The Truth on Target II

by Ulrich van Suntum

Center of Applied Economic Research Münster (CAWM)

University of Münster

www.cawm.de

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Abstract

I use my "Viking Village" macroeconomic model for examining the economic meaning of the so-called Target-balances in the EMU. While some authors like interpret them as liabilities that must be redeemed and paid interest on, others assess them as economically meaningless account entries only. According to the model results, the economic meaning of Target balances depends critically on the rules on distributing seignorage in the EMU. In particular, under the existing rules, the Target balances are already burdened with interest implicitly, even without an explicit interest payment on them (which would indeed be inappropriate). On the other hand, because the common share of seignorage ends in case of a member country leaving the EMU, the Target balances would then immediately get relevant and must be either redeemed or be paid explicit interest on. The counterargument that the interest rate is near to zero anyway is very weak, as the low interest policy itself creates huge redistributions that benefit the high indebted member states at the cost of the more solid ones. These redistributions are not directly related to the Target balances. Nevertheless, they should also be paid more attention in the public than before.

1. Introduction and main results

In the current debate on the so-called Target II balances, there are two extremely different views, both being supported by renowned economists:

- Hans-Werner Sinn (2018 I, II), Thomas Mayer (2018) and others claim that the balances are unpaid receivables within the ECM that must be both redeemed and paid interest on. In particular, they interpret the huge Target deficits of the southern member states as the reflection of goods that have been purchased by these countries from the surplus member states in the past but not yet paid "in real terms". In short, they see an analogy between such Target balances and the foreign exchange reserves in the Bretton Woods system. Like the Dollar-reserves that had been accumulated by the Bundesbank during Bretton Woods, the German Target surplus is at least partly seen by them as the equivalent of former German exports that could and should be converted into respective imports at one day.
- In contrast, in the view of the Deutsche Bundesbank (Beermann 2018) and other economists like Marcel Fratzscher (2013 I, II) and Martin Hellwig (2018), Target II balances are less more than technical accounting entries which do not have much economic significance. Unlike in the Bretton Woods system, imports paid in Euro within the ECM are viewed as being fully compensated by this payment. Only if any country should leave the Euro zone most of these authors acknowledge that the Target balances could cause a problem. However, they normally claim that such a case was extremely unlikely, if not impossible. Moreover, according this view, the Target II issue would then presumably be small in comparison to the huge problems arising then anyway.

Surprisingly, this issue is mostly discussed without a clear theoretical base, using more or less plausible arguments and simple booking examples instead. In the following, I use an appropriately extended version of my "Viking Village"-model in order to fill this gap. I thereby both refine and enlarge the last chapter of my recent book (van Suntum 2018), where I have already briefly sketched the Target issue in the last chapter. Indeed, this theoretical approach can clarify most of the disputed issues concerning the Target II debate, in principal at least. However, I do not provide any empirical analysis here, leaving that for further research.

Before outlining the model in detail, I briefly summarize the main results (that have partly surprised even myself):

1. Yes, Target II balances van emerge in perfect analogy to foreign exchange reserves in a fixed exchange rate system like the former Bretton Woods. However, this does not automatically mean that they should explicitly bear interest in an existing monetary union. In contrast, this depends on how the seignorage is divided between the member central banks within the ECM.
2. In particular, if total seignorage is divided proportional to the member-country`s GDP, Target balances are economically irrelevant, at least as long as no member country resigns. In contrast, if each member central bank owns the seignorage that is created by itself, they should be forced to pay interest on their Target deficits (resp. earn interest on a surplus). Otherwise there would be indeed both the option and an incentive to the own country at the cost of all other members of the monetary union by lending out additional money.
3. In the EMU, seignorage is normally distributed among the member countries proportionate to their share of the ECB capital stock, which in turn depends on their relative GDP. Hence, Target II balances need *not* bear any additional interest so far (in contrast to the current rules)! However, this is different with the so-called ELA (emergency liquidity assistance). As such credits are given by the member central banks on their own account, Target balances resulting from that should bear an explicit interest indeed. In practice, one could calculate the respective interest bill for

Target II from the relative volume of ELA compared with the total volume of credits lent out by the respective member central bank. However, it would clearly be better to either remove ELA completely or allocate it directly at the ECB.

4. In case of a member state leaving the EMU, they should be obliged to either repay their Target deficit or to pay interest on it in future. This is because the common share of seignorage then ends, and this would benefit the leaving country at the cost of all remaining members of the EMU. The redemption of Target balances cannot be made in Euros, because Euros are not a scarce good in the EMU. Instead, the redemption should be made in the form of transferring respective central bank assets, preferybly in the form of Gold or foreign currency like e.g. Dollar.
5. Even in an existing monetary union with commonly shared seignorage, Target balances become immediately relevant if a national central bank should lend out credits at preferential conditions to their own country or government. For example, if the Italian central bank buys Italian government debt at a price above the market value, they would in fact donate money to their government. Hence, part of the commonly owned seignorage would then effectively be branched off in favour of the own economy. For that reason, such preferential conditions should generally not be allowed.
6. Even if preferential conditions are granted to *all* member states, there normally arise redistributions that can reach huge amounts. The purchase of government bonds by the ECB generates such redistributions, irrespective if the purchases are proportional to the respective GDP or not (this is completely irrelevant for the redistribution effect!). For example, even if the ECB would purchase German bonds only, the decrease in the interest rate caused thereby would benefit the Italian government much more than the German government, because Italy has both a larger public debt and a lower rating at the capital markets. The same is true for the low interest policy of the ECB in general, because low interest rates always benefit the borrowers and harm the savers. However, these redistributions are not mirrored in the Target balances, which can even be positive for those countries that pay the costs of this policy. For example, if the Bundesbank would purchase government bonds, this would tend to decrease the interest rate and thus benefit the unsolid states, although the Target balance of Germany would at the same time tend to decrease!
7. In summary, as long as no country leaves the EMU, and apart from the ELA credits, there is no issue with these balances in principle. In particular, there is no need to impose explicit interest on them, because the latter is already implicitly implied by the common share of seignorage. On the other hand, this is completely different if a country should leave the EMU. In that case, Target balances immediately converge to foreign exchange reserves in fact. Unfortunately, it cannot be taken for sure that this will be actually acknowledged by the respective member state. Thus, in order to limit the potential for blackmail lying in this issue, the amount of such deficits that are accepted should be limited at least.
8. Not less important are the distributional effects of the low interest policy in general (and the purchase of government bonds by the ECB in particular). These effects surely discriminate the solid countries and benefit the countries with less solid fiscal policy, even if the expansionary monetary policy is executed symmetrically at the surface. The Target balances may be affected by this hidden redistribution at the cost of the solid member countries, but there is no systematic connection between the two issues. Nevertheless, the best way to stop both this redistribution and the permanent increase in Target (dis)balances would be ending the ultra-expansionary monetary policy in the EMU.

2. The model

I use a two-period OLG model with money and foreign trade like in van Suntum (2018). I first briefly outline the model for a single economy and then introduce a second economy with equal properties, but allowing for different parameter values respectively. There is no growth in the model, apart from temporary adoptions to a new steady state that are, however, not explicitly considered.

The basic model with only one country

Labour input is normalized to unity, so real capital K_F is the only explicit production factor. I assume a simple Cobb Douglas production function that is then reduced to

$$Y = K_F^{\beta}$$

With the depreciation rate being unity and i denoting the interest rate, from marginal productivity distribution theory it follows that we have

$$(1+i)K_F = \beta Y$$

such that non-interest income (of labour and land) is $(1-\beta)Y$.

Households maximize a conventional temporal utility function based on consumption in the two periods of their life C_1 and C_2 , where real liquidity (L/p) appears as an additional element:

$$U = C_1^{\alpha} C_2^{\varepsilon} (L/p)^{\psi}$$

We assume that households receive all non-interest income when they are young and active, while they must live from their savings including interest when they are old and retired. There are no durable goods and no bequests. Savings in period 1 can be either made in the form of offering capital K_H to the capital market or in the form of holding real liquidity (L/p) .Thus (aggregate) household budget restrictions are given by

$$(1-\beta)Y = C_1 + K_H + (L/p)$$
$$(L/p) + (1+i)K_H = C_2$$

Maximizing utility yields

$$C_1^* = \frac{\alpha(1-\beta)(1-\tau)Y}{\alpha+\varepsilon+\psi} \qquad C_2^* = (1+i)\frac{\varepsilon}{\alpha}C_1^* \qquad \left(\frac{L}{p}\right)^* = \frac{\psi}{i\alpha}(1+i)C_1^* \qquad K_H^* = \left[\frac{\varepsilon}{\alpha} - \frac{\psi}{i\alpha}\right]C_1^*$$

Money resp. liquidity is provided by the central bank mainly in the form of credit money, which is directly lent out to the capital market, i.e. we do not have private banks. However, there is a certain amount of "helicopter money" $\overline{M}$ as well (which we need in order to determine the absolute price level p). Helicopter money is not lent out but donated, either to the government or to the private sector (like the German "Münzregal").

The government receives central bank profits as their only financial resource, from that both the public good C_G and interest on public debt K_G must be financed. Hence the public budget restriction is

$$C_G = iK_M - iK_G$$

The amount of credit money and government debt (in real terms respectively) is

$$K_M = mY$$
$$K_G = gY$$

where m and g are the respective rates with respect to total income. Credit money is an additional supply, and government debt is an additional demand at the capital market. The interest rate is calculated from capital market equilibrium, which is defined by

$$K_H^* + K_M \overset{!}{=} K_F^* + K_G$$

Inserting the respective formulae from above yields

$$\left[\frac{\varepsilon}{\alpha} - \frac{\psi}{i\alpha}\right] + mY \overset{!}{=} \frac{\beta Y}{1+i} + gY$$

This equation can be solved algebraically and yields a quadratic equation for the equilibrium interest rate:

$$i^2 + \left[\frac{\frac{(\varepsilon-\psi)}{\alpha}\frac{C_1^*}{Y} + (m-g) - \beta}{\frac{\varepsilon}{\alpha}\frac{C_1^*}{Y} + (m-g)}\right] i - \frac{\frac{\psi}{\alpha}\frac{C_1^*}{Y}}{\frac{\varepsilon}{\alpha}\frac{C_1^*}{Y} + (m-g)} = 0$$

The price level p is derived from the monetary equilibrium condition, which is

$$\frac{\overline{M}}{p} + K_M \overset{!}{=} (L/p)^*$$

At the left hand side we have (real) money supply, while at the right hand side we have (real) liquidity demand, which is negatively dependent on the interest rate. Inserting and solving for the price level yields

$$p = \frac{\overline{M}}{(L/p)^* - mY}$$

(Note that the price level does not necessarily increase in the credit money rate m, because the interest rate decreases in m and liquidity demand decreases in i. Thus, expansionary monetary policy increases both the supply and the demand of money, such that the reaction of the price level is ambiguous.)

The model with two countries building a monetary union

Now we extend the model by adding a second economy with equal properties, but allowing for different values of the respective parameters in the utility function and the production function. We assume that the two countries have a common currency, but separate central banks, as it is the case in the EMU. With perfect markets and no trade barriers, they must have the same interest rate and the same price level. While capital is mobile, we assume that households are immobile and, thus, we can have different incomes and utilities in the two countries. (Otherwise the whole issue of

distributional effects would be meaningless, because everybody could and would just change to the country which is benefitted respectively).

The common capital market equilibrium is

$$K^*_{H;I} + K_{M;I} + K^*_{H;II} + K_{M;II} \overset{!}{=} K^*_{F;I} + K_{G;I} + K^*_{F;II} + K_{G;II}$$

where the sub-indices I and II mark the two countries respectively. Because we generally have different total incomes in the two countries, we need an additional variable that defines their income relation:

$$y_I \equiv \frac{Y_I}{Y_{II}}$$

Solving the capital market equilibrium equation then again yields a quadratic equation for the equilibrium interest rate, that can be analytically solved with any (exogenously given) relative country income y_I:

$$i^2 + i\frac{(\varepsilon_I - \psi_I)\left(\frac{(1-\beta_I)y_I}{\alpha_I + \beta_I + \psi_I}\right) + (\varepsilon_{II} - \psi_{II})\left(\frac{(1-\beta_{II})}{\alpha_{II} + \varepsilon_{II} + \psi_{II}}\right) + (m_I - g_I)y_I + m_{II} - g_{II} - (\beta_I y_I + \beta_{II})}{\varepsilon_I\left(\frac{(1-\beta_I)y_I}{\alpha_I + \varepsilon_I + \psi_I}\right) + \varepsilon_{II}\left(\frac{(1-\beta_{II})}{\alpha_{II} + \varepsilon_{II} + \psi_{II}}\right) + (m_I - g_I)y_I + m_{II} - g_{II}} - Q = 0$$

where

$$Q = \frac{\psi_I\left(\frac{(1-\beta_I)y_I}{\alpha_I + \beta_I + \psi_I}\right) + \psi_{II}\left(\frac{(1-\beta_{II})}{\alpha_{II} + \varepsilon_{II} + \psi_{II}}\right)}{\varepsilon_I\left(\frac{(1-\beta_I)y_I}{\alpha_I + \varepsilon_I + \psi_I}\right) + \varepsilon_{II}\left(\frac{(1-\beta_{II})}{\alpha_{II} + \varepsilon_{II} + \psi_{II}}\right) + (m_I - g_I)y_I + m_{II} - g_{II}}$$

Because total income in both countries must satisfy the respective production function, we are able to calculate all variables in the model in principal. However, because the relative value of total income y_I appears in the interest equation in turn, this is only possible by using numerical methods. Fortunately, we do not really need to know the absolute values of Y_I and Y_{II} in order to examine the *distributional* effects of Target II, which is our main interest here. Thus, in the following, we normalize the income of country I to unity, allowing for a different relative income in country II. All other variables concerning capital input, consumption, real savings etc. (with the exception of i and p) are then defined in relation to the income of country I respectively. For example, $C_{2;II} = 0.2$ would mean that the consumption of the elderly in country II is 20% of total income in country I.

Analogously to the single country model, the (common) price level in the monetary union is derived from money market equilibrium:

$$p_I = p_{II} \equiv p = \frac{\overline{M}_I + \overline{M}_{II}}{(L/p)_I^* + (L/p)_{II}^* - m_I - m_{II}/y_I}$$

Note that (real) money supply and (real) money demand must be equal in the monetary union as a whole, but not necessarily in each of the member countries. If the latter is not the case, we automatically get Target balances T , because these are defined as the (accumulated) net money flow from one member country to the other. Because we exclusively compare equilibrium situations in the following, the Target balances of the two countries (which must of course have equal values with different sign) are given by

$$T_I = (L/p)_I^* - \left[\left(\overline{M}_I / p\right) + K_{M;I}\right]$$
$$T_{II} = (L/p)_{II}^* - \left[\left(\overline{M}_{II} / p\right) + K_{M;II}\right] = -T_I$$

For example, if the central bank in country II prints more money than is demanded in that country, the surplus liquidity will at least partly flow into country I, thereby creating a positive Target balance in that country and a negative Target balance in country II. Moreover, unless there is a countervailing development in country I, the excess money supply in country II will reduce their common interest rate. Note that, with perfect capital markets and no differences in asset risks, it does not matter which assets central bank II purchases because, like money, capital supply is not ear-marked. However, there can definitely arise distributional effects depending on which central bank gets active. This is because any additional supply of credit money generates seignorage $\prod_M$ hat can be distributed among the members of the monetary union in various ways. As will be shown below, the respective rules are actually decisive for the economic relevance of Target balances.

Issuing additional helicopter money $\Delta\overline{M}$ creates a one off seignorage at the same value, while issuing credit money creates a permanent seignorage that is equal to the interest paid on central bank credits. Thus, in real terms, total seignorage created in the two countries is

$$\prod_{M;I} = \frac{\Delta\overline{M}_I}{p} + K_{M;I}$$
$$\prod_{M;II} = \frac{\Delta\overline{M}_{II}}{p} + K_{M;II}$$

Dependent of the distribution of total seignorage $\Pi_M \equiv \prod_{M;I} + \prod_{M;II}$, there obviously arise distributional effects between the two countries. As will be show below, these effects are closely linked to the Target balances.

Analogously, an increase in public debt has also distributional effects between the member countries, because i affects both the national public budgets and the interest rate. Although the latter is equal in both countries, variations of i do not at all work symmetrically, because the amount of both national savings and national debt are normally different between the countries.

Note that any decrease in the interest rate caused by expansionary monetary policy tends to increase total income in both countries even permanently, because investment costs decrease. However, here we neglect this effect for two reasons: First, its explicit recognition would require numerical methods, as I have mentioned above. Second, and more important, such “artificially” created increases in steady state income are Pareto-inefficient in an intertemporal view (van Suntum 2018, pp24). In short: The problem with such “monetary doping” is that there arise losses in the transition period from the lower to the higher steady state income. These losses generally cannot be

compensated by the future benefits and, thus, should be avoided. In other words: The frequently praised increase in income caused by a low interest policy is in reality a disadvantage for the economy, as it distorts the Pareto efficient natural rate of interest.

3. Some simulations with the model concerning Target II

In the following, I simulate some scenarios that are frequently used to discuss the relevance (resp. irrelevance) of Target II. I do not provide general proofs here for the results, although this would be possible for most of them. However, I provide an excel sheet on my institute-website www.insiwo.de where everyone can check my simulations or do his own ones.

The basic scenario

In order to make the results most clear and intuitively accessible, in the following simulations I confine myself to the most basic case: All parameters are equal in the two member countries of the monetary union, except that $y_I (= Y_I / Y_{II}) = 0.8$, i.e. GDP in country I is slightly smaller than GDP in country II. As both the formulae above and respective simulations reveal, the model allows for different other parameters as well, but I do not make use of that here for simplicity. The basic scenario is shown in table 1.

Table 1: basic scenario	**Country I**	**Country II**	**sum**
assumptions			
Y (relative total income)	1	1,25	2.25
alpha (exponent of C_1 in U)	0.5	0.5	
Eta (exponent of C_2 in U)	0.4	0.4	
Psi (exponent of (L/p) in U)	0.1	0.1	
Beta (production elasticity of capital)	0.6	0.6	
M bar (nominal amount of helicopter money)	10.0	12.5	
m (credit money rate)	0,01	0.01	
g (public debt rate)	0,00	0.00	
results (in % of Y_I)			
i (interest rate)	2.8473	2,8473	
K_H (capital supply by households)	0.1460	0.1824	
K_F (capital demand of firms)	0.1560	0.1949	
K_M (capital supply of central bank = credit money)	0.0100	0.0125	
K_G (capital demand of government = public debt)	0.0000	0.0000	
Seignorage (= central bank receipts)	0.0285	0.0356	0.6410
Share in common seignorage	0.0285	0.0356	0.6410
C_G (public consumption)	0.0285	0.0356	
C_1 (private consumption of the young)	0.2000	0.2500	
C_2 (private consumption of the elderly)	0.6156	0.7695	
=> total use of goods (including depreciation K_F)	1.0000	1.2500	2.25
M/p (real money supply including helicopter money)	0.0540	0.0676	0.1216
(L/p)* (real liquidity demand)	0.0540	0.0676	0.1216
=> Target balance T = (L/p)* - M/p	**0.0000**	**0.0000**	
interest on Target balance	0.0000	0.0000	
=> total use of goods including Target interest	1.0000	1.2500	2.25
p (price level)	227.0241	227.0241	
$K_X = K_H + K_M - K_F - K_G$ (net foreign capital)	0.0000	0.0000	

As the table reveals, we have monetary equilibrium in both countries, so no Target balances occur. Moreover, although total income differs, there is no net foreign capital (which we denote as K_X here), because capital demand and capital supply equal each other in both countries as well. Total

seignorage is here assumed to be distributed such that each national central bank earns what they receive. Hence, each national government´s receipts are identical to their central bank`s profits. Because we do not yet have public debt in this basic scenario and taxes do not exist, public consumption here equals national seignorage as well.

In the following scenarios we will change some of the assumptions in the upper part of the table and see what happens with the Target balances. In particular, our main interest is how the distribution of total goods which are *available* to each country changes, and if any unintentional redistributions between them arise. If so, we ask if they could be compensated by paying interest on negative Target balances that go to the respective other country. Thuis can be done by comparing the two highlighted lines in the table labelled as "total use of goods" and "total use of goods including Target interest". By total use of goods we mean the sum of both private and public consumption plus gross investment (including depreciation) in the respective country. Because the Target balances are zero in our basic scenario, both values are the same for the time being, but this will change in some scenarios below.

First scenario: Increasing credit money

We first assume that the national central bank of country II increases their supply of credit money, although there is no good reason to do so. In particular, we assume that m_{II} is increased from 0.1 to 0.5, while all other exogenous variables are unaltered (see table 2). We now have to distinguish between two different rules concerning the distribution of seignorage:

- At the left hand side of table 2 ("national seignorage" scenario) each national central bank earns that part of seignorage which is generated by itself (as it would be the case in a fixed exchange rate system with different currencies).
- In contrast, at the right hand side of table 2 ("common seignorage" scenario), it is assumed that total seignorage is distributed between the two countries according to their shares in total income (as it is the case in the EMU).

As the table reveals, in both scenarios we have a decrease in interest and an increase in the price level resulting from the additional monetary injection. As a result, the real capital stock K_F increases in both countries, while private savings K_H decrease. More interesting for our issue, however, are the monetary developments: Because of the lower interest rate, real liquidity demand increases in both countries, as the opportunity costs of holding money are lower now. Moreover, we do no longer have monetary equilibrium at the national level. In contrast, because money supply in country II has increased and money demand has dropped, some money flows from country II to country I, i.e. we get a negative Target balance for the former and a positive Target balance for the latter.

Even more interesting, in the "national seignorage" scenario there arises a redistribution in favour of country II (which has increased its money supply), while country II suffers. In particular, the "total use of goods" in country II is now 1.3037, which is above its own production (1.25), while country I`s total use of goods drops to 0.9463 which is below its own production (1.00). In other words, country II has managed to increase their share in total goods by simply printing more of the common money. This is the case where Sinn`s arguments are perfectly right, because this unjustified redistribution would indeed exactly be compensated by imposing interest on the resulting Target balances, as the table reveals! Note however, that this is only true under the assumption that the nationally created seignorage stays with the national government respectively.

Table 2: increasing credit money in country II	**National seignorage**		**Common seignorage**	
Variable	**Country I**	**Country II**	**Country I**	**Country II**
assumptions				
Y (relative total income)	1	1,25	1	1,25
alpha (exponent of C_1 in U)	0.5	0.5	0.5	0.5
Eta (exponent of C_2 in U)	0.4	0.4	0.4	0.4
Psi (exponent of (L/p) in U)	0.1	0.1	0.1	0.1
Beta (production elasticity of capital)	0.6	0.6	0.6	0.6
M bar (nominal amount of helicopter money)	10.0	12.5	10.0	12.5
m (credit money rate)	0,01	**0.05**	0,01	**0.05**
g (public debt rate)	0,00	0.00	0,00	0.00
results (in % of Y_I)				
i (interest rate)	2.4156	2,4156	2.4156	2,4156
K_H (capital supply by households)	0.1434	0.1793	0.1434	0.1793
K_F (capital demand of firms)	0.1757	0.2196	0.1757	0.2196
K_M (capital supply of central bank = credit money)	0.0100	0.0625	0.0100	0.0625
K_G (capital demand of government = public debt)	0.0000	0.0000	0.0000	0.0000
Seignorage (= central bank receipts)	0.0242	0.1510	0.0242	0.1510
Share in common seignorage	0.0242	0.1510	0.0778	0.0973
C_G (public consumption)	0.0242	0.1510	0.0778	0.0973
C_1 (private consumption of the young)	0.2000	0.2500	0.2000	0.2500
C_2 (private consumption of the elderly)	0.5465	0.6831	0.5465	0.6831
=> total use of goods (including depreciation K_F)	0.9463	1.3037	1.0000	1.2500
M/p (real money supply including helicopter money)	0.0343	0.0929	0.0343	0.0929
(L/p)* (real liquidity demand)	0.0566	0.0707	0.0566	0.0707
Target balance T = (L/p)* - M/p	**+0.0222**	**-0.0222**	**+0.0222**	**-0.0222**
interest on Target balance	+0.0537	-0.0537	-	-
total use of goods including Target interest	1.0000	1.2500	1.000	1.2500
p (price level)	410.9030	410.9030	410.9030	410.9030
$K_X = K_H + K_M - K_F – K_G$ (net foreign capital)	-0.0222	+0.0222	-0.0222	+0.0222

In contrast, in the “common seignorage” scenario, no redistribution arises from the expansionary monetary policy in country II. As the right hand part of table 2 reveals, “total use of products” remains the same as in the basic scenario and, thus, no interest on the Target balances is appropriate! One can also say that such interest is already implied in the common share of seiognorage proportional to the respective GDP.

Because total seignorage in the EMU is normally distributed according to the respective share in GDP, we can conclude so far that the Target balances in the EMU are irrelevant, at least as long as no member country resigns. The only exception are the ELA-credits, because interest on them stays (at least partly) with the respective national central bank. Thus, these credits imply indeed a certain redistribution in favour of the respective country and, thus, should either be prohibited or be lent out by the ECB itself.

We must, however, make two reservations here:

- First, if country II should leave the monetary union, it´s negative Target balance would immediately get economically relevant (see below).
- Second, if central bank II should lend out credit at preferential conditions to their own country or government, part of the common seignorage was effectively branched off. Thus, we are then at least partly back in the "national seignorage" scenario, where the Target balance is relevant.

Second scenario: increasing public debt

For comparison only, we briefly look at a scenario where country II increases their public debt instead of credit money (see table 3).

Table 3: increasing public debt in country II	**National seignorage**		**Common seignorage**	
Variable	**Country I**	**Country II**	**Country I**	**Country II**
assumptions				
Y (relative total income)	1	1,25	1	1,25
alpha (exponent of C_1 in U)	0.5	0.5	0.5	0.5
Eta (exponent of C_2 in U)	0.4	0.4	0.4	0.4
Psi (exponent of (L/p) in U)	0.1	0.1	0.1	0.1
Beta (production elasticity of capital)	0.6	0.6	0.6	0.6
M bar (nominal amount of helicopter money)	10.0	12.5	10.0	12.5
m (credit money rate)	0,01	0.01	0,01	0.01
g (public debt rate)	0,00	**0.01**	0,00	**0.01**
results (in % of Y_I)				
i (interest rate)	2.9737	2.9737	2.9737	2.9737
K_H (capital supply by households)	0.1465	0.1832	0.1465	0.1832
K_F (capital demand of firms)	0.1510	0.1887	0.1510	0.1887
K_M (capital supply of central bank = credit money)	0.0100	0.0125	0.0100	0.0125
K_G (capital demand of government = public debt)	0.0000	0.0125	0.0000	0.0125
Seignorage (= central bank receipts)	0.0297	0.0372	0.0297	0.0372
Share in common seignorage	0.0297	0.0372	0.0372	0.0372
C_G (public consumption)	0.0297	0.0000	0.0297	0.0000
C_1 (private consumption of the young)	0.2000	0.2500	0.2000	0.2500
C_2 (private consumption of the elderly)	0.6358	0.7947	0.6358	0.7947
=> total use of goods (including depreciation K_F)	1.0165	1.2335	1.0165	1.2335
M/p (real money supply including helicopter money)	0.0535	0.0668	0.0535	0.0668
(L/p)* (real liquidity demand)	0.0535	0.0668	0.0535	0.0668
Target balance T = (L/p)* - M/p	**0.0000**	**0.0000**	**0.0000**	**0.0000**
interest on Target balance	0.0000	0.0000	-	-
total use of goods including Target interest	1.0165	1.2335	1.0165	1.2335
p (price level)	230.1427	230.1427	230.1427	230.1427
$K_X = K_H + K_M - K_F - K_G$ (net foreign capital)	´+0.0056	-0.0056	+0.0056	-0.0056

In contrast to the scenario above, now interest *increases* because of the additional demand of capital of country II. As a result, we have a net capital flow from country I to country II, while in the former scenario the opposite was the case (see the last row in the respective tables). However, because the capital flow is *not* caused by any monetary action now, no Target balances occur. This example shows

that Target balances might converge with respective capital flows resp. foreign trade balances, but do not necessarily do so.

As table 3 reveals, now the total use of goods *increases* in country I, while it *decreases* in country II, which has increased its public debt. However, in contrast to the former scenario, this is *not* an unjustified redistribution. It only reflects the interest that country II has to pay for its increased public debt, because this is partly financed by capital suppliers from country I. Consequently, there is no reason for any concern, as the zero Target balances correctly reveal.

Third scenario: Monetary financing of the state

Now we come to the interesting case where both credit money and public debt in country II increase by the same amount (monetary financing of the state). In particular, we have assumed there that both m_{II} and g_{II} increase by 0.01 compared to our basic scenario (see table 4).

Table 4: monetary financing of government II	**National seignorage**		**Common seignorage**	
Variable	**Country I**	**Country II**	**Country I**	**Country II**
assumptions				
Y (relative total income)	1	1,25	1	1,25
alpha (exponent of C_1 in U)	0.5	0.5	0.5	0.5
Eta (exponent of C_2 in U)	0.4	0.4	0.4	0.4
Psi (exponent of (L/p) in U)	0.1	0.1	0.1	0.1
Beta (production elasticity of capital)	0.6	0.6	0.6	0.6
M bar (nominal amount of helicopter money)	10.0	12.5	10.0	12.5
m (credit money rate)	0,01	**0.02**	0,01	**0.02**
g (public debt rate)	0,00	**0.01**	0,00	**0.01**
results (in % of Y_I)				
i (interest rate)	2.8473	2.8473	2.8473	2.8473
K_H (capital supply by households)	0.1460	0.1824	0.1460	0.1824
K_F (capital demand of firms)	0.1560	0.1949	0.1560	0.1949
K_M (capital supply of central bank = credit money)	0.0100	0.0250	0.0100	0.0250
K_G (capital demand of government = public debt)	0.0000	0.0125	0.0000	0.0125
Seignorage (= central bank receipts)	0.0285	0.0712	0.0285	0.0712
Share in common seignorage	0.0285	0.0712	0.0443	0.0554
C_G (public consumption)	0.0285	0.0356	0.0443	0.0198
C_1 (private consumption of the young)	0.2000	0.2500	0.2000	0.2500
C_2 (private consumption of the elderly)	0.6156	0.7695	0.6156	0.7695
=> total use of goods (including depreciation K_F)	1.0000	1.2500	1.0158	1.2342
M/p (real money supply including helicopter money)	0.0485	0.0731	0.0485	0.0731
(L/p)* (real liquidity demand)	0.0540	0.0676	0.0540	0.0676
Target balance T = (L/p)* - M/p	**+0.0056**	**-0.0056**	**+0.0056**	**-0.0056**
interest on Target balance	0.0158	0.0158	-	-
total use of goods including Target interest	1.0158	1.2342	1.0158	1.2342
p (price level)	259.7900	259.7900	259.7900	259.7900
$K_X = K_H + K_M - K_F - K_G$ (net foreign capital)	´0.0000	0.0000	0.0000	0.0000

The interest rate is the same as in our basic scenario, because both capital demand and capital supply have increased by the same amount. However, the price level is higher than before because of the increased supply of money (which is not be compensated by an increase in liquidity demand here, because the interest rate is unaltered).

More interesting with respect to our issue are the redistributive effects. At first glance, there seems to exist no such effect in the "national seignorage" scenario (left hand part of table 4), because total use of goods in both countries is the same as in the basic scenario. However, this is an illusion, because there actually exists a one-off advantage for the government in country II that has financed their additional public debt by printing additional money. Because the additional seignorage stays with central bank II in this scenario, country II effectively does not even have to pay interest on the additional public debt. In other words, monetary financing of the state is nothing else than printing helicopter money and donating it to one`s own government.

Again, the resulting Target balance shows correctly how large the resulting redistribution between the two countries is. If it is burdened with interest, as it is assumed in the left hand part of table 4, the resulting national use off goods is exactly equal to the national use of goods in the "common seignorage" scenario (right hand side of table 4)! In other words: If the seignorage from monetary financing of the state is fairly divided between the two countries, there only remains a redistribution from the private sector to the public sector (via inflation), but there is no longer an additional redistribution between the two countries.

Concerning the economic meaning of Target balances, we get again the same result as above: If the seignorage resulting from monetary financing of the state is distributed among the member states of the monetary union (as it is the case in the EMU), there is no need to pay any additional interest on Target balances (as long as no country resigns). The reservations made above concerning a split of the EMU or preferential credit conditions for one`s own economy or government are still valid in this case as well.

Note that the Target balances here do not coincide with the net capital transfer (but only with the net money transfer) between the countries, as the last row in table 4 reveals.

Fourth scenario: monetary low interest policy with already existing public debt

Our next scenario examines the case where public debt already exists, but monetary policy tries to mitigate the government`s interest burden by boosting credit money (and thereby decreasing the interest rate). Obviously, this is what really happened in the EMU in the last decade. It seems worth to be examined which distributional effects this policy has between the member countries and if these could be compensated by paying interest on the Target balances.

In table 5, we examine this scenario by assuming that country II has a large public debt and increases credit money in order to mitigate their interest burden. We are particular interested in whether the resulting Target balance is directly related to the resulting redistribution between the countries. Because we have now a different initial situation (with already existing public debt), the table shows the new basic scenario at the left hand side and the "common seignorage" scenario for the situation with increased credit money. We omit the "national seignorage" case here because it does not reflect the current EMU rules anyway, as we have seen above.

Table 5: monetary financing an already existing public debt in country II	**Basic scenario (with public debt and low credit money)**		**Common seignorage scenario (with increased credit money)**	
Variable	**Country I**	**Country II**	**Country I**	**Country II**
assumptions				
Y (relative total income)	1	1,25	1	1,25
alpha (exponent of C_1 in U)	0.5	0.5	0.5	0.5
Eta (exponent of C_2 in U)	0.4	0.4	0.4	0.4
Psi (exponent of (L/p) in U)	0.1	0.1	0.1	0.1
Beta (production elasticity of capital)	0.6	0.6	0.6	0.6
M bar (nominal amount of helicopter money)	10.0	12.5	10.0	12.5
m (credit money rate)	0,02	0.02	0,01	**0.05**
g (public debt rate)	0,00	0.02	0,00	0.02
results (in % of Y_I)				
i (interest rate)	2.8719	2.8719	2.6181	2.6181
K_H (capital supply by households)	0.1461	0.1826	0.1447	0.1809
K_F (capital demand of firms)	0.1550	0.1937	0.1658	0.2073
K_M (capital supply of central bank = credit money)	0.0200	0.0250	0.0100	0.0650
K_G (capital demand of government = public debt)	0.0000	0.0250	0.0000	0.0250
Seignorage (= central bank receipts)	0.0574	0.0718	0.0262	0.1636
Share in common seignorage	0.0574	0.0718	0.0844	0.1055
C_G (public consumption)	0.0311	0.0000	0.0844	0.0400
C_1 (private consumption of the young)	0.2000	0.2500	0.2000	0.2500
C_2 (private consumption of the elderly)	0.6195	0.7744	0.5789	0.7236
=> total use of goods (including depreciation K_F)	1.0319	1.2181	1.0291	1.2209
M/p (real money supply including helicopter money)	0.0539	0.0674	0.0331	0.0913
(L/p)* (real liquidity demand)	0.0539	0.0674	0.0553	0.0691
Target balance T = (L/p)* - M/p	**0.0000**	**0.0000**	**-0.0222**	**+0.0222**
interest on Target balance	0.0000	0.0000	-	-
total use of goods including Target interest	1.0319	1.2181	1.0291	1.2209
p (price level)	294.7430	294.7430	433.7260	433.7260
$K_X = K_H + K_M - K_F - K_G$ (net foreign capital)	+0.0111	-0.0111	-0,0111	+0.0111

As the table shows, country II indeed manages to increase their total use of goods at the cost of country I by monetizing their public debt. Although their private savers suffer from the lower interest rate (as can be seen by the decrease in $C_{2;II}$), the advantage of their government more than balances out the respective loss. In contrast, although the government of country I also benefits from a reduced interest bill, the loss of their savers is larger in terms of real GDP and, thus, total use of goods is reduced in that country. Note that we do not have any Target balance effect here, because we have already assumed the "common seignorage" scenario in the right hand side of the table, which automatically ensures an appropriate interest on these balances. Hence, the redistribution effect in this scenario has another origin than in the scenarios above. In particular, it comes from the simple fact that any decrease in the interest rate benefits the borrowers and punishes the savers. Because country II is a net borrower and country I is a net saver in our example (what can be seen

from the last row in the table), it immediately follows that monetary financing of public debt must generate a redistribution in favour of the former and at the cost of the latter. Note that this would also be the case if country I instead of country II would increase their credit money supply, because the resulting seignorage is commonly shared according to our assumptions (and in line with reality in the EMU) anyway!

Hence, we conclude that, under the EMU rules, the redistribution effect between the member countries of a low interest policy is independent of which central bank increases their credit money. In particular, it would equally arise if all of the additional money were injected by the Bundesbank itself. Moreover, the effect is neither linked to the Target balances nor can it be healed by offsetting them. Nevertheless, it is true that a low interest policy generally benefits the high indebted member countries in the EMU at the cost of those that are net savers. Presumably, the resulting shift of resources within the EMU is equally important as the Target balance issue and, thus, should also receive more attention. Although the Target balances are not directly linked to this kind of hidden redistribution, they may be seen as a sign that something is going seriously wrong in the EMU.

Sixth scenario: Split of the monetary union

Last not least, we consider the case where one member of the EMU resigns or even the whole monetary union splits. It is widespread common sense that, in that case at least, the Target balances must be compensated, as we have also argued above. However, there is a debate how such a compensation could be made: In Euro, in the new currency of the deviating country, or in any other form like gold or any foreign currency? Again, our model gives a clear answer to this question.

Suppose that, in the initial situation (left hand side of table 6 below), country II has a negative Target balance and, thus, country I has a positive balance. As we have seen, this means that total real money supply in country 2 is larger than its liquidity demand, i.e. part of the money issued in country II is held in country I.

Now let country II quit the monetary union, completely disregarding its Target balance(middle part of table 6). Quitting the monetary union means inventing a new currency. For simplicity, suppose that the exchange rate is 1:1, i.e. all cash and deposits in country II are simply renamed, e.g. in “Lira nuova” instead of Euro. However, this is only possible for the money which is in country II, i.e. for $(L/p)_{II}$! In contrast, the excess money supply $(M/p)_{II} - (L/p)_{II}$ will still be in Euro, because it is abroad and, thus, not under the control of country II´s government. Obviously, the respective difference is exactly the Target balance T (with revers sign).

The real problem here is that the (now independent) central bank II still earns interest from this excess money supply! Moreover, because they are no longer member of the monetary union, they receive the total seignorage from their (new) national currency, which is $i(L/p)_{II}$, *plus* the interest on their excess money supply $i\left[(M/p)_{II} - (L/p)_{II}\right]$. Obviously, the sum is equal to $i(M/p)_{II}$, i.e. it equals the full national seignorage that country II had generated (but not received) as a former member of the monetary union. As the table reveals, this is a good deal for country II, because their total share of goods increases thereby, while the total use in country I is respectively lower after the split. The simple reason is that the government in country II, when they were a member of the monetary union, did only participate in the common seignorage proportionately to their GDP, while after the split they effectively earn the full seignorage that was created in their country. The difference is exactly the interest on their Target balance, as the table reveals!

Table 6: split of the monetary union	**Before the split (with common seignorage)**		**After split (ignoring Target balances)**		**After split (offsetting Target balances)**	
Variable	**Country I**	**Country II**	**Country I**	**Country II**	**Country I**	**Country II**
assumptions						
Y	1	1,25	1	1,25	1	1,25
alpha	0.5	0.5	0.5	0.5	0.5	0.5
Eta	0.4	0.4	0.4	0.4	0.4	0.4
Psi	0.1	0.1	0.1	0.1	0.1	0.1
Beta	0.6	0.6	0.6	0.6	0.6	0.6
M bar	10.0	12.5	10.0	12.5	10.0	12.5
m	0,02	0.02	0,02	0.02	0,01	**0.05**
g	0,00	0.02	0,00	0.02	0,00	0.02
results (in % of Y_I)						
i	2.5183	2.5183	2.5183	2.5183	2.5183	2.5183
K_H	0.1441	0.1801	0.1441	0.1801	0.1441	0.1801
K_F	0.1708	0.2134	0.1708	0.2134	0.1708	0.2134
K_M	0.0100	0.0625	0.0100	0.0625	**0.0322**	**0.0403**
K_G	0.0000	0.0125	0.0000	0.0125	0.0000	0.0125
Seignorage	0.0251	0.1517	0.1823	0.0251	0.0810	0.1013
Share in common seignorage	0.0810	0.1013	0.1823	0.0251	0.0810	0.1013
C_G	0.0810	0,0698	0.0251	0.1257	0.0810	0.0698
C_1	0.2000	0.2500	0.2000	0.2500	0.2000	0.2500
C_2	0.5622	0.7028	0.6195	0.7744	0.5622	0.7028
=> total use of goods	**1.0140**	**1.2360**	**0.9581**	**1.2919**	**1.0140**	**1.2360**
M/p	0.0337	0.0921	0.0337	0.0921	0.0559	0.0699
(L/p)*	0.0559	0.0699	0.0559	0.0699	0.0559	0.0699
Target balance T = (L/p)* - M/p	**0.0222**	**-0.0222**	**+0.0222**	**-0.0222**	**0.0000**	**+0.0000**
interest on Target balance	-	-	-	-	-	-
total gain from split (= -iT)	-	-	-0.0559	+0.0559	0.0000	0.0000
p (price level)	422.1217	422.1217	422.1217	422.1217	422.1217	422.1217
$K_X = K_H + K_M - K_F - K_G$ (net foreign capital)	-0.0167	+0.0167	-0.0167	+0.0167	+0.0056	-0.0056

Obviously, In order to avoid such redistributions in case of one country leaving the monetary union, any compensation is necessary. One idea could be to "freeze" the Target balances in the moment of splitting and burden them with interest from that day on. Another possibility is their total redemption at that day, or in the near future at least.

How could the redemption of Target balances could be achieved in practice? In principle, there are several options for that, but not all are equally good:

- Compensation in the previous currency (Euro) would not work. Suppose e.g. that all liquidity in country II $(L/p)_{II}$ is held in cash. Then the invention of the new currency (Lira nuova) means that central bank II collects all the Euros which are in country II in exchange for freshly printed Lira nuova. After that, they could of course easily offset their negative Target balance T and still

have a huge amount of Euros left (namely $(L/p)_{II}+T_{II}$). If they were allowed to keep them, they could use them for purchasing even more goods in country I! In the end, country II would then effectively have invented a parallel currency, thereby massively harming country I that is now swamped with Euros and will suffer from inflation instead of getting real compensation. For that reason, all Euros that are collected in exchange for Lira nuova must be given back to the remaining monetary union anyway and, thus, cannot be used for offsetting the Target balance.

- Compensation in the new currency (Lira nuova): In this case, there indeed arises a claim of country I on the GDP of country II, i.e. a real compensation is realized. This case is perfectly comparable with the former Bretton Woods system, where the United States paid for their trade deficits in Dollar. However, like in that system, there is the danger that country II simply prints additional Lira nuova for paying their Target bill and, thus, instantly inflate their new currency. As a result, country I would receive less real goods than would be necessary for a full compensation (as it was the case with the Dollar, that lost nearly half its worth during the sixties). For that reason, the Target balances should better not be compensated in the new currency, in particular not if they are paid back over a long period only.

The most natural way to compensate a negative Target balance T is transferring real assets worth $-T$ to the remaining monetary union, because T equals exactly the excess money supply of country II. This is what is assumed in the right hand part of table 6, where we have $K_{F;I} = m_I Y_I + T_I$ and $K_{F;II} = m_{II} Y_{II} + T_{II}$ after the split of the monetary union. As a result, national seignorage is now higher in country I and lower in country II than before. As the table reveals, this compensation generates exactly the same total use of goods in both countries as if the monetary union was still in existence, i.e. the unjustified redistribution by the resign of country II is compensated.

Summary

While it is true that a negative Target balance is a liability of the respective member country that must bear interest in principle, this interest is actually already implied in the share of the common seignorage (proportionately to relative GDP). Hence, only if a member country leaves the EMU there arises a problem, simply because then the common share of seignorage ends. This – and not any book losses of central banks, which are indeed no real problem – is the true reason why the Target balances must be compensated in that case.

On the other hand, the view that Target balances were pure account entries without any economic meaning is also false. In contrast, they become relevant at latest if either a member country leaves the EMU or any national central bank seeks to abstract part of the commonly owned seignorage by lending out at preferential conditions. As we have seen above, in both cases unjustified redistributions at the cost of the other EMU members would arise, that could (and should) be compensated by a respective interest burden on the Target balances.

Admittedly, all this appears the less relevant the lower the interest rate is at first glance. However, as we have seen above, if the low interest is generated by expansive monetary policy, this creates itself a redistribution effect, benefitting the high indebted member countries at the cost of the more solid ones. Hence, the currently low interest rate is only a weak argument against the relevance of the Target balances.

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