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A national public bank to finance a euro zone government: Getting the funds for investment and recovery packages

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A national public bank to finance a euro zone government: Getting the funds for investment and recovery packages

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Abstract

A national public bank may be used to finance the national fiscal policy of a country within the euro zone. The bank would only hold domestic government bonds. It would get its funds from the Eurosystem, pledging government bonds as collateral. The publicly owned bank would apply for funds like any other bank, legally not violating the prohibition of monetary financing provision in EU treaties. Effectively, as the profits of the bank are returned to the government, interest on newly issued bonds can be saved, freeing up additional resources for government spending and investment. The biggest risk to the bank is a margin call by the national central bank in response to a fall in the market price of government bonds. A rule change in the ECB collateral scheme is proposed to remedy this risk. Then, a public bank could insulate the national government from buyer strikes and allow the state to pursue an adequate fiscal policy to create employment while debt servicing costs remain subdued.

Keywords: Government Finance, Euro Crisis, Public Bank, Euro Area, European Central Bank, Financing Stimulus, Fiscal Policy, Public Debt Reduction, Monetary Financing, Government Bonds, Public Investment, Government Spending

JEL codes: E63, E52, E62, H1, H12, H63, E42

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Executive Summary

A national public bank may be used to finance the national fiscal policy of a euro zone country. This bank would hold domestic government bonds on the asset side, successively buying up a part or all of the market for them. Interest payments by the state to the public bank are recycled back to the state through the profits and dividends of the public bank. Apart from freeing up additional resources for government spending and investment, the bank could make a positive contribution to sustainable debt dynamics. Moreover, it could insulate the national government from buyer strikes. Most importantly, it allows a domestic euro zone government to end austerity and pursue an adequate government spending policy to create employment.

On the liabilities side, the bank would have capital and borrowed funds. Initially equipped with capital, it would use it to buy government bonds only. The bonds can be used as collateral in the refinancing operations of the Eurosystem to receive (borrowed) funds, which, in turn, can be used to buy more government bonds. This way, the bank can leverage up to a certain ratio depending on both the maturity of the bonds bought and the minimum capital ratio that a regulator may impose. In principle, however, a bank of this type can have a maximum leverage ratio ranging from 20 to 200 and a minimum capital in percent of assets between 0.5% and 5%. There is no hard floor on the minimum regulatory capital because central government bonds are considered risk-free according to the EU Capital Directive and therefore do not require regulatory capital. For the probable minimum capital ratio of 3% as suggested in Basel 3, set as a percentage of total assets, the maximum leverage ratio lies at 33. In this case, a capital of €100 million could buy and hold up to €3.3 billion of government bonds.

Similar to other public banks, the strategic goal of this bank is not to make the maximum economic profit, but to assist the government in its financing tasks. However, the bank should not run an accounting loss, both for its political viability in the national and European context and to avoid the need to recapitalize the bank.

The biggest threat to the profitability of this bank is maturity mismatch (duration gap), or for all practical purposes a strong fall in government bond prices in the near to medium term future. To ensure that the bank minimizes potential capital losses on its balance sheet, government bonds should be held to maturity to the maximum extent possible. A significant fall in market prices of government bonds triggers a margin call (by the central bank to the public bank) on all government bonds used as collateral in standard Eurosystem funding operations, and may either cause liquidity or profitability problems. To avoid this scenario, I propose that the current ECB collateral valuation scheme be slightly altered: The valuation of central government bonds according to market price should be changed to a theoretical present value valuation. If this is not feasible, non-marketable assets may be used as an alternative, albeit inferior, option.

The publicly owned bank would apply for funds like any other bank, legally not violating the pro-

hibition of monetary financing provision in EU treaties. I suggest that the bank should only buy *newly-issued* government bonds on the primary market because bonds on the secondary market have already been sold and do not need further financing assistance.

There are certain political risks such as the proposal for an exposure limit on single sovereigns, or a rating downgrade for some countries (Spain, Italy), that would make it harder for these countries to set up a public bank in a meaningful way because the maximum leverage ratio would be quite low. For (rescue program) countries that experience particularly unfavorable collateral conditions at the ECB, e.g. Greece, the public bank refinancing mechanism suggested here is useless.

The proposal for the bank sketches in a stylized way its balance sheet, its “business model”, and the political implications of the idea in the current European context. For lack of space or proper expertise, it does not discuss potential obstacles posed by the fiscal regime of the European Union and the bank’s place in EU competition law, but it includes some discussion of EU banking regulation when relevant.

1 Introduction

In principle, a euro zone government could use a national public bank to buy its own national government debt. Section 1.1 below explains why this is beneficial. In the beginning of the principal section of the paper, Section 2, the *public bank option to government finance* is explained, including the main refinancing mechanism based on repurchase transactions with the Eurosystem. A stylized balance sheet is presented and various aspects of a bank of this sort are discussed: capital requirements, leverage, profitability, risk and potential bond price decreases, and the scope of activity in the bond market. The implications of ECB actions and banking regulation for the bank are presented in Section 4, and various policy fields that the government needs to attend to in the context of the public bank proposal are briefly surveyed in Section 3. The remainder of the introduction serves to give an overview of the main advantages of the public bank proposal – a discussion I delve into further in Section 5 on the political dimension of the idea, taking into account the current European discussion and recent events.

1.1 Virtues of a public bank financing the government

Three main reasons to finance the government by a public bank are listed below.

Interest cost: The national government saves on interest cost. The profits of the public bank stem from the interest rate spread between the average interest rate paid on the bank's portfolio of government bonds and the interest paid on the interbank market or from direct ECB financing. Through dividends, the interest paid on government bonds may be returned to the national government. Especially for those governments that have low or negative growth rates, any payment of interest may be unsustainable from the straightforward mathematics of debt dynamics.¹

Predictable borrowing cost: The public bank can help to keep down the government bond yields by acting as an additional or if necessary exclusive buyer of *newly-issued* government bonds. While it is a goal of the ECB to hold down government borrowing cost, there are no precisely defined quantitative targets over the yield curve that make it possible for a government to calculate its maximum borrowing cost. By buying government securities at a guaranteed interest rate, or at least at a spread over the current euro zone main refinancing rate, interest cost calculations become more reliable. With a realistic expectation that the ECB main refinancing rate will be close to zero for the foreseeable future, but at least the next three to five years², the government should be able to calculate borrowing costs up to reasonable precision. Furthermore, with the *public bank*

¹see Ley (2009)

²as some euro zone countries enter their third recession since the beginning of the financial crisis, growth is generally weakening even in Germany, and even Northern countries such as the Netherlands and Finland have their own idiosyncratic growth problems

option to government finance, not only the ECB, but also the public bank guarantees predictable financing of the domestic government. Buyers' strikes can entirely be ruled out to adversely affect the financing of the central government.

Financing long-term investment projects and counter-cyclical government spending:

Long-term borrowing costs are historically low, while public infrastructure is crumbling and public investment is at frighteningly low rates. For the US, the argument that "Now is the time to invest" has been summarized and popularized by DeLong and Summers (2012). A public bank could give an additional layer of security and affordability in the financing of projects that require stable long term financing.

2 The public bank

With the rationale for the bank outlined in the previous section, two further questions are apparent: How would the bank fund itself? Can it be profitable, or at least not run a loss? The answer to the first question is the principal suggestion of the paper, and described below. The second question is discussed in Section 2.2.

2.1 Balance sheet and funding structure

Once equipped with capital, initially available as bank reserves, a domestic public bank can buy newly issued government bonds from the domestic government. These bonds can be used as collateral to borrow bank reserves from the Eurosystem, which, in turn, can be used to buy more new government bonds. Those bonds can then be used as collateral to borrow more bank reserves from the Eurosystem.³ Several more rounds of leveraging up follow until a target leverage ratio is achieved that corresponds to a target capital ratio. This builds up the balance sheet of the public bank, and answers the first question of how such a bank would function. An example of this process is provided in Table 1. The sequence of actions in the table is the following: With an initial capital of €100 million, the bank has bank reserves (cash) available of the same amount (second column). It then buys government bonds worth €100 million (third column) that it uses in a reverse repurchase agreement with the Eurosystem to get bank reserves of €95 million.⁴ The latter are denoted in the second line (financing round 2) and second column, where the same process starts again. The bank uses the €95 million to buy securities of that amount that can then be used as collateral at the Eurosystem to get €90.25 million in new funds. At this point, a total of €195 million of

³allocated by the ECB, administered by the domestic national central bank within the Eurosystem

⁴Reverse repurchase agreements (reverse repos) are the legal form of the process by which the Eurosystem provides liquidity to eligible banks. They are equivalent to secured loans from an economic point of view.

government securities have been purchased, which is recorded in the last column.⁵ Eventually, a total of almost €2 billion of government bonds have been purchased (last row) at the end of the process.

2.1.1 Setting up the bank

The only time that a euro zone government would have to use its own resources is when it sets up the bank with initial capital. The funds required to do so could come from either rearrangements within the national budget or from emitting additional bonds. The second option is explained in Appendix A, which is especially useful to the reader unfamiliar with government financing and ECB refinancing operations in the Eurosystem. The bank proceeds to use all its capital to purchase newly-issued government bonds. The bank so far has only used its available equity and has not leveraged up at this point (the leverage ratio is still 0). Once it starts to use the government securities originally acquired as collateral with the Eurosystem in order to receive additional bank reserves, it can leverage up to a desired ratio by increasing borrowed funds. With borrowed funds, the balance sheet of the public bank in stylized form can be found in Table 2. The public bank uses all equity and borrowed funds that preferably come from ECB refinancing operations to invest in securities (government bonds).⁶ To the maximum extent possible, those are classified as held-to-maturity (HTM) to protect the bank from capital losses and negative net income that could arise from falling bond prices. In particular longer term bonds have to be classified as HTM because they are prone to large bond price changes (see also below). If so classified, the bank does not need to recognize any capital losses should they arise – unlike for securities in the other two categories (available for sale and trading account assets).

2.1.2 Collateral requirements limit leverage, capital requirements do not

How much leverage could a public bank achieve by buying government bonds, using them as collateral to get more funds, only to buy more government bonds, and then repeat the circuit to the maximum extent possible? In principle, both capital requirements and collateral requirements can limit leverage. However, due to the specific regulations in the EU, regulatory capital requirements would not constrain the public bank with respect to leverage for two reasons:

Firstly, a credit institution in a euro zone member state does not need to hold capital for government bonds if they are issued by the *domestic* central government and denominated in euros.⁷

⁵This way, the balance sheet can expand rapidly, even if other funding sources were to partially replace the repurchase agreements with the Eurosystem eventually.

⁶While deposits from non-banks such as firms and individuals are included on the liabilities side and the required deposits (through reserve requirements) on the asset side in Table 2, the option of funding the bank through non-bank entities is not explored further in this section. The question is taken up again in Section 2.1.3.

⁷In other words, exposures of credit institutions to bonds of the domestic central government denominated in the domestic currency are assigned a 0% risk weight (European Union Capital Requirements Regulation, 2013, Art. 114 Paragraph 4, in Part 3, Title 2, Section 2, on p. 76). As a result, the regulatory capital requirement is zero.

Table 1: Example: Successive funding rounds of a bank investing in government bonds with maturities above ten years and issued by a central government with credit quality 1 or 2

Financing round	Initial reserves (in millions)	Securities bought in this round (in millions)	Funds received as cash for securities collateral at ECB (in millions)	Total securities bought (cumulative, in millions)
Initial capital	100	100	95	100
2	95	95	90.25	195
3	90.25	90.25	85.74	285.3
4	85.74	85.74	81.45	371.0
5	81.45	81.45	77.38	452.4
6	77.38	77.38	73.51	529.8
7	73.51	73.51	69.83	603.3
8	69.83	69.83	66.34	673.2
9	66.34	66.34	63.02	739.5
10	63.02	63.02	59.87	802.5
11	59.87	59.87	56.88	862.4
12	56.88	56.88	54.04	919.3
13	54.04	54.04	51.33	973.3
14	51.33	51.33	48.77	1024.7
15	48.77	48.77	46.33	1073.4
16	46.33	46.33	44.01	1119.7
17	44.01	44.01	41.81	1163.8
18	41.81	41.81	39.72	1205.6
19	39.72	39.72	37.74	1245.3
20	37.74	37.74	35.85	1283.0
30	22.59	22.59	21.46	1570.7
40	13.53	13.53	12.85	1743.0
50	8.10	8.10	7.69	1846.1
60	4.85	4.85	4.61	1907.9
70	2.90	2.90	2.76	1944.8
80	1.74	1.74	1.65	1967.0
90	1.04	1.04	0.99	1980.2
100	0.62	0.62	0.59	1988.2

Table 2: Stylized balance sheet of the public bank

Assets	Liabilities and Capital
<p>Securities</p> <ul style="list-style-type: none"> - Held To Maturity - Available For Sale - Trading Account Assets <p>Deposits at the CB</p> <ul style="list-style-type: none"> - Required reserves - Excess reserves 	<p>Borrowed funds</p> <ul style="list-style-type: none"> - ECB refinancing operations - Deposits of banks - Deposits of non-banks <p>Equity capital</p> <ul style="list-style-type: none"> - Stock

Secondly, with loans to counterparties, banks are subject to a percentage exposure limit to a single borrower in terms of their total assets – unless that borrower is a central government of the euro zone.^{8 9}

Collateral rules, however, do constrain the leverage of the public bank. Two factors affect the maximum leverage ratio: The first is a *change* in the market price of the collateral, central government bonds. The second is the haircut that the ECB applies to the market value of the asset eligible as collateral.

For now, we shall assume a constant market price of government bonds and thus only consider the second factor. If the full market value of government bonds cannot be used to get an equivalent amount of bank reserves, and only a fraction of the market value of the bonds is paid out as reserves in each reverse repo transaction with the ECB, then clearly an infinite circle of leveraging up is not possible. Instead, the maximum leverage ratio results from the sum of the infinite geometric series that uses as its common ratio the haircut percentage ratio applied to government bonds when they are used as collateral at the ECB. This is shown in equation (1), where c is the ECB collateral haircut percentage.¹⁰

$$\text{Max. Leverage ratio} = \frac{1}{1 - c} \tag{1}$$

⁸see European Union Capital Requirements Regulation (2013, Art. 400 Paragraph 1 (a), in Part 4, on p.234).

⁹Both rules have been criticized, among others by Deutsche Bundesbank (2014), Acharya and Steffen (2015) and Korte and Steffen (2014), who consider the risk weight of 0% for central governments a “sovereign subsidy” that leads banks to hold too little capital when the sovereign does actually default. To be exact, Korte and Steffen (2014) use the term sovereign subsidy exclusively for capital not held due to *non-domestic* sovereign exposures. The proposed public bank would therefore not benefit from a sovereign subsidy according to their definition.

¹⁰Equation (1) only holds if the market price of the collateral remains constant.

At n rounds of leveraging up, the maximum leverage ratio at that point is given by equation (2):¹¹

$$\text{Max. Leverage ratio at } n \text{ rounds} = \frac{1 - c^n}{1 - c} \quad (2)$$

One should keep in mind that the theoretical maximum leverage ratio is an approximation of the process. In practice, the ratio will be slightly lower. At any point in time, the bank might want to hold a part of the liquidity in cash for various reasons.¹²

Generally, the ECB haircut ratios depend on the “credit quality” of the securities used as collateral. The ECB uses credit quality steps to assess the creditworthiness of the issuer of the bonds. These credit quality steps for central government bonds depend on the *best* rating for a central government out of the ratings of four recognized credit rating agencies (S&P, Moody’s, Fitch, DBRS). In terms of the rating categories of Standard & Poor’s and Fitch, a central government rating of AAA to AA- translates to credit quality step 1, ratings of A+ to A- correspond to credit quality step 2, and ratings BBB+ to BBB- to credit quality step 3. Central government securities with ratings below BBB- would translate to credit quality steps 4 or 5, which the ECB does not accept as collateral.¹³ For all euro zone countries, Table 3 shows the current credit ratings of all four rating agencies that the ECB accepts. It also shows separately the best rating of the “big three” (S&P, Moody’s, Fitch), the best rating overall (including DBRS) that counts for the credit quality steps, and a hypothetical credit quality step if DBRS were not one of the admitted rating agencies.¹⁴ It is interesting to note that the credit rating of Italy, Spain and Portugal hinges on the DBRS rating alone. In the case of Portugal, the ECB collateral haircut scheme has been specifically altered to allow Portugal to remain at credit quality 2.¹⁵ Finally, the last two columns in Table 3 establish whether the bonds of a country are accepted as collateral at the ECB and whether the country currently enjoys the most favorable collateral treatment for central government bonds. As a sequel to the previous table, Table 4 shows how the credit quality step of each euro zone country translates into collateral haircuts depending on the maturity of government bonds. Special haircuts apply for countries in an ESM or EFSF program (Cyprus and Greece). Furthermore, it contains a row that

¹¹The row entries in the column *Total securities bought (cumulative, in millions)* in Table 1 can be computed by multiplying initial capital K with the the leverage ratio from equation (2), with n as the financing round:

$$\text{Total securities bought after } n \text{ rounds} = K \times \frac{1 - c^n}{1 - c}$$

¹²Another reason for a lower ratio in practice is that the Eurosystem requires banks to provide collateral for the accrued interest in its liquidity providing operations. Although these payments are too modest in the current super low interest rate environment of around 0.05% to make the ECB ask for more collateral based on accrued interest alone, this is a factor that could play a role in long-term refinancing operations in a higher interest rate environment.

¹³see ECB (2011/14, Section 6.3.1 and 6.3.2) and ECB (2014/10, concerning Section 6.3.1)

¹⁴Dominion Bond Rating Services (DBRS) has a different rating approach towards sovereigns as it attempts to look beyond the cycle (Dominion Bond Rating Agency, 2014a,b). Furthermore, it does not publish ratings for all euro zone countries.

¹⁵The lower threshold for credit quality 2 used to be a rating of BBB by at least one of the three rating agencies (DBRS does not rate Portugal), but was changed to BBB- after Portugal was downgraded (ECB, 2014/10).

has a hypothetical country with credit quality step 3, which none of the euro zone countries are currently rated at. Using equation (1), this information is used to calculate the maximum leverage ratios presented in the first few columns of Table 5. As haircuts for long-term government bonds are larger due to their higher risk, a public bank investing in longer-term bonds could leverage its capital less than if it invested in shorter maturities. However, even with the longest maturity of over ten years, a public bank could still run a leverage ratio of 20. This means that a bank with, for instance, €100 million in capital could ultimately buy up to €2 billion worth of government bonds. For simplicity, the table assumes that the bank would invest all its funds into just one maturity category of government bonds, although any real-world bank would likely make use of the whole maturity spectrum. If the bank solely invests in maturities of 7 to 10 years, it could buy up to 3,333 billion worth of government bonds, and for maturities of 5 to 7 years even up to five billion. For financing or stabilizing the market in shorter maturities, say one to three years, a bank with 100 million capital would even have at its disposal a “buying power” of ten billion. Note, however, that this “firepower” crucially depends on achieving at least credit quality step 2, which in turn depends on the sovereign rating. After a downgrade to a (best) rating below A-, the haircut increases dramatically, with bonds even of the shortest maturity under one year deemed not as safe by the ECB haircut scheme as bonds with a maturity greater than 10 years of a country rated A- and above (fulfilling credit quality step 2 or higher). After a downgrade of its sovereign, a bank with €100 million of capital could only buy €769 million worth of government bonds with maturity greater than ten years as opposed to two billion before. For all practical purposes, it may become harder in this case, if not politically impossible, to raise as much initial capital in the government bond market or to find the funds through re-allocations in the national budget to start the bank. The second part of Table 5 presents calculations of the capital in percent of total assets that a bank would hold if it were to use the maximum of its leverage ratio, which is easily computed using equation (3).

$$\text{Minimal capital ratio in \%} = 100 \times \frac{1}{\text{Max. Leverage ratio}} \quad (3)$$

Note, however, that this is not the required minimum *regulatory* capital ratio, but the actual capital ratio that would result if the bank were to buy assets until it reaches its maximum theoretical leverage ratio. Provided a credit quality step of 1 or 2, the capital in percent of total assets would range from 0.5% for a bank that would invest in maturities under one year (essentially like a money market fund), and up to 5% for a bank that would solely buy government bonds with maturities of ten years or greater.

The required minimum regulatory capital ratio (resulting from risk-weighted assets) is 0% as the bank only invests in central government securities. However, it could be that European Union banking regulation would require a higher ratio that could effectively limit the maximum leverage ratio to a lower number than the maximum numbers given in the first columns of Table 5. One pos-

sibility is a 3% leverage ratio limit proposed in Basel 3 (Basel Committee on Banking Supervision, 2014a). However, what is called “leverage ratio” in the document is actually a minimum regulatory capital ratio. Contrary to the other capital requirements based on risk-weighted exposures (assets), the 3% number is relative to total assets so that the 0% risk-weight of marketable government securities becomes irrelevant for this measure. With a minimum regulatory capital ratio of 3%, the corresponding maximum leverage ratio¹⁶ is 33.3. The two columns named B3 (Basel 3) in Table 5 therefore present the maximum leverage ratios and the minimum capital ratios, assuming investment in government securities with maturities of up to one year with the minimum capital requirement enforced. With the capital rule in place, a public bank investing in bonds of maturities greater than seven years would not be constrained in its maximum leverage ratio, while a public bank investing in bonds of maturities less than seven years would be constrained to 33.3.

The analysis above has investigated leverage ratios under the assumption that market prices of central government bonds are constant. In the main funding operation of the bank (the reverse repurchase transactions with the national central bank (NCB) that is essentially a secured loan), the marketable bonds serve as collateral for bank reserves that the bank borrows from the Eurosystem. If the market price of a bond falls in the secondary market where it is traded, there are repercussions for renewing the reverse repos when they come due: The collateral value is now lower, and the bank either has to provide more collateral to the ECB or borrow less.¹⁷ Borrowing less in the next reverse repo, however, leaves the bank short of some funds to buy back the securities at the agreed amount in the current reverse repo.¹⁸ There is an even more severe problem that arises before the repurchase agreement comes due: if the market price of the bond falls significantly, the public bank faces a margin call from the national central bank (NCB) at the end of the trading day, meaning it has to furnish additional securities or cash to the NCB to compensate for the diminished bond value. More precisely, a margin call is triggered when the adjusted market value of the delivered bonds (adjusted price¹⁹ times quantity) crosses the “lower trigger point”, that is 99.5% of the nominal amount of the repo (the liquidity provided) plus accrued interest.²⁰ Provided the margin call can be met through cash reserves on the asset side or additional borrowing from other sources than the central bank, there are no consequences for the leverage ratio and the future leveraging process.^{21 22}

¹⁶in the sense that I have used the phrase above and unlike the Basel Committee uses it: as a ratio of assets over capital

¹⁷If it cannot do either, a debit in the marginal lending facility is posted by automatic recourse. However, collateral is still required in the marginal lending facility. Failure to provide it *will* result in monetary fines and *may* result in exclusion from the liquidity providing operations altogether (ECB, 2015a, Article 19, Paragraph 6).

¹⁸If it cannot find funding in the unsecured interbank market, the bank ultimately has to sell some of its assets. With unchanged market demand, this increase in the supply of bonds will further depress the price of the bond, causing a vicious cycle of higher margin calls, more forced sales, and a fall in bond prices that again leads to higher margin calls.

¹⁹adjusted for the haircut, e.g. if the market price of a ten year bond is €80, and the haircut of the bond is 5%, then the adjusted market price is €76.

²⁰see ECB (2015a, Annex XII, Example 6: Risk control measures, p.150-153)

²¹other than the leverage ratio being raised through the additional borrowing to fulfill the margin call

²²Note that the initial market price of the bond is irrelevant to the leveraging process. It does not matter whether

Table 3: Current central government ratings in the euro zone and the resulting credit quality steps

Country	Ratings as of Nov 18, 2014 ⁵				ECB Haircut scheme			
	S&P	Fitch	Moody's	Best Rating big three ²	DBRS	Credit quality step w/o DBRS ³	Credit quality step ⁴ as collateral by ECB	More favorable collateral scheme
Austria	AA+	AAA	Aaa	AAA	AAA	1	Yes	Yes
Belgium	AA	AA	Aa3	AA	AA-high	1	Yes	Yes
Cyprus ⁶	B+	B-	B3	B+	B (low)	(5)	Yes	No
Estonia	AA-	A+	A1	AA-		1	Yes	Yes
Finland	AA+	AAA	Aaa	AAA	AAA	1	Yes	Yes
France	AA	AA+	Aa1	AA+	AAA	1	Yes	Yes
Germany	AAA	AAA	Aaa	AAA	AAA	1	Yes	Yes
Greece ⁶	B	B	Caa1	B	B	(5)	Yes	No
Ireland	A-	A-	Baa1	A-	A (low) P	2	Yes	Yes
Italy	BBB	BBB+	Baa2	BBB+	A (low) N	3	Yes	Yes
Latvia	A-	A-	Baa1	A-		2	Yes	Yes
Lithuania ¹	A-	A-	Baa1	A-		2	Yes	Yes
Luxembourg	AAA	AAA	Aaa	AAA		1	Yes	Yes
Malta	BBB+	A	A3	A		2	Yes	Yes
Netherlands	AA+	AAA	Aaa	AAA	AAA	1	Yes	Yes
Portugal	BB	BB+	Ba1	BB+	BBB (low)	(4)	Yes	Yes
Slovakia	A	A+	A2	A+		2	Yes	Yes
Slovenia	A-	BBB+	Ba1	A-		2	Yes	Yes
Spain	BBB	BBB+	Baa2	BBB+	A (low)	3	Yes	Yes

¹ From January 1, 2015

² Best rating of S&P, Moody's and Fitch, depicted in S&P and Fitch scale

³ hypothetical, credit quality steps 4 and 5 are in brackets because only credit quality steps 1-3 are eligible as collateral at the ECB

⁴ actually used by the ECB

⁵ long term domestic currency rating for central government

⁶ for countries in ESM/EFSP programmes, special collateral regulations apply and a credit quality step does not directly translate to a collateral scheme: ECB (2013/13) for Cyprus and ECB (2014/46) for Greece

Source: S&P, Moody's, Fitch, ECB, own representation

Table 4: Credit quality steps and the corresponding valuation haircuts depending on maturity

Country	ECB Haircut scheme ³		ECB collateral haircuts for fixed coupon gov. bond, by maturity						
	Credit quality step	0-1 years	1-3 years	3-5 years	5-7 years	7-10 years	>10 years		
Austria	1	0.5	1	1.5	2	3	5		
Belgium	1	0.5	1	1.5	2	3	5		
Cyprus	(5)	14.5	27.5	37.5	41	47.5	57		
Estonia	1	0.5	1	1.5	2	3	5		
Finland	1	0.5	1	1.5	2	3	5		
France	1	0.5	1	1.5	2	3	5		
Germany	1	0.5	1	1.5	2	3	5		
Greece ⁴	(5)	23	37	47.5	51.5	58	68		
Ireland	2	0.5	1	1.5	2	3	5		
Italy	2	0.5	1	1.5	2	3	5		
Latvia	2	0.5	1	1.5	2	3	5		
Lithuania ¹	2	0.5	1	1.5	2	3	5		
Luxembourg	1	0.5	1	1.5	2	3	5		
Malta	2	0.5	1	1.5	2	3	5		
Netherlands	1	0.5	1	1.5	2	3	5		
Portugal	2	0.5	1	1.5	2	3	5		
Slovakia	2	0.5	1	1.5	2	3	5		
Slovenia	2	0.5	1	1.5	2	3	5		
Spain	2	0.5	1	1.5	2	3	5		
Downgraded²	3	6	7	9	10	11.5	13		

¹ From January 1, 2015

² Hypothetical downgraded country with credit quality step 3 (Best rating: BBB+ to BBB-)

³ based on ratings as of Nov 18, 2014

⁴ Greece is not a particularly good example for a public bank as the current haircut schedule for Greek government bonds as collateral implies that it cannot undertake the public bank idea in a meaningful way – on top of its inability to do so due to the TROIKA program.

Source: ECB, own calculations

Table 5: Maximum leverage and minimum capital of the public bank

Country	Theoretical maximum leverage ratios ²										Capital in % of total assets ³					
	0-1	1-3	3-5	5-7	7-10	>10	B3 ⁵	0-1	1-3	3-5	5-7	7-10	>10	B3 ⁶		
Austria	200	100	66.7	50	33.3	20	33.3	0.5	1	1.5	2	3	5	3		
Belgium	200	100	66.7	50	33.3	20	33.3	0.5	1	1.5	2	3	5	3		
Cyprus	6.9	3.6	2.7	2.4	2.1	1.8	6.9	14.5	27.5	37.5	41	47.5	57	14.5		
Estonia	200	100	66.7	50	33.3	20	33.3	0.5	1	1.5	2	3	5	3		
Finland	200	100	66.7	50	33.3	20	33.3	0.5	1	1.5	2	3	5	3		
France	200	100	66.7	50	33.3	20	33.3	0.5	1	1.5	2	3	5	3		
Germany	200	100	66.7	50	33.3	20	33.3	0.5	1	1.5	2	3	5	3		
Greece	4	3	2.1	1.9	1.7	1.5	4	23	37	47.5	51.5	58	68	23		
Ireland	200	100	66.7	50	33.3	20	33.3	0.5	1	1.5	2	3	5	3		
Italy	200	100	66.7	50	33.3	20	33.3	0.5	1	1.5	2	3	5	3		
Latvia	200	100	66.7	50	33.3	20	33.3	0.5	1	1.5	2	3	5	3		
Lithuania ¹	200	100	66.7	50	33.3	20	33.3	0.5	1	1.5	2	3	5	3		
Luxembourg	200	100	66.7	50	33.3	20	33.3	0.5	1	1.5	2	3	5	3		
Malta	200	100	66.7	50	33.3	20	33.3	0.5	1	1.5	2	3	5	3		
Netherlands	200	100	66.7	50	33.3	20	33.3	0.5	1	1.5	2	3	5	3		
Portugal	200	100	66.7	50	33.3	20	33.3	0.5	1	1.5	2	3	5	3		
Slovakia	200	100	66.7	50	33.3	20	33.3	0.5	1	1.5	2	3	5	3		
Slovenia	200	100	66.7	50	33.3	20	33.3	0.5	1	1.5	2	3	5	3		
Spain	200	100	66.7	50	33.3	20	33.3	0.5	1	1.5	2	3	5	3		
Downgraded⁴	16.7	14.3	11.1	10.0	8.7	7.7	16.7	6	7	9	10	11.5	13	6		

¹ From January 1, 2015

² by maturity (in years) of central government bonds bought. Maximum leverage ratio for each Euro of capital.

³ Capital ratios corresponding to maximum leverage ratios, assuming all capital and borrowed funds are invested in domestic central government bonds of the same maturity category (in years)

⁴ Hypothetical downgraded country with credit quality step 3 (Best rating: BBB+ to BBB-)

⁵ The minimum of: the maximal leverage ratio of bills/bonds with maturity up to one year and the maximum leverage ratio according to Basel 3 if Basel 3 constrains the minimum capital ratio to 3%.

⁶ The maximum of: the minimal capital ratio of bills/bonds with maturity up to one year and the minimal *regulatory* capital ratio of 3% currently discussed in Basel 3 (Basel Committee on Banking Supervision, 2014a).

Source: BIS, own calculations and representation

Table 6: Margin calls from NCB to the public bank if market bond price falls by 5% in selected funding rounds

Finance round	Initial reserves (mil-lions)	Bonds bought in this round (mil-lions)	ECB valuation haircut in % ²	Securities used as collateral for cash at ECB (mil-lions)	Total securities bought (mil-lions)	Current market price of bonds in % of face value	Current market value of securities (mil-lions)	Change in bond price in %	Approximate margin call by NCB (millions)	Margin call in terms of capital of the public bank, in %
1	100	100	5	95	100	100	100			
2	95	95	5	90.25	195	100	195	0	0	0
3	90.25	90.25	5	85.74	285.3	100	285.3	0	0	0
4	85.74	85.74	5	81.45	371	100	371	0	0	0
5	81.45	81.45	5	77.38	452.4	95 ¹	429.8	-5 ¹	-21.5	21.49
10	63.02	63.02	5	59.87	802.5	95 ¹	762.4	-5 ¹	-38.1	38.12
20	37.74	37.74	5	35.85	1283.0	95 ¹	1218.9	-5 ¹	-60.9	60.94
60	4.85	4.85	5	4.61	1907.9	95 ¹	1812.5	-5 ¹	-90.6	90.62
90	1.04	1.04	5	0.99	1980.2	95 ¹	1881.2	-5 ¹	-94.1	94.06

¹ In each of these funding rounds, it is assumed that the market bond price has remains at 100% face value until that specific founding round, when it drops by 5%. Each of them is therefore a separate scenario, reflecting a successively higher leverage before the market bond price falls.

² In continuation with the example of Table 1, a government bond with maturity above ten years is assumed.

However, the amount of funds demanded in the margin call may be prohibitively large for a highly leveraged institution, even when the asset price change is not out of the ordinary. Using the same numbers as in Table 1, Table 6 shows the amount of the margin call for selected funding rounds (5,10,20,60,90). For each of them, it is assumed that market bond price remains at 100% of the face value of the bond until that funding round, and then drops to 95%. The estimate for the margin call amount and the margin call divided by the capital of the public bank can be read off the last two columns. With a leverage ratio of 19.8 at funding round 90, an amount close to the entire capital (€100 million) is requested by the margin call of €94.06 million and has to be raised externally because the capital itself is invested in bonds. Section 2.2 gives three scenarios of bond price changes and shows that losses of 10% or more in magnitude are plausible events, especially for longer term bonds. It is hard to see how a leveraged public bank can continue to operate when faced with elevated margin calls. Therefore, a change in the ECB collateral scheme is necessary if the public bank is supposed to function. Central government bonds would need to be valued either according to a theoretical price, e.g. the calculation of the present value of the bond with constant interest rates. The price should be calculated by the competent national central bank once and remain unchanged over the life of the bond in order to guarantee a stable funding environment for the public bank.²³

Non-marketable assets: One alternative that has not been mentioned so far is for the public bank to rely on *non-marketable assets*, e.g. a regular bank loan to a central government, that cannot be traded on secondary markets, instead of marketable central government bonds.²⁴ For non-marketable assets, Tables 4 and 5 featuring marketable assets have to be replaced with Tables 11 and 12 of Appendix B. As shown in Table 12, the maximum leverage ratio that a bank could achieve based on these non-marketable loans to the government is 10, and even that requires very short term loans (a residual maturity of less than a year). A capital of €100 million could therefore only

the government bond is at 100% or, taking an extreme case, 50% of the face value right before the bank starts buying them up. If the market price of the bond is 50% of its face value, the public bank can (and must) simply buy twice the quantity of bonds to provide as collateral to the NCB for the same quantity of funds. A difference merely arises in two other respects disconnected from the leveraging process: Firstly, a market price below face value means the public bank can expect capital gains as the bond matures towards its end date. Secondly, the government can expect a faster reduction in interest rate cost. For example, if the price of the bond is 50% of the face value and the public bank needs to buy twice the amount of bonds as a result, this implies that double the amount of interest payments are rerouted to the public bank after each leveraging step.

²³When I started writing the paper, I was unaware of the “margin call problem” and initially suspected that the public bank could work in line with existing ECB rules. That, unfortunately, is not the case for marketable assets that face daily revaluations by the national central bank based on the market price. While the problem makes the implementation of the proposal much less likely politically, it does not make its realization impossible. Despite the effort of making government securities equal to private securities in the current EMU architecture, it is clear that much of the financial system is still based on the former. As such, stabilizing the value of central government securities in its collateral price, and as a result its market price to a smaller extent, is not entirely unjustified with regard to financial stability. With the rule change, the ECB would equally help private market participants who suffer collateral shortages when the government securities they hold lose some of its market value.

²⁴While I could not find descriptions of how this is handled in practice, I presuppose in the following discussion that the national central bank does not revalue a loan of this kind on a daily basis (based on the price of comparable marketable assets) once the theoretical price is assigned.

lend a total of €1 billion to the government, an amount far lower than with marketable assets, and at a maturity that is much shorter. This option becomes more relevant if a rule change in the ECB collateral scheme cannot be attained, because it could potentially avoid the margin call problem. However, for the remainder of the paper, the use of marketable assets shall be the main supposition.

2.1.3 Funding alternatives

A bank has five main options to finance its asset purchases: Liabilities against the central bank such as funding through the main and long-term refinancing operations, liabilities against other banks such as deposits resulting from buying bank reserves for up to one year in the interbank market (at roughly EURIBOR interest rates or higher), deposits from non-banks, bank bonds sold to the public, and equity. The latter two financing options are not useful to the bank concept proposed in this paper. Having provided bank capital for founding the bank, the government has no interest in injecting additional capital, which renders the equity finance option undesirable. As for bank bonds, they would have to be sold with a premium on the interest rate that the central government pays.²⁵ As a result, the bank would pay a higher interest rate on its own issued bonds than it would receive on its assets (government bonds). While the public bank does not need to be profitable in the sense that it needs to attract private capital and offer the current market return on equity, it does desire to keep its capital intact. Over time, rising borrowing needs by the central government coupled with the simultaneous requirement of a constant capital ratio and leverage ratio would make it desirable for the bank to make a profit in order to increase its retained earnings (and thus capital) to be able to accumulate more government bonds.²⁶

Despite presenting a few arguments in either direction, I leave unanswered the question as to whether the bank should take in deposits or not.²⁷ If the bank were not to admit deposits from non-banks, minimum reserve requirements would not apply. Therefore, all of the bank's assets may bear the interest rate of government bonds. And because its liabilities (borrowed funds) are less in quantity than its assets (by the amount of capital), it can temporarily allow a slightly smaller return on assets than the interest rate it pays on its liabilities. If the bank takes in deposits, it may be able to pay lower rates on deposits than on its funding through other sources, particularly in normal times when the main refinancing rate is not close to zero. A quantitatively negligent downside is that minimum reserve requirements would apply and 2% of deposits would be remunerated at the main refinancing rate (which in itself may yield a profit). The cost of building up a minimal branch network and hiring staff to administrate deposits would weigh much heavier on profits.

²⁵Typically, a bank or non-bank domestic entity is subject to a sovereign (rating) ceiling in its own rating. Ratings above the sovereign are rare, and would be very unlikely to apply in the case of the particular bank suggested in this paper. Evidence for the European debt crisis is found in Alsakka et al. (2013). The general effect of sovereign rating changes on bank funding conditions is discussed in Panetta et al. (2011).

²⁶Otherwise, another capital injection would be necessary to keep up with increased bond buying over time in case government debt increases.

²⁷Nevertheless, the stylized income statement in Table 7 allows for the opportunity to do so.

As mentioned in the explanation of the financing process in Section 2 and Appendix A, government bond purchases may be financed through repurchase transactions with the central bank. Central bank funding in the euro zone is conducted mainly through two funding operations.²⁸ The main refinancing operation, a repurchase contract between the central bank and a bank with a two-week time horizon, used to be the main funding operation before the euro crisis. Using an auctioning system of “fixed allotment”, the European Central Bank asks for bids of desired amounts of bank reserves at certain prices (interest rates), and then decides up to which interest rate (and to which amount) it fulfills them. Banks may not receive the full amount they ask for. In practice, the interest rate resulting from these auctions are insignificantly higher than the main refinancing rate that the ECB announces. As the central bank typically wishes to keep the interest prevailing on the interbank market (EONIA) close to its announced main refinancing rate, it adjusts the quantity of injected reserves to approximately fulfill that condition. However, it is under no obligation to do so. In this fixed-allotment system, the public bank is not guaranteed the desired quantity directly from the central bank, and would likely have to resort to the interbank market for financing. In this context, it is important to remember that the overnight interbank market rate is not a unique rate for all banks, but merely an average rate that large banks charge other banks for unsecured overnight deposits. This market broke down during the euro crisis: As bank were unsure about the asset quality of their counterparties, they would not lend each other unsecured deposits. A public bank of the sort described here could suffer a similar faith in that it would have to pay higher interest rates in the interbank market (or not get reserves at all) if it was perceived as unsound by its banker peers. For instance, when doubts arise over a government’s ability to pay its debt funding conditions of domestic banks suffer as a result.

Since the crisis and the breakdown of the interbank market, however, a few changes in euro zone monetary policy have made it easier for banks to directly get from the central bank the exact amount of reserves that they desire. The ECB has switched to a funding system of “full allotment”, meaning each bank receives exactly the desired quantity of reserves. It is likely that this system will continue for an indefinite time as long as economic activity is weak, but at least until December 2016 as announced (ECB, 2014b). Furthermore, by far the most funding today is done through long-term refinancing operations (LTRO) instead of the common main refinancing operations before the crisis (Claeys, 2014, Figure 1). In fact, the ECB has conducted long-term refinancing operations with full allotment and maturities of six months, one year and three years in the past years, giving banks a longer planning horizon. However, with loan demand very low, banks paid back their LTRO earlier than desired by the ECB. With euro zone inflation below target and the ECB missing its mandate,

²⁸The banking system in the euro zone is “structurally indebted” to the Eurosystem central banks. While an individual bank may make without central bank funding and get its funding needs and bank reserves through the interbank market or through other deposits (e.g. the German banks in the crisis), the banking system as a whole must rely on central bank refinancing operations to get the bank reserves it needs to give out banknotes and fulfill the legally mandated minimum reserve requirements. Central bank funding systems are discussed in Lavoie (2014, Ch. 4) among others.

we can expect the central bank to continue its lax funding policy in the foreseeable future.

The more the public bank buys government bonds with longer maturities, the more it suffers from a maturity mismatch. To make itself less dependent on market financing and to reduce the mismatch, the public bank should aim to fund itself through LTROs with long maturities when available. However, for practical reasons it may be easier to purchase bank reserves on the interbank market at different maturities (longer preferred).

While the public bank can in principle borrow at all maturities, there is a tradeoff of either buying short or long term government bonds. Similarly, there is a tradeoff between a shorter and longer term funding structure. The case for longer maturities of bonds can be made based on a security argument: It allows for a longer reaction time should conditions in the market change unexpectedly, and ensures a longer time horizon with secure funding both for the bank and the government. Albeit more expensive, long term funding with interest payments locked in to finance long term bonds provides for less maturity mismatch between assets and liabilities on the balance sheet of the bank. In this case, a fall in the price of bonds does not matter for profitability if bonds are held to maturity. Short term funding to finance long term bonds enables a higher net interest margin because of the differences in maturity, at the cost of increased risk (see also Section 2.2). Short period bond and bill yields are lower and thus may not allow for the net interest margin that the bank desires. However, as explained below, the risk of falling prices of bonds held as Available For Sale (AFS) are minimized in this case.

2.2 Profitability and income statement

The core question in terms of the viability of the public bank is whether it is able not to run a loss. This means that the interest revenue needs to be greater than the interest expenses plus operating cost. Interest revenue stems from the government bonds held as assets, and interest expenses result from the funding operations through the central bank or the interbank market. Operating cost should be comparatively small if the bank does not entertain a branch network to acquire deposits. If the bank decides to collect deposits, the management could position the bank as an “internet bank” with at most a handful of branches in order to keep operating costs as low as possible. A stylized income statement is shown in Table 7.

2.2.1 The scope of activity in the government bond market and the degree of interest rate control exercised

There are several ways in which the proposed public bank could be employed in practice, three of which are surveyed below. The strategic goals to be achieved determine the right choice, and in turn affect the profits of the bank.

Table 7: Stylized income statement for the public bank

Revenue	Expenses
<i>Interest Income</i>	<i>Interest Expenses</i>
- Balances at central banks in the Eurosystem	- on repos with central banks
- Securities Held To Maturity	- on borrowed interbank market reserves and other deposits
- Securities AFS	
- Securities Trading Account	<i>Operating cost</i>

Limited operation of an existing public bank: Public banks, such as export credit banks, building association banks, or the *Kreditanstalt für Wiederaufbau* in Germany providing loans to small and medium sized enterprises at below market rates, fulfill various tasks in the public interest, but could expand to include a government bond buying operation. This integration with a bank that runs a different business model provides a diversification advantage and could potentially post higher overall profits than those resulting from the low margins of the bond-buying alone.

A crisis operation: To avoid a potential profitability problem of a rise in yields (and thus a fall in government bond values²⁹), the bank could solely be used in a time of crisis when primary market government bond yields are high. In those times, the public bank could take over and bid down the yield, effectively taking up most or all of the newly-issued government bonds for a while. It could even contemplate to buy bonds on the secondary market to improve the market price of the bonds. Net interest income would run very strong because interest on assets is unusually high while funding from the Eurosystem is cheap. When yields come down eventually, the public bank would record major capital gains, further boosting earnings. It is for this purpose that the idea was originally conceived (Picek, 2010, Footnote 4). During the euro crisis with government bond yields of the Southern euro zone countries plus Ireland under distress, private market demand for bonds fell sharply as a result of rating downgrades (legally compelling some investors to switch to better rated assets), risk of euro zone break-up, and safe haven flight within the euro zone combined with the set-up of the euro zone that allows investors to go into bonds of a different sovereign without taking any exchange rate risk. Italian one year and five year government bond yields are shown and compared to the main refinancing rate and the 12 month money market yield in Figure 1. The Italian 12 month government bill yield is closely aligned with the 12 month money market interest rate (EURIBOR 12M) until 2007. From 2007 on, the bills rate was consistently lower until the euro crisis started to affect Italy in 2011 and Italian debt began to be seen as risky rather than a safe haven. It took until mid 2014 and massive intervention on the part of the Eurosystem for the monthly average of the bill rate to again drop below the money market rate. After a lengthy

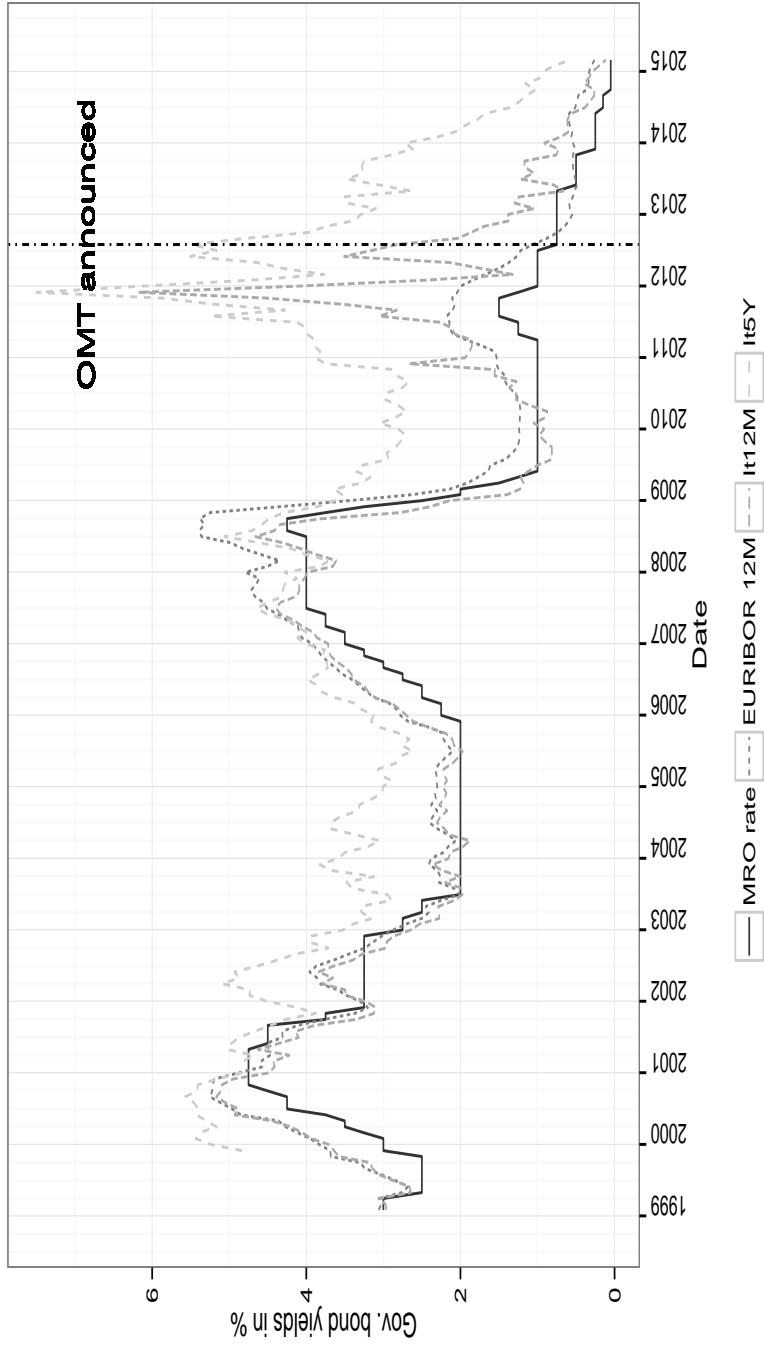
²⁹see Section 2.2.2 for details

paralysis of the ECB council within the murky and indecisive euro group politics, a combination of flooding the market with liquidity (long-term refinancing operations with full allotment) and a guarantee from Mario Draghi on July 26, 2012, to not let the euro fall apart eventually did the trick of incentivizing banks and other investors in the euro zone to demand these riskier government bonds, reversing the rising government bond yields. A similar outcome could have been achieved using a public bank. It could have started to buy national government bonds in the second quarter of 2010, when yields commenced to rise, or at least in late 2011, when the 12 month bill passed the 5% mark. In the market environment back then, it would have been important to equip the bank with enough capital to begin with to be able to significantly affect market demand. This is especially true if an ECB collateral rule change cannot get passed, and the bank has to avoid margin calls triggered by deteriorating government bond prices. Generally, if the risk is deemed to high, for instance if the government is not willing to provide enough capital during a steady and strong downward movement in bond prices, the public bank could be realized by taking recourse to the option of direct loans to the government (non-marketable assets) instead of trying to stabilize the bond market, at the price of a lower leverage ratio and less net interest cost saved.

Full takeover of government bond market with absolute interest rate control: Alternatively, the government and bank management could envisage a full interest rate stabilization of the government bond market. The most prominent example is the 1942-1951 peg of government bond yields by the Federal Reserve (Meltzer, 2002, Ch. 7). The advantage of a bank acting on such a wide scope would be that government interest cost would be driven down predictably. Bank management would bid for all government bonds at a specific yield, effectively setting an upper-bound to the interest rate the government pays. It would take up all government bonds that the private sector is unwilling to purchase at this price. Given current ECB rules, the only constraint to this option is that government bonds need to remain marketable assets, i.e. keep being listed and traded on secondary markets. Thus, a 100% uptake of a new issue of a government bond by the public bank should be avoided.

The details of a broad operation like this would have to be worked out, especially if one contemplates a permanent stabilization of government bond yields. One conceivable way in which a *temporary* stabilization could be realized is by restricting the maturities of the bond purchases to relatively shorter maturities that correspond to the likely duration of the easy money policy of the central bank, on the order of a few years. The government could structure its funding for the period accordingly. With shorter maturities, the bank is less likely to get caught on the wrong foot by unpleasant margin calls or a general rise in its funding cost if an economic upswing followed by tighter monetary policy eventually takes place. The upside to narrowing the maturity to shorter periods is that the potential leverage ratio is high, enabling a buying operation on a large scale. The downside is that the earning potential is capped. In non-crisis times, large capital gains are

Figure 1: Selected Italian government bond prices and Euro money market prices, monthly averages



Source: ECB (EONIA) and Deutsche Bundesbank calculations based on Reuters daily data (EURIBOR), Bloomberg (Gov. bond yields)

almost impossible on bonds with short maturities, and the spread between interest income from government bonds and interest payments to the Eurosystem is low.³⁰ Therefore, a certain degree of maturity transformation on the part of the bank is necessary because the yield on a short-term government bill typically tracks closely the money market rate for the same period, and falls short of it for many euro zone countries.

2.2.2 Risks to profitability

There are a few major threats to the potential profitability of the public bank that need to be considered if a public bank were implemented.

A fall in government bond prices – Consequences for the bank: The bank is subject to interest rate risk. Rising market interest rates or rising refinancing rates at the ECB increase the interest payable on new liabilities as the old ones come due. On the asset side, the price of government bonds (paying fixed coupons) drops as interest rates rise, the more so the longer the maturity of the bonds. The first channel threatens the net interest margin because interest revenues remain constant while interest payments rise. The second channel leads to write-downs of bonds on the balance sheet and therefore direct losses in capital in so far as they are accounted for in the Available For Sale (AFS) or in the Trading Account categories of the balance sheet.

Capital losses, however, decrease the tax burden on the profits derived from the net interest margin. If they are not too large and the net interest margin is not squeezed too much, a part of the capital losses can help neutralize the tax consequences for profits. However, starting from the current low interest rate environment, capital losses are higher than starting from a normal or high interest rate environment due to the convexity inherent in bond prices (Hempel and Simonson, 1999, Ch. 4). The prevailing maturity of the bank's government securities portfolio is most relevant to the amount of potential losses, as a comparison of the interest rate risk of a one year bond in Table 10 and the interest risk intrinsic in a ten year bond in Table 8 shows. Table 9 provides the same calculation for a five year bond. The tables can be read the following way: A hypothetical bond with Euro 100 as face value, two coupon payments per year (except for the 1 year bill, which is assumed to have one coupon payment at the end of its maturity), and a current yield of 0.328%, 1% and 2%, respectively, serves as the basis.³¹ The first column of the five and ten year bond tables shows the coupon rate of the bond because the price of the bond and the bond price percentage changes (in response to increases in yield) vary with the coupon rate.³² Based on the bond price, one

³⁰This is based on the assumption that there is no funding through deposits. With deposits, the spread could be larger.

³¹A change in the face value of the bond is of no consequence to the results. Albeit a hypothetical example, the current yield very closely reflects the Italian yields on December 29, 2014.

³²They also vary with the initial current yield, in about a similar magnitude as with the coupon rate on the order of around 1-2% for high interest rate increases. This is not shown in the tables.

Table 8: Potential bond prices changes in response to yield changes (increases in interest rates) for a government bond with maturity of **ten** years, two coupon payments per year, face value Euro 100, and current **yield 2%**

Coupon rate	Bond price	Bond price change (with yield increase given by column)									
		0.1%	0.5%	1%	1.5%	2%	2.5%	3%	4%	5%	
0.3%	96.35	-0.49%	-2.44%	-4.81%	-7.12%	-9.37%	-11.56%	-13.69%	-17.79%	-25.34%	
0.5%	97.57	-0.49%	-2.43%	-4.79%	-7.09%	-9.32%	-11.50%	-13.62%	-17.69%	-25.21%	
1.0%	100.00	-0.49%	-2.40%	-4.74%	-7.01%	-9.22%	-11.38%	-13.47%	-17.50%	-24.95%	
1.5%	102.43	-0.48%	-2.37%	-4.69%	-6.94%	-9.13%	-11.26%	-13.34%	-17.33%	-24.70%	
2.0%	104.87	-0.48%	-2.35%	-4.64%	-6.87%	-9.04%	-11.15%	-13.21%	-17.16%	-24.47%	
3.0%	109.73	-0.47%	-2.31%	-4.55%	-6.74%	-8.87%	-10.94%	-12.96%	-16.84%	-24.03%	
4.0%	114.60	-0.46%	-2.27%	-4.47%	-6.62%	-8.71%	-10.75%	-12.74%	-16.56%	-23.62%	
5.0%	119.46	-0.45%	-2.23%	-4.40%	-6.51%	-8.57%	-10.58%	-12.53%	-16.29%	-23.25%	

Source: own calculations

Table 9: Potential bond prices changes in response to yield changes (increases in interest rates) for a government bond with maturity of **five** years, two coupon payments per year, face value Euro 100, and current **yield 1%**

Coupon rate	Bond price	Bond price change (with yield increase given by column)									
		0.1%	0.5%	1%	1.5%	2%	2.5%	3%	4%	5%	
0.3%	96.35	-0.49%	-2.44%	-4.81%	-7.12%	-9.37%	-11.56%	-13.69%	-17.79%	-21.67%	
0.5%	97.57	-0.49%	-2.43%	-4.79%	-7.09%	-9.32%	-11.50%	-13.62%	-17.69%	-21.55%	
1.0%	100	-0.49%	-2.40%	-4.74%	-7.01%	-9.22%	-11.38%	-13.47%	-17.50%	-21.33%	
1.5%	102.43	-0.48%	-2.37%	-4.69%	-6.94%	-9.13%	-11.26%	-13.34%	-17.33%	-21.11%	
2.0%	104.87	-0.48%	-2.35%	-4.64%	-6.87%	-9.04%	-11.15%	-13.21%	-17.16%	-20.91%	
3.0%	109.73	-0.47%	-2.31%	-4.55%	-6.74%	-8.87%	-10.94%	-12.96%	-16.84%	-20.53%	
4.0%	114.60	-0.46%	-2.27%	-4.47%	-6.62%	-8.71%	-10.75%	-12.74%	-16.56%	-20.18%	
5.0%	119.46	-0.45%	-2.23%	-4.40%	-6.51%	-8.57%	-10.58%	-12.53%	-16.29%	-19.86%	

Source: own calculations

Table 10: Potential bond prices changes in response to yield changes (increases in interest rates) for a government bond with maturity of **one** year, one coupon payment at the end of the life of the bond, face value Euro 100, and **coupon rate 0.5%**

Current yield	Coupon rate	Bond price	Bond price change (with yield increase given by column)						
			0.1%	0.5%	1%	1.5%	2%	3%	
0.1%	0.5%	100.40	-0.10%	-0.50%	-0.99%	-1.48%	-1.96%	-2.44%	-2.91%
0.3%	0.5%	100.20	-0.10%	-0.50%	-0.99%	-1.47%	-1.96%	-2.43%	-2.90%
0.5%	0.5%	100.00	-0.10%	-0.50%	-0.99%	-1.47%	-1.95%	-2.43%	-2.90%
1.0%	0.5%	99.50	-0.10%	-0.49%	-0.98%	-1.46%	-1.94%	-2.42%	-2.88%
1.5%	0.5%	99.01	-0.10%	-0.49%	-0.98%	-1.46%	-1.93%	-2.40%	-2.87%
2.0%	0.5%	98.53	-0.10%	-0.49%	-0.97%	-1.45%	-1.92%	-2.39%	-2.86%
2.5%	0.5%	98.05	-0.10%	-0.49%	-0.97%	-1.44%	-1.91%	-2.38%	-2.84%

Source: own calculations

can calculate a percentage change in the bond price when interest rates rise. The different interest rate (yield) increase scenarios are shown in the remaining columns ranging from an increase of 0.1% to 5%, and coming close to the worst case scenarios for Italian and Spanish bonds during the euro crisis (with roughly 7% yield for the 10 year bond). In this scenario, the bonds would lose about a quarter of their present value. For an interest rate increase of 2% to 2.5%, the bonds would lose about ten percent of their present value. An increase in the interest rate of 4% (and thus a total of 5% with initial yield 1%) would cost the five year bond between 16% and 18% of its value, which is close to the worst case scenario. The one year bill table is somewhat different in that the coupon rate does not affect the bond price loss significantly, which is why different current yield rates are shown and a constant coupon rate of 0.5% is assumed, contrary to the other tables. The capital losses for the one year bill are very modest at below 3% when the interest rate increases by three percentage points.³³ Finally, all scenarios depicted in the tables are worst case scenarios in the sense that they assume an *immediate* increase in interest rates to the new level rather than a gradual increase over the life of the bond.

Obviously, one factor that could drive up government bond yields is a general increase in interest rate levels, led by the European Central bank in the short end of the yield curve. The likelihood for this scenario, however, is rather small. The interest rate projections of the ECB staff, which are based on market projections themselves, see a constant interest rate environment for 2015 and 2016 (ECB, 2014a). With inflation and inflations expectation currently falling, and a weak economy that has seen a tripe-dip recession in some euro area countries, the upside risks to the economy as the prerequisite of a higher general interest rate environment are very small.

Funding liquidity risk: The bank could run into difficulties to fund itself on the market when doubts arise over the debt sustainability or over staying in the euro zone of a particular country in question. Investors may flee both government bonds and be reluctant to fund domestic banks. While a flight from government bonds helps the bank in its net interest margin, the bank still needs funds to buy up new government bonds. If market funding dries up and the interbank market becomes inaccessible to the public bank, the bank could always use the marginal lending facility with its own national central bank as a backstop, priced at the marginal lending rate.

Default of the national government: The premise for a public bank financing the national government debt is that the national euro zone government does not default. If the national government were to default, the bank would be insolvent. However, the very existence of a public bank as proposed here would help the government avoid a default as interest cost on government debt would be driven down.

³³Conversely, short term securities barely yield a capital gain (Fraser et al., 1995, p. 289).

3 Role of the government

The government has several fundamental roles in supporting the public bank that I sketch below.³⁴

Strategy: As the owner of the public bank the government decides on the strategy. When an interest rate increase is expected, it may support the bank indirectly by setting the interest rate it is willing to pay to a sufficiently high level so that the public bank does not get into financial trouble with respect to its net interest margin.

Choosing the public bank as a primary dealer: The government, typically via the finance ministry or its debt office, should ensure that the public bank is made a primary dealer in government debt as soon as possible. If useful, it may also adjust the primary dealer criteria to allow a public bank to fulfill its role while keeping the private banks as primary dealers.³⁵

Accommodate the issuing schedule of the government debt office for the leveraging needs of the public bank: Depending on the frequency of liquidity auctions at the ECB, the government's debt office or finance ministry should adjust its bond and bills auctions to a more frequent schedule to allow the bank to leverage up in a faster manner.³⁶

Government deposits: The government could transfer a large part of its deposits to the public bank and make the bank its agent for payments. This provides the bank with an extra source of income and with cheap and stable funding through large deposits.

Selection of programs: On the macroeconomic level and regarding European politics, the government has to oversee the selection of spending items, bargain politically to keep the European Council and the European Commission from interfering with the program in substantial ways, and ensure politically that the bank does not violate EU competition policy. Obviously, the government has to spend the funds wisely: not as tax cuts or debt redemption, but as government consumption and investment as closely tied to job creation as possible. In countries with high unemployment, direct employment programs should be part of the agenda.

Complying with deficit procedures: The national government has to ensure that the planned deficit spending passes at the European level. For large deficit spending programs, the selection of items is even more important with this European constraint. In order to put political pressure on

³⁴Although the government is clearly at the center of an employment policy, it is not described in detail here as the main focus of this paper is on the mechanics of the public bank.

³⁵For example, if the public bank takes over most government financing, the minimum percentage requirement of primary bond issues taken up each year in order to remain a primary dealer can be lowered for private banks.

³⁶Weekly auctions might be necessary.

the European Commission and the European Council, some of the spending programs should work fast, leading to clearly visible gains in employment. This can act as political insurance against a monetary fine.

Competition policy: The government needs to have the back of the bank in terms of competition policy. The public bank should be able to not have to require any additional capital injections. Nevertheless, the public bank must not be ruled as unduly distorting competition in the domestic central government securities markets. Should the need arise, the government should seek an exception for its bank.

Deal with current account imbalances The government needs to ensure that the current account does not turn substantially negative in response to the spending program to keep up a macroeconomic “insurance” against speculation and capital movements. The specific areas and projects to receive government spending may be screened for a low import multiplier.

4 Role of the Eurosystem, the ECB and the national bank regulator

This section discusses the ways in which actions and future regulations of the ECB, the European Banking Authority, the national central bank and the national bank regulator, as well as legislation by the European institutions can potentially help or impair the functioning of the public bank.

4.1 ECB actions

The most significant help that the public bank could receive from the ECB would be a change in the collateral valuation for central government bonds as suggested at the end of Section 2.1.2. While the ECB would take on more credit risk, it would also contribute to a stabilization of the value of these bonds (which are also the backbone of the European financial system) on the secondary market. Moreover, the Eurosystem currently is already exposed to significant credit risk via its purchases of bonds in its Asset Purchase Program (APP).³⁷

One risk for the public bank is the threat of a potential downgrade of the asset it is buying. When a rating agency reduces the rating of a country, it indirectly lowers the maximum leverage ratio of the public bank. As mentioned in Section 2.1.2, the credit quality steps and therefore the more favorable haircuts currently depend on one rating agency (DBRS) for Italy and Spain. The regulatory risk here is twofold. Firstly, DBRS could downgrade the country, and the ECB could not

³⁷see also Section 5.2

accommodate and thus not change the collateral rules when the need arises.³⁸ This would cause a major rollover problem and would lead to a shrinking of the public bank balance sheet. Secondly, the ECB may even change the rules on its own in order to “punish” a country undertaking such a program. Therefore, a proper lobbying for votes in the ECB council is in order.³⁹

Furthermore, the ECB could go back to fixed allotment funding procedures at some point if the situation of the banking sector changes favorably. Funding costs would then possibly increase as liquidity becomes scarcer. Finally, it should be noted that the proposal leaves untouched the prerogative of the ECB over monetary policy, and does not constitute a power shift back towards national governments. The latter merely retake control over part of their financing costs and therefore become less dependent on markets, but remain dependent on the ECB. The central bank retains full political control through the discretionary measures in its risk control framework (ECB, 2015a, Art. 128 and Part IX) as it can in principle turn off refinancing operations with the public bank at any time.

4.2 Role of the regulator

A view that some bank regulators and academics hold (such as the Deutsche Bundesbank) is that the regulatory risk weight of 0% for central government bonds is a sovereign subsidy. The Greek default and the repercussions on Cyprus are seen as the prime example.⁴⁰ In this view, sovereign bonds are risky and should carry a positive risk weight. Naturally, if legislation were enacted that would require banks to hold capital for sovereign bonds, the leverage ratio of the public bank would be limited to a certain maximum amount depending on the country rating (derived from the perceived or measured default risk).⁴¹ However, this would only be the case if capital were required for domestic bonds as well, not just foreign bonds.⁴²

Another regulatory idea is to introduce sovereign exposure limits for banks. A twenty-five percent limit on a single central government borrower has been suggested. Indeed, this could severely complicate the public bank in the form outlined above. As an imperfect way out, one could then distribute the task on a set of banks instead of just one bank.⁴³

³⁸like it did when it was necessary for Portugal (ECB, 2014/10)

³⁹This is also useful for political insurance. Support of at least one third of the ECB council members is necessary in case the bank needs Emergency Liquidity Assistance from the central bank in quantities above €2 billion, otherwise the ECB council could shut it down ECB (2013). Examples and historical context on the use of ELA prior to the euro crisis is provided in Manna (2009).

⁴⁰Cypriot banks held a large amount of Greek bonds, but didn't hold adequate capital when the default event actually occurred. (Korte and Steffen, 2014, Figure 1)

⁴¹For EBA probabilities of default and the corresponding risk weights, see Korte and Steffen (2014, Table 1).

⁴²Even Korte and Steffen (2014) explicitly exclude domestic bonds from the calculation of what they name the “sovereign subsidy”.

⁴³This leaves the question unanswered what the remaining bank assets would be invested in. In countries with several public banks that fulfill various tasks, however, that question may not be as pressing because these banks already have other assets. These banks could each partly fulfill the service of buying bonds, making it equivalent in practice to the public bank outlined here.

Basel 3: For many Basel 3 regulations that are being implemented or to be implemented over the course of the next years (Basel Committee on Banking Supervision, 2014a,b) the precise EU regulations have not been decided on. Therefore, the consequences for the public bank are not entirely clear. Nevertheless, there does not seem to be a major issue that would make it impossible to run the bank as intended. The most relevant proposed regulation for the public bank is the required minimum capital relative to total assets (called *leverage ratio*, although it is actually a minimum capital ratio), which would constrain the public bank to a maximum leverage ratio as given in Table 5, even for assets with shorter maturities. However, this 3% minimum capital ratio would effectively allow for a reasonable leverage ratio of 33.3 for most countries.⁴⁴ The *net stable funding ratio* requiring liquidity for thirty days seems less of an issue because the public bank is invested in government securities that are typically traded in very liquid markets.

5 Advantages and disadvantages of the public bank option - the political dimension

A hayday of creativity for new European governance proposals resulted from the drawn-out euro crisis. Unlike proposals that require European consent for their implementation such as Eurobonds (Delpa and von Weizsäcker, 2010; Tumpel-Gugerell et al., 2014; Watt, 2015), there is no need for a national government to convince its fellow European Council or Eurogroup partners of communal action with the public bank. Those countries that want to found one can, while others who don't want simply do not. There are a few advantages that the public bank option has over other communal actions.

A major critique coming from German economists, central bankers and a large group of politicians as well as arguably most of the Northern European publicized (and public) opinion is that Germany and other Northern European countries should not have to pay or accept any liability for Southern European countries – not even through supranational institutions in which Germany has a capital share and would potentially have to bear losses. This ranges from the European Central Bank, where that view is particularly strong and voiced by the German Bundesbank in opposition to asset purchase programs, to unanimous rejection of Eurobond proposals, and even to TARGET 2 credits of the Bundesbank in some cases.⁴⁵ Currently, however, the failure of austerity programs does endanger the medium term survival of the euro zone as it spawns opposition by the public in Southern European countries that is slowly transformed and channeled into new anti-austerity parties, squaring with the Northern European insistence on austerity. One particular advantage of

⁴⁴see the discussion in Section 2.1.2

⁴⁵The Target debate was started by Hans-Werner Sinn in a newspaper, and featured several papers. An example is Sinn and Wollmershäuser (2012). Rejoinders were given by several economists, among others Jobst (2011), Buiter et al. (2011) and Bindseil and Koenig (2011).

the public bank option is that domestic government bonds would only be bought by a domestic bank, not by any supranational or Northern European entity. If a break-up of the euro zone were to occur, the redenomination risk of the bonds would fall mostly on the domestic country.⁴⁶

The biggest current political risk is arguably a break up of the euro area, although the announcement of the Outright Monetary Transactions (OMT) program by the ECB has temporarily stalled that risk.⁴⁷ In a way, a spending program can be seen as an insurance against this type of political risk.⁴⁸

It is possible that the markets would react unfavorably to the announcement of this particular proposal. Nevertheless, the public bank proposal has a clear financing mechanism and could alleviate the debt dynamics resulting from low or negative growth. However, even with a negative market reaction: In times of high yields, the public bank option becomes very attractive as it stabilizes government finances and promises the bank attractive capital gains on the bonds. For the country itself, the public bank option is superior in several ways: Compared to the ECB's Outright Monetary Transactions (OMT) program, the public bank option is not connected to conditionality, and the interest on government bonds is not shared with other EMU countries according to the ECB's capital share.⁴⁹ Compared to the Asset Purchase Program, which is a temporary program, there is no purchase limit of 25% of each bond issue, and the bonds may be bought on the primary market.

5.1 Does a public bank that buys government bonds constitute monetary financing?

Article 123 in the Treaty on the Functioning of the European Union (TFEU, 2012) contains the infamous "prohibition of monetary financing" clause.⁵⁰ When Mario Draghi announced that the

⁴⁶In the case of a dissolution of the euro zone or the exit of the domestic government with the public bank, the liability side of the public bank, however, would affect (Northern) European institutions and banks. However, the effective exposure is not always straightforward, as a contribution to the TARGET2 debate demonstrates (Buiter and Rahbari, 2012).

⁴⁷Government bond yields have been falling even for countries that have experienced a worsening of real economic activity over time due to austerity.

⁴⁸Interestingly, an analogy can be made with the comments by Cœuré (2013) who said that the government bond purchases can be seen as an insurance against redenomination risk.

⁴⁹A country must subjugate itself to a conditional program if it wishes to receive government bond purchases of its one to three year bonds from the ECB (ECB, 2012; Cœuré, 2013). Any country aiming to implement a spending program would be prohibited from doing so in the current austerity framework.

⁵⁰in the original: "Article 123

1. Overdraft facilities or any other type of credit facility with the European Central Bank or with the central banks of the Member States (hereinafter referred to as "national central banks") in favor of Union institutions, bodies, offices or agencies, central governments, regional, local or other public authorities, other bodies governed by public law, or public undertakings of Member States shall be prohibited, as shall the purchase directly from them by the European Central Bank or national central banks of debt instruments.

2. Paragraph 1 shall not apply to publicly owned credit institutions which, in the context of the supply of reserves by central banks, shall be given the same treatment by national central banks and the European Central Bank as private credit institutions."

Eurosystem was prepared to do “whatever it takes to save the euro” (Draghi, 2012), he and the governing council were well aware that they could buy bonds of any national government in the euro zone on the secondary market.⁵¹ The clause prohibits the “direct purchase” of government bonds, interpreted to mean the buying on the primary market, but not an indirect purchase that is interpreted as buying on the secondary market. Of even greater interest is the second paragraph in Art. 123, which says that a bank that acts as the initial buyer in a government bond auction need not be a private bank, but may be a public bank. At the same time, every bank, public or private, is free to buy government bonds as it sees fit and can afford.

Therefore, a national public bank could be conceived as a buyer of last resort of national government bonds, and more specifically, government bonds on the primary market.⁵² While this clears up some of the legal issues surrounding monetary financing, the political dimension of the problem remains to be discussed. Proponents of the prohibition of monetary financing clause base their arguments on two grounds: Firstly, it is supposed to prevent a hyperinflationary policy of a national government that would negatively affect euro-area wide price stability. Secondly, there is the notion that market discipline, i.e. the reduced demand of investors for government bonds following imprudent policies, is the most efficient mechanism to force national governments to engage in “reforms” to correct their “profligacy”.

Regarding the threat of hyperinflation, the financial crisis can be seen as an empirical test for theories of inflation. Monetarists that had been announcing the coming of the hyperinflation in light of the massive extension of the monetary base were contradicted by a breakdown of the money multiplier and a shrinking of larger monetary aggregates such as M3 and a fall in (consumer price) inflation. In addition, fiscal policy is monitored and regulated by the European Commission so that if a government were to truly engage in large-scale spending, it would be noted. Political pressure and monetary fines could be applied by the Council.⁵³

On the issue of market discipline, the financial crisis and the euro crisis are ample evidence that markets by themselves do not price government bond risks solely based on fundamental measures of solvency.⁵⁴ With government bond yields close to German benchmark yields, Southern European governments, banks and firms were able to leverage up to record levels with a continuous inflow of funds, while investors panicked and cut off funding almost entirely when the bubble burst and

⁵¹Buying government bonds had already been implemented in the Securities Market Program (SMP) of 2010-2012, as noted in ECB (2010/5) and ECB (2010). Shortly after Draghi’s statement, the Outright Monetary Transactions program was announced (ECB, 2012). The latter, while remaining unused, has received a largely non-objecting review from the advocate general of the European Court of Justice (Court of Justice of the European Union, 2015; Villalon, 2015).

⁵²A similar line of reasoning is employed by Gros and Mayer (2012, p.7-8 and Annex) in their proposal of a bank charter for an ESM (conceived as a European monetary fund) or for the EFSF as outlined in a previous version of their paper (Gros and Mayer, 2011).

⁵³The Fiscal Compact provided the treaty for the political will of tighter fiscal control (TSCG, 2012).

⁵⁴There is a broad literature about sovereign bond determinants in the eurozone during the euro crisis, see among others De Grauwe and Ji (2012) and the references therein.

growth prospects worsened. Therefore, the disciplining factor by markets is not present at first, and, once it arrives, works in a devastating way such that the government barely has any time to react before illiquidity threatens.

5.2 A large government bond purchase program

On January 22, 2015, the ECB made the decision to engage in a large asset purchase program including government bonds starting in March 2015, called Asset Purchase Program, or APP (ECB, 2015b,c). How does this affect the public bank proposal?

The combination of Draghi's "whatever it takes" resulting in the OMT program, giving an implicit guarantee not to let any other eurozone country default and bring down government borrowing cost, and the execution of three-year long-term refinancing operations that flooded the banks with liquidity (that in turn had to be invested somehow), eventually drove down government bond yields from its previously untenable levels to record all-time lows – after a prolonged crisis that could have been almost entirely averted. Some central bankers argue that the objective of reducing government default risk and refinancing cost have already been achieved through this policy. Nevertheless, the biggest effect of euro zone quantitative easing on governments is a further reduction of their interest rate cost. As 80% of the program is conducted by national central banks, the interest on the government (and private) bonds they hold shows up as their profits and is returned to the government.⁵⁵ Indeed, the ECB has put in place an almost ideal system for the funding of government spending short of a primary market purchase of government bonds.⁵⁶ Thus, part of the original reason for the public bank proposal has become obsolete.⁵⁷ It would seem rather useless to use the public bank merely as a tool to reduce sovereign interest cost, unless of course the domestic government is willing to completely take over the domestic market for government bonds. One risk of the APP program is that it is somewhat of a subsidy for the financial sector. A direct purchase of government bonds by a public bank from the government would prevent the potential for overpaying financial market actors for bonds on the secondary market and limit front-running of informed agents and speculators. Nevertheless, the plan for a public bank remains useful as a back-up plan for a crisis hitting a particular country or the euro zone as a whole, or as a future plan for the time when the ECB begins to taper off its bond buying program.

⁵⁵Note that the bond buying is limited to 25% of each bond and bond issue.

⁵⁶A proposal for direct monetary financing of government spending can be found in Picek (2010) (German). An incomplete overview of proponents of "Overt Money Financing" is provided by Wood (2013).

⁵⁷The proposal was originally intended as a solution to the euro crisis for an individual country with unjustified high yields on its bonds (Picek, 2010). The central aspect was the reduction and future prevention of unduly high interest rate cost under the restriction of "no direct monetary financing".

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Appendix A Changes in balance sheets resulting from different government financing operations

The changes in the balance sheets of several actors (domestic government, public bank, the European System of Central Banks whose currency is the euro or Eurosystem, financial market actors that act as primary dealers, and investors that act as ultimate buyers of bonds) in response to transactions that result from four different operations (emitting a government bond in the current system, capitalizing a public bank, the public bank buying new government bonds from primary dealers, and the public bank buying new government bonds as a primary dealer) are shown in Figure 2.⁵⁸

A regular government bond auction: Figure 2, Step 1 (on the top), serves to illustrate a *stylized* regular government financing operation in a euro zone country in a primary dealer system. The initial capital needed for a public bank can be raised this way, by emitting government bonds to private agents. While not all of the government deficit is funded through bond auctions (or bond auctions in primary dealer systems), it can be considered the most typical government financing operation in the euro zone.⁵⁹ The primary dealers in government bonds are banks that act as an intermediary between the government debt office selling the bonds and the ultimate buyers of the bonds (banks and institutional investors such as pensions funds or insurance companies). They initially bid for and buy an issue of a government bond and then act as market makers for the secondary market. When a primary dealer buys a part of an issue of government bonds, they need to pay in bank reserves. One way to acquire them is through reverse repurchase agreements (reverse repo) with a Eurosystem central bank by which the ECB provides bank reserves to the banking system.⁶⁰ In these repo transactions, a private bank has to commit existing high-quality securities as collateral to the central bank in order to get the funds while minimizing the credit risk for the central bank. The first line of Step 1 shows the repo transaction that is in principle equivalent to a (secured) loan. Once the primary dealer bank has the funds, it uses them to pay for its binding bid and in return acquires the government bonds. The corresponding balance sheet change is shown in line 2. Unless the primary dealer bank wishes to hold the bonds itself, it sells them to other investors (line 3). Through the sale of the bonds, the primary dealer bank receives bank reserves and should have made a profit. It is then able to repay the funds borrowed from the Eurosystem plus interest (line 4). The ultimate investor willing to invest in government bonds has exchanged deposits for bonds on the asset side of his portfolio. This ultimate investor could be a public bank as shown in Step 3 of Figure 2.

Step 2 shows the process of using the funds that the government raised in Step 1 to found the public

⁵⁸A stands for assets, and L for liabilities in the stylized balances sheets in the figure.

⁵⁹For this reason, other government financing options will be disregarded in this paper.

⁶⁰Obviously, an individual bank may also acquire the funds through deposits or term borrowing from other banks.

Figure 2: Stylized balance sheets overview

Step 1: Emitting a government bond / raising capital to found a public bank									
National government		Public bank		Eurosystem		Primary dealer		Private bank/Investor	
A	L	A	L	A	L	A	L	A	L
				+Loans	+Deposits	+Deposits	+Loans		
+Deposits	+Bonds					-Deposits			
						-Bonds		+Bonds	
				-Loans	-Deposits	+Deposits		-Deposits	
						-Deposits	-Loans		

Step 2: Capitalizing the public bank									
National government		Public bank		Eurosystem		Primary dealer		Private bank/Investor	
A	L	A	L	A	L	A	L	A	L
+Deposits	+Bonds								
-Deposits		+Deposits	+Equity						
+Equity									

Step 3a: The public bank buys new government bonds from a primary dealer									
National government		Public bank		Eurosystem		Primary dealer		Private bank/Investor	
A	L	A	L	A	L	A	L	A	L
		+Deposits	+Equity	+Loans	+Deposits	+Deposits	+Loans		
+Deposits	+Bonds					-Deposits			
		-Deposits				+Bonds			
		+Bonds				-Bonds			
				-Loans	-Deposits	+Deposits			
						-Deposits	-Loans		

Step 3b: The public bank as primary dealer buys new government bonds									
National government		Public bank		Eurosystem		Primary dealer		Private bank/Investor	
A	L	A	L	A	L	A	L	A	L
+Equity	+Bonds	+Deposits	+Equity						
+Deposits	+Bonds	-Deposits							
		+Bonds							

bank, giving it the desired amount of equity. Step 2 also shows the balance sheet of the public bank right after its inception, where equity is recorded on the liabilities side and now available as bank reserves that can be used for an investment in government bonds on the asset side.

Steps 3a and 3b show the initial purchase of new government bonds depending on whether the new bank is made a primary dealer or not. The balance sheet changes in Step 3a, the non primary dealer option, are analogous to the sale of bonds to a private bank as described in Step 1. In Step 3b, the primary dealer is skipped and the public bank directly buys the bonds from the government on the primary market. Both balance sheet sequences start with the result of Step 2, the available deposits, in the public bank's balance sheet. Generally, it would make it easier for the bank if it were a primary dealer. The bank could then bid in the bond auctions itself and buy the bonds directly from the sovereign without intermediation from a private primary dealer bank that would charge a margin.

Finally it must be stated that Figure 2 does not show any leverage operations by the public bank as in Table 1, but merely the initial sale of government bonds to acquire the capital for the initial finance stage in Table 1, and then the completion of the initial finance in which the public bank buys up government bonds from the government for the first time, without using them as collateral to receive additional funds from the ECB.

Appendix B Haircuts, leverage and capital ratios for non-marketable assets

In the case of non-marketable assets, different (generally higher) valuation haircuts apply. Tables 11 and 12 show the best case, i.e. lowest haircuts, of a non-marketable asset: a credit claim with a fixed interest payment and a valuation based on a theoretical price assigned by the national central bank (NCB). A column showing the effects of a hypothetical minimum of a 3% regulatory minimum capital ratio is foregone in Table 12 because all capital ratios are higher than it.

Table 11: Non-marketable assets: Credit quality steps and valuation haircuts

Country	ECB Haircut scheme		ECB collateral haircuts for credit claims with fixed interest, by maturity ³						
	Credit quality step	0-1 years	1-3 years	3-5 years	5-7 years	7-10 years	>10 years		
Austria	1	10	12	14	17	22	30		
Belgium	1	10	12	14	17	22	30		
Cyprus	(5)	NA	NA	NA	NA	NA	NA		
Estonia	1	10	12	14	17	22	30		
Finland	1	10	12	14	17	22	30		
France	1	10	12	14	17	22	30		
Germany	1	10	12	14	17	22	30		
Greece	(5)	NA	NA	NA	NA	NA	NA		
Ireland	2	10	12	14	17	22	30		
Italy	2	10	12	14	17	22	30		
Latvia	2	10	12	14	17	22	30		
Lithuania ¹	2	10	12	14	17	22	30		
Luxembourg	1	10	12	14	17	22	30		
Malta	2	10	12	14	17	22	30		
Netherlands	1	10	12	14	17	22	30		
Portugal	2	10	12	14	17	22	30		
Slovakia	2	10	12	14	17	22	30		
Slovenia	2	10	12	14	17	22	30		
Spain	2	10	12	14	17	22	30		
Downgraded²	3	17	29	37	39	40	42		

¹ From January 1, 2015

² Hypothetical downgraded country with credit quality step 3 (Best rating: BBB+ to BBB-)

³ Credit claim on the central government with a fixed interest payment and a valuation based on a theoretical price assigned by the national central bank (NCB)

Source: ECB (2015a, Annex X, Table 2), own calculations

Table 12: Maximum leverage and minimum capital of the public bank with non-marketable assets

Country	Theoretical maximum leverage ratios ²										Capital in % of total assets ³									
	0-1	1-3	3-5	5-7	7-10	>10	0-1	1-3	3-5	5-7	7-10	>10	0-1	1-3	3-5	5-7	7-10	>10		
Austria	10	8.3	7.1	5.9	4.5	3.3	10	12	14	17	22	30	10	12	14	17	22	30		
Belgium	10	8.3	7.1	5.9	4.5	3.3	10	12	14	17	22	30	10	12	14	17	22	30		
Cyprus	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA		
Estonia	10	8.3	7.1	5.9	4.5	3.3	10	12	14	17	22	30	10	12	14	17	22	30		
Finland	10	8.3	7.1	5.9	4.5	3.3	10	12	14	17	22	30	10	12	14	17	22	30		
France	10	8.3	7.1	5.9	4.5	3.3	10	12	14	17	22	30	10	12	14	17	22	30		
Germany	10	8.3	7.1	5.9	4.5	3.3	10	12	14	17	22	30	10	12	14	17	22	30		
Greece	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA		
Ireland	10	8.3	7.1	5.9	4.5	3.3	10	12	14	17	22	30	10	12	14	17	22	30		
Italy	10	8.3	7.1	5.9	4.5	3.3	10	12	14	17	22	30	10	12	14	17	22	30		
Latvia	10	8.3	7.1	5.9	4.5	3.3	10	12	14	17	22	30	10	12	14	17	22	30		
Lithuania ¹	10	8.3	7.1	5.9	4.5	3.3	10	12	14	17	22	30	10	12	14	17	22	30		
Luxembourg	10	8.3	7.1	5.9	4.5	3.3	10	12	14	17	22	30	10	12	14	17	22	30		
Malta	10	8.3	7.1	5.9	4.5	3.3	10	12	14	17	22	30	10	12	14	17	22	30		
Netherlands	10	8.3	7.1	5.9	4.5	3.3	10	12	14	17	22	30	10	12	14	17	22	30		
Portugal	10	8.3	7.1	5.9	4.5	3.3	10	12	14	17	22	30	10	12	14	17	22	30		
Slovakia	10	8.3	7.1	5.9	4.5	3.3	10	12	14	17	22	30	10	12	14	17	22	30		
Slovenia	10	8.3	7.1	5.9	4.5	3.3	10	12	14	17	22	30	10	12	14	17	22	30		
Spain	10	8.3	7.1	5.9	4.5	3.3	10	12	14	17	22	30	10	12	14	17	22	30		
Downgraded⁴	5.9	3.4	2.7	2.6	2.5	2.4	17	29	37	39	40	42	17	29	37	39	40	42		

¹ From January 1, 2015

² by maturity (in years) of credit claim on the central government with a fixed interest payment and a valuation based on a theoretical price assigned by the national central bank (NCB). Maximum leverage ratio for each Euro of capital.

³ Capital ratios corresponding to maximum leverage ratios, assuming all capital and borrowed funds are invested in credit claims (loans or non-marketable bills or bonds) of domestic central governments of the same maturity category (in years)

⁴ Hypothetical downgraded country with credit quality step 3 (Best rating: BBB+ to BBB-) Source: own calculations and representation