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# Communication – an instrument to fight recession?

*A study of communication events' effect on financial markets  
during the euro zone crisis*

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# Abstract

The purpose of this paper is to evaluate whether and how communication events have helped mitigate the current recession in the euro zone. We investigate how communication has influenced financial markets; both sovereign debt and stock markets in Europe. In particular, we evaluate events where important bailouts and stabilisation programmes have been announced, as well as speeches from prominent policy makers in the euro zone. We use a simple t-test to detect changes in the indicators on the event date, applying an event window of three days. We also test with an event window of ten days to evaluate the duration of effects.

Regarding announcements of rescue packages we find that markets to a large degree react to these, but as yield spreads tend to increase and stock markets decline, the effects are generally negative and persistent. These events induced the greatest fluctuations in stock markets.

All announcements of stabilization programmes had somewhat positive effects on financial markets, some of which are large in amplitude. Programme announcements yielded the largest results in terms of absolute changes in yield spreads. Significant results in the three day event window, for the most part, prove to be persistent also in the ten day window. If we look further ahead however, we often find a negative bounce-back effect.

We find that communication affects financial markets, and can indeed be a helpful tool for ECB in solving the euro crisis. This, however, is conditional on the credibility and content of the message, as demonstrated by announcements in which no concrete measures are taken, where we argue that the success depends on whether the communication will be followed by action.

# Acknowledgments

This paper is written as a part of our Master of Science in Economics and Business Administration at the Norwegian School of Economics, within the specialization of Financial Economics.

The choice of communication as a measure of economic policy as the theme for our thesis was motivated by our interest in macroeconomic theory. We have both followed the development in Europe with great interest over the last years and decided to write about the euro zone debt crisis. We particularly found it interesting how much praise Mario Draghi received for his efforts during the summer of 2012 and how some argued that his speech on 26 July, where he essentially promised on behalf of the ECB to do “whatever it takes” to save the euro, was the turning point in the debt crisis. We decided thus to take a closer look at what effect announcements and speeches can have on financial markets, and how it can be used as a tool for policy makers in order to detain recessions.

Writing the thesis has been interesting, albeit at times challenging. Especially attaining a deeper understanding of the mechanisms behind the crisis has been rewarding. Some of the more challenging parts of writing this paper have been to find relevant theory and collect relevant data.

Finally, we would like to thank our supervisor, Gernot Doppelhofer, for guidance throughout the process.

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# 1. Introduction

The Financial Crisis of 2007-2009 was immediately followed by another crisis. As a result of rising private and government debt levels in Europe, investors eventually came to fear a sovereign debt crisis. As the months passed by, one country after another had its government debt downgraded, the borrowing costs of these nations were heavily increasing, and Europe found itself in what has been come to known as the euro zone crisis. As Europe eventually feared that some countries might default on its debt, it was up to the monetary authorities – led by the European Central Bank – to take appropriate measures to solve the crisis.

The acknowledging of communication as a part of a central banks' toolbox has made it an important part of their strategies. In this paper we investigate the effect communication has on financial markets by performing an event study on macroeconomic indicators over the duration of the Eurozone crisis.

## 1.1 Objectives and structure

Our goal is to investigate what we argue to be the most important communication measures taken during the euro zone crisis, primarily announcements made by the European Central Bank. Specifically, we will look at announcements of rescue packages and stabilisation programmes, as well as chosen statements made by prominent European politicians. We will evaluate whether and how the communication had an effect on financial markets by looking at yield spreads of government bonds, stock indexes and implied future volatility in financial markets. Our research question is thus:

*In what way have communication from European policy makers affected the financial situation during the current debt crisis in the euro zone?*

During the crisis, measures such as granting rescue packages to certain countries as well as introducing large programmes aimed at stabilising the economy throughout Europe have been taken. We investigate the effect of the announcement of these measures. As communication is considered an essential part of economic policy, we find it interesting to see whether it has contributed to a mitigation of the crisis. Though the euro zone share the same currency, it is, nonetheless, an area consisting of several countries and thus economies, all of which are different with regards to aspects such as financial strength and political conditions. As a result, communication may not influence the financial markets of the different countries in the

same fashion. Furthermore, as we also look at communication made by other politicians representing different parties, such as Germany and Greece, during the Eurozone crisis, we will see how this communication has affected respective markets.

In order to answer our research question, we have chosen the following approach: First, we will construct a theoretical framework that enables us to evaluate the communication during the euro zone crisis. Second, we perform an event study where we observe and analyse effects on the chosen indicators on defined communication events.

First, in section 2, we discuss how financial assets are priced by investors. Then, in section 3 we briefly present the background for the European Union and the euro zone, before we discuss the debt crisis in section 4. Section 5 is dedicated to the monetary union's role in the crisis and how measures have been taken to mitigate it. Next, in section 6, we discuss monetary and fiscal policy, with emphasis on that of the ECB. Further on, in section 7, we investigate closer the concept of central bank communication. Section 8 lays out the methodology of our event study. The results of the study are presented in section 9. In section 10, we analyse our results, before section 11 finally concludes the paper.

## 2. Asset pricing

In our evaluation of the measures taken during the euro one crisis, we want to assess how certain communication events have had an impact on government bond yields and stock markets. In order to understand potential changes in the prices of these assets, it is useful to look at how prices are derived. In the following, we will present the important assumptions of no-arbitrage and the Law of One Price, and then explain the basic pricing relations for bonds and stocks, respectively. Next, we will look at how prices may deviate from values derived from fundamentals.

### 2.1 Net present values, no-arbitrage and the Law of One Price

Valuation of financial securities relies on the concept of net present values, which is the present value of benefits minus the present value of costs. In order to compute market values, then, it is necessary to find the present value derived from expected future cash flows. This is because of the time value of money. Two cash flows that are equal in nominal terms, but come at different points of time, do not have the same real value, as we always have the option to deposit money in a bank account today and earn interest.

Arbitrage can be defined as the practice of buying and selling goods in different markets to take advantage of price differences. Because an arbitrage opportunity will have a positive net present value, investors will seek to take advantage of this. Once this opportunity is exploited, however, prices will respond and thus the arbitrage opportunity ceases to exist – we have no-arbitrage. This is known as the efficient market hypothesis. The more competitive the market, the less is the chance of finding arbitrage opportunities (Berk & DeMarzo, 2011).

Following this line of argument we can derive the Law of One Price (Berk & DeMarzo, 2011):

*If equivalent investment opportunities trade simultaneously in different competitive markets, then they must trade for the same price in both markets.*

The Law of One Price tells us that the prices of equivalent investment opportunities should be the same. When buying a financial security, such as a bonds or stocks, we can say that the present value of the benefits is the present value of expected cash flows received, and the present value of the cost is simply the cost of buying the security. The no-arbitrage condition

then implies that the net present value of this investment thus should be zero, as investors race to exploit any other pricing, either by taking a long (in the case of  $NPV > 0$ ) or a short position (in the case of  $NPV < 0$ ).

## 2.2 Government bonds

Bonds are fixed-income securities. Bondholders are promised a fixed payment sometime in the future. In addition to the principal amount, or par value, bonds can also pay coupon payments on given points of time preceding the maturity date. The value of the bond thus depends on the present value of these future cash flows.

When speaking of bonds, we often speak about the yield to maturity. This is the discount rate that sets the present value of the promised bond payment equal to the current market price of the bond.

If we denote the maturity date by  $T$  and the yield to maturity by  $YTM$ , the bond price can be written as (Berk & DeMarzo, 2011)

$$Price_0 = \sum_{t=1}^T \frac{Coupon}{(1 + YTM)^t} + \frac{Par\ value}{(1 + YTM)^T}$$

Government bonds are bonds issued by national governments as a means of borrowing money. The yield on these bonds, derived from the principal amount of issued debt and the price received in markets, represent the borrowing costs. When we speak of increased borrowing costs, this implies that governments are able to raise less funding, i.e. the price paid by bond buyers, for the same amount of debt, as investors require compensation for taking on risk. This has been the centre of attention in the Eurozone crisis, as investors began the question the ability of certain countries to repay their loans and thus were willing to pay less money for government bonds.

The yields on long government bonds therefore tell a story about how financial markets perceive the economic outlooks for the issuing country. In our evaluation of the measures taken during the euro zone crisis, we will therefore investigate bond markets by focusing on yields.

## 2.3 Stocks

There are two potential sources of cash flows from owning stocks; dividends<sup>1</sup> and selling the stock. Stocks represent a share of a company's equity, and stock values are thus dependent on the earnings of the respective company, as it will have to generate income in order to afford paying dividend.

Here, we will have to discount the expected cash flows based on the equity cost of capital, which is the expected return of other investments available in the market with equivalent cost.

If we denote the maturity date by  $T$  and the equity cost of capital by  $r_E$ , the stock price can be written as (Berk & DeMarzo, 2011)

$$Price_0 = \sum_{t=1}^T \frac{Dividend_t}{(1 + r_E)^t} + \frac{Price_T}{(1 + r_E)^T}$$

As stock prices depend on the performance of companies, we see that prices will be affected by how investors evaluate the future. Furthermore, the performance of companies is naturally dependent on macroeconomic conditions. In times of recession, investment and consumption will typically decline, companies will be less able to generate income, and the value of equity will be reduced.

## 2.4 Deviations from fundamental pricing

The basic pricing formulas we have presented in this section are what can be claimed to be theoretically correct. That is, asset prices solely based on fundamentals. However, theoretical and empirical work has long suggested that asset prices are not only affected by fundamentals. Arguably the single most prominent researcher in this field has been Robert Shiller, who first argued that long-term bond yields were too volatile to accord with simple explanations models (Shiller, 1981). In his famous book from 2000, *Irrational Exuberance*, which was published right about the bursting of the dotcom-bubble, Shiller claimed that people placed too much confidence in markets and had too strong a belief that their investments would pay off, thus not accommodate for possible bad outcomes (Shiller, 2000). In other words, according to Shiller, asset price changes are to a large degree also a result of market sentiment.

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<sup>1</sup> When presenting the pricing formula, we assume that dividends are paid at the end of every year.

By now, a consensus has been established that asset prices exhibit more volatility than is justified by fundamentals. Over the past years, a field known as behavioural economics have emerged, where models of contagion of opinion, behaviour, fads and bubbles have been applied to provide an explanation for the empirical findings that have raised doubts on the efficient markets hypothesis, and therefore to justify marked and prolonged deviations of asset prices from fundamentals (Alexandre & Bação, 2006).

The consequences of asset price fluctuations resulting from non-fundamentals have been discussed. Bosworth (1975) argued that managers should ignore the information from the market and base their investment decisions on their own valuation of fundamentals. In that case the stock market would be a sideshow with no effect on investment decisions. (Fischer & Merton, 1984) ,on the other hand, argued that whether or not they coincide with their assessment of fundamentals, firms should react to stock prices changes when taking their investment decisions: firms should follow investor exuberance and invest until the marginal product of capital equals the rate of return the investor expects. In this case, non-fundamental movements in asset prices affect investment and, therefore, the real economy, opening an avenue for the intervention of monetary policy

Research has also shown that large movements in asset prices tend to be associated with waves of optimism and pessimism about the future. The 1920s and the Great Depression that followed, and the crash of 1987, have been studied as periods during which asset prices deviated markedly from fundamentals (Gilchrist & Leahy, 2002).

We see thus, that prices of bonds and stocks are more than capable of fluctuating in ways that can be difficult to explain by looking at underlying fundamentals. During the euro zone crisis, borrowing costs of several countries have skyrocketed. Though these increases are undoubtedly largely well-founded in real economic fundamentals, as the countries in question have been facing severe difficulties, which we will further discuss in section 4, our findings above suggest that it is necessary to raise questions about whether some of the fluctuations result from causes such as contagion effects and other sources of mispricing.

Regarding borrowing costs as represented by the yields on government bonds, the consequences of possible mispricing are potentially harmful. Indeed, contagion effects have been much discussed over the duration of the Eurozone crisis. Fear that one country's financial problems will spill over to another country can arguably push borrowing costs above the level suggested by fundamentals, as investors are influenced by sentiment. Another source

of contagion effect is that when more countries face difficulties, costs of those giving aid will increase (Chapple, 2012).

We will however not make any conclusions in this paper about the degree to which the assets we investigate are mispriced, but it is certainly important to keep in mind the finding that market prices do not necessarily reflect underlying fundamentals perfectly.

## 3. The European Union and the euro

To put the euro zone crisis into context, we begin by presenting a short chronological overview of the history of first, the European Union and secondly, the European Monetary Union. Next, we will briefly discuss an important theory behind the creation of the euro zone, namely the theory of optimum currency areas. We discuss this theory for two reasons. The theory of optimum currency areas largely constitutes the basis for the design of the euro zone, as well as it has been a source to much of the criticism of the union. Some critics argue that lack of compliance with the theory of optimum currency areas are blamed for the current economic turmoil in the euro zone. Consequently, the theory serves as an important backbone to the discussion in the rest of the paper.

### 3.1 The European Union: a short chronological overview

The European Union is an economic and political union between 27 European countries (28 when Croatia joins on the 01.07.2013). Its foundation was set by the 1951 establishment of the European Coal and Steel Community (ECSC). Europe had, by that time, experienced centuries of turmoil and war. The European Coal and Steel Community came at the end of an imperialistic era, which cumulated in the Second World War. By creating economic dependency between the European nations, the European politicians hoped to spur a peaceful coexistence rather than the destructing warmongering that had crippled Europe during the first half of the century (European Union, 2013b).

The first union was signed by the Benelux countries, France, Italy and West Germany (European Union, 2010). In 1957 the 6 countries further expanded their cooperation through the formation of the European Economic Community (EEC). This treaty created a customs union between member nations and created a common market beyond the coal and steel industries. In 1973 Britain, Denmark and Ireland joined the union. In 1979 the first open democratic elections were held to elect members for the European Parliament. At the same time, the member nations (except the UK) launched the European Monetary System (EMS). This was an exchange rate system created to prevent fluctuations in the exchange rate between member states. In 1985, the member countries signed the Schengen Agreement, leading the way for not only the free flow of goods but also opening borders for inhabitants of the member states, and some non-member states, to travel without passports across countries (European Union, 2013b).

The Maastricht Treaty of 1993 laid the foundations of the modern union we know today. The union changed its name to the European Union. The treaty also established the three pillars of the European Union: The European Community pillar, the Common Foreign and Security Policy pillar and the Justice and Home Affairs pillar. Furthermore, the treaty established the Maastricht criteria. This was a collection of must-haves for countries seeking membership of the Economic and Monetary Union (EMU) and in conclusion seeking to adapt the new common currency of the union. In 1999 the member countries; Austria, Belgium, Finland, France, Germany, Ireland, Italy, Luxembourg, the Netherlands, Portugal and Spain withdrew their local currency in order to introduce the Euro (European Union, 2013b).

### 3.2 History and design of the Monetary Union

When the European Monetary System (EMS) was launched in 1979, this was an important step towards a full monetary union. An important part of the EMS was the Exchange Rate Mechanism (ERM). The ERM was meant to reduce exchange rate variability in Europe and promote monetary stability (Gärtner, 2009).

The ERM was as a semi-pegged system. Its member countries pegged their exchange rate at an official parity between any pair of currencies. The official parities were to be central rates around which exchange rates may fluctuate within a margin. For most of its existence the EMS band was  $\pm 2.25\%$ . However, wider bands were sometimes used temporarily for single currencies. An example of this was during the EMS crisis of 1993, when bands were broadened to 15% for most currencies as an effort to end the crisis (Gärtner, 2009).

By not assigning a “*n*th” currency (i.e. a vehicle currency that ends up with the policy responsibility) and requiring all countries involved to share the burden of intervention, the EMS avoided giving one country the formal responsibility of the monetary policy in the union. However, experts agree that the Deutschmark did in fact adopt the role of the *n*th currency and thus that the monetary policy responsibility was in effect given to the German Federal Bank, the Bundesbank (Gärtner, 2009).

The original ERM ended when the European Economic and Monetary Union started on 1 January 1999. Then, the euro and ERM2 was introduced and the formal monetary policy responsibility of the euro-area nations was transferred to the European Central Bank (ECB). ERM2 provides a similar framework as its predecessor. It is a voluntary exchange rate system, for members of both the euro-area and countries of the European Union who is

outside the currency union. The current framework requires a two year membership in ERM2 for countries seeking to adopt the Euro (Gärtner, 2009).

### 3.3 Theory behind the European currency area

The implementation and development of the euro zone is largely based on the theory of *optimum currency areas*. Robert Mundell is recognized as having initiated this theory. He published several papers on the subject, the first of which in 1961. Later, in 1999, Mundell's analysis of the *optimum currency areas* helped him to achieve the Nobel Memorial Prize in Economics. Gärtner (2009) defines an *optimum currency area* as “a region or group of countries for which it is beneficial to have a common currency” (p. 386). There can be many benefits of a common currency. Among these, the European Union mentions benefits such as the reduction of fluctuating exchange rates and exchange costs, easier cross-border trade, economic growth, increased consumer choice, more and easier travel and finally more international influence to the European Union (European Union, 2013a). When evaluating whether a group of countries constitutes an optimum currency area there are several criteria that usually are evaluated.

One of these is the question whether member countries or regions are similar enough to have the same type of shocks affecting their national economy. If not, they will have frequent asymmetrical shocks. An asymmetrical shock is defined by McKinnon (2002) as “where an unexpected disturbance to national output affects one region differently from another” (p.4). To illustrate this phenomenon, imagine two countries, of more or less the same size, with a common currency. If one country is experiencing a domestic recession while, at the same time, the other country is experiencing a boom in its national economy, their common central bank will be forced to maintain a neutral monetary policy. In turn, this will do nothing to stabilize neither of the national economies. Thus, according to the theory, if frequent asymmetrical shocks affect the region in question, the region is less suited for a common currency.

The effects of asymmetrical shocks are reduced if the countries in a currency union have a high degree of wage and price flexibility across regions, labour mobility across regions and fiscal federalism. The two former attributes would help because they will keep a region competitive and thus decrease the effect of the shock. The latter attribute would be a system of redistributive fiscal transfers to cushion the shock across regions (Ickes, 2000). If the

region in question have a high degree of the mentioned attributes, it may mitigate the negative effects of asymmetrical shocks.

Furthermore, in order for a region to be an optimum currency area it should have homogenous preferences about inflation and unemployment. Countries and regions tend to differ in their preferences on inflation and unemployment. The more different the countries are, the more reluctant they will be in giving up their independent currency. Political and economic integration are often considered to be important for a country seeking to adopt a common currency (Mongelli, 2002).

Robert Mundell is by some coined the intellectual “father of the euro”. His theory has arguably served as the rationale behind many of the design elements of the currency union. However, the debate on whether the European currency area meets the criteria of the optimum currency area is ever on-going, and has perhaps never been as intense as over the last three to four years. Critics argue that the euro zone should be further amended and that shortcomings in the design of the euro zone are partly to blame for the current crisis (Krugman, 2012). We will come back to these arguments when we discuss the measures taken during the Eurozone crisis in section 5.

## 4. The European debt crisis

In this section, we will seek to explain how and why many European countries suddenly found themselves in a debt crisis, and how the unfolding of the crisis differed across countries. We will do this by first providing a general context to the Eurozone crisis. Next, we investigate each of the GIIPS countries; Greece, Ireland, Italy, Portugal and Spain and try to extrapolate the local conditions that made these countries the protagonists of the story. Further on, we will look at the two largest European economies, Germany and France, and evaluate how these have been affected by the crisis, as well as giving a short recollection of the situation in Cyprus. Finally, we will discuss the sources of the crisis, with particular emphasis on the possibility of mispricing of assets both before and after the onset of the crisis.

The chapter provides an important context for the measures and communication events we later investigate. The relation to our research question here is that we find it necessary to gain insight about how the crisis came about and further developed in order to evaluate the measures taken to mitigate it. In particular, we will emphasize the importance of understanding the differences in how the crisis impacted individual countries, as we suspect that the effect of the measures will induce different reactions in respective nations.

### 4.1 The outbreak of the Eurozone crisis

In the autumn of 2009, doubts appeared in the financial markets on the solvency of several European nations. The financial crisis, with its bank bailout plans and expansive governmental spending in the previous years had exhausted governments' spending power. In the autumn of 2009 the newly elected Greek government revealed that the domestic economic conditions were significantly worse than expected, which came as a shock to the European financial markets. Soon a wave of downgrading of government debt was crushing over the continent and interest rates on sovereign bonds were escalating. Some countries were worse off than others. The impact was particularly bad in Europe's so-called peripheral countries. After a while the offensive acronym PIIGS was flourishing in the mass media, referring to Portugal, Italy, Ireland, Greece and Spain. These were countries where the situation was evaluated as the most critical in Europe (we will however steer clear of this notion and rather refer to these five countries as the GIIPS countries).

## 4.2 Greece

The main driving force behind the outbreak of the crisis in Greece was, arguably, the sovereign debt level. During the early 2000s Greece had one of the fastest growing economies in the Eurozone, with a real growth rate of 4.5%. However, Greece's primary surplus – meaning that the government ran a surplus before interest payments – deteriorated and as of 2003 turned into a deficit (Manessiotis, 2011). Tax cuts combined with increasing costs from social benefits, public sector jobs and pensions made sure to maintain and enhance the already high debt-to-GDP ratio.

Additionally, several structural weaknesses in the Greek system are considered to have contributed to the crisis. According to the World Bank's doing business rankings for 2013, Greece is the 78<sup>th</sup> easiest country to do business in. In 2012, they were ranked as number 89 and earlier than that, even lower. The ranking evaluates the areas of "starting a business", "registration of property" and "protecting investors" to be particularly difficult as they are ranked number 146, 150 and 117 out of 185 countries in the respective categories in 2013 (The World Bank, 2013).

Furthermore, tax evasion has been a major problem in Greece. The size of the shadow economy (i.e. business kept off the books) has been estimated to constitute more than 25% of GDP. This has implicated heavy burdens on honest tax payers and soaring government expenditure on tax collection. To add to this, Greek enforcement of the tax laws was being loosened prior to the crisis. According to Surowiecki (2011) officials in Greece were easy to bribe and the tax courts spent up to ten years resolving cases.

Greece has had an annual budget deficit for several decades (Manessiotis, 2011). By 2001, when Greece was to enter the euro-zone, the country did not match the debt level and deficit restrictions set by the Maastricht Treaty (the Maastricht Treaty is discussed in more detail in section 6.7). In order to adopt the euro, Greece had to report cutbacks in both debt and interest payments. However, rather than implementing appropriate measures recent scandals have shown that Greece misreported budget deficits and performed off-book accounting. According to Case (2011) Greece had investment banks such as Goldman Sachs help them to disguise debt. The Greek government continuously misreported the budget deficit to the European Union. This led to numerous revisions on the real deficits, thus creating confusion around the real economic situation in Greece (European Commission, 2010a). As a

consequence, Greece was able to avoid the implementation of proposed austerity measures such as higher taxes and lower expenses that should have been implemented according to the Maastricht Treaty and the Stability and Growth Pact.

Additionally, Greece was severely affected by the Financial Crisis, as the Greek economy was highly dependent on the cyclical shipping and tourism industries. The Greek government debt soon became unsustainable; the capital markets froze and in the spring of 2010, Greece received their first bailout loan from the European Union and IMF. Two years later, a second bailout package was granted, along with a debt restructuring programme. The help came from the “Troika” consisting of bodies IMF, EU and ECB and is conditional on a much debated austerity plan, including privatization of government assets and structural reforms. These constraints have led to riots, strikes and chaotic political environment (Groves & Chapman, 2012).

### 4.3 Spain

Contrary to Greece, the pre-crisis debt-to-GDP ratio in Spain was much healthier, with the government debt level in Spain lying well within the euro zone’s fiscal rules. At about 40 % of GDP in 2008 the Spanish government debt level relative to GDP was even smaller than that of Germany (BBC, 2013). Furthermore, the Spanish economy also enjoyed strong growth before the crisis. However, a real estate bubble fuelled by excessive private borrowing, finally burst in 2008. This bubble is in retrospect said to have driven most of the Spanish growth the past 10 years, and largely contributed to the strong sovereign finances, the latter helped by taxation on the real estate market. From 1996 to 2007, residential real estate prices tripled. Over the same period, unit labour costs in the country rose 40 % compared to levels in Germany (Knight, 2012), in turn significantly reducing the Spanish competitiveness. The private sector in Spain had been borrowing too much, and when the real estate market broke down, the banks that had to deal with insolvencies in this sector also found itself in a situation of crisis. The combination of the banking crisis and the building sector insolvencies resulted in a seemingly continuously increasing Spanish unemployment rate, and as of the fourth quarter in 2012 it reached a record high rate of 26 % (Trading Economics, 2013).

In order to save the economy, the Spanish government was forced into a spending binge and thus drove the budget into deficit. The Spanish government ran a budget surplus of 1.9% of GDP in 2007, but this was turned into deficits of 11.2% and 9.7% in 2010 and 2011,

respectively (Eurostat, 2013). By 2012, Spain's households, firms and government collectively owed almost one trillion euros to foreigners, an amount representing more than 90% of GDP (The Economist, 2012a).

As a response to downgrades of government debt and increasing interest rates, the Spanish government pushed through a series of austerity measures. In 2012, the Spanish government managed to reduce its budget deficit to 6.7% of GDP (Buck, 2013). Despite this, in June 2012 the yields on Spanish 10-year government bonds reached 7.5% (Bloomberg, 2013). This borrowing cost was by most experts considered to be unsustainable (Chaturvedi, 2012). However, the situation has improved. Since the summer of 2012, the yield on Spanish government bonds has decreased, and by March 2013 the 10-year bond yield was approximately 5 % (Bloomberg, 2013).

## 4.4 Italy

The Italian debt-to-GDP ratio reached 120% in 2012 and is amongst Europe's highest. The debt level has been high for a long time, and has been above 100 % of GDP since 1991. But in comparison to countries such as Spain and Ireland, private debt in Italy is rather small, and as a consequence, Italy's total indebtedness (i.e. not just government debt) is smaller than many other comparable large economies (Knight, 2011). In recent time, Italy has had a primary surplus. Nonetheless, because of the high debt level, the Italian government has been dependent on investor confidence to keep interest payments low. Until recently the Italians have managed this and the debt level has been considered sustainable (The Economist, 2011).

The Italian economy is the third largest in the euro zone, only surpassed by Germany and France. Italy has had a reputation as a strong manufacturing country. However, an aging population, high wage levels, poor regulation and low investment levels have created obstacles for production and have further harmed the country's competitiveness. Over the last decade the Italian economy has been stagnant, and for the last 15 years the average annual growth rate in Italy has only been 0.75% (Knight, 2011).

When the Greek debt crisis emerged in 2009, fear of contagion soon reached Italy. In May 2010, austerity measures were announced in order to maintain and strengthen confidence in capital markets. Nevertheless, as the crisis developed, more action needed to be taken. In August 2011, Silvio Berlusconi, the Prime Minister of Italy, pledged to balance the budget in 2013 rather than 2014 as initially intended. A couple of days later the ECB signalled it would

buy Italian and Spanish bonds in secondary market as part of its Securities Markets Program. This reduced the yields on Italian bonds. However, the effects would not last. On 29 August 2011, Berlusconi went back on the proposed austerity plan and eased the planned increase in tax collection. As a consequence, the situation in Italy worsened. Credit rating agencies cut Italy's rating, general strike in unions caused more uncertainty, and Berlusconi lost confidence both in financial markets and the Italian parliament. On 8 November 2011, the yields on government 10-year bonds had reached 7% for the first time in the euro-area, and Berlusconi offered to resign from office. The technocrat Mario Monti and a coalition government replaced Berlusconi. Monti's main purpose in office was to solve Italy's fiscal predicament and restore confidence in financial markets (Bloomberg, 2011). During 2012, the yield on Italian bonds returned to more viable levels.

In spite of the improved outlook for Italy, the peace seems to be on shallow grounds as it is for several GIIPS countries. A recent general election in the country resulted in a chaotic political situation. This in turn enhanced the uncertainty about whether Italy's austerity programme would continue (Nadeau, 2013).

## 4.5 Ireland

Similar to the situation in Spain, Ireland's troubles was not initially caused by government spending, but rather by a banking crisis. Eventually, this resulted in huge government bailouts. The collapse of the Irish real estate market largely accounted for the losses on behalf of Irish banks. Additionally, similar to Greece, Ireland was heavily exposed to the financial distress in international markets during the financial crisis, as the Irish economy is to a large degree dependent on exports. When the financial crisis was at its peak in late 2008 the Irish government chose to issue blanket guarantees to bank creditors, and later protected the banks' senior bond holders. As a consequence of the massive bailouts, the Irish government accumulated large aggregates of public debt (The Economist, 2013). The budget went from a surplus in 2007 to a deficit of 31% of GDP in 2010 (Eurostat, 2013). As the debt continued to increase, so did the yields on government bonds. This resulted in an agreement with IMF and EU on a bailout package of €85 billion at the end of 2010 (European Commission, 2010d).

The Irish government followed through with a series of austerity measures and restructuring programmes. Ireland was able to cut the deficit to about 8 % in 2012 (The Economist, 2012b). Furthermore, the unit labour cost was sharply reduced, thus making the economy more

competitive (The Economist, 2013). This strong improvement helped Ireland to successfully issue new debt in March 2013, the first issue of 10 year debt since it was locked out of markets in late 2010 (The Telegraph, 2013).

## 4.6 Portugal

The debt crisis in Portugal is similar to that of Greece. The crisis was not caused by an oversized banking sector and a real estate market collapse. Rather, the crisis in Portugal is said to be caused by careless government spending, slow economic growth and lack of competitiveness, thus implicating excessive government leverage (Roche, 2011).

Portugal's GDP growth rate was the lowest in the Eurozone, averaging only 1.1 % in the pre-crisis period from 2001 to 2007 (Roche, 2011). Increasing unit labor costs in Portugal made it difficult to compete with the growing Asian economies in several business sectors, such as the textile industry. As the competitiveness was reduced and the spending continued to increase, the current account deficit soared (Lourtie, 2011).

In May 2011, Portugal became the third euro zone country to agree on a bailout package. However, the recession has persisted in the country, and the government has had difficulties meeting the conditions of the rescue package. Public demonstrations and soaring unemployment rates have made it difficult for the government to go on with harsh austerity measures, forcing the creditors to give Portugal more time to meet the conditions. Despite of this, Portugal was, for the first time since receiving the bailout package, able to enter the bond markets with a debt issuance in January 2013 (Minder, 2013).

## 4.7 Germany, France and Cyprus

The central and northern Eurozone nations (except from Ireland) have so far weathered the storm to a much larger degree than the peripheral countries mentioned above. These countries include Germany, Finland, The Benelux countries, France and Austria. The two biggest economies, Germany and France, have so far been considered rather safe. Of these two, however, France seems to be the country most exposed to the crisis. Sharp declines in competitiveness, followed by deteriorating exports and production have made economists speculate that a crisis is looming in the second largest economy in the euro zone. So far, the government has taken to austerity measures and the financial markets have maintained their trust in France, as the yield on government bonds in France have been just a few basis points

over the German equivalents. But economists are still worried that no real reforms have been made in order to reduce the labour unit costs and enhance the competitiveness of the French economy (Tully, 2013).

Germany is often regarded as the most financially sound of all the euro zone economies, and the least likely to end up in recession. Germany went through a series of controversial labour market reforms in the mid-2000s, called the Hartz reforms. These helped Germany in reducing the non-cyclical unemployment rate as well as the unit labour cost (Krebs & Scheffel, 2013). During the current crisis Germany have benefited from these reforms, and has been able to stay competitive. Because of Germany's healthy economy, they have acted as the main creditor to their euro zone allies. Still, Germany is not unaffected by the crisis, and as the economic conditions of their main trading partners weakens, German export levels will shrink. Furthermore, both the burden taken on by Germany in form of credit which they might never see again, and the potential dissolution of the euro, might eventually harm the German economy significantly.

The last country to be severely struck by the euro zone recession is the Republic of Cyprus. The country was heavily exposed to the Greek economy's collapse and applied for a bailout package during the summer of 2012. Cyprus' banking sector was particularly badly wounded, and in desperate need of aid. A bailout package was agreed upon in March 2013 (European Central Bank, 2013).

## 4.8 Causes of the crisis

The causes for the euro zone crisis are many and complex. The crisis emerged right after the global financial crisis of 2007-2009, and we saw that this global recession largely contributed to the onset of the euro zone crisis. To some degree, all countries in the euro zone were affected by the financial crisis. Arguably, this initial shock was not that asymmetrical across countries. As time passed by, however, the nature of the following debt crisis, the mechanisms leading up to it and the eventual consequences largely differed across nations. Still, the common denominators for the countries ending up in the worst shape were unsustainable debt costs and struggling financial markets.

The fundamental determinants for the prices of bonds as well as equities are expected cash flows. The fact that yields on government bonds increased so much in particular countries should therefore mirror a more negative outlook on the behalf of investors. As the debt levels

increased at the same time as countries proved too ineffective to offset the budget imbalances, the fear of not having their loans repaid led investors to charge higher borrowing costs. At the same time, stockholders were uncertain about businesses' future earnings.

Some of the countries were less able to cope with the crisis than others. The GIIPS countries were most severely hit, and we saw in the discussion above that accumulation of government debt in addition to slow growth, loss of competitiveness and collapses in the real estate markets with subsequent banking crises were important sources of problems.

The latter of these causes relates to the discussion in section 2.4. Here, we found that there are other reasons for asset prices to change. In an article written already back in 2005, Brown and Chambers (2005) presents a series of allegations where they describe several dubious methods that European governments had undertaken in order to hide their increasing budget deficits and growing sovereign debts. According to the authors, Greece underreported military expenditure and overestimated social security surpluses; France and Belgium allegedly consumed corporate pension liabilities, while keeping them off the books; many European governments borrowed large sums not in their own name, but through state-supported or implicitly guaranteed vehicles; Greece and Italy used derivatives to disguise budget deficits in order to enter the euro zone; upfront payments on swap deals were listed as revenues, when they were effectively loans; and usage of methods such as off-balance transactions, inconsistent accounting and complex currency and credit derivatives. All of these are short term measures, presumably aimed at achieving more immediate fiscal leeway and at the same time achieve compliance with the regulatory treaties of the euro zone (Brown & Chambers, 2005). In retrospect, it is probably not farfetched to evaluate the claims of Brown and Chambers as truths. This leads us to conclude that mispricing of assets has been largely present preceding the euro zone crisis.

As the crisis has developed however, and borrowing costs have soared, there may have emerged another source of mispricing, namely that of contagion effects. European politicians and economists alike have feared contagion to other larger euro-zone economies. The fear is, and have been, based on the possibility that economies such as Greece would turn out to be impossible to save and lead to abandonment of the euro as a currency – with unknown consequences for all the member countries and the world economy as a whole. Borrowing costs may therefore have increased beyond levels suggested by fundamentals, as markets have priced in higher risk premiums.

## 5. The monetary union and the crisis

Having seen in the previous section how the euro zone crisis developed in the different countries, we will now investigate closer some of the most common arguments related to the discussion on why the crisis became as severe as it did. In particular, experts have blamed the euro zone structure as one of the most important causes, a claim that needs to be evaluated in light of the discussion about optimal currency areas in section 3.3. Furthermore, we will present and discuss the most prominent measures taken by respective central authorities to mitigate the problems: bailout packages through vehicles EFSF, EFSM and ESM; LTRO; and the OMT programme.

This discussion is closely linked to our event study, where we will assess the effect of announcing these measures, as well as other related statements. We find, thus, that it is crucial to have an understanding of the design of the measures, and how respective packages and vehicles work – or are intended to work. Gaining these insights will further help us in the explanation of reactions across asset markets and countries.

### 5.1 Why did the crisis turn out so severe?

A country in recession normally has some conventional measures on their hands to offset slowdowns in the economy. Common approaches include expansive monetary policies and devaluating the domestic currency. Nations with high and rising production costs could, for example, adjust their currencies so that their exports would remain competitive in world markets. As countries in the euro-zone share the same central bank as well as the same currency, their opportunity to use these methods are limited. The European Central Bank have made use of conventional measures such as the reduction of key interest rates, but as the shocks in the zone are to some extent asymmetrical, the measures cannot be as strict as it could be without a union, cf. section 3.3.

Another problem of the euro-zone is the capital and trade imbalances. Berger & Nitsch (2010) find that trade imbalances increased significantly among euro zone member countries after the introduction of the euro. This can be explained by the lack of flexible nominal exchange rates as a means of maintaining competitiveness. Furthermore, the authors find that the euro zone member countries with less flexible labour and product markets tend to display larger trade deficits, and the same is true for countries with less volatile economies (as they are likely to

have lower buffer savings). Berger & Nitsch conclude that “irrevocably fixed nominal exchange rates do come at the cost of larger and more permanent trade imbalances” (p.15). This is an important reason for the current account deficits (i.e. imports exceeds exports) in peripheral Europe, and have thus contributed to the accumulation of sovereign debt in these countries.

The euro zone is a monetary union, but not a fiscal union. As we saw in section 3.3, however, fiscal federalism is a tool that could help balance the effects of asymmetrical shocks. When the crisis hit the euro zone area, the lack of this attribute was evident as the coordination of political measures and red tape delayed potential measures to ease the pain of crisis-struck countries (Collignon, 2012). The fiscal policy of the euro zone is further explained in section 6.7.

The fear of so-called bank runs has also been present during the sovereign debt crisis. When banking sectors in some countries such as Spain and Ireland came into trouble, the crisis was enhanced by bank runs. As domestic banks are perceived as unsafe, and questions arise whether the respective countries are able to back a possible banking sector collapse, money are withdrawn from bank accounts and transferred to safer countries within the union, such as Germany. In turn, this will worsen the situation for the banks in countries with already struggling bank sectors. The existence of a currency union facilitates for these mechanisms, as the transferring of savings across borders are simplified when the currency is the same, thus reinforcing the crisis (Cowen & Tabarrok, 2013).

We see, thus, that in addition to what we found in the previous section, a possible cause of the severity of the crisis is the structure of the euro zone as a currency union with arguably limited capability of coordinating political measures.

To encounter these issues, European leaders are working towards closer fiscal integration within the euro-zone. In October 2011, the first big summit on a fiscal union took place. The Germans have advocated for a stronger integration in order to better handle asymmetrical shocks, while opponents are afraid of loss of sovereignty. The types of integration that is discussed is, amongst other things, a separate euro zone budget, a single European banking supervision, binding budget contracts for euro-zone member states and some form of jointly backed borrowing to finance a euro-zone treasury (Peel, Carnegy, & Spiegel, 2012).

Still, critics have complained about paralyzed politicians and ECB bankers acting too slow and too little in order to mitigate the damage. However, the politicians of the euro zone and the economists in ECB and IMF have not stood completely idle on the sidelines. On the one hand, conventional monetary policies has been taken, notably, the ECB has reduced the main refinancing operation rate four times since 2010 (European Central Bank, 2013). Furthermore, politicians have conducted a series of more unconventional policy reactions, which we will summarize in the following.

## 5.2 Bailout packages through the vehicles EFSF, EFSM and ESM

The European Financial Stability Facility (EFSF) was created as a temporary rescue mechanism by the euro area member states in May 2010. EFSF issues bonds or other debt instruments on the capital markets. The proceeds may be lent to countries which apply for help. Also, the EFSF intervenes in the primary and secondary bond markets. EFSF contributed to the financing of the rescue package for Ireland in November 2010, the rescue package for Portugal in May 2011 and the second bailout package for Greece. The shareholders of the programme are the euro-zone member states (European Financial Stability Facility, 2013).

The European Financial Stability Mechanism (EFSM) borrows from the financial markets with the EU budget as collateral. It was an emergency funding programme created in January 2011 and contributed to the funding of the Portuguese and Irish bailout packages (European Commission, 2012).

The European Stability Mechanism (ESM) is a *permanent* crisis resolution mechanism for the countries of the euro area. It replaced EFSF and EFSM as the main tool for issuing debt in order to finance loans and other forms of financial assistance to the euro area member states on 8 October 2012 (European Stability Mechanism, 2013).

## 5.3 LTRO

Long-Term Refinancing Operations (LTRO) is operations introduced by the ECB, in which they essentially borrow money at very low interest rates directly to euro-zone banks. The LTRO programme, started in December 2011, was the largest infusion of money into the

banking system in the history of the euro zone (Bloomberg Businessweek, 2011). The idea is that this money will be used to invest in higher yielding assets such as loans to businesses and consumers, in turn helping the real economy in the euro zone. At the same time sovereign bonds can be used as collateral in order to attain the LTRO loans. Those making most use of the operations have been Spanish and Italian banks, and the LTROs have contributed to substantial reductions of these countries' borrowing costs (Boyle, 2012).

## 5.4 The OMT programme

The Outright Monetary Transactions (OMT) is a sovereign bond buying plan initiated by the ECB. The central bank plans to buy sovereign bonds from euro-zone countries unable to handle their own debt in the secondary market. By doing so, the ECB hope to contain the crisis and put a lid on government bond yields, thus lowering borrowing costs for governments hardest hit by the euro zone crisis (Financial Times, 2013). The programme intends to buy government debt with maturity between one and three years. No quantitative limits is set on the bond buying programme, allowing the ECB to use whatever measures appropriate for any euro-zone country struggling with its debt-burden. Any country in the euro-zone area who applies for assistance is qualified for the OMT program, provided that the country takes certain domestic preparations, outlined as the conditionality of the OMT programme (European Central Bank, 2012).

The OMT programme was met with scepticism from the Germans. In particular, Jens Weidmann, head of the German Bundesbank and member of the ECB's Governing Council, publically voiced concerns over the bond buying programme ahead of the official launch. The concerns were related to inflation fear and the lack of pressure it would create for countries to initiate much needed economic reforms. He stated that such a programme would potentially create new problems for the euro zone and that the bond buying plan was "tantamount to financing governments by printing banknotes" (Framke, Kuehnen, & Suoninen, 2013). However, when the ECB decided to initiate the programme, Wiedmann was alone in opposing the programme within the Governing Council (Framke, Kuehnen, & Suoninen, 2013).

The technical features of the programme clearly answer to German concerns. First, all countries receiving help from the OMT programme must submit to required austerity conditions. The adherence to these conditions is partly to be monitored by the International Monetary Fund (IMF). Second, the liquidity created by the programme will be fully sterilized

by ECB, in that way relieving the potential inflation pressure across the euro-zone (European Central Bank, 2012).

Germans in particular fear the OMT programme will cause inflation and loss of tax-payer money. They are anxious that the ECB is changing direction from the traditional Bundesbank model of an independent, inflation-fighting central bank to that of a central bank more typical of Latin nations, with a softer stance against inflation. Additionally, some Germans feel that the European central bank is becoming too intertwined with politics. The former ECB policymaker Juergen Stark formulated this as “the ECB is making itself a prisoner of politics” and “if there is a problem with monetary policy, I have to intervene right away and cannot make my action dependent on the behaviour of a third party” (Framke, Kuehnen, & Suoninen, 2013). The ECB responded by initiating widespread communication explaining its measures. Draghi has taken his most fierce critics on, amongst other things speaking at the German Bundestag. But there are still critics claiming that the ECB is risking its hard won credibility by getting mixed up in politics and new regulatory roles (Framke, Kuehnen, & Suoninen, 2013).

The ECB intends to publish weekly holdings and their market values of OMTs. However, the bank has so far not needed to initiate any transactions (European Central Bank, 2012).

## 6. Monetary and Fiscal Policy

In this section, we will present theory about economic policy. We start off by discussing the theory of monetary policy and address its objectives and how it works through different channels. Next, we discuss the monetary strategy of the ECB, by presenting conventional as well as more non-conventional operations they can make use of, with the latter emphasizing the strategy of acting as a lender of last resort. Furthermore, we look at the important concepts of central bank independence, transparency and credibility. Finally, we evaluate the role of fiscal policy in the euro zone.

The motivation for this section is that we find that the theory of monetary policy is important in order to understand actions taken by policymakers during the euro zone crisis. It also serves as a backbone for the discussion of central bank communication in section 7 – in particular the understanding of independence, transparency and credibility. In addition, as the measures taken during the debt crisis largely have an element of fiscal intervention in them, in the sense, for example, of the austerity measures imposed as conditions of the rescue packages, an insight into the fiscal policy is rewarding.

### 6.1 Monetary Policy

#### 6.1.1 Definitions

*“[Monetary policy is defined as an] action undertaken by a central bank using the instruments at its disposal in order to achieve its objectives”.*

*“The primary objective of the ECB’s monetary policy is to maintain price stability. This is the best contribution monetary policy can make to economic growth and job creation”* (The European Central Bank, 2013c).

These definitions are presented by ECB, and in the following we will seek to explain the rationale behind them, as well as looking at what measures the Central Bank takes to achieve its goals.

## 6.1.2 Objectives

Politicians have to deal with a number of issues when deciding on what policies to undertake. In order to secure the welfare of citizens, many economic issues thus have to be given attention: economic growth, resource utilization, employment and inflation are just some of these. However, there are limits to what certain policies can do to handle these challenges.

In the case of ECB, these limits are addressed in the Treaty on the Functioning of the European Union, Article 127 (1). The Treaty establishes a clear hierarchy of objectives for the euro system, assigning principal importance to price stability. Price stability, according to the Treaty, is the most important contribution that monetary policy can make to achieve a favourable economic environment and a high level of employment. This mirrors the broad consensus that (i) there are substantial benefits of price stability: stable prices on a sustained basis are crucial for the increase of economic welfare and the growth potential of the economy; and (ii) that the natural role of monetary policy in the economy is to maintain price stability. Though real economic activity can be affected in the short term, it can ultimately only influence the price level. Knowing that they can also influence real activity in the short term, however, the ECB should also take into account the broader economic goals when implementing their monetary policies, typically avoiding excessive fluctuations in output and employment – *if* this is in line with its primary objective of sustaining stable prices. As for the real income, this is essentially determined by supply-side factors such as technology, population growth and institutional efficiency. Central bank policies should therefore focus on the enhancing of the growth *potential* of the economy (The European Central Bank, 2013e).

Like many other central banks, the ECB has a stated inflation target. Price stability was defined in October 1998 by the Governing Council of the ECB defined as “a year-on-year increase in the Harmonised Index of Consumer Prices (HICP) for the euro area of below 2%” and added that price stability “was to be maintained over the medium term”. In May 2003, they confirmed and clarified that they aim to keep the inflation “below but close to 2%”. This indicates that the primary goal of ECB’s monetary policy is to maintain price stability in the euro area as a whole. The HICP is the index best suited to approximate changes over time of a representative basket of consumer goods and services purchased by euro area households (Scheller, 2004). This announcement of a quantitative target, the ECB argues, have three explicit benefits. First, it makes the monetary policy more transparent. Second, it provides a clear and measurable benchmark against which the European citizens can hold the ECB

responsible. Finally, it provides guidance to the public for forming expectations of future price developments (The European Central Bank, 2013f).

Scheller (2004) also list further benefits from price stability:

- It makes it easier to recognise changes in relative prices, thus enabling agents to make informed consumption and investment decisions and efficiently allocate resources.
- Risk premiums in real interest rates are reduced because investors know that prices will remain stable in the future, which encourages investment.
- There is no need to hedge against inflation, by for example stockpiling real assets and avoid financial investments – which is not an efficient investment decision.
- Tax and welfare systems could be a source of perverse incentives that would be worsened by strong inflation or deflation.
- History has shown that deflation and inflation may create social and political instability.

The term “below but close to 2%” sets a clear upper bound for the accepted rate of inflation that is consistent with price stability over the medium term (“below”), while at the same time providing an adequate margin to avoid the risks of harmful deflation (“close to”). This illustrates the symmetry in the monetary policy – both inflation and deflation is harmful if not kept at a low level. An inflation rate close to 2%, however, allows the economy to fully enjoy the benefits of price stability. On their website, the ECB states three commitments underlined by the announced inflation target:

- Providing an adequate margin to avoid the risks of deflation. Having such a safety margin against deflation is important because nominal interest rates cannot fall below zero. In a deflationary environment monetary policy may thus not be able to sufficiently stimulate aggregate demand by using its interest rate instrument. This makes it more difficult for monetary policy to fight deflation than to fight inflation.
- Taking into account the possibility of HICP inflation slightly overstating true inflation as a result of a small but positive bias in the measurement of price level changes using the HICP.
- Providing a sufficient margin to address the implications of inflation differentials in the euro area. It avoids that individual countries in the euro area have to structurally live with too low inflation rates or even deflation (The European Central Bank, 2013f).

The phrase “over the medium term” reflects the established consensus that monetary policy cannot fine-tune developments in prices or inflation over short horizons of a few weeks or months. Changes in monetary policy only affect prices with a time lag, and the magnitude of the eventual impact is uncertain. This implies that monetary policy cannot offset all unanticipated shocks to the price level in a short period of time. Some short-term volatility in inflation is therefore inevitable (Scheller, 2004). Thus, monetary policies need to be forward-looking, and it can only maintain price stability over longer periods of time. Furthermore, it is not wise to put forth ex-ante a precise horizon for the behaviour of monetary policy, given that the monetary transmission mechanisms are so volatile in terms of time lags, as well as the fact that different economic shocks requires different policies, with regard to both nature and size. For example, a demand shock moving output and prices in the same manner may only require a swift monetary policy reaction, as this may push both variables in the same, desired directions. On the other hand one finds shocks that moves output and prices in opposite directions. These will require rather gradual responses, which hence will work with a longer time lag (The European Central Bank, 2013b).

## 6.2 The monetary transmission mechanism

The primary objective for the ECB and its monetary policies is to maintain price stability. Their capacity to do so is based on the Euro banking systems’ dependence on money issued by the ECB (“base money”) to:

- i) Meet the demand for currency in circulation
- ii) Clear interbank balances
- iii) Meet the requirements for the minimum reserves that may have to be deposited with the central bank (Scheller, 2004)

It is this control over the creation of base money that enables the central bank to influence market conditions, via the money market. The central bank operations induce changes in the money market interest rates, which further induces a process commonly known as the “monetary policy transmission mechanism”. The complexity of this process is the reason why the time lags of monetary policies to affect markets are – to a considerable degree – uncertain. Additionally, the size and strength of reactions will also vary. Furthermore, the identification of the transmission mechanism is complicated by continuous influence by economic shocks on macroeconomic variables such as inflation and aggregate demand, which makes the tracing

of the causality pattern difficult. After all, monetary policy is not the only factor on which financial asset prices and exchange rates depend on (The European Central Bank, 2011c). Nevertheless, we will look at what we consider the two main channels through which the monetary transmission mechanism works.

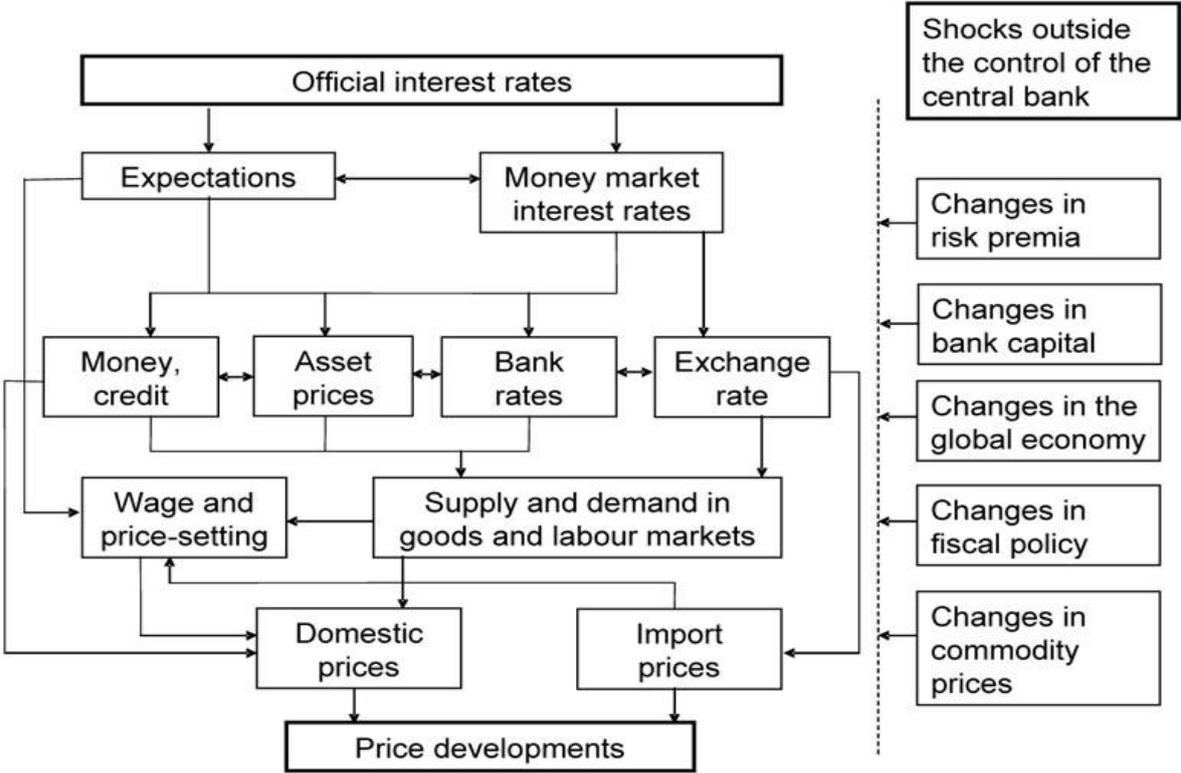


Figure 1: Illustration of the monetary transmission mechanism. Source: ECB

### 6.2.1 The interest rate channel

Figure 1 illustrates a stylised example of how the transmission mechanism works from a change in official interest rates, which the central bank can directly control, to price developments, which is what the central bank seek to control indirectly. By having monopoly power regarding the creation of base money, the central bank can control the funding cost of liquidity for banks. These costs will, in the next step, provide the basis for the general interest rate level. Notably, the money market is influenced, which we can broadly define as the market for interbank lending. Naturally, this market directs the interest rate level faced by private and corporate customers as well, as any bank needs to find the appropriate margins to

optimize its daily operations. These effects are commonly described as the “interest rate channel”.

## 6.2.2 The expectations channel

For the sake of this paper, however, it is particularly useful to look at the role of expectations in monetary policy. As the economy as a whole is made up by a group of independent agents, these agents’ expectations about the future have a great impact on the economic environment. Investment, saving and consumption decisions, for example, are made based on what interest and inflation rates to expect in the future. Furthermore, the price on financial instruments is derived from future interest rates. This other main channel of the transmission mechanism is what we call the “expectations channel”.

Looking at financial theory, we learn that prices and yields of long-term assets are heavily dependent on the financial market participants’ expectations about the future path of monetary policy, cf. section 2. More specifically, with relevant term, risk and liquidity premiums held constant, expectations that short rates will be kept low will encourage the participants to bid down long term bond yields and bid up the prices of equities

Today’s overnight interest really does not matter much at all, economic decisions hinge rather on the *future path* of overnight interest rates. According to standard theories of the term structure, interest rates on longer-term instruments should reflect the expected sequence of future overnight rates. For example, the n-day rate should be, approximately:

$$R_t = \alpha_n + (1/n) (r_t + r_{t+1}^e + r_{t+2}^e + \dots + r_{t+n-1}^e) + \varepsilon_t$$

where  $r_t$  is the current overnight rate,  $r_{t+1}^e$  is today’s expectations of tomorrow’s overnight rate (and so on for  $t+2$ ,  $t+3$  etc.).  $\alpha_n$  is a term premium, and  $\varepsilon_t$  is an error term indicating that the term premium might be stochastic.

Thus, we see that it is not the short term interest rates, but rather the long term interest rates that are of significant importance to investment (and borrowing) decisions. The yield curve is a curve showing several yields or interest rates across different contract lengths for a similar financial contract. The curve shows the relation between the level of interest and the length to maturity. In general, the yield curve can be seen as the market’s expectations about future interest rates given the current market conditions. A rising yield curve implies increasing short interest rates, and conversely, a falling yield curve implies decreasing short interest

rates. However, the interpretation is not always this straightforward, particularly not in times of high uncertainty, such as the Financial Crisis. This uncertainty corresponds to the alpha in the n-day rate formula.

We see that longer-term interest rates depend mostly on the public's *expectations* of future central bank policy. One of the most important tasks for any central bank is thus the shaping of public expectations of the development of monetary policy in the future. After the introduction of rational expectations (Lucas, 1976) – as opposed to the preceding views of static and adaptive expectations, respectively – a consensus that agents try to anticipate future economic policy was established.

Expectations of future inflation matter in two important areas: First, they influence the level of real interest rates and so determine the impact of any specific nominal interest rate. Second, expectations influence price setting and wage-setting and so feed through to actual inflation in subsequent periods (Fuhrer & Olivei, 2010).

The role of expectations in monetary policy has gained importance over the past decades, and has been a source of much research. The expectations channel effectiveness depends, however, on the credibility of the central bank, and notably, its communication. Credibility facilitates successful monetary policy. If the economic agents believe in the central bank's ability and commitment to maintain price stability, inflation expectations will also remain stable. This is what has been come to known as the management of expectations, which we will investigate closer when we discuss central bank communication in section 7.

One can perhaps argue that the monetary transmission mechanism is even more complex for the ECB than for other central banks due to the fact that it covers a multinational currency area. The bottom line still stands, however: in the long run, only the general level of prices will permanently change, and contrary to earlier beliefs, output, employment and other real variables will only change for short periods of time.

### **6.2.3 Experience and empirical knowledge**

Though we have seen that monetary policy works in somewhat mysterious ways, some evidence still exists on how things usually happen. The European Central Bank (2013) claims that some facts about the transmission mechanism are, by now, widely accepted. First, as we have already mentioned, there are long and uncertain lags when speaking of the domestic price level. Second, the interest channel is the most prominent of the transmission channels in

normal times: On an aggregate level, tighter monetary policy implicates a temporary decrease in output, estimated to reach maximum effect between one and two years after the policy change. Furthermore, prices react slower than output. Finally, besides affecting the economy on this aggregate level, firms and households are affected through the so-called credit channels (we briefly discuss these in section 6.4), as cash flow and bank loan supply are determined by monetary policy (Hall, 2001).

## 6.3 The ECB's monetary strategy

In the pursuit of price stability, the ECB works simultaneously from two analytical perspectives. One is the *economic* perspective, where they assess current economic and financial developments and the implied risks to price stability. Among the factors they watch closely are the developments in real output, labour market conditions, several price and cost indicators and the balance of payments for the Euro area. The other pillar of the ECB's monetary policy is the *monetary* perspective. Here, the ECB brings money and liquidity considerations into the picture, following from the fact that monetary growth and inflation are closely related. Specifically, the ECB has announced a reference value for the annual growth of the broad monetary aggregate M3 of 4.5%. In addition to the assessment of the actual monetary growth, the ECB also takes into consideration developments in the components of the aggregates (The European Central Bank, 2011c).

Like other central banks, the ECB has at its disposal a set of conventional tools that it uses to achieve the previously stated targets of the monetary policy. In the following we will briefly present and describe their toolbox.

### 6.3.1 Open market operations

Direct intervention in financial markets plays a key role in the conduct of monetary policy. In doing this, the central bank can manage market liquidity and steer interest rates in the desired direction. The open market operations further consist of five different instruments:

*The main refinancing operations* are weekly liquidity-providing reverse transactions executed by national central banks with maturity of one week (The European Central Bank, 2011b). This is an essential tool in the interest rate steering of the ECB, and the lending rate is currently fixed at 0.50% as of May 2013 (The European Central Bank, 2013a).

*The longer-term refinancing operations* are similar operations and are thus also executed by national central banks, but with longer maturities, normally three months. Unlike the main refinancing operations, the ECB does in general not attempt to send signals to markets in its conduct of these operations, and therefore acts as an interest rate taker (The European Central Bank, 2011b).

*Fine-tuning operations* are the ad-hoc liquidity-providing instrument, conducted with the aim of smoothing the impact of unexpected liquidity shocks. Like the two refinancing operations, these are normally conducted as reverse transactions by the national central banks, but maturities vary. Under “exceptional” circumstances, however, the fine-tuning operations can be executed by the ECB itself (The European Central Bank, 2011b).

*Structural operations* are conducted whenever the ECB wishes to calibrate the structural position of the Eurosystem vis-à-vis the financial sector, either in the form of ECB debt certificates, reverse transactions and outright transactions. Normally, they are carried out by the national central banks, but may also be executed by the ECB itself (The European Central Bank, 2011b).

### **6.3.2 Standing facilities**

The standing facilities provide and absorb overnight liquidity as well as signalling the stance of monetary policy and overnight market interest rates. Eligible counterparties have access to the standing facilities on their own initiative if they meet required conditions. There are two available instruments:

*The marginal lending facility* can be used to obtain overnight liquidity from the national central banks against collateral. Normally, there are neither credit limits nor any other restrictions besides that of eligible assets as collateral. The lending rate also acts as a ceiling for the overnight market interest rate, as no counterparties would wish to obtain funding in the market if it could borrow cheaper money from the Eurosystem (The European Central Bank, 2011b). As of May 2013, this interest rate is fixed at 1% (The European Central Bank, 2013a).

*The deposit facility*, on the other hand, provides the counterparties with the opportunity of make overnight deposits with the national central banks. Normally, there are no deposit limits or any other restrictions on the access to the deposit facility. The deposit rate acts as a floor for the overnight market interest rate, as there is no incentive for counterparties to deposit at a

lower rate in the market it the deposit facility of the national central banks is more beneficial (The European Central Bank, 2011b). As of May 2013, this interest rate is fixed at 0% (The European Central Bank, 2013a).

The situation now is thus that financial institutions receives no compensation for depositing money with the Eurosystem, and the monetary policy has thus reached what we call the zero-nominal bound. This is illustrated in figure 2, where you see the three key policy rates of the ECB as well as the Euro Overnight Index Average (Eonia), which together with the Euribor is the most important money market interest rate in the euro zone, and is computed as a weighted average of all overnight unsecured lending transactions in the interbank market (European Banking Federation, 2013). This is now at a historic low.

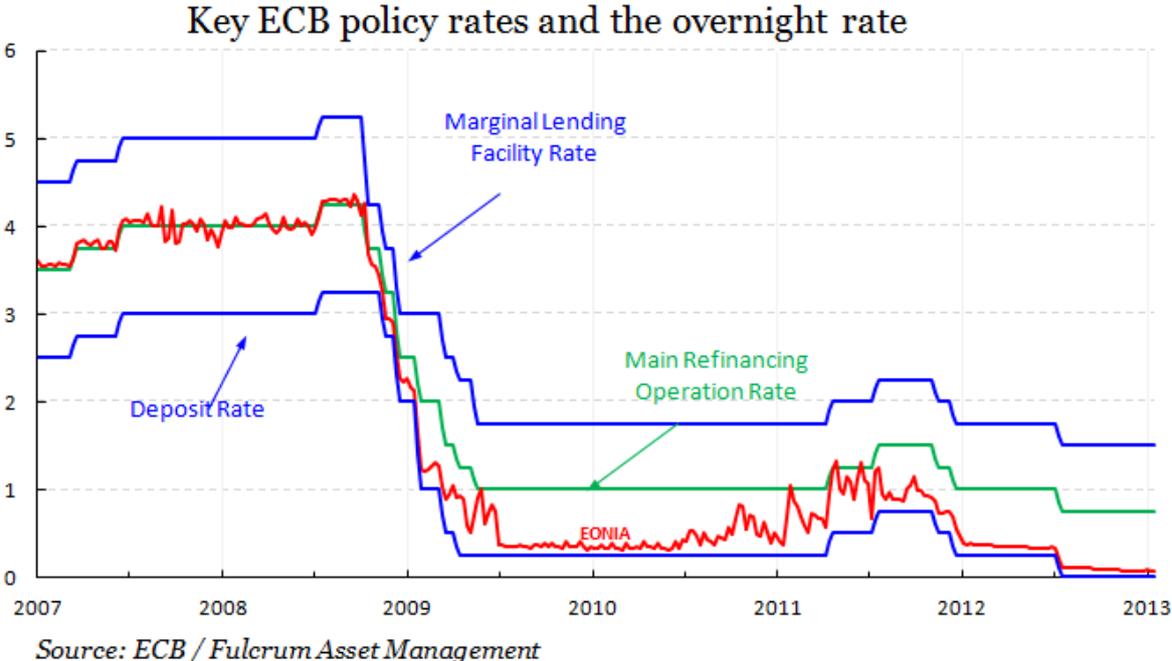


Figure 2: The key policy interest rates of the ECB. Source: ECB

### 6.3.3 Minimum reserves

The ECB also requires that credit institutions hold minimum deposits on accounts with the national central banks, determined by the reserve base of each institution multiplied by a reserve ratio, which again is defined in relation to the short-term liabilities on its balance sheet. This has two key functions; first, to stabilise the money market interest rates; and second, to enlarge the structural liquidity of the banking system by increasing the demand for central

bank refinancing and thus making it easier for the ECB to steer money market rates via the regular liquidity-providing operations (The European Central Bank, 2011b).

Policy operations	Types of transaction		Maturity	Frequency	Procedure
	Liquidity provision	Liquidity absorption			
<b>OPEN MARKET OPERATIONS:</b>					
Main refinancing operations	Reverse transactions	-	One week	Weekly	Standard tenders
Longer-term refinancing operations	Reverse transactions	-	Three months	Monthly	Standard tenders
Fine-tuning operations	Reverse transactions, Foreign exchange swaps	Reverse transactions, Collection of fixed-term deposits, Foreign exchange swaps	Non-standardized	Non-regular	Quick tenders Bilateral procedures
Structural operations	Reverse transactions, Outright purchases	Issuance of debt certificates, Outright sales	Standardized and non-standardized	Regular and non-regular	Standard tenders Bilateral procedures
<b>STANDING FACILITIES:</b>					
Marginal lending facility	Reverse transactions	-	Overnight	Access at the discretion of counterparties	
Deposit facility	-	Deposits	Overnight	Access at the discretion of counterparties	

Table 1: Conventional monetary policy operations of the ECB. Source: Own visualization.

## 6.4 Other monetary policy operations and credit channels

The key instrument for central banks in the pursuit of its objectives is the setting of nominal interest rates. We saw, however, that these interest rates are at a historic low and thus that the viability of this tool is now reduced. This does not mean that the ECB is out of ammunition, but only that it will have to make use of other, less traditional instruments. Keynes (1936) presented the idea of a “liquidity trap”, in which money market interest rates cannot be lowered by the central bank and hence aggregate demand and economic growth is not stimulated. Keynesian ideas certainly reincarnated during the Financial Crisis of 2007-2009, when risk premiums skyrocketed and credit markets dried up. Central banks as the American fed tried to mitigate these problems with quantitative easing. Here, however, we will rather turn the attention to two some other measures that can be denoted as unconventional monetary policies. One of these is the use of communication policies, which we will discuss in a separate section later in the paper. Others are the concepts of quantitative and qualitative easing (the latter also being known as credit easing), which is about the altering of the central bank’s balance sheet size and composition, respectively, that we will not further describe in

this paper. Instead, we will focus on the strategy that has been come to known as lending of last resort.

### **6.4.1 Lender of last resort**

A central bank acting as lender of last resort is associated with the prevention and mitigation of financial crises and panics. These are periods where the confidence in the standing of some financial institutions or assets is suddenly and heavily reduced. Because the credit markets are based on tightly interlinked expectations of the ability of many different borrowers to meet payments, a sense of panic can quickly spread through the financial system, and – if unchecked – have significant effects on the behaviour of the real economy. The role of the lender of last resort is to offer an assurance of credit, given under certain limited conditions, which will stop a financial panic from spreading – or better still – stop it from even occurring in the first place (Fischer, 1999).

If an institution, or even a country, is deemed too important to go bankrupt, then the central bank may take necessary action in order to prevent this from happening. This is effectively what the ECB stated that it would do in the summer 2012, when Mario Draghi announced that the ECB would start buying government bonds from the heavily indebted countries that were facing borrowing costs that were too high.

The strategy of lending of last resort is criticised. Arguably the one most frequent argument against the strategy is the problem of moral hazard (Fischer, 1999). One claim is that lending money to struggling institutions or economies does not solve the underlying problems, and that it is only a short-term mitigation of the problem – a standpoint often taken in the debate about the continuing lending to the GIIPS countries. This argument is closely related to the free market-argument, where the economy is seen as something that should evolve in its own fashion, meaning that bankruptcies are inevitable, as the market equilibrium with free entries and exits will clear the market, and those institutions or market actors that are not efficient are not beneficial for the economy. Rather, the critics would advocate that the more fundamental issues should be tackled. As for the case of ECB, they have imposed austerity measures in order to address these challenges.

How, then, does this “crisis lending” work through the monetary transmission mechanism. In order to better understand the effect of such measures, it is useful to look at the theory of credit channels. The Euro crisis is a debt crisis. Borrowing has become too costly for several

countries, meaning that the credit markets dry up. The term credit channel is widely used, also by the ECB. Following an interest rate decrease on 8 December 2011, Vice President of the ECB, Vitor Constâncio, introduced his speech with the following words:

*“Ladies and Gentlemen,*

*Since the introduction of the euro, our common currency, times have never been as challenging as at present. Despite ongoing efforts by policy makers, the sovereign debt crisis is still ongoing, putting growth and welfare of our citizens at risk. In this context the Governing Council of the ECB met this morning and, as you know, decided to reduce the monetary policy rate by 25 basis points and take a series of measures to improve liquidity provision to the banking sector, thereby **enhancing the operation of the credit channel**”* (The European Central Bank, 2011a).

The credit channel model connects financial stability to monetary stability, as it considers how the financial position of lenders and borrowers can affect aggregate demand. When interest rates set by central banks approaches the zero-nominal bound, the effect of monetary policy can be further enhanced by turning the attention to the financial position of lenders and borrowers. Therefore, the credit channel effects are not a substitute for the monetary transmission mechanism we discussed earlier, but rather an amplification of the interest rate channel, as it describes differently how monetary policy affects the real economy.

The credit channel models are built on the idea of the existence of an external finance premium. This premium is defined as the difference between the cost of internal funds, i.e. retained earnings, or in the case of countries such as Greece, tax income; and the cost of external funds (De Graeve, 2007). As long as loans are not fully collateralized, external financing will be more expensive than internally generated funds. The premium exists because of imperfections in financial markets, such as asymmetric information or costly contract enforcements. It is this premium that has risen dramatically during the Euro crisis, as lenders are questioning the ability of borrowers such as the GIIPS countries to repay their debt.

Hall (2001) presents a neat framework that considers two different ways that financial market imperfections might affect the wider economy: through the *balance sheet channel* and the *bank lending channel*. The ECB’s policies are amplified through these channels, as their policies, such as bailout packages and the outright purchases of sovereign debt have been

aimed at making the most struggling countries in the Euro zone financially better off, in order to reduce the external finance premiums that they are facing.

### **6.4.2 Balance sheet channel**

One way for monetary policy to affect the external finance premium is through the balance sheet channel. The basic idea here is that actors that are in a better financial position should face lower premiums. Theoretically, more financial resources by means of larger balance sheets mean on the one hand that they can more easily obtain funding internally and hence that they would not obtain external funding at high premiums. Secondly, a stronger financial position would imply that they are in possess of more marketable collateral, which will make them better off in a borrowing situation.

The monetary transmission mechanism amplifies through this channel, as interest rates will alter the value of assets on balance sheets. An interest rate decrease will normally increase asset prices and vice versa, thus also altering the value of possible collateral. Furthermore, interest rate changes will alter the cash flow of those that have outstanding debt, thus increase or decrease revenues and hence the ability to obtain internal funding (Hall, 2001).

### **6.4.3 Bank lending channel**

The bank lending channel can be seen as a special case of the balance sheet channels. Banks too, like other companies, and countries, need to obtain funding. When funding becomes costlier to banks, the external finance premium should increase, or reduced in the case of cheaper funding. The cost of funding for banks depends on

The connection to monetary policy here is that central banks can alter the supply of obtainable funds for banks, which then again will affect borrowing costs for those seeking bank borrowing. During the Financial Crisis and the Euro Crisis, we have also seen that the increases in the external finance premiums have amplified through the bank lending channel, with banks' balance sheets being reduced due to losses on loans, e.g. via debt restructurings or falling bank stocks. Through the implementation of the Basel regulations, banks also have to fulfil stricter conditions with regard to capital holdings, thus making their balance sheets less flexible (Hall, 2001).

## 6.5 Independence

Monetary policy is based on central bank independence. That is, the central bank needs to carry out its policies without being subject to political influence. For the ECB, this independence is formally stated both in the EC Treaty and the Statute of the ESCB. The reason for this being so crucial to the ECB is that it better enables them to achieve its objective of price stability, and it also makes them more credible to the public. Governments are run by politicians who have to oversee a number of issues and thus pursue many different objectives, some of which are in conflict with each other. If the central bank, then, is heavily influenced by these politicians, its dedication to the single objective of price stability is not believable. The concept of independence is also extended to the national central banks and covers many aspects.

Institutional independence is secured through laws stating that the ECB and the members of its decision-making bodies shall not take instructions from public and private bodies. Neither should member states of the EU seek to instruct the ECB. The ECB and the national central banks have their own legal independence, including the right to bring actions before the European Court of Justice in order to maintain its privileges in the case that they are impaired. Members of the decision-making bodies of the ECB also have personal independence, secured first and foremost through fixed terms of office, with a minimum and renewable term of office of five years for the governors of the national central banks, and a non-renewable minimum term of office of eight years for members of the Executive Board. Members may only be removed from office if they are not able to fulfil the conditions required for the performance of their duties or in the case of serious misconduct. The concept of independence also covers that of functional and operational independence. For example, the ECB is given full control over the money base in the euro area, as it has a monopoly on banknote issuing. The ECB further has at its disposal regulatory powers and the right to impose enforceable sanctions in case of non-compliance with ECB regulations and decisions. Finally, the ECB have financial and organisational independence (Scheller, 2004).

## 6.6 Transparency and credibility

In the presentation of the monetary transmission mechanism, we argued that efficient monetary policy is really about the management of expectations. In order to achieve this, great emphasis will have to be given to transparency. Transparency, according to the ECB,

means that “the central bank provides the general public and the markets with all relevant information on its strategy, assessments and policy decisions as well as its procedures in an open, clear and timely manner” (The European Central Bank, 2013g). This enables people to better understand the ECB’s monetary policy and the rationale behind it, and the monetary transmission mechanism becomes more effective. Central banks nowadays recognize that transparency is key to having a successful monetary policy (Mishkin, 2004). This has led to an improvement of the communication practices with the public and markets, which we will discuss more specifically later in this paper.

The reason that transparency improves the monetary transmission mechanism is that it promotes credibility. By being clear about its mandate and how it performs tasks, the ECB is being perceived as being both able and willing to achieve its objectives and price expectations are thus well anchored, meaning that actual inflation expectations lie close to the announced inflation target. In addition to regular communication, it is essential that the central bank is open and realistic about what it can do and what it cannot do (The European Central Bank, 2013g). The emphasis on transparency has been very beneficial for central banks, as it has helped achieving low and stable inflation as well as a more stable output, thus making the task of inflation targeting easier. Central banks have also gained more public support for its policies, and transparency has further made the idea of an independent central bank focusing on long-run objectives more palatable, as it is consistent with a democratic society because it is accountable (Mishkin, 2004). That it is accountable can be understood as a legal and political obligation to properly explain and justify its decisions to the citizens and their elected representatives (The European Central Bank, 2011c). In other words, the central bank is held responsible for the achievement of its objectives.

We see that it is the central bank’s interest, then, to be transparent and credible. This leads us to the discussion of the foremost measure that the central bank takes to establish these qualities: communication.

## 6.7 Fiscal policy in the euro zone

Fiscal policy work in much the same way as monetary policy, as it can stabilize inflation and growth. Both fiscal and monetary policies are used to achieve those goals. Fiscal policy is arguably more complex, as it traditionally encounters more objectives compared to monetary policy, such as income distribution and other political issues. The following section gives a

short definition of fiscal policy, how the euro zone generally deals with the issue and how the fiscal policy has been executed during the current crisis.

Fiscal policy is defined as:

*“A government's plan for deciding how much money to borrow and to collect in taxes and how best to spend it, in order to influence the level of economic activity”* (Cambridge Dictionary, 2013a).

When it comes to fiscal policy in the euro zone, governments continue to have the sovereign power of such decisions. This was and will continue to be a major test for the strength of the union. Within the limits of fiscal policies there are incentives for somewhat devious behavior. Increased government spending will drive up domestic interest rates, in turn attracting foreign investors. These investors may well pull money out of other euro zone countries in order to invest in the country leading an expansive fiscal policy. Furthermore, this deprives the income of the nations that have a more prudent fiscal policy. (Gärtner, 2009). Thus, there are incentives for less fiscal discipline to boost national income at the expense of other member countries in the euro zone.

In order to address this problem, the union has designed two regulatory treaties that were supposed to restrict government spending:

First, the convergence criteria in the Maastricht Treaty, based on a report from the Delors Committee of, were the first regulatory measures, with the purpose of examining the issue of an economic and monetary union and to develop a programme aimed at the implementation. The committee based its recommendations on the theory of optimum currency areas. The Maastricht Treaty spells out the following main criteria for monetary and fiscal convergence as a necessity for a country's participation in EMU:

- 1) *Government debt must not exceed 60 % of GDP*
- 2) *The government budget deficit must not exceed 3 % of GDP*
- 3) *Inflation must not exceed average inflation in the three EU countries with the lowest rates by more than 1.5 percentage points*
- 4) *Interest rates on government bonds must not exceed average rates in the three EU countries with lowest inflation by more than 2 percentage points*
- 5) *Membership in the ERM must have been maintained for no less than two years without having initiated a devaluation* (Gärtner, 2009, p. 340)

Second, member states signed the “Stability and Growth Pact” in Dublin 1996, to add to the Maastricht criteria (Gärtner, 2009). The pact has later been reformed, but the main purpose is to “prevent” and “correct” overspending by sovereign states within the euro-zone (European Commission, 2013).

As we discussed in section 4, however, these regulatory measures were not enough to prevent excessive government spending during the euro zone crisis. Several member nations circumvented the regulations by rather questionable methods, such as off-balance transactions, inconsistent accounting and complex currency and credit derivatives (Brown & Chambers, How Europe's governments have enronized their debts, 2005). Furthermore, the Stability and Growth Pact had been washed down so much that it was not able to account for overspending (Schuknecht, Moutot, Rother, & Stark, 2011).

In recessions both fiscal and monetary policy measures are often used to counterweight the crisis. As already mentioned, expansive fiscal and monetary policy can spur short term economic growth. However, as the cost of debt and debt level has been so large in the GIIPS(C) countries, the possibility for an expansive fiscal policy has been restricted. In order not to go bankrupt these countries have needed help in form of bailouts. The conditions on these bailouts have largely been austerity measures. These measures have been controversial, austerity measures (i.e. tax increases and spending cuts) is equivalent to a contractive fiscal policy and thus implicate stagnant to negative growth. Critics argue that these austerity measures is not the way to help these countries out of recession, and that these conditions should be dropped.

The lack of common fiscal union, critics argue, has also lead to too slow action against the crisis. Furthermore, it has left many fiscal policy actions to the “troika” consisting of the ECB, the EU and the IMF.

## 7. Central bank communication

As we in the last section discussed monetary policy in the general, with emphasis on that of the ECB, we would now like to turn the attention towards a specific part of a central bank's toolbox, namely communication. Our goal in this paper is to illuminate the effects of the communication practices conducted during the euro zone crisis, and in the following section we will thus present a theoretical framework describing why communication is important for the central bank, what is normally communicated and how the messages is carried out. Further on, we look at the role of media as a device of intermediate transmitting, before finally discussing the effectiveness of communication.

The discussion about central bank communication has gained increased significance over the past years, notably after the Financial Crisis of 2007-2009. Before this, central bank policy was first and foremost centred on one tool: setting the short-term nominal interest rate, such as the federal funds rate in the United States. The turmoil in the financial markets that we have witnessed after 2007, however, forced central bankers all over the world into looking for other measures as well. For the ECB, communication is an essential tool, further supported by the fact that its key policy rates now has reached the zero-nominal bound, with the deposit rate of the standing facilities fixed at 0%.

### 7.1 Why communication?

As we know, maintaining low and stable inflation is now the primary objective of central bankers, applied by increasing policy rates when inflation is too high, and lowering the interest rates when inflation is too low. However, with inflation low and likely to remain so, industrial countries are at risk of encountering the zero bound on nominal interest rates. Thus the question arises: what options exist for monetary policy when lowering the nominal short-term interest rate, the usual response to a weak economy, is no longer available? Bernanke et al (2004) try to assess this problem by presenting three groups of so-called nonstandard policies: i) using communications policies to shape public expectations about the future courses of interest rates; ii) increasing the size of the central bank's balance sheet – “quantitative easing”; and iii) changing the composition of the central bank's balance sheet through, for example, targeted purchases of long-term bonds as a means of reducing the long-term interest rate.

The study measures and analyses the behaviour of selected asset prices and yields over short periods surrounding central bank statements or other types of financial or economic news, as well as estimating no-arbitrage models of the term structure for the United States and Japan. The models allow the authors to predict interest rates at all maturities, and by using this as a benchmark, assess whether factors not included in the model (i.e. the nonstandard policies) have economically significant effect on rates. The study finds a particular important role for one of these policies - central bank communications – in shaping public expectations of future policy actions, which is the focus of in this paper. The study finds that, for the US, the Federal Reserve’s monetary policy decisions have a significant effect on the change in market expectations about the path of the funds rate over the next year that is not explained by the current policy action. This seems to be strongly linked to Fed policy statements, arguably reflecting the importance of communication by the central bank.

One of the important properties of central bank communication is that it can improve the public’s understanding of the central bank’s reaction pattern, that is, how the central bank will react to the economic development. If the monetary authorities appear consistent and credible, market participants could potentially be calmed, as they will feel safe that necessary actions will be taken in difficult times. For example, the commitment to an inflation targeting monetary policy could potentially lead people into believing that central bankers are “inflation nutters”, as Mervyn King, the present Governor of the Bank of England, warned in 1997. He was concerned that central bankers would turn too single-minded, focusing only on inflation while neglecting other variables such as economic growth, employment and exchange rates. By communicating to the public, however, that they pursue a *flexible* inflation target, central banks can “teach” the public how it adapts to the economy as a whole, if it manages to appear credible. In general, research has shown that central banks are capable of managing expectations through communication policies (Blinder, Ehrmann, Fratzcher, & De Haan, 2008; Brand, Buncic, & Turunen, 2010)

## 7.2 What to communicate?

Although central banks largely share the same objectives, their communication strategies differ. To systemize, however, one can point to four different aspects of monetary policy that central banks communicate about: their overall objectives and strategy, the motives behind a particular policy decision, the economic outlook, and future monetary policy decisions (Blinder, Ehrmann, Fratzcher, & De Haan, 2008).

## **7.2.1 Objectives and strategy**

Independent central banks, as the ECB, are still given defined mandates by governments, which is what constitutes the objectives of the monetary policy – notably, stable prices in ECB’s case. Although the mandates given by governments in many cases do not provide quantitative objectives, central banks may still decide to enunciate concrete numerical objectives, for at least two reasons. Firstly, quantitative objectives provide a possibility to measure the central bank’s performance to a benchmark. Secondly, they help to anchor the expectations of economic agents, which we have seen is crucial to the impact of monetary policy. Unlike the Bank of England, for example, the ECB was not given an explicit quantitative target for its price stabilization policy, but provided one for itself.

## **7.2.2 Policy decisions**

Two decades back in time, central banks had a whole different view of how they should execute their policies. Instead of announcing policy changes, such as the change of interest rates, they wanted to surprise the markets, and leave it to analysts to find the motives behind the policies. Nowadays, most central banks provide the public with information about their monetary policy decisions on the day they are taken. In doing this, news are created, which affects the markets, but it also reduces noise by eliminating any guessing on the part of the public, thus reducing the signal-to-noise ratio. Though it is consensus about the publishing of policy decisions, however, central banks still disagree over how much should be disclosed about the decision process itself. The ECB does not publish minutes, and insists that it makes monetary policy by unanimity, while both the Bank of England and the Federal Reserve release both minutes and voting records. On the other hand, ECB holds press conferences after their policy decisions, which is less detailed than minutes, but allows for more flexibility, as media can ask questions to the board.

## **7.2.3 Economic outlook**

Central banks also inform the public about their thoughts of the future development of the economy, such as inflation levels and economic activity as well as inclinations regarding monetary policy. However, the extent to which this is carried out, and how it is done, differs. The ECB publishes projections four times a year, serving as an input to the Governing Council’s discussions. Some Central Banks even publish estimates of the output gap.

However, because of the difficulties in assessing and projecting potential output, these practices are carried out by only a few central banks.

#### **7.2.4 Future monetary policy decisions**

Given the important role of the longer-term interest rates, and the fact that these rates reflect the expected sequence of future overnight rates, information about the monetary policy decisions carried out in the future is an important part of the central bank's communication. However, the practices differ greatly here as well, particularly when it comes to how explicit the banks are. The ECB has arguably been rather indirect and vague in its communication. On the other end of the scale we find a small number of central banks that even provide quantitative forecasts.

In 1997, The Reserve Bank of New Zealand started, as the first central bank in the world, to publish interest rate forecasts. Later, this has been introduced by central banks in Norway, Sweden and Czech Republic among others. The ECB does not publish quantitative interest rate forecasts, but they still provide qualitative insights regarding their assessment of future interest rate developments. This is a means of communicating the central bank's intentions to the public. In Norges Bank (the Norwegian central bank), for example, judgement and information from other sources are added through conditional forecasting. The forecasts are derived by minimizing a loss function representing the monetary policy mandate and the central bank board's preferences. The publishing of the interest path forecast is believed to improve the public's understanding of the central bank's reaction pattern (Alstadheim, Bache, Holmsen, Maih, & Røisland, 2010). Norges Bank has also developed a set of criteria for a good interest path (Qvigstad, 2006):

1. Inflation targeting. Inflation should be stabilized around the target in the medium term
2. Weight on output stability. There should be a reasonable balance between the inflation gap and the output gap.
3. Gradualism and consistency. Interest rate adjustments should normally be gradual and consistent with the Bank's previous response pattern.
4. Robustness and cross-checks. The interest rate path should be robust to uncertainty about the economic developments and the functioning of the economy. The interest rate path should be cross checked against other information such as market expectations and simple rules.

Ferrero & Secchi (2009) find that the announcement of future policy intentions, either quantitative as in New Zealand, Norway or Sweden, or qualitative as in the ECB, improves the ability of market participants to predict monetary policy decisions. (Andersson & Hofmann, 2009) find that the central banks in New Zealand, Norway and Sweden have been highly predictable in their monetary policy decisions and that long-term inflation expectations have been well anchored in the three economies, irrespective of whether forward guidance involved publication of an own interest rate path or not. Holmsen, Qvigstad, Røisland & Solberg-Johansen (2008) find evidence of fewer monetary policy surprises in the Norwegian money market on the days with interest rate decisions, following the introduction of the interest rate forecasts. Altogether, this suggests that communicating policy intentions improves the market participants' understanding of the central bank's reaction pattern.

## 7.3 How to communicate?

Acknowledging that communication is crucial for the central bank in the shaping of the public's expectations, we now would like to find out how this could and should be carried out. We saw in the last section that the content in the information provided by central banks is very varied. It should thus not come as a surprise that so does the choice of communication tools. In this section we will look at how the communication may differ conditional on whom the sender of the communication is: the committee or an individual committee member.

### 7.3.1 Communication by committees

Communicating by the whole committee as an assembled unity, is most natural on meeting days, when decisions are announced. The ECB holds a press conference on the day of Governing Council meetings, a practice that is also carried out by several other central banks, such as those of Japan, New Zealand and Switzerland to mention a few. This press conference includes a question and answer session. The Federal Reserve, on the other hand, only provides a rather short press release containing the decision, a concise explanation of its underlying reasoning, and some forward guidance. As for the Bank of England, they also provides a press statement announcing the decision, but an explanation is normally only provided when interest rates are changed or when the decision is believed to be surprising. However, as we have seen, both these other central banks later provide minutes of the meetings, including more detailed accounts and explanations of the decisions (Blinder, Ehrmann, Fratzcher, & De Haan, 2008).

Blinder, Ehrmann, Fratzcher, & De Haan (2008) list four main differences between the ECB and the central banks of England and USA regarding their approach. First, their press conference is less detailed than the minutes published by The Bank of England and the Federal Reserve. Second, the approach is timelier, as they have the press conference on the same day as the meeting. Third, because they allow for questions from media during the press conference, they can arguably circumvent some ambiguities and sort out possible misunderstandings. Fourth, the press conferences are better in the sense that they have a greater possibility to reach out to the broader public.

Another way for the committee to communicate is through regular publications from the central banks. One week after each monetary policy meeting, the ECB publishes its *Monthly Bulletin*. Here, the monetary policy decisions taken are explained and made more transparent by providing detailed analyses of the current economic situation and risks to price stability, as well as it contains articles, euro area statistics and annexes (The European Central Bank, 2013d). The Federal Reserve and the Bank of England take on similar approaches, by issuing publications such as the semi-annual *Monetary Policy Report to the Congress* and the quarterly *Inflation Report*, respectively.

### **7.3.2 Communication by individual committee members**

Communication by individual committee members is more flexible with regards to the timing. As we saw, communication by the entire committee naturally happens at the day of the council meetings, implying that these sessions are pre-scheduled to take place once a month. In contrast, individual committee members may give interviews or speeches more or less anytime. This makes the latter well-suited for commenting topical circumstances in the economy. Central banks vary greatly with respect to this kind of communication, thus suggesting that there is a trade-off between timeliness and other aspects of communication – and that different central banks have different opinions on what strategy to choose with respect to this.

Ehrmann & Fratzcher (2007) compare the ECB's communication strategy to that of the Fed and the Bank of England. When looking at contributions from individual committee members, they define this with respect to the ECB as speeches, testimonies or interviews given by any member of the Governing Council in the inter-meeting period. Included in the Governing Council here are the six Executive Board members (“internal” members), including the

President, and the twelve governors of the national central banks of the Eurosystem (“external” members).

The study finds that compared to their American and British counterparts, the ECB follows a somewhat more collegiate communication strategy, meaning that the degree of consistency among the members is significantly higher in the ECB’s case, i.e. that the members often communicate the same messages when they give interviews and such. As for the decision making, the Governing Council also differs from the two other, with voting generally made in a consensual way, whereas there is voting dispersion in the two other central banks, in particular found with the Bank of England.

The final part of Ehrmann & Fratzcher’s study looks at how these different approaches affect the effectiveness of communication. They argue that the collegiate approach followed by the ECB leads to highly predictable policy decisions, implying that markets react to statements by all policy-makers in the same fashion. In contrast, an approach as the one followed by the Fed, where communication is dispersed (but voting rather consensual), will make the central bank predictable *if* markets are able to figure out whose statements to watch closer. In other words, in the case of the Fed, some policy-makers may have a greater impact than others, but in the case of the ECB, the high degree of consensus among members makes them all equally influential. The study concludes that both the ECB and the Fed have proven more effective than the Bank of England in the management of expectations, a result that has also been supported by other studies (Reeves & Sawicki, 2006).

## 7.4 Media

One key challenge for the central bank is to reach out to its audience. This audience can be both large and diverse, and some can be reached easier than others. Financial market participants are naturally rather easy to influence, since these are very attentive to central bank statements, because of the awareness of the importance for markets. As for the general public, however, the case is another. It is the public that eventually accounts for the inflation expectations that eventually feed into the actual evolution of inflation, through channels such as wage claims and savings, investment and consumption decisions. The public rarely gets its expectations directly from central bank communication, but rather from the news picture. Here, the media play an important role. Thus, in order to influence the general public, the challenge for the central bank is to get its message out through different media channels. The

usage of this intermediate transmitting device is crucial to central bank communication (Berger, Ehrmann, & Fratzcher, 2011).

Berger, Ertmann & Fratzcher (2011) find that the media coverage of monetary policy may be influenced from three sides: the policymaker, the media itself and the preferences of the general public. The latter, they argue, is due to the fact that the success of any media provider is dependent on whether the audience is pleased with the content. For example, a newspaper company needs to know its audience at what it prefers in order to sell any newspaper. Thus, audience preferences also affect how media covers economic news. Studies have indeed found that the demand side accounts for a large share of the variation in media viewpoints, and that in cases of uncertainty, consumers tend to rely more on sources that to a higher degree conform to the consumer's own views (Gentzkow & Shapiro, 2006).

Berger, Ertmann & Fratzcher (2011) look in particular at how media covers the ECB's policy decisions. They find that the press critically discusses these in the context of prior market expectations and of the inflation environment. Interestingly, if a given policy decision surprises financial markets – i.e. that it is not in line with the prior expectations – the reports are generally more negative. Also, if inflation is high, the less positive are the media reports. Their findings suggest two things. First, that the media has a monitoring role in critically discussing the ECB's actions, and second, that the ECB can shape the perception of its decisions in the media.

Furthermore, the authors find that in cases where the ECB holds press conferences where they present much information (in terms of economic “news” measured through the size of financial market reactions), media reports are generally more favourable. Additionally, coverage is more positive when decisions have been accompanied by a relatively large number of statements from the ECB representatives previous to the press conferences.

Overall, the study shows that media coverage is responsive to the ECB's communication. Although surprising decisions are generally perceived more negatively by the media, the central bank can counteract this by putting forth a comprehensive rationale for the decisions before and after the decision is made. The responsiveness of media is thus affected by several factors, such as the element of surprise, the current level of inflation, and the degree to which the ECB provides information about the decision.

Doms & Morin (2004) find that the news media influences consumers' perceptions of the economy through three channels. First, the news media expresses topical economic data and the opinions of professionals to consumers. Second, consumers are signalled about the economy through the tone and volume (the authors derive measures of these) of economic reporting. Third, the greater the volume of news, the greater is the likelihood that consumers will update their expectations. These three channels can drive consumer sentiment. When the news reporting on the economy is not consistent with actual economic events, however, consumer sentiment is driven away from what economic fundamentals would suggest, e.g. in the early 1990s. Furthermore, Doms and Morin find that consumers adjust their expectations about the economy much more frequently during periods of high news coverage than in periods of low news coverage. Typically, the frequency of news coverage increases in times of recession and immediately after recessions.

In another study, Carroll (2003) problematizes around the lack of efforts to model actual empirical expectations data, despite the long established consensus that expectations matter. Instead, he says, macroeconomists have simply assumed that expectations are 'rational'. He finds that the public's expectations are not rational in the traditional sense, but are derived from news reports of the views of professional forecasters. The expectations of the latter, however, may very well be rational. Thus, this further underlines the importance of media usage and handling in a central banks' communication strategy.

As is also the case with regards to other central bank issues, the media coverage of ECB's policies is particularly intriguing due to the multicultural and multilingual context it operates within, as it is the central bank of not one, but several countries, with different economic history, monetary policy strategies and institutions. Naturally, national media reports differently from each other the communication from the ECB.

## 7.5 The effect of communication on financial markets

Communication has become an important tool for Central Banks through the last couple of decades. It is a bi-product of the relative new practice of central banking being predictable, and the aspiration to manage expectations. Blinder, Ehrmann, Fratzcher, & De Haan (2008) evaluate the rapidly growing literature on central bank communication in their paper and find that communication can be an effective tool in order to achieve the latter, and conclude that communication can be an "important and powerful part of the tool-kit ... since it has the

ability to move financial markets ... and potentially help the central bank achieve its macroeconomic objectives”.

To measure central bank communication can be difficult. As mentioned previously, there are many ways to communicate. Communication can flow through different channels and have different signal strength. Often, the message that is communicated has a negative impact on financial markets, and often the objectives behind the communication are unclear. To deal with the latter issue some studies turn to test the volatility after communication events. The idea is that you test the reaction of communication in the financial markets without assigning a direction to each form of communication. Blinder, Ehrmann, Fratzcher, & De Haan (2008) mentioned the studies of Kohn & Sack (2003), Reeves & Sawicki (2006) and Connolly & Kohler (2004) as studies which focus on volatility. These studies show that communication create news, but cannot determine the effect they have on direction in financial markets.

All the three studies mentioned above find that markets react to central bank communication, though with varying strength. Kohn and Sack (2003) examine the case of the American Fed and find that market interest rates are heavily influenced, both in the short and the longer run. Reeves & Sawicki (2006) examine the case of the Bank of England and find evidence that the publication of the *Minutes* and the *Inflation Report* significantly affect near-term interest rate expectations, but, according to the authors, arguably less strong than Kohn and Sack's findings.

Blinder, Ehrmann, Fratzcher, & De Haan (2008) go on to mention a number of studies that tries to measure the success of communication. To measure the success, they have to assign strength and direction to the communication. This can be done by classifying the message as either positive or negative. Some studies also assign a number to the messages, for example on a scale from  $-2$  to  $+2$ , in order to measure the strength and magnitude of the message. There are two problems with these types of studies. Firstly, their classification of communication is subjective. Secondly, they use ex post classifications that may not coincide with how the markets understood the signals at the time of the communication. As mentioned earlier, studies show that communication can help central banks achieve their objectives. However so, human errors and misinterpretations might cause the financial markets to react in an unfavourable manner, and thus communication might also work against its purpose.

Blinder, Ehrmann, Fratzcher, & De Haan (2008) also claim that studies have shown that the central banks have become more predictable for the past decades. Furthermore, the increased

predictability of the central banks has led to reduced volatility in the financial markets. Whereas the paper argue that the optimal strategy for central bank communication is not yet clear, and communication can create negative effects, it is clear that communication has the potential to help central banks around the world achieve its goals.

Brand, Buncic, & Turunen (2010) evaluate changes in the euro area money market yield curve on dates when ECB sets and communicates decisions on policy interest rates. The authors find that communication by the ECB may result in significant changes in market expectations of the path of monetary policy and that these changes have significant impact on medium to long-term interest rates.

## 8. Event study methodology

In this section of our paper the purpose is to lay forth a framework for the conduct of an event study evaluating policy announcements during the euro zone crisis.

Event studies are generally used to measure the impact of certain events. In most applications, the focus is the effect of an economic event on the price of a particular class of securities of a firm, notably common equity. However, the methodology is widely applicable, and is abundant within several other research fields, such as management, economics, marketing, information technology, law and political science (MacKinlay, 1997).

The history of event studies stretches several decades back in time. MacKinlay (1997) claims that the perhaps first published event study was written by James Dolley in 1933. This study examines the price effects of stock splits by studying nominal price changes at the time of the split. Since then, event study methodology has become increasingly more sophisticated. According to Binder (1998), the most cited event study is “The adjustment of stock prices to new information” written by Fama, Fisher, Jensen and Roll in 1969, which is cited a total of 516 times from 1969 to 1995 in the Social Sciences Citation Index.

In our study, we will look at yield spreads, stock indexes and implied market volatility, and see how these have been influenced by communication events during the Eurozone crisis. Thus the discussion of the event study structure will be related to these variables. As for the events in questions, these will be defined as key communication events, for example important speeches made by ECB representatives.

The usefulness of event studies that investigates financial variables rely on the assumption that changes in the observed dependent variable over a relatively short time window largely results from defined economic events (MacKinlay, 1997). This enables us to grasp the effect in economic terms.

There is no definitive recipe of how to perform such a study. However, MacKinlay (1997) briefly outlines the structure of an event study in steps that may be considered somewhat universal to most researchers. MacKinlay presents the structure of a study investigating stock returns, but the discussion can easily be generalized to other studies as well.

1. *Finding events.* First, it is necessary to find interesting events. These are events that we believe have an impact on the variables we wish to investigate. For example, the acknowledgement of communication as a central tool for shaping agents' expectations facilitates for the hypothesis that announcements about future policy could potentially reduce risk premiums in the market, which again could boost stock markets and reduce bond yields. Thus, communication containing promises of future central bank action can be an event.
2. *Selecting data.* After finding and defining events, a selection of proper data has to be made. One thing is deciding on what is interesting and suitable for the study, but another important question is whether data is actually available. A lot of data is typically published on a monthly, quarterly or annual basis, which requires a different type of approach than if one works with more frequent data.
3. *Estimation window.* To assess the event's impact, we first need a benchmark for what we can assume to be normal values, i.e. what values we would expect to observe if the event never took place. For each variable  $i$  and event date  $\tau$  we have

$$E [Y_{it} | X_t]$$

where  $E(Y_{it})$  is the normal value for time period  $t$  and  $X_t$  is the conditioning information for the normal performance model. There are two common practices for modelling the normal value. If we want to investigate the price development of a security, the *market model*, where  $X_t$  is the market return, is very useful. However, the *constant-mean-value model*, where  $X_t$  is assumed to be a constant, is arguably more versatile, as its results do not rest on assumptions about any underlying market conditions, and can thus be applied to a broader spectre of variables. This latter model simply assumes that the mean value of a given variable is constant through time: To find normal values, we observe the variable over some time prior to the event, and assume that the mean of the observations equal the normal value.

4. *Event window.* Now we need to assess whether actual post-event values diverges from normal values. Any difference between these is what we label abnormal values. We thus have:

$$\varepsilon_{it} = Y_{it} - E[Y_{it} | X_t]$$

where the difference between actual values  $Y_{it}$  and normal values  $E(Y_{it})$  is the abnormal values  $\varepsilon_{it}$ . Furthermore, we need to define the length of the event, i.e. over what period we should observe and look for abnormal values. In general, the more efficient the markets, the more immediate should the effect of new information be. Another aspect, however, is whether the effect is long-lasting. Given that the event has an impact, is the effect permanent, i.e. will the time series remain on its new level? Or is the effect transient, i.e. will the time series adjust back to its pre-event level?

5. *Testing procedure.* The next step is to test whether there is a significant difference between the normal and actual values, i.e. whether  $\varepsilon_{it}$  is significant. This follows the classic structure of a hypothesis test, where we define the null hypothesis, observe a t-value and compare it to critical values.
6. *Presenting and interpreting results.* After having performed the appropriate tests, the results need to be presented. Here, it may be necessary to shed light on possible biases in the data material or take into account other factors that may influence the outcomes. Hopefully, the results may lead to insights regarding the mechanisms by which the events affect the assessed variables.

## 8.1 Events

We have decided to divide the different events into three groups. By doing so, we can analyse the effects within and between groups. The event dates in the first two groups are related to measures taken in order to prevent escalation of the European sovereign debt crisis. The last group of dates contain speeches or announcements from prominent players in the euro-zone debt crisis. Note that the events in the three groups are often closely related to each other. Some of the events in group two are announcements of programmes that manage and assign the bailouts in group one. Speeches in group three can be responses to, or preparations for, the measures in the first two groups.

### 8.1.1 Group one – bailout announcements

The first group of events we have chosen to look at are the announcements of the final agreements on bailout packages so far in the crisis. All the event dates are found on ECB's own timeline (European Central Bank, 2013). All bailout packages was agreed upon after the country in question agreed on a series of policy actions, focusing on cutting the budget deficit by austerity measures. We name this group of events “bailout agreements”:

<b>Date</b>	<b>Bailout</b>	<b>Details</b>
<b>02 May 2010</b>	The euro area countries and IMF agree on a first bailout package for Greece.	The specifics of the deal include a three year support programme of € 110 billion (European Commission, 2010c).
<b>07 Dec 2010</b>	The European Union and IMF agree upon a first bailout package for Ireland	Following an official request from the Irish government on financial aid, IMF and EU agree upon a bailout package. This includes financial aid of € 85 billion, from the EU, the euro-zone member states, IMF, The UK, Sweden, Denmark (European Commission, 2010b).
<b>17 May 2011</b>	EU council approves aid to Portugal and sets conditions	Portugal's bailout package consisted of a total of € 78 billion in loan, € 52 billion from EU under the ESFS and ESFM programmes, and € 26 billion from IMF. The aid conditions upon a three year policy programme (Council of the European Union, 2011).
<b>21 Feb 2012</b>	Second bailout package to Greece agreed upon	A new bailout package to Greece is settled between euro-zone member countries and the Greek government. The agreement consists of a total € 130 billion (Eurogroup, 2012).
<b>20 Jul 2012</b>	Eurogroup grants fiscal assistance to Spain's banking sector	The euro-zone member countries agree to set aside € 30 billion in emergency funds to Spanish banks (Rooney, 2012). Other major events on this day may cause noise (ECB suspends Greek bonds as collateral).
<b>25 Mar 2013</b>	The Eurogroup countries agree with the Cypriot government on future macroeconomic adjustment programme	Agreement on a EUR 10 billion bailout loan to Cyprus (Eurogroup, 2013).

### 8.1.2 Group two

The second group of events are announcements related to euro-zone programmes. In particular, these programmes are ESFS, ESFM, ESM, LTRO and OMT. These programmes were initiated by the euro-zone member countries in order to prevent further escalation of the

current crisis, and handle future instability in the euro-zone. The programmes were explained in section 5. We name this group “programme announcements”:

<b>Date</b>	<b>Programme</b>	<b>Details</b>
<b>09 May 2010</b>	EFSF and ESFM announced	EU finance ministers decides on a number of measures to defend financial stability in Europe, including European Financial Stabilisation Mechanism and European Financial Stability Facility - with a volume of up to €500bn (European Central Bank, 2013).
<b>28 Nov 2010</b>	Agreement on future launch of ESM	Euro area finance ministers agree on the future European Stability Mechanism to replace the European Financial Stability Facility (EFSF) as of mid-2013. Its purpose is to provide assistance to euro area countries in financial distress (European Central Bank, 2013).
<b>16 Dec 2010</b>	Final go-ahead for ESM agreed upon	EU leaders approve the creation of the European Stability Mechanism as of mid-2013 to defend the financial stability of the euro area. If risks to the stability of the euro area arise, it will offer financial assistance to countries in difficulty. The aid will be conditioned on strict conditions (European Central Bank, 2013).
<b>21 Jul 2011</b>	Statement by ECB president on decisions taken by euro-area leaders to enlarge EFSF	The euro-zone members agree to boost the size of the EFSF’s capital guarantees to €780 billion. Also, the lending capacity is increased to €440 billion (EFSF, 2013).
<b>08 Dec 2011</b>	ECB announces LTRO	ECB announces measures to “support bank lending and money market activity through long-term refinancing operations” (European Central Bank, 2013).
<b>22 Dec 2011</b>	ECB’s first LTRO allotment	ECB allots 489 billion euros to 523 banks in first 36-months longer-term refinancing operation (European Central Bank, 2013).
<b>01 Mar 2012</b>	ECB’s second LTRO allotment	ECB allots 530 billion euros to 800 banks in second 36-months longer-term refinancing operation (European Central Bank, 2013).
<b>06 Sep 2012</b>	Technical features of the OMT programme released	The ECB announces the technical features of Outright Monetary Transactions (OMTs): an unlimited bond-buying programme in secondary sovereign bond markets. (European Central Bank, 2013).

### **8.1.3 Group three**

The third and final group of events contain dates of what we consider to be important speeches and statements from prominent leaders within the euro-zone. This list of speeches is not an exhaustive record of all speeches, and there are undoubtedly other important speeches not included in the group. During the crisis many world leaders have expressed their opinions to the public. We try to include some of the speeches where prominent leaders express a future change in policy strategy (without expressing any tangible actions) or make other statements that are to some degree a surprise or controversial to the public.

There are three main types of speeches in this group. First, there are speeches made by the ECB president and his colleagues. Second, there are speeches made by prominent German leaders. Finally, there are speeches from leaders of countries that are in a deep recession (here represented by Greece and Spain). While the ECB officials arguably make their statements with a purpose of solving the European debt crisis, the speakers in the last two groups may have varying goals when making a statement. They also have to think about national interests, domestic opinion and at the same time work for a long-term solution of the crisis.

As we include only a small sample of speeches and statements, we do not try to draw any conclusions on the effect of speeches in general. Our goal is to simply analyse the speeches below, look at the consequences they have in the financial markets, and by doing so look at the effect speeches and statements from prominent leaders may have. We name this group of events “speeches”.

<b>Date</b>	<b>Speaker</b>	<b>The message</b>
<b>18 Mar 2010</b>	Greek Prime Minister George Papandreou	Warns that borrowing costs are too high, putting pressure on the deficit and increasing the likelihood of a bailout from the IMF. Papandreou gives the European leaders one week to produce a rescue plan, or else he threatens to reach out to IMF instead (Traynor, Greek PM gives European leaders a week to produce rescue plan, 2010).
<b>9 Jun 2011</b>	German Finance Minister Wolfgang Schäuble	In an open letter Schäube states that “any additional financial support for Greece has to involve a fair burden of sharing between taxpayers and private investors” (Traynor, 2011).
<b>31 Oct 2011</b>	Greek Prime Minister George Papandreou	Papandreou surprises by calling for a Greek referendum vote on the new euro zone bailout proposal (Kyriakidou & Papachristou, 2011).
<b>24 May 2012</b>	Spanish Prime Minister Mariano Rajoy	Rajoy calls on the European Central Bank to act in order to bring down the growing Spanish borrowing costs. At this time Spanish bond yields approached the levels that pushed Greece, Ireland, and Portugal into bailouts (Benoit, 2012).
<b>8 Jun 2012</b>	German Chancellor Angela Merkel	In response to the downgrade of Spain’s credit rating the previous day, Merkel stated that her nation is prepared to do whatever is necessary to tackle the European sovereign debt crisis (Ruano & Rinke, 2012).
<b>26 Jul 2012</b>	ECB president Mario Draghi	At a conference in London the ECB president promises to do “whatever it takes to save the euro” (Draghi, 2012).
<b>02 Aug 2012</b>	ECB president Mario Draghi	ECB signals it will start buying government bonds. “The Governing Council ... may undertake outright open market operations of a size adequate to reach its objective.” Draghi told a news conference after the central bank’s monthly meeting (Suoninen & Kuehnen, 2012).

## 8.2 Selecting data

In order to do see how communication measures taken during the Eurozone crisis has influenced markets, and evaluate whether it has helped in the mitigation of the economic trouble, we have chosen to look at three sets of important economic indicators. These are yield spreads, stock indexes and implied market volatility, and in the following we will present our motivation for our choice.

Because we want to perform an event study, however, there are some requirements to the data. Since the underlying assumption is that we can reveal the event's impact by saying that the change in the observed variable is caused by the event, we need to make the event window fairly short in order to reduce noise in the data set. This again implicates that data published on an annual, monthly or arguably even weekly basis is not appropriate. We have therefore focused on data that can be obtained on a daily basis.

This latter remark leads us on to another returning issue when working with empirical analyses: the degree to which data can be obtained. It is of little use to identify a variable that appears interesting if it turns out that the data material cannot be retrieved. Thus, the data included in our study is that which we could somewhat easily access, either publicly on the internet or through databases provided by NHH.

We have retrieved data from Macrobond. Saturdays and Sundays are exempted from the time series, so that one week consists of 5 observations (Mon-Fri).

### 8.2.1 Government bond yields

The first and arguably most important variable we have chosen to investigate is the yield on government bonds. These securities have received much attention during the Eurozone crisis. We saw in section 2.2 that the yields on government bonds represent the borrowing costs of the debtor country. The yields on sovereign bonds are thus critical to countries with a large debt burden. Along with the debt level, the yield determines the cost of government debt and is therefore essential to what absolute level of debt that is viable for a country.

If a country's cost of debt becomes too high, a country may face a **debt overhang**, which is defined as "*a situation in which a country, company, or organization owes more money than it can pay back so that it cannot afford to make new investments*" (Cambridge Dictionary, 2013b). Another fear is that the high debt levels in Europe may cause a **debt spiral**. This is a

situation in which increased debt levels cause creditors to lose confidence and demand increasing risk premiums in order to lend funds to the specific country and thus the country's borrowing cost increases. In order to restore confidence in the financial markets and cut interest rates, the government turn to austerity measures such as tax increases and/or spending cuts. Both of the previous measures tend to slow growth and thus reduce government income. This fall in government revenue may again lead to even higher debt levels, implicating that the circle start over and often intensifies (The New York Times, 2011).

As borrowing costs increase, the probability that either of the two above mentioned phenomena occur, increases with it, and either way the probability of default also increases as costs swell. Many analysts and experts have been discussed the level of yields that is viable for a country. Spain and Italy, for example, is said to have a threshold of about 7 % yield on their 10-year bonds before the countries' amount of debt becomes unsustainable. For this reason the ECB, the IMF, the media, euro-zone leaders, and others have closely monitored government yields throughout the crisis.

Another important property of the yield on long-term fixed income instruments is that it reveals information about expectations, as we saw in section 6.2.2 that long-term interest rates are determined by the market's expectation for the short-term rate plus a constant risk premium. Over the past decades, economists have come to agreement over the slope of the yield curve as a good predictor of future economic activity. Historic data shows, for example, that the flattening and eventual inversion of the yield curve has signalled a coming recession. More recently, economics researchers have tried to apply the curve as a forecasting tool in real time, i.e. make use of the yield curve as an efficient leading indicator (Kanagasabapath & Goyal, 2002; Estrella & Trubin, 2006).

However, for the heavily indebted GIIPS countries, the large yields on government debt compared to other those of other economies are naturally a result of the huge risk premium rather than the basics of the expectation hypothesis, as the yields increase when investors are willing to pay less for the debt of these countries.

Having acknowledged that high borrowing costs can be devastating to single countries as well as the Eurozone as a whole, we find that the yields on government bonds is something that need to be investigated in order to see how the events we have chosen to evaluate have influenced markets. There are many possibilities when it comes to choosing data on bonds. First, bonds are issued with different maturities, such as 3-, 5- and 10-year bonds. Second,

there are several ways to evaluate the yields, we can for example both look at absolute yields and spread to other securities.

In this paper, we have chosen to look at the yield on 10-year bonds for the following countries: Austria, Belgium, France, Germany, Greece, Ireland, Italy, the Netherlands, Portugal, Spain and the UK. In figure 3 and 4, we see clearly how the yields on government bonds has increased during the Eurozone crisis, especially in the GIIPS countries, whereas for the other countries, they have remain more stable, though the borrowing costs of France, Austria and notably Belgium has increased for some periods.

Furthermore, we have chosen to assess the yield spread to German 10-year bonds, as Germany is the most secure economy in the euro-zone. This measure has been given much media attention during the Euro crisis, as it provides an intuitive picture of the economic situation of a given nation. When we speak of yield spreads in the following, thus, this is always referring to the yield spread over German bonds.

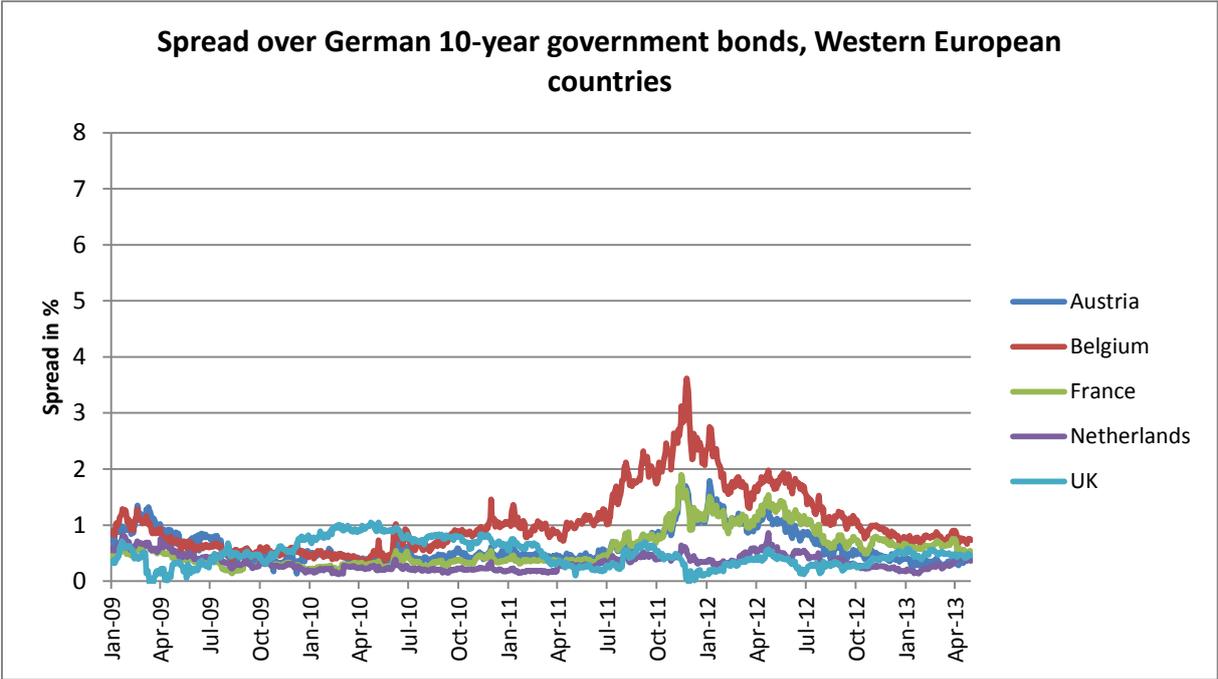


Figure 3: The spread over German 10-year government bonds for countries Austria, Belgium, France, Netherlands and UK have largely been stable throughout the period, with notable exceptions for the three former.

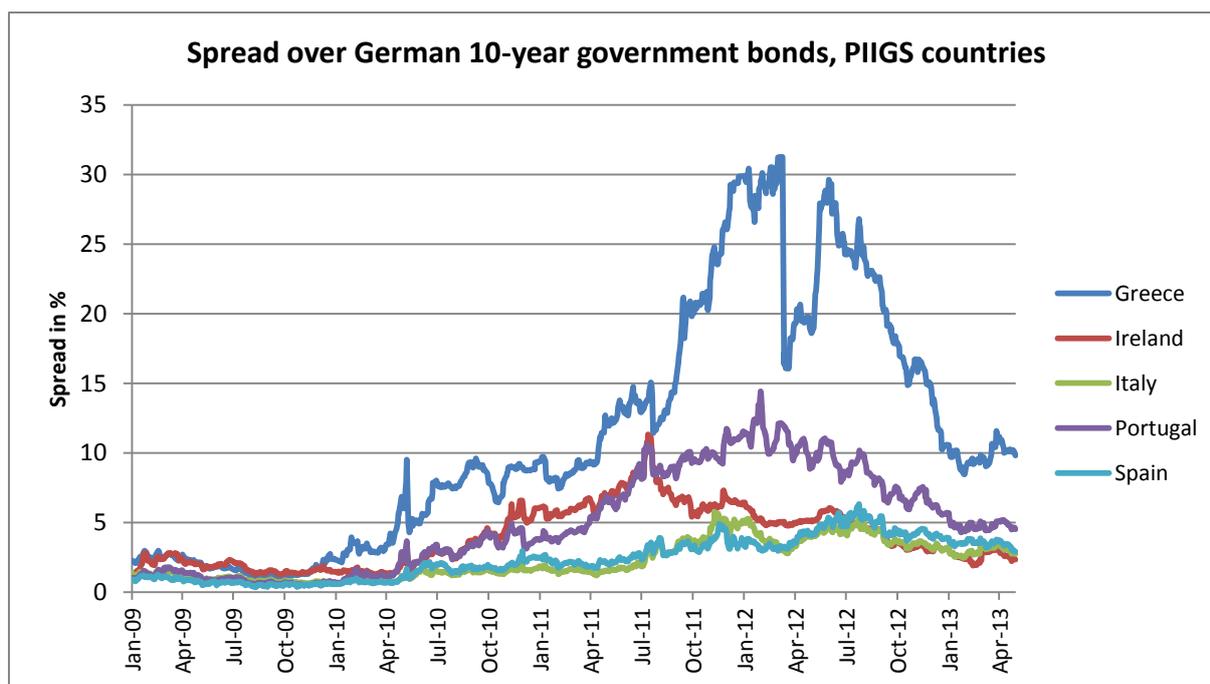


Figure 4: The GIIPS countries have faced skyrocketing yield spreads over German bonds, with Greece definitively being worst off.

## 8.2.2 Stock markets

Second, we want to assess the European stock markets, by looking at respective stock indexes. A stock index is a method of measuring the value of a section of the stock market, such as a sector or an area. It is computed from the prices of selected stocks within the respective market (Bodie, Kane, & Marcus, 2011).

The link between stock markets and real economic activity is intuitive and easily understood, though the stock markets' predictive power is much debated. Here, we keep it simple and state that stock prices are derived from expected future earnings. This, along with the efficient market hypothesis, suggests that a rising stock market – represented by the stock index – implies a positive outlook for the economy, as investors are more positive, cf. section 2.3. Thus, the state of stock markets tells a story about investors' interpretation of the future and is therefore an interesting indicator to investigate with regard to the effect of communication.

Our data sample consists of the benchmark equity index for Belgium, France, Germany, Greece, Ireland, Italy, the Netherlands, Portugal, Spain, the UK and the Euro Area as a whole. Over the past years, the stock markets of the GIIPS countries, particularly Greece, have

struggled, reflecting the negative outlook for the economic future in these countries (see figures 5 and 6).

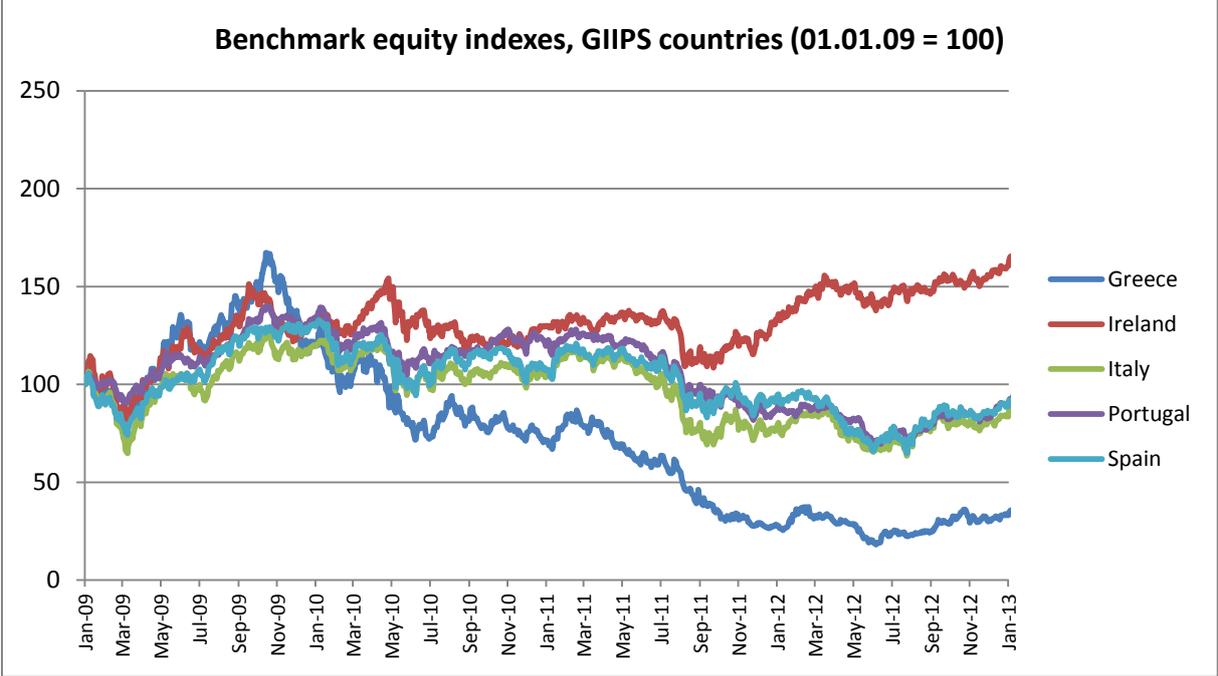


Figure 5: As with bond markets, Greece' stock markets have been hardest hit by the euro crisis.

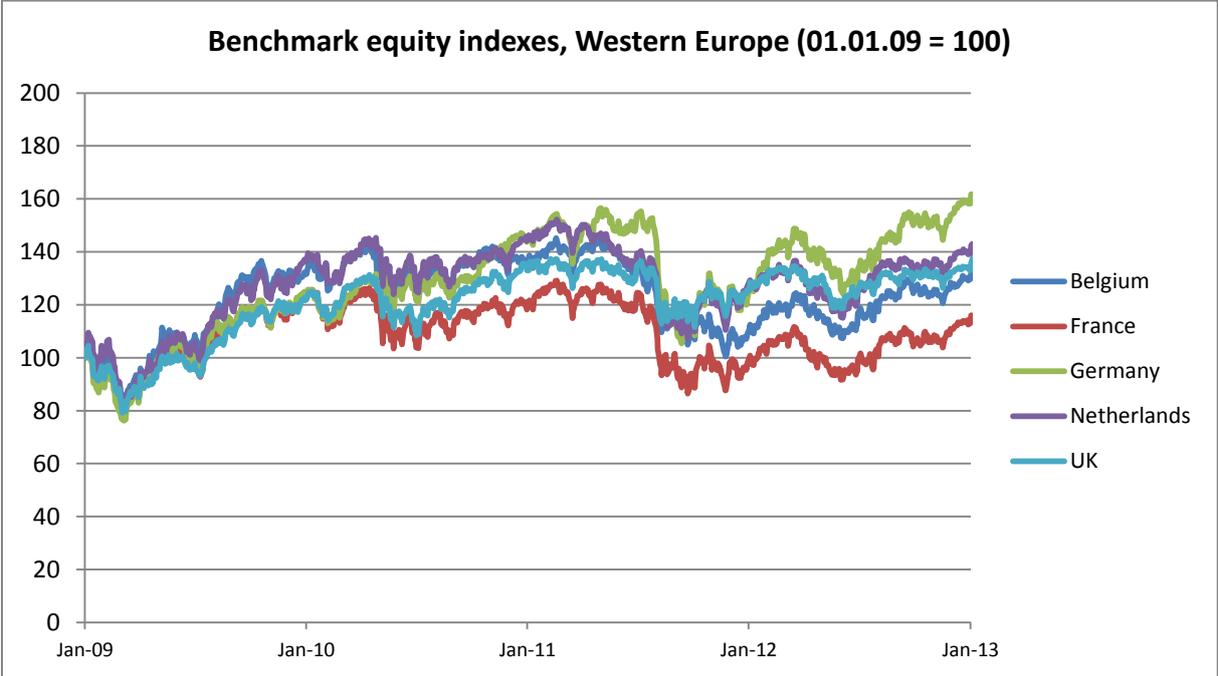


Figure 6: The equity markets of the more stable economies have not suffered as much as GIIPS countries, but the figure illustrates that there are significant differences between the development in France and Germany, for example.

### **8.2.3 Volatility**

The third and final indicator we want to look at is volatility. Volatility is a statistical measure of the variance of the price of a security or market index over time. Therefore, volatility refers to the amount of uncertainty or risk about the size of changes in a security's value. The higher the volatility, the higher the range of values that the security can potentially be spread out over. Conversely, a low volatility implies that a security's value does not fluctuate much (Berk & DeMarzo, 2011).

Our motivation for including this indicator in our event study is to evaluate whether the events have had any impact on market uncertainty. Generally, low volatility is perceived as being positive, whereas high volatility implies that investors are unsure about the future.

There are several variations of volatility. Broadly speaking, it may be useful to distinguish on the one hand between historical, current and future volatility, and on the other hand between actual and implied volatility.

In our paper, we have chosen to look at volatility indexes. These measure the implied future volatility of near-term options. Instead of directly observing the (historical or current) volatility for securities, these indexes reveal what standard deviation that is necessary for an option price to be consistent with the Black-Scholes formula (Bodie, Kane, & Marcus, 2011). Several European volatility indexes exist, based on different European stock exchanges. However, the time series of these indexes are remarkably similar to each other, arguably reflecting the high degree of global financial integration and interdependence. This is illustrated in figure 7, where we also see how uncertainty has influenced markets over the duration of the crisis.

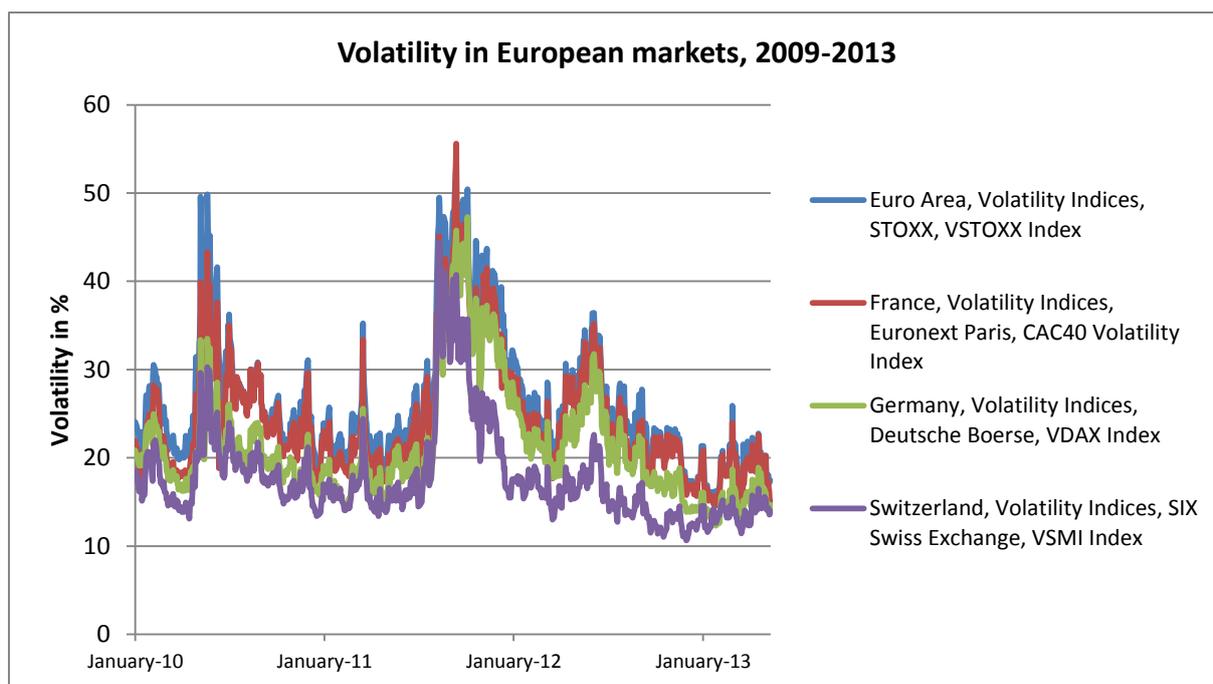


Figure 7: Different volatility indexes in the euro zone are rather similar, mirroring underlying market sentiment across Europe.

As the volatility indexes are so similar, we will only look at one of these, namely the Euro STOXX 50 Volatility Index, VSTOXX. This is the most watched European volatility index. It measures the implied volatility of near-term options on the Euro STOXX 50 index, which is a Eurozone blue chip stock index with very liquid futures and options. The VSTOXX is calculated from two expiration months, interpolated to get constant 30-day maturity (stox.com, 2013). In other words, the VSTOXX tells us how investors believe the market will fluctuate over the next month. For example, if the VSTOXX today is at 20% and the Euro STOXX 50 is at 3000, this implies that investors assume the stock index to fluctuate around 2400 ( $3000 \times 0.8$ ) and 3600 ( $3000 \times 1.2$ ) over the next month.

### 8.3 Choice of estimation window

To study the impact of the event, we need a proxy of the normal values for our variables. The main challenge in this study is that there arguably are no “normal” values. Ever since the outbreak of the Euro crisis, European markets have been characterized by great turmoil. Economic as well as politic issues have constantly influenced the economic environment.

We have chosen to use the constant-mean-value model. Thus, we estimate normal values for yield spreads, stock indexes and volatility by finding the average of the observations over a

given time window preceding the event – the estimation window. The challenge is to decide on the length of the estimation window. On the one hand, if the estimation window is too short, we may include too few observations. On the other hand, if we make it too long, we face the risk of including other shocks or events that influence the observations in an irregular way and make the comparison between pre- and post-event values less valid.

To mitigate these risks we have experimented with different window lengths. The event study is in many cases rather sensitive to the length of this window. However, we have chosen to use an estimation window of two weeks, i.e. ten observations. Because we only look at how the actual values of the time series behave, as opposed to for example estimating betas, as one would do if just investigating single stock returns, we do not require the 120-day estimation window that is normally applied to these studies (MacKinlay, 1997). Ever since the outbreak of the Euro Crisis, where one country after another have expressed concerns for future economic development, we have witnessed a steady stream of potentially significant macroeconomic events, and we thus find that an estimation window of more than two weeks could in many cases dilute the validity of our results, whereas a shorter window would not provide us with enough data to claim that the observations constitute a basis for normal values.

## 8.4 Choice of event window

To assess the impact of a given event, we need to define a time window after the event in which we observe values and see if they deviate from the estimated normal values. We assume the markets to be adjust quickly to new information, thus enabling us to observe reactions immediately. We do not look at intraday data, so we only have one data point per day. As for the exact timing of the events, we only know the date in many cases, and not necessarily whether an event takes place in the morning or evening hours. This means that we do not know whether the information reaches the market on the actual event day or the day after.

As with the estimation windows, we have experimented with different event window lengths, too. To capture the immediate response, as well as trying to isolate the events' impact, we decided on using an event window of three observations. However, in cases where we observe an effect we would also like to investigate the duration of the impact and see whether there

are any reversion, or if the values appear to have changed permanently. Thus, we also perform tests with event windows of two weeks, i.e. 10 observations.

The event date itself is included as the first observation in the event window.

## 8.5 Testing procedure

To test whether there is a significant difference between the normal and actual values, we perform a two-sample t-test and compute a confidence interval of the difference between the means of two populations – meaning, in this case, the values before and after an event. Thus, we have the following null and alternative hypotheses, respectively.

$$H_0: \mu_X - \mu_Y = 0$$

$$H_1: \mu_X - \mu_Y \neq 0$$

We denote the pre-event values by X and the post-event values by Y. We assume the observations to follow a normal distribution. We have:

$$E[X_i] = \mu_X, \quad \text{Var}[X_i] = \sigma_X^2, i = 1, \dots, n_1$$

$$E[Y_i] = \mu_Y, \quad \text{Var}[Y_i] = \sigma_Y^2, i = 1, \dots, n_2$$

We further assume equal variance:

$$\sigma_X^2 = \sigma_Y^2$$

The null hypothesis can be tested by in the following way (Ubøe, 2008):

1. Find  $\bar{X}$  and  $\bar{Y}$
2. Find S where

$$S^2 = \frac{1}{n_1 + n_2 - 2} \left( \sum_{i=1}^{n_1} (X_i - \bar{X})^2 + \sum_{i=1}^{n_2} (Y_i - \bar{Y})^2 \right)$$

3. Calculate

$$S[\hat{\delta}] = S \cdot \sqrt{\frac{1}{n_1} + \frac{1}{n_2}}$$

4. Calculate

$$T = \frac{\bar{X} - \bar{Y}}{S[\hat{\delta}]}$$

5. Use the table for the t-distribution with parameter  $\nu = n^1 + n^2 - 2$  and find the appropriate critical value. Here, we will use a 5% significance level.
6. Reject  $H_0$  if  $T \geq t_{critical}$  or  $T \leq -t_{critical}$ . We perform a two-tailed test, as we are interested in both increases and decreases.

## 8.6 Presenting and interpreting the results

As for the presentation of the results, we will divide this first, by discussing the separate groups of events and second, by discussing the separate variables we investigate. Here, we will point out those results that are most interesting and try to find explanations for what we observe. Some events will undoubtedly stand out as more significant than others, and we will also find that some indicators react more than others.

The discussion is to a large degree based on the theoretical background presented beforehand in the paper. In addition, the variables we look at are closely watched by market analysts, and as a result, markets are frequently commented and analysed. Thus, the use of sources such as Bloomberg and Reuters are helpful in order to better understand market reactions. A particular important issue in an event study like ours is that of conflicting events. Though we try to circumvent potential problems by keeping both estimation and event windows rather short, the period we look at is so packed with market shocks of different sizes that it is virtually impossible in many cases to attribute market movements to one single event. Therefore, it is of utmost importance to shine light on other things happening in the markets around the respective dates.

The economic situation in the euro-zone during this time period has been unstable. The sentiment on the euro-zone viability has changed rapidly, sometimes on a daily basis. This instability makes an event study somewhat difficult. This is because important and less important news sometimes affect the tests we apply, thus creating noise in both the estimation window and/or event window. In the following analysis of the events we try to illuminate this

problem where we find it to be most applicable. Furthermore we assess what consequences the most important dates inferring with our tests have on the events in question.

Furthermore, when interpreting our results we do not claim to find the entire effect of the bailout package or programme that is announced on the event in question. The financial markets we look at should only react to surprises, and for many of the dates we look at many details are already known to the public. For example, all the bailout events are related to final agreements on packages. Prior to this, the country receiving the bailout has applied for help and meetings have been held to negotiate the terms of the bailout loan. This information is known to the public and should be incorporated in the prices of financial assets. This implies that our findings do not show the entire effect of the vehicle or bailout that is announced (this would arguably be more or less impossible to measure). On the other hand: we analyse some of the most important dates relating to the package in question, and can thus say something about whether the market participants react positively or negatively to the new information revealed at those dates, and also whether markets and debt securities are affected or not by the measures.

Another point that needs to be emphasised is that we perform on respective countries' yield spread over German 10-year bonds. Thus, one of the factors influencing the spread is naturally the yield on German bonds. However, the spread on German bonds are remarkably stable. Furthermore, the yield spread over these bonds tells us about how the market perceives the debt of respective countries relative to that of arguably the safest asset in the market.

For yield spreads we would also like to draw attention to another matter. During the period, the yield spreads of those countries not most heavily affected by the debt crisis have remained fairly low and stable. This is especially the case for UK and Netherlands, but also for France, Austria and Belgium, though these three latter economies have experienced some more turmoil. The t-value in the test takes into consideration the estimated variance of the data. Therefore, we may in some cases observe that changes in the yield spread of these countries are significant even if they are small, as there is little variance in the time series.

For each subgroup of events we will start off by presenting the numerical results from each test. For yield spreads, we will present the absolute difference between the average yield spread before the event and the average yield spread after the event for the respective countries. For the stock indexes we will present the same difference as an increase or decrease in percentage of the 'normal' value found from the estimation window, as the absolute

changes in the different indexes are not equivalent. The VSTOXX results will be presented in the same fashion as the latter. Finally, we will highlight all those values that the test detects as statistically significant on a 5% level.

In many cases, we will use graphs to illustrate the movement of the variables around events. Since we investigate yields and stock indexes for several countries, it is not very helpful to show all the time series in all diagrams. Neither will we present graphs from all events. Rather, we will present those figures that we believe is helpful for the reader, and that are of particular interest to the related discussion.

## 9. Empirical results

### 9.1 Event group one – bailout packages

The first group of events that we investigated consists of the dates where the different bailout packages for Greece, Ireland, Portugal, Spain and Cyprus were announced.

The eventual announcement of a bailout comes after much discussion. As a consequence, there are limits to the degree that these final decisions come as a surprise. Arguably, the effect of the decisions comes gradually, as the perceived probability of a bailout is adjusted in financial markets. Nonetheless, the dates we investigate are those where the ECB finally announces that the bailout is agreed upon, so we expect to find indications of market responses. Furthermore, by looking at how the different time series develops before and after the event, we might gain additional insight to that of just looking at the test results.

#### 9.1.1 Yield spreads

**Table 2: Differences between average yield spreads in the estimation window and the three-day event window. Significant changes on a 5% significance level are written in bold and marked out.**

Date	Rescue package	AUS	BEL	FRA	GRE	IRE	ITA	NET	POR	SPA	UK
03.05.2010	Greece	-0.03	0.01	<b>-0.03*</b>	0.75	<b>0.51*</b>	<b>0.16*</b>	<b>-0.05*</b>	0.44*	0.22	<b>-0.09*</b>
07.12.2010	Ireland	<b>-0.09*</b>	-0.10	<b>-0.10*</b>	<b>-0.26*</b>	<b>-1.07*</b>	-0.16	-0.06	<b>-0.92*</b>	-0.21	<b>-0.10*</b>
17.05.2011	Portugal	0.03	0.04	0.01	<b>0.35*</b>	-0.02	0.04	0.00	<b>-0.34*</b>	<b>0.13*</b>	0.03
21.02.2012	Greece II	0.02	0.08	0.04	-0.53	0.01	-0.10	-0.01	-0.13	-0.16	0.00
20.07.2012	Spain	-0.01	0.00	0.00	<b>1.86*</b>	0.10	<b>0.41*</b>	<b>0.03*</b>	<b>0.45*</b>	<b>0.68*</b>	0.00
25.03.2013	Cyprus	<b>0.07*</b>	<b>0.11*</b>	<b>0.07*</b>	<b>1.11*</b>	<b>0.13*</b>	<b>0.13*</b>	0.02	<b>0.31*</b>	<b>0.21*</b>	<b>-0.03*</b>

Greece was the first country to call for help. At this point, they were the only economy in real trouble, though we can see observe tendencies of a negative development in some other countries as well, notably Ireland and Portugal, whose spread to German 10-year bonds also surpassed 2% during the estimation window. On **2 May 2010** a first Greek bailout was agreed upon, including a three year support programme of €110 billion. This seems to have had little immediate positive effects on bond yields, however. Rather, especially Greek bond yields continue to rise, while there was a significant increase of 0.50% in Irish bond spreads.

At the end of the year, Ireland needed financial aid too. **7 December 2010**<sup>2</sup>, a policy package of €85 billion was agreed upon and announced. Here, we observe a significant reduction in the yield spread in several countries, notably that of Ireland (-1.07%) and Portugal (-0.97%). However, looking at the time series, it seems as the turning point occurred some days in advance. This can be explained by the fact that the event really took place earlier than the date presented by the ECB on their website. Indeed, it seems as if financial markets reacted already after 30 November, when Ireland in practice accepted the offered aid (see figure 8). However, though the 10-observation event window still suggests significantly decreased yield spreads in the longer term as well, the reduction is not as large as the immediate impact, suggesting that there may be a bounce-back effect, and that there is fear about the potential spreading of the crisis to other member states. In addition to the already mentioned Portugal, Spain is now followed closely (The Telegraph, 2010). Nevertheless, unlike what happened when Greece was bailed out, the announcement of the Irish bailout seems to have had a strong positive impact in several economies, particularly those of Ireland and Portugal. The results also shows that there was a small but significant decrease in the control countries' yield spread over German bonds, which is explained by the fact that Germany's yield rose a few basis point after the bailout announcement.

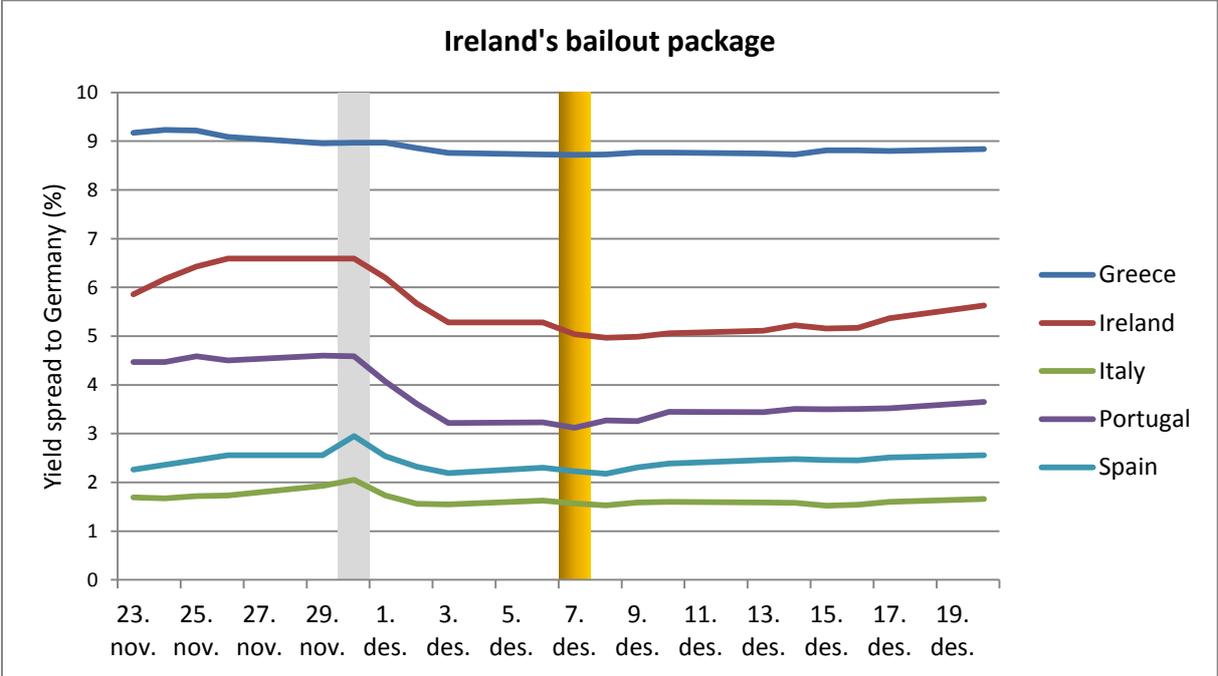


Figure 8: The effect of the announcement of Ireland's bailout package on 7 December. We see, however, that markets reacted already after 30 November.

<sup>2</sup> The announcement of the future launch of the ESM programme on 29 November (event group two) is present in the estimation window. However, this event yielded only negligible results, and should thus not create much noise.

The same positive contagion effect could not be observed after the next bailout package, which was given to Portugal. **17 May 2011**, a total financial aid of €78 billion was announced. Indeed, the only country that enjoyed a significant reduction in yield spreads was Portugal (-0.34%). However, the effect was only momentary, as revealed by the longer term event window. As with the Irish bailout, the news reached the markets earlier than the date specified by the ECB, with the Portuguese yield spread peaking one week before the official date, on 10 May, followed by an immediate decrease of some 40 basis points.

Greece agreed with the other Eurozone countries upon a second bailout on **21 February 2012**. The Greek economy was down on its knees, and the announcement had little effect on yield spreads, not even those in Greece. Before the agreement, the spread between Greek and German 10-year bonds was above 30%, and though the yield spread fell almost 200 basis points on February 22, our test concludes that this decrease is non-significant. None of the other countries experienced significant changes. In the days following the event, outlooks are exacerbated; first, Standard & Poors declares that they consider Greece to be in default on its sovereign debt obligations, and later, the ECB announces that Greek sovereign debt can no longer be used as collateral (Standard & Poors, 2012; Reuters, 2012). However, on 9 March 2012, Greece finally closed a restructuring deal with its creditors, bringing the 10-year bond yield down to levels around 15% (see figure 9).

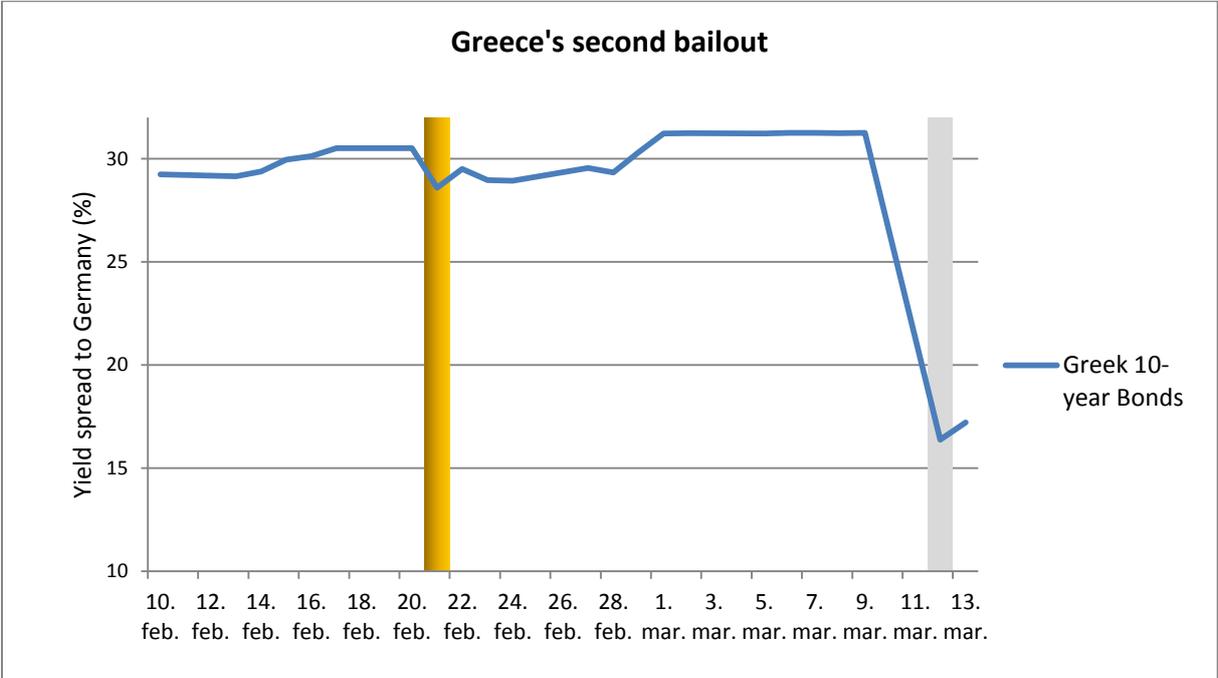


Figure 9: The effect of announcing Greece's second bailout was non-significant, as markets were awaiting whether the country would close a restructuring deal. When this happened, the borrowing costs were reduced by some 50%.

The next country to face serious difficulties was Spain. After a hectic period, the Eurogroup decided to grant fiscal assistance of €30 billion to the country's banking sector on **20 July 2012**. The effect of the announcement seems to be negative for Greece, Italy, Spain and Portugal, as these countries' bond yields rose even more than before (increases of 1.86%, 0.41%, 0.45% and 0.68%, respectively). Greek and Portuguese yield spreads were significantly higher also in the 10-day event window. However, several other events were taking place during this period, possibly affecting our results. For example, on the very same day as Spain was granted financial aid, the ECB suspended Greek bonds as collateral for a second time (Suoninen & Jones, 2012).

The last country in the Eurosystem to request for financial aid was Cyprus, who received their bailout package on **25 March 2013**. We do not have data on Cypriot indicators, but we still wanted to investigate whether other the announcement of the measures had any effect on the economies in other countries. Our results indicate that all countries except the UK experienced significantly increased yield spreads after this announcement. For the neutral economies, this is mostly the result from a small yet significant decrease of the German 10-year yield, but for countries as Greece and Portugal, we see large increases in the spread, and these are also significantly increased in the 10-day event window.

### 9.1.2 Stock markets and volatility

**Table 3: Differences between average stock index values in the estimation window and the three-day event window. Significant changes on a 5% significance level are written in bold and marked out.**

Date	Rescue package	BEL	FRA	GER	GRE	IRE	ITA	NET	POR	SPA	UK	EUR	VSTOXX
03.05.10	Greece	<b>-4%*</b>	<b>-5%*</b>	<b>-2%*</b>	-5%	-3%	<b>-7%*</b>	<b>-4%*</b>	-6%	<b>-8%*</b>	<b>-4%*</b>	<b>-5%*</b>	<b>5.87*</b>
07.12.10	Ireland	2%	<b>3%*</b>	2%	<b>7%*</b>	<b>5%*</b>	<b>3%*</b>	<b>3%*</b>	<b>4%*</b>	<b>4%*</b>	<b>3%*</b>	<b>3%*</b>	<b>-4.68*</b>
17.05.11	Portugal	0%	<b>-1%*</b>	<b>-2%*</b>	-3%	0%	<b>-2%*</b>	<b>-2%*</b>	0%	-2%	-1%	<b>-2%*</b>	0.50
21.02.12	Greece II	0%	<b>1%*</b>	1%	-8%	1%	0%	1%	-1%	-1%	<b>1%</b>	1%	<b>-2.06*</b>
20.07.12	Spain	-1%	<b>-2%*</b>	-1%	<b>-4%*</b>	<b>-2%*</b>	<b>-7%*</b>	0%	<b>-4%*</b>	<b>-8%*</b>	<b>-2%*</b>	<b>-3%*</b>	<b>3.74*</b>
25.03.13	Cyprus	<b>-1%*</b>	<b>-2%*</b>	<b>-2%*</b>	<b>-6%*</b>	1%	<b>-3%*</b>	<b>-1%*</b>	<b>-3%*</b>	<b>-6%*</b>	<b>-1%*</b>	<b>-3%*</b>	<b>3.10*</b>

In general, we find that many of the events lead to significant changes in stock indexes, most of which are negative.

Furthermore, the results of the announcements of the rescue packages' impact on stock markets and market volatility support the results from the previous section. Following Greece's first bailout on **3 May 2010**, investors were sceptical, and stock markets were

declining throughout Europe. This is especially the case for Greece, Italy, Spain and Portugal, but even the Euro Area as a whole experience a significant decrease. Looking at the graphs, it seems as investors were disappointed by the proposed rescue package (see figure 10). We clearly see stock markets plummeting in advance of the event. Right before the announcement, however, we can observe a market recovery, as if markets were hoping that something would be done to save the Greek economy, only to be disappointed with the rescue package, as analysts were questioning “the ability of the Greek government to push through new austerity measures pledged in exchange for aid”, and thus feared that the salvation would only lead to temporary relief (Papadimas & Donovan, 2010).

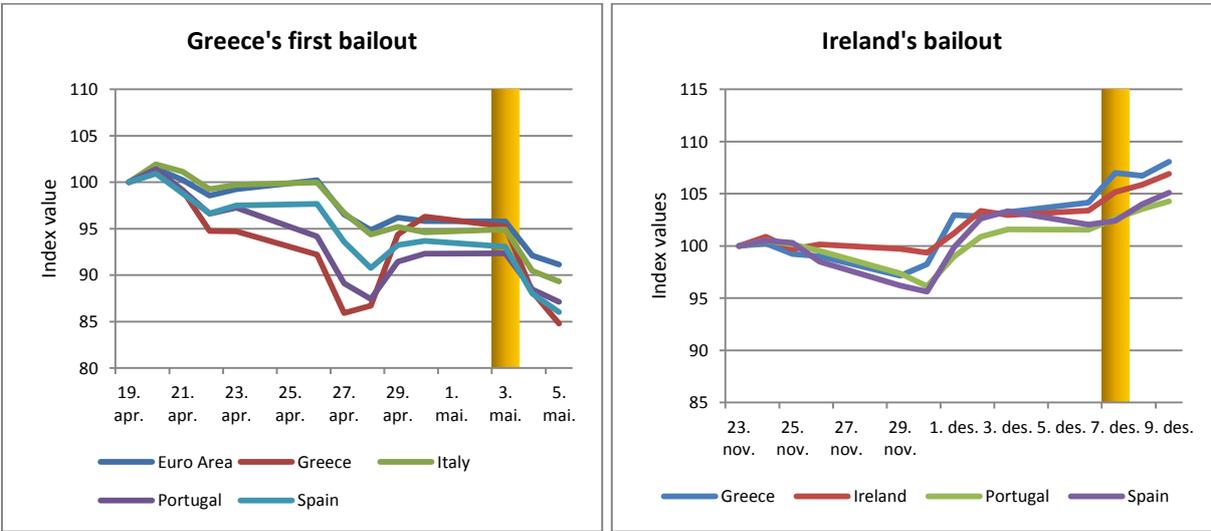


Figure 10: The effects of the Greek and Irish bailout were different, with the former depressing investors and the latter enhancing the stock markets.

As was the case with the yield spreads, the one event that stands out as positive is the bailout of Ireland on **7 December 2010**. Here, we observe a significantly rising stock market, above all in the most uncertain economies; Greece, Ireland, Portugal and Spain, but also other European stock markets appreciated the news (see figure 10). However, the reaction largely came in advance of the final agreement on 7 December. The increases are significant also in the 10-day event window.

We see that after the other bailout announcement, the stock markets generally worsened after the events. This is especially the case on the dates where already mentioned Greece’s (first) and Spain’s bailouts were announced, as well as that of Cyprus. The effect is present also in the 10-day window, but the two first of these bailouts were quickly followed by more positive announcements from the ECB, respectively the EFSF/EFSM announcement on 9 May 2010

and a speech made by Mario Draghi on 26 July 2012. Both these events will be further discussed under event groups two and three. As for the announcement of a rescue package for Cyprus, this differed from earlier agreements in that it marked the first time that junior and senior bondholders as well as large depositors were required to take much of the burden, arguably making the bailout costlier for many stakeholders (Jolly, 2013).

Our test results from the VSTOXX index shows the ambiguity of the bailout announcements in this group, which we can see from the figures below. Note also that these figures show the relative difference in volatility levels at the time, as the values on the vertical axes are the same in all of them. For two of the announcements in this group, namely the first rescue package to Greece (see figure 11) and that to Spain, we see that volatility increases steeply. On these events we also found that stock markets were clearly declining. Both events induce clear upwards shifts, illustrating the anxiety that the actions taken are not enough to save the countries in question. On the other hand, two of the bailout events mark a reduction in volatility. In Ireland's case, uncertainty is clearly reduced (see figure 11). After its peak on 30 November, implied market volatility was steadily reduced day by day, and our tests show an average decrease of almost 500 basis points. Thus, as with the yield spreads, the data suggests that markets reacted twice: first, already one week before the official date, and second, when the agreement on all terms of the package were made. Volatility was also reduced in the case of Greece's second bailout, but not in the same striking fashion. We observe a rather small, but significant decrease both in the short 3-day and the longer 10-day perspective. After this, however, volatility rose heavily, as markets were unsure whether Greece would close its restructuring deal, but when the deal was sealed investors were calmed, and from 7 to 9 March, the VSTOXX fell back down from 28.2 to 22.9 per cent (see figure 12). For the two last events, the packages to Portugal and Cyprus, the effects are vaguer. In Cyprus' case, the test detects a significant increase, but we see that it is no shift in the curve on the day of the event. Rather, the VSTOXX continues on an increasing path also after the event, indicating that investors are equally worried about the foreseeable future as they were before the announcement (see figure 12). As for the case of Portugal's bailout, we find no significant changes in volatility. So, out of the six events in this group, two led to increased volatility, two led to decreased volatility, and two were somewhat neutral. We can only conclude that the tests performed on volatility indicate that the different announcements are differently perceived by market participants. Also, we see that a decreasing stock market goes hand in

hand with increased volatility, as those events leading to the largest falls in stock prices (Greece’s first and Spain’s bailout) also carried with them an increase in market volatility.

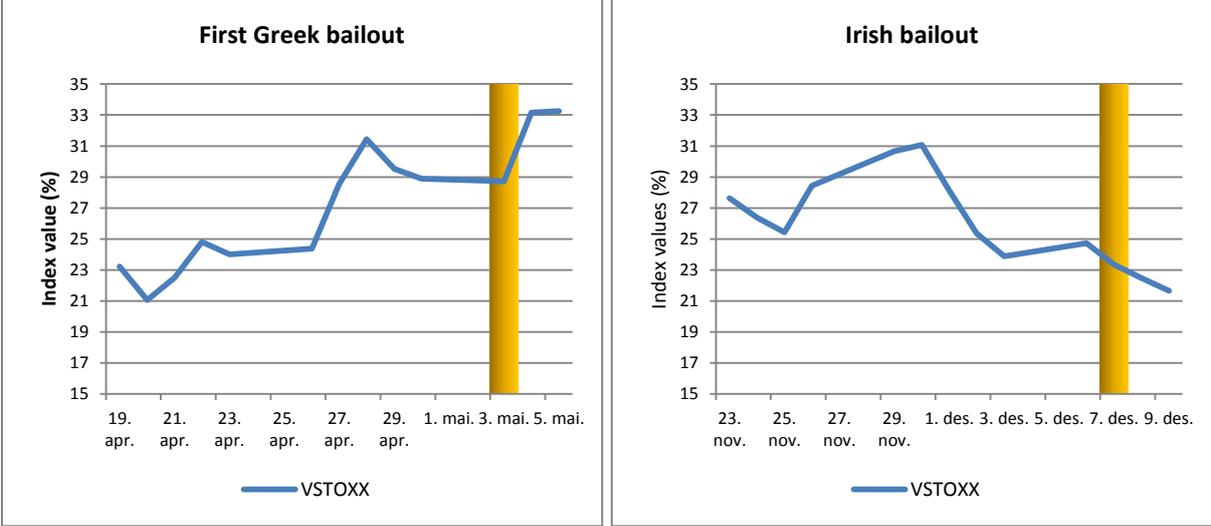


Figure 11: Volatility increased in the case of Greece's bailout, but was reduced after Ireland's.

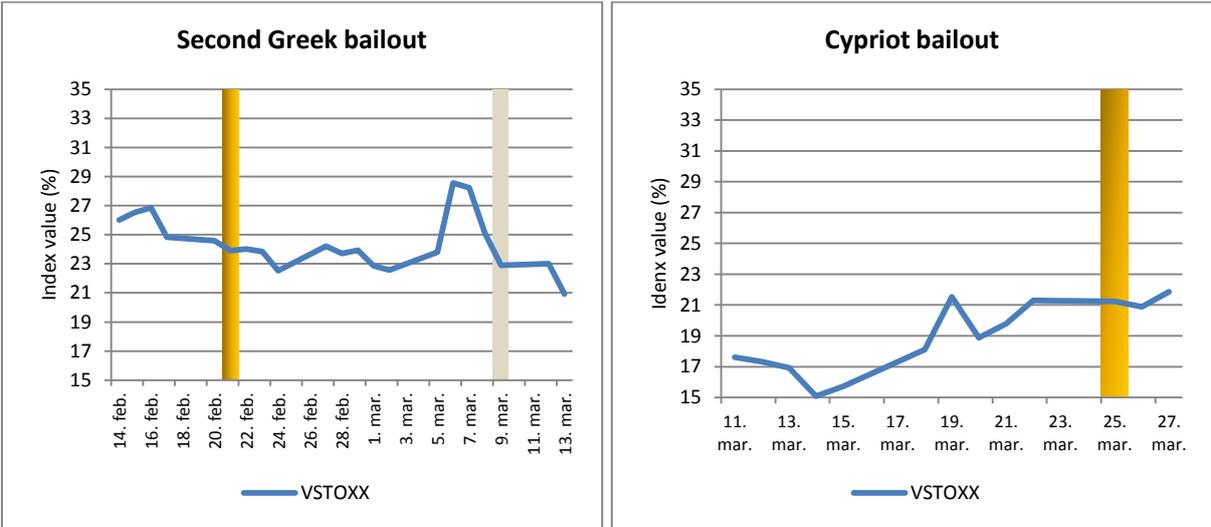


Figure 12: The second Greek bailout led only minor and to temporary relief in markets, whereas the Cypriot bailout cannot be claimed as having much effect on volatility either.

### 9.1.3 Summary

We find that the main takeaway from this group of events is that the announcements are rather ambiguous with regards to effects on financial markets. This can arguably have its simple explanation in the fact that the austerity packages are both good and bad at the same time. Though Greece needed saving, they had to do so by taking drastic measures. Ioanna Antonopolou, the director of LSE’s Hellenic Observatory, for example, has argued that the

packages are really saving Europe from Greece more than saving Greece itself. This argument is based on the fact that the rescue money is largely going to creditors outside of Greece, while Greece will have to take cut its expenses in various ways such as the sacking of thousands of public servants in the years to come (Antonopoulou, 2012).

The terms of the rescue packages also differ from each other, and we believe that the actual content of the different agreements can to a large degree decide whether markets will respond positively or negatively to the announcements. For example, the negative reaction to the Cypriot bailout – a country that has a tremendously huge banking sector compared to the population – was by some commenters partly attributed to the news that agreement included a one-time tax on deposits in Cyprus banks (Fisher, 2013).

To further understand the impact of different events, it would therefore have been interesting to analyse closely which austerity measures that were imposed on the countries in each case. Although the phrase “rescue package” certainly has positive connotations, a rescue is after all a very strong signal about the fact that an economy is facing serious difficulties. Neither is there reason to believe that these kinds of financial measures are destined to succeed in solving the economy’s problems. We saw, for example, that Greece not long after having received their first bailout package, realized that they would need more financial aid.

We would argue that the rescue packages did not have a huge effect on borrowing costs throughout Europe. Results suggest that the countries to which the austerity package is granted are those where we observe the largest impact on yield spreads: When Ireland received its rescue package, this was the country where yield spreads decreased the most; when Portugal received its rescue package, they were the only country enjoying significantly reduced yield spreads; and when Greece received its second rescue package, we see that Greece’s yield spread decreases some (though not significantly) while the other countries are unaffected. However, we argue that there is not strong evidence of any general pattern suggesting that the country receiving the package has their borrowing cost significantly changed after the announcement of a bailout.

There may be several possible explanations to this, but one is certainly that the packages are typically agreed upon after a much discussion, with politicians going back and forth in media. This further complicates the issue of defining the actual event date. This was the case with Ireland and Portugal, where we observe a significant effect that we believe comes from the proposed rescue packages one week in advance of the official event date. It is also safe to say

that the period in which such bailout packages seems to be surrounded by large fluctuations in markets, illustrating the uncertainty about the eventual outcome.

Though the results suggest that the announcements of the different bailout packages seem to have had rather little positive effects on yield spreads, the Irish bailout may arguably be an exemption, as we observe significant yield decreases in several countries at this event. However, the effect was not permanent, as the yield spread on Irish 10-year bonds as well as those of other troubled economies soon bounced back to higher levels. As for the other bailout packages, the effects were generally small and non-significant for the more neutral economies of Austria, Belgium, France, Netherlands and the UK; and negative for the heavily indebted countries – meaning that the yield spread was in general higher after the announcements.

Stock markets, in particular those in Greece and Spain, fluctuate much around the events, thus creating much noise in the time series, which reduce the validity of the event study. Nonetheless, our results indicate that announcements of bailout or rescue packages are in general bad news for stock exchanges, as we observe rather large and negative changes in stock indexes after the events. The effect also seems to be persistent, as the 10-day window confirms our results from testing with the shorter 3-day window. However, looking at the time series plots, it seems plausible to conclude that the announcements themselves do not really surprise stock markets very much. Rather, the announcement of financial aid to particular economies is a sort of culmination of a series of bad news. We found the VSTOXX tests to be of particular interest in this group of events, as they clearly showed the ambiguity in consequences of the different packages.

## 9.2 Event group two – programme announcements

The second group of events are related to the creation of programmes with the purpose of stabilizing the economic situation in the euro-zone. These are announcements of details related to the ECB-induced vehicles EFSF, EFSM, ESM, LTRO and OMT.

### 9.2.1 Yield spreads

**Table 4: Differences between average yield spreads in the estimation window and the three-day event window. Significant changes on a 5% significance level are written in bold and marked out.**

Date	Measure taken	AUS	BEL	FRA	GRE	IRE	ITA	NET	POR	SPA	UK
10.05.2010	EFSF/EFSM	-0.02	-0.08	<b>-0.04*</b>	<b>-2.33*</b>	<b>-0.67*</b>	-0.12	<b>-0.04*</b>	<b>-0.97*</b>	-0.20	-0.03
29.11.2010	Future launch of ESM	<b>0.11*</b>	<b>0.33*</b>	<b>0.08*</b>	-0.06	<b>0.68*</b>	<b>0.27*</b>	<b>0.07*</b>	0.05	<b>0.52*</b>	-0.07
16.12.2010	Final go-ahead for ESM	0.03	-0.07	-0.01	0.05	0.21	0.03	0.00	0.20	<b>0.17*</b>	-0.03
21.07.2011	Enlargement of EFSF	<b>-0.08*</b>	-0.06	-0.07	<b>-1.98*</b>	<b>-1.64*</b>	-0.19	-0.04	<b>-1.56*</b>	-0.22	<b>-0.06*</b>
08.12.2011	LTRO announcement	-0.18	-0.33	0.03	<b>2.27*</b>	-0.33	-0.06	-0.03	-0.26	-0.21	-0.02
22.12.2011	First LTRO allotment	-0.05	<b>-0.27*</b>	<b>-0.09*</b>	0.59	<b>-0.13*</b>	0.01	-0.01	0.18	-0.11	-0.02
01.03.2012	Second LTRO allotment	<b>-0.09*</b>	-0.08	-0.01	1.59	<b>0.05*</b>	<b>-0.50*</b>	<b>0.11*</b>	<b>1.43*</b>	<b>-0.15*</b>	0.04
06.09.2012	Technical features of OMT	<b>-0.10*</b>	-0.05	-0.05	<b>-1.79*</b>	<b>-0.53*</b>	<b>-0.66*</b>	<b>-0.03*</b>	<b>-1.11*</b>	<b>-0.90*</b>	<b>-0.10*</b>

The first event we look at is the announcements of the European Financial Stability Facility (EFSF) and the European Financial Stability Mechanism (EFSM). Both programmes were announced on **9 May 2010**<sup>34</sup>. We find large and significant reductions in yield spreads for Greece, Ireland and Portugal (see figure 13). The effects hold when a longer event window of ten days is applied, implying that the programme announcement had a long term effect. The largest decrease in yields was by far in Greece, with an average decrease in yields of 2.33% over the three day window and 2.03% for the longer event window. We also find small yet significant yield spread reductions for France and Netherlands (-0.04% for both countries), and there is thus some indication of a positive contagion effect, which is further supported by the 10-day event window. However, for the non-heavily indebted countries, the reductions are small. Still, we can argue that financial markets may have assumed that other European countries would be badly hurt if the three “crisis-countries” go bankrupt or depart from the euro-zone. Thus, they demanded a higher borrowing compensation before the event, and when the chances of Greek, Irish and Portuguese bankruptcy are reduced as the EFSF and EFSM vehicles are announced, the yields spreads to Germany on all European bonds decrease

<sup>3</sup> 9 May 2010 is a Sunday, so we place the event on the next day, Monday 10 May

<sup>4</sup> The first Greek bailout announcement on 3 May 2010 is present in the estimation window. However, the announcement did not have any significant effect, as yields and volatility kept rising and equities kept falling. This should therefore not cause any trouble when testing the effect of the EFSF and EFSM announcement.

– a sort of contagion explanation. The announcement was clearly positive and unexpected by the financial markets, causing a decrease in the belief of a Greek bankruptcy, and thus lowering the yields. From the figure below we see that yield spreads for the three countries reached a peak the trading day prior to the announcement (i.e. 7 May 2010). According to the New York Times it was especially the amount available in the programme that was a surprise to market participants (Kanter & Thomas, 2010).

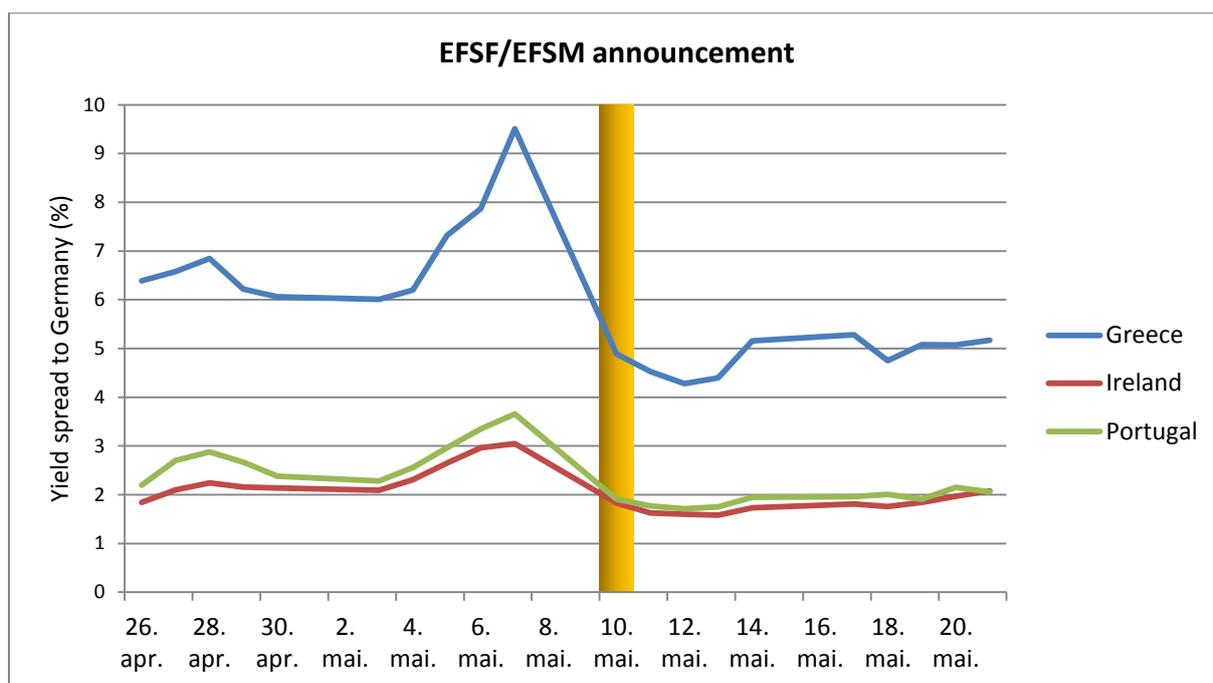


Figure 13: The announcement of the EFSF and EFSM programmes significantly reduced the yield spreads on Greek, Irish and Portuguese government bonds.

On **28 Nov 2010**<sup>56</sup> the euro area finance ministers agreed upon a future launch of the European Stability Mechanism (ESM). This programme was planned to take over the tasks that now was assigned to EFSM and EFSF from 2013, and was to remain a permanent tool against recessions. We find no significant positive effects on any of the yield spreads. In fact, our results suggest some negative effects, as the yield spreads in countries such as Ireland, Italy and Spain were higher *after* the event. The data plot of the yields, on the other hand, tells a different story (see figure 14). The yield spreads to Germany are rather stable after the agreement, and falling two days later. The reason why the two averages are significantly higher for some of the countries is the increasing yields prior to the event, not a negative

<sup>5</sup> 28 November 2010 is a Sunday, and we thus place the event on the day after, Monday 29 November

<sup>6</sup> Whereas the Irish bailout package was officially agreed upon the 7 December 2010, the package was in reality accepted by Ireland in the end of November. This coincides with the event window of the ESM launch.

effect caused by the ESM agreement. Our conclusion is therefore that the event had no effect on bond markets.

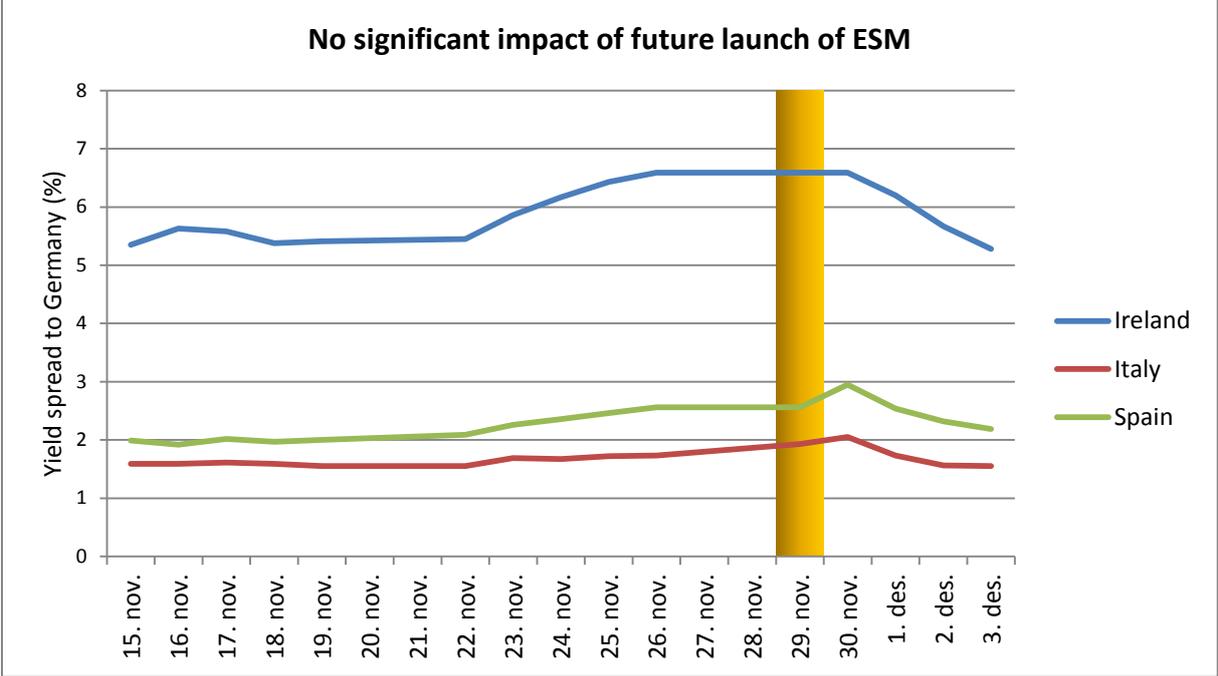


Figure 14: The announcement of the ESM programme did not have an effect on yield spreads, as we see no reactions on the day of the event. Two days later, however, the spreads decreased as a result of the proposed bailout for Ireland.

The final go-ahead for the future creation of the ESM programme came on **16 December 2010**<sup>7</sup>, when the EU-leaders finally declared that they approved the plan. We suspect that this does not come as a great surprise to financial markets, as the finance ministers of the euro area had already agreed to the terms. The reason why we include this date in our study is that the information on ESM reaches the markets in a gradual fashion. Also, as we did not find any significant effect on the previous event, we wish to analyse if the financial markets found this announcement more important. However, the test detects no significant reductions in yield spreads on this event.

The EFSF was boosted on **21 July 2011**, with the capital guarantees enlarged to €780 billion and the lending capacity to €440 billion. We find rather large and significant reductions in yield spreads for Greece (-1.98%), Ireland (-1.64%) and Portugal (-1.56%) as well as minor yet significant reductions in Austria, Netherlands and the UK (see figure 15). Testing with a longer event window results in even greater effects, with the average yield spreads in Greece,

<sup>7</sup> The Irish bailout announcement on 7 December 2010 is present in the estimation window. However, as mentioned, much of the effect of the Irish bailout came in the end of November, and we also observed a bounce-back effect soon after the announcement, and we thus argue that the effect of the Irish bailout is negligible.

Ireland and Portugal dropping 2.1%, 2.2% and 1.54%, respectively. We see, therefore, that the announcements had a widespread and positive effect on sovereign bond markets. There was however other measures announced on this date, too. The most noteworthy in addition to the enlargement of the EFSF programme was the announcement that Greece would receive a second bailout of € 109 billion plus a substantial contribution from private bond holders (the final details of the package would be announced at a later stage, cf. Greece’s second bailout in section 9.1). The European leaders also announced that the terms on the bailout packages given to Greece, Ireland and Portugal would be eased, both in terms of interest payments and maturity (Baker & Toyer, 2011). This means that we cannot make any conclusions on the contribution that the enlargement of the EFSF made alone. It was the collective firepower of all these announcements that made the markets more optimistic about the long term commitment from the euro-zone leaders to deal with the problems of the euro-zone. Nevertheless, our results suggest that markets reacted positively.

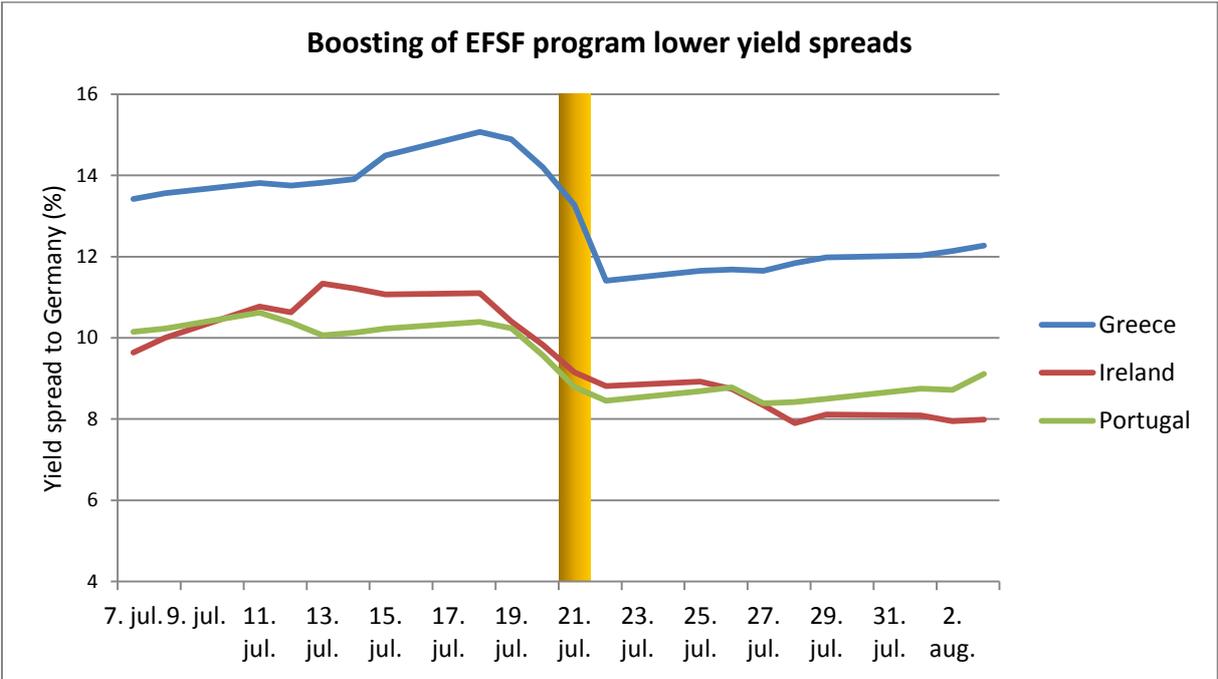


Figure 15: The enlargement of the EFSF capacity clearly reduced yield spreads for Greece, Ireland and Portugal.

On 8 Dec 2011<sup>8</sup> the European Central Bank announces it will support the banks across the euro zone through Long-Term Refinancing Operations (LTROs). Our test only detects one significant change. The average Greek yield spread is actually 2.27% higher after the event. This might intuitively seem like a strange result, as the LTRO announcement should not have

<sup>8</sup> The ECB reduced the interest on the main refinancing operations, the marginal lending facility and the deposit facility by 25 basis points on this day. Traditionally, expansive interest rate operations should decrease long interest rates.

a negative effect on Greece. Looking at the data, however, we can see that this result is probably better explained by weaknesses in our test method. As we can see from figure 16, the yield spread on Greek 10 year bonds increase sharply before the event (for reasons we do not investigate) and is more or less flat after the event. This resulting in that the average before the event is smaller than after. If anything, the event was positive for Greek yield spreads. Still, we conclude that the announcement of LTRO had small no significant effect on the yield spreads in the euro-zone.

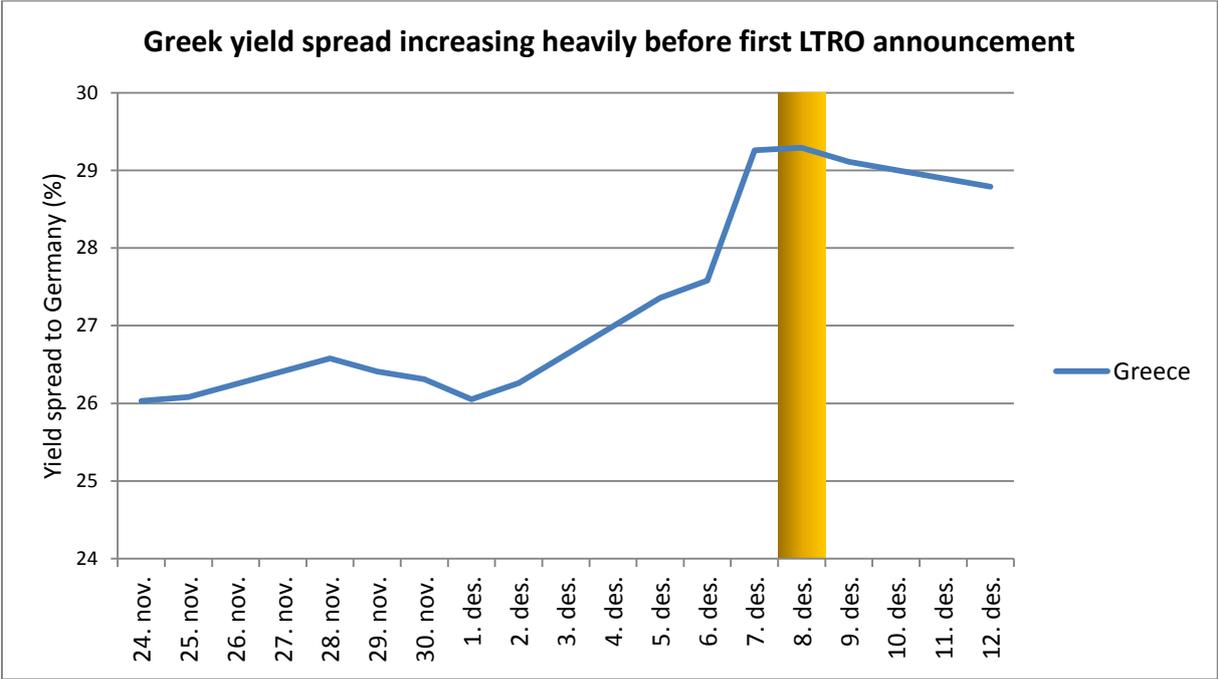


Figure 16: Our test detects a significant increase in Greek yield spreads following the LTRO announcement. However, the figure suggests that this result is a consequence of the steep increase preceding the event, thus making the pre-event values "non-normal".

On **22 Dec 2011**<sup>9</sup> the ECB announced the details of the first LTRO allotment. Here, we find significant reductions only in Belgium (-0.27%), France (-0.09%) and Ireland (-0.13%). In general, also this event produced arguably negligible effects. The reason why traditionally (in the context of the euro-crisis) more stable economies as France and Belgium have their borrowing costs significantly reduced in this case may be attributed to the situation at the time. Approximately one month before this event, on 8 November 2011, the French and Belgium government had to bail out the troubled bank Dexia (Jolly, 2011). The turmoil surrounding the bi-national bank had created a lot of uncertainty concerning especially

<sup>9</sup> The LTRO announcement on 8 December 2011 is present in the estimation window. But as this event yielded small to no effects it should not cause much noise.

Belgium’s finances, and questions were raised whether Belgium would become the next country to find itself in serious financial difficulties. The LTRO allotment might have been perceived as positive for Belgium and Dexia, moving the bank further away from another bailout, thus strengthening the belief in future Belgium and French solvency.

On **1 March 2012**<sup>10</sup> the ECB decided to have another go at it, when they announced a second LTRO allotment. We find significant reductions in yield spreads for Austria (-0.09%), Italy (-0.50%) and Spain (-0.15%) for the three day event window and with the exception of Spain we find the same result when applying a longer event window (see figure 17). This implies that this time the LTRO programme had more of an effect on yields, especially in Italy.

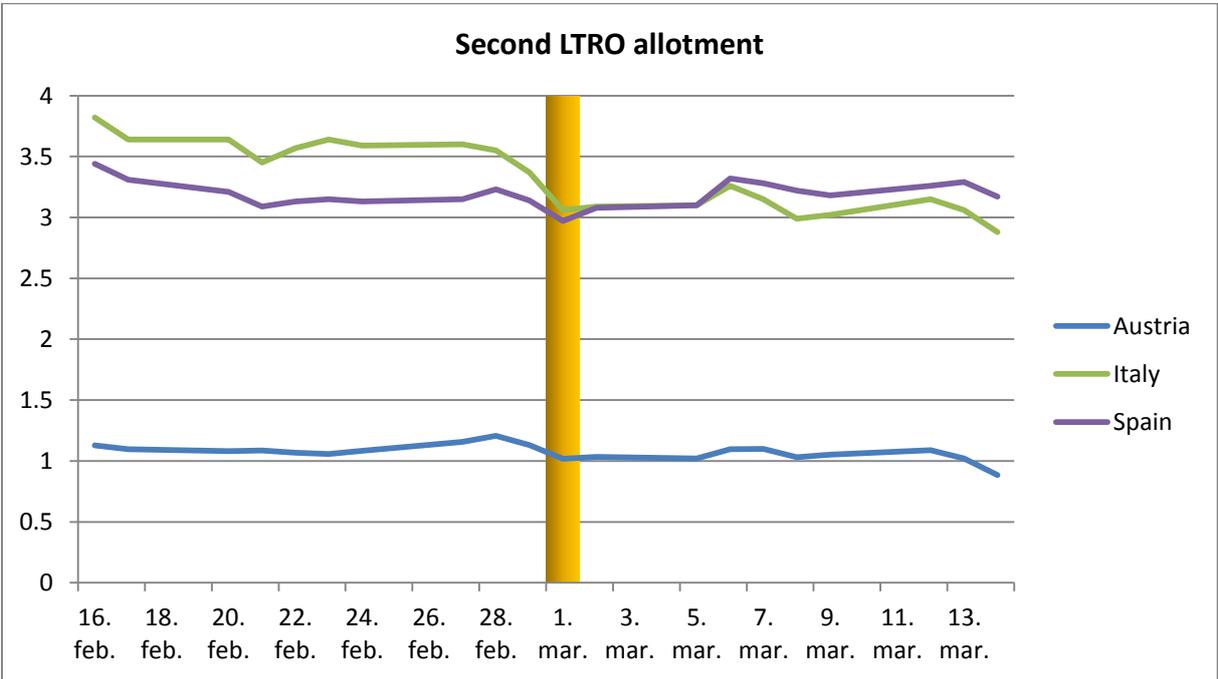


Figure 17: The LTRO allotment on 1 March had some impact on bond markets, as we observe decreased yield spreads to Germany for three countries.

Out of all the events in this group, the announcement of the technical features of the OMT programme on **6 September 2012** yields the strongest effects on bond markets. Using the three day event window we find that yield spreads of all countries in our dataset except France is significantly reduced (see figure 18). Table 5 below shows the significant drop in yields. As seen from the table, using a long event window only enhances the effect. The largest reductions are clearly found in the GIIPS countries, in particular Greece. But the event undoubtedly had a positive effect for other European countries as well, indicating a positive

<sup>10</sup> The second Greek bailout announcement on 21 February 2012 is present in the estimation window. However, we found no significant effects on yield spreads on this event.

contagion effect. This event is the is closely related to two events in our third and final group of events, namely two speeches made by ECB President Mario Draghi on 26 July and 2 August, in which he hinted about what was to come later. This story is interesting because the ECB did not actually need to *use* the OMT programme in order to decrease the borrowing costs in the euro-zone; announcing the possibility was enough. In fact, the ECB has not used outright monetary transactions to this date (20.06.2013). The former US Treasury Secretary Henry Paulon’s, at that time somewhat failed but famous, statement “If you have a bazooka in your pocket, and people know it, you probably won’t have to use it” (Bloomberg, 2008) seems to be applicable to the OMT programme. The financial markets believed that the programme would really help; they believed the ECB would use it if necessary and speculation on mass bankruptcy and euro-zone dissolution was thus quelled. In turn this led to lower yields and debt costs for countries in trouble, and for now at least, ending the dangerously accelerating yield spreads to Germany for countries such as Spain and Italy. Interestingly, this was accomplished without actually executing outright monetary transactions.

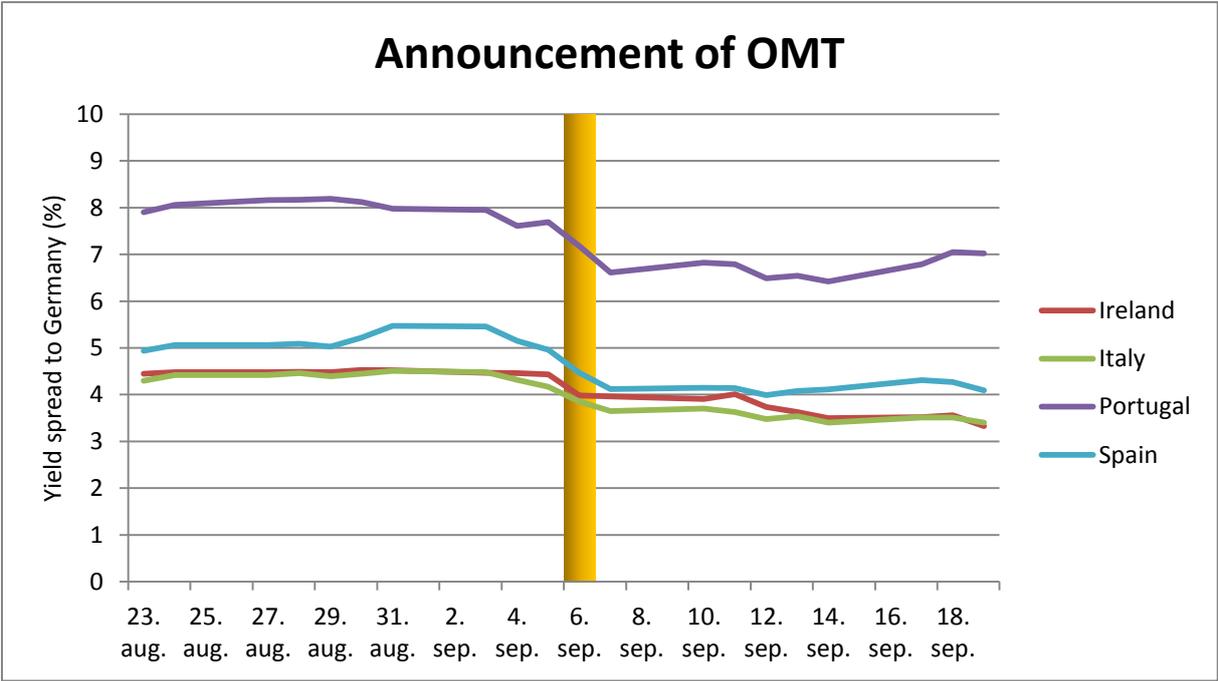


Figure 3: The GIIPS countries, here represented by Ireland Italy, Portugal and Spain largely benefitted from the OMT announcement in terms of decreased borrowing costs.

Table 5: The decreases in yield spreads are significant for almost all countries following the OMT announcement, with the longer event window only enhancing the results.

	AUS	BEL	GRE	IRE	ITA	NET	POR	SPA	UK	FRA
Short window	-0.1	-0.05	-1.79	-0.53	-0.66	-0.03	-1.11	-0.9	-0.1	(-0.05)
Long window	-0.13	-0.14	-2.49	-0.77	-0.83	-0.08	-1.21	-0.97	-0.05	(-0.11)

## 9.2.2 Stock markets and volatility

Table 6: Differences between average stock index values in the estimation window and the three-day event window. Significant changes on a 5% significance level are written in bold and marked out.

Date	Measure taken	BEL	FRA	GER	GRE	IRE	ITA	NET	POR	SPA	UK	EUR	VSTOXX
10.05.10	EFSF/EFSM	0%	-1%	0%	1%	-2%	0%	-1%	2%	1%	-2%	0%	4.93
29.11.10	Future ESM launch	<b>-3%*</b>	<b>-4%*</b>	-1%	-2%	-1%	<b>-5%*</b>	<b>-3%*</b>	<b>-4%*</b>	<b>-6%*</b>	<b>-2%*</b>	<b>-4%*</b>	<b>4.86*</b>
16.12.10	Final ESM go-ahead	<b>-1%*</b>	1%	0%	-2%	1%	0%	1%	-1%	-1%	<b>1%*</b>	1%	<b>-3.50*</b>
21.07.11	Boosting of EFSF	2%	1%	1%	<b>6%*</b>	1%	4%	1%	2%	3%	1%	2%	-3.12
08.12.11	LTRO announcem.	1%	2%	0%	-1%	2%	0%	3%	0%	2%	1%	1%	0.98
22.12.11	1st LTRO allotment	1%	2%	1%	0%	<b>4%*</b>	2%	<b>3%*</b>	0%	2%	1%	2%	<b>-4.65*</b>
01.03.12	2nd LTRO allotment	1%	<b>1%*</b>	1%	-4%	<b>2%*</b>	<b>2%*</b>	0%	<b>1%*</b>	-1%	0%	1%	-1.17
06.09.12	Technical features of OMT	<b>2%*</b>	<b>3%*</b>	<b>3%*</b>	<b>9%*</b>	<b>3%*</b>	<b>6%*</b>	<b>2%*</b>	<b>5%*</b>	<b>7%*</b>	<b>1%*</b>	<b>4%*</b>	<b>-3.08*</b>

Few of the events we tested in this group yielded significant results for stock markets. Five of the events: the EFSF/EFSM announcement on **10 May 2010**; the final ESM go-ahead on **16 December 2010**; and the three LTRO related events on **8 December 2011**, **22 December 2011** and **1 March 2012**; may all be regarded as having positive but to a certain degree negligible effects on stock markets throughout Europe. The changes are generally small and positive, though we observe, for example, that after the first LTRO allotment (22.12.2011), Irish and Dutch stock markets increases 4% and 3%, respectively.

In the previous section, when we tested the yield spreads on the ESM launch on **29 November 2010**, we saw that yield spreads were actually higher after the event, but we concluded that this was due to a flaw in the method, as all the time series showed a sharp rise

in yields up to the event and then flattened out after the announcement. The stock markets tell the same story, as we observe that the post-event values are generally (much) lower after the event, but that this is a result of a sharp decline in stock markets preceding the event.

The enlargement of the EFSF programme on **21 July 2011** seems to have had a positive impact on stock markets, but we only observe a significant increase in that of Greece, which rises by 6%.

As was the case with yield spreads, the one event that had the most positive impact on stock markets is the announcement on **6 September 2012**, where we find significant increases in all stock indexes, several of which are large in amplitude, with averages being as much as 9%, 6%, 5% and 7% higher in Greece, Italy, Portugal and Spain, respectively.

As for volatility, we observe significant changes on **29 November 2010**, **16 December 2010**, **22 December 2011** and **6 September 2012**. The change on 29 November 2010 is positive, i.e. the average of the volatility index is higher after the event. We saw earlier that noise in the time series reduced the quality of the test on this event, and so it is no surprise that the volatility test also produces somewhat “backwards” results. The significant decreases in volatility on 16 December 2010 and 22 December 2011, representing the final ESM go-ahead and the first LTRO allotment, suggests that markets may have perceived these announcements more positively than was indicated by the results from the different stock indexes. Though we did observe rising stock markets in some cases, these were limited to certain markets. The results from the announcement of the technical features of the OMT programme on 6 September 2012 supports our findings from previous sections, as we also see a decline in market uncertainty.

### **9.2.3 Summary**

The empirical evidence suggests that all the events in the group had positive effects on financial markets, but with varying strength.

The first four events relate to programmes designed to provide and manage bailout packages to countries experiencing financial distress (EFSF/EFSM and ESM). Some announcements are however more detailed than others. The events relating to ESM, for example, contain less information, as it announces a programme that will start sometime in the future (2013), while details around the programme are announced gradually, whereas the events related to EFSF and EFSM contain more detailed information, such as the size of the programme in terms of

money. We expected the announcements related to both EFSF/EFSM and ESM to have a positive effect on bond markets, but that the former would have greater effects. The results from the testing of yield spreads supported this, as we both the launch (10 May 2010) and enlargement (21 July 2011) of the EFSF/EFSM programme led to significantly reduced yield spreads. As for the two ESM events in late 2010, however, we did not observe any significant effects on yield spreads. Borrowing costs were generally heavier influenced than stock markets on these events.

The last four events, on the other hand, are related to a new approach in dealing with the crisis. Instead of targeting the management of all bailout packages within the euro-zone, these are announcements related to the LTRO and OMT programme. Rather than infusing money to the government of countries in distress, these programmes take a different approach, dealing directly with financial institutions and the bond market respectively. Thus, compared to the first four events, we suspected that these announcements would have larger effects on stock markets relative to bond market. Our results somewhat confirmed this hypothesis. For example, when the first LTRO allotment was announced on 22 December 2011 our test detects no positive effects on yield spreads. However, when testing the equity indexes on this event, we see indications of rising stock markets. In general, the LTRO events had a somewhat larger effect in stock markets compared to the bond markets (though not large), which we argue may be due to the fact that the LTRO programme is directly targeting banks, and thus arguably creating a larger positive reaction in stock markets than in sovereign bond markets.

That the events related to the LTRO programme did not do anything to help the borrowing costs for these countries such as Italy and Spain, however, which at the time was much the focus of crisis, is a surprise to us, and we find that this should also have been a disappointment for the euro-zone leaders at the time. In general, we find it surprising that the LTRO announcements did not have greater impact. Nonetheless, the results suggest that financial markets did not find the measures adequate in order to save countries such as Italy and Spain

The final announcement, of the technical features of the OMT programme, yields the largest effect of all events. Here, we find significant reductions in all GIIPS countries, as well as seemingly creating a ripple effect across the European sovereign bond markets. We also find

that this event has a tremendous positive impact on stock markets across Europe, as well as significantly reducing market uncertainty.

When we find significant result with a three day event window, we find that using the longer event window confirms our results. For most of the tests, the effect is also stronger for the longer window (i.e. the yields fall more when applying a long event window). However, in the longer picture values tend to converge back to previous level.

We see that it is very useful to cross-check our results with the usage of “eyeball econometrics”, as the data plots may reveal more information than just looking at our numerical results. Notably, the announcement of the future ESM launch on 29 November is so affected by noise in the time series that the event can probably be discarded from our analysis. The test results here indicate rising yields as well as plummeting stock markets and increased market uncertainty, but the graphs tell us that the announcement probably helped stopping a negative development in the respective indicators.

## 9.3 Group three – speeches

The final group of events in our studies consists of speeches and statements made by spokespersons from different parties during the Euro crisis. We have included statements from the ECB, which is the central bank representing the Euro area as a whole; from Spain and Greece, two of the most important PIIGS countries; and from Germany, the largest economy in Europe, and also the main creditor of the indebted countries.

### 9.3.1 Yield spreads

**Table 7: Differences between average yield spreads in the estimation window and the three-day event window. Significant changes on a 5% significance level are written in bold and marked out.**

Date	Speaker	AUS	BEL	FRA	GRE	IRE	ITA	NET	POR	SPA	UK
18.03.10	Papandreou	-0.01	0.00	<b>0.02*</b>	<b>0.20*</b>	<b>0.09*</b>	<b>0.05*</b>	0.00	<b>0.09*</b>	<b>0.07*</b>	<b>-0.05*</b>
09.06.11	Schäuble	-0.02	0.01	0.00	<b>0.60*</b>	0.25	<b>0.10*</b>	0.00	<b>0.67*</b>	<b>0.17*</b>	-0.04
31.10.11	Papandreou	<b>0.15*</b>	<b>0.28*</b>	0.10	<b>1.07*</b>	0.09	<b>0.60*</b>	0.01	-0.07	<b>0.34*</b>	0.00
24.05.12	Rajoi	<b>-0.17*</b>	-0.07	<b>-0.22*</b>	1.72	0.22	0.02	<b>-0.07*</b>	0.63	0.21	-0.03
08.06.12	Merkel	0.04	0.04	<b>0.11*</b>	-0.86	<b>-0.18*</b>	0.08	<b>0.12*</b>	<b>-1.21*</b>	0.02	-0.05
26.07.12	Draghi	-0.07	-0.02	<b>-0.10*</b>	0.59	<b>-0.25*</b>	<b>-0.31*</b>	<b>-0.06*</b>	<b>0.47*</b>	-0.45	<b>-0.12*</b>
02.08.12	Draghi	<b>-0.16*</b>	<b>-0.18*</b>	<b>-0.14</b>	-1.22	-0.21	-0.13	<b>-0.12*</b>	-0.28	-0.21	0.07

The first event took place on **18 March 2010**, when Greek Prime Minister Papandreou made a statement in the European Parliament in Brussels. Having witnessed that borrowing costs were going through the roof as a consequence of the country’s high debt, he put pressure on the other Euro countries to reach out to Greece, or else they would turn to the IMF. In other words, Greece were requesting for a savage package. The yield on Greek 10-year government bonds were at this point approximately 3 per cent above those of Germany, whereas other European bond yields – the other PIIGS countries included – were still fairly low, with only Portuguese and Irish bonds surpassing the German 10-year yield by more than one per cent. Nevertheless, Papandreou’s rather explicit threat would prove to have an impact, as our test detects small, but significant increases in the yield spread in all GIIPS countries, suggesting growing scepticism among investors (see figure 19). The test performed with a 10-day event window supports these results, as we see that the change is significant also in the longer term.

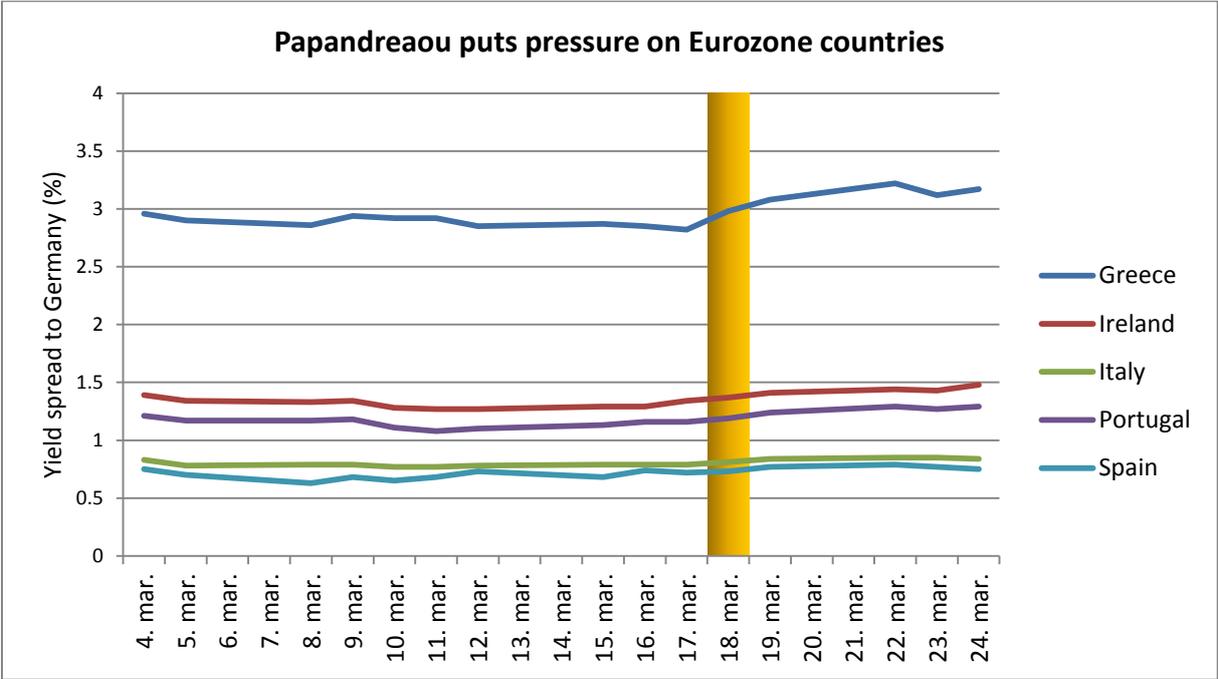


Figure 19: All GIIPS countries, in particular Greece, faced increased borrowing costs following Papandreou's statement.

**On 9 June 2011**, Germany shared their opinions about the on-going development with the rest of the world. The German finance minister, Wolfgang Schäube, stated in an open letter to the ECB, the commission and the other 16 finance ministers of the Euro zone, that another Greek bailout would have to be accompanied by a restructuring of the Greek debt, meaning that private creditors would have to take haircuts or heavy losses on their lending to the Greek government. By acknowledging that another bailout of Greek was required, the statement was also an indirect confession about the failure of the first Greek savage package. Here, we

observe a statistically significant widening of the yield spread in four of the countries in our dataset: Greece (0.60%), Italy (0.10%), Portugal (0.67%) and Spain (0.34%) (see figure 20). The increase is also significant 10 days after the event.

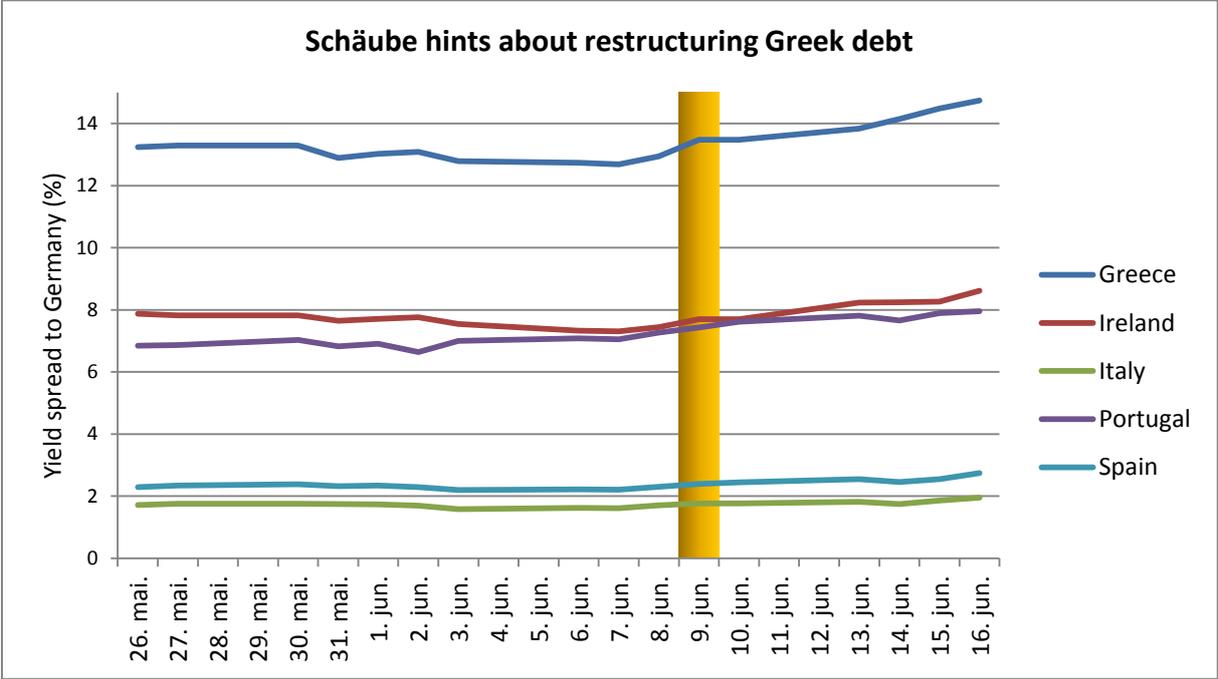


Figure 20: GIIPS countries were affected by Schäube's statement, as their yield spreads increased (Ireland's not detected as statistically significant, however).

In the late fall of 2011, Greek Prime Minister Papandreou surprised the world by calling for a referendum vote on the terms laid forth in the proposed new Greek rescue package. He stated this on **31 October**, and the yield spreads immediately increased in the most troubled economies, and especially those of Greece and Italy, where we observe increases of 1.07% and 0.60%, respectively. As we can see from figure 21 below, however, another event seems to have had an impact, though in the opposite direction, prior to the Prime Ministers statement. This was when the capacity in the EFSF was further leveraged, thus calming investors, and to a certain degree offsetting the consequences of the Greek referendum proposal. Only three days after he had called for a referendum vote, Papandreou backed down from his call, but though this may have mitigate some of the negative consequences, our results indicate that the damage was already done, with changes still being significant – and larger in numbers – in the 10-day event window. It is worth noting, however, that the impact here is clearest in Greece, Spain and Italy, but also in Austria, Belgium and France we see significantly increased yield spreads both in the short and long term event window. Somewhat surprisingly, Portugal and Ireland seem almost unaffected by the announcement.

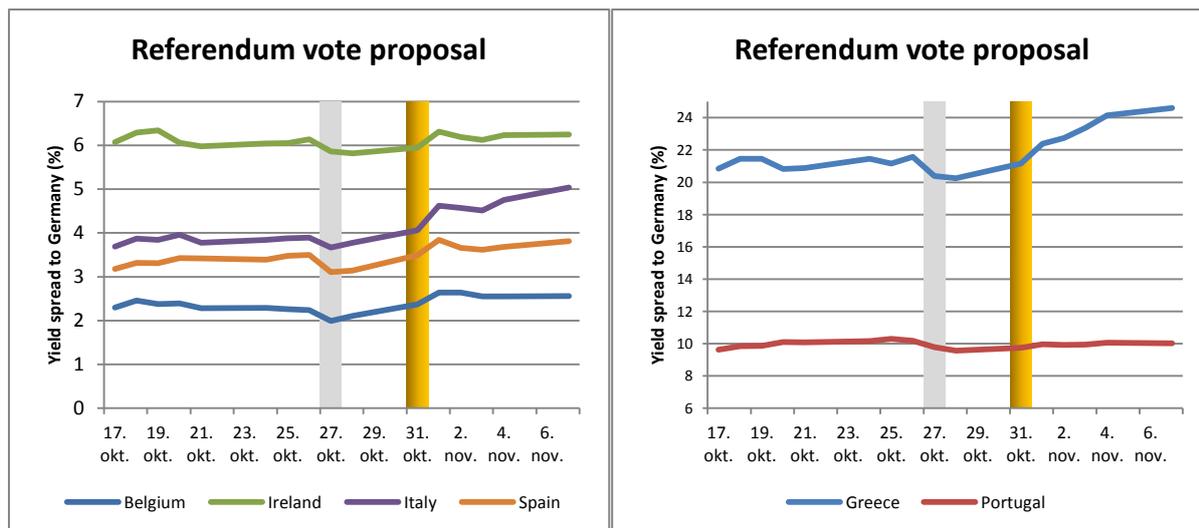


Figure 21: Papandreou's call for a referendum was not well received by bondholders, though the effect is somewhat offset by a leveraging of the EFSF on 27 October.

We tested four statements made from different parties in the crisis during the hectic summer of 2012. The first one of these came from the Spanish Prime Minister, Mariano Rajoy, who was concerned about the ever increasing borrowing costs for Spain, and therefore reached out to the ECB for help, on **24 May**. Here, the test detects no significant changes in any countries but France, Belgium and Netherlands, where we observe significant reductions in the yield spread. The PIIGS countries, on the other hand, seem unaffected around this event. It seems hard to explain why this statement would lower the yield on the French, Belgian and Dutch government bonds. However, the Euro crisis was deepening at this time, with investors getting more and more unsecure about the fiscal union's future. German bonds are the safe haven in the Euro zone, and the 10-year yield were record low. Therefore, market players would go searching for other relatively safe debt instruments, with France, Belgium, Austria and Netherlands being natural choices, thus pushing the yield down (Costa, 2012). It is, however, hard to tell whether this is a result of the explicit event we tested for.

On **8 June 2012**, as Europe was more and more worried about especially the Spanish economy Germany's Angela Merkel stated that her nation is prepared to do whatever is necessary to handle the European debt crisis. Following a conference with among others British Prime Minister David Cameron, Merkel stressed that "we have created the instruments for support in the euro zone and [...] Germany is ready to use these instruments whenever it may prove necessary". We suspected that this would be perceived as a clear and positive signal to financial markets, but our test only detects significant decreases in the yield spread in Portugal (-1.21%) and Ireland (-0.18%), with the latter, though significant, being relatively

modest. However, it is important to see Merkel's announcement in the light of the circumstances. On 7 June, i.e. one day earlier, Spain's credit rating was degraded from A to BBB, and Merkel's statement was more or less a reaction to this. Furthermore, Spain recently had to bailout one of the country's largest banking groups, and investors across Europe were increasingly concerned about an eventual bailout of the Spanish economy (Ruano & Rinke, 2012). Thus, Merkel's seemingly positive statement may probably not have done much to calm down markets.

On **26 July 2012**<sup>11</sup> the president of the ECB, Mario Draghi, made a statement similar to that of Merkel's, when he promised to do "whatever it takes" to save the Euro. Here, the results are more promising, as we observe significant decreases in the yield spread of four countries (see figure 22), and minor but non-significant decreases in all other countries except Greece and Portugal. However, the data material suggests that the test may be underestimating the impact of Draghi's speech, as the time series plots show that yield spreads appear to be stabilized on a consistently lower level after the event. This is further supported by the results from testing with a 10-day event window, where we generally observe that the decreases in the yield spread are higher. However, the image is more striking if we stretch the time frame to cover one month before and one month after the speech. Yield spreads were more or less constantly rising in the heavily indebted peripheral countries up to 26 July, but then started to decrease and remain stably lower. We cannot give Draghi's speech the whole credit for this, but that was likely to be the initial shock to push yields down in the desired direction.

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<sup>11</sup> The Spanish bailout on 20 July 2012 is present in the estimation window. The effect of this announcement was somewhat negative, as yield spreads increased and stock markets declined, and is thus a source of noise in the estimation window. However, the data plots support the positive impact of Draghi's speech nonetheless.

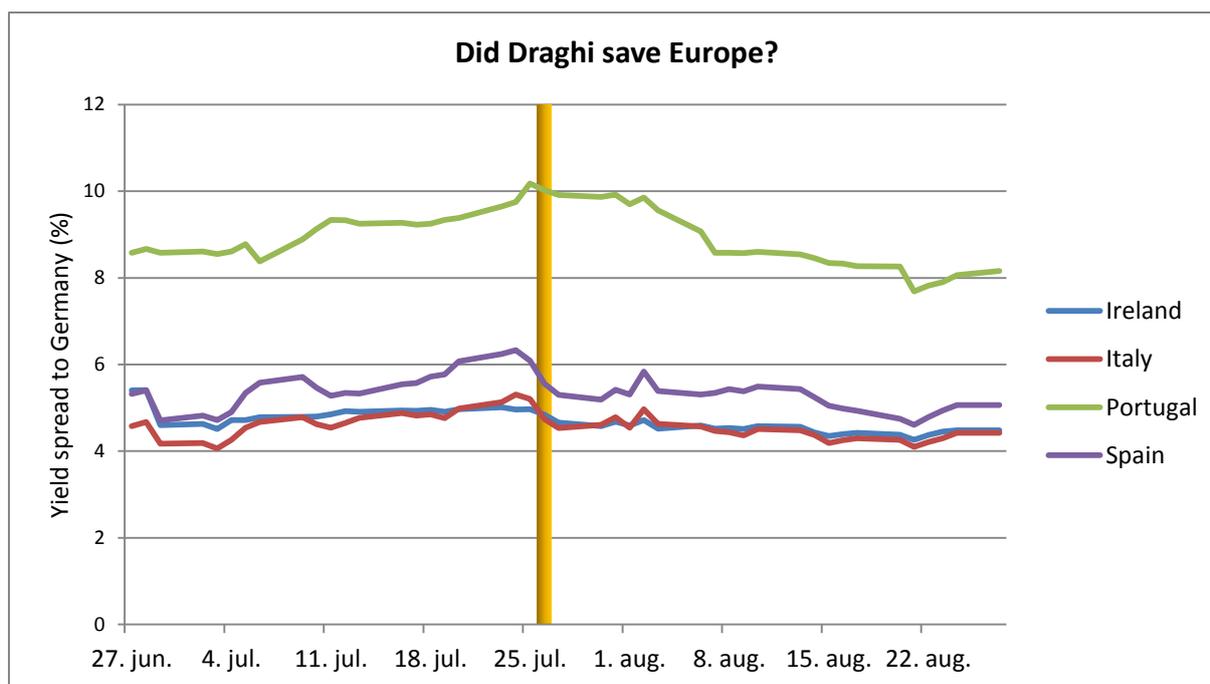


Figure 22: When we investigate the longer picture with regards to Draghi's speech, we clearly see the announcement as a turning point for yield spreads of the GIIPS countries.

The next event is closely related to the previous. After Draghi's promise to save Europe, markets were expecting more concrete messages from the ECB. On **2 August 2012** Mario Draghi came with another announcement. However, no technical features about the political actions were presented; Draghi only hinted that the ECB would start buying government bonds. The technical features would not be presented before the 6<sup>th</sup> of September, an event that we discussed in group two (where we observed large and positive effects on markets). A t-test with a short event window gives significant result for Austria (-0.16%), Belgium (-0.18%), France (-0.14%), Ireland (-0.21%) and the Netherlands (-0.12%). We see therefore, that the signal of sovereign bond buying from the ECB only generated significant results for the countries with already low yield spreads – and Ireland. The results from this test are somewhat ambiguous. On the one hand, we see that the yield spreads are generally lower after the event. However, for the two most important countries at the time, Spain and Italy, the decreases are small and far from significant. What is more striking, perhaps, is that on the actual day of the event, yield spreads tended to increase (see figure 23), only to decrease again the next day. This may indicate that markets were disappointed by the lack of concrete action from the central bank. Testing with a long window we find significantly lower average yield spreads also in the GIIPS countries, with reductions of 2.0, 1.0, 0.4 and 0.4 per cent in Greece, Portugal, Spain and Italy, respectively.

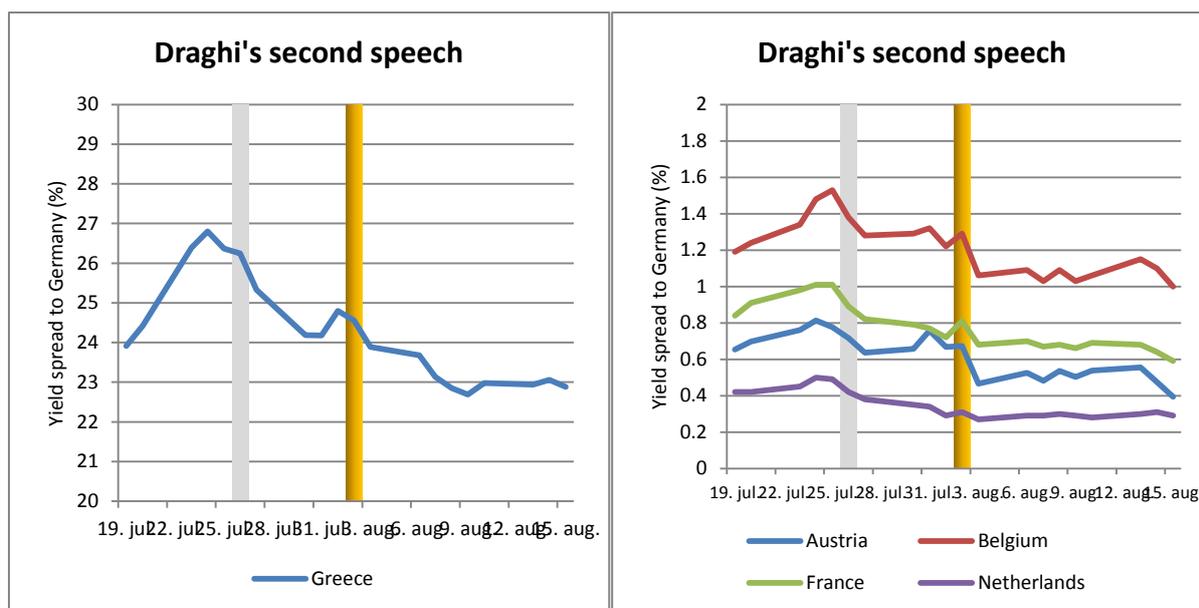


Figure 23: The figure indicates that bondholders were not too happy with Draghi's speech, as the graphs show that yield spreads had a small upwards bump on the day of the event.

### 9.3.2 Stock market and volatility

Table 8: Differences between average stock index values in the estimation window and the three-day event window. Significant changes on a 5% significance level are written in bold and marked out.

Date	Speaker	BEL	FRA	GER	GRE	IRE	ITA	NET	POR	SPA	UK	EUR	VSTOXX
18.03.10	Papandreou	1%	0%	1%	<b>-5%*</b>	3%	1%	0%	1%	0%	1%	0%	-0.93
09.06.11	Schäube	<b>-2%*</b>	<b>-2%*</b>	0%	-3%	<b>-1%*</b>	<b>-3%*</b>	<b>-2%*</b>	<b>-3%*</b>	<b>-2%*</b>	<b>-2%*</b>	<b>-2%*</b>	0.04
31.10.11	Papandreou	<b>-3%*</b>	-2%	-1%	-1%	0%	<b>-5%*</b>	-1%	<b>-4%*</b>	-2%	-1%	-2%	2.25
24.05.12	Rajoy	0%	0%	-1%	<b>-13%*</b>	0%	-2%	-1%	-6%	-3%	-1%	-1%	-0.56
11.06.12	Merkel	0%	1%	-1%	-1%	-1%	1%	1%	-1%	<b>4%*</b>	<b>2%*</b>	1%	-1.74
26.07.12	Draghi	<b>3%*</b>	<b>3%*</b>	2%	-4%	-1%	3%	<b>3%*</b>	-2%	3%	0%	3%	1.84
02.08.12	Draghi	2%	4%	3%	0%	1%	5%	2%	0%	5%	2%	4%	-1.42

The first event, Greece's call for financial help on **18 March 2010**, had no significant impact on European stock markets, with one exception – that of Greece. Here, we observe a decrease of 5% in the benchmark equity index. The finding that European markets in general were not affected is further supported by the VSTOXX showing no signs of significant changes (see figure 24). Papandreou's statement underpinned the trouble in the Greek economy, and a decrease in stock prices seems plausible, as investors are increasingly worried about the future earnings of Greek businesses.

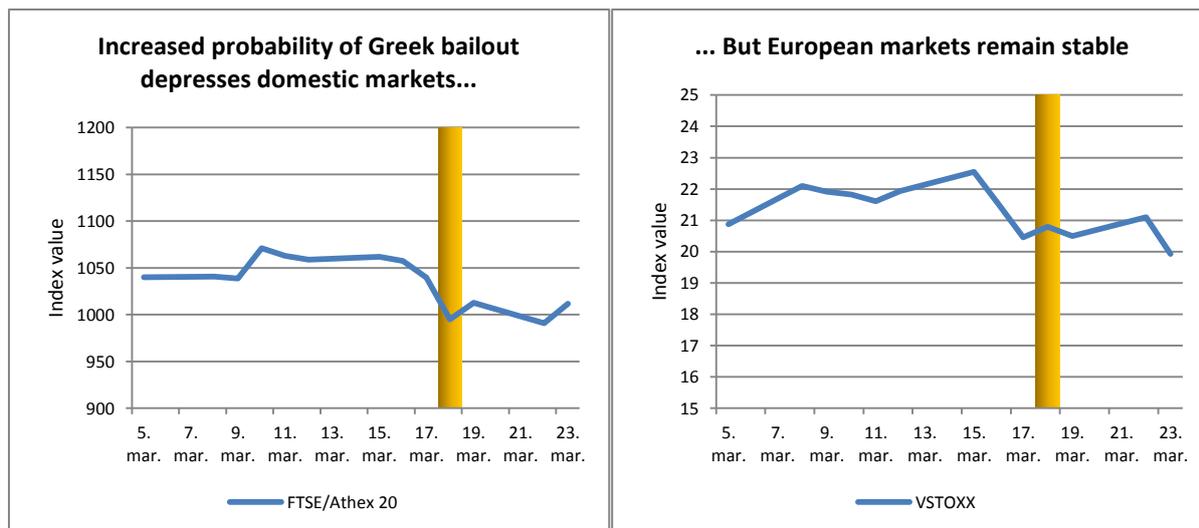


Figure 24: Papandreou's statement seems to have influenced mostly domestic equity markets, as these decline following the event, whereas uncertainty in the European markets in general were unaffected.

The condition proposed by Germany **9 June 2010** that the Greek debt would have to be restructured in the case of a second bailout on would imply losses for creditors. We thus suspected that this statement could have a negative impact on stock prices in Europe. This was confirmed by our results, which showed decrease in stock prices in all 11 stock indexes, except those of Germany and Greece. Greece's index seems to have had a drop here as well, but the high variance within the data may contribute to the test not finding this significant. The fact that the German market perceives the statement about a “conditional” bailout more positively than other economies seems reasonable, since Germany is the foremost contributor to a potential bailout of Greece. There were no significant changes in the volatility index after the event.

The referendum call by Greek Prime Minister Papandreou on **31 October 2011** was undoubtedly surprising, also to stock markets. However, though we observe decreasing stock indexes in almost all economies, few of these are statistically significant. As we touched upon in our discussion about the yield spreads, the boosting of the EFSF capacity was agreed upon four days prior to Papandreou's statement. This was clearly positively perceived by stock markets, as we observe a jump in index values on this date. This naturally offsets some of the negative impact from the Greek referendum discussion, as we can see on the graph below (figure 25), which is showing the Eurozone benchmark equity index, STOXX<sup>12</sup>. The story is even better illustrated by the VSTOXX, though the increase is not detected as statistically

<sup>12</sup> Note that the effect here happens after the event date, as Papandreou made his statement in the later hours.

significant because of the noise in the data. Implied volatility increases from 30% on 27 October to well above 40% after the Greek Prime Minister's statement, indicating that the announcement certainly mattered to investors.

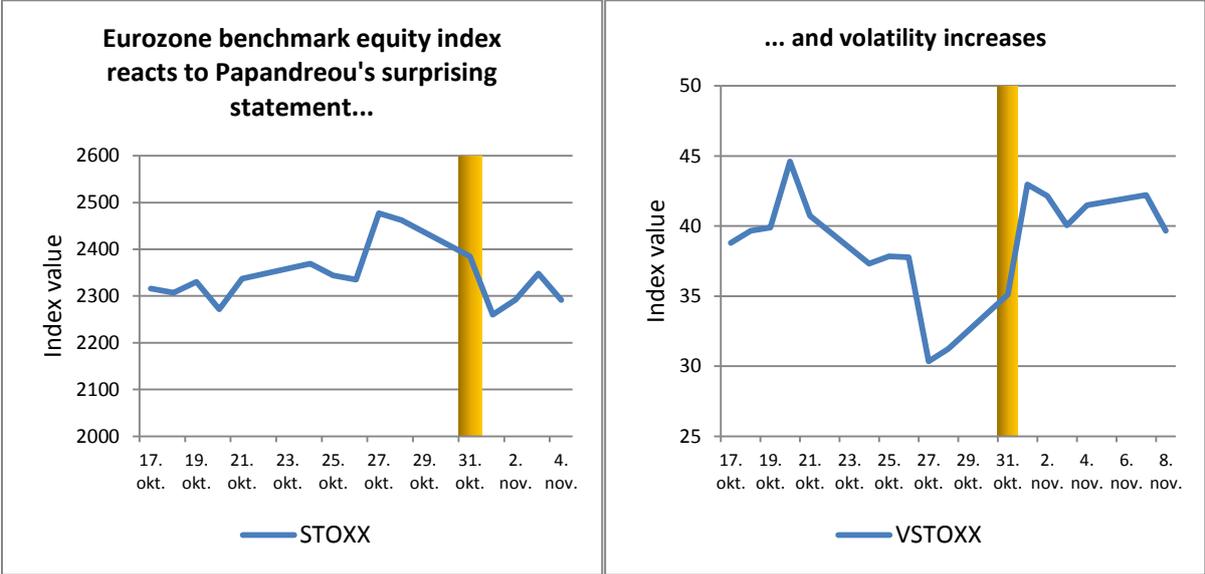


Figure 25: Papandreou's referendum call depressed European stock markets, as shown by the data on the STOXX index, as well as an increase in the VSTOXX.

The request for help from the ECB made by Spanish Prime Minister on **24 May 2012** did not lead to any significant changes in the stock indexes. In Greece we observe that the average index value is as much as 13% lower after the event, which is statistically significant, but the index was falling throughout the whole estimation window, reflecting a fundamental downturn in the economy, which is also why the pre- and post-event averages differ so much. We thus conclude that the particular statement by Mariano Rajoy event was not important to the stock market.

When Angela Merkel promised that Germany would do whatever was necessary to save the Euro on **8 June 2012**, we only see a significant change in the Spanish and British stock market, with the most prominent being the former, where we observe an increase of 4% in the Spanish IBEX 35. Though it is not surprising that Merkel's announcement affects Spain the most – after all, she addressed the Spanish economy – it may be premature to say that the statement alone boosted Spanish stocks. The Spanish economy was highly debated and questioned at the time being, and it is especially hard to isolate the event's impact in this case. Nonetheless, the IBEX 35 is higher both in the short (4% increase) and long term event window (6% increase).

Now we turn to Mario Draghi’s “whatever it takes” speech on **26 July 2012**. Our results here indicate that stock markets are rising, but we only observe statistically significant increases in the indexes of Belgium, France and Netherlands; all of which increase by 3%. However, for most indexes there is a downturn some days prior to the event, probably caused by formal requests about financial aid from Spain and Cyprus as well as a massive credit downgrading of European banks. The data plots clearly suggest an increase in stock indexes for nearly all countries after Draghi’s speech, all of which are further supported and increased over the 10-day event window (see figure 26). What are most striking on this date however, are the values of Spain and Italy. These were the two economies that first and foremost were addressed in Draghi’s speech, and markets rallied in both countries. Spanish IBEX 35 and Italian FTSE/MIB increased by 6.1% and 5.6% respectively from the 25<sup>th</sup> to the 26<sup>th</sup> of July. The impressive impact on stock markets received much attention from analysts. Sceptics questioned, however, whether the effect was only transient. Draghi had chosen his words carefully and promised a rescue of the Eurozone. He was, however, not very specific in describing how they should do it, but markets interpreted the wording as a sign of substantial market intervention. The question raised by analysts was whether and when the ECB would turn promises into action. If this did not happen quickly, the market euphoria would not last long (Evans-Pritchard, 2012).

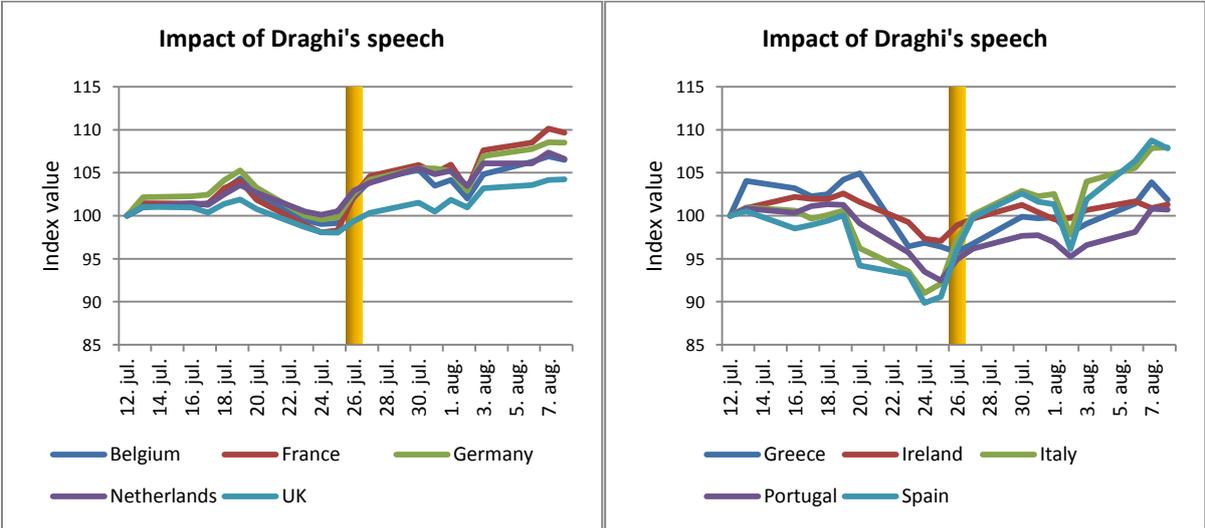


Figure 26: Draghi’s speech had stock markets rally all throughout Europe.

We argued in the last section that the data on yield spreads may have been an indication that markets were not that enthusiastic about Draghi’s not-that-concrete hints about buying government debt on **2 August**. For stock indexes, the only significant change in our test on

stock indexes is a 2% increase in that of UK. We see that on the date of the announcement, most indexes have a sharp drop in values (see figure 27). This further supports our finding that markets were actually disappointed initially (but then recovered the very next day).

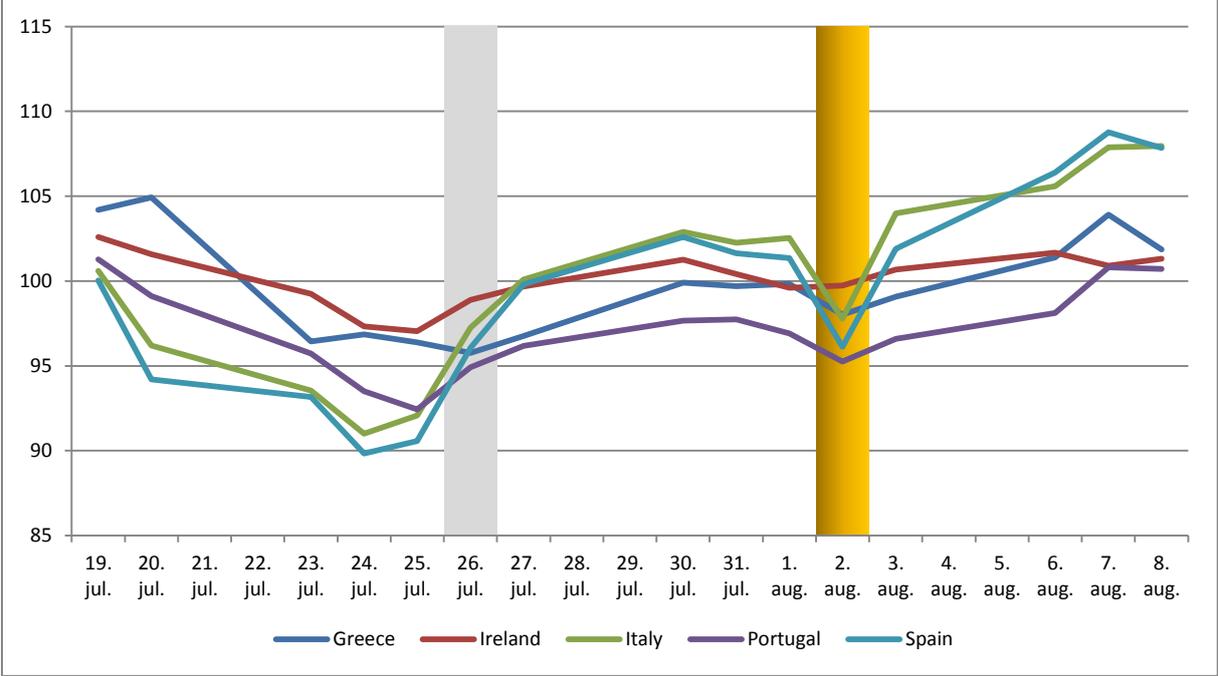


Figure 27: The indications that Draghi's speech on 2 August was somewhat disappointing to financial markets are even stronger in stock markets than bond markets, as the drop in values is very apparent. The grey area marks Draghi's first speech.

The story about Draghi's two speeches fits well with the VSTOXX chart (figure 28). Here, we see that volatility, arguably as a result of the uncertainty about the Spanish economy, is increasing heavily up to the point where Draghi held his first speech. Then, we observe a decrease in the VSTOXX. However, this speech was not enough to offset the large increases preceding the announcement, and the decrease is not statistically significant. In the following days, however, uncertainty again becomes apparent as markets are still awaiting more concrete statements by the central bank. He then makes his second speech on 2 August, and markets are calming down – but not enough for our test to detect a significant decrease in the volatility index here either.

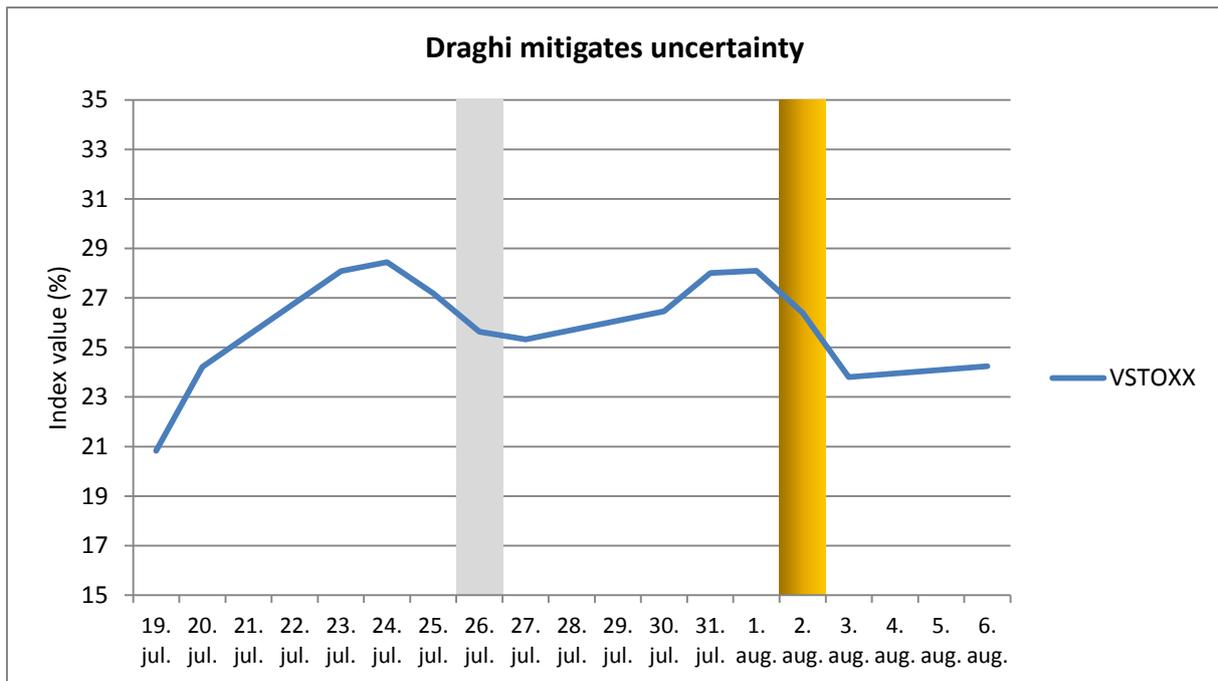


Figure 28: The VSTOXX chart shows that both Draghi's speeches decreased uncertainty, though data noise results in that the changes are not detected as significant.

### 9.3.3 Summary

Financial markets react to statements made by powerful politicians. We see that both leaders of creditor and borrower countries can influence international markets. It is interesting to see the prominent role that Germany plays within the Eurozone. Our results clearly suggest that statements made by German politicians can be significant to markets. It is, however, worth noticing the difference in the results from Merkel's statement on 8 June 2012 and that of Draghi on 26 July 2012. Their message was rather similar, with both speakers advocating that they would do whatever was necessary to circumvent a downfall of the Euro economy, but the reaction of financial markets was totally different, with Draghi's speech creating significantly more optimism. These results indicate that the ECB itself is the most powerful player in the European economy, though Germany clearly is the most important country.

We also see that the public is not easily manipulated. The impact of Draghi's "whatever it takes"-speech was impressive in the way it turned markets around, but to maintain that effect, more concrete measures had to be taken. The technical features of the pending programme were presented one and a half month after the initial speech, and we believe that a negative bounce-back would have been likely if markets would have had to wait longer for this. After this announcement markets really rallied. However, even if investors were not very

enthusiastic when Draghi did not come through with any specifics in his statement on 2 August, this setback was really just a one-day deviation from the positive development over the preceding week.

As for which countries' yield spreads are most affected by the events we have tested for in this group, we find that these are, not surprisingly, those economies that are most indebted. We also observe significant reactions in Italy and Spain to those events taking place in 2010 and 2011, which is arguably before these countries were in serious difficulties – supporting a claim that bondholders “knew” what would happen. The largest absolute changes are found in Greece and Portugal, as the yields are highest in these countries and also fluctuates the most. Looking at the safer economies in our dataset, we see that reactions are typically stronger in Austria, Belgium and France than in Netherlands and UK. This is not surprising, the two latter are – along with Germany – the only countries in our dataset currently holding an AAA credit rating. The pattern is therefore that it seems to be a correlation between the level of uncertainty in a given economy and the impact of political statements.

Two events stand out as particularly important to the stock market, namely the statement made by Wolfgang Schäube on 9 June 2010 and in particular that of Mario Draghi on 26 July 2012. As for volatility, no events are statistically significant, but the VSTOXX can in many cases still serve as an indicator of the sentiment, simply by looking at the day-to-day changes.

We find that the reactions in respective markets are sensitive to the condition of a given country's economic situation at the time. After Papandreou's referendum call, we see that Belgium is the only country, together with Portugal and Italy where we observe a significant stock market decline. As mentioned earlier, in late 2011, questions were raised about the Belgian economy; cf. the bailout of Dexia, and this might make the Belgian markets relatively more sensitive to negative news. Also, Spanish stock values reacted particularly strong to statements made in the summer of 2012, as this was the most topical economy at the time and indeed the centre of attention.

However, compared to the yield spreads, stock markets across Europe are in general more homogeneous in its reactions, with the impact on GIIPS stock markets and the rest of Europe being more similar. Still, stock markets in the former tend to react more. And though stock markets across Europe tend to develop much in the same fashion, we still observe greater fluctuation in Greece than any other country.

## 10. Analysis of the three event groups

The purpose of this paper is to investigate whether announcements and statements by politicians have affected the most important macroeconomic indicators during the Euro crisis. There are two aspects to this. On the one hand, as we in our study look at how markets are reacting to the *announcements* of different measures, we can evaluate whether communication per se is an effective measure. On the other hand, by seeing how bond and stock markets react, we can also evaluate whether the announcements are positively perceived by respective markets.

Our approach was to divide our events into three different groups. The three event groups differ in the way that the first group consists of the announcement of rescue packages to particular countries, the second group consists of the announcement of measures directed to the Euro zone as a whole, and the third group consists of speeches and statements related to the crisis made by political spokespersons.

How markets will react to the different events is dependent on several aspects. Because we test the effect on financial markets, the element of surprise will be important. Markets will not react if the communicated message is "old news", that is, if the market has priced in the information beforehand. This can be a possible explanation for the different reactions we find across groups, as the degree to which information is already known will determine the magnitude of the reactions.

The first two groups are announcement large policy operations, and thus it is not correct to claim that the observed effect of these events is a result of communication in itself. Nonetheless, the events represent the *announcements* of the respective measures, and so they, too, provide us with information about the effect of communication.

Perhaps the latter of the three groups is the single most interesting with regards to theory about communication, as these events are not announcements of concrete future actions, but rather somewhat loose statements made by different parties of the crisis. This is the group that is most closely related to our discussion in section 7. By comparing the results from this event group to those of the two other groups, we find that we can better evaluate the strength of communication as a measure to influence markets. This is because we can use the two other

groups as a kind of benchmark, as these events represent the announcements of the most important monetary political measures taken during the crisis.

## 10.1 Comparative summary of the three groups

In general, we found that the announcements of rescue packages to particular countries to produce ambiguous results. In general, however, markets seem to respond in a negative manner to these events. Results indicate that these announcements are to a larger degree than the two other groups of events priced into markets beforehand, as we found few events with large changes on the actual day of the events, while on the other hand we found reactions to be rather severe in the way that the period surrounding these events were characterized by large fluctuations in the stock markets and thus large differences between pre- and post-event values. Statistical evidence does not suggest that the rescue packages is relieving market tension, as we both found events leading to higher and lower volatility – with most results suggesting the former.

Compared to the first group of events we suspected that the events in the second group had a different effect across nations. Whereas the first group was country specific measures, the second group of events consists of measures that are not specified to one country. The ESM programme, for example, is a “permanent crisis resolution mechanism for *[all]* the countries of the euro area” ([esm.europa.eu](http://esm.europa.eu)). Unlike the first group of events, all programme announcements arguably had positive effects, however not all equally large.

Our third event group contained statements yielding both positive and negative results, indicating, not surprisingly, that politicians are capable of both pleasing and upsetting markets. This was clearly the events that had the least impact on volatility, as none of the events led to significant changes.

## 10.2 Magnitude of reactions

We find it interesting to look at the magnitude of the reactions. That is, to compare the size of the changes in the different groups. In figure 29, we have calculated the average reaction to the events in all groups in absolute yield spread change, i.e. not taken into account the sign of the change, for each country. Here, we see clearly that the largest reactions in absolute terms are found on the events related to program announcements (group two). We also see that the speeches and statements in group three have induced large changes in many cases, on average

equal in size to that of the rescue package announcements. Additionally, the figure illustrates that the impact in terms of absolute values is by far largest in the GIIPS countries.

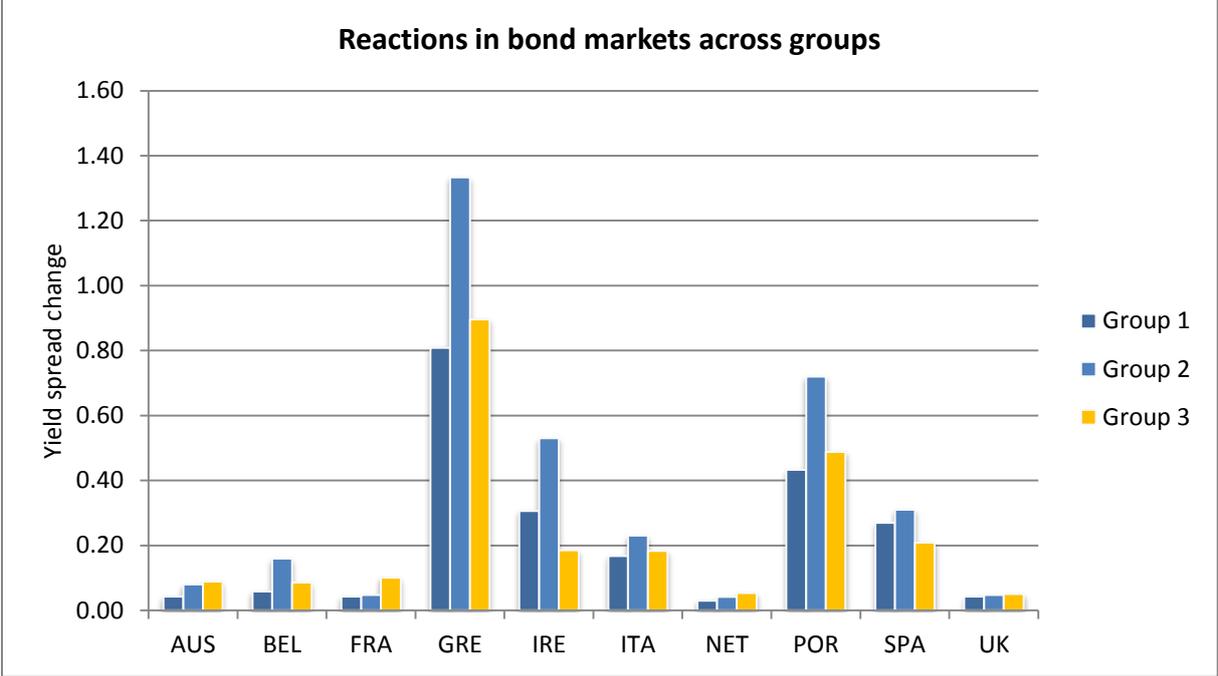


Figure 29: Comparison of reactions across groups. We have averaged the changes in absolute yield spreads on the event dates for each country in each group.

In figure 30, we have done the same comparison of the stock index changes in absolute terms. This figure shows that stock markets are much more similar across countries, as the difference between the GIIPS countries and the other countries are not as high as was the case with yield spreads. Unlike bond markets, stock markets seem to react most to the bailout agreements. As previously stated, however, this is partly due to the heavy fluctuations around the bailout events, which in many cases make our test less plausible. Still, this latter point, too, indicate that bailout packages largely influence stock markets – which is further supported by the finding that all bailout announcements except that of Portugal’s induced significant changes in market volatility.

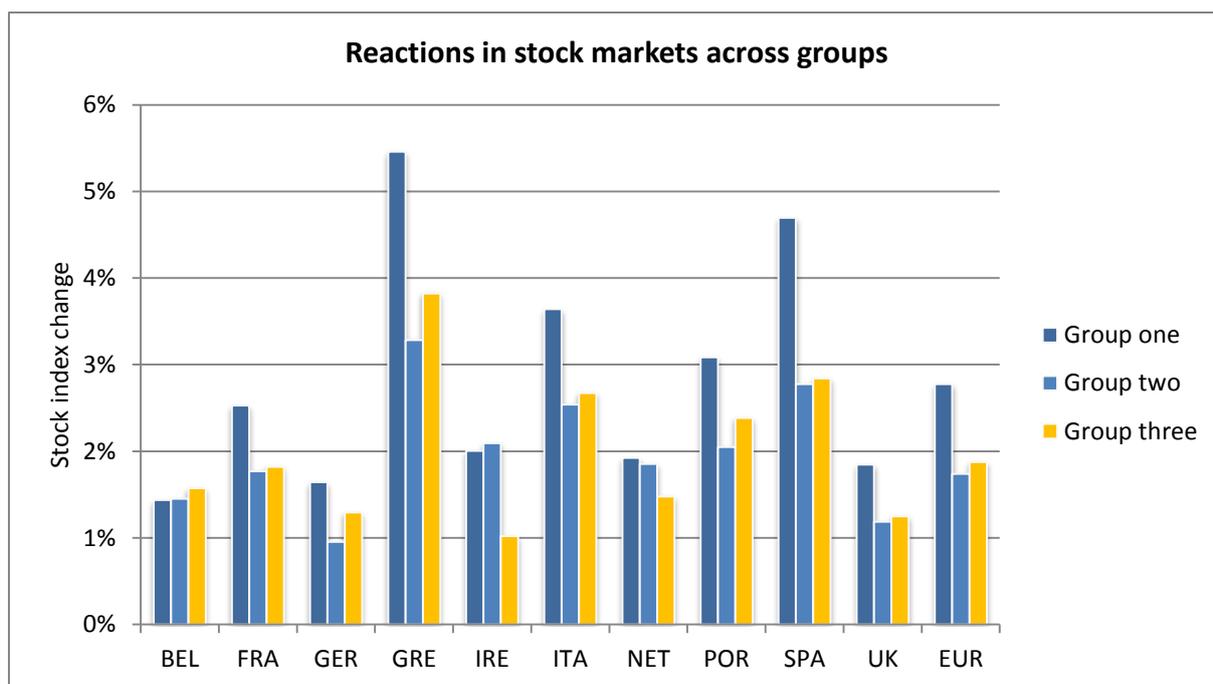


Figure 30: Comparison of stock market reactions across groups. We have averaged the changes in absolute stock index changes on the event dates for each market in each group.

### 10.3 Differences across countries

In section 4, we found that the source and nature of the crisis in the different nations were very different. However, some similarities were found, as for example both the Spanish and Irish economy were shook by collapses of real estate markets which made the banking sector suffer. Nonetheless, the fact that the euro zone is different from country to country makes it especially interesting to investigate whether we see any pattern as to what countries and markets are relatively more affected by the events in our study.

Clearly, the GIIPS countries are the countries most affected in generally all cases, but amongst these five countries there is not very easy to see systematic differences in market reactions. Also, a decrease in the yield spread of 2% in Greece cannot be claim as being as big an effect as a 2% decrease in other countries. One observation, though arguably not very surprising, is that the results suggest that the amplitude of market reactions is conditional on the situation the county is in. For example, Spanish bond yields and equity markets tended to react more on the events taking place at later parts of the crisis, whereas Greek and Portuguese bond yields have generally been rather sensitive to announcements throughout the whole period. Of the GIIPS countries, it seems as if Italy has been the least affected by our events, especially government bond yields, as suggested also by figure 29. As for the other

countries in the euro zone, we find that equity markets largely reacted in the same manner to the events we tested, whereas for yield spreads UK and Netherlands stand out as more or less unaffected. These are also the only countries which yields spreads we tested currently holding an AAA credit rating.

That we cannot make any conclusions of there being countries standing out as relatively more or less affected in either positive or negative terms can arguably be seen in light of the discussion about mispricing of assets in section 2.4. Here, we found that contagion effects were a source of asset price fluctuations. Indeed, it seems as if the respective indicators of asset values in especially the GIIPS countries react much in the same manner.

## 10.4 Duration of effects

Next, we hoped that the results would provide us with some basis for saying something about the duration of the effects from the different announcements. The results we found in the bailout announcements group suggest that these lead to persistent market reactions. Significant results in the short window remained, for the most part, persistent also in the longer picture. Interestingly, the one bailout that seemingly had positive effects on markets, the bailout of Ireland, was characterized by a bounce-back effect, with yield spreads soon converging back to the higher levels from before the announcement. This result further supports our findings that the announcement of rescue packages cannot be claimed to have had positive impacts on financial markets. Concerning the events in group two (programme announcements) and three (speeches), we find that events causing a significant impact in the three-day event window generally also had an effect in the ten-day window.

In evaluating the duration of the effects, however, it may in many cases be useful to go beyond the 10-day window we have defined in our test method, and observe how the indicators are developing in the longer run. This generally yields less promising results for the programme announcements in group two. For these events the seemingly positive effects on yield spreads and stock markets soon evaporate as the indicators go back to previous levels. For example, we found that the announcement of the EFSF and the EFSM programmes on 9 May 2010 significantly reduced yields both in the three and ten day event window for Greece, Ireland and Portugal. But if we investigate the longer picture, we clearly see that there is a bounce-back effect (see figure 31).

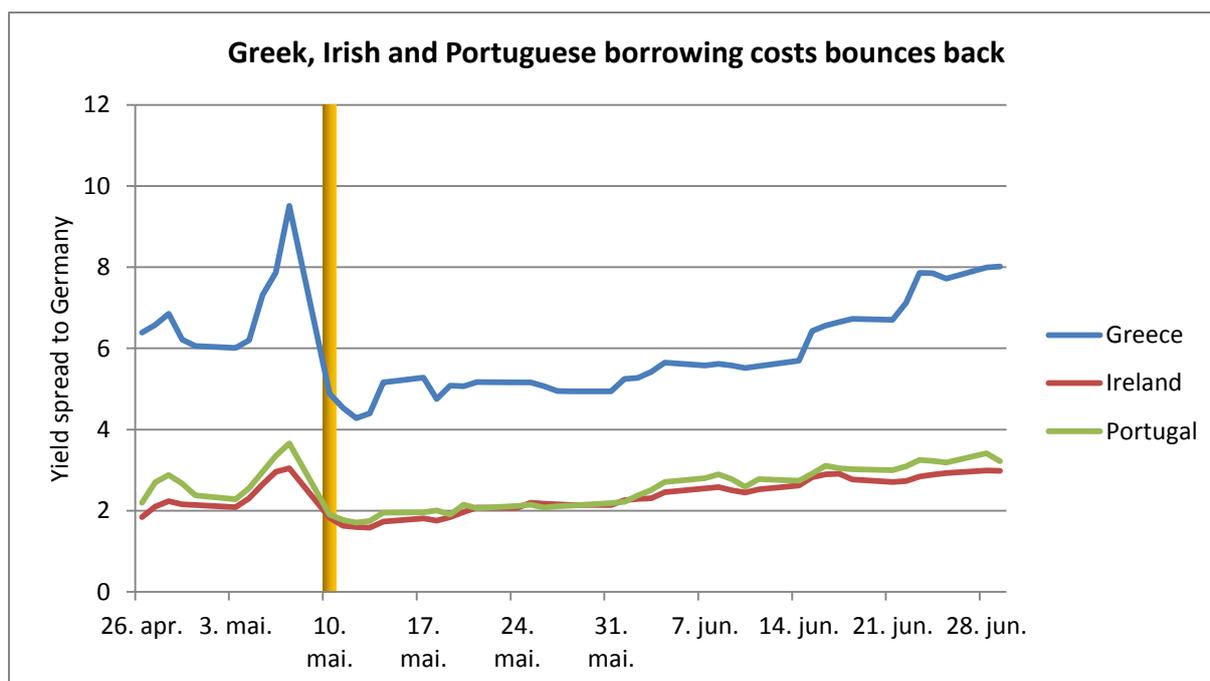


Figure 31: The reaction of bond markets to the announcement of the EFSF and EFSM programmes in May 2010.

However, we find the boosting of the EFSF programme in July 2011 to be an exception (see figure 32). Here too, we found significant decreases in the yield spreads in Greece, Ireland and Portugal. For Greece, the situation was similar to that of the above mentioned event: the yields did not stay lower, but reached the same level as before the announcement by September. For Portugal and Ireland, on the other hand, the effect was more persistent. In particular Irish borrowing costs benefitted from this announcement, as to this date, their yield spread has not returned to the level they were at before the event. In general, however, we cannot claim, from a statistical perspective, that the events we have tested have yielded permanent changes in yield spreads, stock indexes or market volatility.

We argue that this latter finding should be seen in relation to our previous discussions about asset pricing as well as the discussions of causes to the euro crisis, the design of the measures taken and the role of expectations. The fact that positive market reactions are not persistent, suggests that the measures are not perceived by markets as strong enough to mitigate the poor economic conditions in the struggling economies. Specifically, the rather harsh austerity conditions imposed on countries receiving aid may have worried markets, as these included elements that may arguably be harmful to economic growth and prosperity. Furthermore, the lack of persistence in effects supports the arguments of those claiming that the euro zone is not an optimal currency area and that policy makers have not done enough at earlier time stages to prevent the escalation of the crisis.

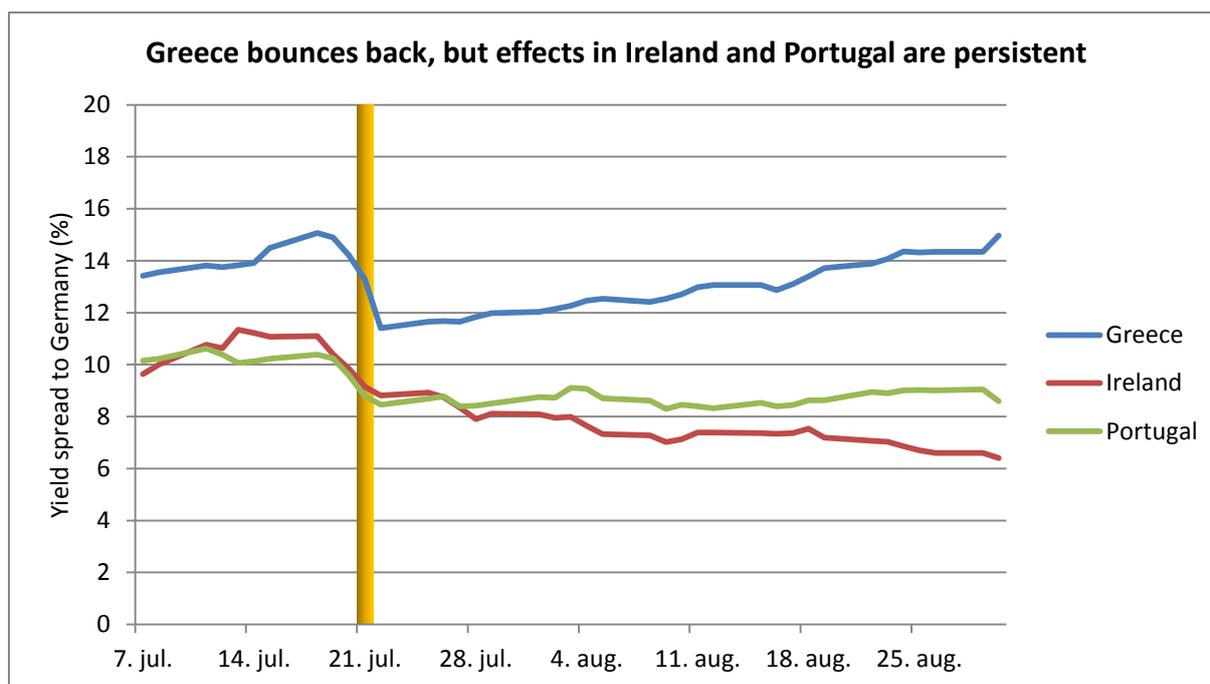


Figure 32: The reaction of bond markets to the boosting of the EFSF programme in July 2011.

The one event we tested that produced the most persistent positive effects across countries and markets is, in our opinion, found amongst the events in group three, where we tested different speeches and statements. Namely the speech made by Mario Draghi on 26 July 2012. When we looked at our data with a longer perspective, i.e. not just the narrow 10-day estimation window and the 3- and 10-day event window, the time series clearly had a turning point at the time of Draghi’s “whatever it takes”-speech. This was, arguably, the only event that marked a real positive turnaround in a long-term perspective. Even if the most prominent events in group two clearly had larger short-term effects in terms of reducing yield spreads in GIIPS countries and boosting stock indexes, these effects were either short-lived (like the EFSF/EFSM-launch in May 2010) or actually just enhancing an already positive market development (like the OMT programme announcement in September 2012).

## 10.5 Using communication to shape expectations

We argued in section 7 that central bank communication is capable of shaping the public’s expectations. In the context of our event study, we would further argue that the indicators we observe largely mirrors expectations. The yield spreads on government bonds represent a country’s cost of borrowing and is determined by how investors evaluate the risk of the debt. Stock values reflect the value of companies’ equity and is thus dependent on businesses’

expected future earnings. Finally, volatility indexes measure whether investors believe financial markets will fluctuate in the time coming.

Thus, observing how these indicators changes is a neat way of investigating how expectations change. From our results in event groups two and three, related to bailout and programme announcements, respectively, we see that markets are affected *before* actual policies – such as for example outright purchases of Greek and Spanish debt by the ECB – are actually introduced, as the markets react already to the message of future action. This certainly supports the postulate that communication is an effective tool for shaping expectations.

## 10.6 Success criteria for communication

We found also in section 7 that the effect of communication is dependent on signal strength, the credibility of the statement, timing and also the content and details of what is communicated. While signal strength and timing can explain some of the results in the event tests, we cannot claim that there are any significant differences across groups for these conditions. However, the three groups differ with regard to content and credibility.

The last group of events, “speeches”, is arguably different than the other two with regard to credibility. The two former event groups consist of communication from mostly the ECB or other intra-national organizations. The announcements in group three, however, are made by many different policymakers, and these politicians do not necessarily have the same credibility. Moreover, the first two groups are events that announce final agreements on either bailouts or policy programmes. Arguably, therefore, these statements should be perceived as more credible than some of the more vague hints and promises in the “speeches” group.

The three groups are also different in terms of details and content. In “bailout agreements”, all details are included in the announcements. This includes amount of money, pay out date, other details concerning payment, conditions of the package and so on. This is also true for several of the events in the group “programme announcements”. What is different from the announcement of bailout packages, however, is that the pay-out schemes for these programmes have a considerably longer perspective. Furthermore, there is uncertainty regarding which country that will profit from the programmes. Event group three, “speeches”, is arguably the group with communication events containing the least detailed content. On these events, nothing concrete is really announced. The communication merely contains suggestions, hints on future policy action and evaluations of the current economic situation.

For this reason, the latter group might be the most interesting of the three groups in the evaluation of communication per se. Here, the reactions will to a lesser degree be conditioned upon the policy actions that are announced.

We cannot make any conclusions as to the degree that the effect of the announcements we have investigated can be attributed to the different attributes of communications, that is, credibility, content or other factors. However, the finding that Draghi's "whatever it takes" speech had such an impact will probably have to be evaluated as largely a result of credibility. However, our results also suggest that the public is not easily manipulated. The success of Draghi's speech on 26 July 2012 was probably conditional on the ECB following up the president's promises with more concrete actions. The instant reaction of markets when he spoke only few days later was negative, with for example stock markets declining, though that particular negative reaction only lasted one day. If the OMT programme had not eventually been presented, there is good reason to believe that the positive development had not persisted, as this would have made Draghi's promise nothing but words. We argue that this would have been devastating to the central bank's credibility.

# 11. Conclusion

The goal of our paper was to investigate whether and how important events of communication have influenced financial markets during the euro zone crisis. We presented a background to the crisis and the measures taken to mitigate it, as well as a theoretical framework addressing monetary and fiscal policy and in particular central bank communication. Then, we performed an event study on announcements of rescue packages and stabilisation programmes as well as chosen statements by different politicians. We tested for effects on yield spreads of government bonds, stock indexes and implied future volatility in financial markets.

When investigating the nature of the euro zone crisis, we found that the increase of borrowing costs for several countries in Europe, notably the GIIPS countries, could be attributed to reasons largely specific to the different nations. All of which however, referring to investors losing confidence of solvency, thus demanding compensation for risk. We found that this is caused by fundamental as well as non-fundamental factors, specifically contagion effects.

In our event study, we found that the announcements in our first group of events – related to rescue packages to particular countries – had less of an impact on yield spreads compared to the programme announcements in our second group of events. Regarding stock markets, we found that the announcements of rescue packages had a strong impact. We observed large fluctuations in the time surrounding the packages, as well as large differences between pre- and post-event values of the stock indexes. However, we argue that markets to some extent price in the announcement beforehand, as there are generally not large reactions on the particular event date. We also found significant changes in volatility, most of which indicating increased volatility. In general, the effects from announcing rescue packages were negative and persistent.

The announcements in our second group of events – related to large stabilisation programmes – were those resulting in largest changes in yield spreads. In particular, this was the case for the events related to the EFSF and EFSM programmes and the OMT programme, all of which significantly reduced borrowing costs of several countries. The effect on stock markets, we find, is smaller in amplitude than was the case with the rescue package announcements. However, these effects are, contrary to the effects of bailout announcements, positive and the tests indicate rising stock markets. There also seems to be a larger element of surprise in these announcements than is the case for the announcements of the rescue packages. One event

stands out as particularly positive both to stock and bond markets, namely the announcement of the OMT programme on 6 September 2012. As for volatility, the programme announcements tend to decrease market volatility. Thus, we find that the events had a positive impact on financial markets.

In our third group of events – consisting of various statements and speeches made by different politicians – we find that these too had an impact on financial markets, though not as big in amplitude as the announcements of the more concrete measures in group two and three. Regarding volatility, the effect of the events in this group was non-significant. The statements by German finance minister Schäube, the referendum call by Greek Prime Minister Papandreou and in particular the speech made by ECB President Draghi on 26 July 2012 had considerable impact on markets. The latter of these were especially important, as it marked a turnaround of market sentiment. This observation must clearly be seen in relation to the importance of central bank credibility, as we argue that the successful outcome was conditional on the fact that the ECB came through with more concrete actions not long after the speech.

In general, we find that the effect on yield spreads is largely conditional on the issuer of the debt, whereas stock markets react more similar across countries. We do not find strong evidence that there is a clear pattern as to which countries have generally benefitted more or less from announcements than others, though we see the largest changes in yield spreads in absolute terms in the GIIPS countries. However, the fact that both yield spreads and stock indexes fluctuates so much in countries as Greece and Portugal clearly indicates that mispricing of assets is present.

We argue that communication is a powerful tool in the shaping of the public's expectations. However, credibility is a success criterion, as illustrated by Draghi's "whatever it takes" speech. Furthermore, the content of the communication also matters, as we in general see that market reactions was largest in the cases where concrete measures were announced, although – in the case of the rescue package announcements – not necessarily positive.

Furthermore, though our testing results with a ten day event window indicate that the announcements of large stabilization programmes had a persistent positive impact on markets, we argue that this is not the full story. If we look to the longer term, we clearly see that these positive effects were not lasting, as borrowing costs generally converged to previous levels. This, along with the finding that the bailout packages largely induced negative effects on

markets, suggests that policymakers in the euro zone have in general been unable to cope with the development of the crisis.

If the Euro crisis is to be solved, it is crucial that markets can trust politicians to take the necessary actions. That is, optimism needed – and still needs – to be reinstated. If investors do not believe that the GIIPS countries will be able to repay its debt, then the risk premiums will only increase, and the countries will have to face impossible borrowing costs. Consequently, if investors do not believe that future earnings and thus stock prices will increase, then the stocks will not be bought, and the stock market will keep plummeting. Arguably, financial markets seem to have been rather sceptical to the capability of the policy makers to cope with the crisis, as our findings suggest that the measures taken with the intention of rescuing the euro zone, has produced somewhat ambiguous effects on asset prices.

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In addition, we used Macrobond, an analytical and charting platform providing time-series data to retrieve data on government bond yields, stock index values and volatility index values. The database is provided to us by the Norwegian School of Economics.