



# **Do the stress conditions of financial markets influence the effectiveness of asset purchase programs?**

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## **Abstract**

In the last decade, the major central banks around the world started to implement asset purchase programs as the primary policy instrument. This study aims to evaluate the effects of asset purchase programs' announcements conducted by the European Central Bank (ECB) on financial markets at different financial stress periods. Using an event-study methodology based on a regression analysis that explicitly controls for the level of financial stress, it was found that the announcement effect is more effective in reducing sovereign yields in peripheral countries in periods of high financial distress. Moreover, a narrowing of country yield spreads is found, with a decrease of yields of peripheral countries and a null or mild increase of yields of core countries. It is also observed that these programs had widespread consequences over the stock market and inflation expectations, especially in periods of low stress. Even though the announcements of the asset purchase programs have a strong effect on sovereign bond rates, they have a limited action under stress periods across other market segments.

**Keywords:** Unconventional monetary policies; Asset purchase programs; Sovereign yields; Financial stress.

# **A condição de stress dos mercados financeiros tem influência sobre a eficácia dos programas de compra de ativos?**

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## **Resumo**

Na última década, a maioria dos bancos centrais mundiais foram forçados a adotar como principal política monetária a compra de ativos financeiros. Este estudo tem como objetivo avaliar os efeitos sobre os mercados financeiros dos anúncios de programas de compra de ativos conduzidos pelo Banco Central Europeu (BCE), em diferentes períodos de stress financeiro. Através da utilização de uma metodologia de estudo de evento baseada numa análise de regressão que controla o nível de stress financeiro, verificou-se que o efeito de anúncio é mais eficaz na redução dos retornos das obrigações soberanas dos países periféricos, em períodos de elevadas perturbações financeiras. É ainda visível uma aproximação dos retornos das dívidas europeias, através da diminuição do retorno da dívida soberana dos países periféricos e do aumento nulo ou moderado desse mesmo retorno dos países centrais. Em períodos de baixo stress financeiro, observa-se igualmente, um efeito difundido destes programas sobre o mercado de ações bem como sobre as expectativas de inflação. Apesar dos anúncios dos programas de compra de ativos apresentarem um forte efeito sobre os retornos da dívida soberana, exibem uma ação limitada sobre outros segmentos do mercado em períodos de elevado stress financeiro.

**Palavras-chave:** Políticas monetárias não convencionais; Programas de compra de ativos financeiros; Obrigações soberanas; Stress financeiro.

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## **List of Abbreviations**

ABSPP – Asset-Backed Securities Purchase Program

APP – Asset Purchase Program

CBPP3 – Third Covered Bond Purchase Program

CSPP – Corporate Sector Purchase Program

EA – Euro Area

ECB – European Central Bank

EFSF – European Financial Stability Facility

ESM – European Stability Mechanism

FED – Federal Reserve

LSAP – Large-Scale Asset Purchases

NCBs – National Central Banks

CISS – Composite Indicator of Systemic Stress

OMT – Outright Monetary Transactions

PEPP – Pandemic Emergency Purchase Program

PSPP – Public Sector Purchase Program

QE – Quantitative Easing

UK – United Kingdom

US – United States of America

USD – US dollar

## 1. Introduction

Since the beginning of the financial crisis in 2007, policymakers took several exceptional measures to stimulate the economy and contain financial instability. With policy rates approaching the zero-lower bound, central banks started to implement unconventional monetary policies, such as the large-scale asset purchases (LSAP) programs. These programs were used with the aim of providing monetary accommodation given that interest rate policy cannot be used, but also to respond to some frictions in financial markets and contribute to their smooth functioning. LSAP often referred to as ‘quantitative easing’ (QE), were first implemented in 2001 by the Bank of Japan. Over the last few years, LSAP were more widely used by the major central banks, namely the Federal Reserve (FED), the Bank of England, and the European Central Bank (ECB). If these programs were initially seen as an extraordinary measure, they have become a standard monetary policy tool in a world of persistently low interest rates. Hence, there has been a surge of empirical and theoretical research that aims to shed light on the workings of these programs.

With an environment of negative interest rates, many economists expect the usage of asset purchase programs to remain a fundamental part of central banks’ toolkits for the future. So, it is vital to comprehend how asset purchase programs affect financial markets, particularly the bond market, and the widespread effects on other asset classes. To construct the whole picture, evaluate the impact of these programs on the economy, as well as maximize their effectiveness in the future, it is relevant to comprehend how the effect can differ across different financial market conditions. Moreover, given that one of the justifications to implement this type of unconventional policy has also been to help stabilize disturbed financial markets, fulfilling a role close to a “market-maker of last resort” by the central bank, it is important to understand their impact under different market conditions.

There is a large body of literature on the effects of asset purchase programs conducted by the FED and by the Bank of England, suggesting that the effectiveness of the programs depends on the state of the economy, with the impact of the asset purchase program being stronger under stressed financial market conditions. Krishnamurthy and Vissing-Jorgensen (2011, 2013) concluded that a large impact, like the one caused by the first program of Large-Scale Asset Purchases (LSAP1), is limited to “unusual times of financial crises”. This is reinforced by cross-sectional analysis of CUSIP-level Treasury bond prices, which founds strong effects of LSAP1 reducing the 10-year treasury yield by almost 50 basis points (D’Amico

and King, 2013), and reduced effects on programs conducted in less-stressed financial market conditions (Meaning and Zhu, 2011).

Does the effectiveness of the asset purchase programs depend on the conditions of financial markets? Given that some of the purchase programs have as objective to smooth financial markets' tensions, are these programs more effective under a financially stressed scenario? Or under acute financial market stress, the presence of financial frictions and balance sheet constraints translate into contractionary effects?

The purpose of this research is to evaluate if, in the euro area (EA), the immediate effects of purchase programs are different according to market conditions. Some authors have already exploited the effect of asset purchase programs in the EA over long-term sovereign yields and other assets, but none assess how the impacts depend on the financial stress level. Also, the large majority of existing literature is focused mostly on one asset purchase program. This investigation involves three different programs: the Outright Monetary Transactions (OMT) program, the Asset Purchase Program (APP), and the Pandemic Emergency Purchase Program (PEPP), which were launched under different market financial conditions with different goals. This study concentrates on the effects of the programs on sovereign yields as LSAP programs are traditionally focused on buying long-term government bonds. This research also exploits the effects on other assets besides the ones targeted by LSAP programs. For example, equity prices are expected to rise with the expected decrease in yields of government bonds. The impact on the exchange rate is also studied, as agents tend to re-balance their portfolios towards other substitutes for government bonds, these programs are likely to put downward pressure on the exchange rate. Finally, it is of relevance to assess the impact on inflation expectations, given that asset purchase programs aim to stimulate the real economy and help the ECB fulfill its final price stability mandate.

The economic theory states that only unexpected policies matter. After the policy is announced, market participants already start to incorporate its effects so that the program's effect will be weaker at the time of the implementation. Thus, the impact of the purchase is found to be greater at the announcement ("stock effect") while at the actual implementation effects are more moderate ("flow effects"). As so, this research will be focused only on the announcement effects of the programs.

To assess empirically the question, two different methods were employed. Firstly, an event-study methodology was implemented. An approach commonly pursued in the literature focuses on changes in asset prices at the announcement dates. The set of announcement dates does not merely include the typically official communications, with information about new

asset purchase programs, but also the announcements regarding increments in size, changes in the portfolio composition, or extensions in the timing of programs, i.e., all the announcements that lead to an easing monetary policy stance. Secondly, an event-study assessment was used based on a regression analysis, along the lines of Altavilla et al. (2014). This dissertation extends their study by explicitly controlling for the level of financial stress. To measure the stress level, it was used as a proxy the New Composite Indicator Systemic Stress (New CISS).

Overall, it is visible a lower dispersion of yields in response to the announcements, with a reduction in the government bond rates of Italy, Spain, and Portugal and a null or mild increase in the ones of Germany, France, and the Netherlands. In periods of high financial stress, the decrease registered for peripheral countries is even more pronounced, in particular at shorter maturities. Hence, it seems that the yields from the countries that were more subject to financial stress were indeed the ones that benefited more from the announcement of the policy measures, especially at times of stress. Furthermore, the asset purchase programs showed an extended effect, affecting other assets in periods of low stress, increasing equity prices, and expected inflation. However, as the stress in financial markets starts to grow, the net effect seems to be close to no effect from announcements, and the impact of the events tends to be mitigated. A possible explanation is that with financial stress, announcements of easing in policy may be interpreted as providing private information by the central bank about a worse outlook than what was previously thought.

The remainder of the paper is organized into seven chapters. Chapter 2 presents the literature review. Chapter 3 shortly introduces the studied asset purchase programs conducted in the EA. Chapter 4 describes the data and the methodology followed in the empirical study. Chapter 5 introduces a descriptive analysis of the announcements over the principal variables, based on 1-day changes. Chapter 6 describes the impact of central bank asset purchase announcements in different periods. Chapter 7 extends the assessment to a more limited set of announcements. Finally, Chapter 8 presents conclusions, limitations, and suggestions for further research.

## 2. Literature Review

Unconventional monetary policy measures were originally designed as an emergency measure. During the last decade, conventional policies have proven to be insufficient to achieve the central bank's objective given the approach to the lower bound on interest rates, thus unconventional policies have become a standard tool of monetary policy to improve the functioning of financial markets and stimulate the economy.

In response to the financial crisis of 2007, the major central banks around the world have lowered their policy rates to the effective lower bound. Subsequently, they implemented a variety of unconventional monetary policy measures to stabilize financial markets and stimulate economic growth. Namely, they engaged in large-scale asset purchase programs focused on buying long-term government bonds from financial institutions. The key idea is that asset purchase programs can operate directly on different segments of the yield curve. With the purchase of long-term government bonds and consequent reduction in the net supply of government bonds on the market, prices tend to rise and yields to decline. In parallel, yields on privately issued securities are expected to decline with those on government bonds. Thus, the short-term rate is at zero, but the central bank can still provide monetary stimulus by lowering long-term yields.

Former FED chair Ben Bernanke (2014) once said that quantitative easing “works in practice, but it doesn't work in theory”. In theory, in perfect capital markets, where there are no frictions and the agents can freely move across asset categories, central bank purchases of government bonds should have no effects on bond yields, as investors will reposition their portfolios offsetting the effects of central bank purchases (Wallace, 1981). In practice, financial markets are segmented, agents have preferences for specific securities, and they may find it difficult to short sell the central bank's targeting bonds. In this case, government bonds' central bank purchases must have effects on bond rates (Vayanos and Villa, 2009).

The basket of non-standard monetary policies that affect the composition and the size of the central bank's balance sheet can be broadly divided into two distinct measures: QE and credit easing. Both seem to have substantial advantages at market stress times. Curdia and Woodford (2010) by extending the New Keynesian model, concluded that QE and targeted asset purchases are likely to be ineffective at all times, having substantial benefits at times of market stress. On the other hand, Gertler et al. (2010) found that credit easing welfare benefits may be substantial during a crisis as the balance sheet constraints on private intermediaries tighten, raising the net benefits from central bank intermediation.

There is an extensive consensus in the empirical literature that asset purchase programs conducted by central banks have economically significant effects, at least on government bond yields. Both the LSAP programs launched by the FED in the United States (US) and by the Bank of England in the United Kingdom (UK) were successful in reducing medium and long-term interest rates on treasuries. However, the precise estimate differs across studies. Gagnon et al. (2011) found a reduction in 10-year US bonds between 30 and 100 basis points. Concerning the programs carried out in the UK, Joyce et al. (2011) estimated that the first asset purchase program led to an on average fall in gilt yields of about 100 basis points. Looking at other LSAP programs launched by the Bank of England, Meaning and Warren (2015) noticed a reduction in yields by around 25 basis points.

Additionally, several studies find that central banks' purchases had a widespread effect, affecting other classes of assets besides sovereign yields. As an example, Gagnon et al. (2011), Krishnamurthy, and Vissing-Jorgensen (2011) by investigating the market reaction to the Federal Open Market Committee's LSAP announcements, found that mortgage-backed securities and corporate bond yields had spillovers from this program of purchases, with different magnitudes across securities and maturities. Furthermore, a rising tendency of equity prices is reported as a programs' consequence by Meinus and Tillmann (2016) and Beck et al. (2019). Also, the purchase announcements had substantial effects on the spot value of the dollar, depreciating the US dollar (USD) exchange rate (Neely, 2012, Haldane, 2016). Moreover, based on survey data (Gambetti and Musso, 2017) and daily change of swap rates (Rieth and Gehrt, 2015), a considerable increase in the expected inflation was found as an outcome of these programs.

Nevertheless, there seems to be less consensus concerning the financial conditions that maximize the programs' effectiveness. Some authors agree that the asset purchase programs are more effective in periods of high-stress financial market conditions due to the illiquidity and higher risk premium environment (Krishnamurthy and Vissing-Jorgensen, 2013), having a beneficial impact on the less-liquid segments of the market (D'Amico, and King, 2013). Dell'Araccia et al. (2018) analyzed the unconventional monetary policies in the EA and the United Kingdom, highlighting that the first round of quantitative easing, in the UK, at the peak of the crisis in 2009, appears to have had stronger effects than in subsequent rounds. Furthermore, they concluded that in the EA, unconventional monetary policy measures have been most effective when they are taken to reestablish the liquidity of the market and eliminate the redenomination risks.

Contrary, some authors raise some questions about the dependency of asset purchase programs on financial stress conditions. Haldane et al. (2016) explored the effects of QE programs for the US and UK over the same period. For the US economy, QE's impact may depend on the state of the economy, being larger in more stressed markets. QE's average output impact was twice as big in a disturbing period of financial markets than in a period of low financial frictions. In the UK, there was less evidence of the impact being different across the two periods.

### **3. European Central Bank Asset Purchase Programs**

This study involves three different asset purchase programs conducted by the ECB over the last decade: the OMT program, the APP, and the PEPP. These programs were launched in distinct periods, under different market financial conditions, and with different goals.

#### **3.1. OMT Program - Outright Monetary Transactions Program**

On July 26, 2012, the ECB's president Mario Draghi announced "to do whatever it takes" to preserve the euro. Subsequently, on August 2, 2012, the ECB announced it would undertake the OMT program. The program was announced "to address severe distortions in government bond markets which originate from, in particular, unfounded fears on the part of investors of the reversibility of the euro".<sup>1</sup> On September 6, 2012, the ECB's Governing Council revealed the OMT program's technical features. When activated, the program allows the ECB to buy an unlimited amount of the country's government bonds with 1 to 3 years in secondary markets.

To activate the OMT program four conditions have to be met: the country must be subject to financial support from the European Financial Stability Facility (EFSF) or the European Stability Mechanism (ESM), the government must fulfill the respective program, the country must have regained complete access to private lending markets and the country's government bond yields should be higher than what can be justified by the fundamental economic data.

The OMT program has not been activated so far. Nevertheless, its announcement had a significant impact on the financial sector. The 2-year bond yields of Italy and Spain declined

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<sup>1</sup> ECB's Press Conference. (2012, September). Retrieved from: <https://www.ecb.europa.eu/press/pressconf/2012/html/is120906.en.html>

by about 2 percentage points (Altavilla et al., 2014). Acharya et al. (2019) confirmed that the OMT announcement only had an effective impact on peripheral countries.

### **3.2. APP - Asset Purchase Program**

On October 2, 2014, ECB's Governing Council announced that they would launch a program to buy asset-backed securities and covered bonds to address the risks of a too prolonged period of low inflation and achieve inflation rates close to 2%. On January 22, 2015, and on March 10, 2016, with the same goal, the ECB's Governing Council announced that they would expand the Asset Purchase Program to government and corporate bonds, respectively.

The APP is part of a package of non-standard monetary policy measures that buy a range of assets at a combined monthly amount, that ranged in the past between €15 billion and €80 billion. The combined purchase was divided into four subprograms: the asset-backed securities purchase program (ABSPP) and the third covered bond purchase program (CBPP3), that were both launched at the end of 2014, November 21 and October 20, respectively; the public sector purchase program (PSPP), with purchases initiated on March 9, 2015; and the corporate sector purchase program (CSPP) that started on June 8, 2016.

Within the different programs, the PSPP is considered the most relevant from the APP, representing more than 80% of total APP holdings. Under the program, central banks and the ECB buy bonds issued by recognized agencies, regional and local governments (88%), international organizations, and multilateral development banks (12%) located in the EA with a maturity ranging between 2 and 30 years. Purchases are coordinated by the Governing Council and the ECB is only responsible for purchasing 8% of the total amount across all eligible jurisdictions and is limited to purchase government bonds and agency securities. The remaining 92% is to be bought by National Central Banks (NCBs). Each NCB is allowed to buy domestic bonds issued by the central governments and recognized agencies of their jurisdictions, as well as bonds issued by international organizations and multilateral development banks.<sup>2</sup> The ECB capital key determines NCB purchases. All purchases take place in secondary markets, and there is a blackout period to avoid direct influence on primary market price formation, also important concerning monetary financing prohibition and market neutrality.

The APP net purchases ended in December 2018 but restarted in November 2019.

Andrade et al. (2016) concluded that the APP produced apparent announcement effects, with 10-year government debt yields declining overnight by 14 and 17 basis points,

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<sup>2</sup> Annex I includes a diagram about the distribution of PSPP purchases.

respectively, for France and Spain and with 20-year government debt yields falling by 19 and 32 basis points. Corporate bond yields also declined by 10 and 13 basis points in the case of AA- and BBB-rated bonds. Altavilla et al. (2016) also showed that the program had significantly and persistently reduced sovereign yields at a time of low financial distress. This may appear puzzling since the existing literature highlighted a sizable impact of asset purchases only in periods when the degree of financial market stress was relatively high. Authors justified this apparent puzzle with the program's asset composition, which weakened certain transmission channels, reinforcing others. APP has affected assets at longer maturities and covering the investment-grade assets, which have favored the duration and the credit channels. Simultaneously, the low degree of financial stress at the program's announcements has weakened the local supply channel, facilitating spillovers to non-targeted assets.

### **3.3. PEPP – Pandemic Emergency Purchase Program**

On March 18, 2020, the ECB's president Christine Lagarde announced to do "everything necessary" to help the economy of the EA. Subsequently, the Governing Council launching the Pandemic Emergency Purchase Program, which had an initial amount of €750 billion. On June 4, 2020, the Governing Council decided to raise the initial envelope to a total of €1,350 billion. And on December 10, 2020, they increased again the value of the envelope by €500 billion to a new total of €1,850 billion.

The PEPP is a new temporary program, which includes all the asset categories eligible under the existing APP, but it is a separate program. PEPP was designed in a flexible manner to allow for fluctuations in the distribution of purchases. In this sense, there is no pre-defined scheme across public and private assets and no specific agenda for the time of purchases to easily adjust the program to specific situations caused by COVID-19 and address financial market tensions. It is the most flexible program, covers a large basket of securities as well as an extensive maturity range, and it is not subject to the capital key distribution. The purchases under this new program are projected to end up when the COVID-19 crisis is over, but never before the end of March 2022.

The European Central Bank estimates PEPP to have reduced the 10-year sovereign term premium by almost 45 basis points.<sup>3</sup> The higher elasticity related to the design of the PEPP, with flexibility in allocating purchases across time, jurisdictions, and maturities tend to make

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<sup>3</sup> Reference for this estimate in:  
<https://www.ecb.europa.eu/press/key/date/2020/html/ecb.sp200624~d102335222.en.html>

this program particularly effective in conditions of elevated market stress (see Philip R. Lanes speech, June 24, 2020).

#### **4. Data and Methodology**

To assess the effects of the programs on the different classes of assets, and following the standard approach in the literature, two methods were used. The typical event-study approach, following Gagnon et al. (2011) and Krishnamurthy and Vissing-Jorgensen (2011) and an event-study assessment based on a regression analysis, following Altavilla et al. (2014).

It is important to clarify that financial markets pricing is based on expectations. Just unexpected announcements are likely to have an impact. If the measure was already anticipated prior to the announcement, the impact at the time solely captures the unexpected component of the announcement. This study will be focused on the programs' announcement effects, which may include previously anticipated components. Given that markets are forward-looking, the major impact of asset purchase programs is likely to occur when market participants update their expectations at the time of announcement or before instead of at the time of purchases.

##### **4.1. Event Study Based on Announcement Dates**

A standard event-study was used to analyze the daily changes of financial variables around official communications of ECB regarding asset purchase programs.

By doing so, it was assumed that the event set includes all announcements that have affected expectations about the LSAPs, and expectations are only affected by announcements. While these working assumptions are convenient, they are also somehow arbitrary and possibly lead to biased estimates.

One of the most important issues in event studies is the choice of the window size. It is crucial to have a sufficiently wide window to not miss the full market reaction and capture all the effects but not too wide to be influenced by other factors, such as macroeconomic surprises. Joyce et al. (2011) realized that choosing a 1-day rather than a 2-day window to measure the impact of UK QE announcements halves the effects. Joyce and Tong (2012) conclude that the gilt market took time to incorporate the news in QE announcements, taking two days to get fully incorporated. Addressing these concerns and since the EA sovereign bonds are relatively high-liquid, the study uses a 1-day window, measured from the closing level prior to the announcement day to the closing level of the announcement day.

The variables examined are the 2-year, 5-year, and 10-year sovereign bonds, the 1-year, 2-year, 5-year, and 10-year inflation swap rate, the euro-USD exchange rate, and the Euronext 100 index. The existing literature for the EA is usually focused on: France, Germany, Italy, and Spain. This study was extended to two more countries: the Netherlands, which will join the core countries, and Portugal, to join the peripheral countries.

The study is focused on a set of ECB's official communications, which contains information about new asset purchase programs, changes in size, composition, or timing of programs, but all leading to an easing monetary policy stance. The twelve dates included in this event set are: <sup>4</sup>

- the Draghi's "whatever it takes" speech on July 26, 2012
- the OMT announcement on August 2, 2012.
- the OMT's technical features announcement on September 6, 2012.
- the ABSPP and CBPP3 announcement on October 2, 2014
- the APP announcement on January 22, 2015.
- the PSPP start date's announcement on March 5, 2015.
- the APP extension until the end of March 2017 on December 3, 2015
- the CSPP announcement and the APP's expanded size from €60 to €80 billion on March 10, 2016
- the APP's restart announcement on September 12, 2019
- the APP's change size to €120 billion on March 12, 2020
- the PEPP announcement on March 18, 2020.
- the PEPP's change size announcement on June 4, 2020.

#### **4.2. Financial Stress Periods and Systemic Risk**

As already mentioned, the programs described above were taken under different financial and economic conditions and consequently, to achieve different goals. The OMT program and PEPP were launched during the sovereign debt crisis and COVID-19 pandemic, respectively, periods in which financial markets were seriously disrupted and extra measures were needed. The APP was introduced in a more stable financial phase, and instead of aiming to address a financial crisis period, its goal was to contradict the low inflation outlook.

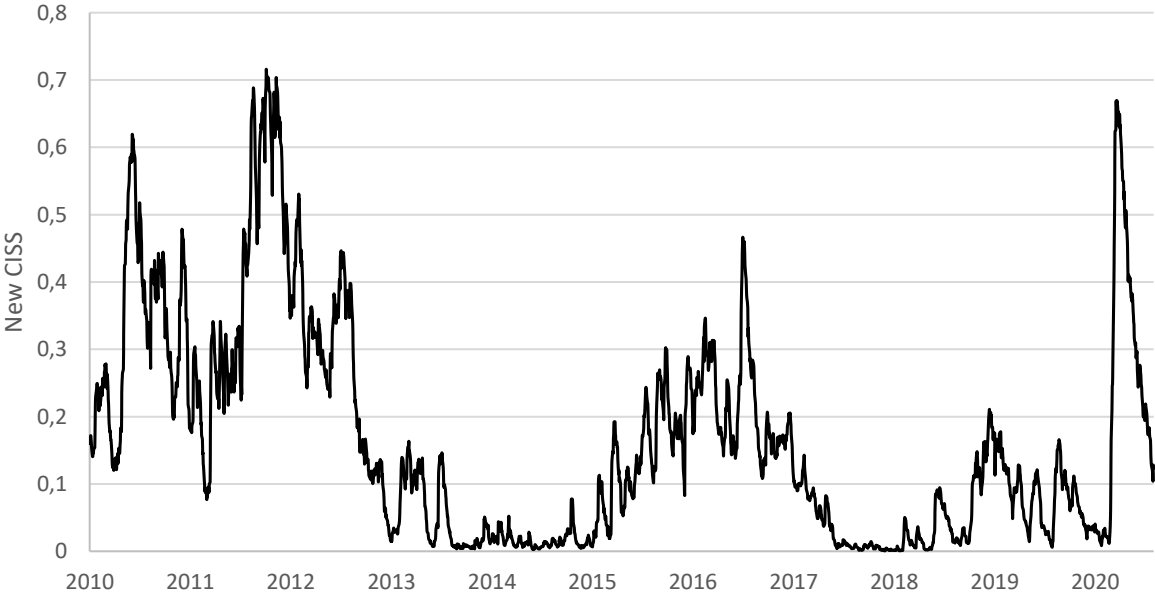
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<sup>4</sup> Annex II includes more details about event dates.

Measuring the level of stress in financial systems is very complex; hence it is not sufficient to look for individual “micro” stress indicators, such as implied volatility. The complicated shape of the financial system requires the use of more sophisticated and embracing indicators. To address this challenging task the New Composite Indicator of Systemic Stress was used as a financial stress indicator (Holló et al., 2012). The New CISS not only takes into account the instability in markets but also in intermediaries and infrastructures, including a total of 15 individual financial stress measures. Another important feature is that it can capture the idea that when stress is widely spread across the whole financial system, the systemic risk is high. By putting relatively more weight on the situation in which instability prevails in several market segments at the same time than only in a specific market segment.

When looking at the New CISS behavior in the last decade, Figure 1, the New CISS records its peaks at the time of announcement of the OMT program and PEPP and presents a substantially lower level at the time of APP announcement. Despite the fact that there are other factors concurring simultaneously that explain the New CISS evolution, what is possible to observe is that the New CISS tends to decrease greatly after the OMT programs and PEPP start to take place. This decline is not so visible after the implementation of the APP. As a result, this can only be seen as a correlation effect but not a causality effect.

Figure 1: The New Composite Indicator of Systemic Stress in the euro area financial markets



Source: ECB Statistical Data Warehouse

### **4.3. Event Study Based on Regression Analysis**

An event-study assessment based on a regression analysis that controls macroeconomic releases and the stress level was used to evaluate the effects of the announcements in financial stress periods on the sovereign bond markets in France, Germany, Italy, the Netherlands, Portugal, and Spain. The following equation was estimated for each country and each maturity, using a sample from January 2010 to July 2020:

$$\Delta y_t = c + \alpha D_t + \beta_0 News_t + \beta_1 NCISS_t + \beta_2 D_t * NCISS_t + \varepsilon_t$$

$\Delta y_t$  incorporates the daily change in 2-year, 5-year, or 10-year bond yields.  $D_t$  takes value 1 in the event days, i.e., value 1 in the day of the announcement, considering a window of one day, or 1 in the day of the announcement and the day after, considering a window of two days, and 0 otherwise. The event dummy variable reflects the twelve announcements shown above.

$News_t$  includes the macroeconomic news which could have influenced bond yields. The  $News_t$  variable controls for the main surprises from economic releases. To construct macroeconomic news' data a data set available in Thomson Reuters was used, which gives for each economic release at any point in time the corresponding expected value. The expectations are median forecasts collected up to one day from the day of the official data release. To complete the data set press release dates were collected from national statistical institutes for each country studied.<sup>5</sup> A time series of standardized daily news was calculated for each macroeconomic variable as the difference between the first release and its expected value. This difference represents the surprise effect, i.e., the relevant “news” that will affect the asset prices. If an economic indicator's value is entirely anticipated, then the release value would not affect asset prices. So,  $News_t$  takes the value of 0 if there is no surprise in the sense that the value predicted is the same as the released value, if there is no macroeconomic announcement on that day or if the expected value is missing.

The regression estimated by Altavilla et al. (2014) was augmented through a variable to measure the financial stress,  $NCISS_t$ . The  $NCISS_t$  captures the New CISS values as described before. The New CISS is made available by the ECB and is updated daily with the previous day's data. It can take values between 0 and 1, with 1 representing a maximum stress situation, even though there is no defined threshold between high stress and low stress situations. By looking to the ECB financial stability reports and New CISS' historical data, it is relatively easy

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<sup>5</sup> Annex III provides more details on the macroeconomic news.

to identify that the New CISS had its peak levels in historical events which are generally perceived as having caused severe disruptions in specific segments of the financial system, as the EA sovereign debt crisis and COVID-19 pandemic, ranging in levels between 0.2 and 0.7. It is also possible to observe that in periods deemed of low financial stress, the New CISS never reaches values above 0.2, making New CISS a qualitative measure. In concordance with the previous analysis, a study of a Portuguese Composite Stress Indicator made by Banco de Portugal indicates that a threshold value for a change between regimes, low stress, and high stress level regime, would be around 0.185 and 0.20. Although this is a different indicator, the similar methodology and interval of variation allow to draw some similarities in the index's interpretation. In this regard,  $NCISS_t$  is initially treated as a dummy variable that takes the value 1 in periods of high stress, i.e., when New CISS is higher than 0.2 and 0 otherwise. Nevertheless, because it was found a weak discontinuity of daily change in sovereign yields relative to the New CISS, the previous equation was also regressed with  $NCISS_t$  as a continuous variable.<sup>6</sup>

The same model was estimated to assess the effects of the announcements on stock markets in financial stress periods. In order to get a detailed vision of the different EA economies, parallel to the analysis of the sovereign bond markets, the main index of each chosen country was considered. In this sense, the dependent variable incorporates the daily percent change in close prices of DAX index for Germany, CAC 40 index for France, AEX index for the Netherlands, IBEX index for Spain, FTSE MIB index for Italy, and PSI20 for Portugal. Besides, the same model was also used to evaluate the effects of the announcements on the exchange rate and on inflation expectations, using the daily variation in euro/US dollar fx spot rate and daily changes on inflation swap rates, respectively, as a dependent variable.

As with every empirical analysis, this study is also subject to a set of shortcomings. Firstly, this analysis does not account for the fact that the announcements did not come as a full surprise, i.e., asset prices could already have moved before the announcement in reaction to expectations. Secondly, the event study assumes that announcement effects are immediately incorporated in prices. These assumptions might not hold, especially in periods of financial distress. Thirdly, the assessment does not control for forward guidance, essentially because forward guidance and QE are often implemented jointly. Thus, the results obtained should be seen as a combination of QE and forward guidance policies when both measures were taken

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<sup>6</sup> Annex V presents the discontinuity study.

together. Lastly, each asset purchase program has some unique features that were kept out of the investigation. Therefore, the presented results cannot be applied directly to each program.

## 5. Descriptive Analysis of Announcements

### 5.1. The One-Day Reaction of Government Bonds

The market reaction to the announcement dates is crucial for the event study assessments on asset purchase programs.

Table 1 exhibits daily changes in sovereign yields for the chosen economies of the EA on the event dates in which the launch, the timing, or the size of the programs were announced.

There is no clear pattern in the impact of announcements over sovereign yields, with some plummeting and others escalating. Although, it seems that the sovereign yields of peripheral countries (Spain, Italy, and Portugal) tend to decrease in most of the announcements. Also, it appears that peripheral countries tend to react more to purchases announcements, namely for the OMT program. As an illustrative example, in the first announcement of OMT, the 2-year sovereign yield decrease by 85 and 55 basis points, respectively for Spain and Italy, increase by 88 basis points for Portugal, while for France decrease by 7 basis points, for Germany increase by only 1 basis point and for the Netherlands not even change.

Looking at the cumulative changes<sup>7</sup> for each program's selected announcement dates the conclusions presented above become clearer. Some yields increase whether others decrease. It becomes more notable that the effects in Germany, France, and the Netherlands are weaker. Altavilla et al. (2014, 2019) also verified that the announcement only had an effective impact on peripheral countries. There seems to be a distinguished pattern of sovereign bonds in response to the APP's announcement, with sovereign yields increasing for all countries. At first sight, this could be interpreted as a sign of a different impact of these programs in a less stressful situation but can also be just a response to a more prolonged sequence of announcements over time.

The absolute variations can be very different between countries simply because yields have different volatilities. To control such effect, changes are divided by the absolute variation for the standard error, getting a fairer comparison between countries. In contrast to what was concluded by observing Table 1, normalized daily changes<sup>8</sup> seem to suggest that peripheral

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<sup>7</sup> Appendix A presents Table A that reports the cumulative changes in sovereign bonds yields.

<sup>8</sup> Appendix A presents Table A.1 that displays normalized daily changes in sovereign bonds yields.

Table 1: Daily changes in sovereign bonds yields of selected euro economies around announcement dates (basis points)

	2-year maturity						5-year maturity						10-year maturity					
	GE	FR	NL	ES	IT	PT	GE	FR	NL	ES	IT	PT	GE	FR	NL	ES	IT	PT
<b>OMT</b>																		
1st announcement	1	-7	0	-85	-55	88	4	-7	-2	-65	-60	72	7	-7	-1	-51	-40	-5
2nd announcement	-3	1	0	1	3	-51	-9	-1	-7	29	18	-21	-11	-3	-11	51	36	-1
3rd announcement	7	3	4	-22	-13	56	11	1	11	-40	-22	1	14	1	10	-40	-21	-46
<b>APP</b>																		
1st announcement	1	0	1	3	3	-2	2	2	2	4	3	-10	1	1	2	6	4	-1
2nd announcement	-2	-2	-1	-7	-7	-3	1	-1	-3	-9	-10	2	-7	-8	-8	-13	-14	-18
3rd announcement	1	0	0	-6	-6	-3	-2	-2	-2	-7	-7	-2	-2	-2	-3	-6	-8	-9
4th announcement	14	13	14	9	13	7	18	17	16	18	21	17	20	19	17	25	23	24
5th announcement	8	5	7	4	2	-3	10	8	10	2	-1	-5	6	5	8	3	3	-1
6th announcement	12	10	10	5	12	2	7	7	9	2	-6	-1	3	1	3	-5	-13	-4
7th announcement	2	7	4	-1	57	12	3	16	3	13	64	23	1	15	4	21	55	30
<b>PEPP</b>																		
1st announcement	9	7	7	20	-7	21	16	10	16	15	-9	12	20	12	17	18	-9	14
2nd announcement	2	0	1	-7	-12	-3	1	-2	-2	-4	-14	-5	3	-2	0	-4	-13	-6

Source: Thomson Reuters

countries only react more to the OMT announcement, while in the APP and PEPP announcements Germany, France, and the Netherlands had bigger variations. This result is somewhat in discordance with Altavilla et al. (2016), which concluded, based on an intraday analysis, that there was a significant decline in sovereign yields across main EA countries in response to APP announcement. This was particularly evident for the 10-year Italian and Spanish bonds, whose yields have plummeted immediately after the two press conference announcements and have continued to decline further in the day.

## **5.2. The One-Day Reaction of Other Assets**

The programs of asset purchase conducted by the European Central Bank contain information about the future course of monetary policy and the economy and are expected to have ultimate impacts on the real economy. Thereby, the asset purchase announcements should also affect other assets such as the exchange rate, the stock market, and expectations about inflation. The past literature reveals that announcements have a propensity to depress the price of money and push up other assets' prices.

As per Table 2, based on 1-day changes, contrary to what could be expected, the euro had on average appreciated versus the US dollar. The higher increase in the exchange rate was registered with APP's announcement, where the euro appreciated by 3.1 percentage relative to the US dollar on the fourth announcement and by 1.6 percentage on the fifth announcement.

Additionally, the pattern of the effects of the announcement on the stock market is far from uniform. Nevertheless, it seems that in most of the announcements, opposite to what could be anticipated, the Euronext 100 index was down at the announcement dates, with some exceptions as the OMT's first and last announcement dates where an increase of 3.3 percentage and 2.6 percentage was observed.

Finally, it was also considered the impact on inflation swap rates. Since asset purchase programs aim to stimulate the real economy and help the ECB fulfill its final price stability mandate, the response of inflation expectations is critical to understand the effects of the programs. Moreover, some asset purchase programs were launched as a measure against decreasing longer-term inflation expectations. An inflation swap is an agreement to transfer inflation risk from one party to another. One side of the contract pays a fixed rate cash flow on a notional principal whereas the other side pays a floating rate linked to an inflation index. In this way, the inflation swap rate gives a notion about inflation expectations. Inflation swap rates had increased on average across all maturities, except for the fourth and last announcement of

the APP and the first announcement of the PEPP when there was a general drop in inflation expectations. These increases can suggest that the announcements were successful in driving inflation expectations toward the intended ECB objective. By looking at the cumulative changes<sup>9</sup> for each program's selected announcement dates, it is visible that events have a negative effect on inflation swap rates, namely at short-term maturities, with the effects becoming positive with an increase in maturity. For instance, the 1-year maturity inflation swap rate decreases by 7 basis points on APP, while the 10-year inflation swap rate increases by 11 basis points. The weak impact on shorter maturities may be explained by the lagged impact these measures are expected to have on prices.

Table 2: Daily changes of exchange rate euro-USD, Euronext, and inflation swap rates around the announcement dates (percent and basis points)

	Euro - USD exchange rate (in %)	Euronext 100 Index (in %)	Inflation swap rate (in basis points)			
			1-year	2-year	5-year	10-year
<b>OMT</b>						
1st announcement	1	3,3	-2	-1	0	-9
2nd announcement	-0,4	-2,0	0	0	2	0
3rd announcement	0,2	2,6	-23	7	0	-1
<b>APP</b>						
1st announcement	0,4	-2,6	0	0	0	0
2nd announcement	-2,1	1,5	3	5	9	8
3rd announcement	-0,4	1,1	8	7	4	4
4th announcement	3,1	-3,3	-2	-2	-3	-4
5th announcement	1,6	-1,5	-2	-1	0	1
6th announcement	0,5	0,5	1	2	6	7
7th announcement	-0,7	-12	-15	-11	-8	-5
<b>PEPP</b>						
1st announcement	-0,8	-5,0	-19	-14	-12	-9
2nd announcement	0,9	-0,2	1	3	4	5

Source: Thomson Reuters

Overall, these event studies suggest evidence of a reaction in asset prices, other than government securities, to asset purchase announcements. Nonetheless, these effects are, on

<sup>9</sup> Appendix A presents Table A.2 that exhibits the cumulative changes in other assets.

average, smaller and more volatile than for government bond yields. The event window used may be too short to capture the full effect. It is also possible that different circumstances, as the level of stress of financial markets, imply different reactions. This hypothesis will be tested further with the inclusion of a stress variable.

## **6. The Impact of Announcements in Different Periods**

### **6.1. Sovereign Yields**

From the theoretical perspective, the European Central Bank's asset purchase programs can provide monetary stimulus by supporting bond prices and lowering yields. Past literature (Gagnon et al., 2011, Krishnamurthy and Vissing-Jorgensen, 2011, Joyce et al., 2011, Meaning and Warren, 2015) shows that these programs appear to have succeeded in reducing long-term rates. There is less evidence of the purchase programs impact being correlated with the state of financial markets. This state-dependency is vital to understand how programs have worked in the past and the circumstances in which it is likely to be effective in the future.

Table 3 reports firstly the estimated coefficient for the equation's standard specification, where the stress indicator is not included in the regression. The results presented are for the event dummy ( $\alpha$ ). Then, the coefficients are presented for the controlled specification, where  $NCISS_t$  is at first treated as a dummy variable and after as a continuous variable. The important coefficients are the event dummy ( $\alpha$ ) and the event dummy times financial stress indicator ( $\beta_2$ ).

In contrast to what is observed in some of the past literature (Acharya et al., 2019), the standard results show a statistically significant increase in yields for Germany, France, and the Netherlands, for a 1-day window, as a consequence of asset purchase announcements. Spain, Italy, and Portuguese bond markets have not significantly reacted to the policy announcements.

When considering the 2-day window, the announcements have been more effective in reducing the government bond rates in Italy, Spain, and Portugal. In parallel, in Germany, France, and the Netherlands bond markets have reacted negatively to the policy announcements, reporting an increase in yield rates, which suggests a lower dispersion of the yields across EA member countries. What is observed is that the announcements of the programs tend to decrease the gap between countries' bond rates, in concordance with literature, which shows that in response to the OMT program, the 2-year bond yields of Italy and Spain declined by about 2 percentage points, whereas Germany and France were not significantly affected for similar maturities (Altavilla et al., 2014).

Table 3: Changes in sovereign bonds yields of selected euro area economies around the event dates (*basis points*)

	2-year maturity						5-year maturity						10-year maturity					
	DE	FR	NL	ES	IT	PT	DE	FR	NL	ES	IT	PT	DE	FR	NL	ES	IT	PT
Standard																		
$D_t$																		
1-day change	4***	3***	4***	-7***	-1	11	5***	4***	5***	-4*	-2	7	5***	3**	3***	0	0	-2
2-day change	3***	2**	3***	-6***	-9***	2	5***	2**	4***	-5***	-7***	-2	5***	2**	3***	-3**	-4***	-7**
Controlled																		
<b>Dummy Variable</b>																		
$D_t$																		
1-day change	5***	4***	5***	-2	0	9	6***	4**	5***	-5	-4	1	5***	2	3**	-6*	-6*	-8
2-day change	3***	3**	2**	-2	0	4	4***	2*	3**	-5**	-3	-6	3**	1	2	-6***	-5**	-11**
$D_t \cdot \text{NCISS}_t$																		
1-day change	-2	-2	-1	-10*	-2	4	-2	0	-2	2	4	12	0	2	0	12***	11**	12
2-day change	1	-1	1	-7*	-16***	-4	2	0	2	0	-7*	7	3*	1	3	6*	1	7
<b>Continuous Variable</b>																		
$D_t$																		
1-day change	4***	3	3*	-6	-5	-1	4*	1	2	-8**	-8*	-4	0	-2	-1	-9**	-9**	-14*
2-day change	1	0	1	-3	1	0	1	0	0	-6*	-2	-6	0	0	-1	-6**	-5**	-11**
$D_t \cdot \text{NCISS}_t$																		
1-day change	3	3	3	-5	14	43	7	12**	11*	15	23*	42	18***	18***	16**	34***	35***	43*
2-day change	8***	6	8**	-10	-37***	6	13***	8*	15***	1	-21**	16	19***	9*	15***	10	1	16
N° of Observations	2695	2707	2706	2707	2707	2707	2694	2707	2707	2706	2692	2695	2695	2707	2709	2707	2692	2706

Source: Thomson Reuters and ECB

Notes: Based on the 12 event dates reported in Annex II.  $News_t$  variable included in the regression but not reported. Standard tests were used to assess whether the coefficients are statistically different from zero. \*\*\*, \*\* and \* indicate significance at 1,5 and 10 percent level, respectively.

Taking into consideration the stress dummy variable (the first line of the controlled regressions in Table 3), in periods of low stress financial market conditions, the 2-year and 5-year maturity continue to present an increase in the yields of core countries. Based on the 2-day window, it seems that the decrease in yields in Spain and Italy comes mostly from periods of stress. In contrast, for 10-year maturity bonds, one of the market's benchmarks and the most liquid ones, the fall in peripheral countries yields is due only to periods of low financial stress. Thus, the effectiveness of the programs in reducing yields during periods of financial stress is not visible as the events seem to not have a different immediate impact in periods of high stress. This contrasts with other past studies, for instance, Haldane et al. (2016), that note that for the US, the impact of QE is greater the weaker and more disturbed the economy.

As mentioned before, the impact of financial stress level could not be immediate from one level to the other but reflect a gradual effect as the degree of financial stress increases. To address this situation, the coefficients were estimated using  $NCISS_t$  as a continuous variable.

The conclusions are not qualitatively different from using the dummy variable. For the 10-year maturity, in periods of low financial stress, the bond rates of Spain, Italy, and Portugal decrease in response to the asset purchase programs. As the financial markets start to experience higher stress, the yields start to react less to the events, with the effect of the asset purchase programs being mitigated. Apparently, when financial markets are seriously disrupted, the stress effect surpasses the announcement effect. All countries' yields tend to increase, and as the peripheral countries are the riskiest and most volatile, their yields tend to increase even more. An increase in the  $NCISS_t$  of 10 basis points is associated to an increase of more than 3 basis points in peripheral bond yields at the day of the announcement, at least for a 1-day window. Additionally, it seems as financial distress increase, the impact of the events decreases for higher maturities. Compared to the 2-year maturity, the rises in 5-year maturity are more pronounced, and the rises in 10-year maturity tend to be even more pronounced.

This response of sovereign yields declining in periods of low stress but rising in periods with more financial frictions contrasts with past studies, finding that the illiquidity and high-risk premium environment in stress periods made the European Central Bank purchases more effective in reducing long-term government bond yields (D'Amico and King, 2013).

Contrasting the 1 day-change with 2 day-change, on average, there are some signals of a possible rebound in the following days.

Consistent with intuition, once the effects of all macroeconomic news are not considered,<sup>10</sup> the estimated effects of the purchase program announcements do not significantly change. This suggests that the events considered are the most relevant news within (not with) the event window. Comparing the estimates with those from the event-study approach, where the  $News_t$  variable was considered (Table 3), the difference between the two approaches is not relevant and is around 1 to 2 basis points.

## **6.2. Equity Prices**

The effects of asset purchase programs are not restricted to sovereign bonds, these programs have a widespread effect on all the asset classes. The central element in this analysis is the possibility that equity prices may also move in response to a purchase of sovereign bonds for which it is a substitute. Besides, the potential positive impact over the medium-run via higher firm valuation following improved macroeconomic conditions. In this regard, it is important to understand how asset purchase program announcements affect the stock markets and how their impact depends on financial market conditions.

Table 4 exhibits the estimated coefficients for the equity indices prices. The standard results indicate that equity prices tend to decline by about 1-1.5 percent for all countries on announcement days, contrasting with the rising tendency founded for Beck et al. (2019) for the US.

When considering the financial stress dummy variable, it seems there is almost no effect in periods of low financial stress, i.e., equity prices do not react significantly to the asset purchase programs announcements. In periods of high financial stress, equity prices registered a homogeneous drop around 2.5-3.5 percent. This seems to indicate that the events do not have the expected favorable impact on equity indices and possibly that announcements in periods of stress may reveal information about a negative economic outlook with the corresponding negative impact on equities. Furthermore, the effect of the announcement is only statistically significant for a 1-day window.

When including the  $NCISS_t$  as a continuous variable, the results change a bit. Equity prices tend to increase slightly in response to the asset purchase program announcements, by about 1-2 percent, with this rise being similar for all the countries. However, as the financial stress starts to increase, equity prices also show an opposite reaction to the events. There is a

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<sup>10</sup> Appendix B reports Table B that exhibits the estimated coefficients for sovereign bonds yields without considering the  $News_t$  variable.

reduction of 0.9-1.1 percentage points in equity indices for almost all countries following an increase of 10 basis points in the  $NCISS_t$  on announcement days, except for Germany that has a less accentuated drop of 0.6 percentage points in DAX price. This pronounced decline confirms that asset purchase programs' effect is diminished as the frictions in the financial market increase. Moreover, purchase announcements only affect equity indices in situations of no stress. A potential explanation is that with the increase of risk and distrust, the equities tend to incorporate the market's fear and are less sensitive to the announcements, possibly responding as these would convene unfavorable information by the central bank.

Table 4: Changes in equity prices of selected euro area economies around the event dates  
(percentage)

	Equity Index					
	DE	FR	NL	ES	IT	PT
Standard						
$D_t$						
1-day change	-1,18***	-1,47***	-1,47***	-1,27***	-1,46***	-1,07***
2-day change	0,14	-0,01	-0,06	0,47	0,46	-0,15
Controlled						
<b>Dummy Variable</b>						
$D_t$						
1-day change	0,01	0,25	-0,17	0,36	0,14	0,28
2-day change	0,33	0,08	0,23	0,45	0,24	0,59**
$D_t*NCISS_t$						
1-day change	-2,41***	-3,43***	-2,62***	-3,25***	-3,17***	-2,70***
2-day change	-0,36	-0,16	-0,52	0,04	0,46	-3,01***
<b>Continuous Variable</b>						
$D_t$						
1-day change	0,62	1,97***	1,32**	1,63**	1,34*	1,69***
2-day change	0,58	0,81*	0,78**	1,00**	0,47	1,34***
$D_t*NCISS_t$						
1-day change	-6,38***	-13,37***	-10,85***	-11,24***	-10,81***	-10,70***
2-day change	-1,53	-3,08**	-3,21***	-2,02	0,01	-5,65***
N° of Observations	2680	2707	2707	2705	2685	2710

Source: Thomson Reuters and ECB

Notes: Based on the 12 event dates reported in Annex II.  $News_t$  variable included in the regression but not reported. Standard tests were used to assess whether the coefficients are statistically different from zero. \*\*\*, \*\* and \* indicate significance at 1,5 and 10 percent level, respectively.

The findings are broadly unchanged when the  $News_t$  variable is not considered.<sup>11</sup> The difference is insignificant, on average 2-3 percentage points and never above 25 percentage points.

### **6.3. Exchange Rate**

As investors consider other assets as closer substitutes for government bonds than money, it is expectable that agents tend to re-balance their portfolios towards these substitutes in response to the boost in money holdings by bond purchases. In past studies, Neely (2012) and Haldane (2016) show that programs tend to put downward pressure on the exchange rate by putting upward pressure on other assets' prices.

Table 5 shows the estimated coefficients for the Euro-USD exchange rate and the inflation expectations based on inflation swap rates. Based on a 1-day window, the euro had appreciated by 0.3 percent versus to US dollar.

By looking at the equation's controlled specification where  $NCISS_t$  is introduced as a dummy variable, the same tendency is visible for periods of low and high financial stress, even though the results are not statistically significant.

Additionally, by analyzing the estimated coefficients using  $NCISS_t$  as a continuous variable, the conclusions remain broadly unchanged as there is no statistically significant impact in the EUR/USD rate.

The findings are not influenced by the  $News_t$  variable, as the difference between the two methods is not significant.<sup>12</sup>

### **6.4. Inflation Swap Rate**

Lastly, it was also studied the impact of purchase program announcements on inflation swap rates. As explained before, the response of inflation expectations is essential to understand the programs' real effects. This is even more crucial at the zero-lower bound, where changes in nominal interest rates are more limited, and changes in expected inflation may be more relevant for the expected real interest rates. The literature is rich in evidence that shows that asset purchase announcements were effective in increasing inflation (Gambetti and Musso, 2017).

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<sup>11</sup> Appendix B reports Table B.1 that exhibits the estimated coefficients for equity prices without considering the  $News_t$  variable.

<sup>12</sup> Appendix B reports Table B.2 that exhibits the estimated coefficients for exchange rate without considering the  $News_t$  variable.

Table 5: Changes of exchange rate euro-USD and inflation swap rates around the event dates  
(percentage and basis points)

	Euro-USD exchange rate (in %)	Inflation swap rate (in basis points)			
		1-year	2-year	5-year	10-year
Standard					
$D_t$					
1-day change	0,29*	-4,37**	-0,32	0,34	-0,19
2-day change	-0,05	-0,68	0,45	0,56	0,84
Controlled					
<b>Dummy Variable</b>					
$D_t$					
1-day change	0,26	-2,11	3,36	2,75	2,50
2-day change	-0,10	-1,42	1,52	2,22	2,36*
$D_t*NCISS_t$					
1-day change	0,05	-4,53	-7,35**	-4,81*	-5,38**
2-day change	0,09	1,41	-1,95	-3,04	-2,82
<b>Continuous Variable</b>					
$D_t$					
1-day change	0,43	3,45	6,75***	6,19***	5,07**
2-day change	0,03	1,73	3,21*	3,51**	3,25**
$D_t*NCISS_t$					
1-day change	-0,55	-30,31***	-27,37***	-22,66***	-20,39***
2-day change	-0,30	-9,09	-10,49*	-11,14**	-9,13*
N° of Observations	2760	2760	2760	2760	2760

Source: Thomson Reuters and ECB

Notes: Based on the 12 event dates reported in Annex II.  $News_t$  variable included in the regression but not reported. Standard tests were used to assess whether the coefficients are statistically different from zero. \*\*\*, \*\* and \* indicate significance at 1,5 and 10 percent level, respectively.

The results are presented in Table 5. For the standard approach, the inflation swap rate has decreased on average on announcement days, but only for 1-year maturity.

Considering the different impacts depending on the degree of financial stress the conclusions change a bit. Assuming  $NCISS_t$  as a dummy variable, in situations of low stress, announcements have no considerable impact on inflation expectations, while in situations of high stress, the inflation swap rates decrease for all maturities, at least on announcement day.

By using  $NCISS_t$  as a continuous variable, these conclusions are reinforced. Inflation expectations tend to increase on announcement days, around 5-7 basis points for maturities from 2-year onwards. As financial stress starts to build up, this effect disappears, and the opposite negative impact prevails. An increase in the  $NCISS_t$  of 10 basis points tends to decrease in about 2-3 basis points on inflation swap rates on all maturities on the day of the announcement of the measures.

The results suggest that the announcements have the projected effect on expected inflation during normal periods, even though in situations of financial distress, the announcements have the opposite effect on expected inflation.

The conclusions are the same when the  $News_t$  variable is not considered in regression, as the difference between the two approaches is insignificant.<sup>13</sup>

## 7. The Impact of Announcements in a Limited Set of Events

Some of the results shown above contrast somewhat with those found by previous studies. This could be related to the fact that some announcements did not come as a full surprise or the fact that announcements' effects were not immediately incorporated in prices. In order to try to understand the source of these apparently inconsistent findings a more detailed analysis was done of the 1-day reaction of sovereign yields to the event announcements. As a result, three announcements were identified as having an unexpected response by the long-term yields of peripheral countries, the ones that theoretically should have a more pronounced reaction to the events. The peripheral countries experienced, on average, an increase in bond rates in the fourth and the last announcement of the APP and the first announcement to the PEPP.

To try to understand this uncommon reaction, an investigation was conducted on polls and news<sup>14</sup> about expectations on monetary policy decisions ahead of the announcements, in order to understand if these announcements were contrary to the expectations of the agents or if, for any reason, they were already expected and then did not have the expected response.

The fourth announcement of the APP corresponds to an extension of the program until March of 2017. Analyzing Reuters news before December 3, 2015, it becomes easy to understand that, on the one hand, the expansion was somehow already anticipated, given that

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<sup>13</sup> Appendix B reports Table B.2 that exhibits the estimated coefficients for inflation swap rates without considering the  $News_t$  variable.

<sup>14</sup> Annex V and VI presents the Reuters news and polls.

in October of the same year, President Mario Draghi indicated that the Governing Council would act if needed to drive up inflation to its 2% target, and, on the other hand, this extension was below expectation. A poll made by Reuters at the end of November of 2015, with over 50 economists, showed that 80% predicted that ECB would announce further easing on the December 3<sup>rd</sup> meeting. The forecasters were expecting an increase in the monthly purchase from €60 billion to €75 billion, or an extension of the quantitative easing program beyond September 2016, or both. Roughly the same result had been pointed out in the previous two polls. Some forecasters pointed out that the likely outcome of the ECB meeting has already been priced in by financial markets since Draghi's comments. The expectations were set so high that there was the risk that the markets would become disappointed no matter what the ECB did.

In the last announcement of the APP, on March 12, 2020, the ECB added a temporary envelope of additional net asset purchases of €120 billion until the end of 2020. As a response to the spread of COVID-19 in Europe, six days after, on March 18, 2020, the ECB announced a new temporary asset purchase program, the PEPP. Looking at the Reuters ECB pre-meeting poll of March is possible to conclude that these announcements were also already expected. Of the 40 surveyed economists, 70% said that the ECB should ease monetary policy further in response to the coronavirus outbreak. Moreover, among those, 66% said that the ECB should increase the size of its monthly asset purchases.

To comprehend if, in fact, it was the predictability of these announcements that leads to the previous analysis to unexpected results, the same regressions were run but with a more limited set of events, i.e., excluding the ones mentioned above.

### **7.1. Sovereign Yields**

Table 6 reports the estimated coefficients for the events dummy and the interactions with the  $NCISS_t$  for the different specifications, considering the limited set of events.

The standard estimates suggest the same conclusion that was verified previously for a 2-day window, in favor of a lower dispersion of the yields across countries. The announcements have been effective in reducing government bond rates in Spain, Italy, and Portugal. In contrast, the yields in Germany, France, and the Netherlands show a null or mild increase.

By introducing the stress dummy variable, conclusions also improve relative to before. In periods of no financial stress, core sovereign yields show no change or tend to increase for the 2-years maturity, while the peripheral countries' yields decrease, especially for the 10-year

Table 6: Changes in sovereign bonds of selected euro area economies around the limit set of event dates (*basis points*)

	2-year maturity						5-year maturity						10-year maturity					
	DE	FR	NL	ES	IT	PT	DE	FR	NL	ES	IT	PT	DE	FR	NL	ES	IT	PT
Standard																		
$D_t$																		
1-day change	3***	2	3**	-13***	-8**	9	3**	1	2	-11***	-11***	4	2	-1	0	-7***	-7***	-11**
2-day change	2***	0	1*	-9***	-11***	1	3***	0	1	-9***	-10***	-5	2**	0	1	-8***	-7***	-12***
Controlled																		
<b>Dummy Variable</b>																		
$D_t$																		
1-day change	4***	3*	3*	-5	-2	9	4**	2	1	-10**	-9**	-2	2	-1	1	-12***	-11***	-15**
2-day change	1	0	0	-7**	-6**	1	1	-1	-1	-7***	-5*	-7	0	-2	0	-11***	-8***	-14***
$D_t \cdot \text{NCISS}_t$																		
1-day change	-1	-3	0	-19**	-13*	-1	-2	-2	3*	-2	-6	12	0	0	-1	11**	8	9
2-day change	3***	2	3***	-5	-12***	-1	5***	3**	5***	-5	-10**	6	6***	3***	1	7***	1	5
<b>Continuous Variable</b>																		
$D_t$																		
1-day change	3**	3	3	8	6	-5	4**	3	-1	0	-1	-9	0	0	0	-6	-8*	-11
2-day change	1	2	1	5	11**	1	2	2	-2*	0	2	-7	0	0	0	-2	-8***	-10
$D_t \cdot \text{NCISS}_t$																		
1-day change	-2	-9	1	-113***	-74***	74	-6	-8	17***	-57***	-52**	68	9	-3	0	-5	5	5
2-day change	5	-11*	3	-74***	-115***	-1	7	-8	16**	-47***	-64***	13	14*	-3	6	-29***	1	-12
N° of Observations	2695	2707	2706	2707	2707	2707	2694	2707	2707	2706	2692	2695	2695	2707	2709	2707	2692	2706

Source: Thomson Reuters and ECB

Notes: Based on the limited set of 9 dates.  $News_t$  variable included in the regression but not reported. Standard tests were used to assess whether the coefficients are statistically different from zero. \*\*\*, \*\* and \* indicate significance at 1,5 and 10 percent level, respectively.

maturity. In periods of high financial stress, the decrease registered for peripheral countries in response to the announcements is even more pronounced for the 2-year and 5-year maturity.

When treating  $NCISS_t$  as a continuous variable, the impact of the announcements is more muted. As financial stress increases, the decreasing effect on yields becomes more apparent, with Spain and Italy registering significant decreases in yields in response to the announcements, especially at shorter maturities. Thus, it seems that the yields from the countries that were more subject to financial stress, especially during the sovereign debt crisis, were indeed the ones that benefited more from the announcement of the policy measures, especially at these times of stress.

These conclusions confirm that central bank asset purchases prove to be a useful tool in an extraordinary time, at least for the most affected market segments.<sup>15</sup>

## 7.2. Equity Prices

Table 7 exhibits the estimated coefficients for equity index prices similarly to what was shown before in Table 4 but now considering a limited set of events.

In line with past literature (Beck et al., 2019), now the results for the standard specification of the equation show that equity prices increase, for all countries, in response to the asset purchase program announcements, at least when looking at a 2-day window, and in contrast to what was found previously when considering all the events.

Adding the stress dummy variable, in periods of no financial stress the increase in equity prices is reinforced. In periods of high financial stress, there is a reversal in the response of equity prices, namely for a 1-day window, i.e., equity prices decrease in response to the announcements. Once considering  $NCISS_t$  as a continuous variable, the conclusions taken with the dummy variable are even more notable. Equity prices indeed increase following a policy announcement, but as stress in the market starts to grow, its effect tends to be stronger than the announcement effect, and the equity prices decrease.

With these results, it is possible to conclude that the announcements of asset purchase programs only affect the equity prices in periods of low financial distress. A possible explanation is that with financial stress, announcements of easing in policy may be interpreted

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<sup>15</sup> The conclusions are the same when the  $News_t$  variable is not considered. Appendix C reports Table C that exhibits the estimated coefficients for sovereign bonds yields without considering the  $News_t$  variable.

as providing private information by the central bank about a worse outlook than what was previously thought.<sup>16</sup>

Table 7: Changes in equity prices of selected euro area economies around the limit set of event dates (*percentage*)

	Equity Index					
	DE	FR	NL	ES	IT	PT
Standard						
$D_t$						
1-day change	0,85**	0,50	0,21	0,54	0,37	0,44
2-day change	1,27***	0,98***	0,78***	1,42***	1,24***	0,79***
Controlled						
<b>Dummy Variable</b>						
$D_t$						
1-day change	0,71	2,70***	2,02***	2,56***	2,44***	2,13***
2-day change	0,71*	1,39***	1,24***	1,64***	1,29***	1,53***
$D_t*NCISS_t$						
1-day change	0,31	-4,98***	-4,13***	-4,59***	-4,65***	3,83***
2-day change	1,27**	-0,92**	-1,05***	-0,51	-0,09	-3,42***
<b>Continuous Variable</b>						
$D_t$						
1-day change	-0,69	2,83***	2,21***	2,57***	2,43***	2,26***
2-day change	-0,17	1,61***	1,38***	1,80***	1,37***	1,67***
$D_t*NCISS_t$						
1-day change	6,77***	-12,32***	-10,60***	-10,71***	-10,80***	-9,58***
2-day change	6,27***	-3,27***	-3,14***	-2,01*	-0,65	-4,61***
N° of Observations	2680	2707	2707	2705	2685	2710

Source: Thomson Reuters and ECB

Notes: Based on the limited set of 9 dates.  $News_t$  variable included in the regression but not reported. Standard tests were used to assess whether the coefficients are statistically different from zero. \*\*\*, \*\* and \* indicate significance at 1,5 and 10 percent level, respectively.

### 7.3. Exchange Rate and Inflation Swap Rate

Table 8 exhibits the estimated coefficients for the exchange and inflation swap rates.

<sup>16</sup> The conclusions are the same when the  $News_t$  variable is not considered. Appendix C reports Table C.1 that exhibits the estimated coefficients for equity prices without considering the  $News_t$  variable.

Even though the results are not significant for the exchange rate, the previously seen tendency remains: the euro appreciate regarding the US dollar on event days. With this appreciation being stronger in periods of high financial stress, at least for a 1-day window.

Table 8: Changes of exchange rate euro-USD and inflation swap rates around the limit set of event dates (*percentage and basis points*)

	Euro - USD exchange rate (in %)	Inflation swap rate (in basis points)			
		1-year	2-year	5-year	10-year
<b>Standard</b>					
D <sub>t</sub>					
1-day change	0,19	-1,83	2,51	3,03*	1,57
2-day change	0,02	1,25	2,40*	2,26**	2,34**
<b>Controlled</b>					
<b>Dummy Variable</b>					
D <sub>t</sub>					
1-day change	0,07	1,56	6,04***	5,58***	4,01**
2-day change	0,03	2,10	3,54**	3,58***	3,46***
D <sub>t</sub> *NCISS <sub>t</sub>					
1-day change	0,26	-7,68**	-7,99***	-5,75**	-5,54**
2-day change	-0,02	-1,29	-2,59	-2,99*	-2,56*
<b>Continuous Variable</b>					
D <sub>t</sub>					
1-day change	0,12	3,10	6,10***	5,95***	4,11**
2-day change	0,08	3,32*	3,91***	3,70***	3,45***
D <sub>t</sub> *NCISS <sub>t</sub>					
1-day change	0,36	-25,95***	-18,90***	-15,36***	-13,35***
2-day change	-0,33	-9,31**	-7,85**	-7,50**	-5,80*
N° of Observations	2760	2760	2760	2760	2760

Source: Thomson Reuters and ECB

Notes: Based on the limited set of 9 dates.  $News_t$  variable included in the regression but not reported. Standard tests were used to assess whether the coefficients are statistically different from zero. \*\*\*, \*\* and \* indicate significance at 1,5 and 10 percent level, respectively.

Relative to the full sample of events, the results with the restricted sample for inflation expectations also show more consistent results. The estimated coefficients for the standard approach of the equation suggest that the inflation swap rates increase in response to the announcements.

Once adding the  $NCISS_t$  dummy variable, in situations of low stress, the same continues to be true. However, in periods of financial distress, inflation swap rates have the inverse response, i.e., they decrease relative to the other announcements. The net effect seems to be close to no effect from announcements at stressed periods. This result is confirmed when using  $NCISS_t$  as a continuous variable. Indeed, as financial stress starts to build up, the effect of the announcements under such market conditions is much reduced. If the expected inflation were translated into real inflation, these results could suggest that asset purchase programs can be used to appreciate prices during stable financial periods and fight the risk of low inflation, as the APP was addressed. In periods where the market is seriously disrupted, asset purchase programs may not be the best instrument to face the low inflation problem. This could suggest that in periods of market stress, the information conveyed by the central bank at the announcements may be interpreted as a more pessimistic economic outlook than what was previously expected by market participants.<sup>17</sup>

## 8. Conclusion

The asset purchase program' announcements conducted by the ECB had a sizable impact on financial markets. This study is in line with previous studies, showing that the announcement effect of asset purchase programs is substantial in several asset classes. Such effect is greater, the greater the unexpected easing of the measures announced. The major novelty of this dissertation relies on studying the impact according to financial market conditions across several asset classes and several jurisdictions in the EA. In this regard, some new and interesting results are found.

Relative to sovereign yields, there is evidence suggesting a compression of yield spreads between core and peripheral countries, given that yields of peripheral countries decrease and yields of core countries show a null or mild increase, which is even more evident in stressed market conditions. Hence, it seems that the yields from the riskier and more volatile countries were indeed the ones that benefited more from the announcement of the policy measures, especially at times of stress. This dissertation also proves that the announcements of asset purchase programs had widespread consequences, generally introducing an increase in equity

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<sup>17</sup> The conclusions are the same when the  $News_t$  variable is not considered. Appendix C reports Table C.2 that exhibits the estimated coefficients for exchange rate and inflation swap rates without considering the  $News_t$  variable.

prices as well as inflation expectations, implicit in inflation swap rates. However, in periods of high financial stress such effect is narrowed, and the announcements are not enough to offset the negative forces of a crisis. A possible explanation is that with the increase of risk and distrust, the other assets tend to incorporate the market's fear and are less sensitive to the announcements. Another possible interpretation of this result could be related to the information conveyed by the ECB announcements. Market participants may believe that the information that the ECB has and that motivates the measures reveals a more pessimistic outlook than the one they had previously, thus revising their inflation expectations and equity market valuations. If this would be the case, it could pose a significant challenge to communication by the ECB, as it ends up being counterproductive.

Overall, these findings indicate that asset purchase programs, even though strong, have a limited action under stress periods, implying that ECB should coordinate their asset purchase policies and communications to avoid contradictory or overly stimulate effects.

As with every empirical analysis, this study has limitations that should be kept in mind. Firstly, this dissertation does not really take into account the unexpected component of the announcements. Secondly, the programs considered in the analysis can have different objectives and may impact the market in different ways. Thirdly, the assessment does not control for forward guidance, thus the results obtained should be seen as a combination of QE and forward guidance policies when both measures were taken together. Lastly, there is no analysis of the persistence of the effects at the announcement since the study does not assess the long-term effects of the announcements.

The study shows that asset purchase programs had a material impact on the bond market in high stress periods, but also leaves several questions unanswered. As a follow-up to this work, it would be interesting to understand if the duration of the effects and the transmission channels through which it works differ across stress periods. It also leaves for future research important issues such as comparing the macroeconomic impact across different times and understanding what factors might explain possible differences.

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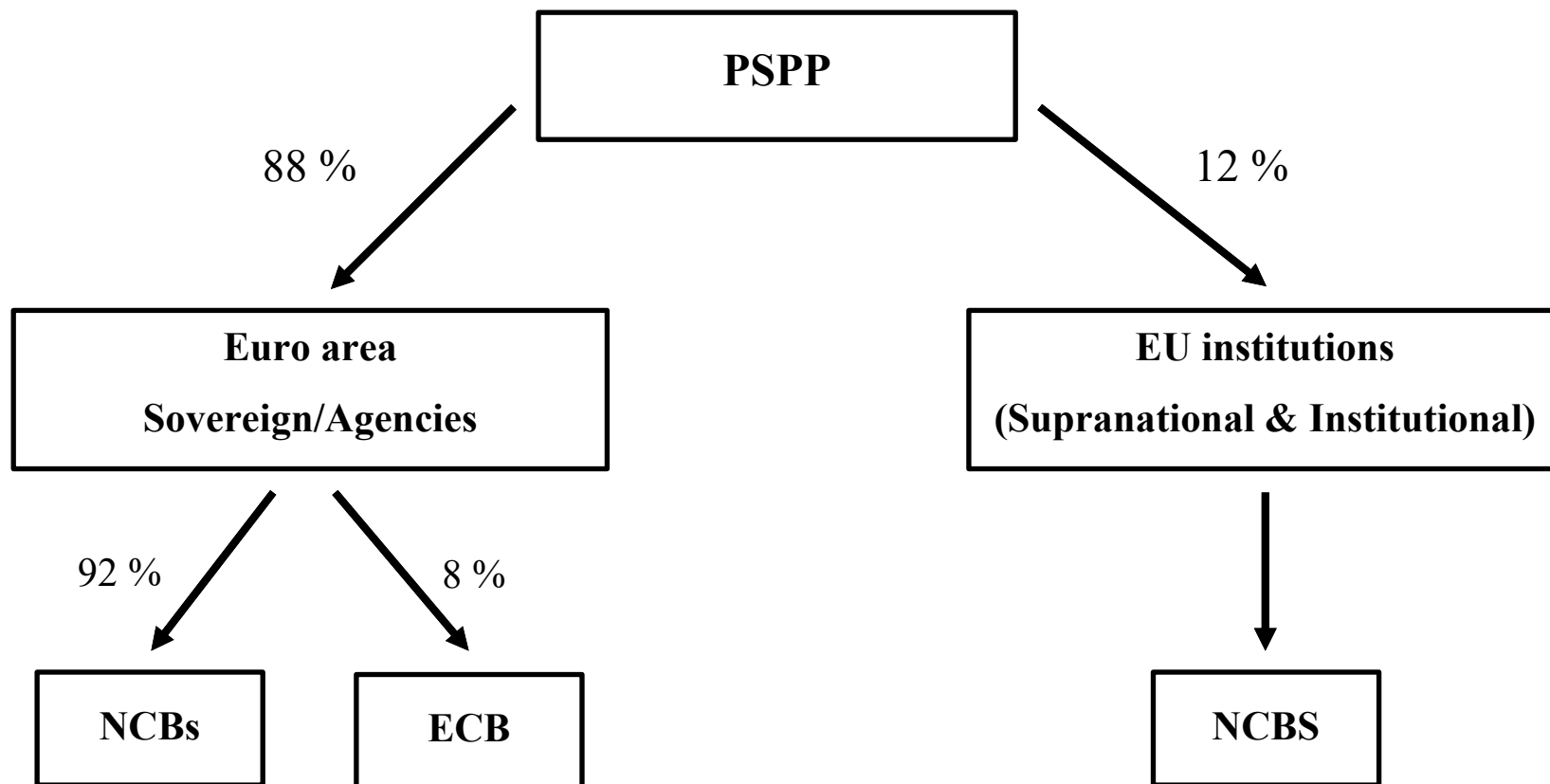
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**Annex I – Structure of PSPP purchases**



## Annex II – Event dates

Date	Event
26 July 2012 Draghi speech in London	Draghi announces that: “ECB is ready to do whatever it takes to preserve the euro.”
2 August 2012 OMT announcement	ECB announces that it would undertake Outright Monetary Transactions in secondary sovereign bond markets to safeguard the singleness of the monetary policy and an appropriate monetary policy transmission.
6 September 2012 OMT’s technical features announcement	ECB decides on the modalities for undertaking Outright Monetary Transactions in secondary markets for sovereign bonds in the euro area.
2 October 2014 ABSPP and CBPP3 announcement	On 4 September 2014, the governing council launches an asset-backed securities purchase program (ABSPP) and the third covered bond purchase program (CBPP3). On 2 October 2014, the detailed modalities of these programs were announced. On 20 October 2014, starts the purchases under the CBPP3 program. In order to improve the functioning of the monetary policy transmission mechanism, stimulate financing conditions in the euro area, support credit provision to the real economy, and produce positive spillovers to other markets. On 21 November 2014, starts the purchases under the ABSPP, with underlying assets comprising claims against the euro area non-financial private sector. To aimed at helping banks diversify funding sources and stimulate the provision of credit to the real economy.
22 January 2015 APP announcement	ECB launches an expanded asset purchase program (APP), including a public sector asset purchase program (PSPP), encompassing the existing purchase programs for asset-backed securities and covered bonds.
5 March 2015 PSPP start date’s announcement	Eurosystem announces that will started to buy public sector securities under the PSPP on 9 March 2015. The securities covered by the PSPP comprise nominal and inflation-linked central government bonds and bonds issued by recognized agencies, regional and local governments,

	international organizations, and multilateral development banks located in the euro area.
3 December 2015 APP extension	ECB extends the APP. The monthly purchases of €60 billion are intended to run until the end of March 2017 or beyond, if needed, until achieving a sustained adjustment in the path of inflation, consistent with the aim of inflation rates close to 2% over the medium term.
10 March 2016 APP recalibration and CSPP announcement	ECB decides to increase the monthly purchases under APP from €60 billion to €80 billion. ECB announces the inclusion of investment-grade euro-denominated bonds issued by non-bank corporations established in the euro area in the list of eligible assets for regular purchases under a new corporate sector purchase program (CSPP). On 8 June 2016, starts the purchases of corporate sector bonds. To further the pass-through of the Eurosystem's asset purchases to financing conditions of the real economy, and support providing monetary policy accommodation.
12 September 2019 APP's restart announcement	ECB decides to restart net purchases under the asset purchase program (APP) at a monthly pace of €20 billion from 1 November. The Governing Council expects them to run for as long as necessary to reinforce the accommodative impact of its policy rates and end shortly before raising the key ECB interest rates.
12 March 2020 APP recalibration	ECB adds a temporary envelope of additional net asset purchases of €120 billion until the end of 2020, ensuring a strong contribution from the private sector purchase programs and supporting favorable financing conditions for the real economy in times of heightened uncertainty.
18 March 2020 PEPP announcement	EBC launches a new temporary asset purchase program of private and public sector securities, Pandemic Emergency Purchase Program (PEPP), to counter the serious risks to the monetary policy transmission mechanism and the euro area's outlook the outbreak and escalating diffusion of the coronavirus, COVID-19.

<p>4 June 2020 PEPP recalibration</p>	<p>ECB announces that the envelope for the PEPP will be increased by €600 billion to a total of €1,350 billion. In response to the pandemic-related downward revision to inflation over the projection horizon. The horizon for net purchases will be extended to at least the end of June 2021. In any case, the ECB will conduct net asset purchases until it judges that the coronavirus crisis phase is over.</p>
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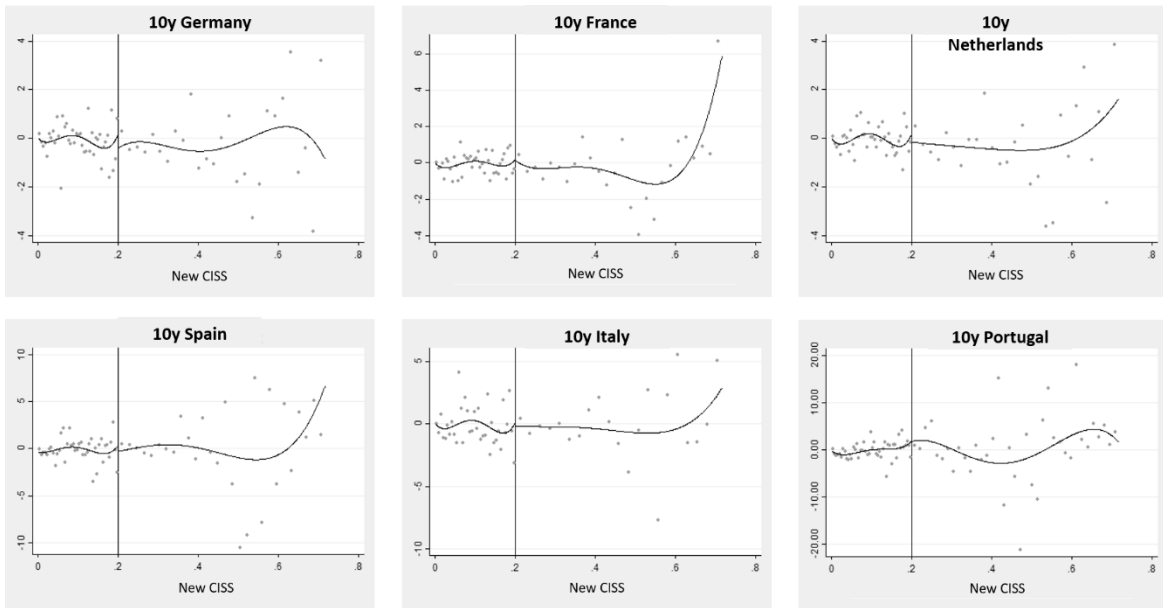
Source: ECB

### Annex III – Macroeconomic variables

Euro Area	Germany	France	Netherlands	Spain	Italy	Portugal
Business Climate	CPI Final MM	Consumer Conf.	CPI YY nsa	CPI MM Final nsa	Consumer Conf.	CPI MM
Consum. Conf. Final	CPI Final YY	Consum. Spend. MM	GDP Final nsa YY	CPIYY Final nsa	C. Prices Final MM	CPI YY
Economic Sent.	Exports MM sa	CPI (EU) Final MM	GDP FINAL sa QQ	GDP QQ	C. Prices Final YY	GDO QQ Prelim
GDP Flash Est. QQ	GDP Flash QQ sa	CPI (EU) Final YY	Unemp. Rate M. sa	GDP YY	CPI (EU) Final MM	GDP YY Prelim
GDP Flash Est. YY	GDP Flash YY nsa	GDP Prelim. QQ		HICP Final MM	CPI (EU) Final YY	
GDP Revised QQ	GfK Consum. Sent.	Ind. Output MM		HICP Final YY	GDP Final QQ	
GDP Revised YY	Import Prices YY	Trade Balance		HICP Flash YY	GDP Final YY	
HICP Final MM	Import Prices MM			Ind. Out. C. Ad. YY	Ind. Output MM sa	
HICP Final YY	Imports MM sa			Manufacturing PMI	Ind. Outp. YY wda	
Ind. Production MM	Industrial Output MM			Retail Sales YY	Unemp. Rate	
Ind. Production YY	Producer Prices MM			Services PMI		
Ind. Sentiment	Producer Prices YY			Unemp. Rate		
M3 Annual Grwth	Retail Sales MM Real					
Prod. Prices MM	Retail Sales YY Real					
Prod. Prices YY	Trade Balance					
Retail Sales MM	Unemp. Chg sa					
Retail Sales YY	Unemp. Rate sa					
Services Sentiment						
Unemp. Rate						
Source: Thomson Reuters and Eurostat	Source: Thomson Reuters and Federal Statistical Office of Germany	Source: Thomson Reuters and Institut national de la statistique et des études économiques	Source: Thomson Reuters and StatLine (Statistics Netherlands' database)	Source: Thomson Reuters and Instituto Nacional de Estadística	Source: Thomson Reuters and Istituto Nazionale di Statistica	Source: Thomson Reuters and Instituto Nacional de Estadística

## Annex IV – Discontinuity Study

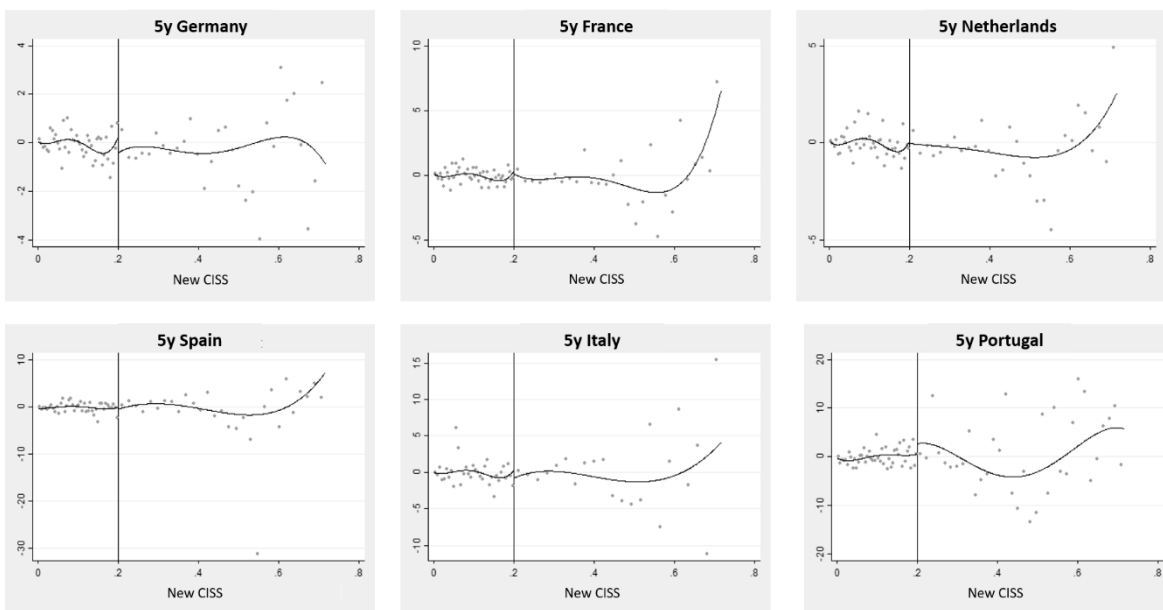
Figure A – Discontinuity regression of New CISS with respect to the daily changes in 10-year maturity sovereign bonds yields of selected euro area sovereign bonds.



Source: Thomson Reuters and ECB.

Note: The vertical axis represents the daily changes of sovereign bonds and the horizontal axis represents New CISS.

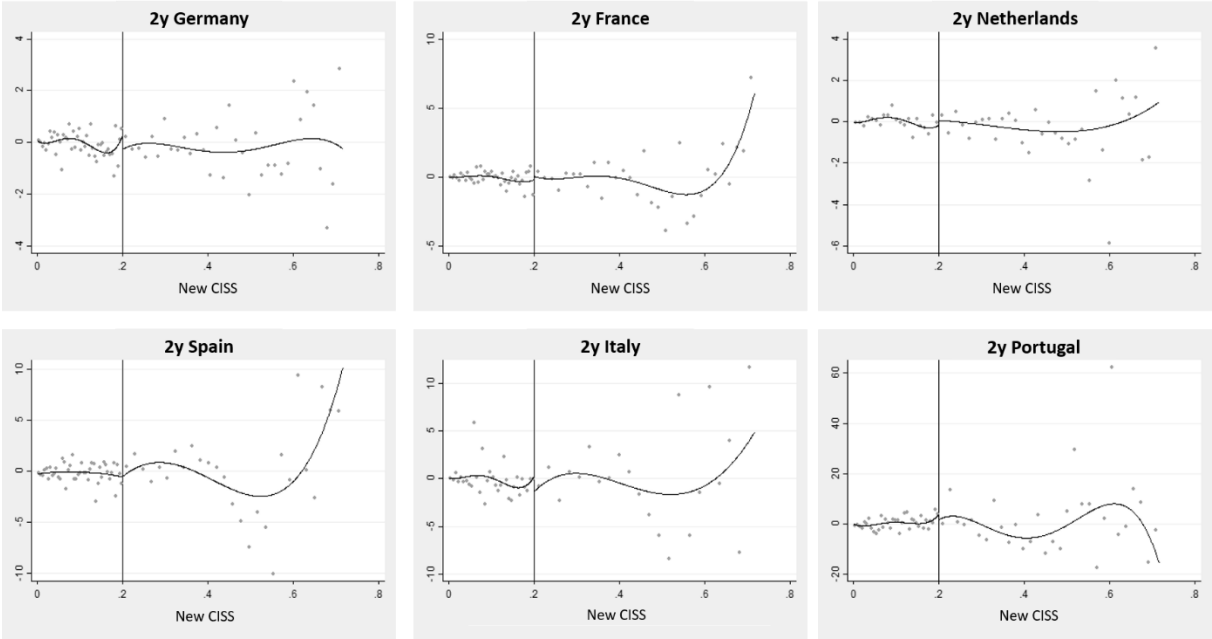
Figure B – Discontinuity regression of New CISS with respect to the daily changes in 5-year maturity sovereign bonds yields of selected euro area sovereign bonds.



Source: Thomson Reuters and ECB.

Note: The vertical axis represents the daily changes of sovereign bonds and the horizontal axis represents New CISS.

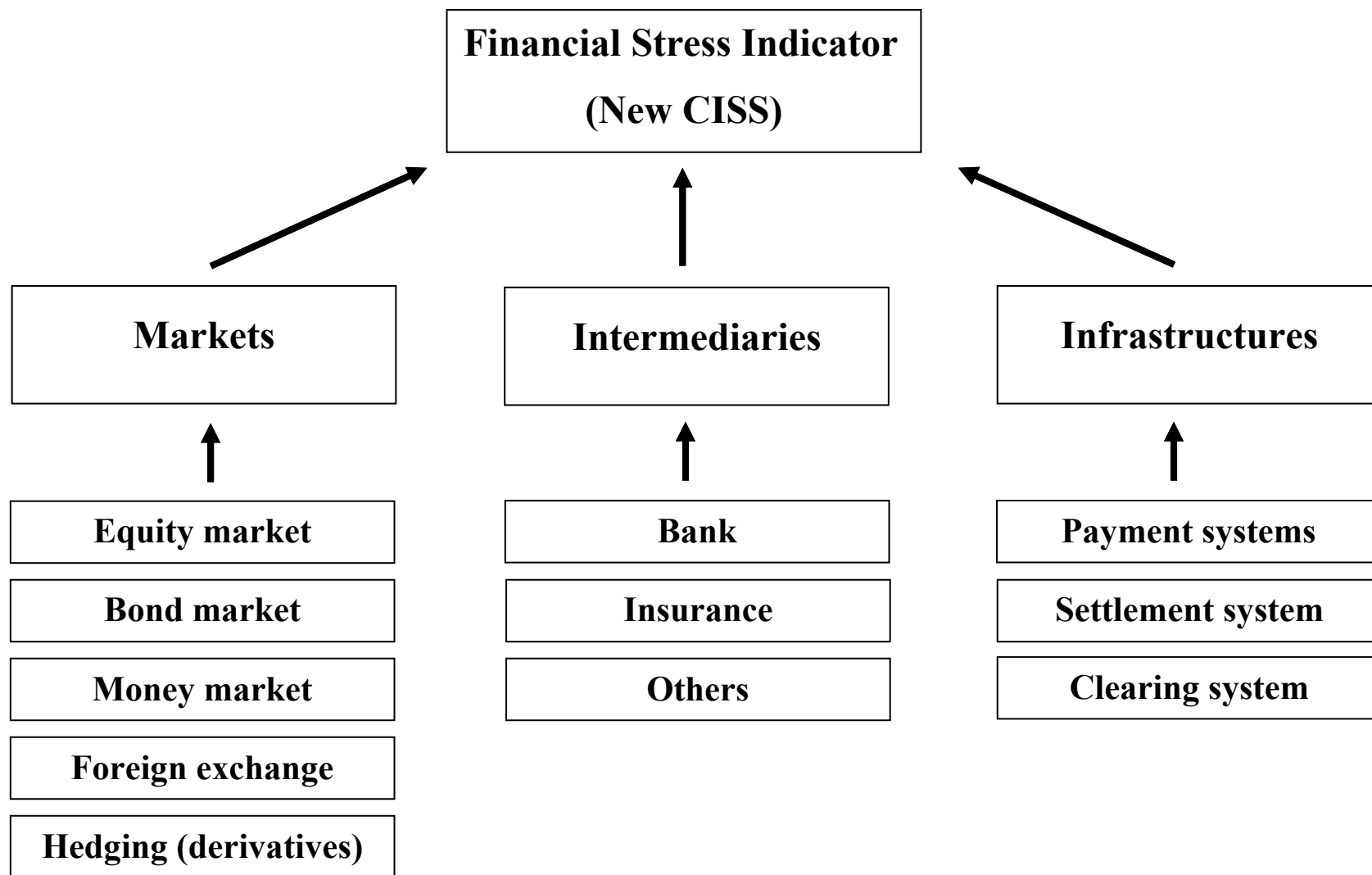
Figure C – Discontinuity regression of New CISS with respect to the daily changes in 2-year maturity sovereign bonds yields of selected euro area sovereign bonds.



Source: Thomson Reuters and ECB.

Note: The vertical axis represents the daily changes of sovereign bonds and the horizontal axis represents New CISS.

**Annex IV – Composition structure of New Composite Indicator of Systemic Stress**



## ECB to ease in December but deposit rate cut unlikely: traders

By Reuters Staff

2 MIN READ



(Reuters) - Euro money market traders see a median 70 percent chance of the European Central Bank easing monetary policy further in December, a Reuters poll found, but they said another cut to an already negative deposit rate was not likely.

ECB President Mario Draghi struck a dovish tone after the central bank meeting last week, interpreted by many as a strong signal it will expand its 60 billion euros-a-month asset-buying program or extend it beyond next September.

The range of probabilities in 17 trader responses on further ECB easing of some kind ran from 40 to 80 percent.

Despite Draghi's assertion last year that interest rates were at the lower bound, most traders polled said the deposit rate, now at -0.2 percent, could also be lowered further even if they did not expect such a cut to happen any time soon.

"Cutting the deposit facility is too simple and won't help," said a trader. "Even what they have done up to now has not had enough of a result for them to be happy. I wouldn't know, but it's not for me to invent the magical instrument - it's for them to invent that."

The median response from the poll said the deposit rate lower bound could be at -0.3 percent, while a few traders said it was even lower at -0.5 percent.

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<sup>18</sup> Retrieved from: <https://www.reuters.com/article/us-ecb-refi-poll/ecb-to-ease-in-december-but-deposit-rate-cut-unlikely-traders-idINKCN0SK1RU20151026>

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So far the ECB's quantitative easing (QE) program launched earlier this year has not generated much inflation at all.

Euro area inflation fell to -0.1 percent in September and data later this week is expected to show that consumer prices did not rise in October compared with a year ago either.

Draghi said at a news conference last week that "the attitude is not 'wait and see', but 'work and assess'" as he strives to reach the ECB's 2 percent target.

The survey also showed the ECB would lend 18.8 billion euros to banks as a part of its three-month loan operation and 68.0 billion euros as a part of the weekly tender. The priors were 21.8 billion and 65.9 billion euros.

Reporting by Siddharth Iyer; Polling by Khushboo Mittal and Hari Kishan; Editing by Hugh Lawson

*Our Standards: [The Thomson Reuters Trust Principles.](#)*

BUSINESS NEWS NOVEMBER 25, 2015 / 12:04 PM / UPDATED 5 YEARS AGO

## ECB seen easing policy next week with deposit rate cut, asset-buying expansion - Reuters poll

By Sumanta Dey, Deepti Govind

4 MIN READ



(Reuters) - The European Central Bank will ease policy next week in some way or another, according to economists polled by Reuters, many of whom say the bank cannot pull back now after signalling its intentions so clearly over the past month.

Speculation of further stimulus from the ECB has mounted ever since President Mario Draghi indicated in October that the Governing Council would act if needed to drive up inflation to its 2 percent target, a view echoed by several policymakers.

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<sup>19</sup> Retrieved from: <https://www.reuters.com/article/uk-ecb-policy-poll/ecb-seen-easing-policy-next-week-with-deposit-rate-cut-asset-buying-expansion-reuters-poll-idUKKBN0TE1CU20151125>

The ECB will next decide policy on Dec. 3, less than two weeks before a Federal Reserve meeting in which the U.S. central bank is widely expected to raise rates from zero for the first time in nearly a decade.

The likely outcome of both meetings has already been priced in by financial markets, which is why the euro has weakened over six percent against the U.S. dollar since Draghi's comments last month.

Inflation, meanwhile, rose to 0.1 percent last month and a core measure is showing signs of strengthening over the past few months.

Still, a poll of over 50 economists taken this week showed forecasters predict an 80 percent probability of the ECB announcing further easing next Thursday - roughly the same result as the previous two polls.

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"It (the ECB) cannot run the risk of disappointing markets, having raised expectations of action. Action in some form or other looks like a racing certainty; it's merely a question of the form it takes," said Ken Wattret at BNP Paribas in London.

Rhetoric from policymakers over the past few weeks has set expectations so high that there is a risk markets are disappointed no matter what the ECB does.

The consensus from the poll is that the ECB will cut the deposit rate further to -0.30 percent from -0.20 percent now.

Forecasters also expect the ECB to increase the amount of bonds it buys each month to 75 billion euros from the current 60 billion euros, or extend its quantitative easing programme beyond September 2016, or do both.

Reuters exclusively reported on Wednesday that ECB officials were considering options such as staggering charges on banks hoarding cash or to buy additional types of debt.

Not everyone, even within the ECB, agrees over the effectiveness of monetary policy though.

On Monday, Sabine Lautenschlaeger, a German member of the core team that sets ECB policy said ever-looser monetary policy had its limits and predicted a diminishing impact of future money printing.

She is not alone. Criticism has come from other quarters in Germany over the past couple of weeks, including from the finance ministry, a panel of economic advisers known as the “wisemen” and the head of the Bundesbank.

Indeed, so far the stimulus has had limited effect.

Inflation has dipped below zero a couple of times since last December owing to low energy prices and weak demand, economic growth has largely stuck to its lacklustre pace while the unemployment rate has remained over 10 percent.

In contrast, unemployment in the United States and Britain has dipped to half that rate, close to a level that policymakers associate with full employment.

A majority, 36 of 46 economists in poll, said the ECB’s monetary policy has been effective in improving lending to businesses - echoing Draghi’s view.

While those claims are supported by the fact that euro zone business lending has stopped contracting, latest official data showed growth in loans to corporations slowed almost to a halt.

Polling by Deepti Govind and Krishna Eluri; Editing by Ross Finley/Jeremy Gaunt

*Our Standards: The Thomson Reuters Trust Principles.*

## European Central Bank seen on hold despite recession risks doubling: Reuters poll

By Richa Rebello

4 MIN READ



BENGALURU (Reuters) - The European Central Bank will not follow the Federal Reserve in cutting interest rates to soften the economic threat from the coronavirus outbreak, even though the median chances of a euro zone recession have doubled in the last month.

While a March 3-4 Reuters poll of economists showed around 40% expect a further ECB interest rate cut at some point this year, the results underscored the central bank's limited policy options, given its deposit rate is already at -0.50%.

Taken after the Fed stunned financial markets on Tuesday with an emergency 50 basis point rate cut, its biggest since the global financial crisis, the survey concluded the ECB will keep the deposit rate on hold until at least the end of 2022.

"While the current situation is extremely fluid, it is unclear how much the ECB's current position will change solely in light of the Fed's move," noted Greg Fuzesi, an economist at JP Morgan.

"The immediate financial market response may not be material enough to cause a rethink. We did not put an ECB deposit rate cut into our forecast and we are still somewhat reluctant to do so after the Fed's intermeeting cut."

Only 11 of 52 economists polled forecast a 10 basis point deposit rate cut to -0.60% at the March 12 meeting. But nearly 40% expect at least one rate cut by the end of this year.

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<sup>20</sup> Retrieved from; <https://www.reuters.com/article/us-eurozone-economy-poll-idUSKBN20T0HR>

The poll results contrast sharply with market expectations of a roughly 90% chance of a deposit rate cut at the March meeting. Two cuts by the end of 2020 are almost fully priced in. [ECBWATCH](#)

The median chance provided by respondents of a euro zone recession in the next year doubled to 40% from 20% in the February poll, following the rapid spread of coronavirus infections from China to other countries, including Europe.

Euro zone growth forecasts in the latest Reuters poll were chopped modestly for the first half of the year, but now show close to no growth at all, at just 0.1% in the current quarter.

Italy, the euro zone's third largest economy, contracted 0.3% in the final quarter of 2019, and is now grappling with a coronavirus outbreak focused in the north of the country. On Wednesday the government announced the closure of schools and universities nationwide.

"In Italy, the considerable tourism sector is already feeling the impact. Before that we already had the shock stemming from a big drop in activity in China that hit supply chains. This could quickly get worse," said Elwin de Groot, head of macro strategy at Rabobank, who expects a March cut.

"The coronavirus spread is the proverbial straw that will break the camel's back and push the euro zone economy into a recession," he said.

In a worst-case scenario, euro zone growth for 2020 would shrink by 0.2% according to those who answered an additional question. The most pessimistic view predicted the economy contracting by 2%, not seen since the global financial crisis.

Forecasts for 2020 full-year average growth were trimmed to 0.8%, the lowest since polling began for that period. If that is realized, it will mark the weakest year since a contraction in 2013 following the euro zone debt crisis.

Twenty-eight of 40 economists, 70%, said the ECB should ease monetary policy further in response to the coronavirus outbreak.

Among those, 18 of 28, or about two-thirds of those respondents said the ECB should increase the size of its monthly asset purchases.

“There is immense pressure on us to act - from markets, the media and the Fed’s cut - so in the end, we may be forced into an emergency move but we’ll try to resist,” a source familiar with the working of the ECB told Reuters earlier this week.

Inflation was forecast stay under the ECB’s medium-term target of below but close to 2% through to end-2021.

Polling and analysis by Tushar Goenka; Editing by Ross Finley and

*Our Standards: The Thomson Reuters Trust Principles.*

## Annex VI – Reuters Polls

### Extra questions

1. What is your worst case scenario forecast for Q1 and 2020 euro zone economic growth?

	Q1	2020
Median	-0,2	-0,2
Highest	0,3	0,5
Lowest	-1,0	-2,0
Count	24	21

2. Should the ECB ease monetary policy further in response to the coronavirus outbreak?

28 said yes

12 said no

Poll conducted March 3 - 4

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## Appendix A

Table A: Cumulative daily changes in sovereign bonds yields of selected euro economies around announcement dates (basis points)

	2-year maturity						5-year maturity						10-year maturity					
	DE	FR	NL	ES	IT	PT	DE	FR	NL	ES	IT	PT	DE	FR	NL	ES	IT	PT
<b>OMT</b>																		
Cumulative change	5	-3	4	-106	-65	93	6	-7	2	-76	-64	52	10	-9	-2	-40	-25	-52
<b>APP</b>																		
Cumulative change	36	33	35	7	74	10	39	47	35	23	64	24	22	31	23	31	50	21
<b>PEPP</b>																		
Cumulative change	11	7	8	13	-19	18	17	8	14	11	-23	7	23	10	17	14	-22	8

Source: Thomson Reuters and ECB

Table A.1: Normalized daily changes in sovereign bonds yields of selected euro economies around announcement dates (basis points)

	2-year maturity						5-year maturity						10-year maturity					
	DE	FR	NL	ES	IT	PT	DE	FR	NL	ES	IT	PT	DE	FR	NL	ES	IT	PT
<b>OMT</b>																		
1st announcement	36	-194	0	-873	-524	277	104	-176	-52	-787	-658	328	167	-169	-25	-679	-549	-33
2nd announcement	-108	28	0	10	29	-161	-235	-25	-184	351	197	-96	-263	-72	-276	679	494	-7
3rd announcement	251	83	117	-226	-124	176	287	25	288	-485	-241	5	335	24	250	-533	-288	-307
<b>APP</b>																		
1st announcement	36	0	29	31	29	-6	52	50	52	48	33	-46	24	24	50	80	55	-7
2nd announcement	-72	-56	-29	-72	-67	-9	26	-25	-79	-109	-110	9	-167	-193	-200	-173	-192	-123
3rd announcement	36	0	0	-62	-57	-9	-52	-50	-52	-85	-77	-9	-48	-48	-75	-80	-110	-57
4th announcement	503	361	408	92	124	22	470	428	420	218	230	78	478	459	426	333	316	160
5th announcement	287	139	204	41	19	-9	261	201	262	24	-11	-23	143	121	200	40	41	-7
6th announcement	431	278	291	51	114	6	183	176	236	24	-66	-5	72	24	75	-67	-179	-27
7th announcement	72	194	117	-10	543	38	78	403	79	157	702	105	24	362	100	280	755	200
<b>PEPP</b>																		
1st announcement	323	194	204	205	-67	66	418	252	420	182	-99	55	478	290	426	240	-124	94
2nd announcement	72	0	29	-72	-114	-9	26	-50	-52	-48	-154	-23	72	-48	0	-53	-179	-38

Source: Thomson Reuters and ECB

Table A.2: Cumulative daily changes of exchange rate euro-USD, Euronext, and inflation swap rates around the announcement dates  
(percent and basis points)

	Euro - USD exchange rate (in %)	Euronext 100 Index (in %)	Inflation swap rate (in basis points)			
			1-year	2-year	5-year	10-year
<b>OMT</b>						
Cumulative change	0,8	3,9	-25	6	2	-10
<b>APP</b>						
Cumulative change	2,4	-16,3	-7	0	8	11
<b>PEPP</b>						
Cumulative change	0,1	-5,2	-18	-11	-8	-4

Source: Thomson Reuters

## Appendix B

Table B: Changes in sovereign bonds yields of selected euro economies around event dates, excluding  $News_t$  variable (basis points)

	2-year maturity						5-year maturity						10-year maturity					
	DE	FR	NL	ES	IT	PT	DE	FR	NL	ES	IT	PT	DE	FR	NL	ES	IT	PT
<b>Standard</b>																		
$D_t$																		
1-day change	4***	3***	4***	-7**	-1	10	5***	4***	4***	-3	-2	7	5***	3**	3***	1	0	-2
2-day change	3***	2***	3***	-6***	-9***	2	5***	2***	3***	-5***	-7***	-2	5***	2**	3***	-3*	-4***	-6**
<b>Controlled</b>																		
<b>Dummy Variable</b>																		
$D_t$																		
1-day change	5***	4***	5***	-3	0	10	6***	4**	6***	-5	-3	1	5***	2	4**	-5*	-4	-9
2-day change	3***	3**	2**	-2	0	4	4***	2*	3**	-5*	-3	-6	3**	1	2*	-6***	-5**	-11**
$D_t * NCISS_t$																		
1-day change	-2	-2	-1	-9	-2	1	-2	0	-2	3	3	11	0	1	-1	12***	10**	13
2-day change	1	-1	1	-7*	-16***	-5	2	0	2	0	-7*	7	3*	1	2	5*	1	8
<b>Continuous Variable</b>																		
$D_t$																		
1-day change	4***	2	3*	-6	-5	1	4**	1	2	-8*	-9*	-3	0	-2	-0	-8**	-8**	-13*
2-day change	1	0	1	-3	1	1	1	0	0	-5*	-1	-6	0	0	-1	-6**	-5**	-11**
$D_t * NCISS_t$																		
1-day change	3	4	3	-3	15	36	7	12**	10*	15	26*	40	17***	18***	15**	34***	34***	44*
2-day change	8***	6*	7**	-10	-37***	3	13***	8*	14***	1	-21**	15	18***	9**	14***	10	1	16
N° of Observations	2695	2707	2706	2707	2707	2707	2694	2707	2707	2706	2692	2695	2695	2707	2709	2707	2692	2706

Source: Thomson Reuters and ECB

Notes: Based on the 12 event dates reported in Annex II. Standard tests were used to assess whether the coefficients are statistically different from zero. \*\*\*, \*\* and \* indicate significance at 1,5 and 10 percent level, respectively.

Table B.1: Changes in equity prices of selected euro economies around event dates, excluding  $News_t$  variable (percentage)

	Equity Index					
	DE	FR	NL	ES	IT	PT
Standard						
$D_t$						
1-day change	-1,18***	-1,48***	-1,48***	-1,27***	-1,47***	-1,05***
2-day change	0,15	-0,02	-0,07	0,45	0,46	-0,13
Controlled						
<b>Dummy Variable</b>						
$D_t$						
1-day change	-0,02	0,18	-0,19	0,32	0,00	0,27
2-day change	0,32	0,05	0,21	0,42	0,18	0,61**
$D_t * NCISS_t$						
1-day change	-2,43***	-3,32***	-2,59***	-3,18***	-2,92***	-2,62***
2-day change	-0,33	-0,12	-0,52	0,09	0,55	-2,96***
<b>Continuous Variable</b>						
$D_t$						
1-day change	0,59	1,95 ***	1,31**	1,64**	1,26	1,73***
2-day change	0,56	0,79*	0,77**	0,98*	0,45	1,35***
$D_t * NCISS_t$						
1-day change	-6,25***	-13,34***	-10,87***	-11,29***	-10,57***	-10,75***
2-day change	-1,46	-3,06**	-3,23***	-1,98	0,09	-5,61***
N° of Observations	2680	2707	2707	2705	2685	2710

Source: Thomson Reuters and ECB

Notes: Based on the 12 event dates reported in Annex II. Standard tests were used to assess whether the coefficients are statistically different from zero. \*\*\*, \*\* and \* indicate significance at 1,5 and 10 percent level, respectively.

Table B.2: Changes of exchange rate euro-USD and inflation swap rates around the event dates, excluding  $News_t$  variable (percentage and basis points)

	Euro - USD exchange rate (in %)	Inflation swap rate (in basis points)			
		1-year Standard	2-year	5-year	10-year
Standard					
$D_t$					
1-day change	0,28*	-4,22**	-0,31	0,11	-0,13
2-day change	-0,05	-0,53	0,48	0,49	0,88
Controlled					
<b>Dummy Variable</b>					
$D_t$					
1-day change	0,27	-2,26	3,22	2,49	2,39
2-day change	-0,09	-1,43	1,50	2,13	2,34*
$D_t*NCISS_t$					
1-day change	0,03	-3,90	-7,04**	-4,72*	-5,04*
2-day change	0,09	1,69	-1,85	-3,14	-2,69
<b>Continuous Variable</b>					
$D_t$					
1-day change	0,45*	3,64	6,88***	6,04***	5,11**
2-day change	0,04	1,91	3,33*	3,59**	3,30**
$D_t*NCISS_t$					
1-day change	-0,63	-30,49***	-27,89***	-22,94***	-20,30***
2-day change	-0,33	-9,24	-10,81**	-11,71**	-9,16*
N° of Observations	2760	2760	2760	2760	2760

Source: Thomson Reuters and ECB

Notes: Based on the 12 event dates reported in Annex II. Standard tests were used to assess whether the coefficients are statistically different from zero. \*\*\*, \*\* and \* indicate significance at 1,5 and 10 percent level, respectively.

## Appendix C

Table C: Changes in sovereign bonds yields of selected euro economies around the limit set of event dates, excluding  $News_t$  variable (basis points)

	2-year maturity						5-year maturity						10-year maturity					
	DE	FR	NL	ES	IT	PT	DE	FR	NL	ES	IT	PT	DE	FR	NL	ES	IT	PT
Standard																		
$D_t$																		
1-day change	3***	1	2**	-12***	-8**	9	3**	1	2	-10***	-11***	4	2	-1	0	-7***	-7***	-10**
2-day change	2***	0	1	-9***	-11***	1	3***	0	1	-9***	-10***	5	2**	0	1	-8***	-7***	-11***
Controlled																		
<b>Dummy Variable</b>																		
$D_t$																		
1-day change	4***	3	3*	5	-2	10	4**	2	1	-10**	-8*	-2	2	-1	1	-11***	-10***	-15**
2-day change	1	-1	0	-7**	-6**	1	1	-1	-1	-7***	-5*	-7	0	-2*	1	-12***	-8***	-14***
$D_t * NCISS_t$																		
1-day change	-1	-3	0	-17**	-14*	-3	-3	-2	3	0	-6	12	-1	0	-2	11**	6	12
2-day change	3***	2	3***	-5	-12***	-2	5***	3**	5***	-3	-10**	6	6***	4***	0	7***	1	5
<b>Continuous Variable</b>																		
$D_t$																		
1-day change	4**	3	3	8	5	-3	5**	2	-1	-1	-1	8	0	1	1	-6	-8*	-12
2-day change	1	2	1	5	10**	1	2	2	-2*	0	2	-7	0	0	0	-2	-8***	-10
$D_t * NCISS_t$																		
1-day change	-3	-8	0	-107***	-71***	65	-8	-9	16***	-48*	-52**	66	8	-4	-2	-2	3	10
2-day change	5	-11*	3	-71***	-113***	-3	6	-9	16***	-45***	-64***	13	14*	-4	5	-2***	0	-8
N° of Observations	2695	2707	2706	2707	2707	2707	2694	2707	2707	2706	2692	2695	2695	2707	2709	2707	2692	2706

Source: Thomson Reuters and ECB

Notes: Based on the limit set of 9 dates. Standard tests were used to assess whether the coefficients are statistically different from zero. \*\*\*, \*\* and \* indicate significance at 1,5 and 10 percent level, respectively.

Table C.1: Changes in equity prices of selected euro economies around the limit set of event dates, excluding  $News_t$  variable (percent)

	Equity Index					
	DE	FR	NL	ES	IT	PT
Standard						
$D_t$						
1-day change	0,82*	0,46	0,17	0,52	0,34	0,46
2-day change	1,27***	0,97***	0,76***	1,40***	1,23***	0,80***
Controlled						
<b>Dummy Variable</b>						
$D_t$						
1-day change	0,70	2,63***	1,99***	2,54***	2,34***	2,14***
2-day change	0,71*	1,37***	1,23***	1,63***	1,27***	1,55***
$D_t * NCISS_t$						
1-day change	0,26	-4,90***	-4,11***	-4,55***	-4,48***	-3,78***
2-day change	1,24**	-0,91**	-1,07***	-0,49	-0,05	-3,39***
<b>Continuous Variable</b>						
$D_t$						
1-day change	-0,69	2,79***	2,18***	2,56***	2,38***	2,28***
2-day change	-0,16	1,60***	1,37***	1,79***	1,36***	1,69***
$D_t * NCISS_t$						
1-day change	6,63***	-12,33***	-10,62***	-10,73***	-10,72***	-9,58***
2-day change	6,17***	-3,28***	-3,18***	-1,99*	-0,65	-4,58***
N° of Observations	2680	2707	2707	2705	2685	2710

Source: Thomson Reuters and ECB

Notes: Based on the limit set of 9 dates. Standard tests were used to assess whether the coefficients are statistically different from zero. \*\*\*, \*\* and \* indicate significance at 1,5 and 10 percent level, respectively.

Table C.2: Changes of exchange rate euro-USD and inflation swap rates around the limit set of event dates, excluding  $News_t$  variable (percentage and basis points)

	Euro - USD exchange rate (in %)	Inflation swap rate (in basis points)			
		1-year	2-year	5-year	10-year
Standard					
$D_t$					
1-day change	0,20	-1,56	2,63	2,76*	1,66
2-day change	0,03	1,74	2,50**	2,18**	2,40**
Controlled					
<b>Dummy Variable</b>					
$D_t$					
1-day change	0,10	1,67	6,16***	5,34***	4,02**
2-day change	0,04	2,25	3,67**	3,58***	3,51***
$D_t * NCISS_t$					
1-day change	0,23	-7,28**	-7,93***	-5,79**	-5,33**
2-day change	-0,03	-1,12	-2,61	-3,13**	-2,51*
<b>Continuous Variable</b>					
$D_t$					
1-day change	0,14	3,39	6,33***	5,77***	4,18**
2-day change	0,09	3,55**	4,07***	3,71***	3,52***
$D_t * NCISS_t$					
1-day change	0,30	-26,06***	-19,42***	-15,80***	-13,30***
2-day change	-0,36	-9,36**	-8,14**	-7,93**	-5,83*
N° of Observations	2760	2760	2760	2760	2760

Source: Thomson Reuters and ECB

Notes: Based on the limit set of 9 dates. Standard tests were used to assess whether the coefficients are statistically different from zero. \*\*\*, \*\* and \* indicate significance at 1,5 and 10 percent level, respectively.

