The implications of intra-euro area imbalances in credit flows

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Outstanding balances of national central banks (NCBs) in the Eurozone with the Target2 settlement and clearing system have increased substantially over the past few years. A number of recent contributions have commented on the likely nature of the transactions underlying the increase in these balances, their economic meaning, and the implications of persistent increases in outstanding NCB balances vis-à-vis Target2. These contributions include (but are not limited to) Whitaker (2011), Sinn (2011a,b,c,d,e), Sinn and Wollmershaeuser (2011), Wolf (2011), Whelan (2011), Buiter et al (2011a,b), Bindseil and Koenig (2011) and Storbeck (2011a,b).[1] In this report, we aim to summarise the facts and their interpretation rather than chronicle the debate.
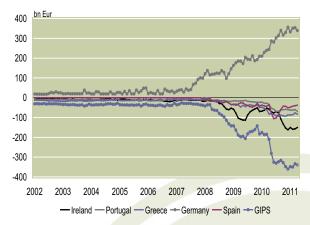
1. What are Target2 balances?

The Trans-European Automated Real-time Gross Settlement Express Transfer System or Target2 is, as its name implies, a recording, clearing and settlement system used by both public and private market participants and operated by the ECB. While the net balances of other members are settled daily or even in an intra-day fashion, Eurozone NCBs can build up gross and net claims and liabilities vis-à-vis Target2 over time, in principle without limit. In other words, Eurozone NCBs can borrow from or lend to other Eurozone NCBs through Target2.

The size of net claims and liabilities of individual NCB's vis-a-vis Target2 (and its predecessor, Target) was small for most of the period since the euro came into being. In recent years, however, the Target2 net liabilities of the Central Bank of Ireland, the Banco de Portugal, the Banco de España and the Bank of Greece have risen substantially. The value of the net claims of the Bundesbank on Target2 have also risen substantially and are of a very similar size as the net liabilities of the NCBs of the GIPS countries (Greece, Ireland, Portugal and Spain) to Target2, at around €340bn as of April 1, 2011 (see Figure 1).[2]

Figure 1.   Selected countries – Target2 net claims (bn euros), 2002–2011

Notes: Germany: Other Assets of the Bundesbank. Spain: Banco de Espana: Liabilities: Other Eurozone countries: MFIs: of which: Greece: Bank of Greece: Liabilities: Liabilities to Other MFIs: Other Eurozone Countries. Portugal: Central Bank Balance Sheet Liabilities: Non-Residents: Deposits & Related Instruments. Ireland: Central Bank Liabilities: Other Liabilities. GIPS is the sum of Greece, Portugal, Ireland, and Spain.
Source: Haver, Bundesbank, Central Bank of Ireland, Bank of Greece, Banco de Espana, Banco de Portugal, CIRA

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1   Earlier related work can be found in Garber (1989, 2010).

2   Target2 net claims and liabilities are not reported explicitly or even in a consistent way by NCBs. Figure 1 depicts proxies for these balances, following Whitaker (2011).

Figure 2.   Stylised balance sheet of a simplified Eurozone

Bundesbank (BB)		Target2 (T)		Central Bank of Ireland (CBI)	
Assets	**Liabilities**	**Assets**	**Liabilities**	**Assets**	**Liabilities**
$D^{GB,BB}$	$(=M^G)$			$D^{IB,CBI}$	$(=M^I)$
$D^{T,BB}$		$D^{BB,T}+D^{CBI,T}$	$D^{T,BB}+D^{T,CBI}$	$D^{T,CBI}$	
sW^T	$D^{BB,T}$			$(1-s)W^T$	$D^{CBI,T}$
	W^{BB}		W^T		W^{CBI}
German banks (GB)				Irish banks (IB)	
Assets	**Liabilities**			**Assets**	**Liabilities**
$(=M^G)$	$D^{GB,BB}$			$(=M^I)$	$D^{IB,CBI}$
$D^{RG,GB}$	$D^{GB,RG}$			$D^{RI,IB}$	$D^{IB,RI}$
	$D^{GB,RI}$				$D^{IB,RG}$
	W^{RG}				W^I
Rest of Germany (RG)				**Rest of Ireland (RI)**	
Assets	**Liabilities**			**Assets**	**Liabilities**
$D^{GB,RG}$	$D^{RG,GB}$			$D^{IB,RI}$	$D^{RI,IB}$
$D^{RI,RG}$	$D^{RG,RI}$			$D^{RG,RI}$	$D^{RI,RG}$
$D^{IB,RG}$				$D^{GB,RI}$	
K^G				K^I	
	W^{RG}				W^I

Source: Citi Investment Research and Analysis

2. A stylised model of balance sheets in the Eurozone

To convey the concepts and mechanisms clearly, it is useful to describe a stylised set of balance sheets for a simplified version of the Eurozone Figure 2). Assume that the Eurozone consists of just two countries, Germany (G) and Ireland (I). For simplicity, again, we view this Eurozone as closed – there is no trade or financial interaction with the rest of the world. Official foreign exchange reserves are therefore omitted from the asset menu of the NCBs and the ECB. For each country we have three sectors – the national central bank, the banking sector, and the rest of the economy. So for Germany we have the Bundesbank (*BB*), "German banks" (*GB*) and "Rest of Germany" (*RG*), which consists of the non-bank financial sector, the private non-financial sector (households and businesses) and government. For Ireland we have the Central Bank of Ireland (*CBI*), "Irish Banks" (*IB*) and "Rest of Ireland" (*RI*), defined analogously to Germany.

There is also Target2 (*T*), a stripped-down version of the ECB. All it does is lend to or borrow from the NCBs. It does not issue base money itself – only the NCBs do, and it has no assets (*A*) or liabilities (*L*) other than its gross claims on and gross liabilities to the NCBs. We use the notation $D^{i,j}$ to denote the gross debt of sector i to sector j, so these are $D^{T,BB}$, $D^{BB,T}$, $D^{CBI,T}$ and $D^{T,CBI}$.

Each NCB has as its assets the gross debt that Target2 has to it ($D^{T,BB}$ and $D^{T,CBI}$). On the liability side of each NCB's balance sheet is the gross debt it owes to Target2 ($D^{BB,T}$ and $D^{CBI,T}$). Another liability of each NCB is the national monetary base (M^G for Germany, M^I for Ireland). In the real world, the monetary base includes currency as well as overnight deposits/reserves held with the central bank by its eligible deposit-taking institutions, but we abstract from currency here, so that the monetary base equals overnight deposits/reserves held with the central bank by domestic banks ($M^G = D_S^{BB,GB}$, $M^I = D_S^{CBI,IB}$). In addition, central banks issue longer-term, non-monetary liabilities to domestic banks ($D_L^{BB,GB}$ and $D_L^{CBI,IB}$) which do not form part of the monetary base and which we set to zero for the time being. The only other asset of the NCB is the gross debt the domestic banks have to it ($D^{GB,BB}$ and $D^{IB,CBI}$, that is, loans from the central bank to eligible deposit-taking institutions, or "central bank credit"). We thus abstract from any outright holdings by the NCB of government or private sector debt other than loans by the NCB to domestic banks and NCB debt to Target2.

For simplicity, the central banks and the commercial banks are not assumed to hold any foreign securities, but the rest of the economy does ($D^{RI,RG}$ and $D^{RG,RI}$). The rest of the economy also holds deposits with domestic banks ($D^{IB,RI}$ and $D^{GB,RG}$) and foreign banks ($D^{IB,RG}$ and $D^{GB,RI}$), but the rest of each national economy can borrow only from domestic banks ($D^{RI,IB}$ and $D^{RG,GB}$) and from the rest of the other national economy, DRI,RG and $D^{RG,RI}$.

In addition, the Rest of Germany hold as an asset the German capital stock, denoted K^G, which is the value of the real (non-human) assets in Germany, such as land and the physical capital stock. The balance sheet of the Rest of Ireland (*RI*) and its components are defined analogously. The central banks jointly own Target2 (the ECB), with the BB owning a share s and the CBI owning a share 1-*s*. The net worth of a sector is the excess of the value of its assets over the value of its liabilities. It is denoted W^i for sector i.

3. What types of transactions can give rise to changes in Target2 net balances?

An increase in the net liability position of one NCB vis-à-vis Target 2 and a corresponding increase in the net claims of another NCB can be caused by a large variety of transactions. In this section, we discuss two examples of types of transactions that can give rise to such changes in balances. One example is a transaction that results in an increase in the trade deficit and the current-account deficit of one member state, say Ireland. The second example is based on a private capital outflow from one member state to another. We show that the two types of transactions have potentially observationally equivalent implications for the change in Target2 balances. We highlight that it is difficult to empirically pinpoint a likely cause of observed changes in the Target2 balances, but present circumstantial evidence that, at least for the case of Ireland, export shortfalls are unlikely to have been the primary driver of the large rise in Target2 net debt of the CBI.

3.1. Target2 balances and Irish current-account deficits

The current-account deficit can be defined in various equivalent ways. One useful definition is that the current-account surplus equals the increase in net foreign claims of a nation.[3] In terms of our notation above, the Irish current-account surplus can then be expressed as the increase in the net worth of Ireland (W^I) minus the increase in domestic wealth (the domestic capital stock, K^I):

$$CA^I \equiv \Delta W^I - \Delta K^I,$$

where Δ denotes differences or changes.

Irish net worth is given by the sum of domestic net worth and the sum of two components of foreign net claims: net claims of the CBI on Target2 and net claims of the consolidated Rest of Ireland and Irish banks on the consolidated Rest of Germany and German banks[4]:

$$W^I \equiv K^I + (D^{T,CBI} - D^{CBI,T}) + (D^{RG,RI} - D^{RI,RG} + D^{GB,RI} - D^{IB,RG}).$$

The Irish current-account surplus is therefore given by the change in these two components of net foreign claims:

$$CA^I \equiv \Delta(D^{RG,RI} - D^{RI,RG} + D^{GB,RI} - D^{IB,RG}) + \Delta(D^{T,CBI} - D^{CBI,T})$$

$$\equiv \Delta(D^{RG,RI} - D^{RI,RG} + D^{GB,RI} - D^{IB,RG}) + \Delta(D^{BB,T} - D^{T,BB})$$

where the second equality follows from the fact that, in our simplified example, net claims of the CBI on Target2 are equivalent to net liabilities of the Bundesbank to Target2, and vice versa. Thus, an Irish current-account deficit ($CA^I < 0$) could be financed by capital outflows from Ireland that are the result of transactions in financial assets between all domestic and foreign private and public entities, other than the national central banks ($\Delta(D^{RG,RI} - D^{RI,RG} + D^{GB,RI} - D^{IB,RG}) < 0$)[5]. The other alternative is an increase in the net credit position of Target2 vis-à-vis the CBI ($\Delta(D^{T,CBI} - D^{CBI,T}) < 0$). A combination of the two is, of course, possible as well.

Now ponder the following example: An Irish farmer borrows X euro from an Irish bank to purchase a German tractor[6]. As a result of this transaction, in terms of the above notation, the Irish capital stock increases ($K^I\uparrow$) and loan balances of Rest of Ireland with Irish banks increase ($D^{RI,IB}\uparrow$). Now assume (note that this is an assumption, if not an implausible one), that instead of reducing its assets or borrowing from other sources, the Irish bank increases its borrowing from the CBI ($D^{IB,CBI}\uparrow$). The CBI in turn increases its (gross and net) debt to Target2 ($D^{CBI,T}\uparrow$). As there were no other transactions in the current account of Ireland, its current-account deficit has increased ($CA^I\downarrow$). Such an example could in principle illustrate how an increase in the net Target2 liabilities of the CBI is created or driven by an Irish current account deficit.

The equations above have certainly highlighted that a net credit position of Target2 vis-à-vis the CBI is *consistent* with an Irish current-account deficit. The example then highlighted a case where an Irish current-account deficit could even *drive* a rise in the net Target2 balances of the CBI. However, in general the fact that an increase in the net credit position of Target 2 vis-à-vis the CBI is consistent with an Irish current-account deficit does not suggest causation running from the latter to the former, nor from the former to

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3   The current account surplus is the value of the net change in claims on the rest of the world, not the change in the value of net claims on the rest of the world. So the current account excludes capital gains and losses on existing holdings of external assets and liabilities. In what follows, we assume for simplicity that that there are no asset and liability revaluations. The thrust of the argument does not depend on this.

4   In our simplified example, the net worth of Target2 is zero and therefore omitted in our presentation.

5   Remember that we assume that commercial banks do not have any foreign assets. We can easily generalise to allow for foreign asset holdings of bank, but the generalisation adds nothing to our presentation.

6   In what follows, an increase in the value of any stock by an amount X euro is denoted by the symbol for that stock followed by $\uparrow$. If the stock is unchanged, the symbol for that stock is followed by $\rightarrow\downarrow$., and if the stock falls, the symbol for that stock is followed by $\downarrow$.

the latter, nor does an example constitute *evidence* that the increase in Target2 net debt of the CBI is driven by Irish current-account deficits. An increase in Irish net debt to Target2 is in fact *also consistent* with an Irish current-account surplus as long as that surplus is smaller than the net capital *inflow* into Ireland from the transactions of public and private entities other than the CBI, i.e. if $CA^I < \Delta(D^{RG,RI} - D^{RI,RG} + D^{GB,RI} - D^{IB,RG})$.

3.2. Target2 balances and deposit flight: A second example

Now ponder a second example. Imagine a German farmer with a deposit in an Irish bank. Somewhat concerned about the solvency of his Irish bank (or of the Irish banks and the Irish that effectively underwrites the Irish Deposit Protection Guarantee), he decides to

withdraw his deposit and instead deposits it with a German bank. In terms of our notation above, deposits of Rest of Germany with Irish banks fall ($D^{IB,RG}\downarrow$). Most of the remaining relevant movements in balances are equivalent to those described in the previous example. Notably, assume again that instead of reducing its assets or borrowing from other sources, the Irish bank increases its borrowing from the CBI ($D^{IB,CBI}\uparrow$) to make up for the lost deposits and that the CBI in turn increases its (gross and net) debt to Target2 ($D^{CBI,T}\uparrow$). As anticipated above, the implications for the Target2 net balances of the CBI or the Bundesbank are identical in the two examples. But the narrative is very different. The second example does not imply a current-account deficit or trade deficit of Ireland vis-à-vis Germany. Instead, the driver is what could be termed "deposit flight" – a movement of financial balances from Ireland to Germany which is, at least directly, unrelated to the demand for goods – it is a financial portfolio rebalancing that does not require any change in the national saving-investment balance. This example does not involve Irish overspending, and may potentially be empirically more plausible, at least for some of the countries in the Eurozone periphery.

3.3. Target2 balances, deposit flight and current-account deficits: Some circumstantial evidence

The above discussion is not just theoretical. One way to interpret the driving forces behind the recent increase in the net debt of the CBI to Target2 is indeed the inability of the Irish public and private sectors other than the central bank to sell assets to the rest of the world (here the Eurozone) or to increase their liabilities to them to fund Ireland's current-account deficit. The increase in the net credit position of a member state NCB vis-à-vis Target2 is the equivalent

of what the official settlements balance (the change in the stock of official gold and foreign exchange reserves) was in pre-common currency days. Only with zero (net) international capital mobility would an increase in the CBI's net debt to Target2 be the only way to finance an Irish current-account deficit vis-à-vis the rest of the Eurozone. Leaving out a discussion of other sources of public and private capital flows can be misleading. What is more, Target2 net balances can arise in the absence of current-account deficits or surpluses.

Figure 3 to Figure 12 compare Target2 imbalances of NCBs and cumulative current-account balances (or changes in net Target2 imbalances and current-account imbalances) for Germany, Ireland, Portugal, Greece, and Spain. Ideally, we would want to compare the NCB Target2 net claims and liabilities with the cumulative current-account deficits of these countries with the rest of the Eurozone only, but those data are unfortunately not available. Nevertheless, these data do provide some indicative evidence. For instance, Figure 3 shows that the cumulative current-account surplus of Germany since 2002 is much larger than the cumulative Target2 imbalances, indicating that Target2 financing was insufficient to fund the rest of the world's current-account deficit with Germany over this period, once again pointing to sources of capital flows other than Target2 access. Figure 4 shows that in the years in which increases in Bundesbank Target2 net claims were largest (2009 and 2010), those increases actually *exceeded* Germany's current-account surpluses.

The charts for Ireland (Figure 5 and Figure 6) are even more telling. The overwhelming majority of increases in net Target2 liabilities of the CBI were between 2008 and 2010 and in all three years increases in CBI Target2 liabilities were multiples of the Irish current-account deficit – if Target2 liabilities were financing the Irish current-account deficit with the rest of the world at all, they also financed an even larger net capital outflow from Ireland. In 2010, when the increase in CBI Target2 net liabilities was largest at an estimated €93bn (for a total outstanding stock of Target2 net liabilities of €162bn), the Irish current account was close to being balanced.

Figure 7 to Figure 12 present analogous evidence for Greece, Portugal, and Spain. All three countries run persistent current-account deficits with the rest of the world and also have NCBs with a net liability position vis-à-vis Target2, loosely fitting the narrative that current-account deficits could be behind the increase in the Target2 net liabilities of the NCBs of these countries. But for Greece and Portugal, again, the largest increases in Target2 net liabilities were in 2010, when the

increase in Target2 net debt was much larger than the overall current-account deficit. The data on current-account deficits and changes in Target2 balances therefore do not provide support for the hypothesis that the current account has been the main driver of change in national net Target2 balances for the EAP countries, even though we are careful to point out that this evidence also does not allow one to conclude that current-account imbalances did not contribute to the increases in net Target2 imbalances.   At best,

the presence or absence of close correlations is suggestive, but it is neither necessary nor sufficient to prove presence or absence of a causal connection.[7]

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7   Just as correlation of X and Y does not imply causation from X to Y or from Y to X, the absence of correlation between X and Y cannot be taken to imply conclusively an absence of a causal relationship between X and Y, but certainly does not constitute evidence in favour of such a causal relationship, either.

Figure 3.   Germany – Target2 balance and the current account I (bn euros)

Note: Target2 Net Claims are "Other Assets" of the Bundesbank.
Source: Bundesbank, Citi Investment Research and Analysis

Figure 4.   Germany – Target2 balance and the current account II (bn euros)

Note: Target2 Net Claims are "Other Assets" of the Bundesbank
Source: Bundesbank, Citi Investment Research and Analysis
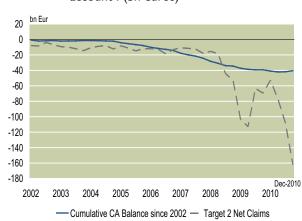
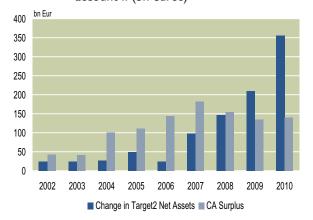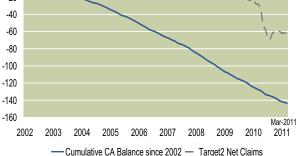Figure 5.   Ireland – Target2 balance and the current account I (bn euros)

Note: Target2 Net Debt are "Other Liabilities" of the Central Bank of Ireland
Source: Central Bank of Ireland, Central Statistics Office Ireland, Citi Investment Research and Analysis

Figure 6.   Ireland – Target2 balance and the current account II (bn euros)

Note: Target2 Net Debt are "Other Liabilities" of the Central Bank of Ireland
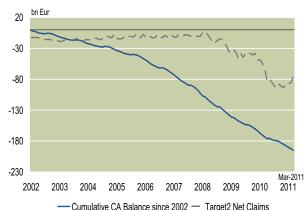Source: Central Bank of Ireland, Central Statistics Office Ireland, Citi Investment Research and Analysis
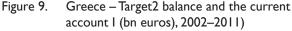
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Figure 7.   Portugal – Target2 balance and the current account I (bn euros), 2002–2011

— Cumulative CA Balance since 2002   — Target2 Net Claims

Note: Target2 Net Claims are minus Portugal: Central Bank Balance Sheet Liabilities: Non-Residents: Deposits & Related Instruments.
Source: Banco de Portugal and Citi Investment Research and Analysis

Figure 8.   Portugal – Target2 balance and the current account II (bn euros), 2000–2010

■ Change in Target2 Net Assets   ■ CA Surplus

Note: Target2 Net Claims are minus Portugal: Central Bank Balance Sheet Liabilities: Non-Residents: Deposits & Related Instruments.
Source: Banco de Portugal, Citi Investment Research and Analysis

Figure 9.   Greece – Target2 balance and the current account I (bn euros), 2002–2011)

— Cumulative CA Balance since 2002   — Target2 Net Claims

Note: Target2 Net Claims are minus Greece: Bank of Greece Liabilities: Liabilities to Other MFIs: Other Eurozone Countries
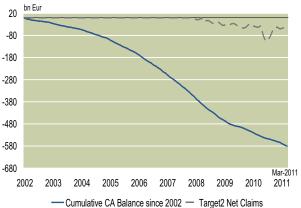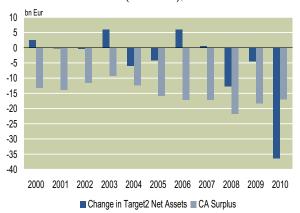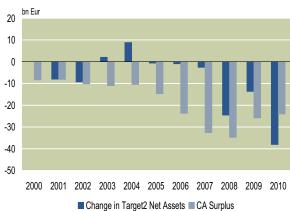*Source:* Bank of Greece, Citi Investment Research and Analysis

Figure 10.   Greece – Target2 balance and the current account II (bn euros), 2000–2010

■ Change in Target2 Net Assets   ■ CA Surplus

Note: Target2 Net Claims are minus Portugal: Central Bank Balance Sheet Liabilities: Non-Residents: Deposits & Related Instruments.
Source: Banco de Portugal and Citi Investment Research and Analysis

Figure 11.   Spain – Target2 balance and the current account I (bn euros), 2002–2011)

— Cumulative CA Balance since 2002   — Target2 Net Claims

Note: Target2 Net Claims are minus Spain: Central Bank BSh: Residents of Other Eurozone Country Liabilities: MFIs: o/w Euro
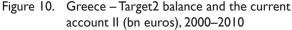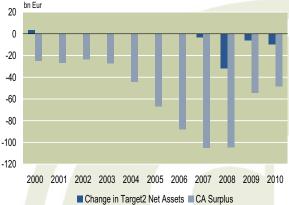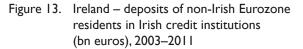*Source:* Banco de Espana, Citi Investment Research and Analysis

Figure 12.   Spain – Target2 balance and the current account II (bn euros), 2000–2010)

■ Change in Target2 Net Assets   ■ CA Surplus

Note: Target2 Net Claims are minus Spain: Central Bank BSh: Residents of Other Eurozone Country Liabilities: MFIs: o/w Euro
Source: Banco de Espana, Citi Investment Research and Analysis
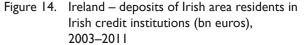
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Figure 13 and Figure 14 present the evolution of the level of deposits by Irish residents and non-Irish Eurozone residents in Irish credit institutions and are meant to provide some evidence for evaluating the possibility that capital flight was at the heart of the emergence of Target2 imbalances in the Irish case. All four series of deposits in Irish banks depicted are clearly off their peaks, with the largest falls in the deposits of non-Irish Eurozone residents. Deposits at Irish credit institutions by non-Irish Eurozone residents alone fell by €118bn from a high of €253bn in January 2009 to just €136bn in April 2011, and continue to fall. The second example above focused on the example of a non-Irish Eurozone resident moving funds from Ireland to Germany. But the implications for Target2 balances, central bank credit and the monetary base in both Germany and Ireland are equivalent if the agent were instead an Irish resident. And the evidence in Figure 13 and Figure 14 does provide some – if, again, not conclusive – evidence that private capital flows from Ireland to Germany are likely to have played a major role in the emergence of Target2 net liabilities of the CBI.

Falls in deposits by non-euro area residents were even larger than reductions by non-Irish Eurozone residents, but as we endeavour to account for intra-euro area capital flows, these are not our primary concern. Deposit flight from Irish banks was strongest in 2009 and 2010, exactly the years when increases in CBI net Target2 liabilities also increased the most. Gross private capital outflows, not current-account deficits were likely the most important driver of increases in CBI Target2 net debt. For Portugal and Greece, and to a lesser extent Spain, gross private capital outflows were smaller in scale, but there, too, they likely played a significant role in the emergence of the Target2 imbalances.

Figure 13. Ireland – deposits of non-Irish Eurozone residents in Irish credit institutions (bn euros), 2003–2011

Source: Central Bank of Ireland, Citi Investment Research and Analysis

Figure 14. Ireland – deposits of Irish area residents in Irish credit institutions (bn euros), 2003–2011

Source: Central Bank of Ireland, Citi Investment Research and Analysis

4. Do increases in CBI net Target2 liabilities reduce ECB/Bundesbank credit for German banks?

4.1. The mechanics of increases in Target2 net liabilities of the CBI and ECB/Bundesbank credit to German banks

In order to assess the implications of increases in CBI liabilities on ECB/NCB credit to domestic banks in other Eurozone economies, it is not necessary to distinguish between the two examples above – their implications are conceptually equivalent.

Assume therefore again that an Irish farmer borrows X euro from an Irish bank to purchase a German tractor. We again refer to the notation and the stylised balance sheets described above. We already noted that as a result of this transaction, the Irish capital stock increases ($K^I\uparrow$), loan balances of Rest of Ireland with Irish banks increase ($D^{RI,IB}\uparrow$) and – under the assumption that Irish banks do not reduce their assets or borrow from other sources – Irish banks increase their borrowing from the CBI ($D^{IB,CBI}\uparrow$). The CBI then ends up with an increases in its (gross and net) debt to Target2 ($D^{CBI,T}\uparrow$). The sizes of the balance sheets of the Irish banks, the Rest of Ireland, and the CBI all increase ($A^{IB}\uparrow$, $A^{RI}\uparrow$, $A^{CBI}\uparrow$). Central bank credit to Irish banks has also increased, while the Irish monetary base (which is here equal to the deposits of Irish banks with the CBI) has remained unchanged ($D^{IB,CBI}\uparrow$, $M^I\equiv D_S^{CBI,IB}\rightarrow$).

If the tractor was second-hand, in Germany the capital stock falls ($K^G\downarrow$), while deposits of the Rest of Germany with German banks increase

($D^{GB,RG}\uparrow$).[8] Now German banks face a *choice*. Their first option is to take the increased deposits of the Rest of Germany and deposit them with the Bundesbank ($D_S^{BB,GB}\uparrow$). In that case, the German monetary base and the balance sheet of the Bundesbank would rise ($D_S^{BB,GB} = M^G\uparrow$, $A^{BB}\uparrow$), and as a result also the total monetary base in the Eurozone ($M^G\uparrow + M^I\to = M^E\uparrow$). The balance sheet of German banks would rise, while Bundesbank credit to German banks remains unchanged ($A^{GB}\uparrow$, $D^{GB,BB}\to$), despite the fact that the CBI's net Target2 liabilities have increased and the Bundesbank's Target2 net claims have risen.

The second option is instead for German banks, after receiving the deposits from the Rest of Germany, to decide, instead of depositing the funds with the Bundesbank, to reduce their loans from the Bundesbank ($D^{GB,BB}\downarrow$). In that case, the German and Eurozone monetary base would remain unchanged ($M^G\to + M^I\to = M^E\to$). The sizes of the balance sheets of German banks, the Bundesbank, and the Rest of Germany would also remain unchanged ($A^{GB}\to$, $A^{BB}\to$, $A^{RG}\to$). Bundesbank credit to German banks would fall ($D^{GB,BB}\downarrow$).

There is no a priori reason to suspect that the second option is any more or any less likely to be taken by German banks than the first option – it would depend, inter alia, on general funding conditions for banks, alternative investment opportunities, and the terms and conditions of central bank and private funding. It may be suspected that demand for central bank credit by German banks should not change as a result of the Irish transaction (e.g. because the fundamental determinants of such credit, including transactions demand driven by the general level of economic activity and payment habits), implying that ECB/BB credit to German banks falls, as implied by the second option. However, even in that case, it would not allow the conclusion that the increases in CBI Target2 net liabilities *caused* Bundesbank credit to German banks to fall. As the above discussion makes clear, if Bundesbank credit to German banks fell in such a scenario, it would be the result of a *choice* made by German banks. Whether the Target2 balance-increasing Irish transactions "crowded out" CB credit to German banks is then a matter of semantics, as the following example illustrates. Assume that you plan to buy a house and intend to borrow half of the funds from a bank. You then unexpectedly win the lottery, eliminating the need to borrow from the bank to buy the house. If the increase in Target2 debt of the CBI "crowded out" BB credit of German

banks, it would also be appropriate to say that the lottery winnings "crowded out" your borrowing from the bank.

4.2. Money supply targeting, limited tenders, and full allotment

At this point it is also useful to clarify the role that money supply targeting by the ECB would play in these scenarios and the ECB's actual approach to monetary policy under partial or full allotment.

First, assume that the ECB pursued strict monetary targeting, in fact fixing the Eurozone monetary base to be constant. From $M^E = M^G+M^I$, it is clear that if Eurozone monetary base and the monetary base in Ireland remain constant, the German monetary base will need to remain constant, too, consistent with the second option above, under which Bundesbank credit to German banks fell, but not with the first, under which it did not. In this scenario, ultimately German banks would have to reduce their use of Bundesbank credit ($D^{GB,BB}\downarrow$), and this reduction would no longer be the result of a choice by German domestic banks.

Second, let us return to reality. There is, as mentioned before, no convincing reason why total base money in the Eurozone, M^E, should remain constant when M^I remains constant or when the CBI's net liabilities to Target2 increase. Certainly, the ECB does not actually choose to control the overall amount of central bank money or credit and it never has, even though it could. Indeed no modern central bank has attempted to control base money. The main monetary instrument (leaving aside reserve requirements etc.) is, in principle, either the price of borrowing base money/bank reserves from the central bank by eligible deposit-taking institutions, or the quantity of base money (central bank overnight credit to the banks plus currency in circulation, the latter component omitted by us for simplicity). Modern central banks, including the ECB, set the price of central bank credit. In the case of the ECB, the official policy rate is the interest rate on the weekly main refinancing operations (MRO) or refi rate for short term money (currently 1.50%). The quantity of central bank credit is then endogenously determined, i.e. demand-determined by commercial banks.

4.2.1. Auctioning off limited tenders or "sterilisation" does not imply base money targeting

Auctioning off limited tenders is not a defining characteristic of (base) money stock targeting or setting central banks. From 28 June 2000 until 15 October 2008, this is what the ECB did – but in an interest-rate setting, demand-determined base money stock regime. The ECB is in fact keen

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8   If the tractor was new, that is, part of the current period's value added in Germany, the accounting treatment would not involve a decline in the capital stock of Germany, but no essential conclusion would be different.

to abandon its policy of full allotment (currently for one-week, one-month, and three-month maturities) and to return to its variable interest rate, limited tender auction practice. This would not change the essence of the monetary regime as an interest-rate setting regime, because the limited aggregate amount offered at the limited tender auction represents the ECB's best estimate of the amount of central bank credit demanded at the refi rate by eligible counterparties. This still leaves the German and the Irish stocks of central bank credit demand-determined, with just a little flutter caused by ECB forecast errors in its estimate of the aggregate central bank credit demand function.

Moreover, it is key to note that the ECB (and all other central banks) *always* operate an interest-rate setting rule, i.e. a "full allotment" system for overnight central bank credit (against high-grade collateral) for eligible counterparties, even when it operates through variable rate limited tender auctions for credit with a maturity longer than overnight, and not through full allotment auctions. The amount of central bank credit of longer maturity (one week or more) is limited or controlled by the ECB under a partial allotment regime, but the total is not. Under the current full-allotment regime, even the amount of central bank credit of longer (weekly) maturity is not set by the ECB.

Sterilisation (of foreign exchange reserve flows or of outright purchases of sovereign debt under the Securities Markets Programme or SMP) is also consistent with an interest rate setting, base money stock demand-determined regime. The ECB has been busy "sterilising" the effect on the stock of base money of its purchases of periphery sovereign debt under the SMP. Such actions are, of course, entirely cosmetic rather than substantive if the ECB sets the interest rate, as it does.

4.3. Base money and total credit to the German banking system

To a first order, it is total credit to the German or any other banking system that matters in the final analysis. The composition of funding of any banking system matters, too, but there is no a priori reason to suspect that central bank funding for commercial banks is preferable (from the point of view of the banks or the central bank) to other sources of funding.

Total credit to the, say, German banking system is not constrained by central bank credit of German banks. German banks also tap other sources of funding, notably domestic and foreign private sector (household, non-financial corporate and interbank) deposits, private debt and equity securities and a variety of other sources of funding.

A reduction in demand for central bank credit by German banks driven by an improvement in the terms or availability of other sources of funding would most likely be seen as a net positive for German banks – after all, the alternative of central bank funding is still there with the terms unchanged, so the change implies an expansion of the "feasible set" for German banks which is at least weakly welfare-improving.

The stock of credit from the Bundesbank to the German banking system is also not constrained to be of the same size as the German monetary base, even if we abstract from currency in circulation. The Bundesbank has non-monetary liabilities other than the gross liabilities to Target2. It also has non-monetary liabilities like term deposits (including the one-week term deposits often used for sterilisation exercises), that it can use to fund loans to the German banking sector.

Consider the case where, for whatever reason, the net credit position of the Bundesbank vis-a-vis Target2 increases ($D^{T,BB}$-$D^{BB,T}$ goes up) and the net credit position of the CBI goes down by the same amount ($D^{T,CBI}$-$D^{CBI,T}$ goes down). Assume that the German monetary base ($D_S^{BB,G}=M^G$) remains constant. Assume also that the net worth of Target2 and the net worth of the Bundesbank remain constant (W^T and W^{BB} don't change). It does not follow that Bundesbank credit to the German banks has to go down by the same amount as the increase in the Bundesbank's net credit position vis-a-vis Target2, or that it has to go down at all. The increase in $D^{T,BB}$-$D^{BB,T}$ could be partly, completely or more than fully offset by an increase in Bundesbank non-monetary liabilities ($D_L^{BB,GB}$).
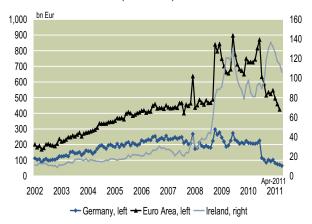
In summary, even ignoring currency in circulation, a constant German monetary base does not imply that Bundesbank credit to the German banking system must shrink whenever the net credit position of the Bundesbank vis-a-vis Target2 increases. The Bundesbank has other, non-monetary sources of funding. Furthermore, the Bundesbank is not the only source of funding for the German banking system. In both of the examples presented above, non-Bundesbank funding of German banks increases automatically to compensate for any reduction in Bundesbank credit to German banks. There is therefore no reason to suppose that the amount of credit *provided* by German banks should in any way be directly negatively affected by the increase in Target2 net debt of the CBI.

4.4. Central bank credit and the monetary base in the Germany, Ireland and the Eurozone

Figure 15 and Figure 16 depict the evolution of central bank credit and the monetary base in Germany, Ireland and the Eurozone. As Figure 15 shows, the stock of central bank credit to German banks has indeed fallen sharply recently, from a high of almost €300bn in October of 2008 to below €65bn for the last available data (April 2011). Eurosystem credit to Irish banks (even excluding Emergency Liquidity Assistance (ELA) provided by the CBI) has seen no such fall. Its levels reached a maximum of €136bn only in November 2010 and remain high at over €105bn in April 2011. Including ELA, the maximum was reached only in February 2011 at a level of €185bn and had fallen to €158bn by April 2011. The monetary base in Germany and in the Eurozone as a whole has remained relatively constant (and has even fallen somewhat recently) since the beginning of 2009, at levels of €250bn-€300bn for Germany and €1trn-€1.3trn for the Eurozone. While these data are consistent with the examples described before under which central bank credit for German banks fell, they do not constitute evidence that it was the increase in CBI credit to Irish banks that reduced Bundesbank credit to German banks, nor that the ECB fixed the monetary base at a certain level. Observationally equivalent but, in our view, more plausible alternative explanations exist.
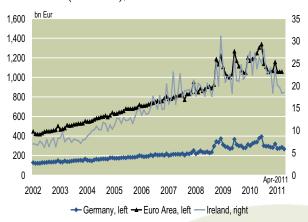
It is more likely that German banks *chose* to demand less Bundesbank credit after the autumn of 2008. After the expiration of the 12-month long-term refinancing operation (LTRO) in July 2010, such credit was a lot less attractive to banks, giving one good reason to reduce demand of commercial banks for Bundesbank/ECB credit.[9] Another reason for this relative unattractiveness of central bank credit could be that German commercial banks could by then access other sources of financing that were relatively more attractive, such as domestic or foreign private deposits. Figure 15 already contains some evidence in favour of such a hypothesis, as it shows that ECB lending to commercial banks in the Eurozone as a whole also declined sharply recently, from a high of just under €900bn in June 2009 to €424bn in March 2011. A scenario under which central bank credit for German banks and the German monetary base fell due to increases in Target2 financing of the CBI would nevertheless at most imply a constant, but not

a falling, total monetary base in the Eurozone.[10] Arguably, the fall in CB credit to German and Eurozone banks could be interpreted as reassuring rather than a cause for concern, as it may indicate an improved ability of German banks to attract private sector funding and acquire a more stable funding base.[11]

Figure 15. Germany and Ireland – central bank lending to banks (bn euros), 2002–2011

Note: Lending to Eurozone Credit Institutions in euro.
Source: Bundesbank, Central Bank of Ireland, Citi Investment Research and Analysis

Figure 16. Germany and Ireland – monetary base (bn euros), 2002–2011

Note: Sum of banknotes in circulation, current accounts and deposit facility balances of eligible credit institutions at the central bank. Coins are omitted.
Source: Bundesbank, Central Bank of Ireland, Citi Investment Research and Analysis

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9 Compared to market funding rates, the interest rate for the 12M LTRO were very attractive for (even healthy) Eurozone banks.

10 We recognise once again, however, that Figure 15 does not provide conclusive evidence against a Target2-based story for the fall in the German monetary base, if total ECB credit to Eurozone banks (and maybe German banks) fell for reasons unrelated to Irish credit or Target2 transactions between NCBs. Since the fall in total ECB lending is quantitatively so large in the data, it would only be natural to focus on those reasons unrelated to Target2 instead if central bank credit to domestic banks, say, in Germany were of particular concern.

11 An obvious alternative explanation for the reduction in central bank credit would be lack of eligible collateral by Eurozone deposit-taking institutions. However, we are not aware of evidence of a general shortage of such collateral in Germany or the Eurozone as a whole.

5. Do Bundesbank Target2 net claims reflect Bundesbank exposure to financial losses?

We have argued before that a more accurate picture of public debt sustainability for individual countries would be achieved by publishing data on gross and net debt (and also for gross and net non-monetary debt) for what we call the consolidated general government – the consolidation of the general government and the central bank.

How would such figures be computed? Take consolidated general government non-monetary gross debt: It should be computed as the sum of general government gross debt plus the non-monetary debt of the central bank minus any general government debt held (outright) by the central bank and any general government deposits with the central bank. Target2 net debt is indeed a non-monetary liability so that including it in computations of the consolidated general government debt would in fact be appropriate.

Calculations of the (non-monetary) consolidated general government net debt would deduct the consolidated financial assets of general government and central bank from the consolidated general government gross debt. Since a substantial portion of the liabilities of a typical central bank are monetary liabilities and capital, from first principles of accounting, the net debt of the consolidated general government would in general be lower than the net debt of the conventional general government debt, while consolidated general government gross debt is likely to be larger than conventional general government gross debt.[12] Only considering the latter would give a misleading and unduly negative picture of the sustainability of EAP sovereign debt.

The considerations of the previous paragraphs apply in principle for all central banks and sovereigns. In the case of the Eurozone, the ECB and the Eurosystem, there is an additional complication. In the case of Eurozone member states, NCB balance sheets, even taking the steps of consolidation outlined above, are not appropriate in order to estimate the exposure to risk and financial losses of the NCB and ultimately the sovereign. The reason is that in the Eurosystem profits and losses from most monetary policy operations are pooled and shared with the other Eurozone NCBs according to their respective ECB capital shares. These represent off-balance sheet contingent assets or liabilities, and are not included in any conventional presentation of the public sector (or the central bank's) accounts.

Figure 17.   ECB capital shares

NCB	Capital key (%)	Adjusted capital key (%)	Paid-up capital (€)
Nationale Bank van België Banque Nationale de Belgique	2.43	3.47	180,157,051.35
Deutsche Bundesbank	18.94	27.06	1,406,533,694.10
Eesti Pank	0.18	0.26	13,294,901.14
Central Bank of Ireland	1.11	1.59	82,495,232.91
Bank of Greece	1.96	2.81	145,939,392.39
Banco de España	8.30	11.87	616,764,575.51
Banque de France	14.22	20.32	1,056,253,899.48
Banca d'Italia	12.50	17.86	928,162,354.81
Central Bank of Cyprus	0.14	0.20	10,167,999.81
Banque centrale du Luxembourg	0.17	0.25	12,975,526.42
Central Bank of Malta	0.06	0.09	4,694,065.65
De Nederlandsche Bank	3.99	5.70	296,216,339.12
Oesterreichische Nationalbank	1.94	2.78	144,216,254.37
Banco de Portugal	1.75	2.50	130,007,792.98
Banka Slovenije	0.33	0.47	24,421,025.10
Národná banka Slovenska	0.69	0.99	51,501,030.43
Suomen Pankki - Finlands Bank	1.25	1.79	93,131,153.81
Total	**69.97**	**100.00**	**5,196,932,289.36**

Note: Adjusted capital key adjusts for the capital of shareholders of the ECB which are not currently part of the Eurozone. With effect from 29 December 2010, the ECB increased its subscribed capital by €5bn, from €5.76 billion to €10.76 billion. The Eurozone NCBs paid their first instalment of their additional capital contributions on 29 December 2010 and the remaining two instalments will be paid at the end of 2011 and 2012, respectively.
Source: ECB, Citi Investment Research and Analysis

The exposure to risk and possible losses of, say, the Bundesbank, as of any NCB, is thus given by the total exposure of the Eurosystem and the share of the Bundesbank in the ECB's capital, currently just over 27% (see Figure 17). The balance sheet exposure is limited to the size of the Eurosystem balance sheet, which stood at €1.9 trillion on 27 May 2011. Against that exposure, the ECB holds capital.[13] The Bundesbank, as shareholder of the ECB, thus shares in the pooled profits or losses made by the entire Eurosystem (as long as these profits or losses were incurred as part of the normal monetary, liquidity, and credit operations of the ECB). Its exposure to losses therefore bears no relationship to the net credit position of the

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12 This statement strictly only follows if we assume that general government debt held by the NCB and general government deposits with the NCB are small.

13 Total capital and reserves for the Eurosystem are just over €81bn. There is also, however, just under €306bn in the Revaluation Accounts, and this too should be loss-absorbing. In addition to the on-balance sheet exposure there are off-balance sheet exposures, such as swap lines with other central banks or lines of credit.

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Bundesbank vis-a-vis Target2, and only moderate relation to the size of its own balance sheet. Target2 balances are remunerated at the refi rate, but as any resulting profits are shared within the Eurosystem (using the same key as for the distribution of Eurosystem losses), it is to a first order irrelevant also for the financial surplus of the Bundesbank whether it had positive Target2 net claims or negative ones.

Similar considerations apply to the NCBs of the Eurozone periphery, including Ireland, Portugal, and Greece. For these countries, too, the exposure of the sovereign to risk and potential losses from monetary policy operations is given by their respective adjusted ECB capital shares and the total exposure of the Eurosystem. The one important qualification is that only losses or profits made through NCBs' ordinary monetary policy operations are shared and pooled with the other NCBs. Emergency Liquidity Assistance (ELA) facilities are excluded. Losses resulting from these facilities will be for the book of the respective NCB only (and its sovereign, as these facilities are customarily granted by an NCB under full and explicit guarantees/indemnities by the respective sovereign). In our view, the "fair value" of the ELA exposure of the sovereign, through the sovereign's guarantee or indemnity for the ELA assets, viewed as a contingent claim and priced accordingly, should be included even in the conventional measure of general government debt of the respective sovereign. In addition, the assets (collateralised loans) acquired by an NCB as a result of ELA operations should be valued at fair value. Despite haircuts on the collateral, over-collateralisation, and margin calls when either the borrowing bank's creditworthiness deteriorates or the fair value of the collateral declines, it is certainly plausible that the fair value of the CBI's ELA assets is less than their notional value. They should be marked down accordingly.

6. Does the US settlement system prevent sustained intra-currency union discrepancies in credit flows?

Another prominent currency union is that of the United States of America. Disregarding the many other institutional differences that exist between the Eurozone and the US, we would like to highlight the relevance of differences in central bank settlement arrangements in the US and the Eurozone.

At the close of business each day, all Federal Reserve Banks and branches in the US assemble the payments due to or from other Reserve Banks and branches as a result of transactions involving accounts residing in other Districts that occurred during the day's operations. Such transactions may include funds settlement, cheque clearing, and automated clearinghouse ("ACH") operations, and allocations of shared expenses. The cumulative net amount due to or from other Reserve Banks is reported as the "Interdistrict settlement account". The Interdistrict Settlement Account must be settled once a year with gold-backed securities or Federal Treasury Bills.

However, as noted by Alea (2011), the so-called annual settlement requirement is solely a bookkeeping transaction that rebalances the monetary base in each Federal Reserve District once a year according to the share of each District Reserve Bank's capital and surplus in that of the Federal Reserve System at the preceding year-end. Furthermore, the settlement equalises the ratio of holdings of gold certificates holdings to Federal Reserve notes outstanding in each District. The Annual Report 2009 of the Federal Reserve System notes:

> "Activity related to securities purchased under agreements to resell, securities sold under agreements to repurchase, and securities lending is allocated to each of the Reserve Banks on a percentage basis derived from an annual settlement of the interdistrict settlement account that occurs in April each year. The settlement also equalises Reserve Bank gold certificate holdings to Federal Reserve notes outstanding in each District." (Federal Reserve System, 2010).

The Interdistrict Settlement Account settlement conventions thus do not prevent open-ended and uncapped interdistrict base money flows and net interdistrict credit flows between the twelve Federal Reserve Districts. It is reassuring that this is so, as a strict implementation of the settlement procedures as suggested by some commentators would be inconsistent with the existence and survival of a currency union, as noted by Bindseil and Koenig (2011).

7. Conclusions and the quasi-fiscal subsidies of the ECB

The fates of sovereign and the banking systems in many Eurozone member countries, and in the Eurozone as a whole, are strongly intertwined as the first the financial crisis and soon after the Eurozone sovereign debt crisis has shown. In many member states, difficulties originate from more than one direction. Debt levels of the sovereign are unsustainable in a number of Eurozone countries, in our view. Funding conditions are difficult for an even larger set of countries.

Banking systems both in the periphery and in the core are in need of concerted recapitalisation and restructuring of unsecured, non-guaranteed debt. In addition, many countries face problems of external competitiveness, the resolution of which will be a major – some say necessary – boost to the growth prospects of these economies. Despite – or due to – the abundance of problems, it is important to be careful in presenting and interpreting the facts in an objective way. In that respect, it is important to highlight that Target2 net balances of NCBs:

- cannot be automatically linked to current-account deficits in those countries

- do not automatically reduce central bank credit to commercial banks in other member states (and any reduction of central bank credit should not be interpreted negatively, as implying reduced funding for banks and their customers)

- should not be interpreted as a measure of the risk exposures of the NCBs of Target2 creditor countries

- cannot be directly capped without putting into question the basic functioning of the Eurozone currency union

This does not mean that the increase in Target2 net debt of particular countries cannot, under certain conditions, be suggestive of serious problems. In particular, these imbalances may be – and currently likely are – a symptom of the difficulty of banking systems in a number of Eurozone periphery countries have in funding themselves in the markets without public support. They should therefore primarily be understood as a call to action for policymakers to put the banking systems in the Eurozone periphery and core on a sound footing – a goal that continues to elude them even after almost four years since the onset of the financial crisis.

The reliance of the Eurozone periphery banking systems on central bank funding also raises potential questions about the terms and appropriateness of the funding provided by the NCBs and the Eurosystem. In particular, it is plausible that much of this funding is associated with quasi-fiscal subsidies. To some extent these quasi-fiscal subsidies may be unavoidable in periods of acute crisis if explicitly fiscal support facilities are either too slow or too small to respond properly. More likely, the explicitly fiscal support facilities like the Greek Loan Facility, the EFSF, and the EFSM have been kept small deliberately by politicians in order to force the ECB into the position of being the only agency capable of preventing multiple disorderly sovereign defaults, some of them probably fundamentally unwarranted, and the inevitably associated banking crisis and wider financial crisis. The result is an ECB/Eurosystem heavily exposed to sovereign credit risk, through its outright holdings under the SMP of €74bn worth of debt issued by sovereigns that are likely to default and its much larger exposure through collateral issued by or guaranteed by sovereigns that are likely to default, for loans to institutions that are themselves likely to fail should the sovereign default.

Even though both the exposure of the explicitly fiscal Eurozone and EU facilities and the exposure of the quasi-fiscal ECB/Eurosystem involve tax payers' money, the former do so transparently and the latter opaquely. This outcome may well be desired by policymakers wishing to hide the true scale of the problems in the banking sector and keen to reduce the need for the public purse to be opened in a transparent way. They do, however, highlight a huge lack of transparency that exists as regards the terms and conditions of portfolio investment and lending decisions of the ECB, including composition of its outright holdings of securities and of the collateral it holds, the prices at which it buys and sells securities held outright, the valuation of collateral, and the models used to price illiquid securities. This lack of transparency is further aggravated by a lack of consistency and diminished credibility created by the ECB's waiver of the minimum rating thresholds for the sovereign debt for Greece, Ireland, and Portugal, and the lack of clarity about the rules governing the operation of ELAs. These are real and substantial issues that merit thoughtful discussion.

References

Alea (2011), "Professor Sinn and the interdistrict settlement account [wonkish]", aleablog.com.

Bindseil, U and PJ König (2011), "The economics of TARGET2 balances", SFB 649 Discussion Paper 2011-035.

Buiter, WH, E Rahbari, and J Michels (2011a), "TARGETing the wrong villain: Target2 and intra-Eurosystem imbalances in credit flows", Citi Global Economics View, 9 June.

Buiter, WH, E Rahbari, and J Michels (2011b), "TARGETing the wrong villain: a reply", Citi Global Economics View, 5 July.

Federal Reserve System (2010), "Federal Reserve Banks Combined Financial Statements", Annual Report 2009.

CEPR POLICY INSIGHT No.57

Garber, PM (1989), "Notes on the Role of Target in a Stage III Crisis", NBER Working Paper 6619, June 1989.

Garber, PM (2010), "The Mechanics of Intra Euro Capital Flight", Deutsche Bank, *Economics Special Report*, 10 December.

Sinn, H W (2011a), "Tickende Zeitbombe", Süddeutsche Zeitung, No. 77, 2 April.

Sinn, H W (2011b), "Neue Abgründe", Wirtschaftswoche, No. 8, 21 February.

Sinn, H W (2011c), "The ECB's Secret Bailout Strategy", *Project Syndicate*, April.

Sinn, H W (2011d), "Deep Chasms", *ifo Viewpoint* No. 122, 29 March.

Sinn, H-W (2011e), "The ECB's stealth bailout", VoxEU.org, 1 June.

Sinn, H-W and T Wollmershäuser(2011), "Target Loans, Current Account Balances and the ECB's Rescue Facility", CESIfo Working Paper No. 3500

Storbeck, O (2011a), "Traktoren, Targetsalden, Trugschlüsse – HWS hat sichverrannt", *Handelsblatt Blog*, 3 June.

Storbeck, O (2011b), "The stealth bailout that doesn't exist: debunking Hans-Werner Sinn", olafstorbeck.com, 6 June.

Whelan, K (2011), "Professor Sinn Misses the Target", *IIEA Blog*.

Wittaker, J (2011), "Intra-eurosystem debts", Lancaster University Management School Working Paper.

Wolf, M (2011), "Intolerable choices for the eurozone", *Financial Times*, 31 May.

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