event the effect of changes in uncertainty does not affect prices, as no immediate decisions are made. However, the effect of credit risk is now much stronger with an economic effect of -2.98%, indicating that resolving impact uncertainty reveals the consequence of potential policy changes on the credit risk of the considered bonds. Thus, we find that the results for the event and post-event returns are in line with the theoretical literature and our hypotheses. Table 12 and 13 present the regressions for short-term zero-coupon bonds. The results are basically identical compared to the ones of the coupon bonds.

5.3 Implications for Issuing Costs

In this section, we investigate the implications of our results on the issuing activities in the primary market. The price levels reported in the various time windows for the secondary market will most likely be important for investors in the primary market, especially because many dealers active in this market sell off their positions in the secondary market. Thus, issuing bonds in times of high political uncertainty might result in lower prices representing additional costs. The Italian government coupon bonds are particularly well suited for the analysis of such effects, as much of the issuance activity is organized as seasoned bond offerings. This allows us to

[19] The regression result for the pre-event period based on all variables is included as well, to allow a direct comparison.

observe secondary market prices even before the issuance for relevant bonds.

In our analysis, we compare the prices of seasoned coupon bond offerings occurring directly before our set of political events, i.e. during the time period $(-20, -1)$, with the prices of the same bonds during the period $(-60, -40)$. Thus, we directly estimate the costs of issuing in times of uncertainty, assuming that these costs could be avoided by issuing before the political uncertainty affects prices. We find that 176.49 billion EUR were issued in the period $(-20, -1)$ in our sample by seasoned offerings.[20] Given the frequency of our events (roughly four per year, i.e., the considered time windows cover 80 trading days per year), we find that the periods before important events show the same average issuing activity as regular periods. Thus, the debt management office seems not to avoid (or focus) on issuing bonds in these periods. In our analysis, we find an average price effect of -1.86% when comparing the periods $(-60, -40)$ and $(-20, -1)$. Note, that this effect is stronger than in our previous analysis, indicating that bonds with issuance activity are even more affected by political uncertainty, on average.

Given the price effects of -1.86%, we assume that this amount represent the potential magnitude lost by issuing a bond in times of political uncertainty.[21] Thus, we find direct costs of roughly 3.28 billion EUR that could be avoided by aligning the issuing activity with important political events in our sample period. Thus, a more active cash and debt management by countries could save substantial amounts, as investors demand significant risk premiums for political uncertainty. However, one has to keep in mind that avoiding the affected time periods could also be costly as one has to deviate from an otherwise optimal issuing strategy which could potentially lower the magnitude of this effect. In this context, Eisl, Ochs, and Pichler (2018) discuss optimal issuance strategies and cash buffers of debt management offices. In their model, increasing the cash buffer, e.g. by issuing before the optimal issuance date, comes simply at the cost of having earlier accruing coupon payments. Issuing the affected bonds earlier, i.e., during the period $(-60, -40)$, would result in accrued interest of 0.63% in our sample and, thus, the potential reduction of issuing costs would be -1.23%. Thus, even after considering the potential effects of deviating from the optimal issuing strategy, we find direct costs of 2.17 billion EUR related to political uncertainty.

[20] The overall issuance volume in the considered time period is 193 billion EUR. Thus, seasoned offerings represent the vast majority of bond issuances in our case.

[21] In an additional analysis (not reported in detail), we analyze the prices of the primary market auctions instead of the secondary market price in the affected period $(-20, -1)$. We find similar magnitudes, i.e. the bonds are auctioned at much lower prices in the affected period compared to the observed prices before the events.

6 Conclusion

In this paper, we study whether political uncertainty affects prices and liquidity in government bond markets. We explore the time period of the European sovereign debt crisis, as it is an ideal laboratory for such an analysis, because investors were exposed to significant political uncertainty and many political events at this time, where almost exclusively focusing on policies handling this crisis. We cover the peak of the crisis from 2010 to 2013, including political summits (Euro, G8 and G20) and relevant elections. We analyze the Italian sovereign bond market, which represents a major European bond market with a notional amount outstanding of around two trillion EUR, comparable in size with Germany and France. Furthermore, Italian government bonds are traded on the MTS platform and, thus, detailed transaction data is available. This provides us with representative high-frequency data on quotes and transactions which allows us to calculate a variety of liquidity measures and conduct an in-depth investigation of price movements.

In line with the theoretical literature, we focus on the effect of political uncertainty and impact uncertainty. In this respect, we focus on price and liquidity effects before the event, analyzing the effect of political news representing political uncertainty. Furthermore, we explore price and liquidity changes directly around the event and after the event. This allows to analyze the immediate impact of potential policy changes and the effect of resolving the uncertainty about the effect of the new policy after the event. We find strong negative price reactions of Italian government bonds before the events showing that political uncertainty affects prices. On average, prices fall by around 1% in the time window 20 days before the event. Directly around the event (i.e., three days before/after the event) we find significant positive price impacts of around 0.4%. Thus, we observe a positive effect as soon as the political uncertainty is resolved and, potentially, a new policy is implemented. However, prices do not further recover for the next 20 trading days showing that a significant impact uncertainty remains. Within 60 days after the events, prices fully recover to pre-event levels indicating that this impact uncertainty is resolved. In an additional analysis based on less detailed data, we find similar effects for government bonds issued by Greece, Ireland, Portugal and Spain.

In addition, we study trading activity measures representing liquidity measures related to transaction costs and volume based measures for the Italian government bond market. We find that our liquidity measures indicate higher illiquidity shortly before the event when prices tend to fall, with the highest illiquidity being observed directly around the event, e.g., the price dispersion measure increase from 15 bp

to 20 bp. The trading costs return to previous levels after 60 days in line with the observed price recovery. Analyzing the trading volume, we observe a significant higher volume of around 5% before the event. This coincides with a much higher sell-side trading activity, in particular three days before the events. Thus, we can show that the observed price movements coincide with sell-side pressure.

In our regression analysis, we relate the observed pre-event, event and post-event returns to variables measuring political uncertainty and representing the economic conditions at the time of the event. We find a significant effect of the EPU index, measuring uncertainty based on newspaper articles, for pre-event returns where a higher increase in uncertainty indicates a stronger fall in bond prices. In addition, weaker economic conditions are related to stronger price reductions. Interestingly, the effect of the EPU index fades out and is not present in the post-event returns indicating that prices only react to political uncertainty in the context of upcoming events and not unconditionally at all times.

Based on our results, we explore how much notional volume was issued by the Italian government in the period 20 days before the events, when prices are severely affected. In these periods, 193 billion EUR of notional volume were issued, thereof 176.5 billion EUR as seasoned bond offerings. In our analysis, we find direct costs of 3.28 billion EUR for exposing primary dealers and investors to political uncertainty. Thus, we find significant costs stemming from these issuing activities. These results show that political uncertainty related to political events should be considered in the issuance policy of debt management offices, as such costs could potentially be avoided by more active cash management. Overall, the results in this paper foster our understanding of the effect of political uncertainty, enriching the results presented for stock and option markets in the empirical literature so far.

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Figures and Tables:

Figure 1: Time-Series of Prices and Liquidity Around Political Events
This figure shows the time-series of the average reported bond prices and price dispersion measures around political events in the Italian government bond market. Each is calculated on a daily basis within the time window of 60 trading days before to 60 trading days after the event across all bond-event combinations. The price is defined as percentage of the notional amount and the price dispersion measure represents trading costs measured in basis points (bp). The gray line provides daily values and the black line represents weekly averages. Our political events include Euro, G8 and G20 summits and relevant elections during the European sovereign debt crisis represented by the time period 2010 to 2013.

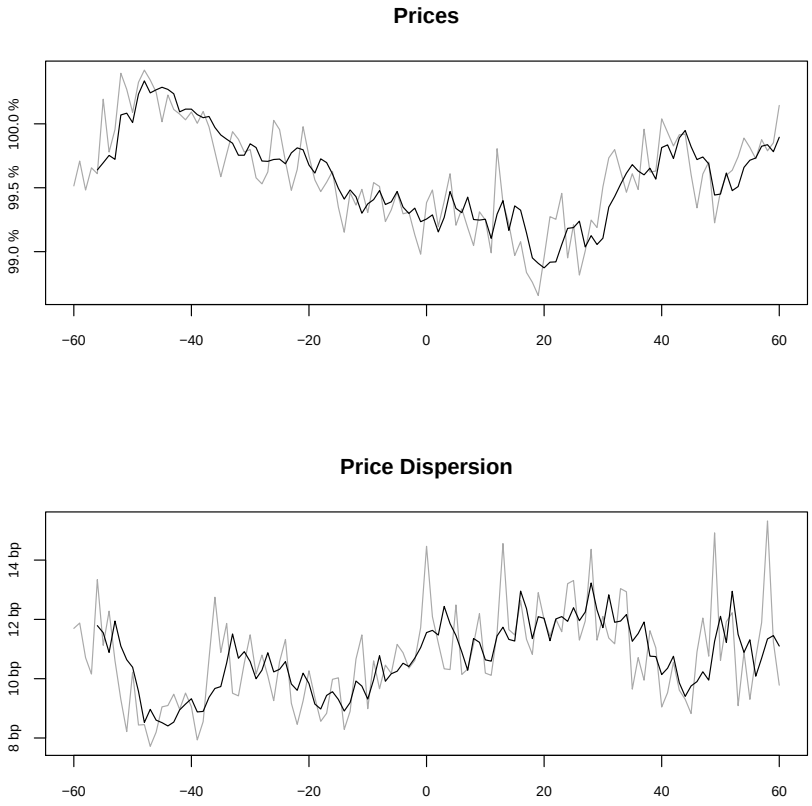

Table 1: List of Political Events
This table provides all Euro, G8 and G20 summits as well as Italian and Greek parliamentary elections during the European sovereign debt crisis represented by the time period 2010 to 2013. For each event the date, type and main topics of the agenda are provided. The last column provides an indicator whether the event is included in our analysis. We exclude events if it is held within five days of a previous event or did not focus on economic topics.

Date	Type	Topics	Included
2010-03-25	Euro Summit	Greek Crisis, Europe 2020	Yes
2010-05-07	Euro Summit	Greek Crisis	Yes
2010-06-25	G8 Summit	Global Recession, European Debt Crisis	Yes
2010-06-26	G20 Summit	Global Recession, European Debt Crisis	No
2010-11-11	G20 Summit	Global Economic Recovery, Financial Regulation, Global Financial Safety Nets	Yes
2011-03-11	Euro Summit	Pact for the Euro, ESM	Yes
2011-05-26	G8 Summit	Internet, Innovation, Green Growth, Nuclear Safety, Arab Spring	No
2011-07-21	Euro Summit	Greek Crisis	Yes
2011-10-23	Euro Summit	Economic Policy, Banking Package	Yes
2011-11-03	G20 Summit	International Monetary System, Strengthen Financial Regulation	Yes
2011-12-08	Euro Summit	Economic Policy, Fiscal Compact	Yes
2012-01-30	Euro Summit	Stimulating Employment,Completing the Single Market	Yes
2012-03-01	Euro Summit	Economic Policy, Treaty on Stability	Yes
2012-05-07	Election	Greek Election	Yes
2012-05-18	G8 Summit	European Sovereign Debt Crisis	Yes
2012-06-17	Election	Greek Election	Yes
2012-06-18	G20 Summit	European Sovereign Debt Crisis	No
2012-06-29	Euro Summit	EMU, Multinational Financial Framework, Compact for Growth and Jobs	Yes
2013-02-25	Election	Italian Election	Yes
2013-03-14	Euro Summit	Economic and Social Policy	Yes
2013-06-18	G8 Summit	Syrian Civil War	No
2013-09-05	G20 Summit	Syrian Civil War	No

Table 2: Descriptive Statistics of Bond Characteristics
This table shows the summary statistics for characteristics of the Italian government bonds in our sample. The bond characteristics cover the amount issued in billions of EUR, the coupon in percent and maturity given in days. The results are shown for the overall market and for short-term zero-coupon bonds (BOT/CTZ) and long-term coupon bonds (BTP) individually. Our data set covers the European sovereign debt crisis represented by the time period 2010 to 2013.

Type	**Number**	**Amount Issued**			**Coupon**			**Maturity**		
		Q_{10}	*Mean*	Q_{90}	Q_{10}	*Mean*	Q_{90}	Q_{10}	*Mean*	Q_{90}
BOT/CTZ	150	3.50	8.25	10.69	0	0	0	139	314	732
BTP	79	15.16	20.25	25.90	2.75	4.24	5.50	1098	3977	11029
Total	229	6.00	12.39	23.92	0	1.46	4.75	183	1578	3837

Table 3: Descriptive Statistics of Trading Activity
This table shows summary statistics for the trading activity across all our bond-event observations in the Italian government bond market. The trading activity is represented by the number of transactions and cumulative trading volume in millions of EUR. We present the sum across all observations, as well as, the daily bond-specific averages calculated within the time window of 60 trading days before to 60 trading days after the considered political event. The results are shown for the overall market and for short-term zero-coupon bonds (BOT/CTZ) and long-term coupon bonds (BTP) individually. Panel A shows the results before applying data filters, whereas Panel B represents our final sample after applying the defined filters. The political events include Euro, G8 and G20 summits and relevant elections during the European sovereign debt crisis represented by the time period 2010 to 2013.

Type	**Bond-Event Observations**	**Transactions**		**Trading Volume**	
		Sum	*Daily Bond Average*	*Sum*	*Daily Bond Average*
Panel A: Without Data Filters					
BOT/CTZ	442	237,850	4	1,567,320	30
BTP	865	548,860	5	2,828,422	27
Total	1,307	786,710	5	4,395,742	28
Panel B: With Data Filters					
BOT/CTZ	420	228,029	5	1,501,210	30
BTP	860	547,489	5	2,822,172	27
Total	1,280	775,518	5	4,323,383	28

Table 4: Price Effects of Coupon Bonds Around Political Events
This table shows the price returns around political events of Italian government coupon bonds (BTP). The following time windows around the events are considered: $(-60, -40)$, $(-20, -1)$, $(-3, -1)$, $(0, 3)$, $(1, 20)$ and $(40, 60)$, where 0 is the event day and all other numbers represent the trading days relative to the event day. For each time window, the bond-specific average values of the prices are calculated and the returns across combinations of two time windows are computed, measuring price effects before, during and after the events. The returns are based on reported (clean) prices and total (dirty) prices. In addition, the abnormal returns with respect to German government bond prices are presented based on total prices. Furthermore, returns and abnormal returns for other highly affected sovereign bond markets, i.e., Greece, Ireland, Portugal and Spain, are presented based on less detailed data. Panel A provides the average price effects measured in percent, Panel B t-values of one-sample t-tests and Panel C p-values of one-sample Wilcoxon signed rank tests. The political events include Euro, G8 and G20 summits and relevant elections during the European sovereign debt crisis represented by the time period 2010 to 2013. The significance is indicated as follows: * < 0.1, ** < 0.05, *** < 0.01.

	Price Returns	Total Price Returns	Abnormal Returns w.r.t. Germany	Returns of Other Affected Markets	Abn. Returns of Other Affected Markets
Panel A: Returns					
(-60,-40);(-20,-1)	-0.978	-0.449	-1.410	-0.096	-1.057
(-3,-1);(0,3)	0.362	0.410	0.311	0.404	0.305
(0,20);(40,60)	1.159	1.610	0.665	2.619	1.674
Panel B: T-test: t-values					
(-60,-40);(-20,-1)	-7.754***	-3.466***	-9.233***	-0.372	-3.779***
(-3,-1);(0,3)	6.794***	7.637***	5.266***	4.099***	2.852***
(0,20);(40,60)	9.740***	13.200***	4.485***	11.020***	6.264***
Panel C: Wilcoxon test: p-values					
(-60,-40);(-20,-1)	0.000***	0.000***	0.000***	0.026**	0.000***
(-3,-1);(0,3)	0.000***	0.000***	0.000***	0.242	0.028**
(0,20);(40,60)	0.000***	0.000***	0.000***	0.000***	0.000***

Table 5: Price Effects of Zero-Coupon Bonds Around Political Events
This table shows the price returns around political events of Italian government zero-coupon bonds (BOT/CTZ). The following time windows around the events are considered: $(-60, -40)$, $(-20, -1)$, $(-3, -1)$, $(0, 3)$, $(1, 20)$ and $(40, 60)$, where 0 is the event day and all other numbers represent the trading days relative to the event day. For each time window, the bond-specific average values of the prices are calculated and the returns across combinations of two time windows are computed, measuring price effects before, during and after the events. The returns are based on reported (clean) prices and total (dirty) prices. In addition, the abnormal returns with respect to German government bond prices are presented based on total prices. Furthermore, returns and abnormal returns for other highly affected sovereign bond markets, i.e., Greece, Ireland, Portugal and Spain, are presented based on less detailed data. Panel A provides the average price effects measured in percent, Panel B t-values of one-sample t-tests and Panel C p-values of one-sample Wilcoxon signed rank tests. The political events include Euro, G8 and G20 summits and relevant elections during the European sovereign debt crisis represented by the time period 2010 to 2013. The significance is indicated as follows: * < 0.1, ** < 0.05, *** < 0.01.

	Price Returns	Total Price Returns	Abnormal Returns w.r.t. Germany	Returns of Other Affected Markets	Abn. Returns of Other Affected Markets
Panel A: Returns					
(-60,-40);(-20,-1)	-0.020	0.275	0.186	1.222	1.133
(-3,-1);(0,3)	0.036	0.067	0.053	0.188	0.175
(0,20);(40,60)	0.298	0.616	0.547	1.310	1.240
Panel B: T-test: t-values					
(-60,-40);(-20,-1)	-0.460	5.642***	3.600***	12.364***	11.223***
(-3,-1);(0,3)	2.848***	5.161***	4.015***	5.370***	4.915***
(0,20);(40,60)	8.432***	13.803***	12.000***	15.379***	14.232***
Panel C: Wilcoxon test: p-values					
(-60,-40);(-20,-1)	0.000***	0.000***	0.019**	0.000***	0.000***
(-3,-1);(0,3)	0.002***	0.000***	0.000***	0.000***	0.000***
(0,20);(40,60)	0.000***	0.000***	0.000***	0.000***	0.000***

Table 6: Liquidity of Coupon Bonds Around Political Events
This table shows the averages of the trading cost measures, trading volume and net-bid measure in various subperiods around political events of Italian government coupon bonds (BTP). The following time windows are considered: $(-60, -40)$, $(-20, -1)$, $(-3, -1)$, $(0, 3)$, $(1, 20)$ and $(40, 60)$, where 0 is the event day and all other numbers represent the trading days relative to the event day. The liquidity measures are represented by the quoted bid-ask spread, as well as, the Roll, Amihud and price dispersion measure based on transaction data. The liquidity proxies are given in basis points and the trading volume and the net-bid measure are measured in millions of EUR. The political events include Euro, G8 and G20 summits and relevant elections during the European sovereign debt crisis represented by the time period 2010 to 2013.

	Bid-Ask	**Roll**	**Amihud**	**Price Dispersion**	**Volume**	**Net-Bid**
(-60,-40)	50.988	12.938	21.355	15.316	36.585	1.107
(-20,-1)	49.716	12.488	21.921	16.181	38.284	1.988
(-3,-1)	54.024	12.226	23.388	16.353	38.244	2.891
(0,3)	57.769	14.589	29.928	20.526	36.038	-0.516
(0,20)	58.691	14.830	26.137	19.394	33.806	1.777
(40,60)	46.009	12.226	21.479	16.043	33.497	0.344

Table 7: Liquidity Effects of Coupon Bonds Around Political Events
This table shows the liquidity effects based on the trading cost measures, trading volume and net-bid measure in various subperiods around political events of Italian government coupon bonds (BTP). The following time windows are considered: $(-60,-40)$, $(-20,-1)$, $(-3,-1)$, $(0,3)$, $(1,20)$ and $(40,60)$, where 0 is the event day and all other numbers represent the trading days relative to the event day. For each time window, the bond-specific average values of the measures are calculated and the changes across combinations of two time windows are computed, measuring liquidity effects before, during and after the events. The transaction cost measures are represented by the quoted bid-ask spread, as well as, the Roll, Amihud and price dispersion measure based on transaction data. These liquidity proxies are given in basis points and the trading volume and the net-bid measure are measured in millions of EUR. The political events include Euro, G8 and G20 summits and relevant elections during the European sovereign debt crisis represented by the time period 2010 to 2013. Panel A provides the average liquidity effects, Panel B t-values of one-sample t-tests and Panel C p-values of one-sample Wilcoxon signed rank tests. The political events include Euro, G8 and G20 summits and relevant elections during the European sovereign debt crisis represented by the time period 2010 to 2013. The significance is indicated as follows: * < 0.1, ** < 0.05, *** < 0.01.

	Bid-Ask	**Roll**	**Amihud**	**Price Disp.**	**Volume**	**Net-Bid**
Panel A: Differences						
(-60,-40);(-20,-1)	-0.950	0.631	0.408	0.905	0.137	0.885
(-3,-1);(0,3)	4.074	2.727	5.933	3.845	-1.869	-3.372
(0,20);(40,60)	-13.393	-2.569	-5.019	-3.602	-0.086	-1.395
Panel B: T-test: t-values						
(-60,-40);(-20,-1)	-0.856	0.942	0.612	2.204**	0.163	1.516
(-3,-1);(0,3)	6.636***	2.680***	6.174***	6.318***	-1.369	-2.804***
(0,20);(40,60)	-15.961***	-4.174***	-8.088***	-8.900***	-0.110	-2.586**
Panel C: Wilcoxon test: p-values						
(-60,-40);(-20,-1)	0.952	0.126	0.531	0.007***	0.451	0.325
(-3,-1);(0,3)	0.000***	0.011**	0.000***	0.000***	0.672	0.002***
(0,20);(40,60)	0.000***	0.000***	0.000***	0.000***	0.690	0.000***

Table 8: Liquidity of Zero-Coupon Bonds Around Political Events
This table shows the averages of the transaction cost measures, trading volume and net-bid measure in various subperiods around political events of Italian government zero-coupon bonds (BOT/CTZ). The following time windows are considered: $(-60, -40)$, $(-20, -1)$, $(-3, -1)$, $(0, 3)$, $(1, 20)$ and $(40, 60)$, where 0 is the event day and all other numbers represent the trading days relative to the event day. The liquidity measures are represented by the quoted bid-ask spread, as well as, the Roll, Amihud and price dispersion measure based on transaction data. The liquidity proxies are given in basis points and the trading volume and the net-bid measure are measured in millions of EUR. The political events include Euro, G8 and G20 summits and relevant elections during the European sovereign debt crisis represented by the time period 2010 to 2013.

	Bid-Ask	**Roll**	**Amihud**	**Price Dispersion**	**Volume**	**Net-Bid**
(-60,-40)	16.233	2.171	3.103	3.618	64.642	-8.399
(-20,-1)	14.111	2.019	2.883	3.207	53.647	-1.546
(-3,-1)	13.906	2.490	3.212	3.321	46.835	4.817
(0,3)	16.245	2.732	3.433	3.738	46.317	-3.053
(0,20)	17.453	2.407	3.190	3.710	43.602	-1.821
(40,60)	11.896	1.514	2.145	2.324	47.778	-5.628

Table 9: Liquidity Effects of Zero-Coupon Bonds Around Political Events
This table shows the liquidity effects based on the trading cost measures, trading volume and net-bid measure in various subperiods around political events of Italian government zero-coupon bonds (BOT/CTZ). The following time windows are considered: $(-60, -40)$, $(-20, -1)$, $(-3, -1)$, $(0, 3)$, $(1, 20)$ and $(40, 60)$, where 0 is the event day and all other numbers represent the trading days relative to the event day. For each time window, the bond-specific average values of the measures are calculated and the changes across combinations of two time windows are computed, measuring liquidity effects before, during and after the events. The transaction cost measures are represented by the quoted bid-ask spread, as well as, the Roll, Amihud and price dispersion measure based on transaction data. These liquidity proxies are given in basis points and the trading volume and the net-bid measure are measured in millions of EUR. The political events include Euro, G8 and G20 summits and relevant elections during the European sovereign debt crisis represented by the time period 2010 to 2013. Panel A provides the average liquidity effects, Panel B t-values of one-sample t-tests and Panel C p-values of one-sample Wilcoxon signed rank tests. The political events include Euro, G8 and G20 summits and relevant elections during the European sovereign debt crisis represented by the time period 2010 to 2013. The significance is indicated as follows: * < 0.1, ** < 0.05, *** < 0.01.

	Bid-Ask	**Roll**	**Amihud**	**Price Disp.**	**Volume**	**Net-Bid**
Panel A: Differences						
(-60,-40);(-20,-1)	-1.747	-0.112	-0.489	-0.431	-19.248	7.090
(-3,-1);(0,3)	2.339	0.457	0.136	0.460	-0.487	-8.548
(0,20);(40,60)	-8.580	-1.352	-1.624	-2.037	5.489	-4.701
Panel B: T-test: t-values						
(-60,-40);(-20,-1)	-1.482	-0.545	-2.364**	-1.764*	-5.976***	3.811***
(-3,-1);(0,3)	5.463***	0.785	0.556	2.375**	-0.172	-3.522***
(0,20);(40,60)	-10.336***	-6.549***	-8.988***	-10.357***	2.384**	-2.115**
Panel C: Wilcoxon test: p-values						
(-60,-40);(-20,-1)	0.018**	0.481	0.000***	0.007***	0.000***	0.001***
(-3,-1);(0,3)	0.000***	0.902	0.204	0.022**	0.730	0.001***
(0,20);(40,60)	0.000***	0.000***	0.000***	0.000***	0.021**	0.040**

Table 10: Pre-Event Return Regressions for Coupon Bonds
This table shows the results of different regression models, where the dependent variable is the pre-event return of Italian government coupon bonds (BTP). The pre-event time windows are given by $(-60, -40)$ and $(-20, -1)$, where 0 is the event day and all other numbers represent the trading days relative to the event day. For each time window, the bond-specific average values of the total prices are calculated and the returns across combinations of two time windows are computed. The explanatory variables are represented by uncertainty measures (EPU and VIX Index), economic variables (inflation, GDP growth, CDS spreads, 3M Euribor), liquidity (price dispersion measure) and bond characteristics (TTM and coupon). For the uncertainty measures, economic variables and liquidity the change of these variables across periods is considered, whereas bond characteristics are represented by their level. The standard errors are given in parentheses and are corrected for heteroscedasticity and clustered at the event level. The political events include Euro, G8 and G20 summits and relevant elections during the European sovereign debt crisis represented by the time period 2010 to 2013. The significance is indicated as follows: * < 0.1, ** < 0.05, *** < 0.01.

	Dependent variable:			
	Pre-Event Return			
	(1)	(2)	(3)	(4)
ΔEPU	−0.052**			−0.022***
	(0.024)			(0.008)
ΔVIX	−0.282**			−0.019
	(0.119)			(0.079)
ΔInflation		0.152		−0.195
		(0.499)		(0.388)
ΔGDP change		0.299***		0.295**
		(0.115)		(0.132)
ΔCDS		−0.038***		−0.028***
		(0.005)		(0.007)
ΔEuribor		−8.271***		−5.795***
		(2.514)		(2.025)
ΔLiquidity			−17.362***	−8.582***
			(3.573)	(2.332)
TTM			−0.0001	−0.0001
			(0.0001)	(0.0001)
Coupon			−0.159	−0.173*
			(0.100)	(0.096)
Constant	0.049	0.251	0.585	1.541**
	(0.716)	(0.457)	(0.480)	(0.695)
Observations	829	829	829	829
R^2	0.377	0.630	0.322	0.742
Adjusted R^2	0.375	0.628	0.320	0.740
Residual Std. Error	2.949 (df = 826)	2.276 (df = 824)	3.079 (df = 825)	1.904 (df = 819)

Table 11: Subperiod Regressions for Coupon Bonds
This table shows the results of different regression models, where the dependent variable is the return of Italian government coupon bonds (BTP) across various subperiods. The pre-event return is defined by the time windows $(-60, -40)$ and $(-20, -1)$, the event return by $(-3, -1)$ and $(0, 3)$, and the post-event return by $(0, 20)$ and $(40, 60)$, where 0 is the event day and all other numbers represent the trading days relative to the event day. For each set of time windows, the bond-specific average values of the total prices are calculated and the returns across combinations of two time windows are computed. The explanatory variables are represented by uncertainty measures (EPU and VIX Index), economic variables (inflation, GDP growth, CDS spreads, 3M Euribor), liquidity (price dispersion measure) and bond characteristics (TTM and coupon). For the uncertainty measures, economic variables and liquidity the change of these variables across periods is considered, whereas bond characteristics are represented by their level. The standard errors are given in parentheses and are corrected for heteroscedasticity and clustered at the event level. The political events include Euro, G8 and G20 summits and relevant elections during the European sovereign debt crisis represented by the time period 2010 to 2013. The significance is indicated as follows: * < 0.1, ** < 0.05, *** < 0.01.

	Dependent variable:		
	Pre-Event Return	**Event Return**	**Post-Event Return**
	(1)	(2)	(3)
ΔEPU	−0.022***	−0.010***	0.001
	(0.008)	(0.004)	(0.011)
ΔVIX	−0.019	−0.016	0.106
	(0.079)	(0.048)	(0.088)
ΔInflation	−0.195	0.416	0.169
	(0.388)	(0.362)	(1.152)
ΔGDP change	0.295**	−0.297**	−0.750
	(0.132)	(0.134)	(0.545)
ΔCDS	−0.028***	−0.022***	−0.041***
	(0.007)	(0.002)	(0.013)
ΔEuribor	−5.795***	11.438**	1.586
	(2.025)	(5.778)	(3.080)
ΔLiquidity	−8.582***	0.051	−5.357**
	(2.332)	(0.411)	(2.093)
TTM	−0.0001	0.00005	0.0001
	(0.0001)	(0.0001)	(0.0001)
Coupon	−0.173*	0.061	−0.059
	(0.096)	(0.037)	(0.110)
Constant	1.541**	0.043	1.024
	(0.695)	(0.288)	(0.731)
Observations	829	733	814
R^2	0.742	0.548	0.532
Adjusted R^2	0.740	0.542	0.527
Residual Std. Error	1.904 (df = 819)	0.983 (df = 723)	2.431 (df = 804)

Table 12: Pre-Event Return Regressions for Zero-Coupon Bonds
This table shows the results of different regression models, where the dependent variable is the pre-event return of Italian government zero-coupon bonds (BOT/CTZ). The pre-event time windows are given by $(-60, -40)$ and $(-20, -1)$, where 0 is the event day and all other numbers represent the trading days relative to the event day. For each time window, the bond-specific average values of the total prices are calculated and the returns across combinations of two time windows are computed. The explanatory variables are represented by uncertainty measures (EPU and VIX Index), economic variables (inflation, GDP growth, CDS spreads, 3M Euribor), liquidity (price dispersion measure) and bond characteristics (TTM). For the uncertainty measures, economic variables and liquidity the change of these variables across periods is considered, whereas bond characteristics are represented by their level. The standard errors are given in parentheses and are corrected for heteroscedasticity and clustered at the event level. The political events include Euro, G8 and G20 summits and relevant elections during the European sovereign debt crisis represented by the time period 2010 to 2013. The significance is indicated as follows: * < 0.1, ** < 0.05, *** < 0.01.

	Dependent variable:			
	Pre-Event Return			
	(1)	(2)	(3)	(4)
ΔEPU	-0.012^{**}			-0.004^{*}
	(0.005)			(0.002)
ΔVIX	-0.074^{**}			-0.028^{*}
	(0.035)			(0.017)
ΔInflation		0.196		0.131^{**}
		(0.122)		(0.063)
ΔGDP change		−0.010		0.001
		(0.041)		(0.026)
ΔCDS		-0.008^{***}		-0.003^{***}
		(0.002)		(0.001)
ΔEuribor		-1.956^{**}		-0.939^{**}
		(0.823)		(0.446)
ΔLiquidity			-14.567^{***}	-9.774^{***}
			(2.684)	(0.745)
TTM			0.0002	0.0002
			(0.001)	(0.001)
Coupon				
			(0.000)	(0.000)
Constant	0.393^{**}	0.370^{***}	0.146	0.239
	(0.166)	(0.139)	(0.127)	(0.181)
Observations	345	345	345	345
R^2	0.374	0.466	0.537	0.688
Adjusted R^2	0.370	0.460	0.534	0.681
Residual Std. Error	0.718 (df = 342)	0.665 (df = 340)	0.618 (df = 342)	0.511 (df = 336)

Table 13: Subperiod Regressions for Zero-Coupon Bonds
This table shows the results of different regression models, where the dependent variable is the return of Italian government zero-coupon bonds (BOT/CTZ) across various subperiods. The pre-event return is defined by the time windows $(-60, -40)$ and $(-20, -1)$, the event return by $(-3, -1)$ and $(0, 3)$, and the post-event return by $(0, 20)$ and $(40, 60)$, where 0 is the event day and all other numbers represent the trading days relative to the event day. For each set of time windows, the bond-specific average values of the total prices are calculated and the returns across combinations of two time windows are computed. The explanatory variables are represented by uncertainty measures (EPU and VIX Index), economic variables (inflation, GDP growth, CDS spreads, 3M Euribor), liquidity (price dispersion measure) and bond characteristics (TTM and coupon). For the uncertainty measures, economic variables and liquidity the change of these variables across periods is considered, whereas bond characteristics are represented by their level. The standard errors are given in parentheses and are corrected for heteroscedasticity and clustered at the event level. The political events include Euro, G8 and G20 summits and relevant elections during the European sovereign debt crisis represented by the time period 2010 to 2013. The significance is indicated as follows: * < 0.1, ** < 0.05, *** < 0.01.

	Dependent variable:		
	Pre-Event Return	**Event Return**	**Post-Event Return**
	(1)	(2)	(3)
ΔEPU	−0.004*	−0.002*	0.0001
	(0.002)	(0.001)	(0.001)
ΔVIX	−0.028*	−0.009	−0.016
	(0.017)	(0.010)	(0.015)
ΔInflation	0.131**	0.013	0.093
	(0.063)	(0.062)	(0.156)
ΔGDP change	0.001	−0.014	−0.056
	(0.026)	(0.013)	(0.107)
ΔCDS	−0.003***	−0.002*	−0.003*
	(0.001)	(0.001)	(0.002)
ΔEuribor	−0.939**	1.520	−0.850***
	(0.446)	(1.233)	(0.244)
ΔLiquidity	−9.774***	−0.452	−10.119***
	(0.745)	(0.530)	(1.521)
TTM	0.0002	0.0004	0.002***
	(0.001)	(0.0002)	(0.001)
Coupon			
	(0.000)	(0.000)	(0.000)
Constant	0.239	−0.006	−0.172
	(0.181)	(0.061)	(0.159)
Observations	345	365	346
R^2	0.688	0.279	0.662
Adjusted R^2	0.681	0.262	0.654
Residual Std. Error	0.511 (df = 336)	0.213 (df = 356)	0.494 (df = 337)