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Sovereign Bond Purchases and Risk Sharing Arrangements: Implications for Euro-Area Monetary Policy

Monetary Dialogue
June 2015

COMPILATION OF NOTES

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Sovereign bond purchases and risk sharing arrangements: Implications for euro-area monetary policy

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Abstract

The notes in this compilation review the main features (size, structure, etc.) of sovereign bond markets in euro area Member States and discuss, in the relation to expanded asset purchase programme (EAPP) of the ECB, the financial risks the Eurosystem is potentially taking on its balance sheet in view of currently very low (negative) yields and possible shortage of government bonds.

The notes have been requested by the Committee on Economic and Monetary Affairs (ECON) of the European Parliament as an input for the June 2015 session of the Monetary Dialogue between the Members of ECON and the President of the ECB.

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DISCLAIMER

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INTRODUCTION

As stated by ECB President Mario Draghi at the press conference of 22 January 2015 announcing the Extended Asset Purchase Programme (EAPP)[1], in March the Eurosystem started to purchase (on the secondary market) euro-denominated bonds issued by governments, agencies and European institutions[2]. The size of the programme (worth about EUR 1.1 trillion until September 2016, or EUR 60 billion/month) raises the issue of the capacity of the Eurosytem to find enough sovereign bonds to be purchased without inducing a fall of yields at record levels. A large part of government securities of core euro area countries (Germany, France) already exhibit negative rates. Critics of ECB's quantitative easing (QE) programme are concerned about the material risks of a bubble in the bond market[3] and potential (future) costs/losses incurred by the Eurosystem.

At the press conference of 15 April, the ECB President Mario Draghi played down the risk of potential scarcity of government bonds available for purchase and the worries concerning bank's capacity to maintain the required levels of collateral under the EAPP: "The worries about potential scarcity of government bonds, sovereign bonds, to be bought under our purchase programme, are just a little exaggerated. We don't see problems. All, both direct and indirect evidence, and market feedback, show that there isn't any problem. And our programme is flexible enough in any event to be adjusted if circumstances were to change. Also, some of these worries have been motivated with the need that some banks will have to retain sovereign bonds for complying with the liquidity requirements, the regulatory liquidity requirements. It's also not quite clear why this should be a worry because government bonds are used for liquidity, as well as cash is used for liquidity, so if they sell bonds, they get cash. From a regulatory perspective, it shouldn't change, unless I'm mistaken, but by and large, we believe that these worries are, to say the least, premature, certainly not supported by the current evidence."

The notes in this compilation review the main features (size, structure, etc.) of sovereign bond markets in euro area Member States and discuss, in the relation to the EAPP programme, the financial risks the Eurosystem is potentially taking on its balance sheet in view of currently extremely low (negative) yields and possible shortage of government bonds.The main conclusions and policy recommendations are summarised below.

The notes have been requested by the Committee on Economic and Monetary Affairs (ECON) of the European Parliament as an input for the June 2015 session of the Monetary Dialogue between the Members of ECON and the President of the ECB.

Danel Gros (CEPS). The contribution focuses on the risks to the balance sheets from the Extended Asset Purchase Programme of the ECB. A first key point is that given the low share of asset purchases subject to risk-sharing, the risks largely fall on the national central banks, not the ECB, nor the Eurosystem as an entity. A second point is that there are real risks, but they do not arise from default risk. The latter appears to have been overestimated. The key balance sheet risk is that the purchases are financed by deposits whose rate is at present so low (minus 0.2%) that it can only go up in future. If this were to happen, in particular if monetary conditions were to normalise and the deposit rate would return to its pre-crisis average of (plus) 2%, some national central banks might make large losses on their EAPP purchases. These losses will probably only appear far off

[1] http://www.ecb.europa.eu/press/pressconf/2015/html/is150122.en.html

[2] ECB's EAPP programme (worth EUR 60bn/month) includes the Asset-Backed Securities Purchase Program (ABSPP) and the Covered Bond Purchase Program (CBPP3) announced late last year. The "additional purchases" of government bonds, agency and European institutions debt will therefore be lower, but still relevant (in the order of 45-50 EUR bn. according to figures circulated in the press). With regards to the sharing of hypothetical losses, the Governing Council decided that purchases of securities from European institutions - which will be 12% of the additional asset purchases, and which will be purchased by National Central Banks (NCBs) - will be subject to loss sharing. The rest of the NCBs' additional asset purchases will not be subject to loss sharing. The ECB will hold 8% of the additional asset purchases. This effectively means that only 20% of the additional asset purchases will be subject to risk sharing.

[3] http://www.economist.com/blogs/freeexchange/2015/01/quantitative-easing-and-euro-zone-0

in the future, when the deposit rate has returned to more normal levels, since the purchases would be held at 'amortised cost'. If they were valued at market prices, the losses would become apparent as soon as long-term interest rates increase. The Bundesbank in particular has paid a high price for avoiding the default risk on the bonds of other countries. It will buy only German government debt whose yield is half a percentage point lower than that of the euro area average. Conversely, the central banks of the high yield countries, like Italy, Spain and Portugal will be much better off because the bonds they buy have a yield which is about 0.8-1% higher than the euro area average. Provided their government do not default, they will thus earn about 10% more over the next ten years, than they would have under full risk sharing. This difference amounts to potential gains of 12 billion euro for Italy alone and a gain of about 3 billion or 1.8% of GDP in the case of Portugal.

Monika Blaszkiewicz-Schwartzman (CASE). The notes addresses two issues related to the ECB expanded soverign purchases programme (ESPP): the impact of potential scarcity of sovereign bonds to be purchased under the programme and the absence of full profit and loss sharing by national central banks (NCBs). If the programme is not appropriately managed, the volume of bonds available for purchase could be an issue. To help the situation, the ECB could change the 25% issue limit or enlarge the list of eligible agencies (if such can be found) in countries which face the danger of reaching the limits before the programme expires. The note also discusses the issue of limited risk-sharing. The ESPP does represent a withdrawal from full risk sharing. Estimates suggest that approximately €738.4 billion of the ESPP will not be subject to risk sharing. It has been argued that this increases the probability of an individual sovereign default despite the whole system remaining solvent. Defaulting countries may be forced to exit the euro area. Non-defaulting countries may prove unwilling to bear the costs of such exits, both of which would threaten the unity of the euro area. However, studies suggest that, at present, all NCBs should be able to bare losses stemming from sovereign debt purchases under the current round of QE.

Jens Boysen-Hogrefe et al. (KIEL Institute for the World Economy). The ECB has launched a Quantitative Easing programme similar to recent programmes launched by other central banks. In launching this programme, the Eurosystem takes additional risks on its balance sheet. Currently, the probability of these risks materializing seems to be relatively small. Nonetheless, if this probability were to increase, the ECB and national central banks may find themselves under increasing political pressure, which in turn may weaken the institutional structure underlying monetary policy in the euro area.

20% of the volume of the programme will be held by the ECB and subject to risk sharing according to the capital key of the ECB. Meanwhile, 80% of the volume of the programme will be held by the national central banks and is not intended to be subject to risk sharing. For this principle to be effective, each national sovereign must be willing to recapitalise the national central bank in the event of insolvency. The ECB has set strict limits and criteria for bonds to be eligible for the PSPP. An analysis of euro area bond markets indicates that by and large, the programme can be carried out as envisaged until September 2016. However, several smaller member countries have not issued a sufficient amount of eligible bonds to fully carry out the programme in a strict sense.

The bond purchase programme has several implications for euro area monetary policy. First of all, the programme makes the ECB more likely to choose a more accommodating monetary policy stance than its mandate by itself would dictate in order to compensate losses or to avoid sovereign defaults. This weakens central bank independence by engaging the ECB more in fiscal affairs.

Given the size of the programme, serious negative implications so far seem to be of limited relevance. However, these implications would become more relevant were the programme to be expanded beyond its current volume. In that case, the ECB would most likely have to adjust the design of the programme, because the volume of eligible bonds (in the current design of the programme) would become a limiting factor.

Eddie Gerba and Corrado Macchiarelli (LSE) The note argues that risk sharing on QE purchases does not constitute a risk to the ECB's balance sheet (in contrast to previously implemented asset purchase programs (e. g, SMP, CBPP)). Moreover, direct ECB's purchases are admittedly limited, given the current arrangements. A limited European guarantee and course of actions may make markets believe that "QE is not enough" as the decoupling of Greek bonds has recently shown. To be credible the EAPP needs more mutualisation. Based on the current projections, the restrictions inherent in the program should not be binding, and therefore the scarcity in the supply of bonds should not be an issue in our view. Nonetheless, as evolving economic conditions may drastically affect the bond market we argue that a careful monitoring of market developments as well as flexibility in the implementation of policy measures are crucial elements for the success of QE going ahead.

Angel Ubide (PIIE). The ECB's asset purchase program has been an unambiguous success, quickly improving the euro area's macroeconomic outlook. Its design has raised some doubts about the potential scarcity of bonds eligible for purchase and the likelihood of losses derived from purchases executed at very low yields. This note argues that the program is well designed and calibrated for the characteristics of the euro zone bond market, and that the ECB could easily relax some of the eligibility restrictions if needed. The program is likely to generate profits and the risk sharing and accounting arrangements, and the ECB loss absorption capabilities, look adequate for the potential risks of the program. Should losses materialize, a prompt recapitalization would be desirable to maintain the credibility of monetary policy and the independence of the European Central Bank.

European Parliament

DIRECTORATE GENERAL FOR INTERNAL POLICIES

POLICY DEPARTMENT A: ECONOMIC AND SCIENTIFIC POLICY

QE 'euro-style': Betting the bank on deflation?

Daniel GROS

IN-DEPTH ANALYSIS

Abstract

There is little reason to believe that the 'Extended Asset Purchase Programme' (EAPP) of the ECB will fail because of a scarcity of suitable government bonds. In any event, the programme is targeted at the market value of the purchases, not their nominal value. The market value of most government bonds in the euro area is presently about 20% above the nominal value.

Buying long-term bonds at near-zero rates implies considerable risk to the balance sheets of the euro area's national central banks as the risks are asymmetric: rates cannot go much lower, but they can go a lot higher. Not buying bonds with a yield to maturity less than today's deposit rate of minus 0.2% provides little protection as the deposit rate can only go up. Large-scale purchases of long-term bonds at ultra-low rates represent an implicit bet on prolonged deflation.

Most of these balance sheet risks are borne by national central banks, not the Eurosystem as a whole, given that 80% of the purchases of sovereign bonds are on a 'non-risk-sharing' basis. This non-risk sharing could cost the Bundesbank about 12 billion euro in lost interest income. The EAPP is likely to lead to a small net loss overall on average, a larger one for the Bundesbank and other core countries, but perhaps a small gain for central banks in southern Europe.

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EXECUTIVE SUMMARY

With its 'Extended Asset Purchase Program' (EAPP), the European Central Bank (ECB) has committed itself to buy more than 1000 billion euros worth of bonds until the end of 2016. It is often overlooked that this target of bond purchases is in terms of how much the ECB intends to spend, not in terms of the nominal bonds it will buy. This is important because at present the market value of most government bonds in the euro area is about 20 % above the nominal. This implies that the ECB will probably in the end have bought only a bit more than 900 billion in terms of the nominal, or face value of bonds, once it has finished spending the entire 1 100 billion earmarked for the EAPP.

This difference between market and face value of bonds is one of the reasons why it is highly unlikely that there will not be enough eligible bonds (at least until September 2016). The supposed scarcity of bonds is anyway material only in one country, Germany, where a large proportion of government debt is not in the form of bonds. Changes in interest rates are unlikely to affect much the amount of German bonds eligible under the EAPP since lower rates might increase the number of issues which have a yield below minus 0.2 %, but lower rates also increase the price of the remaining bonds.

It would anyway have been surprising if the ECB had embarked on a bund-buying program, which it knew in advance, that it could not be fully implemented.

The fact that interest rates cannot go much below zero implies that buying long-term bonds at near-zero rates leads to considerable risk to the balance sheets (or rather the profit-and-loss accounts) of the euro area's national central banks: rates cannot go much lower, but they can go a lot higher. The ECB has argued that there is no danger since bonds with a yield to maturity less than the deposit rate will not be bought. The deposit rate indicates the cost of financing for the ECB. It stands today at minus 0.2% But having a ten-year yield higher than today's deposit provides little protection against future losses as the deposit rate can only go up. The ECB will not increase its deposit rates (in jargon: normalise monetary conditions) until deflationary pressures have abated. This implies that the EAPP would lead to large losses if inflation returns soon to the 2% target. Losses can be avoided only if the deposit rate stays very low for a very long period of time, i.e. if deflationary pressures persist. Large-scale purchases of long-term bonds at ultra-low rates thus represent an implicit bet on prolonged deflation.

An important, and much-discussed, element of the EAPP is that 80% of the purchases of sovereign bonds are on a 'non-risk-sharing' basis. This implies that these balance-sheet risks are borne by national central banks, and not by the Eurosystem as a whole.

The absence of risk-sharing could cost the Bundesbank about €12 billion, with corresponding gains for the Banca d'Italia and other peripheral central banks. The Banco do Portugal stands to gain the most relative to its country's GDP.

The Bundesbank would be better off with the present arrangement of no risk-sharing only if a peripheral government were to default on its debt. But the probabilities implied by today's risk premia seem still unrealistically high to justify the non-risk sharing on an expected value basis. For the Bundesbank it is a near certainty that the EAPP will imply significant losses.

1. INTRODUCTION

The focus of this contribution is the potential impact of EAPP on the balance sheet of the Eurosystem, not its general effectiveness in terms of influencing long-term rates and bringing inflation back to the ECB's target (of close to 2%).[1] However, the strong fall in long-term interest rates over the first week after the start of its implementation and the recent steep rise in the levels that subsequently followed contain an important lesson.

The recent sharp increase of long-term rates (rates on long-term German government bonds increased by over 50 basis points) occurred at a time of widespread speculation that there might not be enough German sovereign bonds available in the market for the Bundesbank to fulfil its allotment under the EAPP. On the one hand, this seems to suggest that 'scarcity' of bonds cannot be the main problem. On the other hand, as argued in Valiante (2015), as that the EAAP might have a strong impact on market structures, potentially reducing liquidity, it could result just in higher volatility.

A further important element to keep in mind is that the capital inscribed formally on central banks' balance sheets has little economic significance, but it may be important from a political point of view. Indeed, given that central banks typically transfer profits to their national treasury, one should not look at the profit-and-loss accounts of a central bank in isolation: they should always be consolidated with that of the home government. See the Box 1 for an explanation of the fiscal aspects of central banks' balance sheets.

Whether or not the EAPP will bring profits or losses cannot be predicted with any certainty today. One can only make some inferences based on today's market prices and some general principles, for example, that interest rates cannot go too negative. This contribution will focus on the interest-rate risk that is inherent in any operation that involves buying long-dated securities financed by very short-term liabilities (e.g. central bank deposits with daily maturity). This risk seems to have been overlooked (or intentionally not addressed) at the time the details of the operation were determined. The only risk that was explicitly considered relevant was the default risk. As will be argued below, however, the interest rate might be much more relevant in practice.

Another detail of the EAPP can be explained by the same reasoning: the ECB does not want to own (either directly, or via its constituent national central banks) more than 25% of any single issue. The reason is again default risk. In case of a default by a government, the ECB would have blocking minority in the creditor committee if it owned more than a quarter of the total.[2]

The remainder of this contribution begins by providing some basic information on the range of bonds eligible under the EAPP and how it has to be looked at in terms of market, and not

[1] www.ecb.europa.eu/press/pr/date/2015/html/pr150122_1.en.html

[2] From ECB website, Q&A on the public sector purchase programme (PSPP):

An issue share limit of 25% needed to be applied in order to avoid obtaining a blocking minority in the event of a debt restructuring involving collective action clauses. This issue limit thus also covers existing Eurosystem holdings of sovereign bonds in the context of the Securities Markets Programme (under which the 25% issue share limit was not applied at the time of purchase) and any other portfolios owned by Eurosystem central banks.

Likewise, the issuer limit of 33% is a means to safeguard market functioning and price formation as well as to mitigate the risk of the ECB becoming a dominant creditor of euro area governments. To this end, the 33% limit is applied to the universe of eligible assets in the 2 to 30-year range of residual maturity. The 33% issuer limit applies to the combined holdings of bonds under all purchase programmes.

https://www.ecb.europa.eu/mopo/implement/omt/html/pspp-qa.en.html

face, value. Section 3 then turns to the interest-rate risk, which seems to have been neglected so far. This section also argues that higher uncertainty should increase the fair price of long-term bonds. Section 4 provides some brief illustrative calculations of the default probabilities that would make the current ten-year interest spreads a fair bet and concludes that they appear to be unrealistically high.

Box 1. The fiscal aspects of central banks' balance sheets

This contribution to the Monetary Dialogue focuses on central banks' balance sheets despite the fact that they are ordinarily of little significance when viewed in isolation. Gros et al. (2015) argue that:

"*In a country with its own currency, the central bank and the Treasury can be consolidated for fiscal purposes, at least in the long run. Any gains or losses the central bank makes are usually transferred to the (national) Treasury. Within the euro area, one could consolidate the sum of all national Treasuries with the accounts of the ECB, since the Eurosystem, sooner or later, transmits most of its profits to national Treasuries, according to the capital key, which determines the share of each country in the ECB*

However, this argument does not apply in the context of the EAPP since 80% of the purchases will be undertaken by the NCBs under their own responsibility. The reason for this was apparently "that the NCBs from creditor countries, such as Germany or the Netherlands, were worried that they might have to share in the losses if there was a default on the bonds bought under this programme".

From a public debt-management point of view (as opposed to the point of view of the central bank balance sheet), this means that purchases under the EAPP will "*have mainly the effect to shorten the duration of the existing national public debt. The deposits of banks with the NCB represent effectively public debt with a zero duration (these deposits can be withdrawn daily). When the Bundesbank buys a German government bond with a residual maturity of 10 years, it reduces the maturity of that part of the German public debt from 10 years to zero (one day, to be precise). If short-term interest rates increase, the Bundesbank would make losses on its investment, but these losses should be offset against the gains the German Finance Ministry made by selling the bond*".

Gros et al. (2015) also show that "*this shortening of the effective duration of government debt could be substantial*" in that "*the effective duration of German government debt (at least that which is in a publicly tradable form) would be reduced by 1.2 to 1.5 years*."

Reducing the effective duration of public debt is equivalent to a bet that long-term rates will stay low for a very long period of time.

2. THE UNIVERSE OF ELIGIBLE BONDS

In principle there should not be a problem with 25% holding limit the ECB wants to observe given that the total government debt amount to over 10 thousand billion (the overall debt/GDP ratio for the euro area is close to 100% (92%) and euro area GDP amounts to over 10 thousand billion euro). On average, the EAPP should thus amount to about 10% of GDP and 10% of total government debt (excluding Greece, of course).

There are of course a couple of special cases in which the holding limit will be relevant. An extreme case is Estonia, which has already very little government debt. The debt to GDP ratio is only 10% and thus the quota of bond purchases for Estonia is higher than the entire public debt of the country. Moreover there is no large liquid market for Estonian government bonds. In this case the national central bank has bought simply the debt of European institutions, i.e. the European Investment Bank (EIB) or the European Financial Stability Facility (EFSF).

For other countries the overall debt to GDP ratio might appear to be high, but it can be misleading as an indicator of the amount of government bonds available to the market. This is in particular the case for Germany where only about one half of total public debt has been issued by the Federal Government. Most of the debt of the "Länder" and lower levels of government is in the form of bank loans, not bonds. Moreover, not all Federal debt is eligible for ECB bond purchases as the ECB specified that only bonds with a residual maturity of more than two years and a yield above minus 0.2% are eligible for purchase. Germany represents thus the only relevant case where a shortage of eligible bonds might arise. The exact numbers vary somewhat, depending on the source one uses.

Yet, the general conclusion is that, even accounting for these restrictions, the total amount of 'QE eligible' German government bonds is roughly equivalent to four times the amount the Bundesbank will be authorised to buy. Table 1 shows the data from which the concerns about a scarcity of German bonds arose also considering the holdings of Italian and Spanish bonds under the SMP.

Table 1. ECB QE-EGBs purchase and total supply (selected countries)

€ bn	Italy	Spain	Netherlands	Germany	France
Total government bonds (outstanding)	1,799.3	995.8	348.2	1,817.8	1,713,8
Central government bonds (outstanding)	1,731	769	345	1,124	1,522
Eligible central government debt (2y – 3oy)	1,225	503	239	768	1,043
ECB max purchase (billion)	153.1	109.9	49.8	223.8	176.3
ECB max purchase (% tot. eligible)	12%	22%	21%	29%	17%
ECB holdings under SMP* (billion)	76.2	28.9	-	-	-
Max purchase + SMP % of tot eligible	18.7%	27.6%	21%	29%	17%

Source: Author's estimates from NCBs, EBA, BIS, Barclays (2015), Bruegel.

Note: Data from Q3 2014, end 2013 for the Netherlands and Q4 2014 for Spain. *ECB max purchase is computed applying the ECB capital key to the total purchases planned of the ECB, which are estimated at about 850 billion (i.e. 1100 billion net of covered bonds and securitization and 12% of bonds issued by supranational institutions)*

**As of December 2014, at nominal value*

At first sight it appears that there might be a shortage of eligible German government debt: as shown in the table the maximum amount that should be purchased until September 2016 would be 29% of the total of eligible German (central) government bonds, i.e. above the 25% threshold.

However, it should be noted that the data in the Table are based on face value and do not take into account the fact that the market value are above parity. As it will be illustrated in the next section German federal debt is about 20% above the face value.

Moreover, the scarcity of German bonds could be alleviated in several ways. First, the Federal Debt Management Office could issue more long-term bonds (i.e. avoid issuing bonds with maturities for which the yield is below minus 0.2%). Second, it could issue more zero coupon bonds, which incorporate the interest payment in the price, thus allowing the ECB to spend more on an equivalent face value with market interest rates. Third, banks could re-package long-term loans to Länder into securities which should be eligible for the ECB. This would not fit into the direct aim of the EAPP to buy central government paper, but it would allow the Bundesbank to fulfil its 'quota' in a different way.

It should be noted that also in the case of Spain the total purchases (past and future) as percentage of eligible debt is above the 25% threshold, yet in this case the correct threshold to apply is 33% (see footnote 3 for details).

2.1. Face versus market value

A large proportion of the euro area debt outstanding today was issued some time ago when market interest rates were much higher. This implies that the market price of these bonds is now much above 100% of the face value.

An extreme example is a German federal bond with a nominal coupon of 4.75%, which matures in early 2040. At its present yield of 1.06%, the market price is over 180 (for 100 of face value).[3] Bonds with a shorter remaining maturity have somewhat lower prices, but given that the average maturity of public debt is between six and eight years, it is clear that most government bonds these days trade at above 100% of face value. Table 2 below shows that for most euro area countries the market value of the outstanding government debt (in the form of tradable bonds) is above 20% above the face value. This implies that the scarcity of German bonds will be less acute than one would conclude on the basis of the face value totals mentioned above.

Table 2. Difference between notional and market value of ECB QE eligible government bonds for selected euro-area countries - 28 May 2015

Country	Nominal outstanding (EURbn)	Market value (EURbn)	Average price
AT	158	198	125%
BE	258	330	128%
DE	767	937	122%
ES	540	658	122%
FI	66	76	115%
FR	1,100	1,359	124%
IE	90	109	121%
IT	1,172	1,404	120%
NL	253	307	121%
PT	90	107	119%
Total	*4,494*	*5,485*	*122%*

Source: Based on Table A1 (Annex), same source.

[3] See German Federal Debt Management Agency (www.deutsche-finanzagentur.de/fileadmin/user_upload/institutionelle-investoren/pdf/kredit_renditetabelle.pdf)

Table A1 in the Annex shows the detailed calculations of the market value of the bonds eligible for the EAPP. For Germany this is about 20% higher than the face value, which implies that the Bundesbank should be able to buy its quota of about 220 billion worth of bonds without owning at the end more than 25 % of the outstanding (nominal) amounts. For other countries (except Estonia, of course) there does not seem to be a problem either. Interest rates volatility will of course yield different results in terms of the difference between market and face values: a lower interest rate increases the number of issues which have a yield below minus 0.2 %, thus restricting the number of issues that could be bought under the EAPP, but it also increases the price of the remaining bonds. These two effects go into opposite directions. The result is that changes in interest rates are unlikely to affect much the amount of German bonds eligible under the EAPP.

It would anyway have been surprising if the ECB had embarked on a bund-buying program, which it knew in advance, that it could not be fully implemented.

3. BALANCE-SHEET RISKS

The discussion about the fiscal risk inherent in any quantitative easing in the euro area has been dominated by concerns over possible default risk, obviously inspired by the Greek case. However, since Greek bonds will not be included for the time being, other risks, notably the interest-rate risk, should be considered. And in that case, one finds that 'no risk-sharing' also implies 'no profit-sharing'.

3.1. Interest-rate risk not avoided

The ECB has stated publicly that bonds whose yield to maturity is less than their deposit rate should not be bought, implying that buying them would constitute a loss-making operation. But this justification has weak foundations.

Whether or not the central bank ultimately makes a loss on the operation does not depend on the difference between the deposit rate today and the interest rate (or to be more precise the yield to maturity) of the bond, but on the difference between the yield to maturity and the average of future deposit rates at the ECB.

This applies of course both to the purchases made by the ECB, and the 80% implemented by the national central banks (NCBs), on their own account.

The main reason why this lower bound was adopted was probably political: the Governing Council likely wanted to avoid the impression that it was forcing the Bundesbank to buy bonds on which it would be making an accounting loss during the first few years. The condition that a central bank should not buy a long-dated bonds that yield less over its life (say 30 years) than the one-day deposit rate today amounts to populist posturing. What matters is the average of the deposit rate over the next ten years. The following sub-section will provide some illustrative calculations in this respect.

The aim of central banks in implementing their monetary policy is not to make a profit, but rather to influence monetary and financial market conditions in the direction of price stability.

Even under the assumption that central banks should try to avoid making losses on their monetary policy operations, one should ask why any private bond holder will sell to the central bank. The sellers must make the calculation that the loss of interest on the bond will be equivalent to the expected average financing cost over the life time of the bond, adjusted for the higher liquidity a central bank deposit offers.

(One can imagine the following question at a basic finance course: Will the buyer of a long-term dated bond necessarily make a loss if the short-term interest rate is higher than the yield to maturity on the bond? Anybody answering yes would fail the test immediately.)

3.2. No risk-sharing = No profit-sharing

In buying longer-term securities, the ECB is undertaking a maturity transformation not unlike commercial banks: it borrows at the short-term to invest in the long term.
Long-term interest rates are usually higher than short-term rates because longer-term securities are more risky as their market price varies inversely with the interest rate. It is important to distinguish between market risk and default risk: the latter should be practically equal to zero for highly rated securities like most government bonds, but the former, the market-price risk, is unavoidable. Consider the following concrete example: if the 10-year interest rate increases by one percentage point, the price of a 10-year bond will normally fall by about 10%.

This difference between the average of long-term and short-term rates (of securities with similar default risk) is called the 'term premium'. It can only be indirectly estimated, but under normal circumstances it is thought to be positive and substantial. If this were the case today, one could expect that the Eurosystem should make a profit on the EAPP. However, some estimates suggest that under today's market conditions the term premium is negative for some countries.

The difference between what the Banca d'Italia would have earned under full risk-sharing and the current arrangement is substantial. At present the rate of return on 10-year Italian government bonds is about 0.8 percentage point higher than the average euro-area rate (on 10-year government bonds). The Banca d'Italia will buy about €150 billion of Italian government debt under its own account. If one assumes that it will buy only 10-year bonds, it will earn on this investment €1.2 billion per year more than it would have under full risk-sharing. Based on a rough calculation, over 10 years, this would amount of more than €10 billion, or about 0.75% of Italy's GDP (provided, of course, that Italy has not defaulted by then). The converse is naturally also true: those national central banks whose national government bond rates are lower than the euro-area average will have lower seigniorage revenues than they would under full risk-sharing. This is the price they must paying for not wanting to share the risk of default.

The table below provides some details of the calculations for two assumptions about the average remaining maturity of the purchases under the EAPP: 7.5 years and 10 years. For Germany the weighted average of the remaining maturity of the bonds eligible under the EAPP is very close to 10 years. (For details, see also Table A.2 in the Annex.)

Table 3. ECB QE-EGBs purchase impact of no-risk sharing (selected countries)

Country	Risk spread	Difference yield national – EA average	Grain/loss from no risk sharing 7.5 years	Grain/loss from no risk sharing 10 years	As % of GDP (10 years)
AT	0	-0.00522	-0.9	-1.2	-0.4
BE	0.003	-0.00222	-0.5	-0.7	-0.2
DE	0	-0.00522	-8.5	-11.4	-0.4
ES	0.013	0.007776	6.3	8.3	0.8
FI	0	-0.00522	-0.6	-0.8	-0.4
FR	0.003	-0.00222	-2.9	-3.8	-0.2
IE	0.007	0.001776	0.2	0.3	0.1
IT	0.013	0.007776	8.7	11.6	0.7
NL	0	-0.00522	-1.9	-2.5	-0.4
PT	0.02	0.014776	2.3	3.1	1.8

Source: See Table A1, in Annex.
Note: The calculations shown in the table are based on prices/rates of a certain day, so results can be subject to certain daily variation. Yet, this does not imply that the message is not valid anymore.

3.3. Maturity transformation with low long-term rates: Betting the bank on deflation

In order to understand the balance sheet effects, a comparison with foreign exchange market interventions is instructive. A central bank sells foreign exchange if it thinks that the domestic currency is undervalued in the market. If the currency then strengthens in the long run, the central bank will have made profit.

In the case of EAPP (as with any QE operation), the link between the aim of the operation (to avoid deflation) and the profit-and-loss account of the central bank is less direct. But an indirect link exists: if inflation increases, it is likely that the central bank will have to increase its interest rates (i.e. the rate at which it lends money to commercial banks). This implies that the central bank is more likely to make a loss on QE if it is successful: Assume

that in a couple of years inflation goes back to about 2% (the rate the ECB charged on its deposits on average until 2008) and financial market conditions normalise. In this case, the ECB will likely have to increase its deposit rate to the average level of the first decade of monetary union, which was about 2%.

To be more concrete, one can imagine that monetary conditions normalise in 2018 and revert to the average of 1999-2008. Assuming the deposit rate has not moved until then, one can calculate the average deposit rate as the simple average of three years at minus 0.2% and seven years at (plus) 2%, or 1.34% (-0.2*3+2*7=-0.6+14=13.4). This implies that under these circumstances the Bundesbank would make a loss by buying 10-year Bunds at half the break-even rate. By contrast, the Banca d'Italia would make a modest profit from buying BTPs at the present yield of around 1.8%.

The Bundesbank can break even on its purchases of Bunds at a yield of 0.6% only if the deposit rate remains at its present level of minus 0.2% for over six years (and then remains below 2% on average for the remaining four years of the lifetime of the bond). In financial market terms, one must conclude that the ECB (or rather its constituent central banks) are offering financial markets a bet that monetary conditions will remain lax for a very long time. The private-sector investors selling the bonds are implicitly betting that monetary conditions will not remain lax for as long as central banks seem to be thinking.

3.3. Interest-rate risk and the lower bound

These considerations have been based only on expected values. However, one of the arguments for QE has been that the future is uncertain and that there is a risk of deflation setting in.

The fundamental problem is that that the financial risks are asymmetric: if inflation is much lower than expected, the ECB will not be able to significantly lower its deposit rate; but it will have to increase its deposit rate if inflation tends to exceed its target of 2%.

An example can illustrate the implications of this asymmetry. Medium-term inflation expectations are now at around only 1%. This could be taken to mean a 50% probability that inflation will increase to 3% and the same probability that deflation will set in with prices falling at 1%. Under the deflation scenario, the deposit rate would presumably remain at its present value, but under the scenario of inflation, one would expect the deposit rate to increase to 3% (a zero real rate as during the first ten years of EMU).

Assuming this uncertainty concerns the years after 2018, one can calculate the fair value of a ten-year bond as the average of the expected value of the future deposit rates under these two scenarios: 0.5*(-0.2)+0.5*(7*3-3*0.2)/10 =1.92%. This is higher than the break-even rate found above because the deposit rate cannot go as much negative as the inflation (or rather deflation) rate.

Different assumptions about the distribution of the inflation risk will of course lead to different numerical results. But the general principle holds: given the lower bound on the deposit rate, uncertainty about future inflation increases the fair value of long-dated bonds. Today's bond prices imply not only an expectation that monetary conditions will remain extremely accommodative for a very long period of time, but also that there is very little uncertainty about this.

4. THE PRICE OF (DEFAULT) RISK

Those who put emphasis on the need for 'non-risk sharing' for the purchases of government bonds had in mind only the default risk. At present, the difference between 10-year Bund rates and Italian BTPs of the same maturity is about 120 basis points. What would be the probability of default (and the loss if there is a default) to justify this risk premium?

Starting with the assumption about the *loss-given default* (the share of an asset which is lost when the borrower defaults) makes the calculations easier. Contrary to a widespread assumption, a default does not mean a total loss.

This would be especially true for a case like Italy where the foreign debt of the country is rather low and most debt is held domestically, which should make it easier for the government to service any debt to foreign entities (such as the Bundesbank). In the case of Italy, a loss rate (in case of default) might thus be limited to about one-half or one-quarter of the total.

Assuming that German bunds are risk free well priced, a spread of 120 basis point combined with a loss-give default of 50%, implies that the implicit probability of default for Italy is 24%. If the loss-given default were lower, say 1/4, the implicit probability of default would be even higher, 48%. These threshold probabilities seem unrealistic, at least given the current situation.

This suggests that the default risk has been overstated.

5. CONCLUSIONS

This contribution has focused on the risks to the balance sheets from the Extended Asset Purchase Programme of the ECB.

A first key point is that given the low share of asset purchases subject to risk-sharing, the risks largely fall on the national central banks, not the ECB, nor the Eurosystem as an entity.

A second point is that there are real risks, but they do not arise from default risk. The latter appears to have been overestimated. The key balance sheet risk is that the purchases are financed by deposits whose rate is at present so low (minus 0.2%) that it can only go up in future. If this were to happen, in particular if monetary conditions were to normalise and the deposit rate would return to its pre-crisis average of (plus) 2%, some national central banks might make large losses on their EAPP purchases. These losses will probably only appear far off in the future, when the deposit rate has returned to more normal levels, since the purchases would be held at 'amortised cost'. If they were valued at market prices, the losses would become apparent as soon as long-term interest rates increase.

The Bundesbank in particular has paid a high price for avoiding the default risk on the bonds of other countries. It will buy only German government debt whose yield is half a percentage point lower than that of the euro area average. Conversely, the central banks of the high yield countries, like Italy, Spain and Portugal will be much better off because the bonds they buy have a yield which is about 0.8-1% higher than the euro area average. Provided their government do not default, they will thus earn about 10% more over the next ten years, than they would have under full risk sharing. This difference amounts to potential gains of 12 billion euro for Italy alone and a gain of about 3 billion or 1.8% of GDP in the case of Portugal.

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ANNEX

Table A.1 Nominal vs Market value of bonds (EUR bn) – 28 May 2015

	DE	IT	NL	AT	BE	FR	ES	IE	PT	FI	Total
						Nominal outstanding					
Nominal bond total	730	999	253	158	258	946	522	90	90	66	4,112
Nominal bond yld.>-0.20	711	999	253	158	258	946	522	90	90	66	4,093
Linkers	56	173				154	18				401
QE eligible	767	1,172	253	158	258	1,100	540	90	90	66	4,494
						Market value					
Nominal bond total	898	1,212	307	198	330	1,172	639	109	107	76	5,048
Nominal bond yld.>-0.20	876	1,212	307	198	330	1,172	639	109	107	76	5,026
Linkers	61	192				187	19				459
QE eligible	937	1,404	307	198	330	1,359	658	109	107	76	5,485
Average price	122%	120%	121%	125%	128%	124%	122%	121%	119%	115%	122%
						Expanded Asset Purchase Programme					
Capital key	26%	17%	6%	3%	4%	20%	13%	2%	2%	2%	94%
Mkt value cap key	217	149	49	24	30	172	107	14	21	15	798
Nominal cap key	178	125	40	19	24	139	88	12	18	13	656
25% of the QE eligible bonds (nominal value)	192	293	63	40	65	275	135	23	23	17	1,126
Nominal /Mkt value QE eligible	19.0%	8.9%	13.0%	9.6%	7.1%	10.3%	13.4%	10.7%	16.6%	17.5%	12.0%
Buffer (25% of the QE eligible - Nominal capital key)	14	168	23	21	41	136	47	11	5	3	470
Gross supply 2015	145	250	53	17	33	185	125	14	17	10	849
Net supply 2015	0	33	16	4	11	89	41	12	7	5	218
Nominal bonds to be acquired/(Nominal QE eligible + net supply)	23.2%	10.3%	14.9%	11.7%	8.8%	11.7%	15.2%	11.4%	18.4%	18.7%	13.9%

Source: Kindly provided by Eurizon Capital ***Note:*** Eligible bonds includes nominal bonds with YTM>-0.2 + Agencies + Linkers. Excluding purchases of bonds of Institutions, covered bonds and BS, it implies a purchase of 45 billion for 19 months, i.e. a total of 885 billion euro

Table A.2 Rates of listed German Federal securities as of 29/05/15

ISIN NR	Title	Maturity	Remaining maturity		Vol. (€ bn)	Rate	Interest (%)	Net-Interest	Rate plus accrued interest	QE eligible *	Market value
			Y	M							
DE000 113742 0	0,000 BSA 13	12/06/2015	0	0	15.0	100.003	-0.10	-0.07	100.003	0	15.0
DE000 113528 3	3,250 Bund 05	04/07/2015	0	1	21.0	100.303	-0.10	-0.07	103.259	0	21.7
DE000 113743 8	0,250 BSA 13 II	11/09/2015	0	3	15.0	100.138	-0.24	-0.18	100.318	0	15.0
DE000 114158 8	1,750 BO S 158	09/10/2015	0	4	16.0	100.700	-0.21	-0.16	101.827	0	16.3
DE000 113744 6	0,000 BSA 13 II	11/12/2015	0	6	14.0	100.125	-0.24	-0.17	100.125	0	14.0
DE000 113529 1	3,500 Bund 05	04/01/2016	0	7	23.0	102.245	-0.27	-0.20	103.664	0	23.8
DE000 114159 6	2,000 BO S 159	26/02/2016	0	8	16.0	101.650	-0.23	-0.17	102.171	0	16.3
DE000 113745 3	0,250 BSA 14	11/03/2016	0	9	13.0	100.385	-0.25	-0.18	100.441	0	13.1
DE000 114160 4	2,750 BO S 160	08/04/2016	0	10	18.0	102.553	-0.24	-0.18	102.959	0	18.5
DE000 103050 0	1,500 Bund 06 index.	15/04/2016	0	10	15.0	101.150	0.18	-	117.734	0	17.7
DE000 113746 1	0,250 BSA 14 II	10/06/2016	1	0	13.0	100.508	-0.24	-0.18	100.769	0	13.1
DE000 113446 8	6,000 Bund 86 II	20/06/2016	1	0	3.8	106.550	-0.21	-0.16	112.238	0	4.3
DE000 113530 9	4,000 Bund 06	04/07/2016	1	1	23.0	104.620	-0.23	-0.17	108.258	0	24.9
DE000 113747 9	0,000 BSA 14	16/09/2016	1	3	13.0	100.313	-0.24	-0.18	100.313	0	13.0
DE000 113449 2	5,625 Bund 86	20/09/2016	1	3	0.8	107.630	-0.21	-0.15	111.544	0	0.9
DE000 114161 2	1,250 BO S 161	14/10/2016	1	4	16.0	102.043	-0.24	-0.17	102.831	0	16.5
DE000 113748 7	0,000 BSA 14 II	16/12/2016	1	6	14.0	100.370	-0.24	-0.18	100.370	0	14.1
DE000 113531 7	3,750 Bund 06	04/01/2017	1	7	20.0	106.375	-0.24	-0.17	107.896	0	21.6
DE000 114162 0	0,750 BO S 162	24/02/2017	1	8	16.0	101.718	-0.24	-0.17	101.917	0	16.3
DE000 113749 5	0,000 BSA 15	10/03/2017	1	9	14.0	100.415	-0.23	-0.17	100.415	0	14.1
DE000 114163 8	0,500 BO S 163	07/04/2017	1	10	18.0	101.365	-0.24	-0.17	101.440	0	18.3
DE000 110460 2	0,000 BSA 15 II	16/06/2017	2	0	5.0	100.475	-0.23	-0.17	100.475	0	5.0
DE000 113533 3	4,250 Bund 07 II	04/07/2017	2	1	19.0	109.375	-0.22	-0.16	113.241	0	21.5
DE000 114164 6	0,500 BO S 164	13/10/2017	2	4	16.0	101.720	-0.22	-0.16	102.036	0	16.3
DE000 113534 1	4,000 Bund 07	04/01/2018	2	7	20.0	110.945	-0.20	-0.15	112.567	1	22.5
DE000 114165 3	0,500 BO S 165	23/02/2018	2	8	17.0	101.920	-0.20	-0.15	102.054	1	17.3
DE000 114166 1	0,250 BO S 166	13/04/2018	2	10	17.0	101.275	-0.19	-0.14	101.308	1	17.2
DE000 103053 4	0,750 BO 11 index.	15/04/2018	2	10	15.0	104.060	-0.65	-	110.647	0	16.6
DE000 113535 8	4,250 Bund 08	04/07/2018	3	1	21.0	113.705	-0.17	-0.12	117.571	1	24.7
DE000 114167 9	1,000 BO S 167	12/10/2018	3	4	17.0	103.865	-0.15	-0.11	104.501	1	17.8
DE000 113537 4	3,750 Bund 08	04/01/2019	3	7	24.0	113.945	-0.12	-0.09	115.466	1	27.7
DE000 114168 7	1,000 BO S 168	22/02/2019	3	8	16.0	104.135	-0.11	-0.08	104.406	1	16.7
DE000 114169 5	0,500 BO S 169	12/04/2019	3	10	16.0	102.315	-0.10	-0.07	102.383	1	16.4
DE000 113538 2	3,500 Bund 09	04/07/2019	4	1	24.0	114.655	-0.08	-0.06	117.839	1	28.3
DE000 114170 3	0,250 BO S 170	11/10/2019	4	4	16.0	101.335	-0.06	-0.04	101.519	1	16.2
DE000 113539 0	3,250 Bund 09	04/01/2020	4	7	22.0	115.065	-0.03	-0.02	116.383	1	25.6
DE000 103052 6	1,750 Bund 09 index.	15/04/2020	4	10	16.0	112.400	-0.74	-	123.332	0	19.7
DE000 114171 1	0,000 BO S 171	17/04/2020	4	10	17.0	99.970	0.01	0.00	99.970	1	17.0

ISIN NR	Title	Maturity	Remaining maturity		Vol. (€ bn)	Rate	Interest (%)	Net-Interest	Rate plus accrued interest	QE eligible *	Market value
			Y	M							
DE000 113540 8	3,000 Bund 10	04/07/2020	5	1	22.0	115.165	0.02	0.01	117.894	1	25.9
DE000 113541 6	2,250 Bund 10	04/09/2020	5	3	16.0	111.695	0.02	0.02	113.359	1	18.1
DE000 113542 4	2,500 Bund 10	04/01/2021	5	7	19.0	113.650	0.06	0.04	114.664	1	21.8
DE000 113544 0	3,250 Bund 11	04/07/2021	6	1	19.0	119.055	0.11	0.08	122.011	1	23.2
DE000 113545 7	2,250 Bund 11	04/09/2021	6	3	16.0	113.215	0.13	0.09	114.879	1	18.4
DE000 113546 5	2,000 Bund 11	04/01/2022	6	7	20.0	112.085	0.16	0.11	112.896	1	22.6
DE000 113547 3	1,750 Bund 12	04/07/2022	7	1	24.0	110.810	0.21	0.15	112.402	1	27.0
DE000 113549 9	1,500 Bund 12	04/09/2022	7	3	18.0	109.100	0.23	0.17	110.210	1	19.8
DE000 110230 9	1,500 Bund 13	15/02/2023	7	8	18.0	109.270	0.28	0.21	109.706	1	19.7
DE000 103054 2	0,100 Bund 12 index.	15/04/2023	7	10	16.0	107.270	-0.79	-	111.039	0	17.8
DE000 110231 7	1,500 Bund 13 II	15/05/2023	7	11	18.0	109.320	0.31	0.23	109.390	1	19.7
DE000 110232 5	2,000 Bund 13	15/08/2023	8	2	18.0	113.440	0.34	0.24	115.029	1	20.7
DE000 113492 2	6,250 Bund 94	04/01/2024	8	7	10.3	149.970	0.34	0.24	152.504	1	15.7
DE000 110233 3	1,750 Bund 14	15/02/2024	8	8	18.0	111.570	0.40	0.29	112.078	1	20.2
DE000 110235 8	1,500 Bund 14	15/05/2024	8	11	18.0	109.320	0.44	0.32	109.390	1	19.7
DE000 110236 6	1,000 Bund 14	15/08/2024	9	2	18.0	104.750	0.47	0.35	105.545	1	19.0
DE000 110237 4	0,500 Bund 15	15/02/2025	9	8	20.0	99.910	0.51	0.38	100.096	1	20.0
DE000 103056 7	0,100 Bund 15 index.	15/04/2026	10	10	4.0	108.900	-0.69	-	109.725	0	4.4
DE000 113504 4	6,500 Bund 97	04/07/2027	12	1	11.3	167.750	0.65	0.45	173.662	1	19.6
DE000 113506 9	5,625 Bund 98	04/01/2028	12	7	14.5	159.220	0.70	0.49	161.501	1	23.4
DE000 113508 5	4,750 Bund 98 II	04/07/2028	13	1	11.3	149.980	0.73	0.52	154.301	1	17.4
DE000 113514 3	6,250 Bund 00	04/01/2030	14	7	9.3	175.120	0.78	0.54	177.654	1	16.5
DE000 103055 9	0,500 Bund 14 index.	15/04/2030	14	10	5.0	115.440	-0.50	-	116.664	0	5.8
DE000 113517 6	5,500 Bund 00	04/01/2031	15	7	17.0	167.320	0.87	0.60	169.550	1	28.8
DE000 113522 6	4,750 Bund 03	04/07/2034	19	1	20.0	165.650	0.97	0.67	169.971	1	34.0
DE000 113527 5	4,000 Bund 05	04/01/2037	21	7	23.0	157.550	1.02	0.71	159.172	1	36.6
DE000 113532 5	4,250 Bund 07	04/07/2039	24	1	14.0	167.890	1.05	0.73	171.756	1	24.0
DE000 113536 6	4,750 Bund 08	04/07/2040	25	1	16.0	180.890	1.06	0.73	185.211	1	29.6
DE000 113543 2	3,250 Bund 10	04/07/2042	27	1	15.0	150.640	1.08	0.76	153.596	1	23.0
DE000 113548 1	2,500 Bund 12	04/07/2044	29	1	16.0	134.850	1.09	0.78	137.124	1	21.9
DE000 110234 1	2,500 Bund 14	15/08/2046	31	2	11.0	135.950	1.13	0.80	139.087	1	15.3
TOTAL			**6**	**8**	**1,111**						**1305**
*Eligible for QE**			*9*	*7*	*698*						*869*
					63%						*67%*

Note: *Maturity June 2017 or after and yield equal or above -0.2%
Source: https://www.bundesbank.de/Navigation/DE/Service/Bundeswertpapiere/Kurse_und_Renditen/kurse_und_renditen.htm

NOTES

DIRECTORATE GENERAL FOR INTERNAL POLICIES

POLICY DEPARTMENT A: ECONOMIC AND SCIENTIFIC POLICY

Sovereign bond purchases and risk-sharing arrangements: Implications for monetary policy

Monika BLASZKIEWICZ-SCHWARTZMAN

IN-DEPTH ANALYSIS

Abstract

Insufficient liquidity in the bond markets could reduce the impact of the euro area Quantitative Easing (QE) programme and lead to market volatility. The principle of partial risk sharing in the QE programme design could also undermine the unity of the euro area. In the first months of the roll-out of QE these risks have proved manageable.

CONTENTS

EXECUTIVE SUMMARY

- The euro area Quantitative Easing (QE) programme is known as the Expanded Asset Purchase Programme (EAPP), the most important aspect of which is the Public Sector Purchase Programme (PSPP), which was announced in January 2015 and launched in March.
- The EAPP is expected to entail approximately €60 billion / month over 19 months of which 80% will entail the purchases of the bonds of euro area central governments, agencies and European institutions, under the PSPP.
- Two key issues related to the PSPP have attracted most attention. The first is the possibility that there may be insufficient liquidity in bond markets over the life of the programme, which may reduce the impact of the programme and lead to a distortion of markets.
- Estimations suggested that insufficient bonds may be available over the life of the programme. There is an imbalance between the supply and demand of newly issued bonds of €102 billion. Countries most likely to struggle with a shortage of bonds are Germany, France, Austria, Netherlands, Belgium, Portugal, Finland and Slovenia. However, the programme has run smoothly in its first 3 months, while market volatility has been managed.
- The second issue relates to the contention that the ESPP represents a withdrawal from full risk sharing. It has been argued that this may increase the probability of default by a national central bank, even as the whole Eurosystem remains solvent. Defaulting members may leave the euro area. Non-defaulting members may be unwilling to bear the costs of such defaults. Some have suggested that this could threaten the unity of the euro area.
- On an empirical level, it has been suggested that, at present, all NCBs should be able to bare losses stemming from sovereign debt purchases under the current round of QE. However, there is a risk of default under a low growth scenario.

1. INTRODUCTION

The ECB Governing Council introduced its asset-purchasing programme, also known as quantitative easing (QE), in September 2014. This began with two private sector asset purchase programmes: the Covered Bond Purchase Programme (CBPP) was adopted in conjunction with the Asset-Backed Securities Purchase Programme (ABSPP). Effectively, the ECB began buying covered bonds (a type of debt secured by a pool of loans, such as mortgages) in October 2014 and added asset-backed securities in November 2014. However, it was not until January 2015 that the European Central Bank Governing Council decided to extend the programme and launch sovereign QE, with the announcement of the Public Sector Purchase Programme (PSPP). The new programme, effective from March 9 2015, encompasses euro-denominated investment-grade securities issued by euro area governments and agencies and European institutions. The CBPP, ABSPP and PSPP are together known as the Expanded Asset Purchase Programme (EAPP)[1].

Since then there has been significant disagreement over the necessity of the euro zone sovereign QE programme, its timing, legality, prospects for success and failure, as well as over how it should be designed. Different viewpoints are based on both economic and political considerations. The ECB itself did not initiate QE without some hesitation, despite pressure from markets, governments, and international financial institutions[2]. Rather, QE was launched gradually and, as stated by Benoît Coeuré, member of the Executive Board of the ECB, only when it was felt that the economy was moving into a zone in which inflation rates were expected to persistently deviate from the ECB's definition of price stability, and in order to restore function to dysfunctional markets after the financial crisis (April 2015)[3].

With the PSPP now in place, the debate continues apace as the programme gains momentum and evolves. From an economic perspective, the debate is centred around two main themes: first, the potential scarcity of sovereign bonds to be purchased under the programme – the dominant theme in the current debate on sovereign QE; and second, the absence of full profit and loss sharing by national central banks (NCBs). It has been claimed that both issues have consequences for the success of the European QE programme.

In respect of the first of these themes, it has been argued that liquidity constraints could undermine the ability of the ECB to bring inflation closer to its target of 2%, and could also disrupt the bond market. The purchase of bonds under QE would drive bond prices up and yields down. Of course, low yields is precisely what QE is intended to achieve. But if there is insufficient liquidity, the magnitude of the effect would be insufficient to achieve the goals of QE. Additionally, under conditions of scarcity QE could disrupt bond markets, giving rise to mispricing, undermining pass through to lending rates, and leading to a reduction in the availability of collateral necessary for repo transactions.

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1 Quantitative easing policies can be described as policies that increase the monetary base. They include such programmes as asset purchases and lending programs. Under such definition, the ECB has engaged in a form of quantitative easing already in the aftermath of the global financial crisis of 2007 and 2009. At that time, the ECB focused on direct lending to NCBs to increase their reserves. Although the Securities Markets Programme introduced in 2010 allowed the ECB to purchase sovereign debt in secondary markets (during 2010 and 2012, the Bank bought sovereign debt from countries like Greece, Spain and Italy), it cannot be considered as QE as the purchases were sterilized and did not increase the monetary base of the euro area (Fawely and Neely, 2013).

2 See for example: http://blog-imfdirect.imf.org/2014/07/14/euro-area-qa-on-qe/ or http://www.theguardian.com/business/2015/jan/13/world-bank-quantitative-easing-eurozone-stagnation.

3 It should be noted that although the ECB itself started seeing in mid-2014/early-2015 the risk of possible deflation (i.e. a situation in which there is a downward spiral driven by falling wages and prices in which aggregate demand decreases with negative results for employment and growth), others, such as Bundesbank President Jens Weidmann, believed there was no such risk.

In respect of the second of these themes, it is argued that limited risk-sharing (i.e., the absence of full profit and loss sharing between euro zone countries) could potentially lead to a situation in which some NCBs refuse to participate in the programme[4], or in which individual NCBs become insolvent, putting at stake the unity of the euro area (Willem Buiter, March 2015)[5].

ECB President, Mario Draghi, has addressed these issues directly, stating that although some discretion will be allowed, the ECB remains in full risk-sharing mode. He has emphasized that although limited risk-sharing arrangements adopted for the needs of EAPP may have some effects, these effects are not highly relevant to the overall effectiveness of the programme (Draghi, 2015). Mr. Draghi has also confirmed the expectation of many observers that in the event of a country default and exit from the euro zone, the remaining members would necessarily share the related cost through the TARGET 2 system (i.e. the euros created for the purposes of debt monetisation will stay in the system and will become liabilities to the Eurosystem).

In this brief we will look more closely at the issues behind these themes, and assess the likeliness that the associated concerns will materialise, with implications for common monetary policy and the overall stability of the euro system. In Section 2 we review the structure of the QE programme. In Section 3, we analyse liquidity concerns arising from the size of the programme, low government net issuance and negative yields. In Section 4 risk-sharing concerns are addressed. Finally, Section 5 concludes with comments on the implications of the programme for Europe's common monetary policy.

[4] As raised by Ugo Panizza, professor of international economics at the Graduate Institute in Geneva: 'why should I buy Italian bonds if the ECB itself is not taking a risk?' (The Economist, January 2015)

[5] In his speech titled "Public sector purchases and monetary dominance in a monetary union without fiscal union", Peter Preat, member of the Executive Board of the ECB, argued that the limits imposed on full risk-sharing roughly correspond to the allocation of fiscal responsibilities in the euro area, thereby preserving the incentives for fiscal discipline of the member states' governments (April, 2015).

2. THE STRUCTURE OF EAPP

In the beginning of March 2015, Eurosystem central banks commenced large-scale purchases of the bonds of Euro Area (EA) central governments, agencies and European institutions, putting into effect the PSPP that had been announced in January. The purchases under the PSPP added to purchases of the two other programmes already in place: the Third Covered Bond Purchase Programme (CBPP3), and the Asset-Backed Securities Purchase Programme (ABSPP). Together, the CBPP3, the ABSPP and the PSPP comprise the Expanded Asset Purchase Programme (EAPP).

With the launch of the PSPP, the ECB announced that combined monthly purchases under the EAPP will amount to €60 billion (or €1.1 trillion annually). Of this €60 billion, €15 billion will be purchased by the ECB and €45 billion by the National Central Banks (NCBs) (see Table 2).

The duration of the programme will be at least 19 months, with Mr. Draghi stating that the programme will last until at least September 2016 and, in any case, until the Governing Council sees a sustained adjustment in the path of inflation, consistent with its aim of achieving inflation rates below, but close to, 2% over the medium term (Draghi, January 2015)[6]. Notwithstanding some improved sentiment on European recovery and inflation, Mr. Draghi restated this timeline in April 2015, dispelling any expectation of early tapering (Draghi, April 2015).

The PSPP has attracted significantly more attention than the CBPP3 and ABSPP, most immediately because of its size—most estimates of the PSPP put the size of the PSPP at roughly 80% of the EAPP (see below for further details). The PSPP also stands apart from the CBPP3 and ABSPP in that the latter comprise the purchase of private assets – covered bonds and asset backed securities. The PSPP, however, entails the purchase of the debt of euro area governments and agencies and European institutions, which, together with the scale of the PSPP and the lack of full risk-sharing, has far greater implications for the euro systems.

Under the PSPP, the ECB and NCBs purchase on the secondary market nominal and inflation-linked central government bonds as well as bonds issued by recognised agencies, international organisations, and multilateral development banks located in the Eurozone. Securities purchased by the NCBs under the PSPP can only be issued by their respective governments, implying limited risk-sharing (ECB, 2015). The purchases of NCBs and the ECB are made according to the ECB's capital key (see Table 1). To be purchased on the secondary market, the bonds must have a remaining maturity of 2 to 30 years, and must be denominated in euros and be eligible as collateral under ECB policy operations[7]. No maximum or minimum maturity has been defined for CBPP3 or ABSPP.

It was also decided that bonds yielding less than the ECB deposit rate (currently minus 2 basis points) are not eligible for purchase (ECB, 2015)[8]. When complete, sovereign QE should leave the ECB with about 15% of the outstanding sovereign debt in the EA (see Table 1, Column 7). For comparison, the Fed, BoE, or BoJ hold 20% or more of their sovereign's debts.

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6 Draghi, M., Introductory Statement to the Press Conference (with Q&A), January 2015, https://www.ecb.europa.eu/press/pressconf/2015/html/index.en.html

7 To be able to serve as collateral, the bond must have a sufficiently high rating or be under an EU assistance programme (to make allowance for bail-out countries).

8 Implementation Aspects of the Public Sector Purchase Programme, ECB, March 2015.

Table 1. EA distribution of outstanding debt according to capital key

Country	Capital key	Gov bonds 2-30Y	Agencies 2-30Y	PSPP potential	Gov bonds+agencies plan	Plan (% of outstanding)
Germany	25.6	825.5	168.8	254.5	205.5	21
France	20.1	1121	128.6	251.2	161.3	13
Italy	17.5	1308	9.7	230.6	140.5	11
Spain	12.6	571.1	16.6	74.1	101.1	17
Netherlands	5.7	270	40.2	17.7	45.7	15
Belgium	3.5	274.4	0	9.6	28.1	10
Austria	2.8	154.5	0	4.3	22.5	15
Portugal	2.5	90.2	0	2.3	20.1	22
Finland	1.8	71	1.3	1.3	14.4	20
Ireland	1.6	102.8	0	1.6	12.8	12
Slovakia	1.1	22.8	0	0.3	8.8	39
Slovenia	0.5	12.6	0.1	0.1	4.0	32
Others	4.7	n.a	n.a	n.a	37.7	n.a
Eurosystem	100	4823.9	365.3	847.5	802.6	**15**

Source: Bloomberg, own calculations.

Note: Columns 3 and 4 present the outstanding debt with a maturity between 2 and 30 years of the EA governments and agencies included in the programme. Column 5 shows PSPP potential in this class of assets. Finally, columns 7 and 8 present the envisaged scope of the programme and programme buying as a percentage of total outstanding debt.

In addition to these eligibility criteria (the high bond rating and minimum yield), the Governing Council also imposed a 25% limit on holdings of individual issues and an aggregate 33% limit on an issuer (holdings of any national government's aggregated bond debt). According to the ECB, an issue share limit of 25% needed to be applied in order to avoid potential direct financing of a member state (such as debt restructuring). Similarly, the issuer limit of 33% was imposed in order to preserve market functioning and price formation as well as to mitigate the risk of the ECB becoming a dominant creditor of euro area governments. To this end, the 33% limit is applied to all eligible assets in the 2 to 30-year range of residual maturity (ECB, April 2015)[9]. The limits are based on the nominal value of bonds (as opposed to market value). No minimum issuance volume has been defined for CBPP3 or ABSPP.

2.1. Decomposition of Purchases under the EAPP

Table 2 below presents an estimation of how the EAPP has been composed. The design of the programme is evolving, with the ECB seeking to maintain some flexibility, and so there is some uncertainty on the final shape of the EAPP.

[9] Q&A on the Public Sector Purchase Programme (PSPP), ECB, March 2015.

Table 2. Allocation of assets under the EAPP and risk-sharing

<table>
<tr><th colspan="4">Total monthly purchases (billion)</th></tr>
<tr><td colspan="4">60 (1,140)</td></tr>
<tr><td>ABSPP+CBPP3 (20%)
Subject to loss-sharing</td><td colspan="3">PSPP (80%)</td></tr>
<tr><td rowspan="5">12 (228)
20%

ECB</td><td colspan="3">48 (912)
80%</td></tr>
<tr><td colspan="2">GOV BONDS+AGENCIES (88%)</td><td>SUPRAS (12%)
Subject to loss-sharing</td></tr>
<tr><td colspan="2">42 (802.6)</td><td rowspan="3">6 (109.4)
NCBs</td></tr>
<tr><td>8%
Subject to loss-sharing</td><td>92%
Lack of loss-sharing</td></tr>
<tr><td>3 (64.2)
ECB</td><td>39 (738.4)
NCBs</td></tr>
</table>

Source: Based on the ECB's data and EAPP announcement (January 2015) [10].

Note: The total value of purchases until September-2016 is provided in brackets.

The ECB has stated that the CBPP3 and ABSPP will remain at its current scale – approximately €12 billion worth of covered bonds and asset-backed securities per month, which implies that the PSPP should reach approximately €48 billion per month or €802.6 billion up to September 2016 (see Table 2). The ECB has further clarified that the purchase of securities of European institutions (international or supranational institutions, (SUPRAS)) will correspond to 12% of the total value of the PSPP (or around €6 billion per month), leaving the implied target for government and agency bonds at around €42 billion per month[11]. Out of the €42 billion eligible for purchase, the ECB qualifies for 8%, or €3 billion worth of additional asset purchases (i.e. purchases under the PSPP). This leaves €39 billion for the NCBs (or €738.4 up to September 2016), which is the amount in euros which is not subject to risk-sharing.

The split between the ECB and the NCBs purchases from national agencies has not been clarified. Some estimations point into an equal share (see Section 3 for more on this issue and on the issue of availability of liquid funds from agencies and SUPRAS). What the ECB has indicated is that NCBs will enjoy freedom in choosing the amount of bonds to purchase from national governments and from agencies (as long as those agencies are located in their jurisdiction). Therefore the split between sovereign bonds and bonds purchased from agencies will vary across NCBs.

[10] https://www.ecb.europa.eu/press/pr/date/2015/html/pr150122_1.en.html

[11] The list of eligible agencies and SUPRAS is available on the ECB website: https://www.ecb.europa.eu/mopo/implement/omt/html/pspp.en.html

3. BONDS ELIGIBLITY AND LIQUIDITY CONSTRAINTS

The first major issue of the debate around the EAPP relates to liquidity constraints. The size and the design of the EAPP immediately raised the question of the potential scarcity of bonds available for purchase. The scarcity of bonds to purchase could have two impacts – it could limit the effectiveness of the programme, reducing impacts on inflation (and support to growth). It could also lead to significant distortions in bond markets, with supply insufficient for demand.

The ECB has played down the issues relating to liquidity constraints, stating that "the programme is flexible enough in any event to be adjusted if circumstances are to change" (Draghi, April 2015). However, liquidity constraints under the PSPP could be an issue for a number of reasons: first, the fact that only bonds yielding no less than -0.2% are eligible for purchases may limit the amount of bonds eligible for purchases (at the onset of the programme the interest rates of many major countries' bonds were already low, and so increased demand could push more bonds into 'non-buying' territory); second, the size of the programme is curtailed by the 25% limit on holdings of individual issues and the aggregate 33% limit on an issuer; and third, the fact that the Eurozone governments are currently on a path of fiscal consolidation – i.e., they are reducing fiscal deficits, which negatively impacts governments' net issuances (and the amount of newly issued bonds available for purchase).

Estimation of the total amount of newly issued government bonds over the duration of the programme, suggest that there may be an imbalance between the supply and demand of newly issued bonds of €102 billion. As Table 3 shows, (see column 'Adjusted Net Issuance' in Table 3), countries most likely to struggle with a shortage of bonds are Germany, France, Austria, Netherlands, Belgium, Portugal, Finland and Slovenia.

Table 3. Bond availability under the PSPP limits

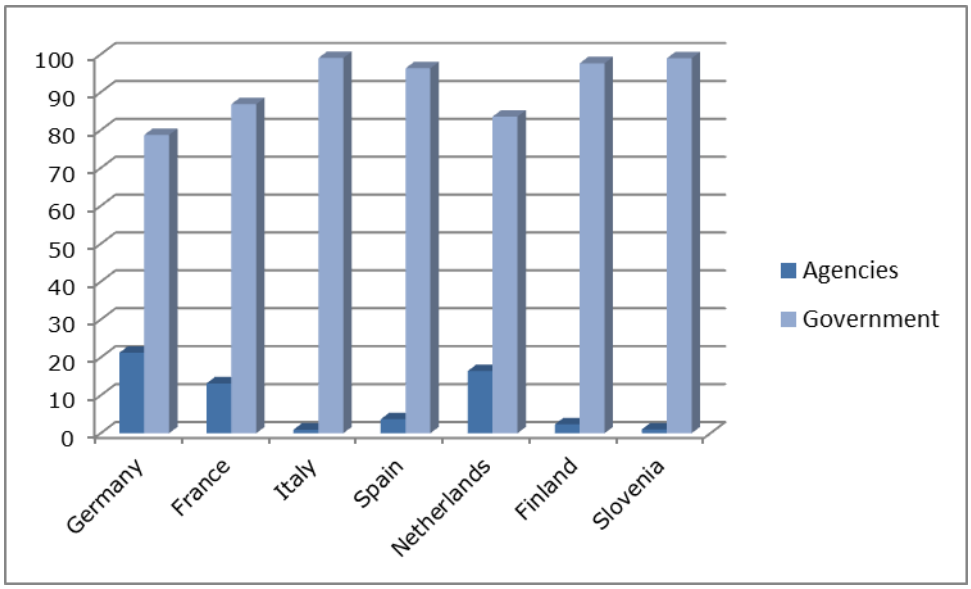
	Gross issuance 2015e	Net issuance 2015e	Inferred buying*	Net flow	Adj net flow	Adj net issuance**
Germany	251.8	32.3	162	-9	-213.3	-172
France	296.1	120.4	140	54.8	-124.6	-59
Italy	424.6	203.5	139	111.6	-47.8	44.1
Spain	224.8	131.7	97	85.6	-43.2	2.9
Netherlands	76	27.9	38	13.9	-41.2	-27.2
Belgium	56.2	19.8	28	1	-39.3	-20.4
Austria	26.9	2.2	22	-8.3	-30.7	-20.2
Portugal	20.6	12.7	20	5.5	-14.6	-7.4
Finland	19	7.5	14	4	-10	-6.6
Ireland	21.4	13.3	13	5	-8.3	0
Slovakia	13.2	10.2	9	8.5	-0.3	1.4
Slovenia	4.3	3	0	2.1	-2.9	-2
Others	n.a	n.a	4	n.a	n.a	n.a
Total	1434.9	584.5	687.0	274.7	-576.2	-266.4

Source: Bloomberg, own calculations.
Note: *Column 'Inferred Buying' was calculated after taking into account the share of eligible government bonds in total eligible bonds. **Column 'Adjusted Net Issuance' adjusts net issuance of bonds for coupon purchases.

Estimations of net flows also point to shortages in the supply of available bonds. Net flows indicate the value of bonds left for purchase after adjusting for reinvestment of coupon repayments. Although net flows are positive for all countries but two (Germany and Austria), after adjusting for programme purchases, there appears to be an imbalance between supply and demand (column 'Adjusted net flows'). The shortage of liquidity could be potentially managed by purchases from the supranational and international issuers (and the programme envisages that the NCBs will be buying around €6 billion of debt from these institutions). However, some estimates suggest that net issuances of SUPRAS in 2015 may be negative, which would limit this option (Danske Bank (2015), for instance, estimates net issuances in 2015 of negative €3 billion). The existing gap could also be partially supplemented by purchases from agencies. However, as Figure 1 shows, smaller countries, for which the share of eligible bonds to purchase from agencies in total bonds available (excluding SUPRAS) is minimal, may struggle to meet their buying targets.

Finally, since the estimates presented in Table 1 suggest that the sovereign bond buying programme could be larger in scope by around €45 billion if the 25 and 33% caps were not applied, the ECB could also think about changing the limits imposed on bonds eligible under the programme[12].

Figure 1: The share of eligible agencies' bonds under PSPP



Source: Bloomberg, own calculations.

3.1. Recent Developments

How have these issues played out?

With the programme already in place for almost three months, it can be said that the issues behind market concerns – although justified in principle – have not yet materialised. As shown by Table 4, the ECB has been able to achieve its target of €60 billion.

[12] This is because the value of eligible bonds (i.e. bonds with maturity between 2 and 30 years and with yields greater than - 0.2%) is estimated to be €847.5 billion whereas, currently, the programme envisages purchasing around €802.6 billion (see Table 1).

Table 4. Eurosystem holdings under EAPP

	CBPP3	ABSPP	PSPP	Monthly total
	Outstanding Amounts			
Oct-2014	0	4,768	0	4768
Nov-2014	368	17,801	0	18169
Dec-2014	1,744	29,632	0	31,376
Jan-2015	2,325	40,255	0	42,580
Feb-2015	3,463	51,209	0	54,672
Mar-2015	4,624	63,606	47,356	115,586
Apr-2015	5,785	75,070	95,056	175,911
	Monthly Changes			
Mar-2015	1,161	12,397	47,356	**60,914**
Apr-2015	1,161	11,464	47,700	**60,325**

Source: Own calculations based on ECB data.

Also, it would appear that in March and April, the ECB was also compliant with the capital key ratios in its purchases, with only very small divergences (see Table 5 below). In terms of the weighted average maturity of the purchases, these were also very much in line with the weighted average maturity of eligible bonds, with some discrepancies for small countries (Gudin et al., 2015). Among the larger issuers, only Portugal and Spain displayed some divergence. According to many market observers, this kind of diversity is normal in the early stages of a programme.

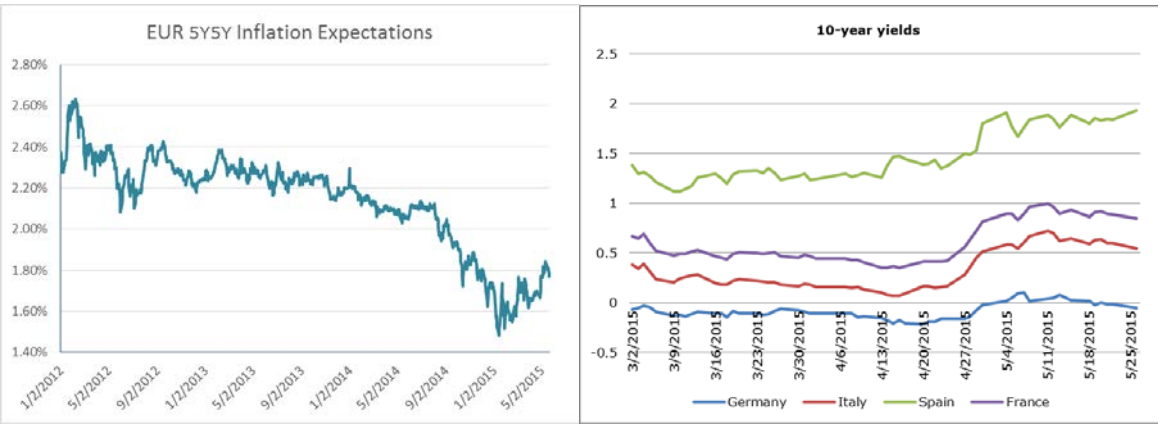
Table 5. ECB's country holdings and duration under PSPP

Country	Max monthly	Holdings		Change	Duration	
		Mar-15	Apr-15		Mar-15	Apr-15
Germany	10.8	11.06	22.21	11.2	8.12	7.9
France	8.4	8.75	17.38	8.6	8.22	7.84
Italy	7.4	7.6	15.19	7.6	9.07	8.41
Spain	5.3	5.44	10.91	5.5	**11.66**	**9.73**
Netherlands	2.4	2.49	5.01	2.5	6.71	6.97
Belgium	1.5	1.53	3.06	1.5	8.8	9.1
Austria	1.2	1.22	2.42	1.2	7.79	7.99
Portugal	1.1	1.07	2.16	1.1	**10.96**	**10.77**
Finland	0.8	0.77	1.56	0.8	7.26	7.15
Ireland	0.7	0.72	1.46	0.7	9.43	9.14
Slovakia	0.5	0.51	1.03	0.5	9.49	9.26
Others	2.0	0.3	0.82	0.5	6.85	6.45
Slovenia	0.2	0.21	0.43	0.2	6.33	7.92
SUPRA		*5.68*	*11.43*	5.8	*7.26*	*8.05*
TOTAL	42	**47.36**	**95.06**		**8.56***	**8.25***

Source: Bloomberg, own calculations; *the numbers indicate weighted average remaining maturity in years.

The calm start to the programme, increasing inflation, as well as inflation expectations (see Figure 2) has led to speculation of early tapering of the programme. This resulted in large-sell offs of sovereign bonds at the beginning of May. Yields, which decreased at the beginning of the programme, started increasing (see Figure 2) and the euro appreciated against the dollar. This can be generally perceived as a market correction and a signal that investors are prepared to take more risk and diversify their portfolios towards more risky assert – precisely the effect that QE aims for.

Figure 2: Inflation Expectations and Bond Yields



Source: Own calculations.

Going forward, Benoit Coeure, ECB Executive Board Member, signalled that the ECB is prepared to 'moderately frontload' bond purchases. He explained that although purchases were very strong in the first three months of the programme, summer months are typically slower in primary-market issuance in the covered-bond market. Therefore, such strong issuance and purchases might not be observed in subsequent weeks. To avoid liquidity problems, Mr. Coeure stated that the ECB intended to increase asset purchases in May and June, ahead of an expected low-liquidity period in the summer months (Coeure, London, May 18). In response to his remarks, the euro depreciated, leading to a surge in bond prices, and declining yields (see Figure 2). These developments raised again the issue of sovereign market volatility, which may lead to mispricing as well as impairment of the much needed pass-through from banks' borrowing to lending rates.

The downward pressure on the yield cure as a result of the aggressive bond buying in the first two months of the programme also created increased volatility in repo markets. Since early Feburary, German repo rates, which typically trade close to the benchmark overnight rate, have widened from 4 basis points to 11 basis points (Golman Sachs). In response, at the beginning of April, the ECB introduced a 'securities lending' framework setting out how it will loan bonds back to banks to avoid distortions or shortages in repo markets. It included a fixed borrowing term of one week with the option to roll over loans three times, and imposed limits on the amount of any single bond that can be borrowed by a counterparty. However, it was also stated that the NCBs have "some flexibility" to adapt the framework to suit their own needs. The introduction of the security lending program in April does seem to have improved repo market liquidity.

4. THE ECB AND RISK-SHARING ARRANGEMENTS

The second major issue of concern arising from the EAPP relates to risk-sharing arrangements under the PSPP. Although the absence of full profit and loss sharing between euro zone countries under the PSPP has received relatively less attention as of late, it was extensively discussed around the time that sovereign QE was announced.

The most thorough recent treatment of this topic is that of Willem Buiter (Buiter, 2015). As Buiter points out, unlimited risk-sharing among the NCBs participating in the euro system eliminates the hazard that even if the consolidated system remains solvent, an individual NCB may become insolvent, which is possible when risk sharing is limited. Rather, with unlimited risk sharing, you have one system in which the central bank can always monetise debt.

Before the onset of the debt crisis in Europe, the ECB was a lender of last resort to any NCB in the euro zone. This changed when under the Emergency Lending Assistance (ELA), the NCBs were allowed to purchase assets or extend collateral lending at their own risk, i.e. the national central banks are largely responsible for taking lending decisions under the ELA, and so must bear any profits or losses that might result. Additionally, in 2011, the ECB allowed NCBs to extend certain loans in exchange for collateral generally not accepted in the euro area (Buiter, 2015).

When sovereign QE was announced, the Governing Council decided that only purchases of securities from the European institutions (SUPRAS), in addition to purchases conducted by the ECB, would be subject to risk-sharing. Table 2 shows that only 20% of purchases under the PSPP (or €173.6 billion) is subject to mutual loss sharing (12% of bonds purchased from SUPRAS and 8% of ECB purchases). The purchases under CBPP3 and ABSPP are also subject to mutualisation (i.e. risk-sharing). Assuming the duration of the EAPP program to be 19 months, it can be estimated that the NCBs will take on risk worth around €738.4 billion (given liquidity constraints, this estimation represents an upper bound). As pointed out by Buiter (2015), this increases the probability of an individual sovereign default despite the whole system remaining solvent. This probability is higher the larger the NCB balance sheets and the larger the exposure to one borrower.

What could be behind the ECB's withdrawal from full risk-sharing? Some member states – notably Germany – have argued that the lack of full risk-sharing is appropriate, since sharing of risk reduces the incentive to run unsustainable fiscal policies. This view is reflected in some of the statements of members of the ECB. For example, ECB Executive Board member, Peter Preat, has stated that partial risk-sharing corresponds roughly to the current allocation of fiscal responsibilities in the euro area[13]. Under this approach, the distribution of risk preserves needed discipline of euro area governments (Preat, March 2015).

There are a number of important consequences of limited risk-sharing in the euro area. Some have argued that a retreat from full risk-sharing sends a negative signal to markets that the ECB is no longer a 'joint and several' institution, which runs counter to the principles of the common currency area, in which one monetary authority serves the needs of the entire area (Wolf, 2015). This view is shared by Paul De Grauwe who states that the ECB's movement in the direction of 'juste retour' leads to a loss in the unity of action in monetary policy (January 2015). Additionally, limited risk sharing could hypothetically lead to a situation in which some NCBs refuse to participate in the programme, again impacting the credibility of the programme, as well as a stability of the bond market (although the

[13] See 'Public Security Purchases and monetary dominance in a monetary union without a fiscal union, a contribution to the panel of low-interest-rate policy and non-standard monetary policy'. Frankfurt am Main (March, 2015)

later depends on the share of a country in the programme). Buiter has gone further to argue that without full risk-sharing, the euro system cannot be seen as consolidated and that it looks more like a system of 19 currency boards with a peg to the euro, any of which could become insolvent (Willem Buiter, March 2015).

The consequences of default for the NCBs and the whole euro system without full risk sharing differ from those under full risk sharing. Under full risk sharing, since the ECB provides liquidity to banks, it can always issue more money and remain solvent (although most likely not without conditionality). Although ECB liabilities will increase, the euro system as a whole remains solvent as along as the ECB's Governing Council decides to generate sufficient seigniorage[14]. This is because the future income of a central bank is an asset available for current lending (Buiter 2015) [15]. Although nobody 'pays the bill', since there is more money in circulation, there is a trade-off between higher inflation and solvency. The impact on inflation – among other things - depends on the size of the debt being monetized.

This framework changes when the risk among member states is not fully shared. In the situation when national banks carry their own risk but are in the euro area, they do not control their future seigniorage revenues and therefore can become insolvent (since the voting system is based on the capital key (see Table 1), the individual NCBs only receive a fraction of the ECB's profits). The euro system is no longer fully consolidated and although the whole system can still remain solvent, the individual NCBs may become insolvent.

The implications for the euro system as a whole then depends on whether an insolvent NCB stays in the euro area or exits. In both cases however, there is an ex-post loss sharing for the euro system regardless of the arrangements under the ELA or PSPP.

In the case when the NCB exits the euro area, since assets from the exiting member state are backed by euros and since now they do not carry any value, the losses would be shared by other national central banks via the Target 2 balances (the ECB would record a loss on its balance sheet which is then redistributed to the other NCBs according to their capital key). As Mr. Draghi has stated, should a country default, the euros created - which remain liabilities of the euro system - would remain in circulation and be fungible across the euro zone (Draghi, 2015)

The situation becomes more complicated in the case where the insolvent NCB stays in the euro zone. Since any direct participation of the ECB in debt restructuring is illegal and considered by EU law as monetary financing, it is difficult to see how such restructuring would happen (the insolvent NCB would have to force its creditors - including the ECB - to write off losses). Also, as Buiter point out, the ECB has stated that in the PSPP the euro system (i.e. the NCBs) will be pari passu with private purchases of the same public debt instrument. Thus, the pari passu rule essentially eliminates the ability of a government to issue new debt that its NCB then places on its balance sheet, as such action would give preferential treatment to the NCB over private purchases. Moreover, as an insolvent NCB is no longer an eligible counterparty for the rest of the system via TARGET 2, with time, it would be forced out of the monetary union (Buiter, 2015).

[14] Revenues from base money creation in the euro area are distributed among member states according to their capital key. In the euro area, seigniorage is divided among the 19 NCBs in proportion to their capital key. National banks pass it to the respective governments.

[15] Buiter (2008) argues that the discounted present value of future seigniorage should be included as an asset on the balance sheet of the central bank implying a large capacity to sustain losses.

From the above discussion, it is clear that the ECB's QE programme retreats from full risk-sharing. Member NCBs can default. And while the potential losses from the default of a NCB will be shared by the euro system, the unity of the euro system is at risk, since insolvent countries may be forced out of the union and richer members may chose not to bare the losses. This is different from a system with full risk-sharing, where the debt of the NCBs can always be monetised at the cost of higher inflation. Although when member states exit the euro system, the financial consequences for the system are similar to those under full risk sharing, under partial risk-sharing, the existence of the entire euro zone is at stake as it is highly unlikely that an insolvent member state would be able to continue to stay in the Union.

This gives rise to the important question of how likely defaults are among the EA members under the QE programme.

Under the PSPP, NCB defaults are likely to be caused by the debt of their governments. Benink and Huizinga (2015) have attempted to assess the likelihood of default by estimating of the loss absorption capacities of NCBs in the euro area, weighed against their income from seigniorage and the value of exposure to public debt under the PSPP. Their results show that if the present discounted value of NCB current and future seigniorage revenues are taken into account, all NCBs will be able to bare any losses stemming from sovereign debt purchases under the current round of QE. The limits of the loss absorption capacities of some NCBs, however, are reached under a low growth scenario, or if the NCBs have to acquire higher percentages of their sovereign debts.

5. CONCLUSIONS

This brief addressed two issues related to the ESPP: the impact of potential scarcity of sovereign bonds to be purchased under the programme and the absence of full profit and loss sharing by NCBs.

As shown in Section 2, there are grounds to be concerned about the scarcity of available bonds for purchase over the life of the programme. This should be carefully managed. However, in the first three months of the programme, implementation has run smoothly, although there has been some volatility in the bond market. So far, however, there has been sufficient flexibility in the system to manage challenges, in keeping with the outcome predicted by Mr. Draghi (Draghi, April 2015). 'Securities lending' helped stabilise the repo markets and bond 'frontloading' helped prevent market volatility due to the expectation of low liquidity over summer. This flexible approach has been well received by markets.

Nonetheless, if not appropriately managed, the volume of bonds available for purchase could be an issue. To help the situation, the ECB could change the 25% issue limit or enlarge the list of eligible agencies (if such can be found) in countries which face the danger of reaching the limits before the programme expires.

In the second part of the brief, the issue of limited risk-sharing was discussed. The ESPP does represent a withdrawal from full risk sharing. Estimates suggest that approximately €738.4 billion of the ESPP will not be subject to risk sharing.

It has been argued that this increases the probability of an individual sovereign default despite the whole system remaining solvent. Defaulting countries may be forced to exit the euro area. Non-defaulting countries may prove unwilling to bear the costs of such exits, both of which would threaten the unity of the euro area. However, studies suggest that, at present, all NCBs should be able to bare losses stemming from sovereign debt purchases under the current round of QE.

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NOTES

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POLICY DEPARTMENT A: ECONOMIC AND SCIENTIFIC POLICY

Sovereign bond purchases and risk sharing arrangements: Implications for euro area monetary policy

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IN-DEPTH ANALYSIS

Abstract

The ECB has launched a Quantitative Easing programme similar to recent programmes launched by other central banks. In launching this programme, the Eurosystem takes additional risks on its balance sheet. Currently, the probability of these risks materializing seems to be relatively small. Nonetheless, if this probability were to increase, the ECB and national central banks may find themselves under increasing political pressure, which in turn may weaken the institutional structure underlying monetary policy in the euro area.

CONTENTS

EXECUTIVE SUMMARY

- The ECB has launched the Public Sector Purchase Programme (PSPP) in March 2015. The PSPP extents existing asset purchase programmes to debt securities, mainly those issued by central governments (€44 billion per month), but also securities issued by European institutions (€6 billion per month). The programme is intended to be carried out until at least September 2016.
- 20% of the volume of the programme will be held by the ECB; this 20% is subject to risk sharing according to the capital key of the ECB. Meanwhile, 80% of the volume of the programme will be held by the national central banks; this 80% is not intended to be subject to risk sharing. For this principle to be effective, each national sovereign must be willing to recapitalise the national central bank in the event of insolvency.
- The ECB has set strict limits and criteria for bonds to be eligible for the PSPP. An analysis of euro area bond markets indicates that by and large, the programme can be carried out as envisaged until September 2016. However, several smaller member countries have not issued a sufficient amount of eligible bonds to fully carry out the programme in a strict sense.
- The Eurosystem takes additional risks on its balance sheet, in particular sovereign default risks and interest rate risks. From today's perspective the former are low. Interest rate risks emerge when future economic circumstances urge the ECB to considerably tighten its monetary policy stance. These risks are difficult to quantify, but scenario projections indicate that they are economically significant.
- The loss absorption capacities of the national central banks and the ECB appear sufficient to deal even with the worst case of sovereign defaults. Therefore, the current PSPP seems to impose low risks with respect to central bank recapitalization requirements and additional risk sharing beyond the 20% share held by the ECB.
- The bond purchase programme has several implications for euro area monetary policy. First of all, the programme makes the ECB more likely to choose a more accommodating monetary policy stance than its mandate by itself would dictate in order to compensate losses or to avoid sovereign defaults. This weakens central bank independence by engaging the ECB more in fiscal affairs.
- Given the size of the programme, serious negative implications so far seem to be of limited relevance. However, these implications would become more relevant were the programme to be expanded beyond its current volume. In that case, the ECB would most likely have to adjust the design of the programme, because the volume of eligible bonds (in the current design of the programme) would become a limiting factor.

1. INTRODUCTION[1]

The ECB has launched the Public Sector Purchase Programme (PSPP) in March 2015. The PSPP extends existing asset purchase programmes by purchasing bonds that are mainly issued by central governments of euro area member states. The programme is intended to be carried out until at least September 2016 increasing the Eurosystem's consolidated balance sheet by about 50%. In implementing this programme, the Eurosystem follows other central banks in launching large scale so-called Quantitative Easing (QE) programmes. In doing so, the Eurosystem takes risks on their balance sheets. While regional risk sharing of central bank operations is not an issue for countries like the United States where the national monetary authority may buy bonds issued by the national sovereign, this aspect plays an important role in the euro area in general and for the PSPP in particular.

The balance sheet of the ECB is linked to those of the Eurosystem's national central banks, their respective fiscal authorities, and ultimately to their taxpayers. These links are discussed in general terms in the Appendix. Given these links, profits and losses of the ECB have implications for taxpayers, both in the aggregate and across euro area countries. To understand the resulting risks, we first discuss the institutional framework within which the QE programme operates (Section 2). This framework is designed to mitigate the risks of the ECB engaging in monetary financing of euro area governments; we review whether or not we expect this framework to be workable. To assess both the feasibility of the PSPP in aggregate quantitative terms and country-specific peculiarities we discuss the main PSPP-related features of the euro area sovereign bond markets (Section 3). Finally, we quantify the financial risks for the Eurosystem and the implications of these risks for monetary policy (Section 4). We conclude that, while the quantitative easing program is not risk-free, the relevant risks seem to be fairly contained in magnitude. Nevertheless, if these risks were to increase, the ECB and national central banks may find themselves under increasing political pressure, which in turn may weaken the institutional structure of monetary policy in the euro area (Section 5).

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2. QUANTITATIVE EASING POGRAMME OF THE ECB AND LEGAL FRAMEWORK

The Public Sector Purchase Programme (PSPP) started on 9 March, 2015 and is intended to last at least until September 2016 and in any case until the inflation rate is back to its medium-term target. It supplements the Asset-Backed Securities and Covered Bonds Purchase Programmes launched in September 2014. Together, these purchases constitute the Extended Asset Purchase Programme (EAPP) and amount to €60 billion per month. Over the course of the programme (until September 2016) about €1.1 trillion in assets will be bought. This equals about half of the consolidated Eurosystem balance sheet, which stood at about €2.2 trillion at the end of February 2015. Including the EAPP purchases, the consolidated Eurosystem balance sheet would stand at about 24% of current euro area nominal GDP.[2] While €10 billion per month will be spent on Asset Backed Securities and Covered Bonds, the PSPP accounts for the majority of purchases within the EAPP with a volume of €50 billion per month. 12% (6 billion euros) of the volume of the PSPP will be used to buy assets of supranational institutions that will then be held by the national central banks but are still subject to risk sharing. The remaining €44 billion will be spent mainly on central government bonds and on debt securities of some national agencies (the list of which is subject to amendment by the Governing Council) and will be allocated across countries in correspondence to the ECB's capital key.[3] 80% (€40 billion) of PSPP spending will go to sovereign debt held by national central banks and 8% (4 billion euros) to that held by the ECB. The individual national central banks will focus their purchases exclusively on their home markets. Overall, most of the risks of the PSPP purchases (€40 billion per month or 80% of the volume of the programme) are not supposed to be shared.

The credibility of the risk separation crucially depends on the recapitalisation rules in case any national central bank faces substantial losses that erode its equity. Should a member state default on its debt, this would have a severe impact on the balance sheet of the corresponding national central bank that holds, through PSPP, a substantial part of that debt. If this central bank were not to be recapitalised, the Eurosystem as a whole would have to assume the responsibility for the liabilities incurred by this national central bank, namely the euros put into circulation. This would constitute risk-sharing. In its 2010 Convergence Report, the ECB provided its interpretation of the central bank independence principle with regard to the statutory capital of national central banks (NCB):"Therefore, the event of an NCB's net equity becoming less than its statutory capital or even negative would require that the respective Member State provides the NCB with an appropriate amount of capital at least up to the level of the statutory capital within a reasonable period of time so as to comply with the principle of financial independence." To reduce the political uncertainty, it might be worthwhile to explicitly codify this principle in EU regulation.

To be eligible the PSPP, a sovereign bond must fulfil the following criteria: it must have a remaining maturity of 2 to 30 years, be denominated in euros, and be eligible as collateral for ECB monetary policy operations. This last criterion can be met either by a sufficiently high credit ranking or by the issuing country being a beneficiary of an EU financial assistance programme. Whenever such a programme is under review, purchases of government bonds of this country are suspended. This currently applies to Greece. Bonds yielding less than the deposit rate (currently -0.2%) are excluded from purchase. Furthermore, there are two limits in place: the Eurosystem as a whole may not hold more than 33% of the debt of any single issuer and not more than 25% of any given issue.[4]

[2] For comparison, the Fed balance sheet amounts currently to 26% of US GDP.
[3] The eligible national agencies are located in France, Germany, and Spain. Bonds of regional governments are currently not eligible for the PSPP.
[4] The higher 33% per issuer limit was put in place to deal with legacy holdings of the sovereign debt of some countries from previous programmes.

These limits include bonds bought under the Securities Market Programme and other central bank bond holdings. According to the ECB, the 25% per issue limit was set to avoid the question of monetary financing of governments because any higher ownership share would give the Eurosystem a blocking minority in any restructuring process. In general, the 25% per issue limit is not a relevant criterion for identifying whether or to what extent the PSPP implies monetary financing of euro area governments via the Eurosystem.[5] In a broad sense, monetary financing can be interpreted as any central bank operation that impacts the financing conditions of governments (see also section A.1.2 in the appendix). Most clearly, monetary financing of governments is seen in issuing new money to directly cover public budget deficits.[6] This form is usually associated with severe negative economic consequences. The ECB has declared that its QE programme is not intended to work in this way. The fact that this 25% per issue limit is scheduled for review by the Governing Council six months into the programme might indicate that the ECB is aware of potential conflicts between the PSPP programmes and its monetary mandate.

[5] One could even argue that such a non-blocking minority position weakens the central bank's ability to prevent the government from wiping off the debt burden by defaulting without recapitalizing the monetary authority even though the material impact of a formal central bank's veto is not to be considered as very high.

[6] It is insignificant whether the central bank operates in the primary or the secondary bond markets as long as first buyers of government bonds know that they can resell these bonds to the central bank after a short period of time. If this is the case, the buyers on the primary market assume no financing function in the economy but operate as brokers for the central bank only.

3. SOVEREIGN BOND MARKETS IN THE EURO AREA MEMBER STATES

3.1 General overview of the euro area sovereign bond market

In general, outstanding debt securities that have been issued by central governments in the euro area, by selected national agencies, and by selected supranational institutions are eligible for the PSPP. The total sum (nominal value) of outstanding debt securities denominated in Euro issued by central governments was €6,666 billion at the end of 2014. According to Claeys et al. (2015), the amount of outstanding debt securities issued by national agencies that are eligible for the PSPP was about €350 billion. Further, the amount of outstanding debt securities issued by the selected supranational institutions was €567 billion at the beginning of 2015. Given the 25% per issue limit, the available amount of eligible bonds from central governments is reduced to €1,666 billion. Since the ECB already owned €149.4 billion due to the SMP program before the PSPP started, and national central banks owned about €240 billion in debt securities before the PSPP started, about €1,250 billion of eligible central government bonds remain. The amount of debt securities eligible for the PSPP is further restricted because the ECB intends to buy only those securities that yield above the deposit rate (May 2015:-0.2%) and have remaining maturities between 2 and 30 years. However, the latter criterion is not particularly restrictive because during the course of the PSPP most of the bonds that have currently maturities below 2 years will mature and be replaced by securities with a maturity that is eligible for the PSPP. Another factor easing the 25% per issue limit is that this limit applies to for nominal values while the total volume of the intended purchases within the PSPP corresponds to market values. Currently, the market values for most of the outstanding securities in the euro area exceed their nominal values. With regard to the purchases of debt securities of supranational institutions, there seems to be a sufficiently large amount of eligible bonds available to carry out this part of the PSPP until September 2016 (Claeys et al. 2015). However, after September 2016 the amount of eligible bonds would become an increasingly limiting factor for the programme. The larger part of the PSPP will be used for purchases of government bonds. Given that the regional distribution of these purchases follows the ECB capital key and given that the 25% per issue limit directly translates into a corresponding limit at the country level, a country-specific analysis of the euro area sovereign bond market is essential.

3.2 Country-specific overview of the euro area sovereign bond market

The question whether the PSPP can be carried out in its full volume until September 2016 (or even longer) is difficult to answer and depends on future market conditions and the behaviour of issuers of debt securities. Due to the criteria and limits for bonds to be eligible for the PSPP, the amount of €1,250 billion in euro area government bonds that are in general eligible for the PSPP cannot directly be compared with the volume of 836 billion of government bonds (or debt securities of national agencies) the ECB will purchase until Sep 2016.

The most important restriction at the country level is the 25% per issue limit. It is obvious that the PSPP can only be carried out at its full volume if every single country has issued a sufficient amount of government bonds that are eligible to the PSPP. We calculate an index that is comparable across countries and that can be interpreted as a proxy for the

likelihood that the 25% per issue limit becomes binding.[7] The higher the index value, the less likely it is that the planned government bond purchases for the country will be constrained by the outstanding amount of bonds. Negative values of this index correspond to a high likelihood that the 25% limit will become binding.

It turns out that the sovereign bond purchases will be constrained by a low amount of government bonds that have been issued by some countries (Table 1). For example, Estonia has issued no government bonds. Latvia and Lithuania have only issued small amounts of government bonds. Moreover, some countries are highly indebted but their debt is unlikely to be fully eligible for the PSPP since their government bonds have been replaced by loans (mainly provided by the EFSF) or the ECB, and the national central banks already hold too many of their government bonds. This is particularly the case for Greece and Ireland but may also apply to Portugal. On the whole, for several countries in the euro area the 25% per issue limit will most likely become binding. Therefore, the PSPP in its current design cannot be carried out in its full volume until September 2016. However, all of these countries are small according to the ECB capital key and the question whether a substantial part of the PSPP can be carried out depends more on the sovereign bond markets in those countries with larger shares in ECB capital. The government bonds of Germany, France, Italy and Spain represent almost 80% of the euro area bond market and 75% of the planned purchases of government bonds of the ECB until September 2016.

France issued an amount of government bonds with maturities between 2 to 30 years that is well above 1 trillion (nominal value) end of March 2015; the total amount of outstanding government debt (that is relevant if one assumes that maturing bonds will be replaced to a large extent by bonds with maturities between 2 and 30 years) was even above €1.5 trillion. For Italy these amounts of outstanding government bonds were even higher. Overall, for both countries it is unlikely that the 25% limit will be become binding until September 2016 or soon thereafter. For Spain the outstanding amount of government bonds with maturities between 2 to 30 years exceeded €540 billion euros; the total amount of outstanding government bonds was about €840 billion. Given that the Eurosystem already holds more than €65 billion of Spanish government bonds, it is less clear for Spain whether the planned purchases of €105 billion can be completely carried out; this is also indicated by the lower value of the proxy index. However, it seems likely that Spain will issue a substantial amount of new government bonds (also in net terms) that are eligible for the PSPP. Therefore, we do not expect that the 25% per issue limit will apply to Spain until September 2016. In case of Germany the outstanding volume of government bonds with relevant maturities (€782 billion in April 2015) is apparently too small for the planned purchases to be carried out in its full volume until September 2016. However, we expect that the purchases that can be carried out completely as eligible securities of four German national agencies will amount to about €200 billion. Moreover, some of the government bonds with a remaining maturity of below 2 years will mature over the course of the programme and will be replaced by bonds with maturities between 2 and 30 years.

After the most recent hikes in government bond yields, the criterion that yields have to exceed the rate of ECB's deposit facility (-20 basis points) is currently (end of May) not binding any more. With yields still being very low – especially for German government bonds –this criterion could become binding again for some debt securities. However, if yields decrease, the market value of all bonds (also those with higher yields) will tend to increase, such that any constraining effects due to the yield criterion will be partially offset.

[7] The index is calculated for each country as the outstanding volume of government debt divided by 4 minus the planned purchases of those government bonds minus the already existing ECB holdings of those bonds. This number is divided by the ECB capital key to obtain an index that is comparable across countries.

Overall, we expect that the substantial part of the PSPP can be carried out. The limiting criteria become binding for some smaller countries only. However, if the programme is substantially extended beyond September 2016 (or the volume of the monthly purchases is expanded), the amount of eligible bonds (in the current design of the programme) could become a limiting factor, for example for larger countries like Germany and for the intended purchases of securities of supranational institutions.

Table 1: Euro area government bond market and planned purchases

(ECB's capital key: in %; Planned purchases, Outstanding debt securities, and Holdings of central banks: in billion Euro.)

	ECB's capital key	Planned purchases	Outstanding debt securities	Holdings of central banks	Proxy index	Likelihood that 25%-limit is binding
Germany	25.56	213.7	1142.4	4.4	3	low
France	20.14	168.4	1507.0	42.2	8	very low
Italy	17.49	146.2	1780.0	197.9	6	very low
Spain	12.56	105.0	838.5	65.0	3	low
Netherlands	5.69	47.6	352.0	0.0	7	very low
Belgium	3.52	29.4	380.6	4.6	17	very low
Austria	2.79	23.3	182.2	2.2	7	very low
Greece	2.89	24.2	80.2	19.8	-8	very high
Finland	1.78	14.9	95.1	0.4	5	low
Portugal	2.48	20.7	110.0	15.9	-4	very high
Ireland	1.65	13.8	120.5	37.0	-13	very high
Slovakia	1.1	9.2	35.4	0.0	0	high
Luxembourg	0.29	2.4	6.3	0.0	-3	very high
Slovenia	0.49	4.1	19.0	0.3	1	high
Lithuania	0.59	4.9	5.0	0.0	-6	very high
Latvia	0.4	3.3	3.5	0.0	-6	very high
Estonia	0.27	2.3	0.0	0.0	-8	very high
Cyprus	0.21	1.8	6.7	0.0	0	high
Malta	0.09	0.8	5.0	0.4	1	high

Sources: EFC Sub-Committee on EU Sovereign Debt Markets, Eurostat, Claeys et al. 2015, ECB, own calculations.

4. FINANCIAL RISKS FOR THE EUROSYSTEM

Central bank independence is accepted as one of the most important principles of modern monetary policy. Strong financial health is a key factor to ensure this independence. Otherwise, the central bank would depend on fiscal support, increasing its exposure to political pressures (Schwarz et al., 2014, p.10). In anticipating the loss of monetary policy autonomy the central bank may try to proactively circumvent such situations, thereby deviating from their otherwise optimal policy strategy. In particular, insufficient future profits may tempt the central bank to conduct an inflationary policy for generating higher revenues. This would severely undermine the credibility of the central bank, with severe consequences for the ability to anchor inflation expectations at targeted levels. Although there are no insolvency problems in a technical sense since central banks can create money in unlimited amounts, the lack of financial health creates a binding restriction on the central bank's monetary policy strategy. The technical ability to create unlimited amounts of new money out of nothing is of little help once the trust in the currency is lost – in this case, what the central bank can create would no longer considered as money. As the provision of a reliable means of exchange (i.e. money) is the ultimate task of the central bank, issuing more money just to prevent technical insolvency would nevertheless mean that the central bank misses its most important policy assignment.

The link between financial soundness of the central bank and its monetary stance is typically not a binary, but a gradual relationship that calls for an empirical assessment. For this purpose, Adler et al. (2012) investigate whether a central bank's financial health exerts an impact on monetary policy. The analysis is done in two steps: firstly, Taylor rules are estimated for a cross-section of 41 countries. Secondly, deviations of actual interest rates from Taylor rule interest rates are regressed on a variable capturing central banks' financial health. The results indicate that a weak financial condition tends to motivate central banks to engage in excessive monetary expansion. This is in line with Klüh and Stella (2008), revealing a negative impact of central banks financial health on the country's inflation rate, irrespective of the cross-section of countries or econometric techniques.

Against the backdrop of the empirical evidence, we conclude that financial weakness may force central banks to adhere to inferior monetary policy, a situation accurately termed 'policy insolvency' (Stella and Lönnberg, 2008) as opposed to regular 'technical insolvency'. Given the potential consequences of policy insolvency, the private sector will take into account the current financial situation of the central bank when forming expectations about the future path of monetary policy. This is why financial accounting and reporting of the central bank are important for monetary policy. Before discussing the risks for the ECB policy solvency arising from the QE programme we briefly outline the main accounting principles relevant for assessing a central bank's policy solvency.

4.1. The ECB's Accounting Principles

In order to fully capture the benefits of credibility, central banks typically follow a strategy of transparency. In the ECB monthly bulletin 4/2014 it is confirmed that

'*As public institutions, central banks are accountable both for the use of the public resources entrusted to them and for the efficient fulfilment of the tasks necessary for attaining their objectives, including the effective conduct of monetary policy. The latter creates the need for appropriate communications, without which economic agents might not perceive the objectives of central bank operations as intended. The lack of sufficient information could, therefore, endanger the effective conduct of monetary policy*.' (ECB monthly bulletin April 2012, p. 87).

Aside from the transparency issue, it is of utmost importance which accounting rules are used to calculate profits and losses of the ECB. The legal framework for accounting and reporting of profits and losses of the ECB is published in the Official Journal of the European Union, L 35, 09/02/2011, pp. 31 – 68, amended in January 2012 (Official Journal of the European Union, L 19, 24./01/2012, pp. 37). The accounting rules generally rely on the principles of the International Financial Reporting Standards (IFRS) with respect to economic reality, materiality, consistency, etc. However, the ECB deviates from IFRS by stressing a prudence principle in the valuation of assets. The prudence principle allows the ECB to retain unrealised valuation gains, which are instead used to accumulate provisions against future financial risks. Two accounting rules are relevant for the implementation of the prudence principle:[8]

Income recognition of the ECB:

- Unrealised profits from asset revaluations are not taken as distributable income, but contribute to provisions in a revaluation account and do not increase the year-end payment to the government.
- Unrealised losses that arise from revaluations of currency and securities holdings as well as derivatives are part of the profit and loss statement and lower the year-end payment to the government.

Provisioning:

- A general provisioning allows the ECB to buffer against financial risks arising from revaluation losses. The amount of resources put aside to shield against future risks is regularly assessed on the basis of the level of risky assets, value-at-risk calculations, current outlook of future risks, etc.
- The provisioning may vary among national central banks due to local legislation and the type of transactions with private sector banks.
- Provisions are perceived as equivalent to reserves, thereby adding to the national central bank's equity.

With respect to the current QE programme with a maximum amount of €1.1 trillion it is obvious that an appropriate provision to meet the prudence principle could not be established, because it would imply increasing ECB's equity to be provided by national governments. As a result, the securities to be purchased within the QE programme (like the purchases within the securities market programme) are declared as 'held to maturity' and are, therefore, not subject to the above accounting rules. Thus, the following risks will not be covered by central bank reserves and provisions.

4.2. Default Risks

Financial risks primarily arise from potential counterparty default. In general, the probability of a European government default (except for Greece) is currently perceived to be negligible. It should be remembered, however, that elevated sovereign CDS spreads during times of the Euro crisis reflect substantial market fears of some European governments to (partially) default on their debt (Falagiarda and Reitz, 2015). Considering the prudence principle of ECB accounting, it is clearly important to assess potential losses arising from QE transactions and the loss absorption capacities of the national central banks of the Eurosystem.

From the overall amount of more than €800 billion government bonds of member states to be purchased within the current QE programme a fraction of 92% is allocated across

[8] The accounting rules are discussed in the ECB Monthly Bulletin 4/2012, pp. 93 – 94.

national central banks according to the respective ECB capital key shares. The resulting figures are collected in the first column of the following Table 2, which is taken from Benink and Huizinga (2015). The authors also calculated the total amount of government bonds in national central bank accounts in case the ECB also engage in Outright Monetary Transactions up to a limit of 25% of national government debt (Column 2 of Table 2). The 25% per issue limit is interpreted by the ECB as the absence of monetary financing of government budgets, because a junior creditor cannot block a potential restructuring of a euro area country debt.[9] Table 2 shows that, for example, if Spain completely defaults on its debt the loss for the Banco de España amounts to €87.3 billion from the current QE programme and €241.5 billion as a maximum amount arising from potential future OMT programmes.

Table 2: Potential write-downs of national central banks under current QE and potential future Outright Monetary Transactions

(Billion euro)

Country	Current QE	25% of total debt
Austria	20.4	65.2
Belgium	25.5	103.1
Cyprus	1.4	4.6
Estonia	1.9	0.4
Finland	13.1	28.1
France	149.5	488.3
Germany	199.2	541.5
Greece	20.6	79.7
Ireland	11.7	53.8
Italy	131.4	517.1
Luxemburg	1.8	2.7
Malta	0.6	1.3
Netherlands	41.9	110.2
Portugal	18.4	54.9
Slovakia	3.4	10.0
Slovenia	7.2	6.3
Spain	87.3	241.5

Source: Benink and Huizinga (2015)

In order to capture the national central banks' ability to deal with a counterparty default, column 1 of the following Table 3, also taken from Benink and Huizinga (2015), reports the amount of equity, reserves, provisions, revaluation accounts, etc., which could be liquidated to cover the potential losses. In addition, column 2 of Table 3 reports the sum of discounted future shares of ECB seigniorage, which might be taken as a cash-flow equivalent to private-sector accounting. The estimates stem from Buiter and Rahbari (2012) and are based on a non-inflationary scenario with an underlying GDP growth rate of 1% and a discount rate of 4%. The seigniorage shares sum up to €2,065 billion for the entire euro area. Column 3 of Table 3 reveals the sum of the first two columns.

The figures suggest that the current reserves of national central banks are strong enough to absorb potential losses from government default. Even in the event of a 100% default,

[9] Notice that in case of Greece the 25% limit has already been exceeded.

the national central banks could deal with the associated losses by resorting to existing reserves. For example, the reserves of the Banque de France (€269.9 billion) easily exceed the potential losses of a maximum amount of €149.5 billion by far. In the unlikely event that the ECB agrees on an extended OMT programme, purchasing up to a limit of 25% of outstanding government debt, and has to accept a full write-down, the ability to generate cash flow from regular monetary policy transactions provides sufficient extra cushioning. Only in the case of Ireland is this loss covering capacity slightly exceeded.

Table 3: Loss absorption capacity

(Billion euro)

Countries	Reserves	Seigniorage	Total
Austria	40.5	57.4	97.9
Belgium	42.5	71.6	114.1
Cyprus	2.9	4.1	7.0
Estonia	2.7	5.3	8.0
Finland	23.9	36.9	60.8
France	269.9	419.6	689.5
Germany	354.2	558.9	913.1
Greece	34.5	58.0	92.5
Ireland	20.1	32.8	52.9
Italy	245.4	368.8	614.2
Luxemburg	3.6	5.1	8.7
Malta	1.2	1.8	3.0
Netherlands	76.0	117.7	193.7
Portugal	34.9	51.6	86.5
Slovakia	10.4	9.7	20.1
Slovenia	5.5	20.4	25.9
Spain	127.4	245.1	372.6

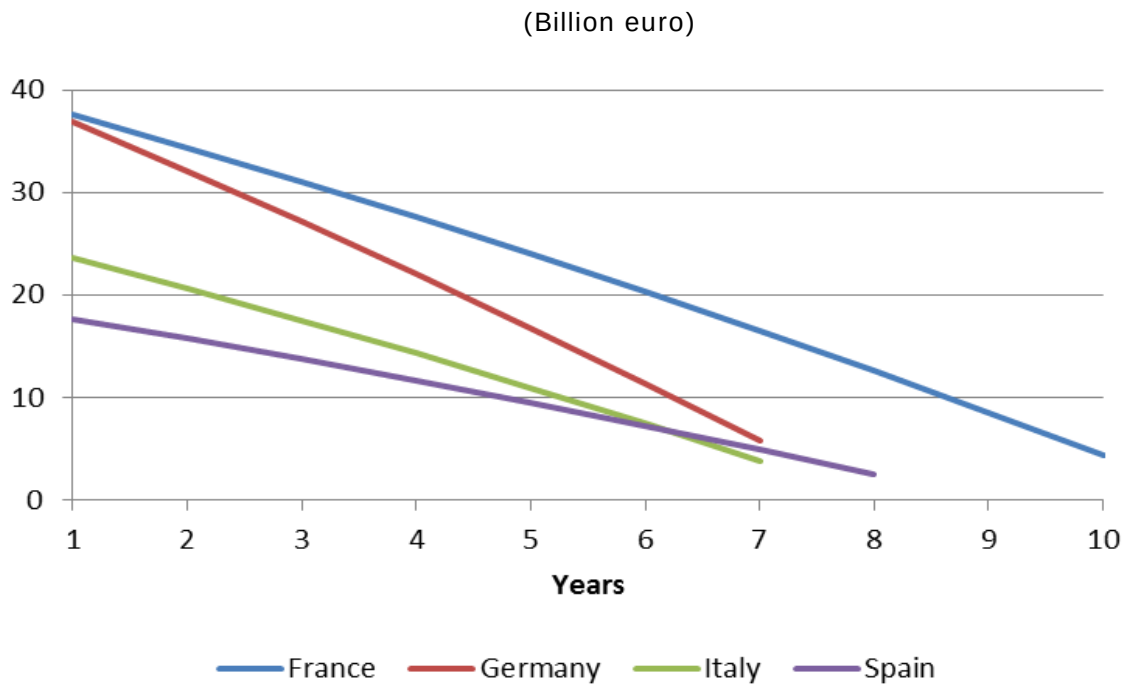
Source: Benink and Huizinga (2015)

This exercise shows that the current financial health of the ECB system is strong enough to even deal with a complete default of government debt. Against the backdrop of the policy-solvency concept, however, a significant deviation from optimal monetary policy has to be expected already in situations of smaller but significant losses.

4.3. Interest Rate Risks

A second important source of potential losses arises from interest rate risks. Of course, the accounting rules discussed above clearly indicate that government bond purchases earmarked as 'held-to-maturity' are not subject to revaluations that may show up in the balance sheets of the national central banks. Policy solvency, however, implies that potential losses from future sales of government bonds may impose a restriction on monetary policy. If, for example, a strong recovery of the European economy within the next few years calls for higher interest rates, the ECB may hesitate to sell back QE bonds and opt for less efficient policy measures to mop up excess liquidity.

Figure 1: Interest Rate Risk of QE



Source: Own calculation based on data from Claeys et al. (2015).

In order to capture the size of this problem, potential future write-downs are approximated using the projected purchases within the current QE as reported in Table 2. We calculate (weighted) average maturities of outstanding bonds for France, Germany, Italy, and Spain using data from Claeys et al. (2015). Covering more than 70% of total projected purchases, the central banks of the four countries share the major part of financial risks. While the average maturity of French government bonds is 9.3 years, the average maturity of Germany, Italy, and Spain is 6.4, 6.7, and 7.2 years, respectively. From Claeys et al. (2015) we also take the weighted average yield of outstanding bonds as an approximation of the average coupon. We assume that the country-specific (constant) discount rate instantaneously and persistently increases by 300 basis points (bp) and calculate changes in the present value of government bonds.[10] Thus, the potential losses represent the decline of the average present value times the sum of the projected purchases.

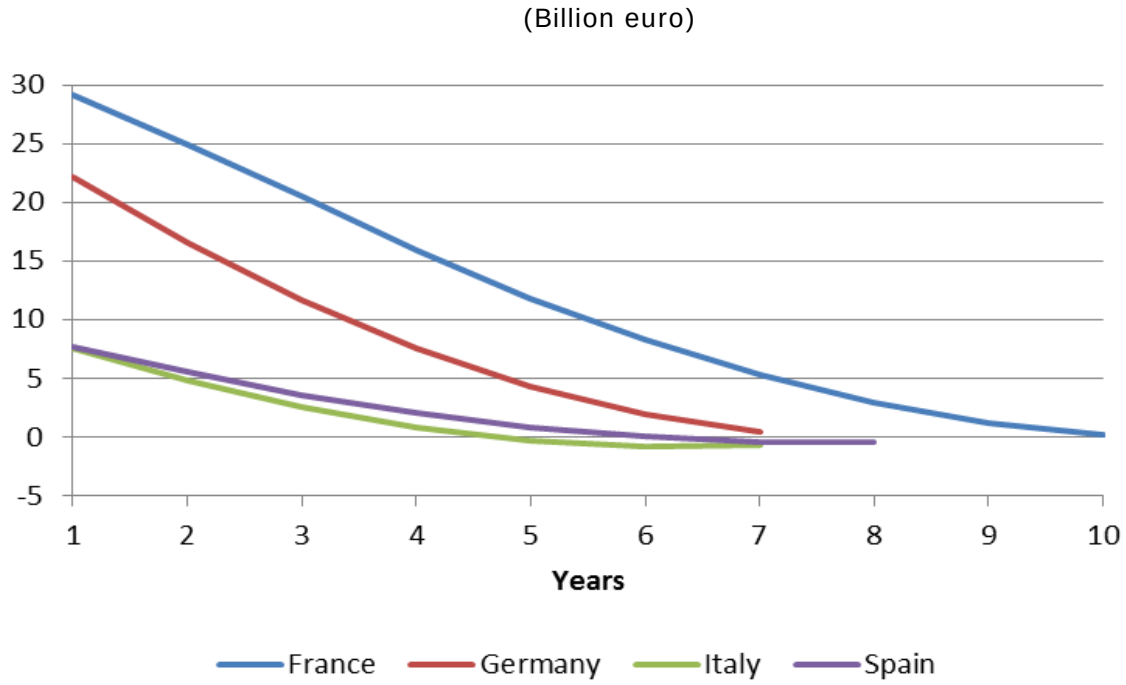
The potential losses decline over time from quite substantial levels (Figure 1). France and Germany start with potential losses of around €37 billion (as outstanding French government bonds exhibit the longest average maturity) and Germany is expected to purchase the largest fraction of the QE programme. Italy and Spain start at loss levels around €20 billion, because of a smaller amount of government bonds to be purchased and relatively short average maturities of outstanding debt.[11]

[10] The yield on average German government bonds ("Umlaufsrendite von Anleihen der öffentlichen Hand") was 0.27% at the start of the QE programme, while the average of this yield since the introduction of the Euro is 3.29%. Thus, assuming a 300 bp increase of the interest rate implies a return to average capital market conditions. Given that the Bundesbank publishes an official discount factor (§253(2) HGB) of 4% for 10 years maturity of investments, our choice represents a quite moderate assumption.

[11] The calculated potential losses crucially depend on the assumption for the interest rate path. For example, a lower increase of interest rates leads to more moderate losses from present value calculations. If we assume a 200 bp increase instead of 300 bp, the projected loss in case of selling all bonds in the first year after QE completion is €11 billion lower for France and Germany, and €7 billion (€5 billion) lower for Italy (Spain). The elasticity of losses with respect to future market interest rates declines when approach maturity.

The above calculations might be perceived as artificial in the sense that a potential future interest rate increase materialises in a more gradual fashion and a successful policy to counter the European government debt crisis will lead to a decline in bond spreads vis-á-vis Germany. Thus, we also investigate an alternative scenario where after the completion of the QE programme European government bond yields have converged to a level of 0.5% and increase at a yearly delta of 0.5% to a maximum of 4%. Assuming Rational Expectations, private sector agents will use these interest rates as discount rates to calculate present values of government bonds. The increase in discount rates typically leads to a slight convexity of time paths of the associated losses for the respective national central banks (Figure 2).

Figure 2: Interest Rate Risk of QE



Source: Own calculation based on data from Claeys et al. (2015).

Due to lower average discount rates, the projected losses decline substantially, ranging from nearly €30 billion in the case of France and roughly €8 billion in the case of Italy and Spain in the first year. The relatively lower decline in overall losses for France arises from a stronger influence of high discount rates due to extended maturities. Interestingly enough, for Italy and Spain, the losses from interest rate risks may turn negative, because the increase in the level of European interest rates is compensated by the decline in government bond spreads.

The different scenarios show that under a fairly broad range of assumptions, projected losses remain economically significant. This is largely a result of the maturities of outstanding government bonds and the ECB's commitment within the QE programme to outright transactions, i.e. to the principle of 'held-to-maturity'. A return to more conventional monetary policy might thus be perceived to be expensive, particularly in the period right after the completion of the QE programme. In turn, the private sector may interpret the incentive to remain interest rates at low levels as an obstacle to credibility of a future announcement to return to more conventional monetary policy.

5. CONCLUSION

The ECB has launched the PSPP in March 2015. The programme extends existing asset purchase programmes (€10 billion per month) to debt securities with a market value of €50 billion per month. Overall, 20% of these additional purchases will be held by the ECB and are subject to risk sharing, 80% will be held by the NCBs and are not subject to formal risk sharing. The major part (€44 billion per month) of the PSPP will be used mainly to purchase sovereign debt of euro area member states and will be allocated across countries in correspondence to the ECB's capital key.

The ECB has set several criteria and limits for bonds to be eligible for the PSPP, most prominently the limit not to hold more than 25% of any given issue of bonds. According to the ECB the 25% per issue limit was set to avoid the question of monetary financing of governments as any higher ownership share would give the Eurosystem a blocking minority in any restructuring process. However, the mechanism of monetary government financing via sovereign bond purchases by the central bank works irrespective of such a blocking position.

An analysis of euro area sovereign bond market indicates that the major part of the PSPP can be carried out until September 2016 although some smaller countries have not issued a sufficiently large amount of sovereign debt to fully participate in this programme. If the PSPP was to be continued beyond September 2016 (or extended in terms of volumes), it would become more and more difficult for the Eurosystem to carry out the major share of the monthly asset purchases. In this case the eligible amounts of sovereign bond of several larger countries (such as Germany) as well as those of supranational institutions would turn out to be insufficient. Then, the ECB might be forced to adjust its limits and criteria to pursue its asset purchases.

Via the PSPP, the ECB is taking substantial risks on its balance sheet. Major risks are sovereign default risks and interest rate risks both of which are difficult to quantify. Interest rate risks emerge as soon as future circumstances urge the ECB to tighten its monetary policy stance while still having a significant amount of low yielding bonds on its balance sheet. Scenarios for present values variations indicate substantial interest rate risks if the ECB were to start severe tightening of its monetary policy directly after the envisaged end of the PSPP. Of course, these risks diminish the later and the slower interest rates increase.

The potential losses due to the PSPP should be compared to the expected interest earnings from holding additional securities. These earnings will, however, be relatively small due to the low yields of relevant bonds in the euro area. Estimates indicate that the expected interest payments received from sovereign debt will amount to about €4 billion between March 2015 and September 2016 (Claeys et al. 2015). By international comparison, the expected interest payments due to Quantitative Easing programmes received by the Eurosystem are also relatively small. For example, the Fed started its Quantitative Easing programmes in a period when yields of US government bonds were considerably higher. Therefore, the Fed's interest earnings were higher and its interest rate risk exposure lower compared to the ECB. Overall, the financial risks resulting from its Quantitative Easing programme seem to be higher for the ECB than for the Fed.[12]

Estimates of the loss absorption capacities of the NCBs indicate that these capacities seem to be sufficient to deal even with the extreme case of substantial sovereign defaults for the

[12] For detailed projections how the Fed's balance sheet is impacted by its quantitative Easing Programmes, see Carpenter et al. (2015) or Greenlaw et al. (2013).

PSPP in its current setup. Therefore, the risks for recapitalisation needs of national central banks or of additional risk sharing that goes beyond the current arrangements seems to be limited from the today's perspective.

The PSPP could have several implications for monetary policy. First, it increases the incentives for the ECB to choose inferior more accommodating monetary policy stance than its mandate by itself would dictate to avoid losses due to interest rate risks or due to sovereign debt defaults. Second, it weakens the independence of the ECB by making her more dependent on the fiscal soundness of the euro area member states. Third, the financial risks that are related to the PSPP may be perceived by market participants as a signal that interest rates will remain low for an even longer period than they would otherwise be. However, this implication may be intended by the ECB as this perception could help to lower long-run interest rates.[13] Fourth, in extreme scenarios the PSPP significantly harms the financial health of the Eurosystem reducing its capacity to ensure price stability. Fifth, the PSPP may contribute to higher volatilities in the targeted bond markets or feed asset price bubbles. This would counteract some of the envisaged effects. However, such risks are difficult to assess. Sixth, if the ECB wants to expand its asset purchase programmes it may have to deviate from its current limits and criteria for eligible debt securities.

[13] In this regard, Quantitative Easing could be interpreted as a means to make the 'forward guidance' efforts of central banks more credible.

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APPENDIX: THE FISCAL IMPLICATIONS OF MONETARY POLICY

This appendix highlights the fiscal consequences of monetary policy in general and of quantitative easing in particular. The goal is to clarify the main conceptual issues that are relevant to the debate about the ECB's balance sheet and the balance sheets of national central banks. These issues underlie the more detailed and quantitative discussion in the main text that concerns risks to the Eurosystem and to taxpayers. Meanwhile, this appendix discusses why these risks are relevant in the first place. Furthermore, it is helpful to have a clear understanding about what the ECB's policies should be or should not be expected to accomplish, with respect to the fiscal situations faced by national governments.

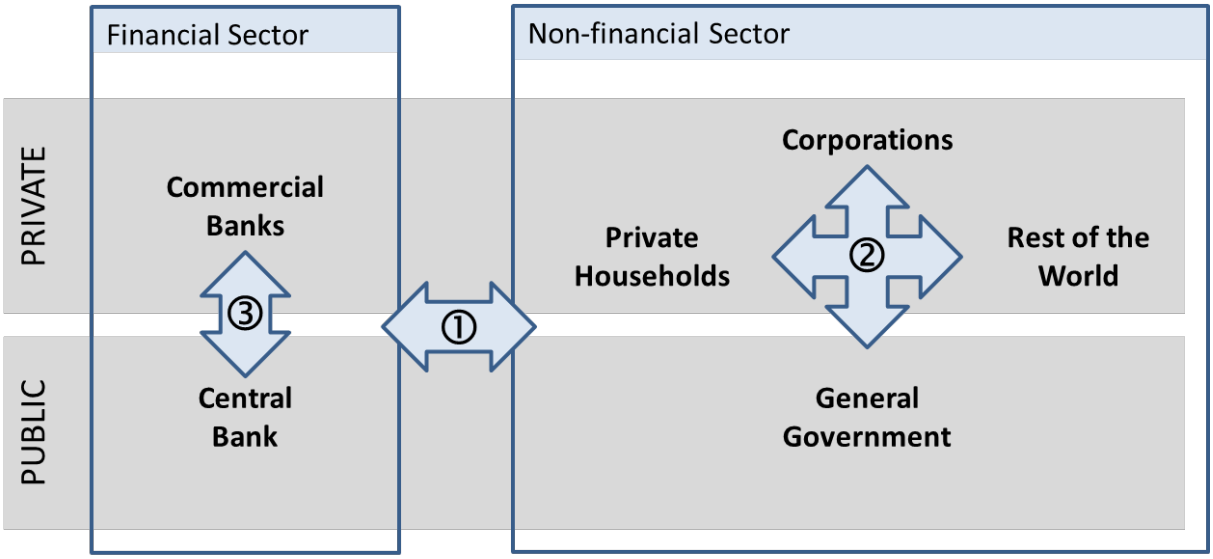
A.1 Monetary and fiscal policies

A.1.1 Monetary and fiscal policies are tightly linked

The public debate on the ECB's quantitative easing policy suffers from some confusion as to where to draw the boundary between monetary and fiscal policies. This is in part because, in reality, there is no clear boundary. In fact, this lack of a boundary is implicit in the rule against monetary financing, since such a rule would not be necessary in the absence of relationships between monetary and fiscal policies. These relationships also come into play when discussing the benefits and risks that may result from the ECB's policies of quantitative easing. Also, it is helpful to address a few misconceptions about what the ECB's balance sheet represents, in a broader accounting and economic context. This context is one whereby the monetary system is backed by credit, and this credit in turn is backed by national governments and, ultimately, their taxpayers.

The relevant relationships between monetary and fiscal policies include, at their core: (1) a set of relationships that link the assets and liabilities of the ECB with the balance sheets of national governments, and in turn of taxpayers, and (2) an inverse relationship between the price level and the real value of government debt. Both of these relationships in turn place tight constraints on what the ECB can actually hope to accomplish through quantitative easing. Therefore, while the economic effects of quantitative easing should be evaluated on their own merits, the links between fiscal and monetary policies implies that the ECB's quantitative easing program does not provide a free lunch.

Figure A1: Sectoral Classification, Money Creation, and Financing



① Money creation and financial intermediation
② Financing
③ "Quantitative Easing"

One of the main sources of confusion in the current debate is the complicated institutional structure linking governments and monetary authorities. This structure features overlapping sectoral concepts with respect to institutions and ownership (shown in Figure A1). Institutionally, the general government belongs to the non-financial sector (sometimes called the "real sector"). The real sector is where people produce goods and services, generating income, which the government then redistributes in part. By contrast, the financial sector creates money, which allows people in the real sector to indirectly exchange the goods and services that they produce. In parallel, commercial banks direct funds between lenders (savers) and borrowers (investors), in a process known as financial intermediation. In terms of ownership, however, both the central bank and the general government belong to the public sector (in a wider sense) while commercial banks and all remaining non-financial institutions belong to the private sector. Furthermore, in an economic sense, the private sector owns the public sector, and the real sector owns the financial sector. Anything that these sectors do must therefore be financed by the real, private sector.

A.1.2 The monetary financing of governments

Financing is the exchange of present goods for future goods. This is reflected in lending and borrowing transactions between economic agents (at the micro level) or sectors (at the aggregate level). These transactions occur because savers and investors are not necessarily the same person. Strictly speaking, there is no such thing as "monetary financing" in the sense of lending from the central bank to the government, as the purchasing of government bonds by central banks boils down to substituting one financial asset (sovereign bonds) issued by the government for another financial asset (high powered money). This high powered money is issued by the central bank, which in turn is owned by the government. However, this is not financing as described above because the central bank cannot produce any goods or services.

This implies that "monetary financing" by the central bank works in an indirect way. When the central bank creates additional money and buys new government bonds, the

government receives newly created purchasing power. This allows the government to buy goods and services, near the old price level, from other real sectors (the Cantillon effect). This process injects new money into circulation, leading to an increase in the general price level. This increase in the general price level functions like a tax on the holders of nominal assets such as nominal bonds or money. This tax, known as the inflation tax, transfers resources from the private sector to the public sector.

By contrast, the ECB's QE programme works in a different way. While the monetary financing of governments involves issuing new money to cover public budget deficits, the ECB's QE programme involves purchasing already outstanding bonds from commercial banks, in exchange for new money (monetizing the public debt). If commercial banks then lend out this money to the private non-financial sector, this would also inject new money into circulation which would also lead to an increase in the general price level. While the government in this case does not benefit from the Cantillon effect, the resulting inflation still functions as a tax. In addition, the QE programme is expected to reduce nominal interest rates, which in turn eases the financing conditions of governments. This would allow governments to run higher primary deficits. Therefore, even though the ECB has declared that its QE programme is not intended to work as monetary financing, the QE programme in practice cannot avoid some degree of monetary financing.

A.2 The monetary base is not net wealth

A.2.1 Quantitative easing is not a unilateral transfer

Given this setup for the quantitative easing program, quantitative easing does not involve any unilateral transfers from central banks to private actors, nor from central banks to governments. At its most basic, quantitative easing consists of exchanging a liability for the ECB (the monetary base), for an offsetting asset (government bonds or, in principle, other assets). This setup, in fact, resembles the Federal Reserve's open market operations, and as such, quantitative easing at the outset is a pure financial operation. However, a pure financial operation does not create a net claim on real assets, nor does it affect the distribution of these claims at the outset. This is because every increase in the monetary base creates a liability for the central bank, and this liability is exchanged for an asset of equal value, such that no unilateral transfer takes place. Furthermore, for the private banking sector, this increase in the monetary base represents an asset, for which the private sector gives up an asset of equal value. This means that the effects of quantitative easing do *not* come from an increase in the size of balance sheets, but rather through a change in the structure of public and private balance sheets. This structure might be important to the extent that, from the perspective of the private banking sector, the monetary base is a poor substitute for government bonds, or to the extent that the government bonds of different countries are poor substitutes for each other. In addition, quantitative easing may provide signals about future policy behaviour. These channels are summarized in the previous report of Gern et al. (2015), which summarizes previous studies on the effects of quantitative easing. These studies have tended to find that quantitative easing seems to provide a small but positive amount of economic stimulus in practice.

A.2.2 The ECB's balance sheet is not net wealth for the EU

Since the monetary base appears as a liability on the central bank's balance sheet, and the central bank issues these liabilities in exchange for assets, changes in the relative values of these liabilities and assets must result in changes in the central bank's equity. Such changes in equity might occur because, for example, bonds issued by national governments may return interest rates that are different from those paid on reserves, or a national government might default on its bonds. The resulting net gains to the ECB, when positive,

are known as seigniorage; seigniorage results when the ECB earns a positive return on its balance sheet.

At first sight, it might appear that the ECB can engage in seigniorage or bear losses on assets in lieu of private households, thus generating net wealth; however, a closer look reveals that this is a misconception. This inability of the ECB to create wealth out of thin air is another implication of credit-backed money creation—the ECB cannot generate net wealth for the EU as a whole, because national governments and their taxpayers must foot the bill (even if implicitly) for any losses incurred by the ECB, while the ECB remits any gains from seigniorage to these same governments and taxpayers. This is even though seigniorage revenues are typically positive, which means that the ECB already engages in some degree of monetary financing. However, the fact that the taxpayers own the ECB means that, at the end of the day, the seigniorage revenues or losses created by the financial operations of the ECB cannot by themselves create net wealth for European taxpayers. This is the same line of reasoning behind the claim by Barro (1974) that government bonds are not net wealth. Furthermore, this line of reasoning implies that seigniorage functions like an increase in revenue. Instead, any changes in net wealth must come from the secondary economic effects of quantitative easing—for instance, from a higher rate of investment caused by a fall in interest rates, or an increase in the supply of goods and services which results from a temporary rise in inflation.

A.2.3 But, there can be important distributional implications across EU countries

While the disposition of seigniorage revenues implies that the ECB's policies have fiscal implications, the ECB's policies can also have important effects on the distribution of wealth across EU countries. These effects occur when, for instance, interest rates and bond prices do not move together across countries, or in an extreme case, when a government (such as Italy) defaults on debt held by the ECB. In this case, the ECB loses equity, and European taxpayers must make up for this change in equity. In practice, such a case would result in a transfer of wealth from the taxpayers of the non-defaulting countries to the taxpayers of the defaulting country. This mechanism represents a form of "risk sharing" across countries. In addition, such a situation could present problems with moral hazard, by creating an incentive for a country to strategically default.

To avoid such a situation and minimize "risk sharing", to the degree that risk sharing is unwanted in the first place, several proposals have described mechanisms which would shield the ECB and its ultimate owners, the taxpayers, from country-specific default risks. For instance, the proposal by de Grauwe and Ji (2015) involves increasing countries' shares in seigniorage revenue by the interest that they pay to the ECB, and reducing countries' shares in the equity of the ECB by any shortfalls caused by default. This type of mechanism would provide some protection against the distributional implications of quantitative easing, although it can be somewhat complicated in practice (especially when the QE program is large relative to the equity of the ECB), and with unknown spillover effects. Another proposal involves placing debt held by the ECB in a senior position relative to debt held directly by the private sector. However, as the pseudonymous JKH (2015) points out, such proposals still cannot address risks to the ECB's aggregate balance sheet that come from the possibility that the ECB may suffer a loss on the asset side, which would result in a fall in equity. Such a situation would correspond to negative seigniorage. In general, given these main points, it appears possible to reduce the amount of "risk sharing" in the system, although this reduction would come at the cost of making the system more complex. Furthermore, this reduction in cross-country risk does not imply that it is possible to completely eliminate aggregate risk to the ECB's balance sheet and hence to taxpayers in non-defaulting euro area member countries.

In practice, given these complications, the ECB chose a different route, which seems to engineer away the presence of residual risk to the ECB. However, even then, it is not likely that these risks have been fully eliminated. Under current plans, the ECB plans to subject 20% of its bond purchases to explicit risk sharing, while the ECB intends for 80% to avoid risk sharing. For these 80%, the ECB's quantitative easing program attempts to avoid a large degree of risk sharing by having national central banks hold the bonds of their own governments on their balance sheets. However, as Wright (2015) points out, this structure for the quantitative easing program may still expose the ECB and its equityholders (and taxpayers) to sovereign risk. This is because for the 80% of bonds that are held by the national central banks, these bonds are financed with reserves created by the ECB. The ECB lends these reserves to the national central banks in exchange for obligations on these central banks, obligations which represent assets on the ECB's balance sheet. At the same time, these obligations appear on national central banks' balance sheets as liabilities, to match the government bonds held as assets. However, in the event of a sovereign default, these bonds would be permanently written down, which would put pressure on the asset sides of the national central banks' balance sheets exactly at a point in time when the national central banks cannot turn to their own governments or to the public for new funds. For this reason, and for the same types of political reasons that would lead to a sovereign default in the first place, central banks can find themselves under pressure to default on their obligations to the ECB. Therefore, while the mechanism through which the ECB engages in quantitative easing through national central banks may at first glance insulate the ECB from some risks, this mechanism is not likely to eliminate risks to the ECB that may arise when national governments default, bringing their central banks down with them.

A.3 The price level is also a major fiscal policy tool

Finally, there is a tight link between the price level and fiscal policy insofar as the real value of government debt is affected by changes in the price level, such that for a given nominal stock of public debt, an increase in the price level drives down the real stock of public debt. However, the real value of the public debt always equals the present value of real primary surpluses. In turn, this equivalence implies that, in the absence of Ponzi schemes, the price level must also be compatible with expectations about the sustainability of future fiscal policy. In fact, as shown by Sargent and Wallace (1981) and Leeper (1991), for a monetary authority such as the ECB to fulfill its mandate for a stable price level, fiscal authorities must in turn be willing to credibly act in a way that keeps the public debt at sustainable levels. When market participants begin to believe that this may not be the case, as in Argentina in the early 2000s, they then try to sell off the public debt, at which point the central bank must decide: allow the public sector to default, or let the price level rise? Both actions would have a similar effect, by wiping out a portion of the real public debt. A much less dramatic version of this situation is known as the "fiscal theory of the price level", in which central banks accommodate themselves to the price fluctuations caused by changes in the fiscal outlook. Although this theory is not completely uncontroversial as a positive theory (see, for instance, Bassetto 2008), this is the type of situation that the Maastricht Treaty, Stability and Growth Pact, and Fiscal Compact were intended to prevent.

The links between quantitative easing and expectations-driven inflation are not yet well understood, although theoretical results and past practice hint at the importance of expectations about the future fiscal policy regime. For example, if quantitative easing reflects a signal that future fiscal policy is expected to follow a less sustainable course, then this could put upward pressure on the price level, or else if these expectations are not accommodated, this could result in a higher default risk. Alternatively, if European governments do not credibly follow a sustainable fiscal policy path, then this could put the ECB into an unpleasant, Argentina-like situation. The ECB could respond by accommodating

a large increase in the price level, which would reduce the value of the debt, especially for the indebted countries. Or, the ECB could stand its ground and allow for individual countries to default, in which case it may receive political blame for precipitating the crisis in the first place. Either way, the ECB's independence is tied to the way in which fiscal policy is conducted in the EU's member countries.

A.4 Conclusion: No free lunches, including with respect to risk sharing

The basic issue looming in the background of this discussion is that a set of relationships links the ECB's policies to the fiscal policies of national governments, and it is important to keep these relationships in mind when discussing the ECB's quantitative easing program. These relationships imply that quantitative easing does not only have possible effects on financial markets, but it also has implications for fiscal policy at the national level. Furthermore, while it is possible to set up programs in such a way to address some of these implications (such as risk sharing), these programs still have consequences for fiscal policy that cannot be engineered away. These consequences are the basis for the more technically-oriented discussion that takes place in the main text.

European Parliament

DIRECTORATE GENERAL FOR INTERNAL POLICIES

POLICY DEPARTMENT A: ECONOMIC AND SCIENTIFIC POLICY

Sovereign bond purchases and risk sharing: Myth and reality of the European QE

Eddie GERBA, Corrado MACCHIARELLI,

IN-DEPTH ANALYSIS

Abstract

In March, the Eurosystem started to purchase on the secondary market euro-denominated bonds issued by governments, agencies and European institutions. The total amount of bond purchases is estimated to 1.14 trillion EUR until September 2016, or 60 billion EUR per month.

The size of the Expanded Asset Purchase Program raises issues of scarcity of bonds to be purchased by the Eurosystem without inducing a fall of yields at record (negative) levels. Several sovereign bonds (Germany, France, Netherlands) already exhibit negative rates.

Against this background, this paper reviews the main features of government bond markets in the Euro-area, including its size, structure, and current developments. Moreover it discusses the (potential) financial risks that the Eurosystem might be taking on its balance sheet in view of the currently low (or negative) yields and (expected) shortage in supply of sovereign bonds.

CONTENTS

EXECUTIVE SUMMARY

The expanded asset purchase programme (EAPP) announced in January is aimed at fulfilling the ECB's price stability mandate, in particular aimed at achieving an inflation rate below but close to 2%. The EAPP consists of monthly purchases of EUR 60 billion in public and private sector securities, purchases under the public sector purchase programme (PSPP) of marketable debt instruments issued by euro area central governments, certain public agencies located in the euro area or certain international or supranational institutions. Some restrictions have been applied on the size and composition of the bond purchases in order to mitigate potential risks from monopolizing the market. The purchases will run until September 2016, or until the level of inflation is consistent with the ECB target.

The currently low (or negative) yields for many segments of Eurosystem sovereign bonds coupled with possible shortages of available bonds to purchase poses challenges to the success of the programme. However, based on the current projections, the restrictions inherent in the program should not be binding, and therefore the scarcity in the supply of bonds should not be an issue. Nonetheless, as evolving economic conditions may drastically affect the bond market. We therefore identify a number of potential financial risks that need to be considered and monitored:

- At the start of QE there was essentially an effect on negative front-end yields (2 years). Subsequently, there has been a substantial flattening on the long end of the curve (maturity above 20 years). This is likely to force investors to look for riskier assets, via a significant portfolio rebalancing.
- At the same time, with Grexit concerns being on the rise, the price impact of QE in pushing periphery yields lower may increase going ahead. Importantly, this may not be the case for Greece, as markets may be willing to discriminate even more, especially if the ECB will be pushed into a situation where the 25% and 33% QE limits become biting.
- A fall in yields into negative territory for German Bunds of up to 4 years maturity, the self-imposed restrictions on the EAPP program, and the high appetite amongst institutional investors for holding bonds for regulatory and liquidity purposes puts a lot of uncertainty on the timing of a potential shortage of bonds.
- High market volatility during the second month of QE has forced financial intermediaries to hold more capital to offset this volatility (please see Draghi's recent remarks on the volatility issue – ECB press). Coupled with a generally low-yield on these bonds, this could result in losses for financial intermediaries. Possible consequences of this could be a reduction in overall (private) lending activities.
- Negative yields and high market volatility introduce noise into security prices, which makes the risk management by financial intermediaries much more problematic. In extreme cases, this can lead to an under-pricing of risks.
- There is already some evidence that negative yields may induce capital outflows from Europe to the US (and possibly to Asia and the Middle East). Moreover, the record-low yields are spreading to other fixed-income segments, such as corporate bonds, where already some the big firms issue bonds at negative yields.
- While the limited risk-sharing arrangements of QE purchases do not constitute a major risk to the ECB's balance sheet, a limited European guarantee and course of actions may make markets believe that "QE is not enough" as the decoupling of Greek bonds has recently shown. To be credible the EAPP needs more mutualisation.

- A materialization of any of these risks might potentially undermine the success of QE and its overarching objective of reviving inflation and, ultimately, economic activity in the Eurozone. Therefore a careful monitoring of market developments as well as flexibility in the implementation of policy measures are crucial elements for the success of QE. We identify a number of measures which could mitigate some of the risks in the last section.

1. INTRODUCTION

As announced by ECB President Mario Draghi at the press conference of 22 January 2015, in March the Euro-system started the Expanded Asset Purchase Programme (EAPP), i.e. the purchase (on the secondary market) of euro-denominated bonds issued by governments, agencies and European institutions. The program foresees a key role of national central banks (NCBs) of the Eurozone in the purchase of sovereign bonds. This will be part of the European Central Bank's 1.14 EUR trillion landmark quantitative easing (QE) programme (or about EUR 60 billion/month) to be carried out until September 2016. Given its size and open-ended nature, QE has been at the centre of policy discussions.

One issue is the capacity of the Eurosystem to find enough sovereign bonds to be purchased without inducing a fall of yields at record levels. Critics of ECB's QE programme are concerned about the material risks of a drying up of the euro area bond market and potential (future) costs/losses incurred by the Eurosystem. This note will review and discuss these aspects in details.

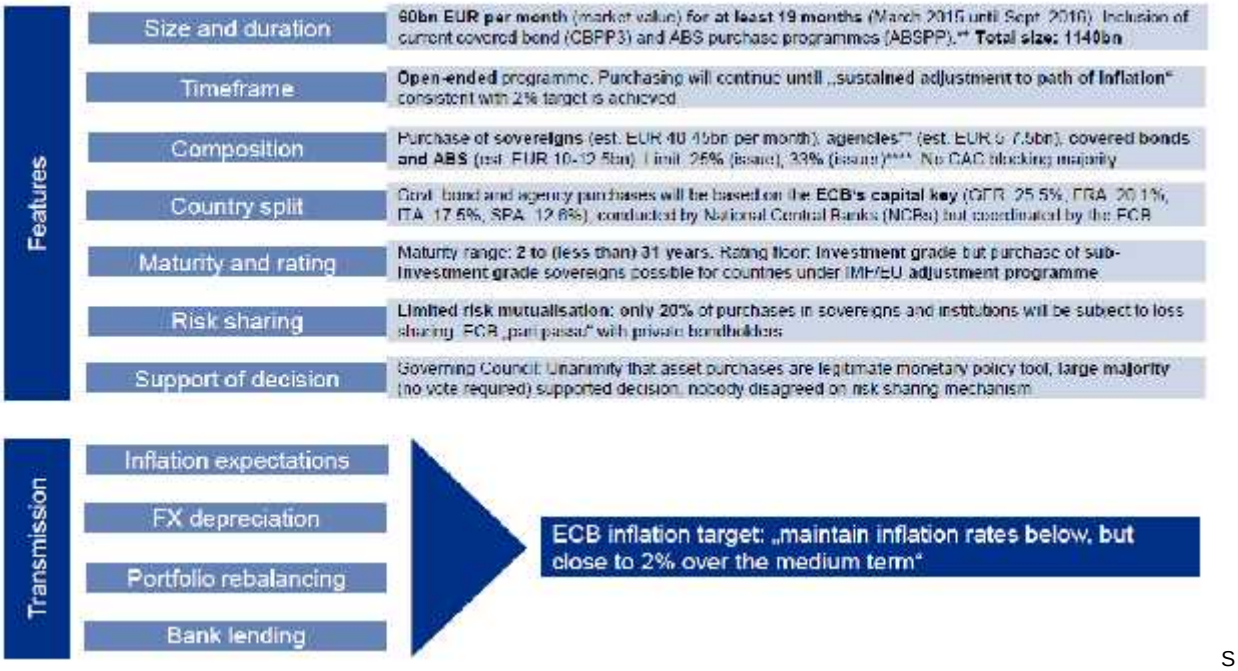
2. REVIEW OF THE EAPP

2.1. Details of the Programme

The Expanded Asset Purchase Programme (EAPP) announced in January is aimed at fulfilling the ECB's price stability mandate, i.e. at achieving an inflation rate below but close to 2% over the medium term.

The EAPP consists of monthly purchases of EUR 60 billion in public and private sector securities, purchases under the public sector purchase programme (PSPP) of marketable debt instruments issued by euro area central governments, by certain public agencies located in the euro area or certain international or supranational institutions. The purchases will run until September 2016, or until the ECB inflation target is met. An overview of the program and a summary of the key parameters are reported in Figure 1 and Table 1 respectively.

Figure 1: Key facts about ECB´s Expanded Asset Purchase Programme (or QE)



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Source: Allianz Global Investors Report

Such monthly purchases will be allocated to different asset classes. In particular, EUR 10 billion – the average value of the monthly purchases falling under the remit of the Asset-Backed Securities Purchase Program (ABSPP) and the Covered Bond Purchase Program (CBPP3) launched in October last year – will continue to be channelled through to purchases of covered bonds and asset-backed securities.

"Additional purchases" of EUR 50 billion – representing de facto the novelty of the EAPP – will be partitioned as follows. EUR 6 billion per month will go towards the purchase of the debt of supranational institutions located in the euro area; the remaining EUR 44 billion will be split among sovereigns and agencies.

Specifically, EUR 4 billion will be held by the ECB (8% of the €50 billion "additional purchases"), and EUR 40 billion will be held by the NCBs. As a part of this allowance, the NCBs will be able to choose themselves between purchases of sovereign bonds and the bonds of the agencies under their jurisdictions (ECB, 2015). A list of eligible agencies (as of May 2015) is provided in Table 2. The ECB has not specified what share should be spent

specifically on agencies' bonds, albeit market analysts estimate this amount to be around EUR 3.6 billion.[1]

Table 1: Calibration of the ECB Expanded Asset Purchase Programme
Timing: Purchases began in March 2015, intended to last until September 2016 and "in any case" until a sustained adjustment in the inflation path is achieved.
Volume: €60bn/month (total of all asset purchases). The additional purchases on top of the existing CBPP3 and ABSPP should be around €50bn/month.
Assets: Central government bonds, agencies and international or supranational institutions located in the euro area.
Country split: Purchases in government bonds and agencies to be divided according to ECB capital key.
Risk split: 80% of the additional purchases will be held by National Central Banks (NCBs) at their own risk, 20% of the purchases will be subject to loss-sharing, comprising the portfolio of European institutions (12% of additional purchases) and an ECB portfolio of government bonds and agencies (8% of additional purchases).
Volume limitations: 25% issue limit, 33% aggregate holding limit (issuer limit). Limits apply to total of additional purchases plus existing SMP portfolio.
Country limitations: Program countries will be excluded during their program reviews (e.g. Greece).
Maturities: 2-30 years.
Seniority: Eurosystem supposed to accept pari passu treatment.
Securities lending: Yes.
Inflation-linked debt, floaters: Eligible.
Reporting: Weekly reporting of the aggregate monetary policy portfolios detailed monthly reporting by issuer residence and weighted average maturity.

Source: Commerzbank's Rates & Credit Research

Table 2: Eligible issuers (as of May 2015) of bonds

International & Supranational QE Eligible Issuers
International or supranational institutions located in the euro area
Council of Europe Development Bank
EZ Atomic Energy Community
EZ Financial Stability Facility
EZ Stability Mechanism
EZ Investment Bank
EZ Union
Nordic Investment Bank
Agencies located in the euro area
Caisse d'amortissement de la dette sociale (CADES)
Union Nationale Interprofessionnelle pour l'Emploi dans l'Industrie et le Commerce (UNEDIC)
Instituto de Credito Oficial
Kreditanstalt fuer Wiederaufbau
Landeskreditbank Baden-Württemberg Foerderbank
Landwirtschaftliche Rentenbank
NRW.Bank

Source: ECB and Nikko Asset management

The ECB committed to buy government and corporate bonds in proportion to each country's 'capital key'. This is a measure of a country's size, calculated according to their population

[1] Bloomberg (Across the curve). Published on 26-02-2015.

and gross domestic product (in nominal terms). Hence, the ECB will buy more bonds from bigger countries than smaller ones. We will come back to this point later.

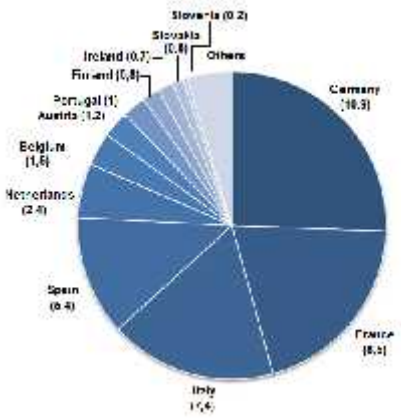
As for the previous programs (Security Market Program (SMP), Outright Monetary Transactions (OMT)), there will be no primary market purchases under the EAPP, regardless of the type of security, as such purchases are not allowed under Art. 123 of the Treaty on the Functioning of the European Union (TFEU).

To be purchased in the secondary market, the bonds must have a remaining maturity of 2 to 30 years, be denominated in euros and eligible as collateral for ECB monetary policy operations (i.e. typically collateralized lending or repos). The ECB has set a ceiling on what it is willing to pay for bonds — debt on offer at yields of below its deposit rate of minus 0.2 per cent will not be bought.[2] Taking into account these criteria, the monthly purchases of each country´s bonds that is expected to be bought under ECB´s capital key rule are presented in Figure 2.

With regards to the sharing of hypothetical losses, the Governing Council decided that purchases of securities from European institutions – which will be, as discussed, 12% of the additional asset purchases, and they will be purchased by NCBs – will be subject to loss sharing. The rest of the NCBs' additional asset purchases will not be mutualized. The ECB will hold 8% of the additional asset purchases, effectively meaning that the ECB should shoulder 20% of the overall risks associated with QE. The remaining risk will be held by NCBs.

On top of the eligibility criteria reminded before, the Governing Council also decided to put in place a 25 percent issue limit and a 33 percent issuer limit on Eurosystem holdings. An issue share limit of 25% was applied in order to avoid a situation where the ECB would gain a blocking minority in the event of a debt restructuring concerning collective action clauses. This issue limit therefore also covers existing Eurosystem holdings of sovereign bonds in the context of the Securities Markets Programme (under which the 25% issue share limit was not applied at the time of previous purchases) and any other portfolios owned by Eurosystem central banks.

Figure 2: Monthly purchases volume based on ECB´s capital key rule (in bn EUR)*



*Total monthly purchases held by NCBs is 40 billion Euros.

Source: Allianz Global Investors Report

Similarly, the issuer limit of 33% was meant to safeguard market functioning and price formation as well as to mitigate the risk of the ECB becoming a dominant creditor of euro

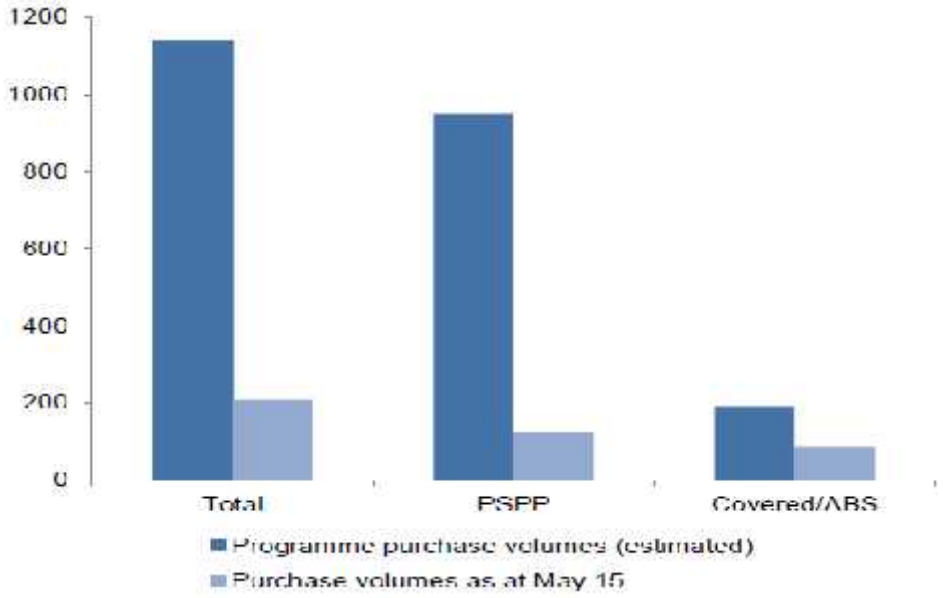
[2] Buying below the deposit rate would result otherwise into an accounting loss.

area sovereigns. In this respect, the 33% limit is applied to all eligible assets in the 2 to 30-year range of residual maturity. The 33% issuer limit applies to the combined holdings of bonds under all purchase programmes.[3]

Except for Greek debt, the 25 per cent and 33 per cent caps should at the moment not prove binding in a scenario where the ECB keeps a pace of monthly asset purchases of €60bn. The limits could be reached in the event the ECB would need to increase the size of its monthly purchases under QE or implement OMTs targeted on specific (peripheral) countries.[4] However, we recognize that many factors affect the liquidity in the bond market, as will be discussed in the subsequent section.

In terms of the amounts already purchased by ECB/NCBs as of May 15th, Figure 3 depicts the executed amounts versus the total estimated (until, at least September 2016). Looking at the shares between the national bonds (PSPP) and securities issued by agencies (Covered/ABS), the share of latter has clearly outpaced the former, and almost half of the estimated agency securities have already been purchased. Already now, this raises questions to whether the share of agency bonds will be expanded in the near future, or whether Eurosystem plans to stop purchases of those at some point. In any case, there is a high probability that the (estimated) 1-to-10 split between agency and sovereign bonds will be violated in the near future.

Figure 3: Composition and purchase volumes of the EAPP (in bn EUR)



Source: Allianz Global Investors Report

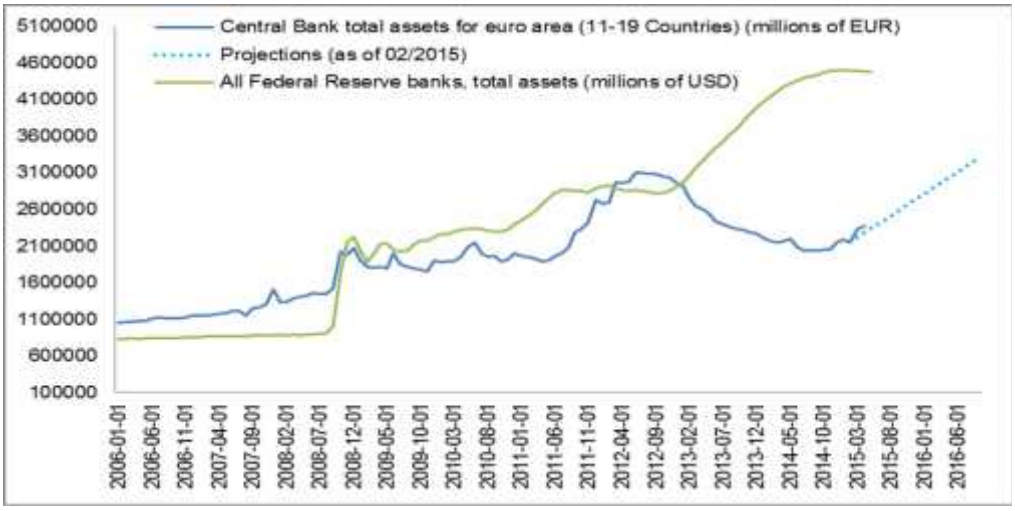
2.2. The nature and early effects of the intervention

Quantitative easing will certainly increase the size of the ECB's balance sheet. Figure 4 shows the asset side of the balance sheet. Unlike the Fed's balance sheet, which continued to increase, the ECB's balance sheet has shrunk for almost two years. Since July 2012, the ECB's balance sheet has declined from a little less than 3.2 trillion euros to about 2.2 trillion euros. Many economists have found this decline puzzling, given that the ECB's balance sheet was contracting as Europe fell into a recession. For the ECB we calculated the projections according to an estimated monthly purchase of EUR 60 billion until September 2016 so to hit the targeted 1.14 trillion asset increase.

[3] ECB (2015).
[4] Claeys, Leandro and Mandra (2015)

Figure 4: ECB and Fed Total Assets

(outstanding amounts, end of month)



Source: Federal Reserve Bank of St. Louis. Authors' calculations.

Whether this policy will succeed as intended is another issue. Economists continue to debate the effectiveness of the Fed's QE programs, and estimating the macroeconomic effects of such measures is clearly challenging.

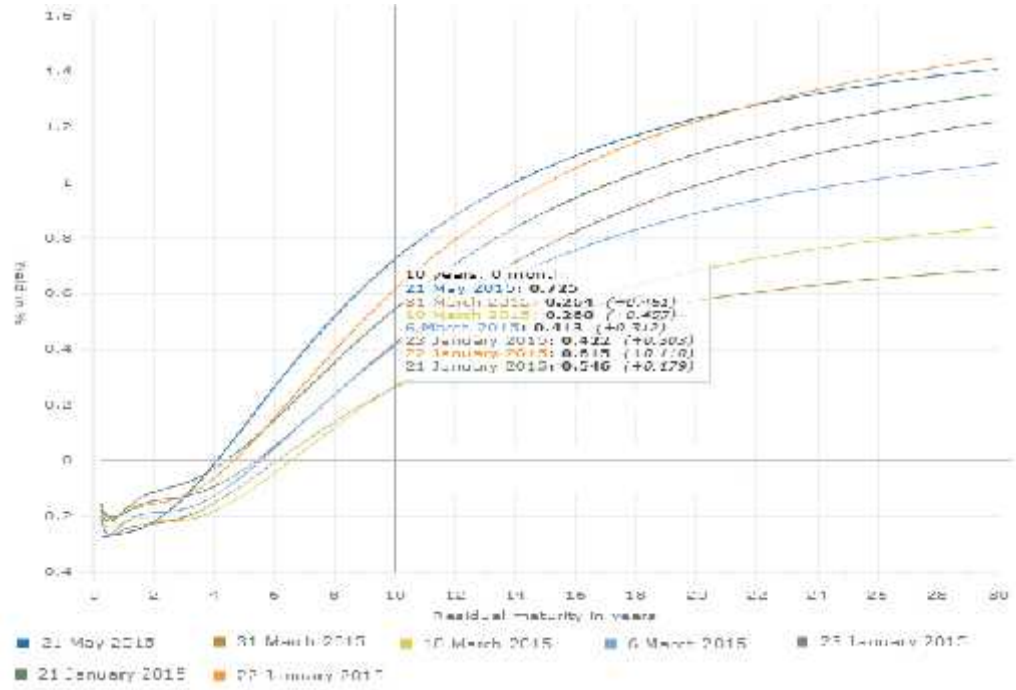
Similar initiatives to the European QE have been recognized to generally have success in the United States and the United Kingdom. According to IMF (2013), in the US, the cumulative effects of bond purchase programs on bond yields are estimated to be between 90 and 200 bps (estimates vary depending on methodologies and event windows). Most studies focused on LSAP 1 (Large Scale Asset Purchase) where the largest effects are found (between 50 bps and 100 bps). In the U.K., cumulative effects range from 45 bps to 160 bps.

However, the US and UK environment in which such measures took place was a different one. Also, the technical details of the programs were different as they were targeting different types of assets. In Japan, for instance, IMF staff estimates highlight that purchases of government bonds under the Comprehensive Monetary Easing and Quantitative and Qualitative Monetary Easing Program's policies reduced 10-year yields by a little over 30 bps.

As discussed in a previous note,[5] the effects of the ECB's quantitative easing are yet unclear. From what we can observe so far, the effect of the first round of purchases started on 9th March has flattened the entire yield curve, as well as shifted it down, compared to the curve before Draghi's announcement in January. Concerning the maturity distribution of sovereign bonds, it is important to note that most bonds – about three quarters of the 2-30 year range for the euro area as a whole – have a remaining maturity of less than 10 years.[6] Therefore, most of the purchases will likely take place within this range as the ECB intends not to violate "market neutrality".[7]

[5] "Financial (in)stability low interest rates and (un)conventional monetary policy", Monetary Policy Dialogue, note to the European Parliament, IP/A/ECON/2015-01, Mar 2015.
[6] Claeys, Leandro and Mandra (2015)
[7] ECB (2015)

Figure 5: Term structure of interest rates



Source: ECB website

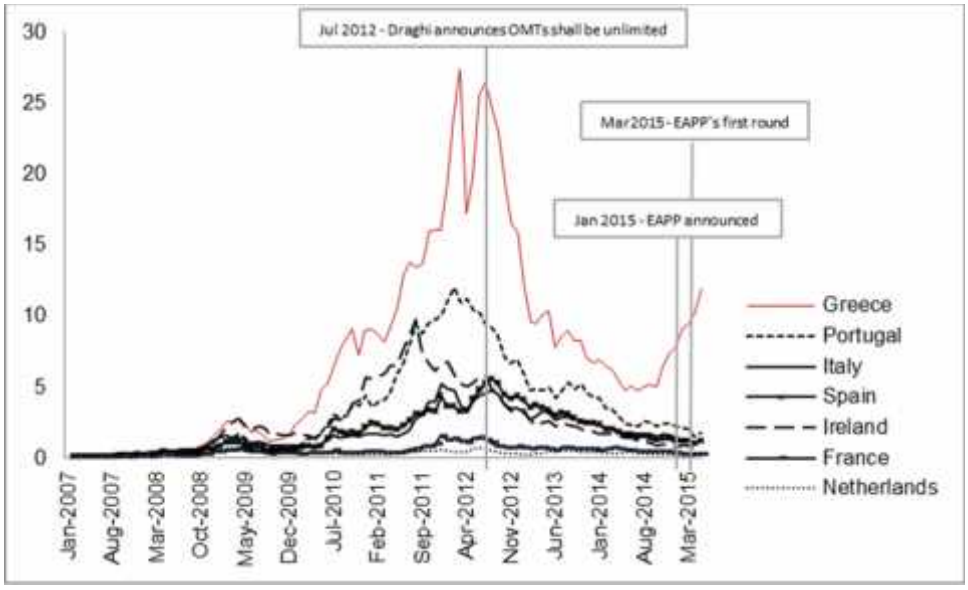
In Figure 5, we highlight some key or end of month dates (note that 6th March is the last trading day before the QE announcement of 9th March). From the figure, it is clear that once QE started there was essentially an effect on negative front-end yields (2 years). In addition, there has been a complete flattening on the long end of the curve (maturity above 20 years) following the last recorded date. This is likely to force investors out of the curve into riskier assets, via a significant portfolio rebalancing. Moreover, this introduces noise in bond prices. Some comments are warranted in the next section.

At the same time, as per the effect of these first months of QE, government bond spreads between core and periphery narrowed down further, getting close to pre-2010 levels. The announcement effect and subsequent rounds of QE nonetheless did not prevent a decoupling of interest rates between Greece and other peripheral countries, under the heightened tensions of a possible Grexit (Figure 6). In particular, with Grexit concerns being on the rise, the price impact of QE in pushing periphery yields lower may increase going ahead. Importantly, this may not be the case for Greece, as markets may be willing to discriminate even more, especially if the ECB will be pushed into a situation where the 25% and 33% QE limits become biting.[8]

[8] In this respect, contrary to its initial design, the OMT programme could no longer be seen as "unlimited". In the case of Portugal, for instance, the 25 per cent and 33 per cent limits would leave barely any room for OMT purchases in addition to the planned QE purchases. The Portuguese case would be another interesting one as the limits imposed by the ECB on QE purchases interact with previous acquisitions of bonds by the ECB or the NCBs, limiting the pace of purchases as of 2017 already (see Claeys, Leandro and Mandra, 2015).

Figure 6: 10-year sovereign bond spreads

(vs. German bund)



Source: OECD Statistics and ECB's Statistical Data Warehouse. Authors' calculations.

In addition, while the yields of German Bund decreased in the first month of EAPP purchases, they started to rise again in the second half of April. Volatility of yields dramatically increased in the second months of EAPP, both inter-daily as well as intra-daily, prompting many market analysts to diagnose the problem as a lack of supply in the Bund market, which also constitutes the largest share of the QE purchases. We will develop on this point below.

2.3. Current market reactions

Traders and market analysts have been very rapid in responding to the developments on the bond markets. In this section, we just wish to highlight a few of them in order to demonstrate the operational issues and challenges that are currently facing the QE program. We will discuss each one of them in further detail in the financial risks section below.

- "PSPP encourages market players to buy or hold on assets rather than selling them (e.g. asset liability management of insurance companies)", in relation to the limited (or low expected) supply of bonds, Ann-Katrin Petersen, Global Capital Markets & Thematic Research at Allianz, May 21, 2015
- "It will be challenging for the ECB to source enough government bonds to meet its QE targets", Anthony O´Brien, co-head of European rates strategy at Morgan Stanley, Feb 25, 2015
- "(European) passive investors and banks are unlikely to sell Bunds in large sizes due to investment mandates and regulatory reasons", Cagdas Aksu, rates strategist at Barclays, Feb 25, 2015
- "There is definitely a scarcity of safe assets, but a price will be found" in relation to the supply and price/yields of German Bunds, Luke Bartholomew, investment manager at Aberdeen Asset Management overseeing 323 bn GBP in funds, Feb 25, 2015
- "Even if the pace of decline in bond yields slows in the remainder of the year, the ECB could run out of eligible bonds from some governments by the turn of the year", Marie Diron, Senior Vice President at Moody´s, Apr 14, 2015

- “The reason why you are getting these wild fluctuations is due to liquidity – or rather the lack of it”, referring to the high volatility in Bund yields in late April, Steven Major, HSBC´s Head of Fixed Income Research, Apr 30, 2015
- “We were positioned to see yields move higher, so it´s been a favourable market move for us. But the speed of the move took everyone by surprise”, in relation to the high market volatility in May, Andrew Wilson, Chief Executive Officer at Goldman Sachs Asset Management who handles more than 1 trillion USD, May 7, 2015
- “Right now the market is in a state of shock. A lot of people are staying clear, and that makes the market less liquid, which is helping to exaggerate market moves”, Zoeb Saches, Head of European Government-Bond Trading at Citigroup Inc, May 7, 2015
- “It´s as though QE disappeared – it didn´t exist. In one week we had a total unwinding of all QE-related trades” in relation to the downward and then equal upward move in yields of German (and some other EZ) bonds, Franck Diximer, Chief Investment Officer for European Fixed Income at Allianz Global Investors, May 7, 2015
- “It´s a combination of drivers but the lack of liquidity is exacerbating everything else that´s going on. In the cash market for Bunds, our traders tell us that it is harder to get things done”, in relation to the scarcity of Bunds, Lyn Graham-Taylor, Rabobank, May 7, 2015
- “(European investors) believe the short-to-medium trend will be dollar appreciation, so it makes sense for them to look elsewhere, especially the emerging markets”, in relation to the observations that more investments are flowing out of EZ and into the Middle East, Angelo Rossetto, Trader at GMSA Investments, March 25, 2015
- “The repo market is still reflecting the growing mismatch between low supply and high demand for high-quality collateral, such as German Bunds...repo rates have recently become even more negative. Even if the ECB has introduced securities lending to mitigate this effect, these potential shortages might dampen further yield increases on the market for euro area government bonds”, Ann-Katrin Petersen, Global Capital Markets & Thematic Research at Allianz, May 21, 2015

3. FINANCIAL RISKS RELATED TO EAPP

Following from the data available so far on the purchase programme, and from the comments of (market) participants and (market) makers on the trends in the sovereign bond market, we wish to highlight the potential (and realized) risks from EAPP. In particular, we do not only include risks that materialize directly onto central banks balance sheets, but also those of the European financial institutions and capital markets, as they are at the core of a well-functioning monetary and financial system.[9] Moreover, in light of the newly proposed (and partially implemented) banking and capital market unions, the risks of QE generated on markets will play an even bigger role in the near future.

To structure our exposition, we have divided the analysis in two parts. First we consider the risks that low yields and shortage of bonds can cause in the immediate (or very near) future, the so-called 'static effects'. Next, we consider the effects that persistently low (or negative) yields and shortage of bonds can have on the market behaviour and central bank balance sheets in the near future. We call this second type 'dynamic effects' since these risks would only materialize if these (market) characteristics remain for many periods. Finally we consider risk-sharing issues arising from the EAPP set-up.

3.1. Static effects of QE

3.1.1. Scarcity of bonds and liquidity risk

To look at the issue of scarcity, we must refer to the net issuance of European bonds after the start of QE.

Table 3: Monthly gross issuance minus redemptions and expected QE, vs. historical April March (EUR billion)

	Mar-15	Apr-15	May-15	Jun-15	Jul-15	Aug-15	Sep-15	Oct-15	Nov-15	Dec-15	Average
Germany	-15	-13	0	-15	-15	-1	-9	-15	1	-18	-10
France	12	-10	11	11	-26	-9	12	-21	-9	-2	-3
Italy	8	4	15	-18	-4	-16	2	20	-5	-40	-3
Spain	-4	-15	10	10	-10	-5	9	4	-10	-1	-1
Netherlands	7	-12	3	3	-10	-2	3	2	2	-2	-1
Belgium	-10	1	2	2	1	0	-10	1	1	-2	-1
Austria	0	0	1	2	-12	0	2	0	0	-1	-1
Finland	2	-1	0	0	-4	0	1	0	0	-1	0
Ireland	0	-1	0	0	1	0	1	-1	-1	-1	0
Greece	0	0	0	0	-4	-3	0	0	0	0	-1
Portugal	-1	5	-3	-3	2	1	2	-6	0	-1	0
Total	0	-41	39	-8	-82	-36	12	-15	-21	-67	-22

Source: ECB, NCBs and JP Morgan from marketwatch.com[10]

Between April and May net issuance of Eurozone government debt and other bonds that qualify for ECB purchases jumped from negative EUR 41 billion to positive EUR 39 billion. According to market analysts, this was largely due to the "typical lack of redemptions", i.e. only a few bonds maturing this May (www.marketwatch.com), but also, as evidenced from Table 3 a zero net issuance of German Bunds.

With the ECB set out to buy EUR 60 billion a month, investors expect net issuance in the eurozone to remain negative. This is also evidenced from the last column of Table 3, where net issuance until January 2016 (excluded) is expected to be -22 EUR billion. According to

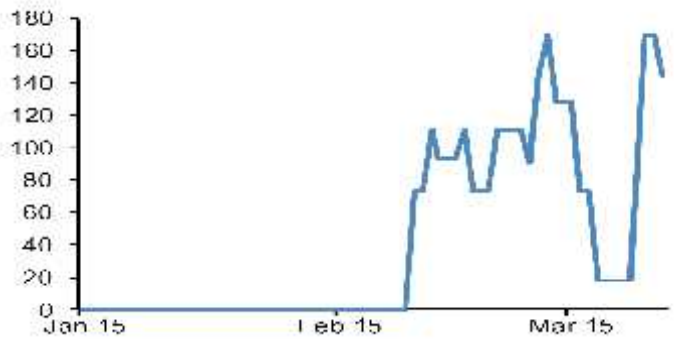
[9] And therefore can be transmitted to the CB balance sheet in an indirect manner, or at a later stage.

[10] http://www.marketwatch.com/story/there-may-be-a-simple-overlooked-reason-for-the-eu-bond-meltdown-2015-05-21.

these figures, the impact of bond supply is mainly concerned with German Bunds (but also with French and Italian to a certain extent).

JP Morgan (2015) highlighted a big increase in the number of euro government bonds between 2y and 30y traded below -20 basis points (i.e. the ECB's limit). In Figure 7 these numbers increased to 170 billion at the beginning of March, after the first QE round, mainly driven by German Bunds. According to JP Morgan (2015), this means that almost 4% of the EUR 4.6 trillion of 2y-30y euro government bonds and more than 20% of the EUR 800 billion of the whole 2y-30y German government bonds were traded below -20 basis points.

Figure 7: Euro area government bonds with maturity more than 2yr and yield <-0.2%



Source: JP Morgan (2015)

As Allianz (2015) points out, the ultra-loose monetary policy seems to be imposing the negative interest rate spectrum on high-quality credit rated bonds as the norm. As of May 21, 2015, one tenth of the EAPP eligible bonds have negative yields. The picture is even more drastic within the different maturities for the different sovereign bonds. According to Allianz Research, German Bunds under 4 years, and bonds of other northern European countries under 3 years were all traded at negative yields in May (Table 4). For Switzerland, the picture is even gloomier, where all bonds under 10 years are traded at negative yields.[11]

Table 4: European generic bond yields (in %)

	3M	1Y	2Y	3Y	4Y	5Y	6Y	7Y	8Y	9Y	10Y	15Y	20Y	30Y
Germany	-0,32	-0,22	-0,22	-0,17	-0,09	0,07	0,14	0,20	0,41	0,52	0,64	0,90	1,10	1,28
France	0,19	0,18	0,16	0,05	0,03	0,23	0,32	0,40	0,64	0,79	0,92	1,20	1,46	1,72
Netherlands	-0,24	-0,18	-0,19	-0,08	0,01	0,13	0,32	0,10	0,61	0,70	0,82			1,38
Belgium	-0,18	-0,18	-0,15	-0,01	0,11	0,21	0,36	0,10	0,06	0,80	0,93	1,13	1,41	1,68
Austria		0,10	0,13	0,00	0,11	0,20	0,35	0,52	0,65	0,12	0,76	0,96		1,41
Finland		-0,23	-0,20	-0,04	0,06	0,15	0,20	0,20	0,50	0,50	0,69	1,03		1,22
Switzerland		0,80	0,79	0,76	0,58	0,42	0,30	0,19	0,13	0,04	0,04	0,31	0,47	0,68
Sweden	-0,27	-0,37	-0,27	-0,15	-0,04	0,27		0,63			0,82			
Denmark	-0,93	-0,35	-0,31			0,05	0,36				0,84			1,35

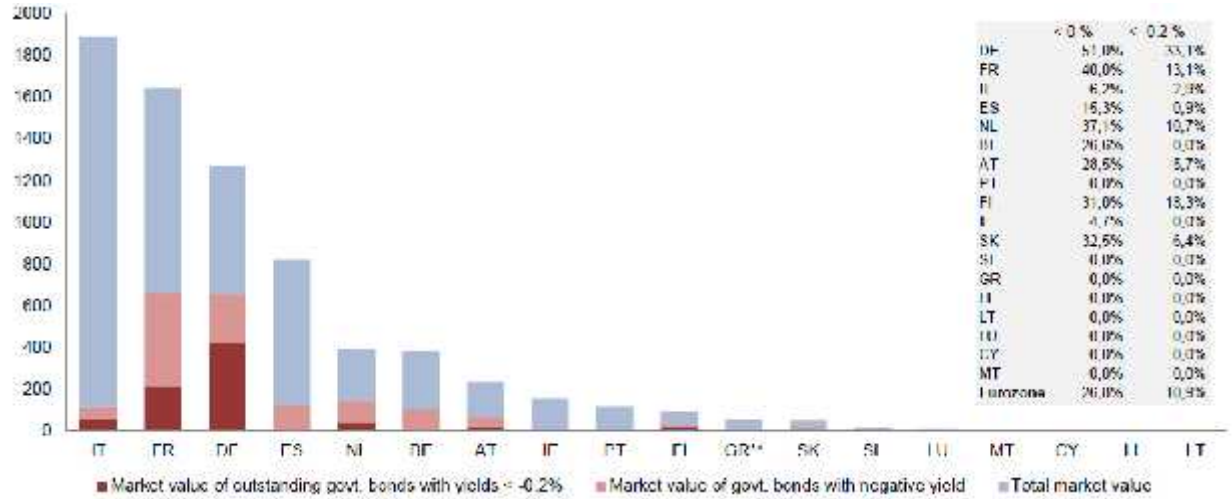
Non-EMU countries

Source: Allianz Global Investors Report

In terms of volume (bn EUR), the amount of outstanding public debt (as of May 19, 2015) with negative yields below ECB´s deposit rate at -0.2% per country of issuance is presented in Figure 8.

[11] Allianz Global Investors QE Monitor, Ann-Katrin Petersen, May 21, 2015

Figure 8: Total market volume of outstanding public debt at negative yields and yields below ECB's deposit rate (in bn EUR)



Source: Allianz Global Investors Report

Looking at these figures and taking into account ECB´s rule that only bonds with a yield higher than its own deposit rate are eligible for QE, this considerably shrinks the universe of debt it can buy.

Moreover, there are pressures from regulators of financial intermediaries not to sell high-quality bonds, and even to increase their demand. On the pension fund side, regulators require them to allocate the majority of their capital to safe, low-risk asset classes and AAA-rated sovereign debt. Further, the desire to conservatively hedge their portfolios ensures that the demand (supply) for high-quality bonds from pension funds is high (low). Insurance companies are equally (if not more) required to be conservative, and they use bonds to match the duration of their liabilities. For instance, life insurance companies match the life expectancies of their policy holders by buying long-term bonds. Lastly, for banks there is an intrinsic incentive to hold sovereign debt because of the capital requirement calculations. Sovereign debt requires the least amount of regulatory capital, which allows the banks to achieve maximum leverage. Therefore, low-yielding sovereign bonds with a minimal capital requirement are sometimes more attractive, on balance, than high-yielding assets since they tie-up much more of a bank´s scarce capital.[12] As Table 5 shows, the share of total bond-holdings that intermediaries are prepared to sell to ECB and NCBs is scarcely low.

Therefore, these regulatory constraints do not only cut the incentive for intermediaries to sell their bonds and increase the general supply, but push them to demand bonds even more. However, ECB´s action will likely crowd their demand out which might lead to significant demand/supply distortions and possibly failures of regulatory compliance.

Lastly, the self-imposed restrictions on the ownership structure of bonds and portfolio composition reduce the flexibility of the ECB to implement its measures under the low yield-scenario. This can aggravate the scarcity problem even further. At the beginning of the QE (March 12, 2015), BNP Paribas (2015) made a 'stress test' on the supply of bonds based on the available market data at the time. It shows that despite an increasing scarcity of German Bunds, QE ownership of bonds could still remain below the 25% limit per issue rule, if the central bank purchases more of the longer-dated bonds to maintain QE effective. In order for scarcity to turn into a shortage-of-bond problem, yields would need to fall by a

[12] Integrated Mortgage Planners at integratedmortgageplanners.com, March 2, 2015

further 10-15 bp (compared to the March 12 yield), as ECB's implied ownership would be 25.8% and 27.4% respectively, clearly violating the 25% restriction.[13]

Table 5: Holders of Eurozone bonds and their willingness to sell

All Euro area	€bn					%				
	Domestic	Non-domestic			Total	Domestic	Non-domestic			Total
		Euro	Non euro	Total			Euro	Non-euro	Total	
Central banks	270	236	1500	1736	2006	4%	3%	20%	23%	27%
Banks	1216	427	300	727	1943	16%	6%	4%	10%	26%
Insurance companies	802	300	120	150	952	11%	4%	2%	2%	13%
Pension funds	242	125	100	80	322	3%	2%	1%	1%	4%
Investment funds	380	432	50	482	862	5%	6%	1%	6%	12%
Others	620	718	90	308	928	8%	3%	1%	4%	12%
Total	3530	1738	2160	3898	7429	48%	23%	29%	52%	100%

* Domestic means investor is based in the country of the issuer

unwilling sellers (49%)

willing sellers (51%)

Source: Allianz Global Investors Report

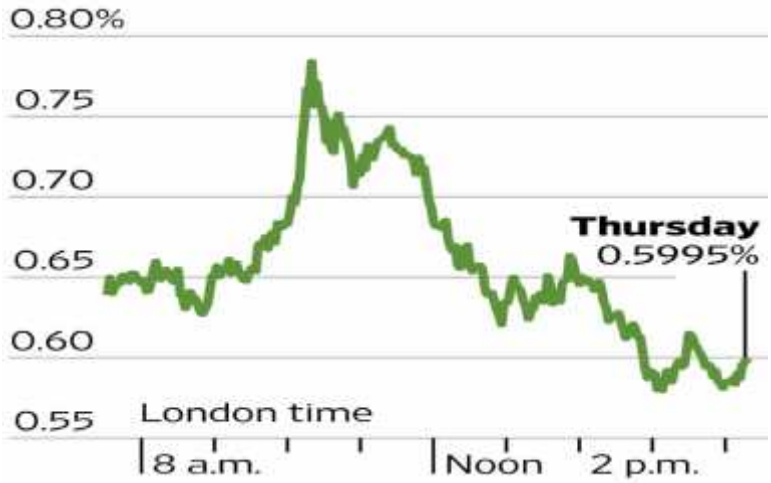
3.1.2. Volatility, regulatory capital and capital losses

Following a general drop in yields of all bond maturities during the first month of QE, there was a sharp reversal in the second half of April. For instance, while the 10-year Bund traded at the record-low 0.077% on April 20, it rose to a short-term record high of 0.796% on May 7.[14] This is more than a 10-fold increase in just over 2 weeks. Moreover, there has been high intra-day volatility since late April, which has made the markets nervous. As an example, Figure 9 shows the intraday yields traded on the 10-year German Bund on May 7. In a matter of 4 hours, the yield dropped 25 bp. The end-of-day yield was lower than the beginning-of-day yield, but the spike and then sharp drop experienced in a matter of a few hours is not the normal intra-day volatility.

Since Bund yields act as a ('risk-free') benchmark for other rates, an increased volatility in these affects other prices across European financial markets. That has already led to spill-over on the futures markets (futures are used as a hedge), where the volume of trading on 10-year German Bunds was more than the double the average for the past 5 years in the first week of May. Also intra-day volatility of other bonds sharply increased. Yields on French 10-year bond hit 1.10% before falling back to 0.90% later the same day (May 7). Equivalent Italian bond yield moved almost 30 bp., from 2.03% to 1.76%, on the same day.[15] Market analysts are unclear on what triggered these moves, but many point towards a lack of a European policy commitment in an environment where inflation expectations are starting to rise, a lack of liquidity, or ECB´s determination to see the euro weaken, as key drivers.[16]

[13] ECB QE: The thin line between scarcity & shortage, BNP Paribas, March 12, 2015
[14] WBP Online: Bye-Bye QE Effect: German Bund Yields Spike Amid Epic Bond Rout, May 7, 2015
[15] Wall Street Journal: European Bonds Back to Pre-QE Levels after Weeklong Selloff, May 7, 2015
[16] Analyzing the underlying causes is beyond the scope of this work, and more data will be needed to generate such studies. However, we do wish to point out the confusion that exists amongst market participants and market watchers, which could make the problems more serious in the coming months.

Figure 9: Yield on 10-year German Bund on May 7, 2015



Source: Tradeweb, The Wall Street Journal.

These moves can have sizeable effects on the balance sheet of banks, insurers and pension funds that, as we mentioned before, are holding a lot of these bonds for regulatory and liquidity purposes. Thus, an increase in volatility of the seemingly risk-free sovereigns might push up the volatility of the entire balance sheets, which would force them to hold even more capital to offset the perceived rise in volatility. Coupled with a generally low-yield on these bonds, this could result in losses for the financial intermediaries. Under the current market (and economic) environment, that would not be welcoming since this may cause them to reduce overall lending, either by charging a higher risk premium for credit, reduce lending volume, or both.[17]

3.1.3. Volatility, price noise, and risk management

Sharp price moves can also introduce noise into prices. This is in particular true for sovereign bonds, which are used as market benchmarks and which traditionally have been considered as a risk-free market alternative. However, with negative yields and sharp price swings, it becomes unclear whether the bonds remain risk-free under current market circumstances, or whether their risk profile has changed. For a financial intermediary´s risk management strategy it is crucial to know the price and risk profile of bonds, as their portfolio strategies will be measured against it. In normal circumstances, these bonds will be considered risk-free and therefore the risk-return profile of the intermediary's portfolios can easily be determined and subsequent hedging positions taken. However, if the prices of bonds carry noise and do not represent the 'true' risk profile of these instruments, the task of risk managers becomes problematic, as (market) benchmarking becomes difficult to obtain. In extreme cases, such noise can lead to severe under-pricing of risk and security mispricing, as in the US subprime market between 2006 and 2007.

3.1.4. Capital outflows

With a rising USD and a foreseeable rise in the Federal Funds rate in the near future, there is a significant risk that capital will flow out of the European markets, and into the US government and corporate debt. Yields on the European markets are extremely low (if not negative), and are expected to remain at these levels until at least September 2016. Investors, seeking higher returns, might take their capital out of Europe. This, in turn puts additional pressure on the EUR and pushes the USD up. Hence investment flows to the US could be enhanced by currency return. This trend seems very likely in the current context

[17] Moreover, in normal circumstances, banks wish to hold as little capital as possible. Therefore, by having to hold more capital, they will also become less liquid in their operations, which is not desirable from a financial point of view.

since as early as mid-April, some European corporate bonds traded at negative yields, including bonds from BP, Novartis, Royal Dutch Shell and Nestlé. And this was only after a month of QE.[18] Generali Investments Europe reported in February 2015 (i.e. before QE launch) that more than half of euro-area government bonds are held by institutions who have direct access to extra-European markets, and can therefore easily redirect their investments at a low cost.[19] Thus, continued pressure on the euro currency would not be surprising as investors sell their European bonds, and then exchange them for more attractive investments in the US, or elsewhere. As recent as last month, Abu Dhabi and other regional corporations issued debt as a means of funding their expansion programmes. Prospects of higher yields in the Emirates are by many experts expected to generate particular interest amongst European investors keen to obtain dollar-denominated bonds (since dirham is pegged to USD). In early February, National Bank of Abu Dhabi placed 750 million USD in bonds, with a coupon of 2.25% maturing in 2020 (compare that to below 0.1% in the Eurozone for a bond maturing in 5 years as of May 21). Almost half of the sale went to European investors. In addition, a report issued in March by Barclays Capital expects Abu Dhabi and other Gulf States to increase their bond issuance in the near future, since the flow of bank deposits have weakened partly due to the lower oil prices.[20] Under these (favourable) international market conditions, a capital outflow from Europe seems a very likely option for European investors.[21] Therefore Middle East (ME), and possibly Asia could be the new net receiver of European investments.[22]

3.2. Dynamic effects of QE

3.2.1. Spill-over effects to other (financial) market segments

The ECB´s bond-purchase program appears to affect the European fixed-income market to a greater degree than the Fed´s QE programs influenced US interest rates. Taking into account that the size of ECB´s QE program is very similar to the US counterpart, and that the European fixed-income market is smaller and (potentially) less liquid than the US market, it is to be expected that the impact on rates in the European case is greater than what was witnessed with the Fed. The spill-over effects on European corporate yields are already evident (as shown in the previous section), and ultimately it is expected to have effects on fixed-income markets in the US.[23] Moreover, tensions are building up on the repo markets – in which government bonds are used as collateral to borrow cash. So far, attempts by the ECB to alleviate repo stress (by lending back bonds) have not worked and market participants complain that securities lending programmes are too costly and too heterogeneous between Eurozone countries.[24]

The effects on other (non-Eurozone) European markets are also evident. Ahead of ECB´s decision to launch the EAPP program, the Swiss National bank abandoned its exchange rate floor. As a result, the value of Swiss franc surged sharply as a result, and combined with the adoption of more deeply negative deposit rates, Swiss sovereign bond yields moved to negative territory across all maturity spectrum up to 10 years. The Danish central bank

[18] Lord Abbett: ECB, get ready for shockwaves from QE, April 17, 2015.
[19] More than 30% are owned by foreigners, and more than 20% by pension funds and insurance companies. GIE Research Market Commentary, February 2015.
[20] Spy Ghana: Abu Dhabi´s bond market sets to grow with influx of QE funds, April 23, 2015.
[21] Recent studies by Chen et al (2012) and Fratzscher et al (2013) have shown that US QE lead to significant (pro-cyclical) outflow of capital from the US to emerging markets. Taking into account the context in which LTAPs 1 and 2 in the US were executed and the current market environment, it is more than likely that these results would be strengthened in the European case.
[22] In the light of QE, data on net outflows of capital from Eurozone to Asia are not readily available; therefore we only concentrate on ME in this exposition.
[23] Via higher interest rates and an increase in capital inflow. Lord Abbett: ECB, get ready for shockwaves from QE, April 17, 2015.
[24] Financial Times: German bonds measure success of Eurozone QE, April 30, 2015.

pushed interest rates further into negative territory (from -0.05% to -0.75%) in order to maintain its long-standing currency peg to the EUR.[25] In addition, central bank sharply increased its pace of foreign exchange reserve accumulation as buffer. Also Sweden cut its policy rates into negative territory and further initiated QE purchases to balance the ECB´s. Poland, Romania and Turkey all cut rates.[26]

A sustained period of such international (active) re-balancing can have sizeable negative effects for market functioning. Low or negative yields in the fixed-income segment can, if sustained under a longer period of time, push liquidity out of that entire segment and turn it into a 'ghost' market. Where the liquidity will go is difficult to say at this point, but there is a noticeable probability that it will go to riskier or (speculative-prone) segments, such as derivatives market. Taking into account the events that unfolded following excessive speculation on those market running up to September 2008, it is worth monitoring these developments with much care.

3.2.2. Weakened macroeconomic effects from QE

The observation on May 7 by Wall Street Journal[27] that the reversal in yields in the second month of QE was so sharp that the yields returned to the levels before the stimulus began can, if repeated, have a weakening effect on the macroeconomic transmission of QE. Typically, higher (lower) inflation expectations and higher (lower) economic growth push up (down) yields. However, multiple reversals of this type can cause turbulence as it would heighten fears of a disruptive sell-off.[28] Down the line, this would result in weak (if not negative) transmission to the macroeconomy that could possibly undermine ECB´s objective of 2% inflation and macroeconomic revival across the Eurozone. At the moment, this scenario does not seem likely, but if repeated reversals of this type re-emerge, then the effectiveness of the policy could seriously be questioned. Therefore it is crucial to keep an eye on market developments also from this angle.

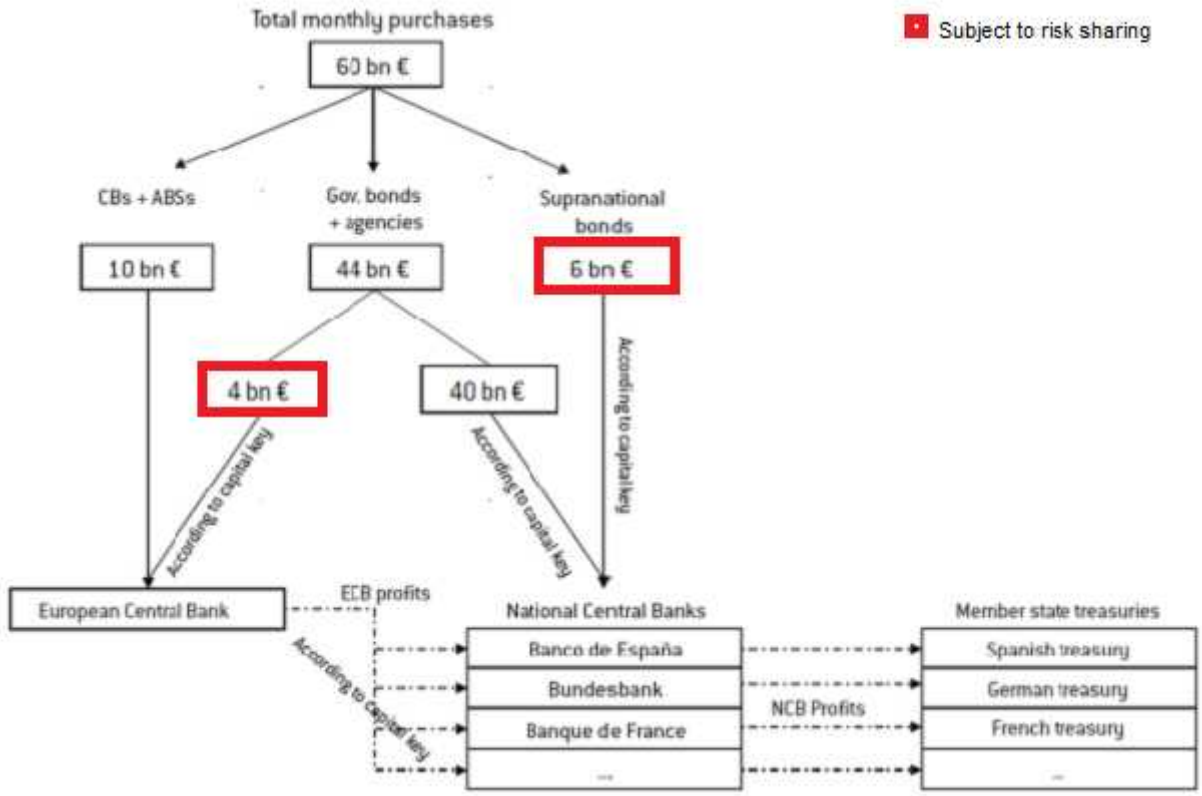
3.3. Risk-sharing issues

The extent to which QE-related profits are channelled back through the Eurosystem is well summarized by Bruegel's report of Claeys, Leandro and Mandra (2015) (see Figure 10).[29] According to the EAPP, the ECB is able to buy a portfolio of government bonds in proportion to the economic weight of each country in the euro zone (the capital keys), i.e. 26% of German bonds, 20% of French bonds, 17% of Italian bonds, etc. (see also Table 2).[30] The profits made on the sovereign debt held by the ECB are redistributed to countries according to the capital keys. This very much corresponds to a rule of juste retour (De Grauwe, 2015) whereby the ECB reimburses the same amounts to each euro area government, without any fiscal transfers between Member States. A similar reasoning applies to purchases of supranational bonds (Figure 10).

The remaining purchases by NCBs (totalling EUR 40 billion, as discussed) will focus entirely on the home market.[31] Thus, each national central bank will be buying its own government bonds, exposing NCBs exclusively to its own country's debt holding.

[25] The Peninsula Qatar: ECB´s QE can have large cross-border spillover effects, Feb 01, 2015.
[26] Looms Sayles: Bond Market Review and Outlook, April, 2015.
[27] Wall Street Journal: European Bonds Back to Pre-QE Levels after Weeklong Selloff, May 7, 2015
[28] Financial Times: German bonds measure success of Eurozone QE, April 30, 2015.
[29] The proportion of QE expenditure on euro area agencies' bonds are not explicitly accounted in the figure, but this is irrelevant for our discussion.
[30] The figures we propose are calculated as share of the capital key % over the total. Source: http://www.ecb.europa.eu/ecb/orga/capital/html/index.en.html
[31] ECB (2015)

Figure 10: Allocation of monthly asset purchases by the Eurosystem



Source: Claeys, Leandro and Mandra (2015)

Given the absence of risk sharing for these NCBs holdings, it is reasonable to assume that the potential profits will not be shared between NCBs.[32] Therefore, for example, a large slice of forgone profits for the French central bank will be accrued to the French Treasury, not involving any fiscal transfers among euro area member states. Given the absence of risk sharing on such NCBs purchases, the same reasoning applies to potential losses as well[33]

3.3.1 Risk sharing

One source of concern would involve the 20% joint liability resulting from ECB's (EUR 4 billion) and NCBs' purchases (EUR 6 billion) highlighted in Figure 10.

Should a government pursue a debt restructuring or a default, the ECB would have to book a loss on its balance sheet. Application of the just retour would imply the country not to receive any interests refund pro-rata, based on its capital key.[34] However, there is still a lot of uncertainty on this element and the rules on a eurozone central bank's involvement in a debt restructuring are rather unclear at the moment.

Certainly, this discussion should clarify whether a country's nonattendance will result into leaving the currency union or not.

Shall the ECB write-down the bond due to debt restructuring, this would result in an accounting "loss" that is not different from the losses due to the ECB's lending operations

[32] Claeys, Leandro and Mandra (2015)
[33] For these purchases, the ECB stands as "lander of last resort" but this is irrespectively of the nature of the QE program.
[34] De Grauwe, 2015

(e.g. LTROs) or other public asset purchase programs (e.g., the Security Market Program). In fact, any such operations involve ECB's holding of government bonds or other assets.

In case a member state defaults and leaves the Eurozone instead, the ECB would still have to book a loss on its balance sheet (a write-off, from an accounting point of view), but at this point it would have little to do with how well designed the quantitative easing program is.[35] In fact, in case of a country leaving the eurozone, losses would extend to assets not only involved with QE purchases but also standard monetary policy operations, which would be a different issue.

3.3.2 Does the central bank need equity?

With regard to our previous example, when the central bank writes down the bonds of a country, the value of its assets will decline. The counterpart on the liabilities side of the central bank's balance sheet will clearly be recorded as a decline in equity. The empirical evidence would suggest that ECB's losses could be dealt without too many troubles for either the ECB's shareholders (sovereigns) or tax payers, as long as the ECB was willing to accept its capital moving into "negative territory".[36]

An early ECB paper, Bindseil, Manzanares and Weller (2004), finds that a positive capital would safeguard the central bank's independence in ensuring price stability. Such a required level of positive capital will depend on the "risks in the central bank's balance sheet and on its contingent liabilities" (i.e. potential off-balance sheet obligations).

It is worth stressing again, however, that risk sharing on QE purchases would not constitute a risk to the ECB's balance sheet, which is qualitatively different to the one involved in standard monetary policy operations or previously implemented asset purchase programs (e. g, SMP, CBPP).

A central bank in fact needs not to have capital or positive net worth to function for small accounting losses on its balance sheet.[37] Alternatively, large enough losses in the central bank's balance sheet could be absorbed "if a fully automated and fully credible rule of re-capitalisation is in place".[38] This would be the case without the central bank having to abandon the price stability objective or having to resort to financial repression. The provisions contained in the Protocol on the Statute of the European System of Central Banks and of the European Central Bank (Art 33.2) suggest that all such rules are in place. Due to political frictions, what is lacking is a credible commitment. If, on the one hand, the decision to put limits to risk sharing would certainly affect the credibility of the QE program,[39] on the other hand, the possibility that risk sharing on, e.g., ECB's purchases, may constitute a risk to the ECB's balance sheet are very limited (Table 6), given the current arrangements. In other words, while limiting the ECB's purchases to 8% of the "additional purchases" (Figure 10) sends the message to the market that the degree of European involvement, in a federal sense, is limited, such ECB's purchases constitute a small risk for the ECB's balance sheet. In the Table below, we quantify "how small" these risks are and report the outcome of the Bruegel's projection exercise on sovereign bond purchases by countries and bondholders until September 2016.[40] We refrain from reporting the details of the projection exercise, which are well explained in Claeys, Leandro and Mandra (2015). In a very naïve fashion, we augment these results with a column looking at the ECB's balance sheet (i.e. total assets) and the percentage that these purchases would represent at the end of each period

35 See also Noonan (2015)
36 See also De Grauwe (2015)
37 Stella (1997)
38 Bindseil, Manzanares and Weller (2004)
39 De Grauwe (2015)
40 These are not dissimilar from the figures estimated by Allianz in Figure 2, with the difference that the Bruegel figures allow a further breakdown by periods.

(December 2015 and September 2016, respectively). The ECB's total assets are estimated for December 2015 and September 2016 based on the figures for the total ECB's purchases in Table 6. In other words, given the figures for the Central Bank total assets for the euro area in February 2015 (about EUR 2156 billion), the assumed euro area purchases are accounted on the ECB's balance sheet for a period of 10 months, consistent with Claeys, Leandro and Mandra (2015), for the period March – December 2015, and for a period of 9 months for the period January – September 2016.[41] As it can be gauged from column 5 and 8, those purchases (end of period) remain not sizeable (2.76% for Italy; 1.97% for Spain and so on). Our take is that, under the current arrangement, the ECB's direct purchases under the EAPP do not entail specific or higher risks to the Central Bank's balance sheet, or anyway risks which are qualitatively different from the one involved in standard monetary policy operations or previously implemented asset purchase programs (e. g, SMP, CBPP).

Table 6: Sovereign bond purchases by country and by bondholder
(March 2015 to September 2016)

			March - December 2015			January - September 2016		
	ECB capital key (%)	Maximum monthly purchases €billions	ECB monthly purchases €billions	NCB monthly purchases €billions	ECB purchases % of total assets (end of period, i.e. 10 months)	ECB monthly purchases €billions	NCB monthly purchases €billions	ECB purchases % of total assets (end of period, i.e. 9 months)
Germany	25.6	11.2	10.2	102.3	4.02	9.2	92	2.91
France	20.1	8.9	8.1	80.6	3.19	7.3	72.5	2.31
Italy	17.5	7.7	7	70	2.76	6.3	63	1.99
Spain	12.6	5.5	5	50.2	1.97	4.5	45.2	1.42
Netherlands	5.7	2.5	2.3	22.7	0.91	2	20.5	0.63
Belgium	3.5	1.5	1.4	14.1	0.55	1.3	12.7	0.41
Greece	2.9	1.3	0.1	0.7	0.04	0	0.4	0.00
Austria	2.8	1.2	1.1	11.2	0.43	1	10	0.32
Portugal	2.5	1.1	1	9.9	0.39	0.9	8.9	0.28
Finland	1.8	0.8	0.7	7.1	0.28	0.6	6.4	0.19
Ireland	1.6	0.7	0.7	6.6	0.28	0.6	5.9	0.19
Slovakia	1.1	0.5	0.4	4.4	0.16	0.4	4	0.13
Lithuania	0.6	0.3	0	0	0.00	0	0	0.00
Slovenia	0.5	0.2	0.2	2	0.08	0.2	1.3	0.06
Latvia	0.4	0.2	0.1	0.7	0.04	0.1	0.5	0.03
Luxembourg	0.3	0.1	0	0	0.00	0	0	0.00
Estonia	0.3	0.1	0	0	0.00	0	0	0.00
Cyprus	0.2	0.1	0.1	0.5	0.04	0	0.2	0.00
Malta	0.1	0	0	0.4	0.00	0	0.3	0.00
TOTAL	100	44	38.3	383.2	15.09	34.5	343.8	10.90

Source: Claeys, Leandro and Mandra (2015) and authors' calculations ("ECB purchases % of total assets" column).

At the same time, it is worth stressing that the limited European guarantee and course of actions may make market believe that "QE is not enough" as the decoupling of Greek bonds has recently shown. To be credible the European EAPP needs more mutualisation. This can be done only if tail risks of default are reduced, hence avoiding a scenario where the Central Bank will operate with negative equity. By removing market pressure, QE would certainly give countries a window of opportunity to do the necessary investment and reforms to spur and rebalance growth. This is the only way European QE can prove effective.

[41] The ECB's total assets for December 2015, for instance, are estimated as the February 2015 figure (EUR 2156 billions) plus the Bruegel's estimated total ECB's monthly purchases (EUR 38.3 billion a month), for a period of 10 months, i.e. 2156 billions + monthly 38.3 billion X 10 months = EUR 2539 billion in December 2015. For September 2016 we cumulate the latter figure, with the monthly ECB's total asset purchases, as provided by the Bruegel report, over the January – December period.

4. POLICY MEASURES TO MITIGATE SOME OF THE RISKS

While we have pointed out potential risks from the QE program, the question remains on how ECB can tackle these problems in the current context. We have identified a few measures that would at least help alleviate the potential scarcity of bonds or liquidity problem.[42]

- Cutting the deposit rate further or abandoning the negative-yield rule in order to make more bonds eligible for purchase. ECB President Mario Draghi has already signalled he would consider buying negative-yielding debt. In practice, however, there is a risk that the policy of cutting the deposit rate further, while unfreezing additional eligible bonds, might harm the money markets, and add to the existing uncertainty on lending. In fact, pushing the deposit rate lower than -0.2 would imply banks will make more clients pay (rather than earn) an interest rate to hold their money, with the obvious side effect of retail clients preferring to hold cash instead. In addition, should banks (and not clients) shoulder the costs of negative rates themselves, this will squeezes the profit margin between their lending and deposit rates, and making them less willing to lend.

- ECB could loosen the self-imposed restriction not to own more than 25% of any single bond, thereby increasing its portfolio composition. By removing this limit, possible OMTs and EAPP interactions would be avoided. In fact, contrary to its initial design, the OMT programme could no longer be seen as “unlimited”, especially from the point of view of some peripheral euro area countries, where the 25 per cent (and 33 per cent) limits would leave barely any room for possible OMT purchases in addition to the planned QE purchases. The agreed limit would thus make QE purchases interact with previous acquisitions of bonds by the ECB or the NCBs, limiting the pace of purchases overall. One of the main constraints in removing the 25% limit is political. Removing the 25% limit, while practically effective, could increase Germany’s nervousness about the Eurozone status quo, especially in the light of the European Court of Justice final ruling on the ECB’s OMT case, referred by German Constitutional Court this 16 June 2015.

- It could also consider increasing purchase of bonds belonging to government agencies and/or expand the list of agencies eligible for QE, which would help it alleviate the supply-constraint on the national debt markets.

- EAPP needs more mutualisation or guarantees. As discussed in the previous sections, a quantitative easing program trading-off between efficacy and political feasibility is likely to be less effective, especially in a situation where the aforementioned implementation limits become biting. We recognize, however, that additional mutualisation creates political resistance and we argue this should be done only if tail risks of default are reduced, hence avoiding a scenario where the Central Bank will have to operate with negative equity. The latter, while not representing a problem per sé, may increase the nervousness of some euro area countries about the QE program. It is understood that QE does not address any structural issues underlying the fragility of some euro area economies. As such, we argue that the European QE should be understood as instrumental to boost confidence and not as a “new normal” (even if this does not rule out the possibility of multiple rounds of QE, as in the US or the UK). By removing market pressure, QE would give indeed countries a window of opportunity to do the necessary investment and reforms to spur and rebalance growth.ECB needs to improve communication with the markets in order to reduce market volatility. Confusion and doubts amongst market participants should be avoided at all costs.

[42] We recognize that this is neither an exhaustive nor exclusive list of measures. Other instruments could possibly attain the same outcomes. It should simply be taken as a list of suggestions.

Increased market volatility is not only bad for investments and risk management policies, but also for the effectiveness of the EAPP program as a whole. Therefore, communication with the markets needs to be clear, honest, continuous and unanimous. In this respect, lessons and best-practices can be drawn from Fed's, BoE's and BoJ's QE communications (see also IMF, 2013).

- Coordination with national regulators and supervisors will be necessary in the coming months in order to secure a 'release' of some of the bonds from banks, insurers and pension funds. ECB should make sure that conservative (banking and insurance) rules, which in normal times make sense, are not proving a binding constraint on its policy measures, and do not heavily restrict the much-needed liquidity on the market.

- A possible set of exceptional incentive measures for financial intermediaries should be considered, which would incentivize them to remain on the European capital markets, release some of the bond supply, and engage in private lending. Examples of such measures could be to temporarily expand the list of eligible European assets for Tier I or II capital, to temporarily relax the liquidity requirements in order to allow intermediaries to go into more illiquid European alternatives and release some of their (more liquid) bonds, or to provide a State guarantee for investments into national corporate/private bonds. These measures, should however, have a temporary feature in order not to encourage pro-cyclical and herding behaviour.

- Macro-prudential policy, as we described in an earlier note, are crucial in order to maintain excessive risks from building up, and from avoiding a (possible) systemic crisis. ECB and/or NCB should not be afraid of triggering these policies if indicators show that speculation is overtaking the markets.[43]

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[43] "Financial (in)stability low interest rates and (un)conventional monetary policy", Monetary Policy Dialogue, note to the European Parliament, IP/A/ECON/2015-01, Mar 2015.

5. CONCLUSIONS

As announced by ECB President Mario Draghi at the press conference of 22 January 2015, in March the Euro-system started the Expanded Asset Purchase Programme (EAPP), i.e. the purchase (on the secondary market) of euro-denominated bonds issued by governments, agencies and European institutions. The program foresees a key role of national central banks (NCBs) of the Eurozone in the purchase of sovereign bonds. This will be part of the European Central Bank's 1.14 EUR trillion landmark quantitative easing (QE) programme (or about EUR 60 billion/month) to be carried out until September 2016. Given its size and open-ended nature, QE has been at the centre of policy discussions, in particular regarding the issues of risk sharing and possible market distortions.

On the first point, we argue that risk sharing on QE purchases would not constitute a risk to the ECB's balance sheet, which is qualitatively different from the risk involved in standard monetary policy operations or previously implemented asset purchase programs (e. g, SMP, CBPP). Moreover, direct ECB's purchases (i.e. 8% of the so-called "additional purchases") are admittedly limited, given the current arrangements. A limited European guarantee and course of actions may make markets believe that "QE is not enough" as the decoupling of Greek bonds has recently shown. To be credible the EAPP needs more mutualisation. We recognize however this is not without problems, given the nervousness of some countries about the status quo of the euro area.

On the second point, the currently low (or negative) yields for many segments of Eurosystem sovereign bonds coupled with possible shortages of available bonds to purchase poses challenges to the success of the programme. However, based on the current projections, the restrictions inherent in the program should not be binding, and therefore the scarcity in the supply of bonds should not be an issue in our view. Nonetheless, as evolving economic conditions may drastically affect the bond market we argue that a careful monitoring of market developments as well as flexibility in the implementation of policy measures are crucial elements for the success of QE going ahead.

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European Parliament

DIRECTORATE GENERAL FOR INTERNAL POLICIES

POLICY DEPARTMENT A: ECONOMIC AND SCIENTIFIC POLICY

Sovereign bond purchases and risk sharing arangements: Implications for euro-area monetary policy

Angel UBIDE

IN-DEPTH ANALYSIS

Abstract

The ECB's asset purchase program has been an unambiguous success, quickly improving the euro area's macroeconomic outlook. Its design has raised some doubts about the potential scarcity of bonds eligible for purchase and the likelihood of losses derived from purchases executed at very low yields. This note argues that the program is well designed and calibrated for the characteristics of the euro zone bond market, and that the ECB could easily relax some of the eligibility restrictions if needed. The program is likely to generate profits and the risk sharing and accounting arrangements, and the ECB loss absorption capabilities, look adequate for the potential risks of the program. Should losses materialize, a prompt recapitalization would be desirable to maintain the credibility of monetary policy and the independence of the European Central Bank.

CONTENTS

EXECUTIVE SUMMARY

The ECB's asset purchase program has been a macroeconomic success, leading to higher inflation expectations and better growth prospects.

The program has been calibrated based on the capital key. As a result, purchases of German government bonds are outsized with respect to its market share. This has created a worry that there may not be enough bonds available for purchase.

One of the channels of transmission of quantitative easing is the reduction in the term premium via the so-called scarcity effect. Therefore, the creation of scarcity is a positive development that will boost the effect on the economy.

Under most scenarios, the current design should be successful in its implementation, although the restrictions imposed by the ECB on the eligibility of bonds could become binding for Germany if yields were to decline abruptly from current levels or the program had to be extended further beyond September 2016. In that case, the ECB could easily modify the rules to be able to ease monetary policy as much as needed.

Under most scenarios the asset purchase program should generate positive profits. The restriction not to purchase bonds yielding below -0.2 percent ensures that there will not be ex-ante valuation losses and, if the bonds purchased are held to maturity, the ECB's accounting standards imply no mark to market losses.

The ECB's loss absorption capacity and the risk sharing agreement limit the amount of potential losses that could be shared across countries in the case of default. Even under the very extreme assumption of a debt restructuring in several countries similar in size and extent to that of Greece in 2012, the shared ex-ante losses and potential ECB recapitalization needs would be small.

Although central banks can operate with negative capital, if losses were to materialize, a prompt recapitalization would be desirable to maintain the credibility of monetary policy and the independence of the European Central Bank.

1. INTRODUCTION

At its meeting on January 22, 2015, the ECB announced the EAPP (Expanded Asset Purchase Program), a program of secondary market purchases of euro-denominated investment-grade securities issued by euro area governments and agencies and European institutions, to complement the monetary policy measures adopted in the second half of 2014, which included the TLTRO and the programs of purchases of private assets (the Covered Bond Purchase Program (CBPP3) and the Asset Backed Securities Purchase Program (ABSPP)). The intent was to address the heightened risks of too prolonged a period of too low inflation. The purchases started in March, and the combined purchases of public and private sector securities will amount to €60 billion per month. The ECB intends to purchase private and public securities until end-September 2016 and, in any case, until it sees a sustained adjustment in the path of inflation which is consistent with its aim of achieving inflation rates below, but close to, 2% over the medium term. There is clear evidence that the policy measures are effective, as financial market conditions and the cost of external finance for the private sector have eased considerably over the past months and borrowing conditions for firms and households have improved notably, with a pick-up in the demand for credit. As a result, consensus forecasts for growth and inflation in the euro area have been revised upwards.

The program will encompass investment grade euro-denominated bonds from euro area central governments, agencies, and supranational or international institutions located in the euro area. The ECB intends to allocate 88 percent of the total purchases to government bonds and agencies, and 12 percent to bonds of supranational and international institutions. The purchases of the supranational and international institutions will be performed by a few selected NCBs. The residual maturity range will be 2-30 years at the time of purchase and purchases will be allocated along this maturity spectrum in a market neutral way via weights on nominal outstanding amounts. The purchases will be allocated across issuers of the various countries on the basis of the ECB's capital key.

In order to limit the market interference of the purchases and to better manage the risk across national central banks, the ECB introduced a series of restrictions to the program. The ECB decided to apply a limit of 25 percent per issue (including pre-existing holdings from the SMP program and other portfolios of eurosystem central banks) to avoid obstructing the application of collective action clauses in an eventual case of debt restructuring, as this could be construed as monetary financing of governments. It also decided to apply a 33 percent limit per issuer to preserve market functioning and avoid becoming a dominant creditor to any country[1]. These percent limits apply to nominal, not market values. It also decided to exclude from the universe of eligible securities those with a yield below the current deposit rate (-0.2 percent) in order to avoid ex-ante losses (see discussion below).

[1] The ECB can't hold more than 25 percent of an issuer without holding more than 25 percent of some issues. Thus the 33 percent per issuer limit was driven by the fact that the ECB already holds more than 25 percent of some issues in its balance sheet as a result of the SMP program.

2. ACCOUNTING AND RISK SHARING ARRANGEMENTS

The ECB follows a prudent accounting approach. This applies particularly to the differing treatment of unrealised gains and losses for the purpose of recognising income, and to the prohibition on netting unrealised losses on one asset against unrealised gains on another. Unrealised gains are transferred directly to revaluation accounts. Unrealised losses exceeding the related revaluation account balances are treated as expenses at the end of the year. Impairment losses are taken to the profit and loss account in their entirety.

The distribution of profits and loses of the ECB follows the following rule: (1) at the discretion of the Governing Council, up to 20 percent of the net profit may be transferred to the general reserve fund, subject to a limit equal to 100 percent of the capital; (b) the remaining net profit may be distributed to the shareholders of the ECB in proportion to their paid-up shares. In the event of a loss incurred by the ECB, the shortfall may be offset against the general reserve fund of the ECB and, if necessary, following a decision by the Governing Council, against the monetary income of the relevant financial year in proportion and up to the amounts allocated to the national central banks.

Because the size of the EAPP program is expected to be large, reaching around €1.1 trillion by September 2016, and in view of potential quasi fiscal implications of the program in the event of a debt restructuring, the ECB decided to adopt a specific risk sharing agreement for the EAPP program. Based on this agreement, 92 percent of the net profit from the purchases of central government bonds and agencies will be kept at the NCB level, while the remaining 8 percent will be shared according to the capital key. On the other hand, the net profits of the purchases of bonds of supranational and international institutions, and of the private sector assets programs (CBPP3 and ABSPP), will be fully shared according to the capital key.

Table 1 (see Appendix) shows the details of the risk sharing agreement. Based on these calculations, on average about 17 percent of the net profit of the comprehensive asset purchases program will be shared. Table 2 shows the expected distribution of purchases, in billions of EUR and as share of GDP per country[2]. This allows the calculation of the potential losses from an eventual debt restructuring. Imagine, in an extreme case, that the debt of the 4 countries that were under pressure during the crisis (Italy, Spain, Portugal and Ireland), suffers a haircut of 50 percent (the haircut in the Greek restructuring was 53.5 percent). That would imply loses of about 140b EUR. Assuming no loses on the purchases of European institutions assets and on the CP/ABS programs, the risk sharing agreement would imply shared losses of about 15b EUR. Of course, in that case one would need to assume some default ratio for the ABS/CP program, although this need not be high. The historical default rate in European ABS is very low, a mere 2 percent over the last 10 years (see Financial Times 2014), which would imply losses of about 4b EUR. For the sake of the argument, one could assume the historical default rate of ABS in the U.S., which is about 20 percent. In that pessimistic case, a 20 percent haircut applied to the CP/ABS program would then yield total shared losses of about 38b EUR. Therefore, potential losses from the three programs could be in the range of 19-53b EUR, or between 0.2 and 0.9 percent of GDP depending on the country.

In theory, in addition to a potential debt restructuring loses could arise from valuation changes. By its nature, the portfolio of government bonds purchased under a successful quantitative easing program should have an expected negative value on a mark to market basis, because the intention of the central bank is to improve the growth and inflation

[2] Some of the smaller euro area countries will hit the 25 percent limit fairly soon and thus the amount of purchases shown is smaller than what the capital key allocation would suggest. For Greece, the 33 percent limit will be binding and thus its share is also smaller.

outlook and restore inflation expectations back up to the desired level. This should lead to an appreciation of risky assets and, eventually, to an increase in long term yields to reflect the better nominal growth outlook. Because bond prices move inversely to yields, a successful bond buying program implies buying government bonds when they are expensive (their yield is lowest) hoping they will become cheap (their yield will increase, or at a minimum stabilize and stop declining). Note that this would not be the case if the assets purchased were risky assets, as the central bank would be buying them when they are cheap and would appreciate if the program is successful.

The probability of incurring mark to market loses increases the closer bond yields are to zero. Bond pricing is a function of maturity and the coupon yield and, because all the bonds that can be purchased have been issued with positive coupon yields, bonds purchased at negative yields will deliver with certainty a capital loss at expiry. However, because the purchase of the bond also generates an increase in reserves, and those reserves are "remunerated" at -0.2 percent (the ECB charges -0.2 percent on deposits), the ECB ensures that there is no ex-ante loss if bonds at purchased at -0.2 percent or higher.

In addition, the accounting convention of the ECB distinguishes securities held for monetary policy purposes from other securities. Those held for monetary policy purposes are valued at amortized cost subject to impairment. The rest of securities are valued at amortized cost if they are expected to be held to maturity or marked to market otherwise. Thus assets purchased under the EAPP, CBPP3 and ABSPP programs are valued at amortized cost and won't be at risk of mark to market loses unless they are sold. The ECB hasn't disclosed whether it plans to sell these assets at some point or keep them to maturity. The Federal Reserve has announced that it plans to hold to maturity the assets purchased in the context of its quantitative easing programs, and it should expected the ECB to do the same as the size of the balance sheet is not an impediment for the effective conduct of monetary policy.

This accounting convention plus the likely hold to maturity of the purchased assets implies that loses arising from the ECB's quantitative easing program would only arise from default. The restriction not to buy securities below -0.2 percent ensures that no valuation driven loses are incurred; moreover, because the weighted yield of the purchases is materially above the ECB's funding cost of -0.2 percent, the ECB ensures that it makes a profit with the QE program. For illustrative purposes, the weighted yield of the bonds purchased under EAPP program during March-May has been about 0.6 percent. If this were to become the average yield of the full program, a 1tr EUR worth of asset purchases would generate a minimum profit of about 7.5b EUR.

Finally, it is important to clarify that central banks do at times incur losses (see, for example, the discussion in Dalton and Dziobek (2005)), and have built-in buffers to absorb this potential losses. For example, in 2003 and 2004 the ECB incurred significant losses in its holdings of foreign exchange as a result of the steady appreciation of the EUR (Figure 1) (see Appendix). The ECB has a loss absorbing capability that includes capital, provisions, and revaluations accounts (see Figure 2). Provisions for foreign exchange, interest rate credit and gold price risk have been accumulated to offset future realized and unrealized losses, in particular valuation loses not covered by the revaluation accounts. The provision was created in 2000 and its size is assessed annually based on an assessment of exposure to risks, and can't exceed the value of paid up capital. In 2003 and 2004 the provision was depleted as a result of the losses incurred and was replenished in the subsequent years. The revaluation accounts arise from unrealized gains on assets, liabilities and off balance sheet instruments. This account has increased in parallel to the increase in the size of the ECB's balance sheet and shows, at the moment, a sizable surplus of 19.9 billion EUR.

As of end 2014, the total loss absorption capacity of the ECB amounts to about 35b EUR. Any future losses from the EAPP program would have to be set against the profits generated by the program (in an accounting sense) and the major macroeconomic improvement that it has generated[3]. The GDP forecasts for 2015 are being revised upwards steadily, in part due to the positive effect of the quantitative easing program, inflation expectations have shifted upwards and closer to the ECB's definition of price stability, and the reduction in interest expenditure in 2015 due to the reduction in bond yields amounts to about 0.6 percent of GDP. As a result, the fiscal outlook of the euro area has improved.

[3] See Ubide (2014) for a detailed discussion of the need and likely impact of the ECB's QE program.

3. THE EURO AREA BOND MARKET

The face value of the outstanding amount of euro area government bonds is over EUR 6.5 trillion. Taking into account the ECB self-imposed maturity restrictions, eligible securities in the 2-30yr range have a face value of about EUR 5 trillion. Because many of these bonds are trading at above par, the market value of eligible bonds is closer to EUR 6 trillion. In addition, the face value of outstanding debt of eligible agencies and supranational European institutions in the 2-30 yrs. maturity range is about EUR 825b.

Table 3 shows for the main euro area countries the relative size of the ECB's program vs each national bond market. The ECB's asset purchases program is small from a stock perspective – it is small relative to the total stock of outstanding euro area bonds - compared to those of the Fed, the Bank of Japan or the Bank of England, but it is aggressive from a flow perspective, as it is expected to buy more than the net issuance on a monthly basis (Table 4). In addition, it is large as a share of German bonds, both stock and net issuance, because the capital key allocation gives German bunds a disproportionate share in the total amount of purchases (Table 5). This has raised worries about the ability of the ECB to execute the program.

In addition, the restriction not to buy bonds with yields below -0.2 percent has the potential to further reduce the universe of eligible bonds, although the recent back up in yields has lowered that risk. At the recent low point in yields during April-May 2015 over 7 percent of euro area bonds were trading below -0.2 percent, affecting bonds in Germany, Austria, Netherlands and Finland.

Two additional factors make the ECB's quantitative easing program different from those of the Fed, the BoE or the BoJ, both in the direction of pushing long term yields closer to zero. First, the ownership structure of euro area bond holdings is such that there are more constraints to sales by large domestic holders such as insurance companies and pension funds, domestic banks, and foreign central banks. In addition, the combination of QE and negative deposit rates is pushing investors further out the curve. This is making the portfolio rebalancing effect more effective but also raises the probability of hitting the -0.2 percent constraint.

3.1 The bond scarcity problem

Quantitative easing affects long term interest rates via three main channels: (1) the signalling effect of market expectations of short term interest rates; (2) the duration effect, via the general reduction of the term premium across maturities and assets; and (3) the scarcity effect, via the reduction in term premium of the specific assets being purchased, due to reduction of the available local supply (associated with the preferred habitat literature, see Vayanos and Vila(2009)).

The combination of smaller fiscal deficits (and thus smaller net issuance), low yields, and the ECB limits could exacerbate the scarcity of eligible bonds in some countries. This would amplify the positive impact of the QE program, but it has also raised worries that the ECB may not be able to fully execute the program. Because of the combination of lower net issuance and a higher percentage of bonds trading close to or, at times, below -0.2 percent, the market where the ECB may encounter more difficulties at the time of achieving its objectives is German bunds.

Based on the program size and the capital key, the objective is to buy about 210b worth of German bonds by September 2016. The market value of eligible securities fluctuates depending on market pricing. Figure 3 shows that at the lows in yields in mid-April, bonds up to the 4 year maturity had become ineligible (their yields had fallen below -0.2 percent). That reduced the pool of available German bonds to about 225b, once the ownership limits

are taken into account, creating a very small buffer with respect to the target purchases. However, the recent bond sell off has rendered eligible all German bonds across the maturity spectrum, increasing the size of the available pool of bonds to about 260b, well above the 210b target. In addition, the Bundesbank can use these market fluctuations to opportunistically buy at different points of the curve that could become ineligible again, to alleviate the potential for bond shortages. In fact, in May the Bundesbank took advantage of the increase in yields to dramatically shorten the maturity of its purchases – from an average of 8.1 years in march to an average of 5.8 years in May. Furthermore, the Bundesbank's securities lending program should also alleviate the potential scarcity problem, as it should reduce the banks' concern that by selling bunds to the Bundesbank they could run out of collateral needed for repo operations. The securities lending program is currently limited to overnight transactions, but it is expected to be expanded later in the year to weekly and monthly maturities.

The scarcity problem could over time apply to other countries, and become more severe if purchases were to be extended beyond September 2016. In the case of Greece, the ECB already holds more than 33 percent of its bonds, and thus would be unable to buy Greek bonds (assuming other conditions, such as participation in a program, are met) until August 2015 at the earliest, when some of the holdings of Greek bonds mature. For many of the smaller euro area countries the 25 percent issue limit could be reached well before September 2016 and, in the case of Portugal, by December 2016. For the larger euro area countries the timing of reaching the limit will depend on the level of yields. If the -0.2 percent limit is not binding, the 25 percent limit would be reached in Germany in late 2017.

To alleviate these scarcity constraints the ECB could change the rules of the program. For example, the set of eligible issuers could be expanded to include other agencies or even state-level German debt. The ECB has announced that the 25 percent limit on individual issues will be reviewed after 6 months, and could be increased if needed, for example for issues with very low risk (i.e. rated AA or AAA) or without collective action clauses. And the ECB could decide to change the allocation of purchases from the capital key weighted to the more efficient market weighted, thus transferring some of the allocation of the Bundesbank to other NCBs.

4. DOES CAPITAL MATTER FOR CENTRAL BANKS?

We have shown that the risk sharing arrangements, the ECB's accounting convention and loss absorption capability, and the structure of the euro area bond market all augur well for a successful quantitative easing program that doesn't generate any loses (absent an unexpected shock) that could lead to a depletion of the ECB's capital. But even if that were to be the case it should not become an impediment for the operations of the ECB. In fact, capital may not be the best concept to assess the strength of a central bank.

Central banks are not commercial banks. Central banks pursue the maximization of national welfare, not profits. Therefore their financial success is a poor, and many times misguided, indication of their success. Central banks can always create money to earn seignoriage and pay their bills, and can't be declared bankrupt by a court. They don't need capital to cover startup costs or buttress their credibility to borrow in markets (unless they have to borrow in foreign exchange). In abstract, central banks don't need capital to operate.

There is, however, ample empirical evidence, mostly for less developed countries (see Stella (1997), Ize (2005), Schoebert (2008), Stella and Lonnberg (2008)) showing a negative correlation between inflation performance and financial strength of central banks. This has led to a view that central banks need a certain level of capital in order to achieve their monetary policy objectives. It is an issue worth exploring, as the explanations of the causation and exact nature of the relationship have often remained vague. In its simplest form, a central bank earns a return on its monetary policy operations, on its assets, and on its issuance of base money (banknotes and reserves) and incurs operational costs. Thus, in principle, a central bank will steadily generate profits for as long as people are willing to hold central bank liabilities at no interest and base money grows at least as fast as operating expenses.

Therefore, under most macroeconomic scenarios and central bank balance sheet structures, a temporary shock creating a loss-making situation (as a result of operating expenses exceeding operating income or net valuation loses) that leads to negative capital would always be reversed in the medium run with the central bank returning to profitability and a positive level of capital. There are two possible theoretical exceptions, though: when the economy falls into a persistent deflationary trap and the growth rate of banknotes falls below the growth rate of operating costs; and when the growth rate of the demand for banknotes falls short of nominal interest rates (see Bindseil, Manzanares and Weller (2004)).

But even a negative long term profitability outlook shouldn't necessarily lead to failure to conduct monetary policy in an effective way[4]. For that to happen, a relationship between central bank capital and other institutional factors, such as credibility or independence, is needed. It can be argued that, regardless of the tightness of the legal arrangements, a central bank can never achieve a bullet-proof, guaranteed institutional independence. Changes in the exchange rate regime, such as dollarization, could hamper the central bank's solvency. But, more importantly, no government can commit future governments not to change the central bank law or abolish its exclusive right to issue legal tender.

From a conceptual standpoint, a better concept than capital to assess the soundness of a central bank would be net worth, or financial strength (Stella (1997)). Net worth takes into account the central bank's "franchise value" - its monopoly over the issuance of money and the right to impose reserve requirements on commercial banks - and its off balance sheet obligations, such as the potential need to bail out banks during crisis or defend an

[4] For example, the Central Bank of Chile incurred in significant losses during the 1990s from sterilization and bank recapitalization activities and recorded negative net worth as late as 1997.

exchange rate regime. Net worth will depend on the functions for which the central bank has independent responsibility, and will vary over time. Therefore, the optimal size of a central bank's capital will vary across countries and depend on its risk exposure (including currency, interest rate, and credit risks), profit sharing and accounting arrangements, institutional strength, and crisis management responsibilities. The bigger the risk exposure and crisis management responsibilities, and the weaker the institutional strength and profit sharing arrangements, the bigger the capital buffers the central bank should build during good times.

Central banks can be run with persistently negative capital, but over time this could create perverse incentives. On the central bank side, a loss making central bank may attempt to restore profitability by easing monetary policy in order to accelerate the demand for banknotes - and this could be incompatible with its price stability objective. This is what Stella and Lonnberg (2008) defined as "policy insolvency". On the government side, the government may be tempted to put conditions on the recapitalization that could jeopardize the credibility and independence of monetary policy, leading to fiscal dominance.

Thus a condition for a credible central bank is to have positive net worth (its future stream of profits), regardless of whether current profits and capital are positive, and recapitalization arrangements must focus on the rapid rebuilding of equity. Most modern central bank laws require that, in case of negative capital, the government issue to the central bank interest bearing securities at market rates to restore capital levels and provide a level of core earnings that covers operating expenses, thus reducing the scope for further operational losses. A fully automated and fully credible rule of recapitalisation by the government of the central bank in case of losses can be regarded as a substitute for positive capital. Since such rules are however difficult to implement in practice, positive capital levels remain a key tool to ensure that independent central bankers always concentrate on achieving their mandate.

This link between net worth and credibility has become even more critical as central banks have reached the zero lower bound (ZLB) and have had to resort to tools that are highly dependent on the ability to do whatever it takes for as long as it takes, such as QE or foreign exchange intervention. If market participants doubt the resolve of the central bank because of its reluctance to incur in loses (as it has happened recently in the case of the Swiss National Bank and its exchange rate floor) then the policy may fail. Therefore, there is an argument that central banks should have higher levels of capital (or stronger arrangements for recapitalization) as the risk of hitting the ZLB increases. This creates a trade-off between a lower inflation target (which increases the odds of hitting the ZLB) and the level of capital. On the other hand, this desirability to have higher levels of capital has to be offset by the heightened democratic requirements needed to conduct quasi fiscal activities. There is a strong argument to keep capital levels of central banks at minimum levels, so that any central bank action that increases risks above normal levels is accountable democratically and not the decision of an independent body. This is the basis for the Bank of England (BoE) strategy, where there was a specific authorization by the Chancellor for each stage of the BoE's asset purchases program.

5. CONCLUSION

The ECB's asset purchase program has been a macroeconomic success, leading to higher inflation expectations, higher asset prices, and better growth prospects. The program has been calibrated based on the capital key. As a result, purchases of German government bonds are outsized with respect to its market share in the total stock of government bonds. This has created a worry that there may not be enough bonds available for purchase.

One of the channels of transmission of quantitative easing is the reduction in the term premium via the so-called scarcity effect. Therefore, the creation of scarcity is a positive development that will boost portfolio rebalancing effect and the program's impact on the economy. The current design should be successful in its implementation, although the restrictions imposed by the ECB on the eligibility of bonds could become binding for Germany if yields were to decline abruptly from current levels or the program had to be extended further beyond September 2016. In that case, the ECB could easily modify the rules to be able to ease monetary policy as much as needed.

Under most scenarios the asset purchase program should generate positive profits. The restriction not to purchase bonds yielding below -0.2 percent ensures that there will not be ex-ante valuation losses and, if the bonds purchased are held to maturity, the ECB's accounting standards imply no mark to market losses.

The ECB's loss absorption capacity and the risk sharing agreement limit the amount of potential losses that could be shared across countries in the case of default. Even under the very extreme assumption of a debt restructuring in several countries similar in size and extent to that of Greece in 2012, the losses and potential ECB recapitalization needs would be small. Although central banks can operate with negative capital, if losses were to materialize, a prompt recapitalization would be desirable to maintain the credibility of monetary policy and the independence of the European Central Bank.

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APPENDIX

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Table 1: Risk sharing arrangement

	Expected pace of purchases		Risk sharing	
	monthly	thru Sept 2016	(in percent)	in EUR billion
Covered Bonds/ABS	10	190	100%	190
EAPP	50	950		
European Institutions	6	114	100%	114
Central Governments and Agencies	44	836	8%	67
Central governments	42	798	8%	64
Agencies	2	38	8%	3
Total	60	1140	17%	190

Table 2: Distribution of potential shared losses

	Allocation of purchases (in EUR billion)	GDP (EUR billion)	Purchases/GDP (in percent)	19b shared losses (in EUR billion)	53b shared losses (in EUR billion)	19b shared losses (in % GDP)	53b shared losses (in % GDP)
Germany	213	2810	8	3.8	12.8	0.1	0.5
France	170	2114	8	3.0	10.1	0.1	0.5
Italy	146	1610	9	2.6	8.7	0.2	0.5
Spain	105	1049	10	1.9	6.3	0.2	0.6
Netherlands	48	643	7	0.9	2.8	0.1	0.4
Belgium	29	395	7	0.5	1.8	0.1	0.4
Austria	23	323	7	0.4	1.4	0.1	0.4
Portugal	21	169	12	0.4	1.2	0.2	0.7
Finland	15	202	8	0.3	0.9	0.1	0.4
Ireland	13	175	8	0.2	0.8	0.1	0.5
Estonia	3	19	16	0.0	0.1	0.2	0.7
Greece	2	182	1	0.4	1.4	0.2	0.8
Cyprus	2	18	13	0.0	0.1	0.2	0.6
Latvia	2	23	9	0.1	0.2	0.3	0.9
Lithuania	1	35	3	0.1	0.3	0.2	0.8
Malta	1	8	13	0.0	0.0	0.2	0.6
Luxembourg	3	45	7	0.0	0.1	0.1	0.3
Slovenia	4	36	10	0.1	0.2	0.2	0.7
Slovakia	10	74	14	0.2	0.5	0.2	0.7

Table 3: Euro area bond markets (Face value; EUR billion)

	Total	2-30yr	Eligible (25%)	Agencies	2-30yr	Bonds+Agencies Total eligible	Target purchases
Germany	1140	863	216	199.43	184.83	262	212.8
France	1580	1185	296	115.73	93.53	320	169.1
Italy	1852	1384	346	0	0	346	146.3
Spain	874	632	158	34.78	14.4	162	104.5
Netherlands	350	288	72	0	0	72	47.5
Belgium	357	280	70	0	0	70	28.5
Austria	215	180	45	0	0	45	22.8
Portugal	124	98	24	0	0	24	20.9
Finland	103	83	21	0	0	21	15.2
Ireland	125	115	29	0	0	29	13.3

Source: Bloomberg

Table 4: QE shares (as a % of GDP; Total stock; Net issuance)

	QE/GDP	QE/total stock (in percent)	QE/net issuance
Fed	22	15	28
ECB	12	9	189
BoJ	39	21	206
BoE	21	26	75

Table 5: Estimated monthly ECB purchases vs issuance (EUR Billion)

	ECB Purchases	Gross Issuance	Net Issuance		Gross issuance-ECB	Net issuance-ECB
Germany	11.1	13.3	0.3		2.2	-10.8
France	8.8	17	7.1		8.2	-1.7
Italy	7.6	22.7	6.3		15.1	-1.3
Spain	5.5	11.9	4.7		6.4	-0.8
Netherlands	2.5	4.2	1.1		1.7	-1.4
Belgium	1.5	2.8	0.9		1.3	-0.6
Austria	1.2	1.6	0.5		0.4	-0.7
Portugal	1.1	1.9	1.4		0.8	0.3
Finland	0.8	0.8	0.7		0	-0.1
Ireland	0.7	1.3	0.8		0.6	0.1
Total	40.8	77.5	23.8		36.7	-17

Sources: ECB, National Treasuries, JPM

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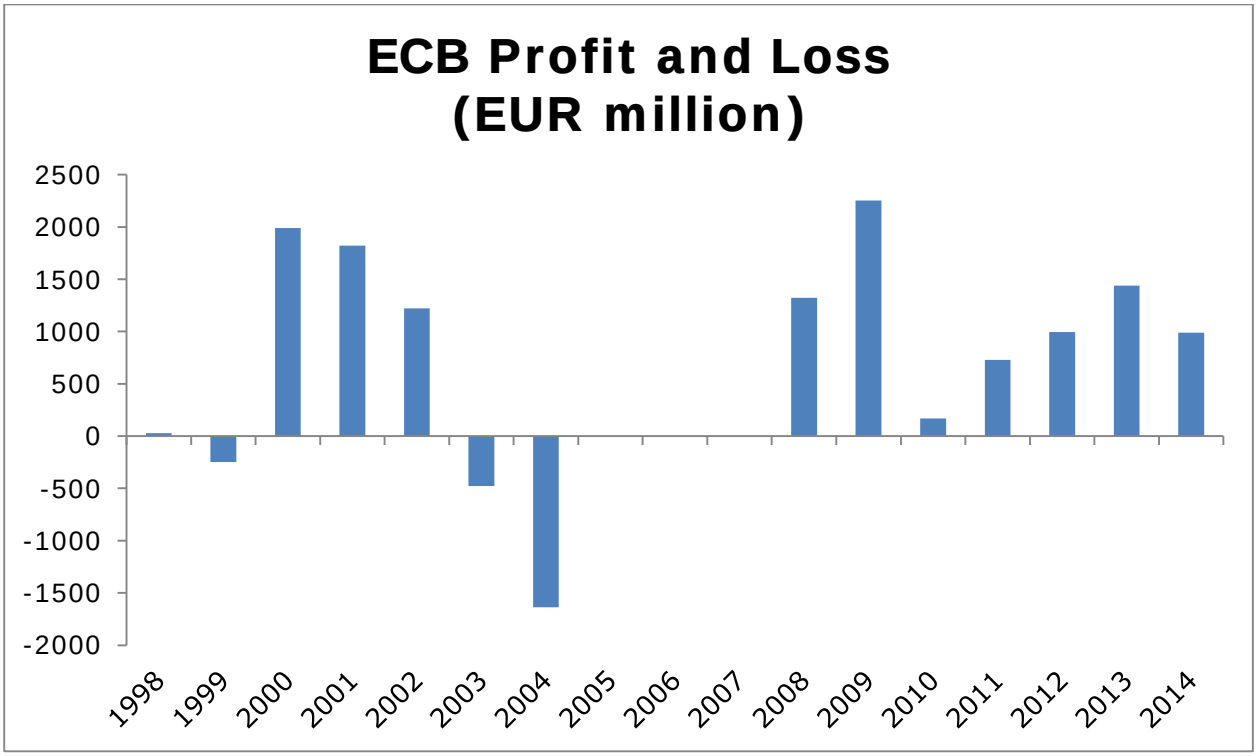
Figure 1



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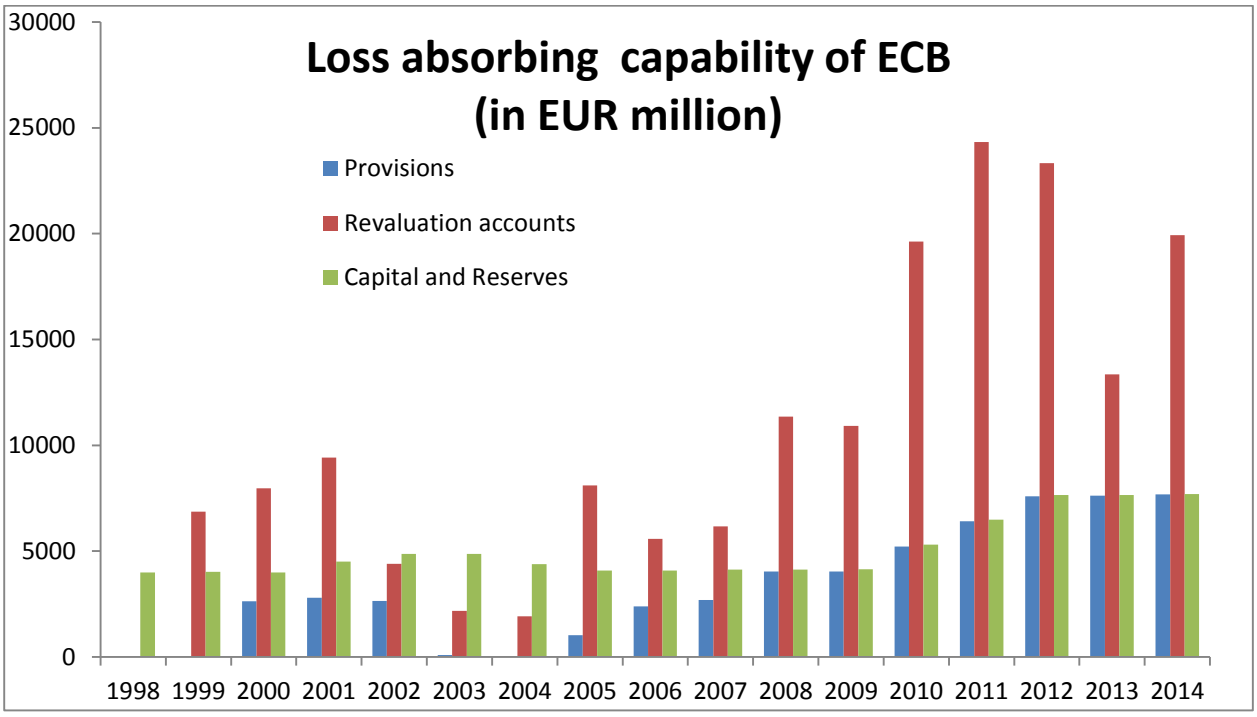

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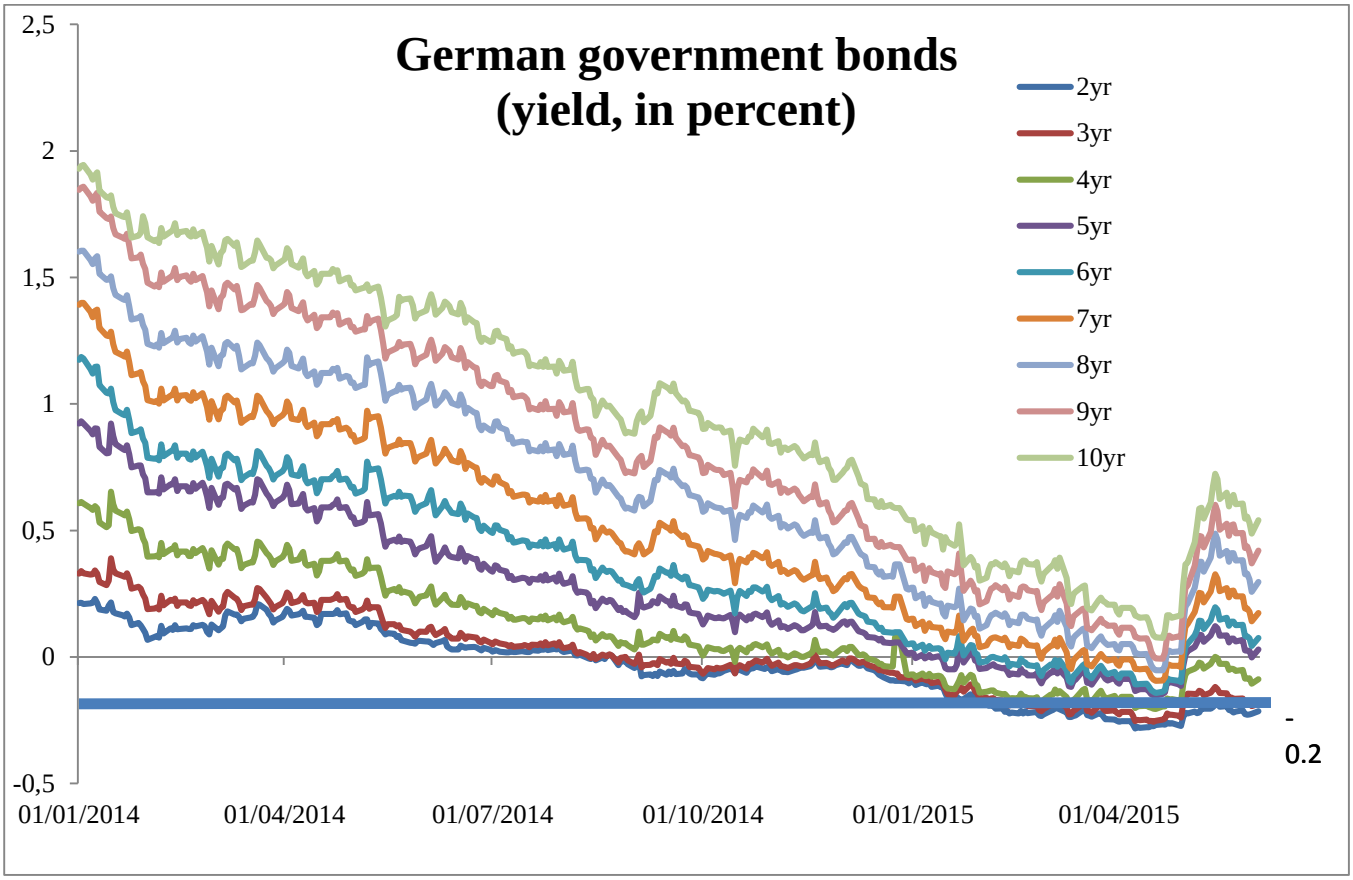

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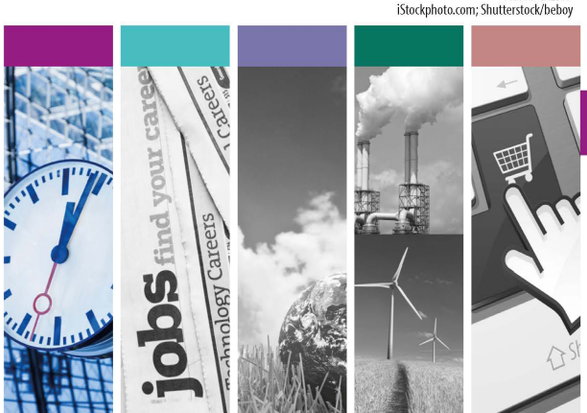

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