Unconventional Monetary Policies: The Euro Area Experience

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Abstract

This article discusses the role of monetary policies implemented by ECB after 2008 financial crisis, with a special focus on unconventional measures, analyzing to what extent they influenced Euro area's main macroeconomic indicators in the period. In particular, we analyze Euro area's sovereign/private yield curves responses with each asset purchase program announced/implemented from 2010 onwards. Some measures avoided the more acute risks of contagion through the region, and managed partial improvements in macro indicators. But other programs did not reach their initial targets, receiving strong criticisms for not avoiding or aggravating the crisis. Nevertheless, serious problems remain for governments and private agents in the region. Although the ECB strategy of gradual downsize of unconventional programs while still keeping an accommodative monetary stance is considered appropriate, the path for a sustained growth recovery in Euro area cannot rely only on easy monetary policies. They should also be complemented by a fiscal policy which is more coordinated and has a countercyclical role, coupled with adequate institutional reforms that together foster credit markets, encourage private/public investments in long term and reduce regional asymmetries. Additionally, it is believed that a more robust and integrated framework for financial supervision would contribute to reduce negative spillovers from volatility episodes, bringing more financial stability to the zone.

Keywords: Euro area, monetary policy, unconventional

JEL: E52, E58, F42, F45

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1. Background: Banking and Sovereign Crisis

The use of unconventional monetary policies in the Euro area began in 2008, in the aftermath of the international financial crisis, with its epicenter in the United States and global implications. After the collapse of Lehman Brothers in September 2008, the world's leading central banks, including the ECB, took measures to avoid a more severe spread of the crisis to the financial sector and to the real economy. In this regard, they took not only conventional measures (e.g.: rapid and significant reduction of interest rates), but also a series of unconventional measures, such as extensive liquidity provision operations and foreign exchange swap agreements to ensure the liquidity needs of banks in foreign currency, according to Lane (2012). European banks also had significant exposures in the US subprime market. In this sense, the action of central banks in 2008 has helped to contain panic and avoid a massive failure of banks.

However, the worsening of the crisis in the Euro area in 2009 showed that the situation was not just an "external shock" originated in the USA, but a crisis with roots deeply inserted into the monetary union. Indeed, since the adoption of the euro as the single currency in 1999, it was hoped that the monetary union would promote an improvement of the economic and financial integration and, coupled by the output expansion that occurred in the 2000s, would help Euro area's less developed countries (*periphery*, namely: Greece, Ireland, Portugal, Spain, Italy, Cyprus) in a movement towards convergence with the development level achieved by Euro area's *core* countries (namely: Germany, France, Netherlands, Austria, Finland, Luxembourg, Belgium). Nevertheless, what actually happened was an increase of the zone's economic asymmetries.

We find in the literature several views which aim to explain the Euro area crisis[1]. In our article, we discuss two widely accepted views: the Balance of Payments (BoP) and the Monetary Sovereignty.

The BoP view is supported by authors from various economic strands, from mainstream (Sinn et al, 2012) to Post-Keynesian authors, such as Cesaratto (2015). Under this view, since the creation of the euro, current account imbalances that existed within the region started to widen significantly. During the 2000 decade, core countries specialized in manufacturing and capital goods' exports, while the periphery was left with the supply of basic goods, services and construction sectors. This implied that Germany, Netherlands, Austria, Finland and Luxembourg widened their current account surpluses, while other countries increased their current account deficits, especially in the periphery.

Additionally, the periphery also lost competitiveness to their main trade partner in the period (Germany) due to lower wage growth rates in this country. Net real wages barely grew in Germany in the 2000s, and actually fell in some years (between 2004-2008). The reasons behind this would be the relative loss of bargaining power from labor unions (mainly in industry), and labor market reforms implemented in 2002 and 2008, which increased labor market flexibility and reduced employees' benefits. Those factors are possible explanations why unit labor costs grew much less in Germany than in the periphery. Also, taxes were shifted away enterprises towards individuals. This strategy allowed Germany to increase manufacturing production and exports, keeping lower levels of domestic consumption and imports. Within the monetary union, in the absence of a mechanism to adjust the exchange rate, while Germany could improve its surplus, periphery countries remained dependent of basic goods exports and capital goods imports, increasing their current account deficit. So an important component of the BoP view was the lack of an exchange rate mechanism to adjust current account imbalances, what would turn periphery countries in a position close to emerging countries under fixed exchange rates, subject to convertibility risks and a sudden stop once a crisis of confidence hit those countries. According to Cesaratto (2015), the existence of the Target 2 payment system (allowing that

[1] Other interpretations for the origins of the crisis would be: i) High public spending/wage growth in periphery states (fiscal profligacy view); ii) Monetary union's arrangements serve exclusively for the profit of German's capital, at the expense of other coutries (Marxian view). We do not develop those interpretations in the text, but some of their ideas are also enbedded in the two main views we present.

cross-border claims and liabilities from national central banks vis a vis the ECB increased substantially) could delay, but not stop such movements.

Furthermore, during most of the 2000s, current account deficits were financed by capital flows from the core to the periphery, fostered by the abundance of liquidity and low interest rates (sovereign debt yields from the periphery were close to the ones of core countries). Banks in the core lent money to enterprises and banks in the periphery, which in turn could pay for its imports and lend money domestically cheaply. Credit expansion was accelerated in the periphery in the 2000s, especially in the housing/real estate sector of countries like Spain and Ireland. Thus, according to BoP's view, the structure of an asymmetric monetary union in a fixed exchange rate regime would have led to over-indebtedness and moral hazard in periphery countries.

After the 2008 financial shock in USA, due to the liquidity scarcity, banks in the core interrupted their flows to the periphery and claimed their loans there. Then, banks in the periphery claimed their loans to enterprises and households. This provoked a sharp rise in non-performing loans/default rates, and fire sales of assets. At this point, the banking crisis affected severely private agents and impacted directly the real economy.

Those imbalances in the banking system and the private sector were transferred to periphery's public sector through the fiscal channel. Since the 2000s, some periphery countries (Greece, Italy) already had fiscal deficits, once an important share of their economic growth counted on public expenditure. After 2009, the abrupt drop in income, the growth in expenditure needs to rescue banks/firms in difficulty and pay unemployment benefits forced public deficits to rise quickly in the whole periphery. At the same time, public debt, which until then was relatively manageable in most of these countries (except for Greece, which at that time was 120% of GDP), increased rapidly. This took sovereign yield curves to steepen considerably in the periphery. At that time, mechanisms for the mutualization of risks within the monetary union were temporary or insufficient. Then, each national government had to bailout (assume large shares of liabilities from) its own banks and private agents. This is what actually turned a banking crisis into a sovereign debt crisis in each country. To make matters worse, since 2010 the sovereign crisis assumed a nature of "contagion": high public bond yields in a single periphery country began to transmit to other periphery countries, perceived by the market as facing similar macroeconomic problems.

This event began with Greece, which disclosed a record fiscal deficit in late 2009, starting a process that led to the announcement of three rescue programs: € 110 billion in May 2010, € 130 billion in February 2012, and € 86 billion in August 2015, totaling € 326 billion. Rescue packages by the Troika were also announced for Ireland (€ 85 billion in November 2010) and Portugal (€ 78 billion in May 2011), and later for Spain (availability of up to € 100 billion for banks in June 2012, of which € 41 billion were used in recapitalization) and Cyprus (€ 10 billion in March 2013).

Conversely, the Monetary Sovereignty view of the crisis does not put weight on cost differentials and current account imbalances like the BoP view. Instead, it links the origins of the crisis with the following arguments: i) The divorce between Euro area's monetary and fiscal authorities: the lack of a Euro area central fiscal authority limited the ECB to have a true role as lender of last resort (De Grauwe, 2013; Arestis, 2015); ii) The role of the Target 2 system, which when properly backed by a supranational fiscal authority and a central bank lender of last resort, would ensure the role of the euro as a unique currency in a single monetary regime, avoiding convertibility risks that exist in fixed exchange rate regimes (Lavoie, 2015); (iii) Financialization or money manager capitalism, which shifts the origin of the crisis to a transformation of the capitalist system, where finances play an increasing relevant role, at the expense of the real economy (Hein, 2013 and Wray, 2015).

Our point is that the Euro area crisis emerged from an export-driven and a debt-driven growth model, which resulted in a rapid increase in private current account imbalances and debt ratios. So it had origins in factors explained both by the BOP's view and Monetary Sovereignty view, but with more emphasis on the latter, following authors such as Stockhammer et al (2016). While current account imbalances and intra-Euro area capital flows are significant aspects for

understanding how financial fragilities built up within the Euro area, one of the key factors to understand how imbalances transformed into a sovereign debt crisis is the policy framework design, which split Euro area's monetary and fiscal spaces, and did not provide adequate financial regulatory mechanisms. With those limits in the policy framework, any serious financial crisis could lead to a deep recession, even if it was not preceded by current account imbalances. On the other hand, if the constraints on the policy framework and to implement stabilizing/regulatory measures did not exist, current account imbalances could not necessarily lead to a crisis.

Having presented the basic features of Euro area's banking and sovereign debt crisis, the following sections analyze monetary policy actions taken by the ECB after 2008, observing to what extent they were able to contain the crisis and influence the macroeconomic performance of Euro area countries as a whole in the period. Section 2 discusses conventional and unconventional measures taken between 2008 and 2014, before the implementation of Asset Purchase Programs (APPs). Section 3 focus on the programs implemented from September 2014 onwards, mainly on APPs, TLTROs and their effects on the monetary union. Section 4 makes an analysis of Euro area's sovereign/private yield curves levels and differentials, taking into account ECB's main asset purchase programs announced/implemented from 2009 onwards. Section 5 presents the main conclusions of the text, and some challenges ahead for the monetary, financial stability and economic policies in the Euro area.

2. Pre-Asset Purchase Programs

Before discussing ECB's unconventional programs in the post-2008 period, we will present a brief overview of the evolution of ECB's official interest rates (main refinancing and deposit) during the period.

2.1 Official Interest Rates (Main Refinancing/Deposit)

Regarding the main refinancing interest rate, with the adverse events of the financial crisis in the USA in 2008, the ECB promoted a rapid reduction of this rate, from 4.25% in September 2008 to 1.0% in May 2009, 325 basis points (bps) on total. This rate has remained at that level until April 2011, when it rose 25 bps, and increased again by 25 bps to 1.5% in July 2011. ECB's Governing Council President at that time was Jean Claude Trichet. He justified the rate hikes based on two reasons: (i) To control inflation expectations' acceleration (headline inflation was at that time 2.6% YoY, above ECB's objective); (ii) To avoid forming new "asset bubbles", due to the accommodative liquidity conditions since the end of 2008. Those rate hikes were criticized by many people, as the increase in headline inflation was caused by temporary factors (such as high international commodity price levels), but core inflation remained under control (around 1.6%, as it can be seen inside the dotted part of graph 1).

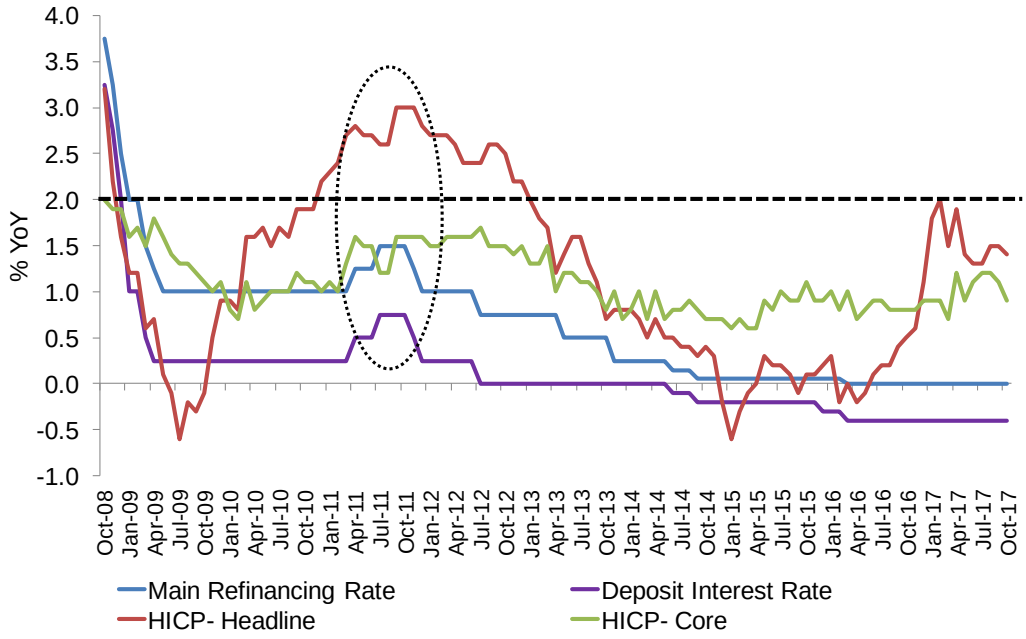
Critics argued that those rate hikes brought further restrictions to the then difficult financial conditions in the monetary union, and had negative spillovers from smaller periphery countries (Greece, Ireland, Portugal) to larger nations (such as Spain and Italy). Hence, there would be no funds available to rescue all those countries together. In fact, with higher interest rates and the worsening of the sovereign crisis, the Euro area experienced a sharp financial volatility during the second half of 2011.

However, it was just in November 2011 (when Mario Draghi assumed as the new President of ECB's Governing Council) that rates began to change their course. The main refinancing rate was reduced in November (-25 bps) and December 2011 (-25 bps), to 1.0%. Since then it was established a downward trend. Between 2012 and 2016 the rate was reduced 100 bps, until the historic low of 0% in March 2016.

When it comes to the deposit interest rate, it has broadly followed the course of increases/reductions of the main refinancing rate, although the main refinancing rate did not reach the negative territory as the deposit rate did. Between October 2008 and April 2009, the deposit rate has fallen from 3.25% to 0.25%. It was then raised in April 2011 (0.5%) and June (0.75%), following ECB's tightening at that time. It resumed a declining path only in November

2011 (0.5%), reaching 0% in July 2012. The introduction of negative deposit rates occurred in June 2014 (-0.1%). The ECB was the first major central bank to introduce negative deposit rates as a tool to achieve price stability[2]. With this measure, it tried to strengthen the commitment of "low rates for an extended period" established in July 2013, and then re-anchor long-term inflation expectations, that were quite subdued at that time. It was also seen as a mechanism to try to incentive banks to lend their excess reserves, that otherwise would be parked at ECB balance sheet (deposit facility/current account). Further deposit rate cuts took place in September 2014 (-0.2%), December 2015 (-0.3%) and March 2016 (-0.4%).

Graph 1 - Euro area - Interest Rates (Main Refinancing/ Deposit) and HICP (Headline/Core % YoY)



P.S.: Euro area's core inflation excludes energy, food, alcohol and tobacco. Source: Eurostat

2.2 Enhanced Credit Support and Covered Bond Purchase Program

When it comes to unconventional monetary programs in the Euro area, some initial measures had already been implemented in 2008, but a formal ECB unconventional program only began in July 2009, with a set of initiatives that was called "Enhanced Credit Support": (i) The conduction of fixed rate full allotment (FRFA) auctions for liquidity supply; (ii) A broader range of asset types (public and private) accepted as collateral for loans from the ECB; (iii) The extension of ECB's liquidity operations maturities (from 3 months up to 1 year); (iv) The provision of liquidity in foreign currency (mainly dollars) through swap agreements with central banks; (v) The purchase of covered bonds issued by banks.

Regarding the Covered Bond Purchase Program (CBPP), the universe of assets purchased by the ECB included securities issued by banks in the primary and secondary markets, in issuances of at least € 100 million, with a minimum investment grade rating (BBB - or similar) and backed by public or private guarantees. The program's objectives were: i) To promote lower interbank market rates; ii) To reduce funding restrictions for credit institutions, and indirectly to non-financial companies; iii) To encourage credit institutions to expand their loan book; iv) To improve liquidity conditions, particularly in the private debt market. The first phase of this program (CBPP 1) occurred between July 2009 and June 2010. In this phase, the ECB bought a nominal amount of € 60 billion, 27% in the primary market and 73% in secondary. The maturity of the securities purchased was between 3 and 7 years, with an average duration of 4.1 years, according to Beirne et al (2011). Despite CBPP 1 managed to buy the previously announced amount of € 60 billion, and in general terms fulfilled its four objectives, it was not enough to

[2] Denmark's Central Bank had already introduced negative interest rates in July 2012, but with an objective to counter capital inflows from the Euro area and exchange rate appreciation pressures.

prevent covered bonds yields' to steepen in periphery countries affected by the banking/sovereign debt crisis.

A second phase of the program (CBPP 2) was launched in November 2011, the same month the ECB started cutting official interest rates again. In the second phase, the ECB announced an intention to buy a nominal amount of € 40 billion in covered bonds until October 2012. This time the ECB purchased securities that came from bank issuances of at least € 300 million. The CBPP 2 lasted until the intended date, but the more stringent conditions in covered bonds markets and from the program itself led the ECB to undershoot its intended amount. It purchased only € 16.4 billion (36.7% in the primary market and 63.3% in the secondary).

2.3 Long Term Refinancing Operations

Before 2008, the ECB usually offered Long Term Refinancing Operations (LTROs) monthly, to be repaid in 3 months. In 2008, it began to offer also operations to be repaid in 6 months. In June 2009 it added to its tender procedures operations with repayment in 12 months too. In November 2011, when the ECB noticed the sovereign crisis had worsened and the liquidity available for banks and the economy as a whole had shrunk, the institution announced two major three-year LTROs, which were held in December 2011 and February 2012. On those occasions, the ECB lent to banks amounts to be paid over three years, charging only the main refinancing rate (then in a level of 1.0%). The first operation amounted € 489.2 billion, and the second operation € 529.5 billion, thus totaling a liquidity injection of € 1018.7 billion by the ECB within three months. However, due to the high uncertainty level in the Euro area, a large amount of this liquidity had two undesired destinations: i) ECB's balance sheet, parked at the current account or deposit facility; ii) Carry trade, speculative operations that used cheap money to buy assets with higher returns, including short-term sovereign debt of the periphery. Thus, although three-year LTRO operations have avoided a massive bank deleveraging and promoted a short-term positive effect in sovereign yields (as stated by Pattipeilohy et al, 2013), those large liquidity injections did not achieve their goal of restoring credit market's dynamics and channel funds to the real economy.

2.4 Securities Markets Program

This program was implemented in May 2010, same month when the first Greek aid package was agreed, but markets priced high spreads between German's and periphery countries' bonds. In order to reduce financial fragmentation in the Euro area and improve monetary policy transmission, the ECB engaged in purchasing periphery countries' securities, in an attempt to prevent their yields to rise.

Although the program also legally allowed corporate bond purchases in primary and secondary markets, its implementation was through government bond purchases in secondary markets. The program focus was not to make monetary policy more expansionary or to finance member countries. As a consequence, the ECB conducted weekly open market operations to provide fixed-term deposits (with a weekly duration), in order to sterilize the liquidity injected through its purchases.[3]

In the beginning (May 2010 to February 2011), purchases were limited to Greece, Ireland and Portugal bonds. After a pause between February and July 2011, the ECB resumed its purchases in August 2011, including also bonds of Spain and Italy.

The program has officially ended in September 2012, although purchases have actually occurred until February 2012. According to ECB data, the program has acquired bonds with an average maturity of 4.3 years and a nominal amount of € 218 billion, of which almost half belonged to Italy, as shown in Table 1.

[3] The ECB interrupted SMP portfolio weekly sterilization operations since July 10, 2014.

Table 1 - ECB - SMP - Amount Purchased by Country and Average Bond Maturity

Issuer Country	Nominal Amount (€ billion)	% Per Country	Average Maturity (years)
Italy	102.8	47.2%	4.5
Spain	44.3	20.3%	4.1
Greece	33.9	15.6%	3.6
Portugal	22.8	10.5%	3.9
Ireland	14.2	6.5%	4.6
Total	**218**	**100.0**	**4.3**

Source: ECB

When it comes to the evaluation of SMP impacts, there are several studies working with different methodologies to verify its effectiveness. In general, most authors agree that interventions have managed to reduce the yields of periphery countries, but only in the short term (a few weeks, as Pattipeilohy et al, 2013, or even a day, as Doran et al, 2013). According to Doran et al, although after a ECB intervention yields fell on the same day, with adverse macroeconomic events and a possible lag for a new intervention, yields resumed rising up to pre-intervention levels in the next day. From the point of view of private investors, what concerned them the most was that the ECB legally had seniority over them. This implied that private investors would be the first to bear the losses of any default in these bonds, and the ECB could be charged only after all private investors had been wiped out. This was one of the reasons why SMP interventions had only very short-term effects, with yields soon returning to rise again.

Indeed, the great controversy both in public opinion and among ECB members themselves were factors that led interventions to be discontinued in time, and actually interrupted seven months before the official end of the program. The disagreement within the ECB was such that it was pointed as a reason to the resignation of Bundesbank President Axel Weber and ECB's Chief Economist Jurgen Stark.

Helm (2012) states that ECB core countries (notably Germany) considered that the program did not respect ECB mandate to keep price stability. According to them, SMP would just have tried to disguise monetary financing of periphery governments. Although the program didn't purchase government securities in primary markets, it would have allowed periphery countries to delay the much "requested" fiscal adjustments/austerity measures.

2.5 Verbal Intervention Strategy and the OMT

With debt yields of periphery countries rising to unsustainable levels and sovereign contagion threatening to reach even core countries (e.g.: France), the ECB introduced a different communication approach. From July 2012 onwards, it started a "verbal intervention" strategy, trying to contain negative expectations on markets and aiming to increase monetary policy credibility. On a speech in July 26, 2012, Draghi affirmed the ECB would do "whatever it takes to save the euro".

This change in the communication strategy continued in the following months. In August 2012 ECB meeting, it was mentioned the possibility of undertaking "outright open market operations", in order to address seniority concerns by investors. The main features of the Outright Monetary Transactions (OMT) program were actually announced in September 2012. This new program intended to restore the transmission mechanism of monetary policy, which was notoriously disrupted. It opened the door for the ECB to buy sovereign debt of specific countries in secondary markets, in order to stabilize their yields, once they signed a Memorandum of Understanding with fiscal and reform conditionalities attached.

ECB purchases would be of bonds with maturities between 1 to 3 years, in unlimited amounts. The OMT focus wasn't on countries which were already receiving assistance from the Troika (Greece, Portugal or Ireland). Instead, it aimed to avoid spreading contagion to countries which had their debt trading on markets, but at high yields (e.g.: Spain, Italy). Most importantly, the ECB would be treated *pari passu* with other sovereign bond creditors, eliminating the

problem of ECB seniority that existed in SMP. As the SMP, the OMT received a number of legal challenges in the German Constitutional Court (GCC) and the European Court of Justice (ECJ), related to accusations such as monetary financing of government debt. Both courts dismissed OMT's charges, and gave a final ruling of "approval with conditions": the ECJ in June 16, 2015, and the GCC in June 21, 2016. Nonetheless, the OMT was never activated, only remaining in the field of verbal intervention.

ECB's OMT program was part of a broader set of other institutional actions taken by the EU in that period: (i) The creation in October 2012 of a permanent bailout fund, the European Stabilization Mechanism (ESM), to replace other previous temporary funds (European Financial Stability Facility - EFSF and European Financial Stabilization Mechanism - EFSM). The ESM would have a higher lending capacity (€ 500 billion) and stable guarantees; (ii) The beginning of the project to create a Banking Union. Under this project, from November 2014 onwards it would exist a Single Supervisory Mechanism, by which the ECB would centralize most Euro area banking supervision authority under its responsibility.

Later, it would be established a Banking Recovery and Resolution Directive (effective since January 2015) and a Single Resolution Mechanism (effective since January 2016), so that bank resolution costs would rely mostly on private (bail-in), rather that public (bailout) funds. Finally, the harmonization of Deposit Guarantee Schemes would protect Euro area's depositors of up to € 100,000 from potential losses on their deposits[4].

All of them intended to convey positive messages to markets. In OMT's case, it showed ECB's unconditional willingness to take bold actions if necessary. The ESM ensured an increase in the amount and time period of rescue funds (now permanent). With the Banking Union, there would be a substantial advance in monetary union's banking supervision and resolution framework. The combination of these elements had an important role in reducing investors' risk perception about Euro area countries. Therefore, from the end of 2012 onwards, the former trend of rising sovereign yields was halted.

In fact, the gradual downward trend of yields was reinforced with the introduction of the "forward guidance" mechanism, at the meeting of July 4, 2013. This change in communication by the ECB introduced a commitment that interest rates would remain at low levels for a prolonged period of time, signaling an accommodative monetary stance for an extended period.

3. Asset Purchase Programs and Targeted Long Term Refinancing Operations

3.1 Background

Despite the less volatile scenario in 2013 and 2014, with some countries of the periphery ending their assistance programs without the need of precautionary credit lines (Ireland, Portugal, Spain for banks) and the gradual downward trend of sovereign yields, Euro area economy still showed slow signs of recovery in credit and output in those years.

From the middle of 2014 onwards, the most serious concern became the threat of deflation, with signs that the low inflation level was not just a temporary event (related to an oil price drop), but a more lasting element, with second round effects that would weaken economic activity. The risk of deflation was a heavy burden for an economy with difficulty to recover, which could generate a situation that entrepreneurs would no longer invest, families would postpone spending decisions and the real value of debts would increase.

[4] The Banking Union is composed by three pillars: Single Supervisory Mechanism (SSM), Single Resolution Mechanism (SRM) and European Deposit Insurance Scheme (EDIS). The first two have already been implemented, but the third is still under discussion. According to the current European Commission proposal, EDIS would be implemented after a transitional period with two phases: i) Up to 2021, re-insurance (only liquidity coverage, leaving losses to be covered by national deposit insurance schemes); ii) From 2022 onwards, co-insurance (EDIS would partially cover losses together with national deposit insurance schemes, but subject to the condition that measures to address risks related to NPLs/legacy assets were previously implemented). Only after those two phases have been gradually introduced, a full EDIS would be in place, but with no date yet established for implementation.

In this context, in June 2014 the ECB introduced a negative deposit rate (-0.1%), and reduced the main refinancing rate from 0.25% to 0.15%. It also began to monitor more closely medium/long-term inflation expectations. In August 2014, the 5Y5Y inflation swap index[5] fell below 2% YoY for the first time on record.

3.2 CBPP 3, ABSPP and TLTRO I

In an attempt to avoid a deflationary spiral, trying to improve the transmission of monetary stimulus to credit markets and the real economy, the ECB launched new initiatives in September 2014. In terms of interest rates, the main refinancing rate was reduced to 0.05%, and the deposit rate was reduced to an even more negative level (-0.20%). In addition, it announced a set of three unconventional measures:

i) Covered Bond Purchase Program – CBPP 3: a third round of ECB's purchases of covered bonds issued by banks;

ii) Asset Backed Security Purchase Program - ABSPP: ECB's purchases of securitized bonds, backed by guarantees from private assets (e.g.: mortgages, auto loans, credit card bills);

iii) Targeted Long Term Refinancing Operations – TLTRO I: the provision of long-term liquidity lines to banks, with should target this liquidity preferably for loans to non-financial companies/households, except for mortgages.

Regarding the CBPP 3, purchases of covered bonds by the ECB began in October 2014 and were expected to last until at least September 2018, without a predetermined amount. This third phase of the program acquired an amount of bonds almost four times higher the first phase. According to ECB data available until October 2017, an amount of € 236 billion was acquired, with majority of purchases in the secondary market (66%).

In terms of the ABSPP, the program started a month later, in November 2014, and was also expected to last at least until September 2018. Nevertheless, there were some technical difficulties in its implementation. This happened because Euro area's market for securitized bonds shrank considerably after the 2008 crisis, and the availability of collateral that met ECB's requirements was small. The ECB made some changes in the ABSPP framework in September 2015, with national central banks assuming a greater role in ABS purchases. However, the pace of purchases remained low in the following months. Until October 2017, only € 24.68 billion of ABS were purchased by the ECB.

As for the TLTRO I, it was decided that the ECB would hold eight operations between September 2014 and June 2016, all maturing in September 2018 (i.e., operations would last between two and four years). The fees charged to banks would be 0.15% in the first two operations, dropping to the main refinancing rate in the following six operations (0.05% until December 2015, and 0% in March and June 2016). The idea was that banks could borrow funds respecting their initial limit (7% of their loan portfolio in the first two operations), which could be gradually expanded in the following operations if their loan portfolio directed to non-financial businesses and households (except for mortgages) increased. However, there was no serious punitive mechanism for banks if the borrowed liquidity was not directed towards lending to the real economy. The only "punishment" was that the resources must be repaid two years earlier (September 2016, instead of September 2018).

In January 2015, it became clear that ECB's implicit objective to expand its balance sheet by over € 1 trillion until September 2016 just with the programs announced in September 2014 would not be met. At the same time, with the sharp fall experienced by energy prices, Euro area's inflation rate was -0.6% YoY, deepening in the negative territory (reached in December 2014 with -0.2% YoY) and fueling fears of a deflationary spiral.

In this context, most economic analysts converged to a view that a more incisive action was necessary. This view also became the most suitable alternative for the majority of ECB Governing Council members, and tolerated by Germany, since the ultimate goal of ECB

[5] This is one of the most tracked indexes of inflation expectations. It is a measure of expected inflation (on average) over the five-year period that begins five years from today.

purchases would not be monetary financing of governments, but to ensure Euro area's price stability in the medium/long run. The institution was then ready to follow the path of Quantitative Easing (QE) also adopted by other major global central banks: Fed (USA), BOE (UK), BOJ (Japan), although well after them.

3.3 Public Sector Purchase Program

It was at this scenario that in January 2015 the ECB announced it would start in March 2015 its QE program, called Public Sector Purchase Program - PSPP. Its focus would be to make unsterilized purchases of bonds issued by governments, national agencies and EU's supranational bodies, initially at least September 2016. Additionally, the ECB would continue the programs announced in September 2014 (CBPP 3, ABSPP and TLTROs). Together, they would promote an initial monthly expansion in ECB's balance sheet of € 60 billion, which implied a net expansion in the institution's balance sheet of over € 1 trillion, to levels observed in the middle of 2012. The focus was on achieving a sustained path in inflation towards the level of below, but close to, 2% over the medium term.

Here we perform a brief description of the main features of the PSPP, valid from March 2015 until December 2015[6]. First, bond purchases were made by the Eurosystem (ECB or National Central Banks - NCBs) in the secondary market, not to incur in monetary financing of governments[7] . Purchases were being divided in a way that the ECB bought 8% of the securities and NCBs the remaining 92%. Of these 92%, NCBs acquired 12% from EU supranational bodies and 80% from their own government or national agencies. Thus, although the program comprised the entire Euro area, the mutualization of risks within the Eurosystem was low (only 20%), with 80% under each country's responsibility through its NCB. In terms of amounts acquired, they roughly followed the share of each country in ECB's capital key, so that the largest countries were responsible for most part of the purchases. Germany, France, Italy and Spain supplied around 80% of the securities bought by the PSPP (excluding supranationals). In months when some countries bought less national bonds than established by their capital key, those deviations were usually compensated by the purchase of supranational bonds. The same was true for countries which did not have enough sovereign bonds trading on markets (i.e. Estonia). In terms of ECB purchases, there was a limit of 33% per issuer country, in order to prevent the ECB to concentrate its purchases in a single nation. There was also a 33% limit per bond issued, to avoid that ECB purchases eventually distorted the negotiation of a specific bond in the market. Assets purchased must have a minimum investment grade rating (BBB- or equivalent). Greece and Cyprus, which were below this threshold, would have to fulfill additional conditionalities in order to participate. Hence, the purchase of Greek bonds up to now was not authorized by ECB, and of Cyprus bonds the authorization lasted just for a limited period of time[8]. However, their National Central Banks operated in the program buying supranational bonds, in accordance with their ECB capital key. If it turned out necessary to restructure a sovereign bond in the program, ECB would receive *pari passu* (not senior) treatment with private creditors. Regarding the maturity of securities, short and long-term bonds (between 2 and 30 years) were being purchased. ECB/NCBs could buy bonds including ones with negative yields, provided that they were not below the deposit rate.

3.4. APPs Concerns and Modifications

Since the beginning of APPs, several concerns related to the implementation of programs emerged, related to the following issues: (i) Time period - too short or too long, so as to calibrate their effects on inflation/ inflation expectations; (ii) Availability of assets to be purchased -

[6] Subsequent changes in PSPP's features are described in section 3.4.

[7] Violation of article 123 - Treaty of Functioning of the European Union.

[8] The ECB granted a waiver for the Central Bank of Cyprus to buy sovereign bonds while the country was still during Troika assistance, and fulfilling properly program's conditionalities (between July/ November 2015). After the assistance program ended in March 2016, and Cyprus bonds continued to be rated below investment grade, their purchases were suspended.

scarcity of bonds in markets due to ECB purchases and (iii) Yields' level - too low, undermining agents' profitability and causing financial stability problems. Therefore, some important modifications were introduced in APPs in order to face some of those concerns, and try to increase their effectiveness.

In the December 2015 meeting, ECB implemented the first round of changes. It was announced that APPs would remain at least until March 2017, what meant an extension of 6 months from the original date of September 2016. Furthermore, main refinancing operations and 3 month-LTROs would remain as fixed rate tender procedures with full allotment (FRFA) until at least the end of 2017. And securities bought under APPs would have their principal payments reinvested as they matured, which meant the ECB would maintain an expanded balance sheet for as long as it considered adequate for its monetary policy objectives. In addition, it also lowered the deposit rate from -0.2% to -0.3%, so more bonds with negative yields could be bought. Moreover, it included regional and local government bonds in the list of eligible assets for the PSPP program[9].

In the March 2016 meeting, more incisive modifications were taken. First, not only the deposit rate was lowered 10 bps (from -0.3% to -0.4%), but also the main refinancing and marginal rates were lowered 5 bps (to 0% and 0.25%, respectively). The schedule of APPs was kept at least until March 2017, but the volume of monthly purchases was increased from € 60 to € 80 billion per month. The availability of assets to be purchased was also increased in the following ways: (i) Lowering the yield floor for purchases, with the deposit rate cut; (ii) In the PSPP, increasing the issuer and issue limit of bonds purchased from international organizations and multilateral development banks from 33% to 50% (although the share of those securities in total purchases would fall from 12% to 10%, and ECB purchases would be increased from 8% to 10%); (iii) Including investment grade non-financial corporate bonds in the list of eligible assets to be purchased from June 2016 onwards, with the introduction of the Corporate Sector Purchase Program (CSPP). The CSPP purchased corporate bonds denominated in euros in primary and secondary markets, with maturities from 6 months until 30 years, and issue limit of 70%. It was conducted by six central banks (Germany, France, Italy, Spain, Belgium, Finland), in coordination with the ECB. Until October 2017, it bought € 121.61 billion in corporate bonds, around 85% in secondary markets. Issuer companies were mostly from the four largest Euro area economies, with the most significant amounts destined to the following sectors: utilities, infrastructure/transportation, automotive, telecommunication, energy. Around 49% of the bonds purchased had a BBB rating. The distribution of ECB purchases according to country, sector and bond rating was not discretionary. They broadly followed the availability of corporate bonds in Euro area markets. iv) The intention to increase the availability of funds to the real economy was strengthened not only through this decision to buy corporate bonds, but also through the announcement of a new round of TLTROs. TLTRO II was a series of four quarterly operations, from June 2016 up to March 2017. Banks could borrow money for four years, with the possibility of early repayment in two years, but no mandatory requirement for early repayment if loan benchmark was not achieved, as it was the case of TLTRO I (so banks could roll from TLTRO I to TLTRO II). The limit for each counterparty to borrow would be up to 30% of the stock of eligible loans, as of the end of January 2016 (higher than the 7% limit established in TLTRO I). But the main change was the incentive introduced for banks to provide credit to the real economy, enabling the ones which lent more to non-financial corporations and households (except for housing) to have lower rates. For each operation, the interest rate would be the main refinancing operation prevailing at that time (i.e. 0%). But for banks which achieved their loan benchmark to the real economy, the interest rate could be as low as the deposit rate (-0.4%)[10].

[9] In July 2015, the ECB added 13 new national agencies in the list of agencies whose securities were eligible for the PSPP.

[10] To have the right to get funding at the lowest rate, the ECB established two different benchmarks. For banks that were previously expanding their balance sheets, it was requested that their level of loans to the real economy in January 2018 was at least 2.5% higher than January 2016. For banks whose balance sheets were previously shrinking due to restructuring, it was requested that between January 2016 and January 2018, they eased their pace

In the December 2016 meeting, a third round of modifications came into place. The main ones were: i) Extension of programs until the end of December 2017, or beyond if necessary; ii) Reduction in the monthly amount of ECB asset purchases from € 80 billion to € 60 billion, starting from April 2017 to December 2017; iii) Allowing PSPP purchases below the deposit rate "to the extent necessary", so as to overcome availability constraints on bond purchases posed by the former yield floor on deposit rates; iv) Broadening the maturity range of the PSPP, by decreasing the minimum maturity of bond purchases from two years to one year; v) Allowing APPs securities lending for banks against cash collateral, up to the limit of € 50 billion.

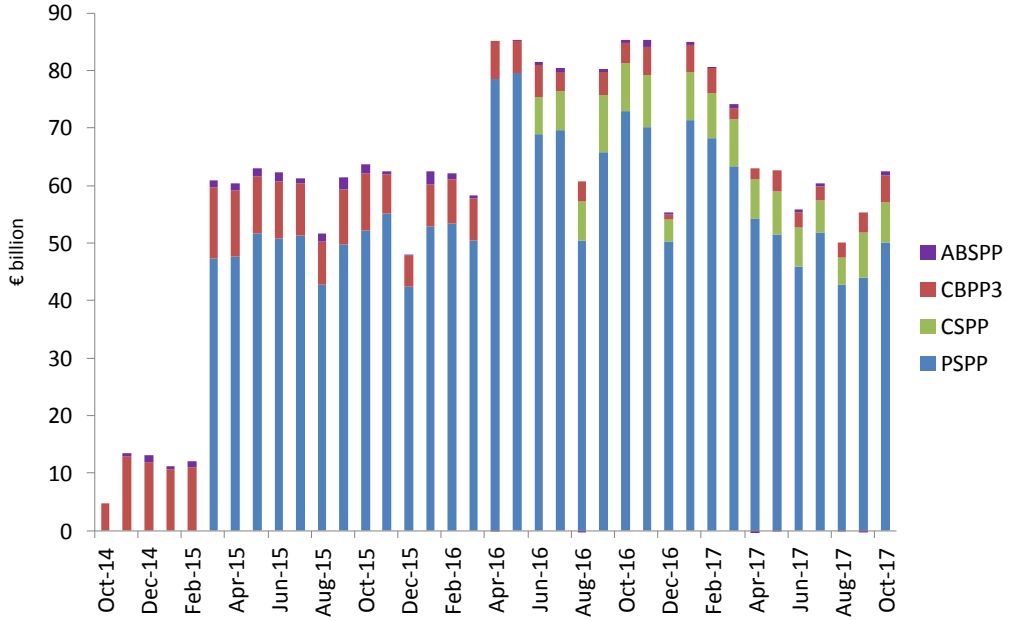
In the October 2017 meeting, a fourth set of changes was announced. The more important one was the reduction in the monthly amount of asset purchases from € 60 billion to € 30 billion, from January to September 2018, or beyond if necessary. Moreover, the ECB made a commitment to: i) Reinvest the principal payments from maturing securities purchased under APPs for an extended period of time after the end of its net asset purchases; ii) Conduct main refinancing operations and 3 month-LTROs as fixed rate tender procedures with full allotment (FRFA) for at least until the end of 2019. In this sense, although the ECB is reducing the pace of its net purchases, the institution is keeping APPs open ended, so the program can be extended or increased if inflation does not pick up or financial conditions tighten. In addition, the institution has not established a timeframe neither for rising interest rates, nor for reducing its balance sheet size, in order to keep an accommodative policy stance for as long as it considers appropriate. As the ECB states that APPs are flexible in size, composition and duration, new changes can be introduced in the future if the institution considers necessary.

3.5 APPs and TLTROs Features

3.5.1 APP Features

We begin the analysis of ECB APPs features by looking at the flow of ECB net purchases after 2014, as it can be seen on graph 2.

Graph 2 - Eurosystem Flow of Net Purchases under Asset Purchase Programs after 2014 (€ billion)



Source: ECB

of contraction of loans to the real economy by at least 2.5%. For banks that improved their lending to the real economy but below the benchmark, the level of the interest rate would stay in a range between 0% and -0.4%, following a linear graduation according to the proportion of the improvement.

Observing the flow of purchases, we can see that between October 2014 and February 2015, when only CBPP 3 and ABSPP had started, the amounts were very small. Only after the beginning of the PSPP in March 2015, the amounts rose to substantial levels. One can see that between March 2015 and March 2016, the monthly target of € 60 billion was largely met (except in August and December 2015, but bond purchases were compensated in other months, so as to keep the monthly average of € 60 billion). The same can be said between April 2016 and March 2017, when the monthly target of bond purchases was increased to € 80 billion (except for August and December 2016). In April 2017, the monthly amount of purchases has been reduced again to € 60 billion, keeping around this pace until December 2017. From January to September 2018, the monthly target of purchases will be € 30 billion. Since it was created, PSPP was responsible for the largest flow of purchases, while ABSPP was always the smallest program. CBPP 3 was the second program in flows until June 2016 when CSPP was implemented, and the latter became the second more important in monthly flows.

Next, we present a table with the net amount of bonds acquired by the Eurosystem during the asset purchase programs, from October 2014 until October 2017.

Table 2 - Eurosystem Stock of Net Purchases under Asset Purchase Programs after 2014 (€ billion)

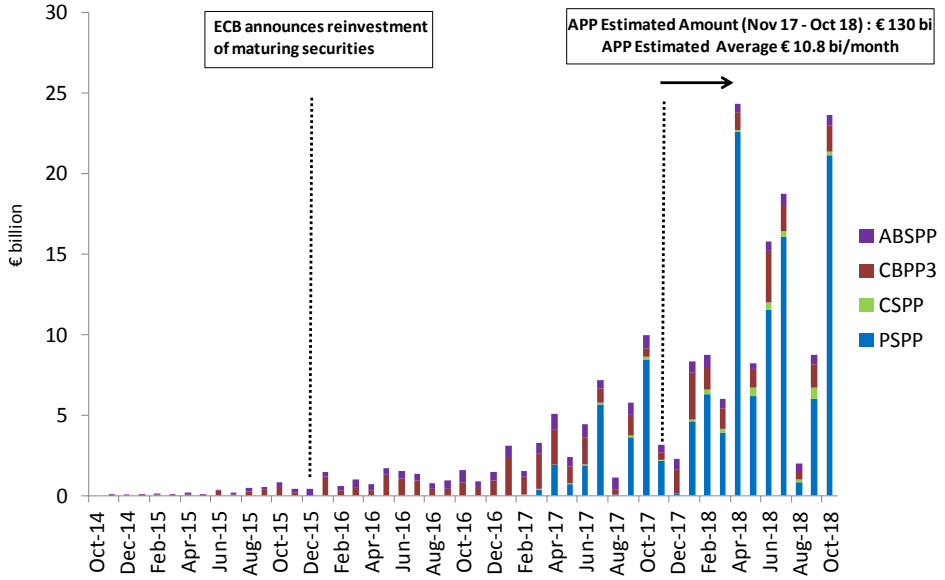
Program	ABSPP	CSPP	CBPP 3	PSPP	Total
Date of Implementation	November 2014	June 2016	October 2014	March 2015	-
Cumulative amount (up to October 2017)	24.68	121.61	236.00	1798.24	2180.53

P.S: Cumulative amounts take into account quarter end adjustments. Source: ECB

In terms of the stock of purchases, we observe the much higher amount of PSPP when compared to other contemporaneous programs. Even when compared with a former sovereign bond purchase program which lasted for a considerable time (SMP, two years), the PSPP purchased an unsterilized sum around nine times the amount of the SMP. Considering all asset purchases since October 2014, a cumulative amount of € 2.18 trillion has been bought until October 2017. With this expansion, the consolidated balance sheet of the Eurosystem reached a record amount of € 4.37 trillion in assets in the end of October 2017.

Moreover, with the commitment made by the ECB in October 2017 that it will continue to reinvest the principal payments from maturing securities purchased under APPs for an extended period of time after the end of its net asset purchases, the institution is determined to keep its balance sheet with a large size for a considerable period of time. In fact, the reinvestment of maturing securities under APPs was already announced since December 2015. But as the stocks of securities purchased were still low, the reinvestments represented small amounts. As the stock of securities purchased grew in time, those repurchase amounts became larger since 2017, and increasingly important since the October 2017 commitment. This October 2017 announcement marked a shift in ECB accommodative policies. They intend to be less reliant on flows (APP net purchases), and more based on stocks (reinvestments of securities) and forward guidance (low interest rates and large balance sheet for "extended period"). According to ECB data, the expected amount of bond redemptions from securities purchased under APPs from November 2017 for the following 12 months is near € 130 billion. This implies a monthly amount of € 10.8 billion in ECB reinvestments. But those numbers vary considerably according to the month (i.e. € 24.3 billion in April 2018 and less than € 2 billion in August 2018), as it can be seen in graph 3. Even so, in October 2018, month that ECB has not yet announced plans for net asset purchases, the institution expects to repurchase € 23.6 billion. This suggests that the ECB intends to use those reinvestments as an alternative tool of monetary accommodation, possibly offsetting to some extent other future measures that tighten the monetary stance.

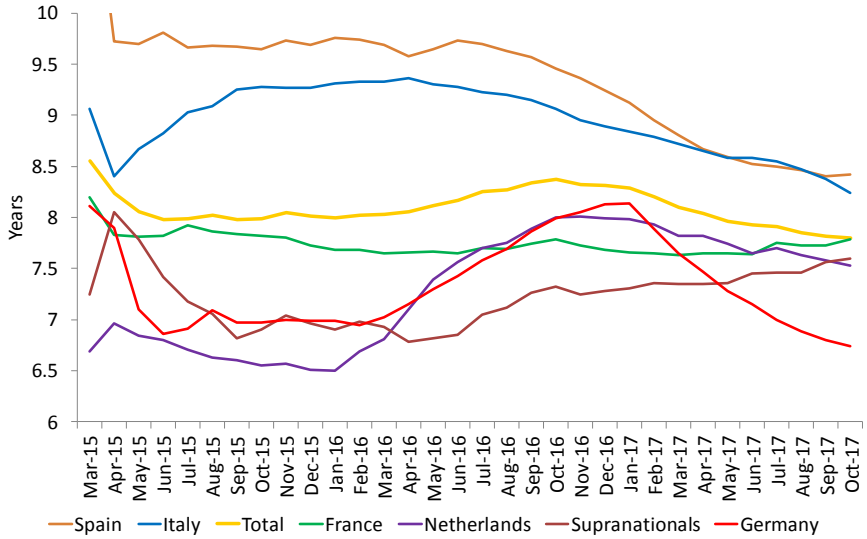
Graph 3 - APP Bond Redemptions - Realized and Estimated



Source: ECB

Regarding the maturity of asset purchases under APPs, the ECB did not establish any limits for maturities under CBPP 3 and ABSPP. For the CSPP, maturities ranged from 6 months up to 30 years. For the PSPP, maturities went from 1 up to 30 years. But the only program which the ECB discloses the remaining weighted average maturity (WAM) of its portfolio is the PSPP. Since the beginning of PSPP implementation in March 2015, WAM decreased in the Euro area as a whole, from around 8.6 years to 7.8 years in October 2017. A negative point for a decrease in the maturity of asset purchases would be the lower impact of UMP's duration mechanism towards the whole spectrum of the yield curve, reducing its effectiveness. In fact, this Euro area average concealed a great degree of heterogeneity among countries. Graph 4 shows WAM of the five countries that accounted for the largest share of purchases: Germany, France, Italy, Spain and Netherlands (around 88%, including supranational bonds). On the graph, we can observe that in countries which had a lower sovereign rating and a considerable amount of debt available in markets (Spain and Italy), WAM was above Euro area average. But in countries which had a higher sovereign rating, and the availability of debt in markets is lower (France, Netherlands, Germany), WAM was below Euro area average.

Graph 4 - PSPP - Remaining Weighted Average Maturity of Bond Purchases



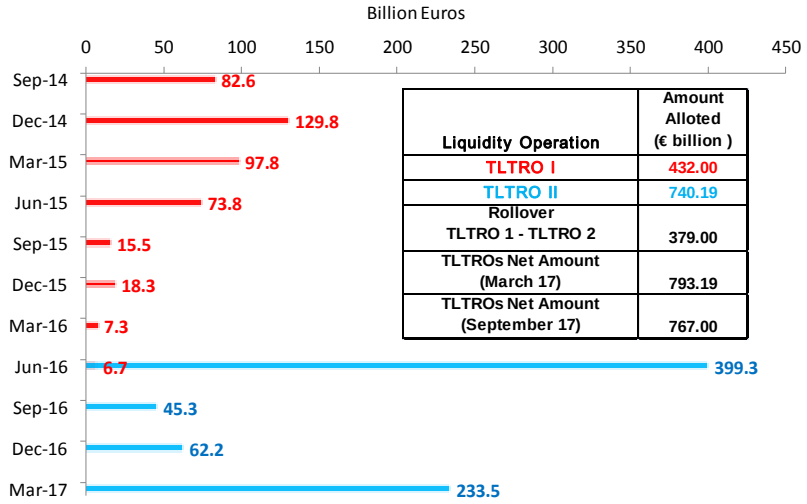
Source: ECB

In fact, in some countries where the availability of sovereign debt in markets is lower (i.e. Finland, Portugal, Ireland and Slovenia), the asset scarcity problem was significant. They had to substitute the purchase of national securities for supranational ones, in order to compensate their deviations from respective ECB capital keys. Asset scarcity was also a concern in top rating countries which net issuance has been negative in recent years (such as Germany and Netherlands). With the increase in the pace of ECB purchases to € 80 billion/month in April 2016, and a larger share of their bonds being traded with negative interest rates, German and Dutch purchases were pushed towards medium/long-term maturities up to December 2016. But since this date, the deposit rate yield floor was removed and bonds of 1 year maturity were also included in the list of eligible securities. With those measures, we have observed a decrease in the WAM of those countries, especially in Germany. However, with the announcement by the ECB that it will slow down the pace of asset purchases to € 30 billion/month from January to September 2018, it is believed that the availability limit for German bonds will not be exceeded until September 2018. This reduces for the moment some of those bond scarcity concerns in this country, although they can regain strength if APPs are prolonged further into time.

3.5.2 TLTRO Features

The amounts and dates of TLTRO I and TLTRO II operations are showed in graph 5. One can observe that the total amount of liquidity injected by the ECB on those operations, after deducting rollovers from previous operations (net amount), was around € 793 billion in March 2017. Later, it started to drop gradually due to TLTRO I early repayments. For instance, in September 2017 it was around € 767 billion.

Graph 5 - Eurosystem TLTRO operations



Liquidity Operation	Amount Alloted (€ billion)
TLTRO I	432.00
TLTRO II	740.19
Rollover TLTRO 1 - TLTRO 2	379.00
TLTROs Net Amount (March 17)	793.19
TLTROs Net Amount (September 17)	767.00

Source: ECB.

Regarding TLTRO I, the ECB has offered a total amount of € 432 billion in eight operations. The amounts were relatively higher in the first four operations, but in the last four declined considerably. Anyway, those values fell far short of ECB's own initial estimate, which was € 400 billion just for the first two operations (actual amount of € 212.4 billion in those operations). Several analysts sought to explain this lower than expected participation by banks. According to Merler (2014), the main reason was that banks feared to extend new loans to businesses and households in a still uncertain scenario. In the initial operations, the institutions were just swapping former LTRO funds, which matured in February 2015 with a rate of 1%, for new TLTRO I funds with lower rates. In the following operations, banks already with available liquidity, but negative deposit rates and slow credit demand growth were possible reasons why the amounts declined.

As for TLTRO II, we could observe larger take-ups in the first and fourth operations, while the second and third operations presented much lower amounts. Those differences could

be explained by the following reasons: i) 95% of the amount of the first TLTRO II operation was composed by banks rolling over TLTRO I with lower rates; ii) Regarding the fourth operation, it may be the case that banks were taking the "last chance" to lock in lower rates, once the ECB did not extend TLTRO II after March 2017, and reduced APPs monthly purchase levels from April 2017 onwards.

Both TLTRO I and II received several common criticisms, of not being really "targeted" towards the real economy, as stated by authors such as Gros et at (2016). One of them is related with the fact that institutions could form "groups", and the calculation of the TLTRO benchmark and borrowing allowances would be based on the group's aggregate loan data, instead of individual members' loan data. This allowed banks under the benchmark but inside a group to participate, benefiting from the positive net lending of others, and qualifying anyway for lower interest rates without raising loans. A second criticism was the possibility that banks could "window dress" their loan book (i.e. grant a loan to a company at zero interest rates as "working capital", but then require to put its proceeds into a blocked account as collateral).

Nevertheless, one has to recognize that the incentive in TLTRO II framework, when compared with TLTRO I - lower rates for banks that lend more towards the real economy - was one important factor to offset the compression of negative interest margins experienced by banks after the implementation of negative deposit rates. Because of the several issues already discussed (rolling over loans, TLTRO groups or window dressing loans), it's very hard to assess precisely what were the true impacts of TLTROs on lending to the real economy. As it will be seen in next session, credit to households/firms recovered in the period those operations were implemented, although at modest rates.

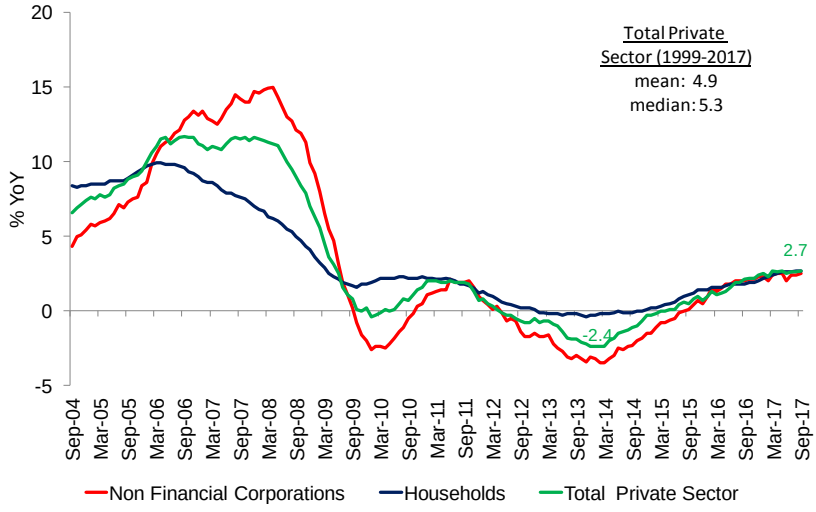
3.6 Macroeconomic Indicators during APPs and TLTROs

Now we continue our analysis focusing on the evolution of important macroeconomic indicators (credit, exchange rate, output, inflation, sovereign yields) while ECB asset purchase programs and TLTROs were taking place. Considering the initial period of APPs, most of those indicators had positive responses to the programs. Later they had more mixed developments, due to intra-Euro (e.g.: financial volatility in bond markets, political instability in Greece) and extra-Euro area factors (i.e.: price of oil, USA and China economic uncertainties).

3.6.1 Credit

With regard to credit, Euro area data pointed to a gradual recovery after the implementation of the APPs, as it can be seen in graph 6.

Graph 6 - Euro area - Loans to Total private sector - Growth Rate (% YoY)



P.S.: Data seasonally adjusted, loans adjusted for sales, securitization and cash-pooling. Total private sector includes households, non- financial corporations and non-monetary financial institutions (e.g.: insurance corporations and pension funds). Source: ECB

Loans to total private sector had declining annual rates of growth since the end of 2011, which became negative in 2012, and only returned to positive territory in May 2015. This growth trend continued with some oscillation, up to 2.7% in September 2017. Loans to non-financial corporations experienced a sharp fall in annual growth rates since end-2011, presenting negative rates until August 2015, but since then growing up to 2.5% in September 2017. On the other hand, loans to households traced a more benign path, not experiencing such a sharp fall such as non-financial corporations. Loans to households' growth rates entered positive territory since December 2014, up to 2.7% in September 2017. Despite this moderate recovery, we can observe that private credit growth is still very below its average during the existence of the euro.

Further information regarding current conditions and future credit expectations in the Euro area can be obtained in the quarterly ECB Bank Lending Surveys. In general, the Surveys from 2015 Q1 until 2017 Q3 showed that, in terms of credit supply, there was a reduction in loan restrictions imposed by banks over non-financial companies and households. In terms of credit demand, there was an increase for households and non-financial companies. But in the case of non-financial companies, this demand growth has been motivated by three main factors: low general level of interest rates; mergers and acquisitions (M&A) transactions; debt refinancing needs. Inventories/working capital and fixed investment also had positive contributions to credit demand, but the role of the latter was very small, except in Q2/Q3 2017 Surveys[11]. Conversely, alternatives sources of financing (internal funds/ security issuance) had a negative contribution to demand growth, albeit small too.

Those results support the argument that, even if non-financial corporations presented a moderate recovery in credit growth recently, this has not been fully translated into the real economy, as firms generally preferred to use the funds for financial purposes/pay debts, rather than to make new investments in a still uncertain scenario. Moreover, it's important to highlight that credit conditions are still heterogeneous inside the Euro area, either among countries (e.g.: in places with huge legacies in private debt such as Greece, loan growth is still on negative level) or within each country (small and medium enterprises -SMEs- with funding costs higher than large non-financial corporations).

3.6.2 Exchange Rate

The ECB does not have an official exchange rate policy, as the euro has a flexible exchange rate regime. However, in theory asset purchase programs could play a significant role on the exchange rate, once an increase in APPs is usually associated to local currency depreciation. Maintaining the euro at a more depreciated level would be desired for the monetary union during its recovery stage, as it would enhance the competitiveness of its exports (supporting output growth) and bring a positive effect for inflation, by increasing the prices of imported goods.

In order to analyze the evolution of the euro exchange rate, and try to capture some influence of APPs on it, we cannot take into account only the rate euro versus dollar. The reason behind it is the end of the QE program by the Fed in October 2014 and the outlook of monetary policy normalization in USA from 2015 onwards. The "Fed effect" led to the appreciation of the dollar against most global currencies (including the euro), starting from the second half of 2014 onwards. However, whenever the USA disclosed weaker output data and/or the Fed gave signs it could delay its interest rate hikes, several global currencies (including the euro) partly recovered their losses against the dollar.

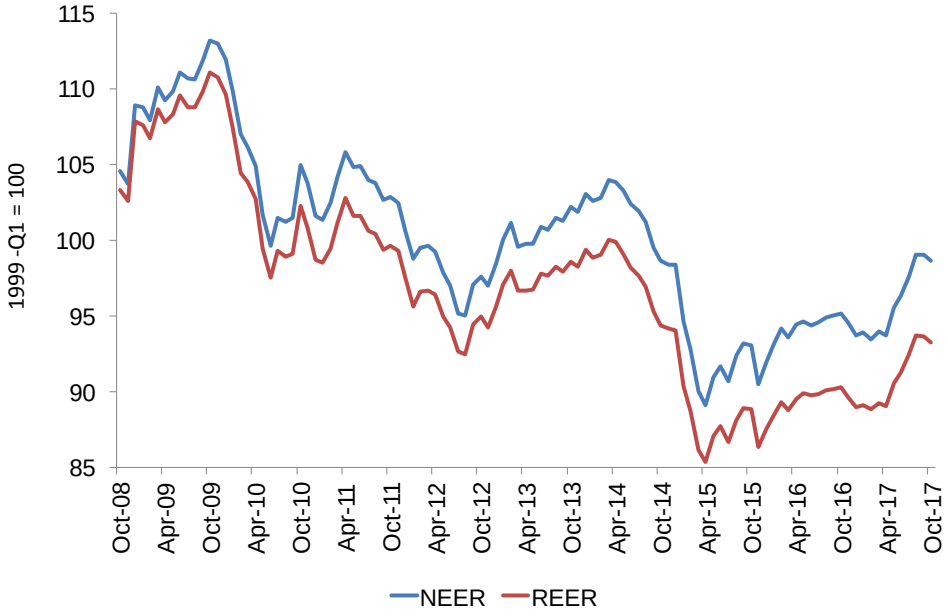
Therefore, in order to better analyze the euro exchange rate, and try to have a more clear view of the influence of APPs on it, we observe the evolution of the euro against the basket of 19 currencies which are most relevant to Euro area's trade[12], measured through the effective

[11] In the period 2015 Q1-2017 Q3, only 2017 Q2 and 2017 Q3 Surveys reported that fixed investment had an important positive effect in credit demand, when compared to other explanatory factors.

[12] Australia, Canada, Denmark, Hong Kong, Japan, Norway, Singapore, Korea, Sweden, Switzerland, United Kingdom, USA, Bulgaria, Czech Republic, Hungary, Poland, Romania, Croatia and China.

exchange rate. Graph 7 expresses the evolution of nominal (NEER) and real (REER) effective exchange rates from October 2008 to October 2017.

Graph 7 - Euro Nominal (NEER) and Real (REER) Effective Exchange Rate



Source: ECB

The graph shows that, from January to April 2015, the euro's NEER and REER had a significant depreciation. The latter was even more intense than the former, due to the low level of inflation in the Euro area at the beginning of 2015. Since then, those rates took a more volatile path. The euro NEER/REER experienced moments of appreciation (e.g.: uncertainties in China and devaluation of the renminbi in August 2015), as well as moments of depreciation (October/November 2015).

Overall, we can infer that between January/April 2015, the announcement of PSPP and the beginning of its implementation had a depreciation effect on euro's NEER/REER. The "Fed effect" also had a role, but it could not be responsible alone for such sharp euro depreciation movement (once the dollar was appreciating at a strong pace since July 2014). However, between April 2015/ April 2017, it's more difficult to associate euro exchange rate movements with APPs directly, once NEER/REER did not present a clear trend, and several factors were at play at the same time. Nevertheless, the announcement by the ECB that would start reducing the pace of its asset purchases in April 2017 (together with other elements, such as a more positive economic momentum in the Euro area) can be considered a factor that contributed to euro's appreciation between April and September 2017. From October 2017 onwards, the announcement by the ECB that it would reduce the pace of its asset purchases on a gradual manner, and still maintain an accommodative stance, was one of the factors that helped containing euro's appreciation trend in the previous months.

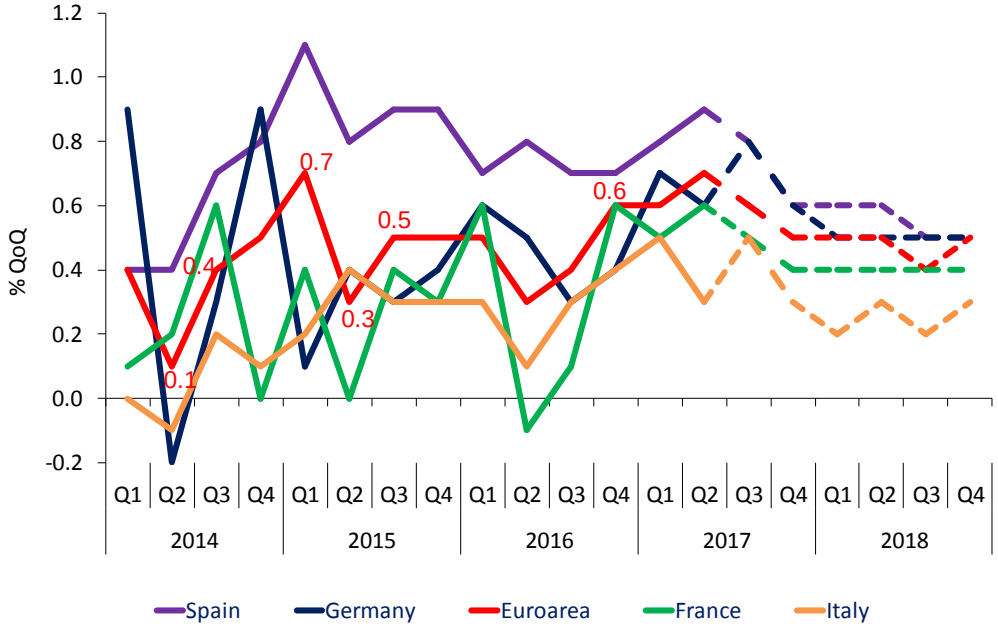
3.6.3 Output

Quarterly GDP results of the Euro area and its main countries between the period 2014 Q1-2017 Q2, as well as its current forecasts for 2017 Q3 - 2018 Q4, are presented in graph 8.

In terms of the Euro area, it can be seen that the period of the announcement/ initial implementation of APPs was an occasion when growth recovered (from 0.1% in Q2 2014 to 0.4% in Q3 2014), peaking at 0.7% in Q1 2015, quarter when the PSPP was announced/ implemented. In the following quarters, GDP growth reduced to a more modest level, between 0.3% and 0.5%. So after a good start in the quarter of PSPP announcement/ implementation, it took almost two years until GDP resumed growing on a more considerable level (around 0.6%, since Q4 2016). Beside the more accommodative monetary policy, other factors that have

supported Euro area's growth in the period 2014-2017 Q2 were: i) Private consumption (drop in energy prices and in unemployment[13] increased real household income and improved consumer confidence); ii) A more neutral fiscal stance (differing from the tightening that prevailed in previous years). Despite the weaker exchange rate in historical terms that helped net exports growth in the first part of 2015, the slowdown of foreign demand in important trade partners (e.g.: Russia) did not provide a great push on Euro area's net exports on the following quarters (with the exception of some countries, like Spain). Overall, it was more a domestic-led than a foreign-led recovery.

Graph 8 - Euro area GDP Growth: 2014-2018 (% QoQ)



P.S. Bold lines are actual values (2014 Q1- 2017 Q2). Dotted lines are forecasts (2017 Q3 - 2018 Q4).
Sources: Eurostat/European Commission (forecasts)

On annual terms, after recording negative GDPs in 2012 and 2013, the Euro area returned to positive values in 2014 (1.3% YoY), then increasing to 2.1% in 2015 and slowing to 1.8% in 2016. The European Commission November 2017 forecast projects a better number for 2017 (2.2%), but with some deceleration in 2018 (2.1%) and 2019 (1.9%). Although the Euro area has presented a moderate GDP recovery over the last years, several factors pose doubts to the continuation of this growth for a longer period. On regional terms, the risks are mainly political: concerns over integration in EU (i.e. Brexit) and Euro area (e.g. Catalonia), possible rise of extremist parties in some countries, immigration/refugee problems, security/terrorism issues. Also, problems in financial/banking sectors of some countries (e.g.: Italy). On international terms, a slowdown in global trade/economic output could have spillovers that derail the region's recovery. All those factors would contribute to an environment of greater uncertainty, which could hinder progress on institutional reforms, investments and growth. In such scenario, even an eventual extension of APPs and other accommodative measures by the ECB would not be enough to avoid a slowdown in growth.

3.6.4 Inflation

When it comes to inflation, after APPs announcement/implementation, the headline and core HICP indexes increased, but not on a sustained basis. Regarding the headline HICP index, its dynamics was strongly influenced by energy prices. Energy prices on the Euro area presented negative values from July 2014 until November 2016 (mostly because of falling global oil

[13] After peaking in 12.1% in April 2013, unemployment rate declined very slowly to 11.5% in June 2014, when it stagnated. The downward trend only resumed in December 2014 (11.3%), falling to 8.9% in September 2017.

prices). On its turn, headline HICP prices registered deflation in the Euro area between December 2014 and March 2015, 0% YoY in April 2015 and positive values in general after that. But whenever the deflation in energy prices regained strength, headline HICP turned again into negative/null values (e.g.: September 2015, February - May 2016). However, after a rapid increase in energy prices in the end of 2016/beginning of 2017 (coupled with a one-off rise in food prices), headline HICP increased from 0.6 % in November 2016 to 2% in February 2017, oscillating in the following months up to 1.4% (October 2017).

While the headline HICP traced a more volatile path, the core HICP index in general presented less intense fluctuations. The core HICP index increased from 0.6% in January 2015 to 1.1% in October 2015, and then it slowly lost its previous gains until 0.7% in April 2017. Next, it presented some recovery, up to 1.2% in July 2017, oscillating to 0.9% in October 2017. Service prices, which are an important component of core HICP, remained in a level around 1.1% until March 2017. After an increase in April 2017 to 1.8% due to Easter holiday related items, service prices moderated to 1.2% in October 2017. Other important component of core prices, non-energy industrial goods, presented an increase from -0.1% in January 2015 to +0.7% in January 2016. Next it slowly reduced to 0.2% in February 2017, then recovering to 0.4% in October 2017.

In terms of inflation projections, November 2017 European Commission forecast points that headline HICP should present an average of 1.5% YoY in 2017, 1.4% in 2018 and 1.6% in 2019. According to the institution, while headline inflation might present a temporary decline due to base effects in energy prices and a relative appreciation of the euro in Q2/Q3 2017, underlying inflation might remain low (as unutilized resources are still weighing on domestic price and wage formation) and is expected to rise only gradually over the medium-term (supported by the accommodative monetary stance and a continuation of economic growth).

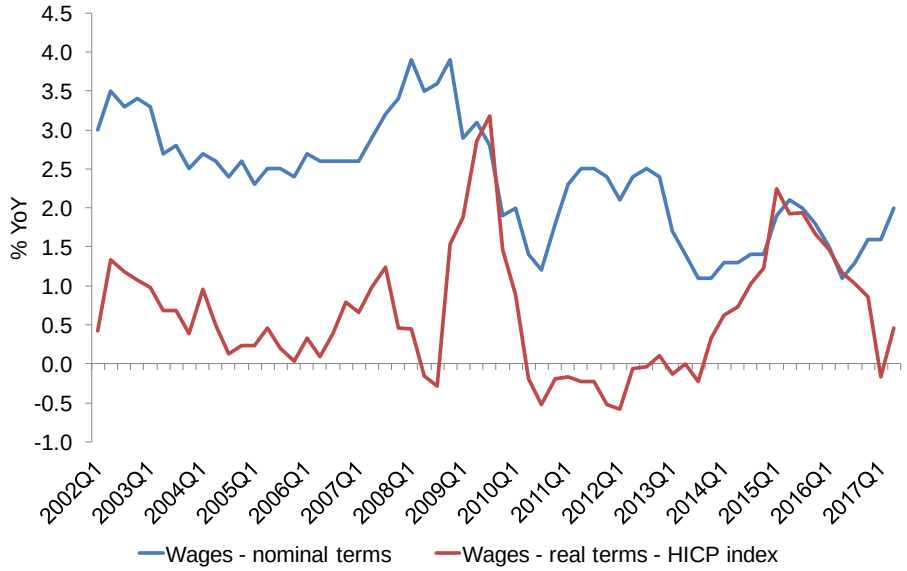
As for long-term inflation expectations, we can say that since APPs announcement/implementation they have partly recovered their ground, but still with downward fluctuations and below the 2% objective. Observing the 5Y5Y inflation swap, it has increased from around 1.50% YoY in January 2015 to a maximum 1.86% in July 2015. Then it declined to 1.25% in July 2016, presenting again an increase up to 1.8% in February 2017, but then falling to 1.5% in June 2017, oscillating up to 1.66% in November 2017.

Ultimately, we can say that the Euro area barely avoided deflation in 2015 (0%) /2016 (0.2%), and APPs/accommodative measures were not able to increase headline/core inflation towards its target on a consistent basis. Long-term inflation expectations have partly recovered, but are still below the desired level of 2%. The ECB itself acknowledges this point, and in the January 2017 press conference stated the conditions in which inflation would be considered at an appropriate level: i) Convergence to the objective of below, but close to, 2% YoY over a medium-term horizon; ii) A durable convergence, so that it's not transient/temporary ; iii) A self-sustained convergence, that does not require the group of accommodative monetary measures that has been implemented to be maintained; iv) A geographically homogeneous convergence, in which the inflation objective is met for the Euro area as an aggregate, and not in a few countries. In order to achieve those appropriate conditions, several elements would be at play, but one key element that would be taken into account is wage growth.

Graph 9 shows the Euro area annual wages/salaries growth, in nominal and real terms. Regarding nominal wage growth, one can see that the average presented before the 2008 crisis (around 2.5% and 3%) was not restored. Despite some recovery between the end of 2014 and the beginning of 2015, during 2015-16 it was not sustained. Some tentative signs of recovery only appeared in the beginning of 2017. Observing real wage growth, the peaks in 2009 Q3 and 2015 Q1 are associated to occasions when the Euro area was into deflation (-0.4% and -0.3%, respectively). The ECB attributes this low wage growth to several factors, such as: backward-looking wage negotiations; trade union strategy mostly geared towards stabilizing jobs than going for wage increases; low productivity; rise of global value chains. While some of those factors may disappear as the slack in the labor market closes, other may stay for a long time. Thus, it understands that without a sustained improvement in wage growth, the conditions in

which inflation would be considered in an appropriate level won't have been met, and there would be still reason to keep accommodative measures. After this statement, wage growth became one indicator to be carefully monitored, as one of the elements that would support ECB's decision for the timeframe of its accommodative policies.

Graph 9 - Euro area Wages/ salaries growth (%YoY) - 2002/2017

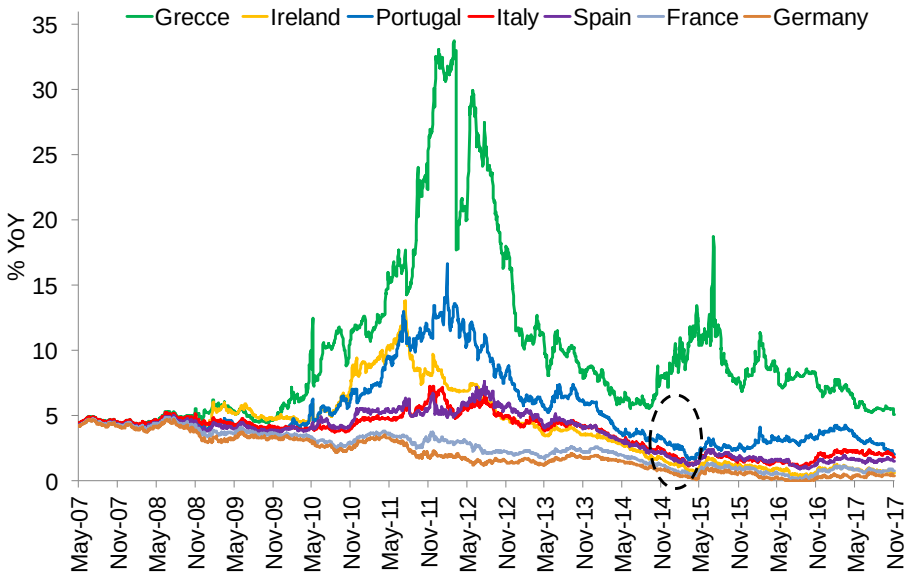


P.S: "Wages/salaries" is one of the components of Eurostat Labor Cost Index (LCI). The other component of LCI is "social contributions paid by employers". Data seasonally adjusted. Source: Eurostat.

3.6.5 Sovereign yields

Sovereign bond yields in the Euro area had very close levels until the emergence of the global financial crisis in 2008. The idea that all countries within the monetary union were on a "convergent path" and exposed to broadly the same risks made possible that this sovereign yield alignment occurred. In fact, it fostered large lending flows from banks of core countries to the periphery, as discussed before in section 1. This scenario changed after the 2008 financial crisis, when periphery sovereign yields started to diverge from the core. This divergence increased considerably between 2010-2012. It only began to be reversed by mid-2012, with the introduction of ECB's "verbal intervention" strategy, as it can be seen on graph 10.

Graph 10 - Euro area - Sovereign Bond Yields -10 years (%)



Source: Bloomberg

The set of initiatives announced in September 2014 and especially the PSPP announcement in January 2015 (inside the dotted part of graph 10) gave new impetus to yields' downward trend (with the exception of Greece, due to the political and economic turmoil experienced by this country). The reduction in yields was important for countries such as Ireland, Spain and Italy, once it diminished the cost of financing their sovereign debt and the burden over their fiscal accounts, since they had been struggling in recent years to reduce their debt and deficit levels.

Nevertheless, yields also dropped in core countries, which were already in very low levels. In particular, there was a reduction in the availability of German bonds in the market, since it was the security more often purchased by the ECB/Bundesbank (because of the higher German share on ECB's capital key), and the German Finance Agency did not change substantially its issuing schedule after the announcement of the PSPP, keeping its objective of not increasing the country's debt ratio. In the end of April 2015, the German yield curve had negative yields up to maturities of 7 years, and the 10 year bund was hovering around 0.07%. In the date of April 29, the 10 year bund yield jumped from 0.16% to 0.28%, and in the first week of May it was trading near 0.58%. This sudden volatility came to be known as "bund tantrum". Some analysts claimed is was caused by the release of macroeconomic indicators, which implied higher growth and inflation expectations for the Euro area (e.g.: in the end of April 2015, release of first Euro area HICP out of deflation after four months, coupled with higher oil prices). But a more proper analysis made by authors such as Sundaresan/ Sushko (2015) and Domanski/Shin/Sushko (2017) observed that institutional investors (insurance/pension funds) tend to have in their balance sheets liabilities with longer duration than their assets. In an environment of continuous falling yields, their duration risk increases, and so their demand to hedge against possible interest rate changes. At that moment, there was a spike in institutional investors demand to receive fixed rate payments via swaps to hedge those positions, while at the same time there was a lack of counterparties willing to receive floating (pay fixed) rates amid sharply falling market yields. The steeply rising euro hedging costs preceded the correction in yields, which resulted in the "bund tantrum".

In the following months, German and Euro area sovereign yields have experienced periods of higher volatility. When uncertainty rose (i.e. June and beginning of July 2015, with the problems in Greece), Euro area's yields restored their previous diverging trend: core yields decreased with risk aversion, while periphery yields increased with contagion fears, albeit still at much lower levels than back in 2011/2012. Also, in days when economic data pointed to higher future inflation, all sovereign yields rose due to higher inflation expectations. Nevertheless, yields are expected to continue at low levels as long as accommodative policies continue in place.

Even with the episodes of bond market volatility between April and June 2015, yield levels remained historically low. During PSPP implementation, yields of several countries were traded in negative territory, including mid-term maturities (e.g. Germany up to 10 years), some even below the deposit rate. Some of the concerns related to the very low/negative yield levels were: (i) Low bank profitability (squeeze in net interest margins, due to lower lending rates and stickiness in negative deposits for retail customers), leading to problems on their balance sheets; (ii) Institutional investors may also have problems in their balance sheets, with the increasing duration mismatch between liabilities and assets; (iii) Possible losses incurred by savers, as they see their long-term income in bank deposits shrink, and could even bear the costs of negative deposit rates if banks decided to pass them on to customers; (iv) Extremely low yield levels could feed new asset bubbles, with potential to generate financial stability distress.

With regard to those criticisms, the ECB has its own justifications. In terms of the issues in banks' balance sheets, it states that the squeeze in net interest margins is a good opportunity for banks to implement necessary modernization measures that lead to operational improvements and cost reduction. Furthermore, the banking supervisory framework already had a huge improvement since 2008, and the ECB stands ready to act if there is an unwarranted tightening of financial conditions or change in the inflation outlook. As for the potential losses for savers, it

states that due to competition, banks have not passed negative interest rates to retail customers, but the ECB will continue to monitor this indicator. When it comes to worries about new asset bubbles, the ECB states that, as credit growth is still moderate, it does not see any broad movement of "releveraging". If any specific sector starts presenting signs of overvaluation (e.g. real estate/housing prices in some European big cities), this will be addressed by proper macroprudential policies in those respective places. In broader terms, the ECB argues that low yields are due to the extraordinary financial conditions, and that its programs are justified because inflation/inflation expectations have not resumed their sustained path towards ECB's objective.

Nevertheless, in the episode of "bund tantrum", important players in the market that were linked to it (e.g.: insurance, pension, mutual and exchange-traded funds) are not under ECB direct supervision. Although they are all overseen by a common Euro area macroprudential body (the European Systemic Risk Board), the ESRB only issues warnings and recommendations to national macroprudential authorities, but does not have enforcement powers to implement measures itself. The same happens with EU financial market supervision authorities for securities (ESMA) and insurance/pensions (EIOPA). Therefore, the "bund tantrum" experience and the possible problems in those agents' balance sheets associated to low interest rates suggest that financial regulation/supervision should continue to be strengthened. This is true not only in the banking sector (completing the Banking Union), but also in those other EU non-bank financial market supervision and macroprudential authorities. Those entities could have more enforcement powers at EU level[14], and should also improve their coordination with respective national authorities, in order to harmonize rules and avoid that sudden movements of agents under their oversight (e.g.: institutional investors) provoke sharp volatility episodes, with potential to disrupt financial markets and the real economy.

4. Asset Purchase Programs: Yield Curve Impacts

In this section, our objective is to analyze Euro area's sovereign/private yield curves' levels and differentials with ECB's main asset purchase programs announced/implemented from 2009 onwards. We choose a one-day window[15] around each program's announcement/implementation, considering that each program announcement/ implementation was the main event that influenced Euro area's yields on its respective day. All graphs which base the analysis presented in this section are on an appendix in the end of the article.

4.1 Sovereign Bond Programs:

Yield Curves: Cover 2, 5, 10, 30 year[16] sovereign bonds of 10 Euro area countries: 5 from the core (Germany, Netherlands, France, Belgium, Austria); 5 from the periphery (Italy, Spain, Portugal, Ireland, Greece).

4.1.1 Securities Markets Program (SMP)

Levels: Line graphs compare yield curve levels in four dates: date of the implementation of SMP first phase[17] (10/05/2010); trading day before the implementation of SMP first phase

[14] The European Comission submitted a proposal in September 2017 to increase the autonomy of its supervisory agencies (EBA, EIOPA, ESMA), with the latter gaining direct powers over certain sectors of EU capital markets. They also proposed some changes in the governance of the ESRB. However, even if those changes are implemented (after being approved by the European Parliament and the Council), the ESRB will still not have enforcement powers for macroprudential issues at EU level.

[15] According to the widely used event study methodology, an optimal analysis would be to compare data in the minutes/hours just before and after the programs announcement/ implementation dates. However, our data source (Bloomberg) could not provide historical data of yield levels on an hourly basis, so the option for one-day windows.

[16] When those maturities are not available, the closest available maturity is presented (e.g.: 3 months instead of 2 years in the case of Greece; 9 instead of 10 years and 15 instead of 30 years in the case of Ireland).

(07/05/2010); date of implementation of SMP second phase (08/08/2011); trading day before the implementation of SMP second phase (05/08/2011).

Differentials: Column graphs compare yield curve differentials in two occasions: date of implementation of SMP first phase (10/05/2010) and trading day before the implementation of SMP first phase (07/05/2010); date of implementation of SMP second phase (08/08/2011) and trading day before the implementation of SMP second phase (05/08/2011).

Analysis:

Observing periphery countries, one can see that in the first phase, yields fell more in Portugal, Ireland and Greece (which were the countries targeted at this phase). It is worth noting the highly dysfunctional (inverted) yield curve of Portugal, Ireland and Greece, pricing more risk at shorter maturities. On the second phase, yields fell with more strength on Italy and Spain (the countries targeted at this phase). On both phases, the larger impacts were on shorter maturities (SMP's purchases average maturity was 4.3 years).

Core yields were not targeted on the SMP, but their movements usually were a sign of "risk-off" (lower risk propensity, lower core yields) or "risk-on" flows (higher risk propensity, higher core yields). In the first phase, the usual response of increase in core yields meant a "risk-on" movement, narrowing spreads between core and periphery. In the second phase, lower core yields possibly meant "risk-off" flows, with spreads between core and periphery narrowing less, and showing signs that SMP was not managing to tackle the problem of huge fragmentation between periphery and core bond yield curves, that undermined the transmission of monetary policy.

4.1.2 Verbal Intervention

Levels: Line graphs compare yield curve levels in six dates: date of Mario Draghi's speech "whatever it takes to save the euro" - WIT (26/07/2012); trading day before the speech (25/07/2012); date of the announcement of detailed features of Outright Monetary Transactions Program – OMT (06/09/2012); trading day before OMT announcement (05/09/2012); date of ECB first announcement of Forward Guidance - FG (04/07/2013); trading day before the first announcement of FG (03/07/2013).

Differentials: Column graphs compare yield curve differentials in three occasions: date of the "whatever it takes to save the euro" speech (26/07/2012) and trading day before the speech (25/07/2012); date of OMT detailed announcement (06/09/2012) and trading day before OMT announcement (05/09/2012); date of the first FG announcement (04/07/2013) and trading day before the first FG announcement (03/07/2013).

Analysis:

In core countries, we observed that yield curve levels gradually increased from 2012 until 2013 (in most countries, except for Belgium and the long end of Austria yield curve), which meant that the compression those yields were experiencing with safe haven flows gradually faded off. In terms of differentials, for the forward guidance the announcement meant lower yields for nearly all maturities in all countries. However, for the other announcements, the impacts were different according to the country. German yields have risen both with "whatever it takes" and OMT, which implied a risk-on movement. For other core countries (France, Netherlands, Belgium, Austria), the movements were different in each occasion. While yields lowered in the "whatever it takes" speech (the crisis what escalating with such intensity by mid-

[17] SMP officially did not have two phases. But in order to allow an analysis of different moments of the program, we called "Phase 1" the date it was announced purchases of Greek, Portuguese and Irish sovereign bonds, while "Phase 2" refers to the date when Italian and Spanish bond purchases were also included in the program.

2012 that those core countries "safe haven" role was disrupted, and their yields were rising before the speech), yields have generally risen just after the OMT announcement (what might have been a sign that their "safe haven" role was beginning to be restored by September 2012).

In periphery countries, we observed that yield curves levels decreased from 2012 until 2013, as a result of lower spreads being charged over those countries. In terms of differentials, changes were more intense than in core countries. The forward guidance was the announcement which in general provoked the smallest changes (maybe because FG announcement was more anticipated than "whatever it takes" or OMT announcements). Regarding these two latter announcements, the "whatever it takes" speech provoked larger yield drops in Italy, Spain, Ireland short-term maturity (2 years) and Greece long-term maturity (30 years). Conversely, at the OMT announcement yields fell more in Portugal and Ireland mid-term maturity (5 years). Although Portugal and Ireland were not eligible for the OMT when it was announced (OMT was designed for countries which had bonds regularly trading on the market), lower yields implied expectations that those countries would regain access to markets some time ahead, becoming eligible for this program too.

4.1.3 Public Sector Purchase Program (PSPP):

Levels: Line graphs compare yield curve levels in four dates: date of PSPP announcement (22/01/2015); trading day before PSPP announcement (21/01/2015); start of PSPP implementation (09/03/2015); trading day before the start of PSPP implementation (06/03/2015).

Differentials: Column graphs compare yield curve differentials in two occasions: dates of PSPP announcement (22/01/2015) and the trading day before the PSPP announcement (21/01/2015); start of PSPP implementation (09/03/2015) and trading day before the start of PSPP implementation (06/03/2015).

Analysis:

In core countries, yields fell few percent points, with the largest drops in long-term bonds (10 and 30 years). The differential was usually larger around the implementation date than around the announcement date. In periphery countries, yields fell several percent points[18], with the largest drops in long-term bonds (10 and 30 years). The differential was larger around the announcement date than around the implementation date. Therefore, the graphs' analysis suggests that, in the beginning of the PSPP, unconventional monetary policies (UMPs) played a role mainly through different channels according to each group of countries. For core countries, UMPs portfolio balance channel was more relevant, reducing asset yields by the mechanisms of scarcity and duration when asset purchases were implemented. For periphery countries, UMPs signaling channel was more important, reducing asset yields by committing to an accommodative stance for an extended period on announcement dates.

4.2. Private Bond Programs:

On this section, our analysis is for Euro area's private yield curves as a whole. This is because our reference source for yield curves (Bloomberg) provides data for Euro area eligible (investment grade) covered bonds and non-financial corporations on an aggregate basis, not providing individual data for the 10 countries presented before.

4.2.1. Covered Bond Purchase Program (CBPP)

Yield Curves: Cover 2, 5, 10, 20 year investment grade covered bonds, issued by eligible credit institutions, on the program's three phases.

[18] With the exception of Greek bonds, which were not eligible for PSPP at that date, and yields went up on the day of the program's implementation for domestic reasons.

Levels: Line graphs compare yield curve levels in the following occasions:

CBPP 1: In two dates: date of the implementation of CBPP first phase (02/07/2009); trading day before the implementation of CBPP first phase (01/07/2009) [19];

CBPP 2: In four dates: date of the announcement of CBPP second phase (06/10/2011); trading day before the announcement of CBPP second phase (05/10/2011); date of the implementation of CBPP second phase (03/11/2011); trading day before the implementation of CBPP second phase (02/11/2011);

CBPP 3: In four dates: date of the announcement of CBPP third phase (04/09/2014); trading day before the announcement of CBPP third phase (03/09/2014); date of the implementation of CBPP third phase (20/10/2014); trading day before the implementation of CBPP third phase (17/10/2014).

Differentials: Column graphs compare yield curve differentials in the following occasions:

CBPP 1: Date of the implementation of CBPP first phase (02/07/2009) and trading day before the implementation (01/07/2009);

CBPP 2: Date of the announcement of CBPP second phase (06/10/2011) and trading day before the announcement (05/10/2011); date of the implementation of CBPP second phase (03/11/2011) and trading day before the implementation (02/11/2011);

CBPP 3: date of the announcement of CBPP third phase (04/09/2014) and trading day before the announcement (03/09/2014); date of the implementation of CBPP third phase (20/10/2014) and trading day before the implementation (17/10/2014).

Analysis:

Observing CBPP 1, we can see that in the initial day of the program's implementation, yields have fallen in all maturities, mainly in shorter term bonds (which were the ones being purchased by the ECB). However, in CBPP 2 results were mixed: bond yields actually increased in most maturities after the program's announcement, and after the program's implementation yields also increased in longer maturities (10/20 years), while only decreased in shorter maturities (2/5 years). Those results show that, while CBPP 1 implementation managed to reduce the whole covered bond yield curve level, CBPP 2 implementation only reduced the yield curve in shorter maturities. This is one possible factor which explains that, while in CBPP 1 ECB fulfilled the amount of purchases previously expected (€ 60 billion), in CBPP 2 the institution did not reach the amount of purchases previously established (€ 16.4 billion x € 40 billion). Regarding CBPP 3, we can observe that the impacts in the announcement and in the implementation dates were broadly of decreasing yields, with a larger impact on the announcement date in shorter maturities.

4.2.2. Corporate Sector Purchase Program (CSPP)

Yield Curves: Cover 2, 5, 10, 30 year investment grade bonds, issued by eligible non-financial corporations.

[19] Data of covered bond yields on CBPP 1 announcement date (07/05/2009) and the trading day before (06/05/2009) was not available.

Levels: Line graphs compare yield curve levels in eight dates: date of CSPP first announcement (10/03/2016); trading day before CSPP first announcement (09/03/2016); date of CSPP second announcement - "program details" - (21/04/2016); trading day before CSPP second announcement (20/04/2016); date of CSPP third announcement - "remaining program details" - (02/06/2016); trading day before CSPP third announcement (01/06/2016); date of CSPP implementation (08/06/2016); trading day before CSPP implementation (07/06/2016).

Differentials: Column graphs compare yield curve differentials in the following occasions: date of CSPP first announcement (10/03/2016) and trading day before the first announcement (09/03/2016); date of CSPP second announcement (21/04/2016) and trading day before the second announcement (20/04/2016); date of CSPP third announcement (02/06/2016) and trading day before the third announcement (01/06/2016); date of CSPP implementation (08/06/2016) and trading day before the implementation (07/06/2016).

Analysis:

Observing the graph related to CSPP levels, we can see that, after a brief increase on the same day the program was first announced, yields tended to decrease considerably after this first announcement. That's one important factor that fostered corporate bond issuance in the Euro area in the beginning of 2016. However, when we observe the graph related to CSPP differentials, we realize that yields actually increased both on the first and second announcements, when compared to their respective previous trading days. On those two announcements, the full details regarding the functioning of the program had not yet been disclosed by the ECB, and investors probably reacted on an adverse way on those specific days. Conversely, after the third announcement (when the ECB disclosed the remaining details about issuer's eligibility) and on the day of CSPP implementation, corporate yields declined, mainly on long-term maturities. The analysis of corporate yield performance with CSPP announcements/implementation shows the significant role central bank's communication has on markets. When it is not done in a clear and complete way, investors may react adversely. Nevertheless, when it's done in a proper tone, providing relevant information in a transparent way, investors usually react better, according to the previously intended objectives.

4.3 Yield Curve Impacts - Session Summary

Making a comparison among all the programs taking into account only the graphs presented is not our objective, once each announcement/program had very particular and different features. But taking an overall perspective of the analysis presented in this session allows us to observe some interesting results. Regarding sovereign bond programs, unlike other programs, we can see that PSPP initial announcement and implementation led to lower yields across almost all countries (with the exception of Greece, that was not eligible). Furthermore, PSPP led to more intense yield drops in the periphery (where the signaling channel of monetary policy was more important, in the announcement date) than in the core (where the portfolio balance channel was more important, in the implementation date). Those facts implied a reduction in the cost of borrowing of almost all countries, and reduced yield spreads between periphery and core countries, which was one of the main problems during the region's crisis (disrupted mechanism of monetary policy transmission within the Euro area). These results are in line with other studies that make an assessment of PSPP, such as De Santis (2016) and Andrade et al (2016). We also underline the importance of the way central banks communicate their announcements, and how they achieve better results when they do it in a more proper way, improving the effects of UMPs signaling channel. This fact was observed on sovereign bond programs "verbal intervention" announcements, as well as in private bond programs, with the CSPP experience.

5. Conclusions

This article described the path experienced by the Euro area economy after the 2008 crisis, with a special focus on ECB's unconventional monetary policies. Measures initially implemented by Euro area authorities after the collapse of Lehman Brothers in September 2008 avoided that the US financial crash had more drastic consequences on monetary union's financial system. However, after the turmoil in USA, financial and credit conditions in the Euro area became more restrictive. Nevertheless, the US episode only aggravated a crisis which had earlier roots within the region itself. The Euro crisis, which became more acute after 2009, had its origins in an export-driven and debt-driven and growth model, which resulted in a rapid increase in current account imbalances and private debt ratios in periphery countries, leading to a banking and sovereign crisis with contagious features.

Since then, a number of conventional and unconventional measures were taken by the ECB. Some of the actions taken in 2010/2011 (such as the SMP, the interest rate hikes in April and June 2011, and the three-year LTROs) received strong criticism for not fighting adequately or even aggravating the situation of the banking and sovereign crisis, and fostering financial contagion among countries. This crisis only began to show signs of softening in the second half of 2012, with the implementation of the "verbal intervention" strategy by the ECB (e.g.: OMT), together with other actions by the EU (permanent stabilization fund - ESM and Banking Union project).

However, in 2013 and 2014 the output continued to present a sluggish recovery, and fears of deflation began to increase towards the end of 2014. Therefore, the ECB implemented negative deposit rates in June 2014, and announced new stimulus programs in September 2014 (TLTROs, CBPP 3, ABSPP), which were complemented by a massive public sector bond purchase program (PSPP) in March 2015 and a corporate sector bond purchase program (CSPP) in June 2016.

When we analyze the performance of main macroeconomic indicators (credit, exchange rate, output, inflation, sovereign yields) during the announcement/implementation period of asset purchase programs and TLTROs, we observe positive effects at their initial stage, in general close to the announcement/implementation of the main program (PSPP, January/March 2015). After that, those indicators became more volatile and the effects were more mixed, due to reasons related to the own Euro area (e.g. bond market financial volatility, tensions in Greece) and other countries (i.e. uncertainties surrounding USA and China economies). In the case of credit, we have observed moderate improvements in growth rates, although those rates are below long-term averages, and there are evidences that non-financial companies have directed funds more for financial purposes than for the real economy. In terms of output, the improvement in growth rates (increase in GDP growth and reduction in unemployment) may not be sustained, because of several downside political and economic risk factors (regional and international). Regarding inflation, increases in the headline/core indexes were not on a sustained basis, and medium/ long-term inflation expectations are still below ECB objective. Due to the previous mentioned shortcomings, and also concerns on negative effects over agents' balance sheets/financial stability problems, the ECB has received a number of criticisms about the programs, to which the institution has presented its justifications. Nevertheless, it should be borne in mind that these ECB programs were not a unique solution to the various problems experienced by the Euro area.

From the point of view of private agents, non-financial companies and households' debt levels have reduced since the crisis, but are still high. It will take some more years for the deleveraging process to be completed, and so the credit recovery may be slow. Moreover, credit demand conditions remain unequal in terms of countries (lower in highly indebted countries in the periphery), and funding costs also differ considerably among agents (higher to households and small businesses than to larger corporations). High levels of non-performing loans are still a concern in some places, posing challenges to the banking systems of countries such as Italy. From the point of view of public accounts, several countries remain with high levels of public debt. At times when PSPP manages to reduce sovereign yields, they tend to lower countries' debt

service costs. Nevertheless, critics to the PSPP state that it stimulates moral hazard, by postponing the "necessary" fiscal adjustments in countries. On the other hand, other voices argue that what Euro area countries need in fact is to avoid procyclicality in fiscal policies (stricter austerity, deeper recessions). Instead, they should focus on meeting their fiscal targets over a medium/long-term basis, and increase public investment to resume growth.

This controversy is closely related to the intricate monetary union's political framework, both inside countries, and within the Euro area/EU. The case of Greece is emblematic to show how the political game is complex within a union that has a common currency, but different sovereign countries with distinct development levels and independent fiscal policies. This turns the decision-making mechanisms extremely complicated, and in several times slower than financial market reactions. Concerns over integration in EU (i.e. Brexit) and Euro area (e.g. Catalonia), possible rise of extremist parties in some countries, immigration/refugee problems and security/terrorism issues are all political matters that raise uncertainty and pose downside risks to the region stability and growth.

Summing up, unconventional monetary policies were necessary, and they have shown some efficacy in the Euro area: the ones in 2008/2009 avoided a financial collapse in the beginning of the crisis, and the ones from 2014 onwards usually presented positive effects right after their announcement/implementation. Nevertheless, those positive effects were generally not observed on a sustained basis, and were insufficient to solve a crisis with very complex and multiple roots. Although we agree that the ECB strategy to gradually downsize the pace of asset purchases, while still keeping an accommodative monetary stance in broader terms is considered appropriate (so as to avoid an unexpected tightening in financial conditions in case of a "quick exit"), the Euro area cannot rely *only* on easy monetary policies to sustain its growth. Therefore, we understand that monetary policy measures should be complemented by several other initiatives aimed at restore growth on a sustained path in the region in the medium/long term. Some of the most important measures that would be recommended are presented in the items below.

(i) Adopt a more coordinated fiscal policy among its countries. One way to do so would be to create a supranational institution ("Euro area Treasury") that issued common Euro area securities, and the pool of resources conceded grants to countries to undertake public investments[20]. Among other benefits, this would allow that Euro area's fiscal and monetary policies could be effectively coordinated, and the ECB could assume a true role of Euro area "lender of last resort", shielding the region against future sovereign crisis.

(ii) Allow national fiscal policies to work in a countercyclical way, to avoid deepening recessions. Within EU rules, this could be done by giving more importance to medium-term budgetary objectives, instead of focusing only on the 3% nominal fiscal deficit threshold.

(iii) Actions towards reducing regional economic asymmetries, with the periphery receiving more support from the European Investment Bank and other national development banks in key areas for development (infrastructure, innovation, energy/ecological transition, SMEs, "decent jobs" creation), while core countries with high external surpluses could focus their growth strategy more on domestic demand, strengthening wages/consumption and public/private investment.

(iv) Conducting institutional reforms that enhance countries competitiveness not by labor cost cutting measures (e.g. wage reduction, precarization, layoffs), but by the development of

[20] This proposal is in line with the one presented by Bibow (2015). According to this author, the Euro area Treasury would neither involve fiscal transfers across states (grants according to GDP/ECB capital key), nor mutualization of previous debts (member states would continue responsible for their own existing debts). Euro ares's taxes would be levied just to fund common debt service expenditures. As governments would agree the initial volume of common area-wide public investment spending and its annual growth rate thereafter, Euro Treasury decisions would be based in rules, not in discretion. In addition, by reducing debt service costs, it would open up more fiscal space and provide a long-term basis for infrastructure investment and GDP growth in the area. Furthermore, the creation of common safe assets would allow ECB-Euro Treasury to provide a "ultimate backstop" in occasions needed to handle systemic financial crises.

technological capabilities that allow the differentiation of goods/services, increasing their value added and their attractiveness in local/foreign markets.

(v) In terms of Euro area's financial system, enhance the framework in such a way that financial integration is increased in tandem with an improvement in financial regulation/ supervision, so as to strengthen countries resilience to financial shocks. This could be done not only by completing the Banking Union with a proper European Deposit Insurance Scheme, but also by working towards a EU Capital Markets Union in which other EU authorities for financial market supervision (ESMA, EIOPA) and macroprudential issues (ESRB) would have increased powers. With proper enforcement powers and adequate coordination with respective national authorities, those EU entities would have more tools to harmonize rules and avoid that sudden movements of agents under their oversight (e.g.: institutional investors) provoke sharp volatility episodes, with potential to disrupt financial markets and the real economy.

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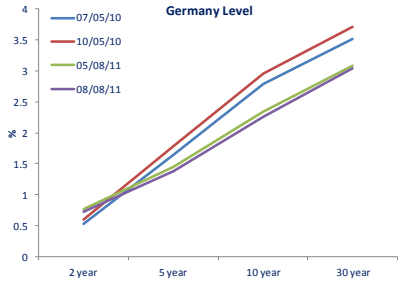
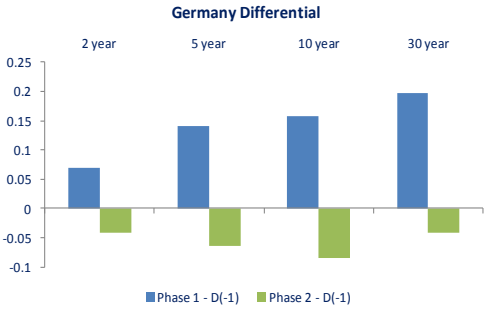
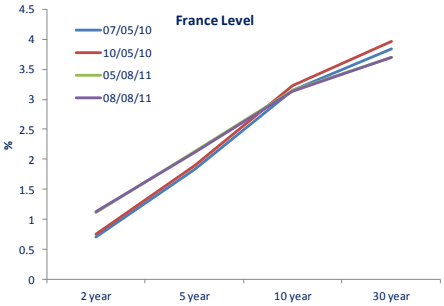
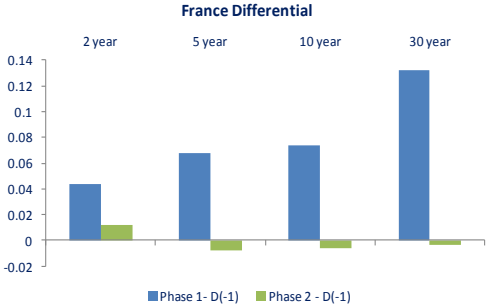
Appendix - Euro area's Yield Curve Graphs

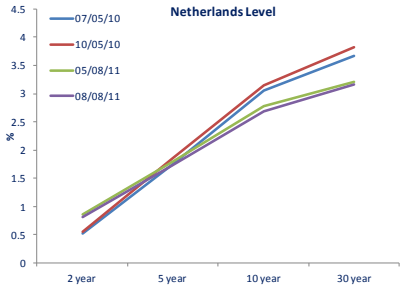
SMP - Core Countries

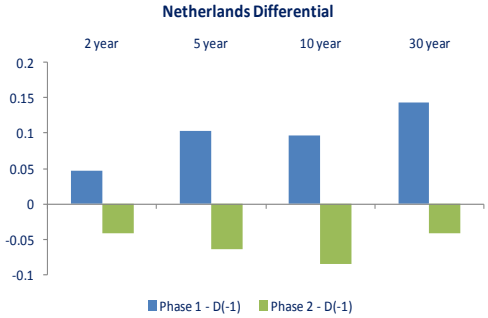


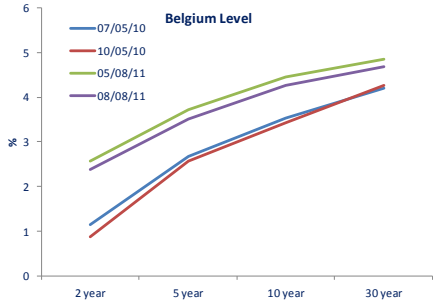


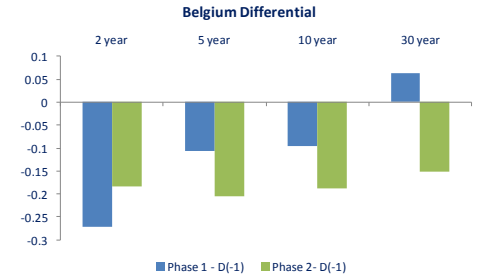


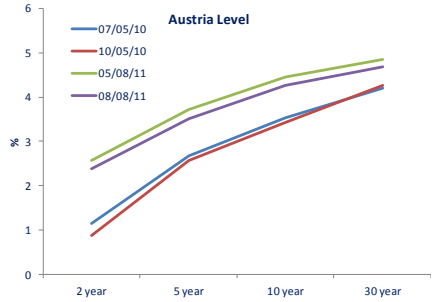


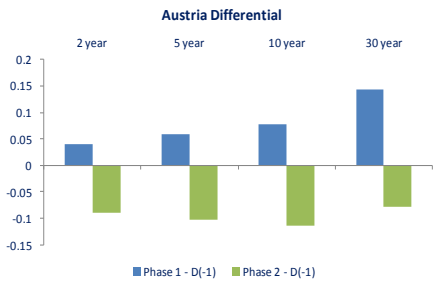




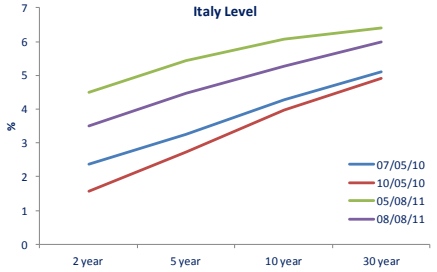


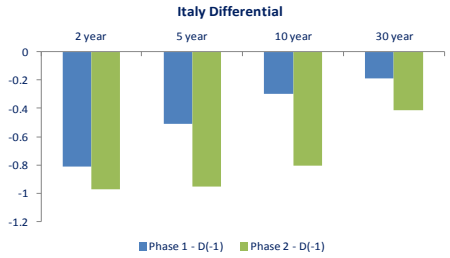


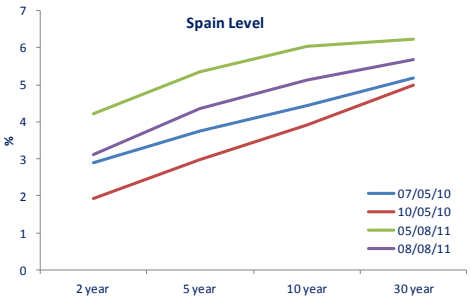


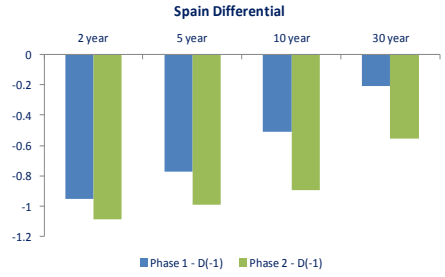


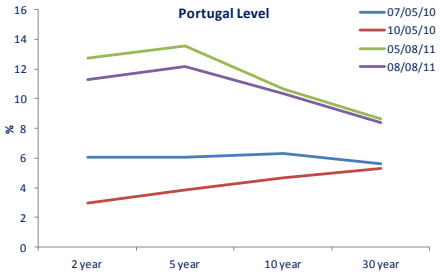
SMP - Periphery Countries

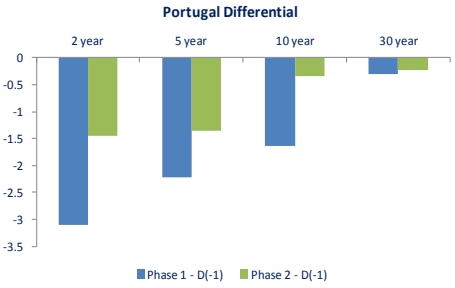


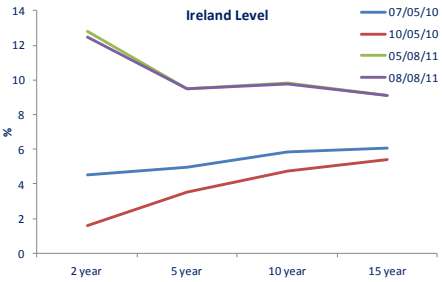


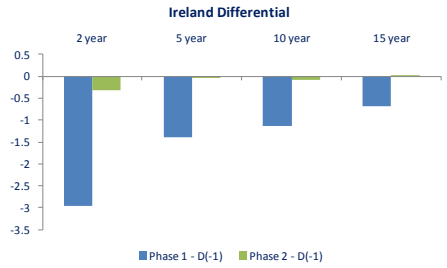


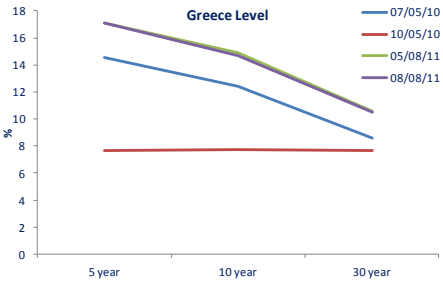


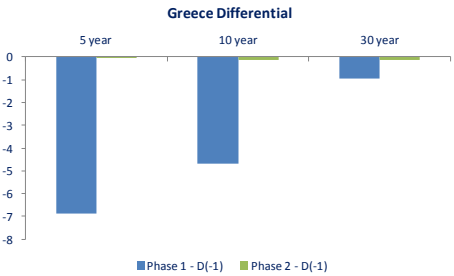






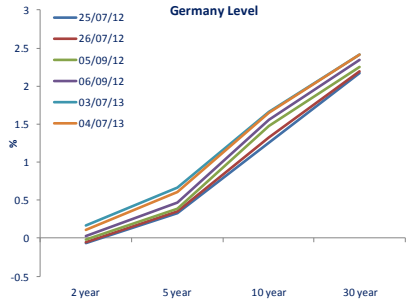


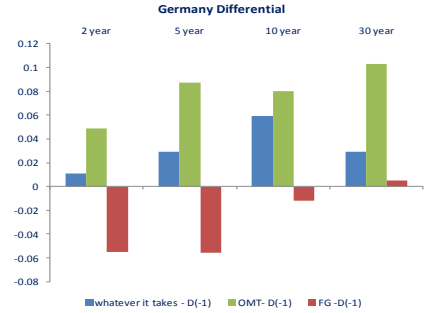


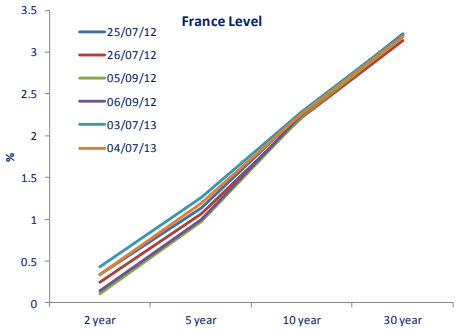


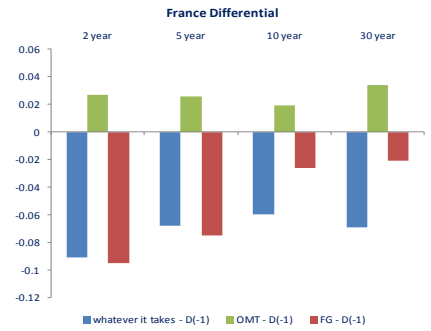
Note: The longest maturity available for Ireland was 15 year bonds. The shortest maturity available for Greece was 5 year bonds.

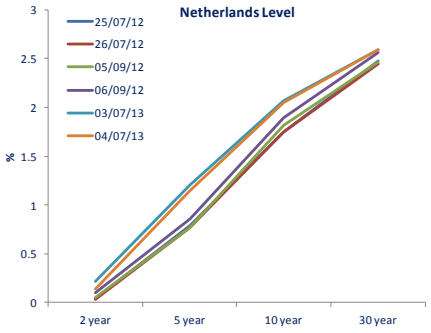
Verbal Intervention - Whatever it Takes, OMT, FG - Core Countries

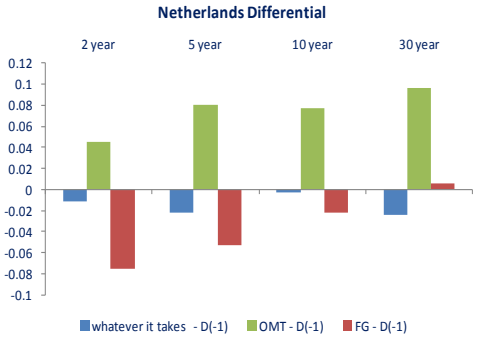


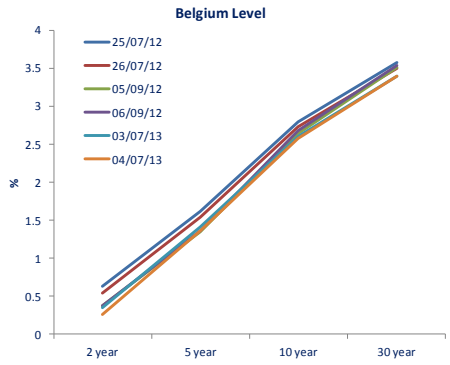


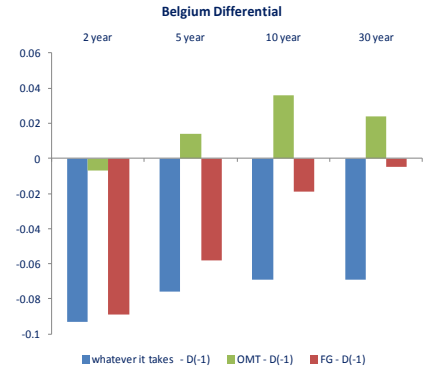


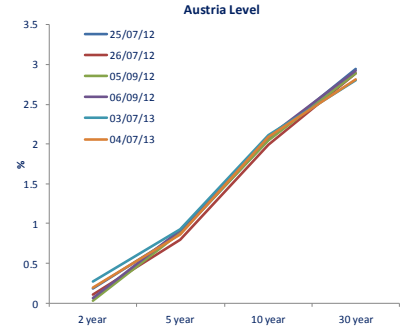


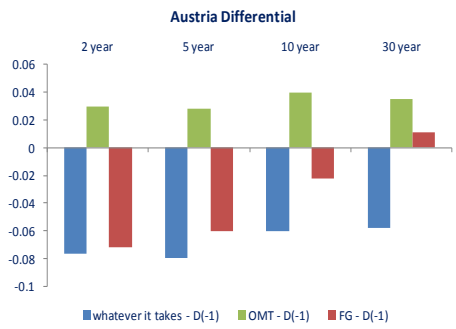




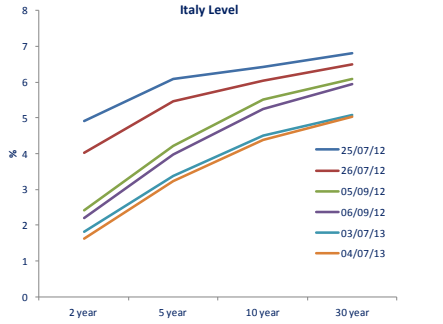


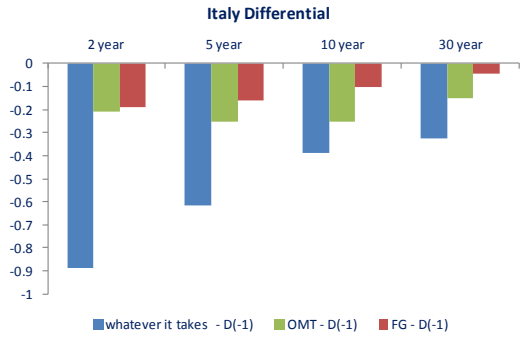


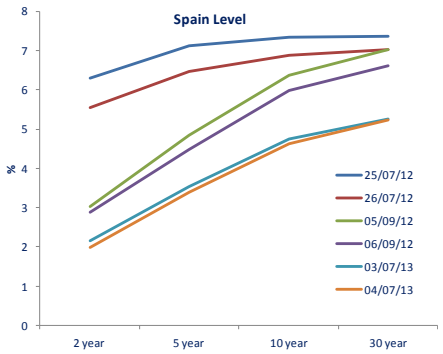


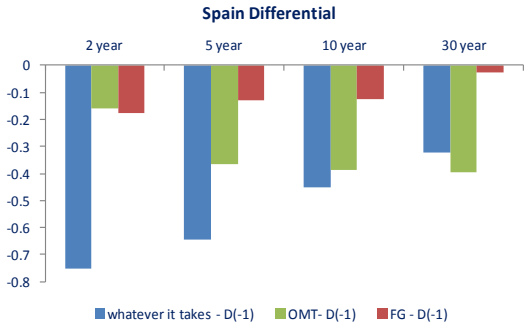


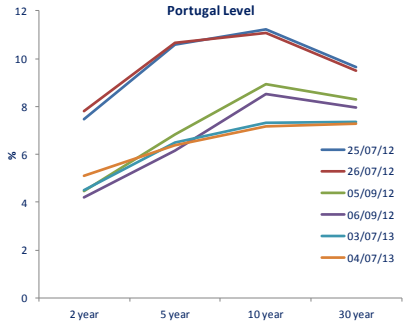
Verbal Intervention - Whatever it Takes, OMT, FG - Periphery Countries

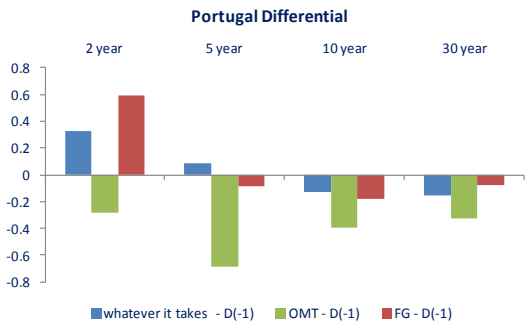


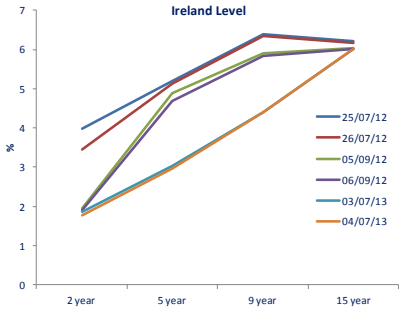


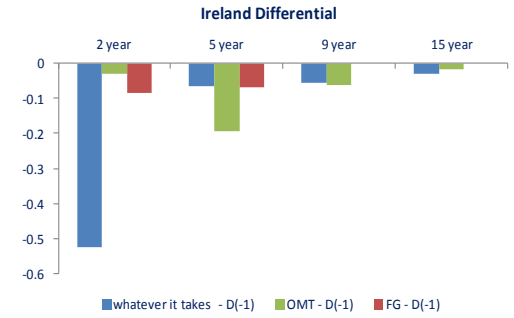


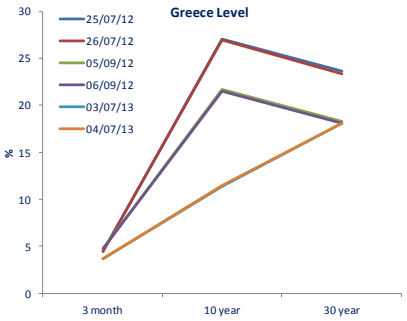


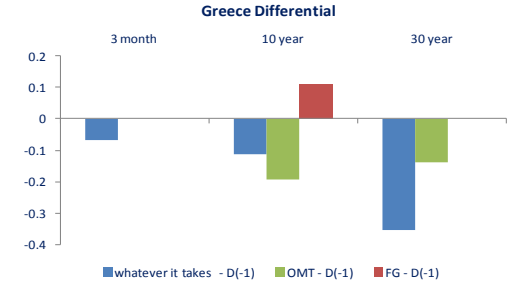






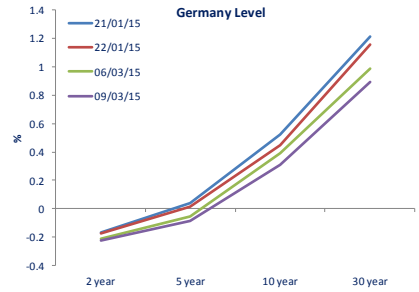


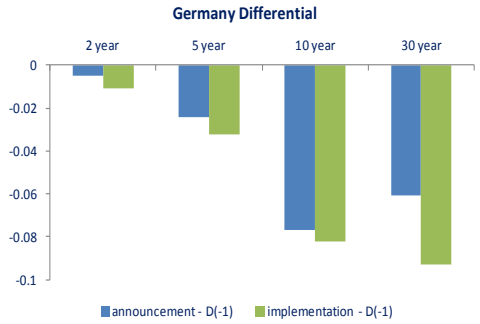


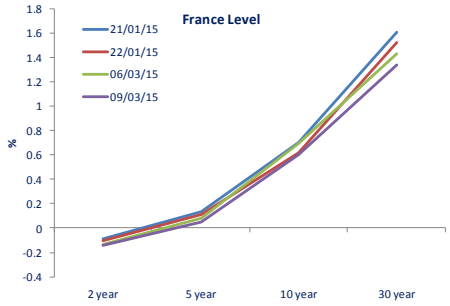


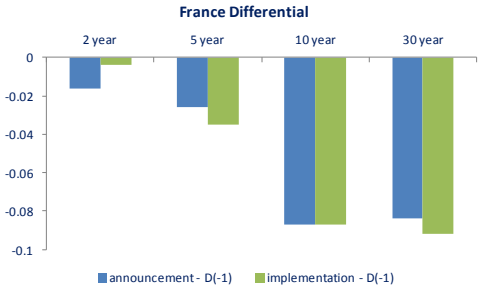
Note: The available maturities in Ireland were 9 years (instead of 10 years) and 15 years (instead of 30 years). The available maturities in Greece were 3 months, 10 years and 30 years.

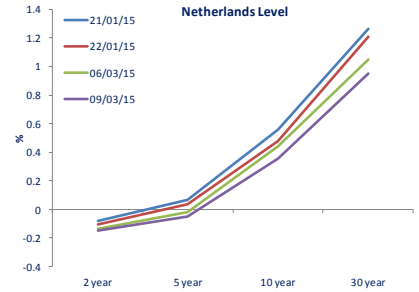
PSPP - Core Countries

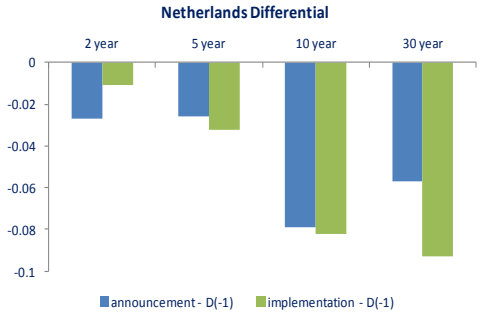


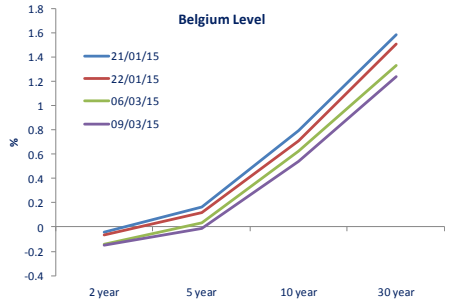


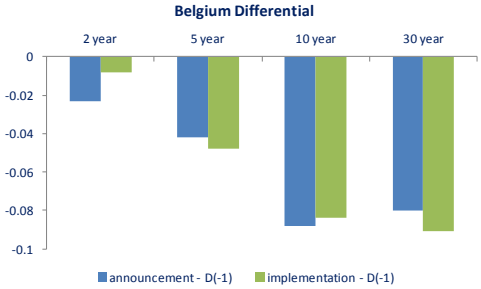


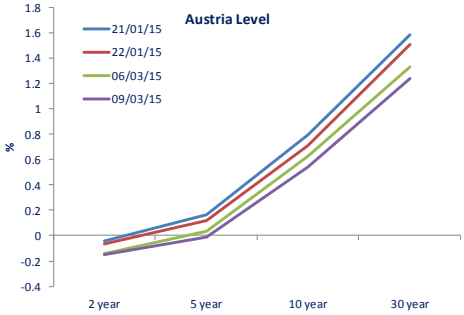


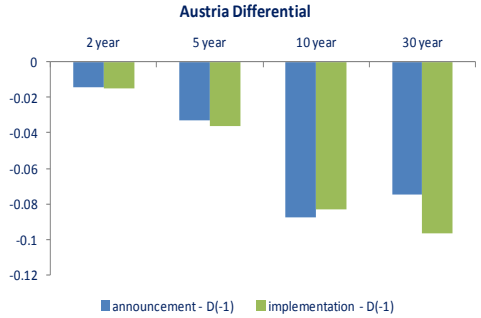




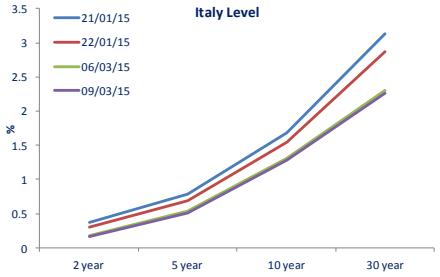


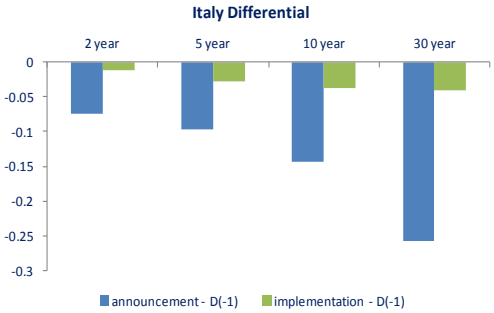


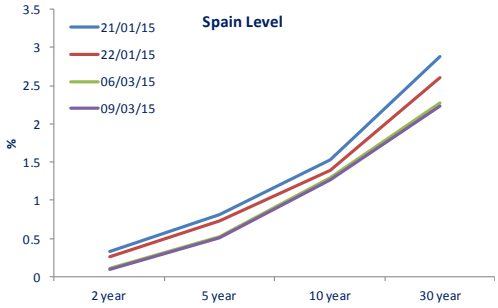


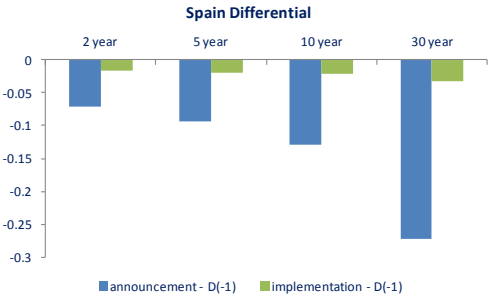


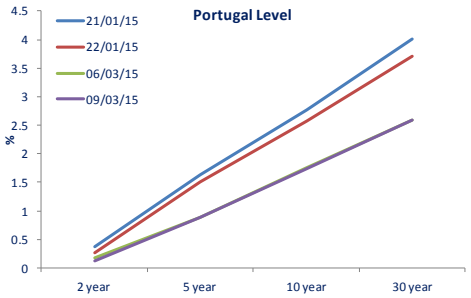
PSPP - Periphery Countries

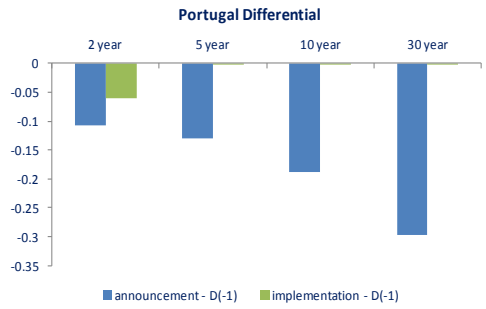


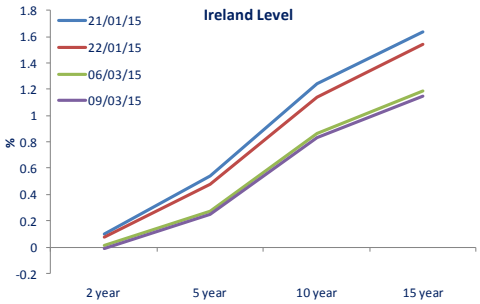


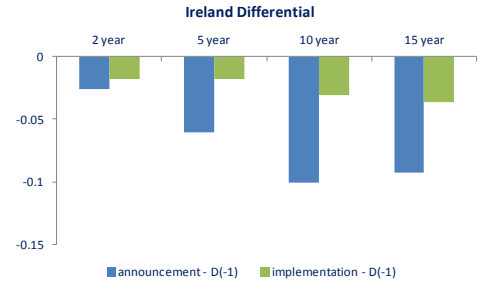


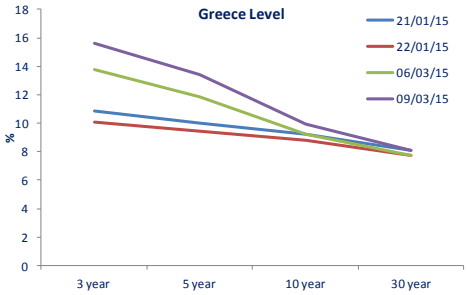


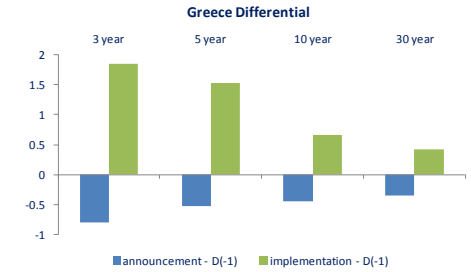






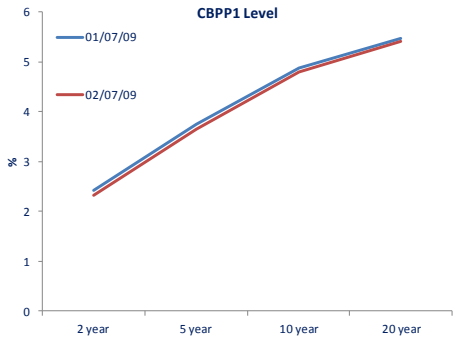


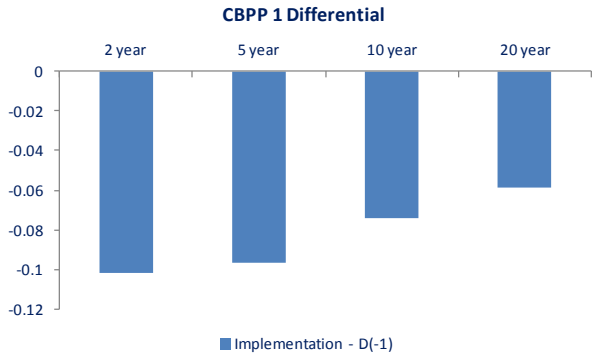


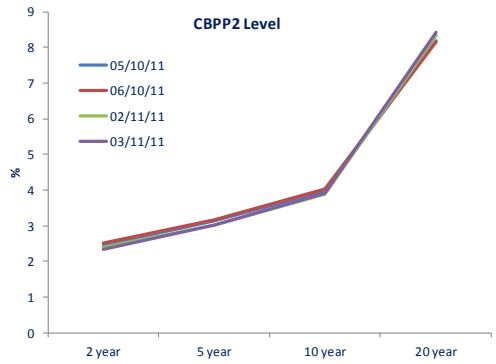


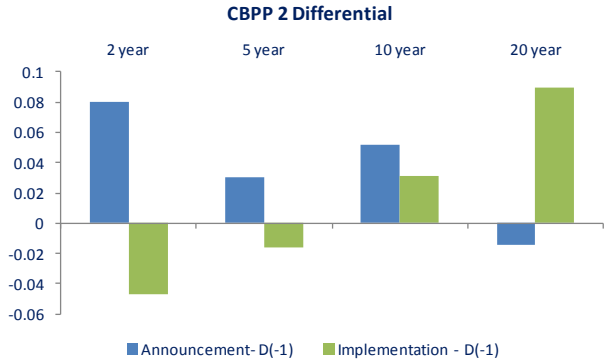
Note: The available maturities in Ireland were 15 years (instead of 30 years). The available maturities in Greece were 3 years (instead of 2 years).

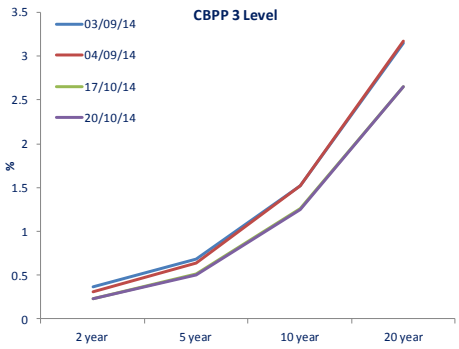
CBPP and CSPP

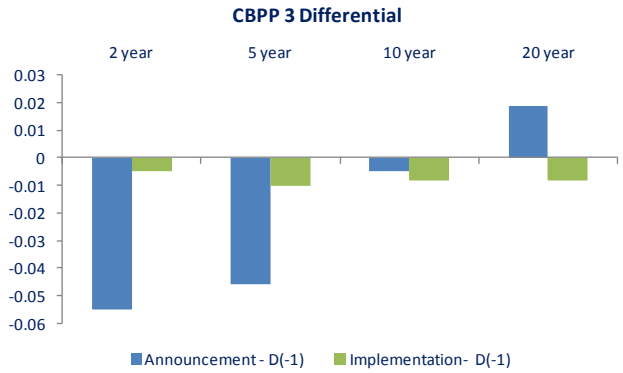


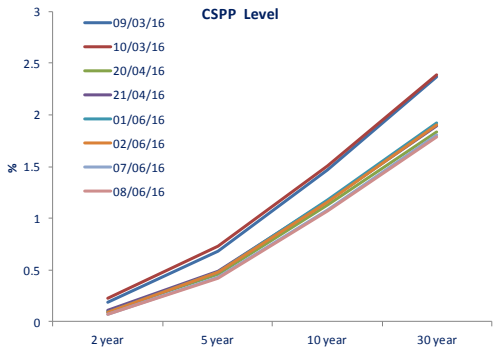


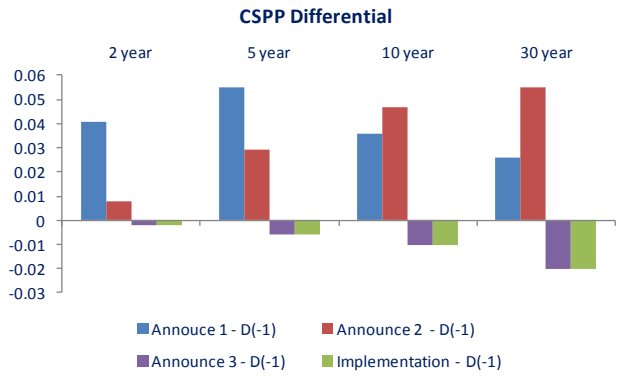












Source: Bloomberg