

TARGET2 and the European Sovereign Debt Crisis

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I. Introduction

The TARGET2 (T2) positions on the balance sheets of several euro-area national central banks increased considerably since the beginning of the European sovereign debt crisis in 2009. This unprecedented increase attracts more and more the attention of professional economists and the public media. Yet, despite the large amount of available information on this issue, neither has a consensus on the “correct” interpretation of T2 balances been reached, nor is there any agreement with respect to the possible ramifications of cross-country imbalances in T2 accounts and to the adequate policies that can be used to address their growth.

Why is T2 such a controversial issue, why is it “complicated”?¹

Firstly, T2 positions are particular central bank balance sheet items and their development can be best understood when the respective off-setting positions are also taken into account. This necessarily requires a precise financial account representation of the economy. So far, most writings about the topic lack such a representation.² This has caused some misleading conclusions, as for example the proposition that T2 claims constitute an autonomous monetary policy measure.³ Secondly,

* The views expressed in this article are those of the authors and do not reflect official views of the European Central Bank. The article is based on an earlier CRC 649 working paper entitled “The Economics of TARGET2”. We would like to thank Kartik Anand, Ansgar Belke, Benoit Coeuré, Philippine Cour-Thiman, Ioannis Efthymiadis, Frank Heinemann, William Lelieveldt, Alexander Lipponer, Alexander Meyer-Gohde and Hans-Werner Sinn for helpful comments and suggestions on this paper or on the earlier working paper version. We also thank Marco Corsi and Miles Rimasch for research assistance. All remaining errors are, of course, our own. Support from Deutsche Forschungsgemeinschaft through CRC 649 “Economic Risk” is gratefully acknowledged.

¹ *Credit Suisse* (2011), p. 2.

² Exceptions are *Buiter et al.* (2011), *Goldman Sachs* (2011), *Garber* (2010) or the working paper version of this paper, *Bindseil/Koenig* (2011).

some commentators are confusing cause and effect. We will stress throughout this article that recent developments in T2 positions are an *effect* of adverse developments in money and capital markets and respective counteracting monetary policy measures. Thirdly, the role of T2 as a constituting element of the monetary union has often been underestimated, in particular, when proposals of whether and how to limit the size of T2 positions were discussed.⁴ Fourthly, T2 claims have been perceived as constituting financial risks on their own. Articles in the public media, especially in Germany, warned about the resulting costs to the (German) taxpayer, thereby triggering resentment rather than helping to understand the determinants of T2 balances.⁵

This article fills a gap in the existing literature. Firstly, in section IV we provide a financial account representation, similar in style and spirit to *Stützel* (1958), *Gurley/Shaw* (1960) or *Bindseil/Jablecki* (2011), which allows to understand the mechanics behind T2 developments. Secondly, we discuss the relation between T2 balances and enhanced monetary policy support and we explain how the latter determines the evolution of T2 positions (sections V and VI). Thirdly, we discuss the trade-off between risk-taking and enhanced liquidity support by the central bank and how this relates to the financial risk implications of T2 positions in section VI. Fourthly, we explain the relationship between T2 positions and the monetary base (section VII) as well as the implications of euro area – internal current account imbalances for T2 imbalances (section VIII). Finally, we discuss possible measures that can be used to address T2 imbalances (section IX). The following section II shortly introduces the institutional nature of T2 and its importance for the monetary union, while section III provides an overview of the current controversy.

II. The TARGET2 System

1. Institutional Aspects of T2

As enshrined in Article 105(2) of the Treaty establishing the European Community and Article 3 of the Statute of the European System of Cen-

³ E.g. *Sinn* (2011b). Even worse, some commentators have referred to T2 positions as being similar to a fiscal measure. The subsequent discussion in this paper will hopefully clarify that such beliefs are completely misguided.

⁴ The most prominent proposal of putting upper bounds on T2 liabilities can be found in *Sinn/Wollmershäuser* (2011). It will be discussed further in section IX below.

⁵ See e.g. *Sinn* (2011d).

tral Banks and of the European Central Bank, the Eurosystem is charged with the task of providing, guaranteeing and overseeing the operation of payment and settlement systems in the euro area. A smooth operation of payment and settlement systems is key for the success of the monetary union because an efficient and well-functioning payment system is (a) essential for maintaining the stability of the financial system, (b) needed to preserve the confidence in the common currency, (c) a necessary condition for the implementation of the single monetary policy.⁶ Therefore the Eurosystem has been assigned the dual role of regulator and service provider for payment services in the euro area. The first generation of the Eurosystem's own payment system TARGET was put into operation in 1999. It was replaced in November 2007 by its successor system T2. Initially, TARGET was a decentralized payment system that provided the link between the RTGSs of national central banks (NCBs) and the ECB's payment mechanism. While TARGET contributed to the integration of intra-European money markets, its decentralized nature had several shortcomings, in particular with respect to cost efficiency and technical maintenance. The successor T2 was designed to overcome these shortcomings. It is based on a single technical platform. The rules for participation as well as the transaction cost structure are to a large extent harmonized between the members of the European system of central banks.

T2 provides payment and settlement services for its participants without imposing any upper bound on the amounts that can be processed during the day. Except for payments related to Eurosystem monetary policy operations and for the settlement of positions in large-value net settlement systems that effectively operate in euro, market participants are free to make use of other payment and settlement systems and arrangements.⁷ Intra-day credit created by T2 transactions needs to be collateralized. The set of eligible collateral is the same as for Eurosystem liquidity-providing monetary policy operations (i. e. reverse transactions and recourse to the marginal lending facility).⁸

⁶ Cf. *Bank for International Settlements* (2003).

⁷ A detailed account of the development of the TARGET and T2 systems are provided in *European Central Bank* (2009). More detailed explanations of the functioning of the European payment mechanisms are given in *Kokkola* (2010).

⁸ See *European Central Bank* (2011), ch. 6, for a description of the collateral framework of the Eurosystem.

2. The Importance of T2 for the Monetary Union

The introduction of the euro as a common currency in 1999 implied that cross-border payments within the monetary union were from then on treated as payment flows within the borders of a single country. This constituted a crucial difference between the monetary union and the previously prevailing system of pegged exchange rates. The maintenance and stability of the latter depended (partly) on the participating central banks' disposal over a sufficiently large stock of international reserves. By definition, the former implies that all transactions undertaken within the currency area and denominated in the single currency are considered as *domestic* transactions.⁹ Hence, to successfully establish the single currency, the reserves of banks with the central bank had to become fully fungible, such that deposits in one country of the currency area could be "exchanged" at the lowest possible cost against such deposits in another member country. Furthermore, the ability of agents to undertake intra-union cross-border transactions and payments then depends only on the available stock of central bank eligible collateral in the hands of the private sector (not on the central bank's stock of international reserves). This crucial difference becomes all the more important in times of crises. Under a fixed exchange rate regime, the inability of the central bank to process cross-border payments, due to a depleted stock of reserves, enforces the break-up of the regime. This is perilous as it exposes a country's monetary and exchange rate regime to speculative attacks and sudden reversals of capital flows. This is different in a monetary union. Even though banks may default if they run out of collateral, the central bank cannot run out of reserves and speculation against a country exiting the monetary union would therefore be much more difficult, if not impossible. In the euro area, as *Garber* points out, the TARGET mechanism constitutes the Eurosystem's particular operational tool that "irrevocably unifies the former national currencies (...) whose exchange rates are merely fixed at par into a single currency".¹⁰ Put differently, the TARGET2 system is the backbone of the operational side of the currency union. Curtailing its functioning or even switching it off would clearly forfeit the stability of the monetary union.

⁹ *Kokkola* (2010).

¹⁰ *Garber* (2010), p. 2.

III. A Short Summary of the T2 Debate

1. Two Stylized Facts

The debate about T2 is centered around two empirical observations. Firstly, in the course of the recent crisis, large T2 imbalances were built up on the balance sheets of NCBs in the euro area. In particular, the current crisis countries (CCCs)¹¹ have all become T2 debtors and currently only four euro area countries record net T2 claims. Figure 1 compares net T2 positions of euro area countries during the second quarter of 2007 (last pre-crisis quarter) and the third quarter of 2011. Noticeably, combined T2 liabilities in CCCs increased by more than 520 bn, while the German Bundesbank, currently the largest T2 creditor, recorded an increase of around 430 bn.

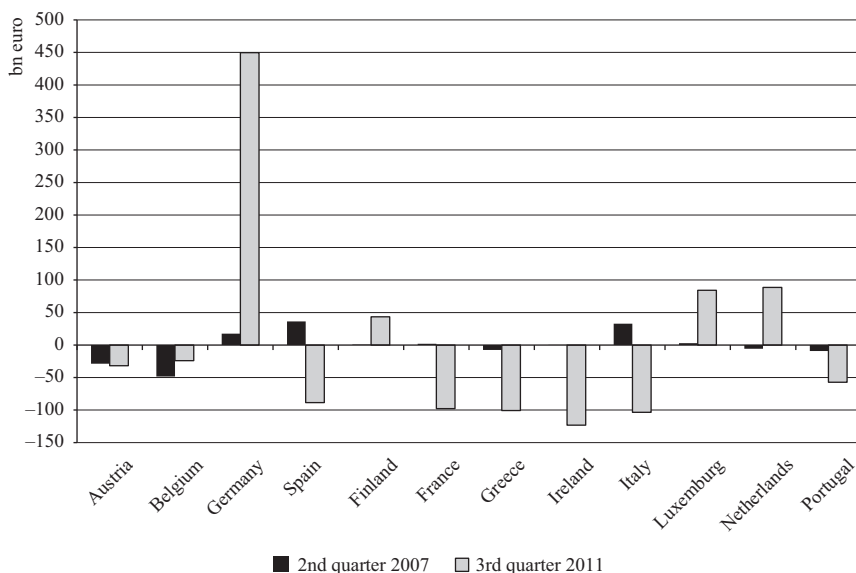


Figure 1: Snapshots of T2 Positions

Secondly, the distribution of Eurosystem credit among euro area countries became, in the course of the crisis, more concentrated towards banks in CCCs which currently obtain a disproportionately large fraction

¹¹ In the remainder of the paper we will use the abbreviation CCCs for Greece, Italy, Spain, Portugal and Ireland.

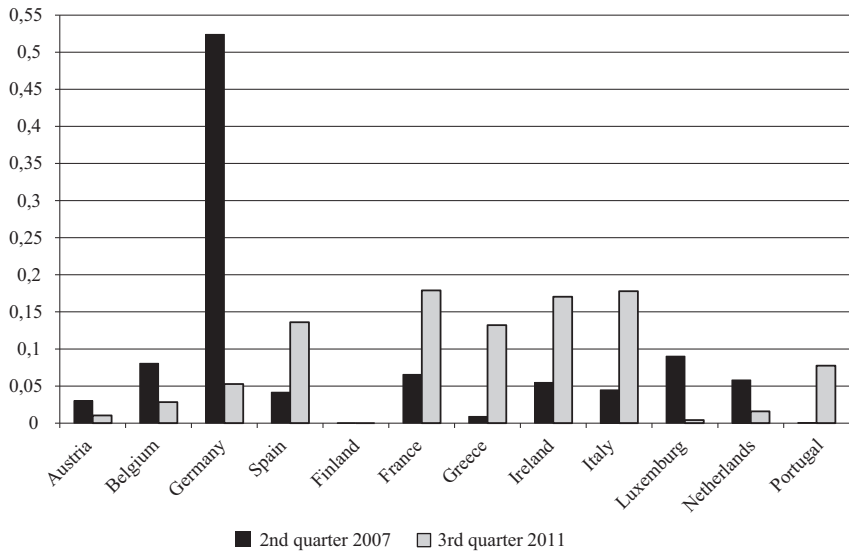


Figure 2: Snapshots of Participation in Refinancing Operations

of refinancing credit (around 70 %). On the other hand, German banks, traditionally the largest borrowers in refinancing operations, now take out only a meager 5.3 %. Figure 2 provides a stylized representation of this phenomenon, again comparing the last pre-crisis quarter with the third quarter of 2011.

These two phenomena lie at the heart of the current debate about T2 and they constitute the two sides of one and the same coin: A reversal of capital inflows to CCCs and the segmentation of euro area interbank markets along national borders resulted in large funding gaps in the balance sheets of banks in CCCs. These are temporarily closed by a larger recourse to central bank refinancing operations in order to avoid fire-sales of illiquid assets and an overly costly shortening of banks' balance sheets. Capital flows in turn are directed towards euro area countries perceived as safe havens. This leads to the build-up of imbalanced T2 positions in NCBs' balance sheets. Moreover, the change in the direction of capital and funding flows raises the amount of central bank money in the reserve accounts of banks in safe haven countries which allows them to cover their liquidity needs with less borrowing from the Eurosystem. Taken together, continuing funding outflows, increasing central bank funding to substitute for the loss of private financing and the segmenta-

tion of interbank markets along national borders are the key factors behind the evolution of T2 balances and Eurosystem refinancing credit. Clearly, countries that have run large current account deficits prior to the crisis were more vulnerable to a sudden stop of capital flows (and to a crisis in general) and one therefore observes that euro area current account deficit countries are often also T2 debtor countries.

2. Previous Discussion

Garber (1999) has already argued that T2's predecessor TARGET could have fueled a speculative attack on weak currency countries during stage III of the European Monetary Union when legacy currencies were still in circulation but interbank payments were already denominated in euro. *Garber* (2010) discusses the mechanics of an intra-euro area capital flight and explains how the structure of T2 claims and liabilities would change if a euro area member became subject to a capital outflow. *Whittaker* (2011) compiles the figures of intra-Eurosystem claims of Germany, Luxemburg, Netherlands, Finland, and Italy vis-à-vis the remaining euro area countries. Furthermore, he writes that intra-Eurosystem credit to Ireland (via the Central Bank of Ireland) is more than twice the amount that he believes has been paid under so-called emergency liquidity assistance (ELA). *Garber* (2010) and *Whittaker* (2011) confined their analyses to a positive discussion of the mechanics of T2 and a presentation of available statistics. Moreover, their papers did not receive much attention from the non-academic public. *Sinn* (2011a) made T2 known to a larger non-academic audience and drew some provocative conclusions. *Sinn* (2011a, 2011b, 2011c) and *Sinn/Wollmershäuser* (2011) essentially conclude that the operation of T2 would eventually undermine the sustainability of the Eurosystem's single monetary policy. Moreover, they view the above reported reduction in T2 creditor countries' participation in Eurosystem refinancing operations as a "crowding out" of inside money which the ECB cannot continue indefinitely. Therefore and to limit the potential cost to the German taxpayer, they propose the introduction of limits on T2 liability positions. These conclusions and their restatement in the public press have triggered a large public debate between economists, journalists and financial market participants. While e.g. *Whelan* (2011), *Buiter et al.* (2011), *Lipponer/Ulbrich* (2011), *Jobst* (2011) or *Bindseil et al.* (2011) to a large extent disagree with the analysis and conclusions of *Sinn/Wollmershäuser*, the majority of authors in *Sinn* (2012) tend to agree.

IV. Stylized System of Financial Accounts

In this section we introduce a stylized system of financial accounts of a closed economy. The economy consists of a household and a firm sector, as well as a banking sector and a central bank. This stylized accounting framework serves as the workhorse for the remainder of the paper. It is well-suited to capture the mechanics of intra-system funding flows and the role of the central bank in providing liquidity to the banking sector. We further believe that such a framework is the best way to understand the nature and origins of T2 balances, which are determined *automatically* from the evolution of net payment flows between different euro area countries. We derive the system of financial accounts by making several assumptions about the initial endowments of the respective sectors and about the way in which the respective sectors transact with each other. Firstly, the household sector is initially endowed with real assets whose nominal value is E . The firm sector does not have an initial endowment but possesses the ability of employing real assets for productive purposes. Secondly, the central bank has the monopoly right to issue legal tender and accepts only banks as counterparties in its credit operations.

The firms borrow banknotes of amount B from the banks in order to purchase real assets from the households. The banking sector borrows the banknotes from the central bank. Households are willing to sell real assets because they demand banknotes for reasons such as payment purposes or portfolio diversification. For similar reasons, households hold deposits of amount D with the banks. This releases further real assets which the firm sector can employ for productive purposes. Furthermore, the central bank not only provides credit to the banks but also conducts outright purchases of securities. To avoid the introduction of a fiscal sector, we assume for simplicity that central bank outright holdings are claims against firms in the form of firm bonds of amount Z . This direct financing of the firms by the central bank reduces the firms' need to finance through the bank and the need of the banks to finance through the central bank. Thus, the amount of banknotes in circulation (determined jointly by household preferences and by the firms' demand for real assets) and the decision of the central bank how much assets to hold outright determine mechanically the *liquidity position of the banking sector vis-à-vis the central bank*. The liquidity position of the banking sector is defined as the net sum of all monetary policy operations (netted on the

asset side of the central bank's balance sheet). We say that the banking system is in liquidity deficit whenever this sum is positive, else it is in liquidity surplus.¹² In the present framework, the liquidity position is given by $B - Z > 0$ and the banking sector is in liquidity deficit.

The financial accounts of the three sectors and the central bank are depicted below. The upper left panel shows the household sector's aggregated accounts. The household sector has equity of amount E . It holds only $E - B - D$ of its initial endowment in the form of real assets. Amount B is held in the form of banknotes and amount D in deposits. The next panel shows the firm sector. Firms have purchased real assets $B + D$, financed partly through a credit from the banking sector (amount $B + D - Z$) and partly by selling firm bonds of amount Z to the central bank. The lower left panel shows the banking sector. It has a claim of $B + D - Z$ against the firm sector which is matched by credit from the central bank ($B - Z$) and by household deposits D . The lower right panel shows the central bank. On the liability side it has banknotes in circulation of amount B . This is matched on the asset side by credit operations to banks of amount $B - Z$ and by outright holdings of firm securities of amount Z . This completes the description of the basic framework of financial accounts of the economy.

| <i>Household</i> | | | | <i>Firm</i> | | | |
|------------------|-------------|-------------|-----|-------------|---------|-------------|-------------|
| Assets | | Liabilities | | Assets | | Liabilities | |
| real assets | $E - B - D$ | equity | E | real assets | $B + D$ | to bank | $B + D - Z$ |
| banknotes | B | | | | | to CB | Z |
| deposits | D | | | | | | |

| <i>Bank</i> | | | | <i>Central Bank</i> | | | |
|-------------|-------------|-------------|---------|---------------------|---------|-------------|-----|
| Assets | | Liabilities | | Assets | | Liabilities | |
| credit | $B + D - Z$ | deposits | D | credit bank | $B - Z$ | banknotes | B |
| | | CB credit | $B - Z$ | outright | Z | | |

¹² Bindseil (2004), p. 49.

V. Bank Funding Flows and Central Bank Intermediation

1. *The Case of a Closed Economy*

In order to understand how funding flows between different banks affect the financial accounts of individual banks and the central bank, we further split the banking sector into two ex-ante identical banks. Each bank has claims of $(B - Z + D)/2$ against the firm sector, central bank credit (liabilities to the central bank) of $(B - Z)/2$ and liabilities of $D/2$ to the household sector.¹³

We are now considering the effect of a deposit shift between the two banks. Such a deposit shift can occur for a variety of reasons. For example, a household, let's say, a depositor of bank 1, may sell goods to a household who is customer of bank 2. Accounting-wise, such a transaction constitutes an asset swap for both households, thereby leaving the aggregated balance sheet of the household sector unchanged. If the buyer transfers the purchase price via his bank, deposits of bank 2 decrease while deposits at bank 1 increase. Another example would be a mere reallocation of deposits, a transaction without a real leg. A depositor of bank 2 may open a new account at bank 1 and transfers deposits from bank 2 to his new account at bank 1. During every business day, a myriad of such transactions occurs, usually leading to deposit flows in both directions. Yet, as deposit inflows and outflows of a single bank hardly match, it is important to consider the effects of a net outflow of one bank, tantamount to a net inflow to the other bank. In particular, in times of financial sector and banking stress, individual banks can suddenly lose depositor and investor confidence and may be subject to bank runs and wholesale run-offs. Such runs on individual banks are usually associated with large net deposit shifts in one direction. In what follows, we consider such a net deposit shift of amount μ and we assume that it leads to a reduction of bank 2's deposits (i. e. an increase of deposits at bank 1). Total deposits of bank 2 are then given by $D/2 - \mu$, whilst

¹³ From the perspective of the following analysis of financial flows, other forms of bank liabilities, i. e. debt instruments such as commercial paper, certificates of deposits, bank bonds, covered bonds etc., can be considered equivalent to household deposits. Although different forms of banks liabilities may have different characteristics in terms of stability or potential evaporation, this is not of particular relevance here since the framework was restricted to a single period. Hence, when the following refers to "deposits of households" or "deposit shift shocks", this should be understood to encompass any form of investment into bank debt instruments by households and other investors.

those of bank 1 increase to $D/2 + \mu$. Assume that bank 2 tries to avoid a shortening of its balance sheet. Initially, it will possibly try to close the resulting funding gap by borrowing μ from bank 1 on the interbank market. But whenever bank 2 has also lost access to the interbank market (for reasons similar to those that led to the deposit run), it has to take recourse to the central bank in order to extend its central bank credit to $(B - Z)/2 + \mu$. Regular credit from the central bank requires sufficient eligible assets that can be pledged as collateral. Hence, the ability of bank 2 to withstand shocks by closing the resulting funding gap through central bank credit depends on its *funding liquidity buffer*. For the present purposes, it is sufficient to define the funding liquidity buffer as the maximum amount of deposit withdrawals that the bank can absorb (within a given time horizon) before it sells off firm loans and shrinks its balance sheet.¹⁴ Bank 2's funding liquidity buffer essentially depends on the eligibility of firm loans for central bank operations and on the haircut imposed on firm loans by the central bank.¹⁵ Denote the haircut by $\psi \in (0, 1)$. The maximum amount that bank 2 can then refinance with the central bank is given by $(1 - \psi)(B + D - Z)/2$. Without selling off firm loans, the bank can withstand at most deposit outflows of amount¹⁶

$$\mu \leq \mu^* = -\psi \left(\frac{B - Z}{2} \right) + \frac{(1 - \psi)D}{2}.$$

If the bank exhausts its funding liquidity buffer it can ask the central bank for emergency liquidity assistance (ELA).¹⁷ If it approves the request for ELA, the central bank provides funding against non-eligible collateral (i. e. the entirety of the remaining assets of the banks can be

¹⁴ Alternatively, one could define funding liquidity buffers as the probability that banks do not need to fire-sell assets within a given time horizon.

¹⁵ In practice, not all central banks accept firm loans as collateral, and those who do, as for example the Eurosystem, impose relatively large haircuts on such loans. Note that the limitation of bank assets to firm loans in this framework comes without loss of generality because the restriction of bank assets to firm loans was only a matter of simplicity. The framework could easily be extended by adding further asset classes.

¹⁶ μ^* is calculated as follows

$$(1 - \psi) \left(\frac{B + D - Z}{2} \right) \geq \frac{B - Z}{2} + \mu \Leftrightarrow \mu \leq \mu^* \equiv -\psi \left(\frac{B - Z}{2} \right) + \frac{(1 - \psi)D}{2}.$$

¹⁷ ELA provision in the euro area is within the discretion of the NCB of the euro area member where the respective financial institution is located. Access to ELA is not automatized (like the access to standing facilities), but has to be assessed and approved by the respective NCB and the decision making bodies of the ECB, see *European Central Bank* (2007), p. 80.

pledged). Alternatively, if no assets to be pledged are left, the central bank could demand a government guarantee in order to be protected against potential default risk. If the request for ELA is declined, the bank may close the funding gaps through asset (fire) sales, thereby possibly exerting downward pressure on prices and creating an asset fire sale spiral. If revenues from asset sales were not sufficient, the bank would default (due to illiquidity) and its entire assets would be seized by its creditors (which would probably incur losses).

Returning to our example, we assume that bank 2 has lost access to the interbank market but it is able to substitute deposit outflows by additional credit from the central bank (be it through normal credit operations or ELA). This situation is depicted in the panels below. While the asset side of bank 2's balance sheet remains unchanged, on its liability side deposits are reduced to $D/2 - \mu$ and its central bank credit is expanded to $(B - Z)/2 + \mu$. Bank 1 in contrast has experienced a liquidity inflow and is now overly liquid. Whenever $\mu > (B - Z)/2$, the bank has liquidity in excess of its needs. Since the interbank market has broken down, it will deposit the excess liquidity with the central bank, which is reflected on the asset side of its balance sheet by an increase in central bank reserves of amount $\mu - (B - Z)/2$. As a consequence, the central bank's balance sheet expands by $\mu - B/2$. Given the collapsed interbank market, the central bank assumes the role of an *interbank market maker* and intermediates the banking system: On the one hand it extends liquidity support to the bank suffering from a funding outflow thereby substituting for the supply side of the interbank market. On the other hand, it provides additional absorbing facilities (in practice often automated) that substitute for the market's borrower side. The use of such facilities comes usually at the cost of a lower remuneration. A bank will thus rely on these facilities only if interbank counterparties are perceived as rather credit risky, or if a systemic liquidity crisis caused a general hoarding of liquidity.¹⁸

¹⁸ The central bank may wish to actively absorb the excess reserves that the liquidity-rich banks hold with the central bank by means of debt certificates, fixed term deposits, or liquidity absorbing repo operations. Accounting-wise, this would correspond to a liability swap and would not reduce the size of its balance sheet. Rather, such operations would reduce downward pressure from interest rates in the still functioning segments of the interbank market. Moreover, such absorbing operations would neutralize any effects of central bank intermediation on the monetary base.

| <i>Bank 1</i> | | | <i>Bank 2</i> | |
|---------------|-------------------|-------------|-----------------|-------------------|
| | Assets | Liabilities | Assets | Liabilities |
| credit corp. | $(B + D - Z)/2$ | - | $(B + D - Z)/2$ | - |
| CB reserves | $\mu - (B - Z)/2$ | - | 0 | - |
| deposits | - | $D/2 + \mu$ | - | $D/2 - \mu$ |
| CB credit | - | 0 | - | $(B - Z)/2 + \mu$ |

| <i>Central bank</i> | | | |
|---------------------|-------------------|---------------|-------------------|
| Assets | | Liabilities | |
| credit banks | $(B - Z)/2 + \mu$ | banknotes | B |
| outright | Z | bank reserves | $\mu - (B - Z)/2$ |

2. The Case of a Monetary Union

How does the scenario in the previous example change when deposit shifts in a monetary union rather than a single closed economy are considered? The proposition that the central bank's balance sheet expands as a consequence of assuming the role of an interbank market maker and sufficiently large deposit shifts does not change. Also the monetary union's central bank must supply sufficient liquidity to close the union-wide liquidity deficit (which is the sum of the individual liquidity deficits of the union's members). Again, once the interbank market breaks down, the liquidity deficit cannot be reallocated on the market and central bank intermediation replaces the market mechanism. The size of the deposit shift, necessary to cause an expansion of the central bank's balance sheet, may be much larger because of the larger union-wide liquidity deficit and the greater number of central bank counterparties. Moreover, funding flows may cross the borders between economies which previously conducted their own monetary policy. Whenever the individual central banks maintain separate balance sheets even after joining the union, such cross-border flows give rise to *intra-system accounting positions*. When the consolidated balance sheet of the union is considered, such intra-system positions would be netted and would therefore vanish. This corresponds to the case of the Eurosystem where the NCBs publish individual balance sheets and explicitly report net intra-system posi-

tions. These positions are netted out on the Eurosystem's consolidated balance sheet.

To clarify these points by means of the system of financial accounts, we consider a monetary union between two previously separated economies indexed by $i \in \{1, 2\}$. Prior to joining the union, both economies can be represented in a system of financial accounts similar to the one in the previous section. The individual liquidity deficits $B_i - Z_i$ may initially differ as a result of institutional differences like banknote demand of households, outright security portfolios of central banks, reserve requirements, payment habits etc.

Suppose that banks in, say, area 2 face deposit losses of amount μ and that the union's interbank market becomes segmented along national borders as a result of a financial crisis. Suppose further that area 2 banks increase their borrowing from the central bank in order to avoid costly balance sheet contractions. In the closed economy case, the central bank's balance sheet expanded once the shock exceeded the liquidity needs of the receiver bank, $\mu > (B - Z)/2$. In case of a monetary union, one has to distinguish between individual countries' central bank balance sheets and the consolidated union-wide central bank balance sheet. In order to bring our example closer to Eurosystem reality, we assume that banks in area 1 cannot become counterparties of the central bank in area 2 and vice versa. The areas' central banks have retained their stock of counterparties after joining the monetary union.¹⁹ All transactions between a counterparty and the Eurosystem are then reflected on both the balance sheet of its respective NCB as well as on the consolidated balance sheet of the Eurosystem.

Consider firstly how the deposit shift in area 2 above affects the balance sheets of the individual central banks in areas 1 and 2. For simplicity, we assume that the full amount μ is moved to banks in area 1. After loosing deposits of total size μ , area 2 banks extend their central bank credit to $(B_2 - Z_2) + \mu$. The individual balance sheet of the area 2 central bank will increase immediately. Banks in area 1 receive inflows of amount μ and use these to reduce their central bank credit of amount

¹⁹ This corresponds to the case of the Eurosystem where banks can access the Eurosystem's facilities and operations only via the NCB of the member country in which they are established, cf. *European Central Bank* (2011), ch. 2. However, it is important to note that cross border use of collateral is allowed, and that the larger banking groups have typically Eurosystem counterparties in more than one country. Therefore they can easily centralize their liquidity management through such group structures.

$B_1 - Z_1$. Once $\mu > (B_1 - Z_1)$ area 1 banks become overly liquid and they deposit any surplus liquidity with their central bank. Only in this case will the balance sheet of the area 1 central bank begin to increase. The cross-border flows μ are transferred through the monetary union's payment system. The payment system is operated by the central banks and net inflows (net outflows) are then booked on the central banks' balance sheets as *intra-system claims (liabilities)*. In the euro area these intra-system items basically correspond to the T2 positions. The two individual balance sheets look as follows:

| | <i>Central bank area 1</i> | | <i>Central bank area 2</i> | |
|-------------|-------------------------------|---------------------------------|----------------------------|-------------|
| | Assets | Liabilities | Assets | Liabilities |
| credit bank | $\max \{B_1 - Z_1 - \mu, 0\}$ | - | $B_2 - Z_2 + \mu$ | - |
| outright | Z_1 | - | Z_2 | - |
| banknotes | - | B_1 | - | B_2 |
| reserves | - | $\max \{\mu - (B_1 - Z_1), 0\}$ | - | 0 |
| T2 balances | μ | 0 | 0 | μ |

However, when the consolidated balance sheet of the monetary union is considered, the intra-system positions are netted out. The consolidated balance sheet expands only if the balance sheet of the area 1 central bank expands, i.e. if $\mu > B_1 - Z_1$.

| <i>Consolidated central bank balance sheet</i> | | | | |
|--|--|--|-------------------|---------------------------------|
| Assets | | | Liabilities | |
| credit banks | $\max \{\mu + (B_2 - Z_2), \sum_i (B_i - Z_i)\}$ | | banknotes | $\sum_i B_i$ |
| outright area 1 | Z_1 | | reserves of banks | $\max \{\mu - (B_1 - Z_1), 0\}$ |
| outright area 2 | Z_2 | | | |

VI. Financial Risk Issues Related to Central Bank Intermediation and T2

1. Central Bank Financial Risk Taking During Crises

It is important to keep in mind that the balance sheet developments in the previous section rest on the assumptions that the union-wide inter-

bank market is segmented along the borders of the two economies 1 and 2 and that all banks in area 2 suffer from funding outflows. While this is an extreme scenario, it reflects to a large extent the developments that occurred in the euro area during the recent crisis. Banks in CCCs recorded massive outflows of funding, while banks in safe haven countries saw a huge influx via the T2 payment system. CCC banks, to fill their resulting funding gaps, took extra recourse to Eurosystem credit. In this sense, the Eurosystem assumed the role of an interbank market maker of last resort.

Such extended liquidity provision by central banks during a crisis comes at the cost of larger risk-taking compared to normal times. The risk increase is mainly driven by the following factors.

1. *Probabilities of default of central bank counterparties and issuers of debt instruments used as collateral increase during a crisis.*

As illustrated by *Standard & Poor's* (2009), investment grade debtors (i.e. at least BBB-rated debtors) experience no default at all in good years (e.g. in 1992–1994, 1996, 2004, 2006, 2007 not even a single BBB-rated debtor defaulted).²⁰ In contrast, during bad years even higher rated companies default. For instance, in 2008 the default frequency for AA- and A-rated debtors was both 0.38 %.

2. *Correlation risks between central bank counterparties and collateral credit quality increase during a financial crisis.*

Generally, systemic crises create high correlation between debtors because common risk factors (instead of idiosyncratic risk factors) become predominant. Therefore, the likelihood of the worst case scenario for a central bank, that of a simultaneous default of both the counterparty and the collateral issuer, increases.

3. *Central bank lending shifts towards stressed counterparties.*

During financial crises, stressed banks lose market access and experience funding gaps which are often addressed through increased recourse to central bank credit. Hence, central bank lending becomes more concentrated which implies that the asset side of its balance sheet becomes less diversified and its risk exposure increases. The shift of Eurosystem credit provision to banking systems in CCCs illustrates this (see figures 1 and 2).

²⁰ *Standard & Poor's* (2009), p. 5.

4. *Central banks may conduct outright purchases to support specific securities markets under stress.*

In case the central bank supports specific market segments at a large scale (e.g. RMBS and agency bond purchases by the Federal Reserve), it adds additional special risk factors to its balance sheets.

Despite these higher financial risks, there are good reasons for central banks to assume the role of a lender of last resort during a financial crisis and to provide an highly elastic credit / liquidity supply against collateral.

1. *Negative social externalities of funding liquidity stress.*

The central bank should be ready to engage in measures supporting the funding liquidity of banks because of the potential negative externalities of bank stress and bank default. As a public player, its objective should be overall economic welfare. As pointed out in the *Geneva Report*, the most important externality of bank default stems from the fire-sale spiral induced by liquidity problems of individual banks:

In order to deal with such liquidity problems prior to failure, and in the course of liquidation after failure, the bank in difficulties will often be forced to sell assets (fire sales). But such sales will drive down the current market price of the same assets held on other banks' books, when these are valued on a mark-to-market basis. (...) In short, there is an internal amplifying process (liquidity spirals) whereby a falling asset market leads banks, investment houses, etc., to make more sales (deleveraging), which further drives down asset prices and financial intermediaries' assessed profit and loss and balance sheet net worth.²¹

The authors of the *Geneva Report* point out that the fire-sale externality justifies the intervention of prudential regulation. Mutatis mutandis, this applies also to enhanced central bank liquidity support during crises: By lending to banks against collateral and thereby eliminating the need for asset fire sales, the central bank can prevent a downwards liquidity spiral.

2. *The central bank is the only economic agent not threatened by illiquidity in its own currency.*

Central banks have been endowed with the monopoly and freedom to issue the legal tender, central bank money. Therefore, they are never threatened by illiquidity in their own currency and it seems only natural that, in case of a liquidity crisis when all agents attach a high

²¹ *Geneva Report on the World Economy* (2009).

price to liquidity, the central bank remains more willing than others to hold (as collateral or outright) assets which are less liquid. This argument does not rely on the existence of negative externalities. Even if the central bank were a purely profit-oriented enterprise, its exemption from liquidity stress should make it ready to take over illiquid positions in a crisis against a premium.

3. *Haircuts are a powerful risk mitigation tool if credit risk is asymmetric and the cash taker (i.e. collateral provider) is more credit risky.*

The power of haircuts is limited if cash taker and cash lender in a repo agreement are equally credit risky. The counterparty risk of the cash taker rises with the haircut because his loss, given a cash lender default, is increasing. This is why haircuts between banks of similar credit quality tend to be rather low, while banks impose relatively high haircuts when they lend to other market participants, for example hedge funds. Thus, banks would never question haircuts imposed by the central bank, because the central bank cannot default.²²

As these last points show, while the central bank *always* plays a prominent role in terms of collateral acceptance and liquidity provision, during times of turmoil, the trade-off between containing a systemic liquidity crisis and a large increase in the riskiness of its operations becomes crucial. This trade-off was already extensively discussed during the 19th century. As the Bank of England's Jeremiah Harman explained regarding the crisis of 1825: "We lent it (money) by every possible means and in modes we had never adopted before consistent with the safety of the bank. Seeing the dreadful state in which the public were, we rendered every assistance in our power."²³ *Bagehot* also emphasized the importance of central bank liquidity provision, "(...) in time of panic it (Bank of England) must advance freely and vigorously to the public".²⁴ Hence, while *Bagehot* was well aware of the associated higher risk-taking of the central bank, he considered enhanced liquidity provision to be the only possibility to safeguard financial stability. Furthermore, he argued that such measures would be necessary to minimize the central bank's *own* financial risks because such measures would be the only way to prevent a financial meltdown and any accompanying massive losses for the central bank. This in turn implies that social motives and positive external-

²² Cf. *Ewerhart/Tapking* (2008).

²³ Quoted from *Bagehot* (1873), p. 51.

²⁴ *Bagehot* (1873), p. 196.

ities of central bank operations would not even be necessary conditions for an active provision of liquidity. *Bagehot* explicitly writes, “(M)aking no loans as we have seen will ruin it (Bank of England); making large loans and stopping, as we have also seen, will ruin it. The only safe plan for the Bank (of England) is the brave plan, to lend in a panic on every kind of current security, or every sort on which money is ordinarily and usually lent. This policy may not save the Bank; but if it do not, nothing will save it.”²⁵

More recent authors also point out that the assumption of financial risks by public authorities during a crisis is not only useful, but also unavoidable. For example, *Buiter/Sibert* (2007) write: “Dealing with a liquidity crisis and credit crunch is hard. Inevitably, it exposes the central bank to significant financial and reputational risk. The central banks will be asked to take credit risk (of unknown) magnitude onto their balance sheets and they will have to make explicit judgments about the creditworthiness of various counterparties. But without taking these risks the central banks will be financially and reputationally safe, but poor servants of the public interest.” It must be stressed, however, that the principal willingness to assume financial risks does not justify to disregard prudence, caution and a steady monitoring of risks. We therefore disagree with *Buiter/Sibert* if they argue that credit risks of “unknown magnitude” ought to be taken.

2. *Intra-Bank Intermediation by Central Banks During the Recent Crisis*

During the recent crisis, in particular in the aftermath of the Lehman crash in September 2008, interbank lending in most developed countries temporarily came to a standstill. In order to maintain the stability of the banking system, central banks took over the role of an interbank market-maker which resulted in unprecedented expansions of the respective central banks’ balance sheets. As we discussed in the previous paragraph, such policy may be required to sustain the economy’s financial stability and to avert a credit crunch and an associated deflation. This is part of the Bagehotian heritage that almost all major central banks adhered to during the crisis. Table 1 provides some examples for the increase in intermediation activities of central banks during the recent crisis. It shows snapshots of the balance sheets of the Bank of England, the

²⁵ *Bagehot* (1873), p. 199.

Federal Reserve System, the Eurosystem and the Riksbank. Balance sheet items are aggregated into autonomous factors, outright holdings of securities, reserves of banks and liquidity providing/absorbing operations.²⁶ It is visible from the respective first rows that prior to the crisis all four central banks had relatively lean balance sheets and provided liquidity (more or less) to the extent that was just sufficient to cover their banking system's liquidity needs.²⁷ In the aftermath of the Lehman bankruptcy, interbank lending came to a halt. As described above, central bank intermediation replaced interbank lending and borrowing. The liquidity provision through outright holdings and through credit operations increased considerably, while at the same time all four central banks chose to conduct absorbing operations to recapture part of the liquidity in order to retain control over interbank interest rates. The Fed and the BoE decided to remunerate reserves of banks in October 2008 and March 2009 respectively. Such policies are similar to absorbing liquidity via issuance of debt certificates or auctioning of fixed term deposits (unless, of course, one sticks to a strict definition of the monetary base).²⁸ The figures that best highlight the extent of intra-bank intermediation by the central bank are printed in bold. With respect to the most recent figures of the Bank of England and the Fed, it should be noted that the excess liquidity,²⁹ of around GBP 177 bn and USD 1545 bn respectively, is driven by a huge expansion of outright holdings of securities under the so-called quantitative or credit easing programs. This does not necessarily point to

²⁶ Autonomous factors refers to those items on the central bank's balance sheet that are not controlled by the monetary policy function of the central bank. In the stylized system of financial accounts the only autonomous factor was banknotes in circulation, whereas in reality further autonomous factor items are central bank capital, investment portfolios, gold or foreign reserves, see e.g. *Bindseil* (2004), ch. 2.

²⁷ The liquidity needs of the banking sector are defined as the sum of autonomous factors and average minimum reserve requirements. Of the four central banks above, the Eurosystem imposes the largest minimum reserve requirements (in relative terms) on its banking sector. The Riksbank and the BoE did not had reserve requirements in place in 2006, while the reserve requirements of the Fed have been relatively small. A meaningful "leanness indicator" for a central bank balance sheet is the ratio of monetary policy operations (outright purchases or credit operations) to banknotes in circulation. Whenever this is close to unity one may speak of a lean balance sheet.

²⁸ In fact, Fed chairman Ben Bernanke explained the introduction of reserve remuneration with the inability of the Fed to absorb the huge surplus liquidity and therefore to control the federal funds rate effectively, cf. *Bernanke* (2008).

²⁹ Excess liquidity is defined as the difference between reserves of banks plus net recourse to the deposit facility and minimum reserve requirements. For the Fed and the BoE, we approximate this by reserves of banks.

Table 1: Comparison of Simplified Balance Sheet Snapshots

| | Assets | | Liabilities | | |
|------------------------|---|--------------------------------|--------------------|--------------------------------|-------------------|
| | Outright holdings | Liquidity providing operations | Autonomous factors | Liquidity absorbing operations | Reserves of banks |
| | Bank of England (in billion GBP) | | | | |
| 26/06/07 (pre-crisis) | 33 | 47 | 60 | 0 | 20 |
| 14/01/09 (post Lehman) | 45 | 190 | 78 | 101 | 56 |
| 09/03/11 | 231 | 13 | 106 | 0 | 138 |
| 18/01/12 (recent) | 291 | 6 | 120 | 0 | 177 |
| | Federal Reserve System (in billion USD) | | | | |
| 26/06/07 (pre-crisis) | 790 | 20 | 763 | 30 | 17 |
| 14/01/09 (post Lehman) | 495 | 583 | 143 | 89 | 846 |
| 09/03/11 | 2358 | 21 | 942 | 56 | 1381 |
| 18/01/12 (recent) | 2600 | 0 | 961 | 94 | 1545 |
| | Eurosystem (in billion EUR) | | | | |
| 29/06/07 (pre-crisis) | 0 | 463 | 230 | 1 | 182 |
| 02/01/09 (post Lehman) | 0 | 857 | 353 | 291 | 213 |
| 11/03/11 | 139 | 454 | 266 | 93 | 234 |
| 13/01/12 (recent) | 279 | 815 | 255 | 706 | 133 |
| | Riksbank (in billion SEK) | | | | |
| 23/01/07 (pre-crisis) | 0 | 4 | 3 | 1 | 0 |
| 07/01/09 (post Lehman) | 0 | 266 | 80 | 186 | 0 |
| 09/03/11 | 0 | 1 | 6 | 7 | 0 |
| 15/01/12 (recent) | 0 | 0 | -20 | 20 | 0 |

a failure of the interbank market which needs to be cushioned through central bank intermediation. Therefore, for the BoE and the Fed, one observes intermediation of the kind described above only in the aftermath of the Lehman breakdown.

For the Eurosystem, intermediation increased recently to unprecedented levels, even above the post-Lehman peak. In particular, this is due to the allotment of a long-term operation of almost EUR 500 bn in December 2011. Reserves of banks in the Eurosystem tend to be required reserves since excess reserves are not remunerated.³⁰

The Riksbank is the only central bank amongst the four that had phased out crisis measures as of January 2011. Neither central bank intermediation, nor large outright portfolios continue to lengthen its balance sheet. However, one should not infer from the reported numbers that the Riksbank's balance sheet is actually so short. The provided figures are the result of a netting of liquidity providing and absorbing autonomous factors. Specifically, the Riksbank holds large foreign reserves which tend to counterbalance the liquidity absorbing autonomous factors, such as banknotes in circulation.

The balance sheet snapshots show that central banks became the interbank market makers after the interbank markets broke down in the aftermath of the Lehman crash. The substantial increase in liquidity supply ensured that all banks (even those which lost access to market funding) did not experience a damaging shortage of their liquidity coverage. The resulting excess supply of liquidity was largely absorbed through absorbing operations, thereby creating an artificial borrower side of the interbank market.³¹ As the sovereign debt crisis still prevails in the euro area, and interbank markets became impaired again during the last months of 2011, the Eurosystem has re-assumed its intermediation role. The intermediating measures have swollen its balance sheet to an even greater extent as in the aftermath of the Lehman crash which points to grave and unresolved problems in the euro area banking sector.

³⁰ A more detailed account of the factors leading to the lengthening of the Eurosystem balance sheet during the current financial crisis can be found in *Papadia/Valimäki* (2011).

³¹ It is important to note that intermediation measures do not provide a measure for the size of the deposit shift shocks μ . The deposit shift shocks are obviously larger because the total liquidity deficit of the banking system vis-à-vis the central bank can be re-allocated amongst banks before central bank intermediation and a corresponding expansion of the central bank balance sheet occurs.

3. Financial Risks Behind T2 Positions

So far, we have demonstrated that the recent increase in T2 imbalances reflects payment flows associated with capital outflows and deposits shifts. Banks can process such flows because they increase their borrowing from the Eurosystem. But T2 positions do not expose the central bank to an additional risk above what has been incurred through higher and less diversified central bank lending. In the euro area, central bank lending can basically take two forms, Eurosystem credit operations and ELA. Both forms differ with respect to how potential losses are shared within the Eurosystem and therefore differ with respect to the risks incurred by any NCB.

- With regard to *Eurosystem credit operations*, a loss arises if and only if a Eurosystem counterparty defaults and the liquidation value of the posted collateral falls short of the credit claim. Any loss thus incurred would be borne by the Eurosystem as a whole and losses are shared among the NCBs according to the ECB capital key. It is therefore not important on which NCB balance sheet credit operations are recorded and, a fortiori, it is not important on which balance sheet T2 claims are recorded. As pointed out by the *Bundesbank* “the Bundesbank’s risk position would be just the same if the positive settlement balance from T2 were accrued not by the Bundesbank but instead by another Eurosystem national bank.”³²
- With regard to *ELA*, there is no loss sharing at all, i. e. any losses that would arise would be solely borne by the NCB that provided the ELA. According to *European Central Bank* (2009a), “(T)he main guiding principle is that the competent NCB takes the decision concerning the provision of ELA to an institution operating in its jurisdiction. This would take place under the responsibility and at the cost of the NCB in question.”³³

Because euro area NCBs cannot default, T2 claims do not constitute an autonomous credit risk, but rather reflect part of the risks that have been taken by increasing central bank credit provision. However, the question has been raised as to what would happen if a country with a large T2 liability would leave the euro area and were then defaulting subsequently. This situation is purely speculative (so far euro area lea-

³² *Deutsche Bundesbank* (2011), p. 35.

³³ *European Central Bank* (2009a), p. 98.

ders have always strongly rejected such a possibility). Suppose nevertheless that a country would unilaterally declare its exit from the common currency union and would then re-introduce a national currency. Suppose further that upon exiting, the country's new currency would devalue and the country would default on its existing euro-denominated liabilities. Firstly, the seignorage revenues of the Eurosystem would be reduced. Secondly, the Eurosystem would have indeed a euro-denominated claim against the exit country. However, it is reasonable to assume that the claim would be eventually repaid, i.e. even if the exiting country is not able to pay back immediately, it would have to do so over time and in the context of a scheme that would be contained within an "exit agreement" between the exit country and the remaining euro area. If the claim could, contrary to these expectations, not be fully recovered (for whatever reasons), the ECB would have to book a loss. Depending on the size of the loss, the ECB's shareholders, i.e. in particular the euro area NCBs, would presumably have to inject more capital. The recapitalization volume and the seignorage loss would then be shared according to the capital key, i.e. in line with the loss-sharing for monetary policy operations. Accordingly, the particular distribution of T2 claims and liabilities among the other NCBs has no effect on the distribution of potential T2 related losses.

VII. Implications of Central Bank Intermediation for the Monetary Base

In the euro area, extended liquidity support and central bank intermediation led to a higher concentration of central bank lending to distressed counterparties. This becomes visible in a larger fraction of Eurosystem credit allotted to banks in CCCs, while the fraction of Eurosystem credit to banks in T2 creditor countries strongly decreased. In the previous sections we explained that this is the result of unidirectional intra-system flows of central bank money from banks in CCCs to countries perceived as the euro area safe havens. These flows have reduced the liquidity needs of recipient banks and thus their participation in Eurosystem refinancing operations. In turn, the share of banks in crisis-ridden countries in Eurosystem credit went up as central bank financing substitutes for the drain of private funding. The following figures visualize these developments most sharply. Figure 5 shows the evolution of countries' shares in outstanding Eurosystem refinancing opera-

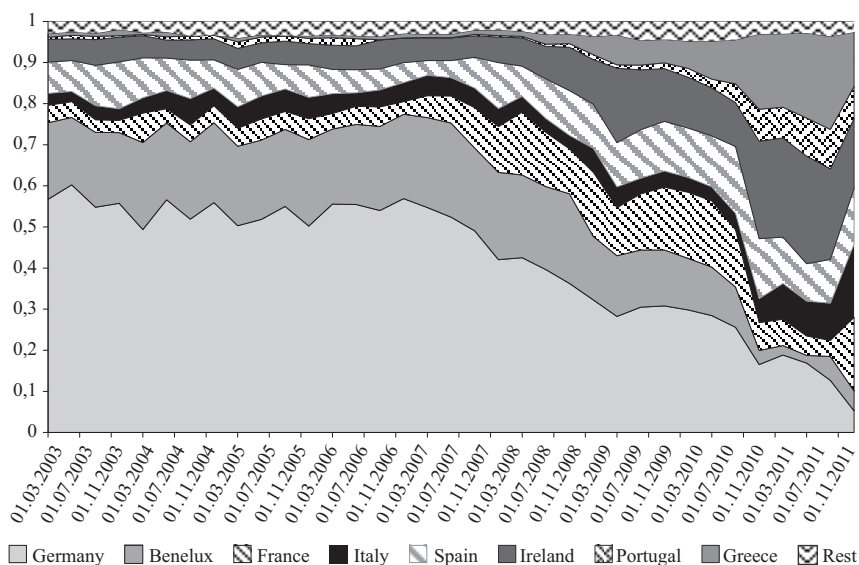


Figure 3: Shares in Refinancing Operations

tions.³⁴ Figure 4 shows the evolution of total T2 claims and the number of T2 creditor NCBs.³⁵ It is striking that with the onset of the crisis in 2007, total T2 claims started to rise and the number of creditor NCBs started to decline.

Revoking “Gresham’s law”, the concern has been raised that within the euro area “bad euros” are driving out “good euros”. Most prominently, *Sinn/Wollmershäuser* dub this development a “crowding out of refinancing credit”.³⁶ They further write that “(T)oday the Bundesbank converts the ‘GIIPS euros’ into ‘German euros’, which then crowd out the ‘refinancing-credit euros’ issued by the Bundesbank, and instead of foreign currency or foreign assets, the Bundesbank receives Target claims on the Eurosystem (...)”.³⁷ Keeping this statement in perspective, and

³⁴ The data is taken from the published balance sheets of NCBs and from the ECB’s weekly financial statements. The figure shows the fraction of each NCB in balance sheet item A5 “Lending to euro area credit institutions denominated in euro”.

³⁵ Again, data is taken from the NCBs’ balance sheets. We have added up asset items “Net claims related to T2 system”.

³⁶ *Sinn/Wollmershäuser* (2011), p. 16.

³⁷ *Sinn/Wollmershäuser* (2011), p. 15. Remark: *Sinn/Wollmershäuser* use the term GIIPS to refer to the totality of Greece, Ireland, Italy, Portugal and Spain.

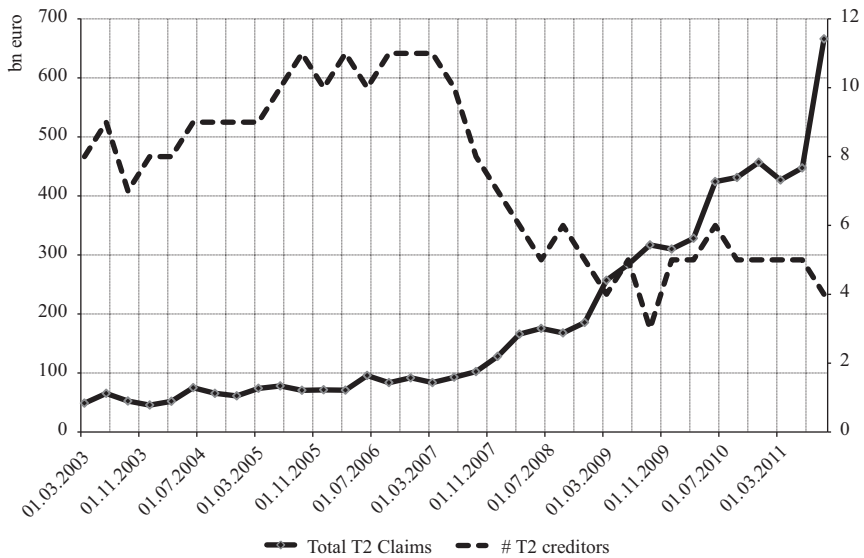


Figure 4: T2 Claims (Left-Hand Scale) and Number of T2 Creditors (Right-Hand-Scale)

ignoring for the moment the distinction between euros of a different origin, it seems to merely describe the stylized fact that we alluded to in section III. Yet, *Sinn/Wollmershäuser* complain that due to payment flows via T2, NCBs in the euro area are

“(…) (F)orced to deliver new central bank money to the banks without lending it to them, i.e. to create outside money, this automatically crowds out the inside money, i.e. the monetary base generated through refinancing operations or asset purchases. Given the time paths of marketable assets that the NCBs hold in their balance sheets, the inflow of central bank money from abroad has no influence on the monetary base in the recipient country and displaces the central bank refinancing credit one to one.”³⁸

In our opinion, this statement reflects some misunderstandings about euro area monetary policy operations and their relationship to T2 balances and to the monetary base. We clarify these issues step by step.

³⁸ *Sinn/Wollmershäuser* (2011), p. 15.

1. T2 Balances and Eurosystem Credit Operations

T2 balances do not constitute an independent monetary policy measure as one may infer from the proposition that new central bank money is delivered without being lent. T2 balances are a reflex of underlying payment flows of central bank money beyond national borders. If an NCB's balance sheet shows T2 liabilities, the balance sheet identity requires that these liabilities are matched by a counterposition on the asset side. And usually, the respective counterposition will show up either under Eurosystem credit operations or under outright holdings of securities (or under some other financial asset position). Hence, from the perspective of the euro area as whole, it is not correct to say that T2 flows cause a crowding-out of the monetary base, normally created by means of refinancing or outright operations. The only possibility where net T2 liabilities may not be matched one-for-one by credit or outright positions on the asset side is during the day, as the T2 system allows for intra-day credit. However, intra-day credit is collateralized and the demanded collateral is subject to the same requirements that also apply in normal Eurosystem monetary policy operations.

2. Monetary Base Versus Liquidity Deficit

While the concern about a “crowding out” of the monetary base is not justified, it may be due to a confusion of the concepts of the *monetary base* on the one hand, and the not so publicly known concept of the *liquidity deficit* on the other hand.

The monetary base is usually defined as the sum of currency in circulation (banknotes plus coins) and reserves of bank with the central bank. Reserves are usually split into required reserves and excess reserves.³⁹ Hence, for the Eurosystem, the ECB defines the monetary base as the sum of currency in circulation, required minimum reserves and reserves held voluntarily in the deposit facility.⁴⁰ From a monetary policy implementation perspective, the monetary base is not a useful concept, since it adds a particular autonomous factor item (currency in circulation) to the reserve holdings of banks which are fundamentally different in nature and which are rather closely related to required minimum reserves. It is

³⁹ Cf. *Mishkin* (2007).

⁴⁰ See the glossary on the ECB's website, <http://www.ecb.int/home/glossary>.

not clear then how to interpret this quantity in a meaningful way, except if one believes in a textbook-style money multiplier logic.⁴¹

A more meaningful concept is the liquidity position of the banking system vis-à-vis the central bank. It is defined as the net sum of all autonomous factor items, netted on the liability side of the central bank's balance sheet, plus the required minimum reserves of banks. If this sum is positive, the banking sector is said to be in *liquidity deficit*. In contrast to the monetary base, the liquidity position encompasses all autonomous factor items, not just currency in circulation, and therefore provides the best measurement for the banking sector's aggregate liquidity needs.

From the perspective of an individual NCB in the euro area, T2 positions are part of the autonomous factors. If, say, the Bundesbank, receives net T2 inflows, autonomous factors netted on the liability side decrease, thereby reducing the Bundesbank's counterparties' liquidity needs and therefore their participation in Eurosystem credit operations tends to decline. But what happens to the monetary base in Germany? If the recipient banks in Germany keep the liquidity that flows in via T2 on their reserve account (or even when they move it to the deposit facility), the monetary base increases. The monetary base, strictly defined, would not increase if excess liquidity of German banks would be absorbed by the Eurosystem.

To sum up: Firstly, net T2 inflows tend to increase the monetary base (or leave it constant), but they will never decrease it. Conversely, if accommodated through higher central bank liquidity provision, net T2 outflows will usually have no impact on the monetary base in T2 debtor countries. Secondly, net T2 inflows reduce the liquidity deficit in T2 creditor countries and increase the liquidity deficit in T2 debtor countries. The broader macroeconomic consequences of such developments are not clear. Firstly, the monetary base is a relatively poor indicator and lacks predictive power with respect to other macroeconomic variables as e.g. future inflationary pressure. Secondly, what are the consequences of a reduction in the liquidity deficit, yet even a switch from deficit to surplus in some countries? Basically, a liquidity surplus would, under normal circumstances, exert downward pressure on interbank interest rates, i.e. decrease the short end of the yield curve. However, as the interbank market and the transmission mechanism in the euro area are somewhat impaired due to the ongoing crisis, the effects may be ambiguous. In gen-

⁴¹ Cf. Bindseil (2004), p. 49.

eral, a liquidity surplus and the associated pressure on interest rates does not constitute a problem for monetary policy implementation since the control of short-term interest rates can be achieved with similar precision by means of liquidity absorbing operations. In particular, if the Eurosystem would consider the system-wide liquidity to be too high, it could absorb the excess liquidity by issuing debt certificates or fixed term deposits.⁴²

VIII. Relationship Between T2 and Current Account Imbalances

1. Current Account Imbalances in the Euro Area

We now turn to the relationship between T2 imbalances and current account imbalances. The euro area as a whole exhibits a rather small current account deficit. However, internally, some euro area members have witnessed considerable deteriorations in their current accounts over the recent years. Especially the CCCs experienced persistent current account deficits since the early 2000s. In contrast, the currently more stable euro area economies such as Germany, the Netherlands, or Finland have tended to accumulate surpluses. Net foreign asset positions cumulate these deficits and surpluses. Figure 5 shows net foreign asset positions of CCCs, Germany and France. Since 2002, Germany has accumulated net assets of currently up to 1,000 bn euro, while all CCCs have accumulated net liabilities. Spain has the largest liability of around 1,000 bn euro, which is among the world's largest liability positions.⁴³

As pointed out by *Blanchard/Milesi-Ferretti* (2009), current account imbalances are not per se problematic and there are “good” imbalances which reflect an optimal allocation of capital over time and space, and “bad” imbalances, stemming from domestic as well as systemic distortions. In the euro area, the introduction of the common currency and the ensuing deeper integration of capital and financial markets relaxed borrowing constraints and led, to an increasing degree, to capital flows from more mature countries (Germany, France, Netherlands) to the countries

⁴² For example, the Eurosystem currently absorbs on a weekly basis the liquidity that is injected via the so-called Securities Market Programme by means of fixed term deposits.

⁴³ The data is taken from Eurostat and reflects aggregate positions and therefore shows not only euro area internal positions but also positions vis-à-vis the rest of the world.

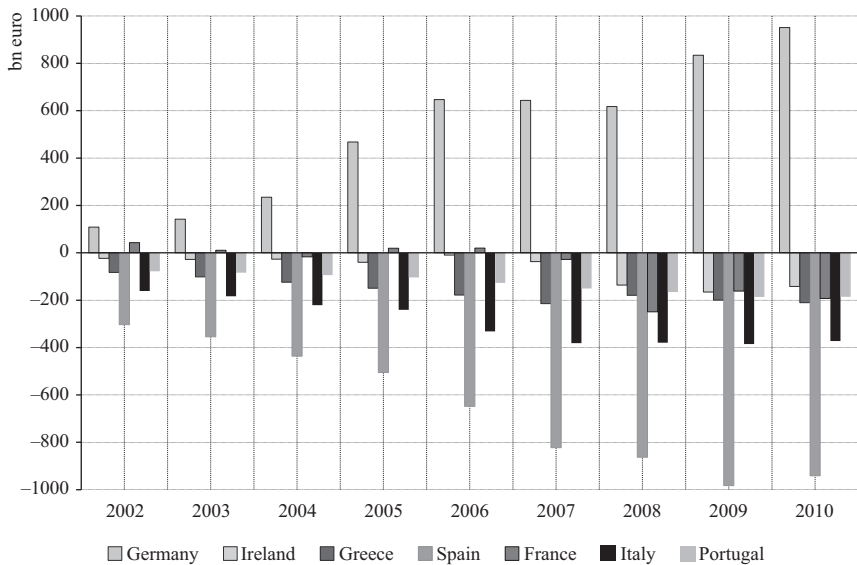


Figure 5: Net Foreign Assets

with higher growth potential (Portugal, Spain, Greece).⁴⁴ It is therefore tempting to classify euro area imbalances as “good” imbalances which resulted from more efficient capital markets. However this comes up short. As shown by *Berger/Nitsch* (2010), capital had also the tendency to go where distortions in product and labor markets were quite pronounced, which is rather a sign of imbalances of the “bad” type.

Moreover, as pointed out by the *European Commission* (2006), deficits were largely financed via bank loans (often originated in the surplus countries’ banking sectors) and portfolio investments rather than foreign direct investments (FDI). In general, bank loans and portfolio investments, in particular when they are of short maturity, are less resilient and stable than FDI-flows and often become subject to quick and detrimental reversals during episodes of financial turmoil.⁴⁵ Hence, due to their large current account deficits and due to foreign capital inflows taking the form of “bad cholesterol”, to use a term coined by *Hausmann/Fernandez-Arias* (2000), euro area deficit countries over time became in-

⁴⁴ *Blanchard/Giavazzi* (2002), *Ahearne* (2008) or *Lane* (2010) provide empirical underpinnings for the tendency of intra-euro-area capital flows to move from richer to poorer economies.

⁴⁵ Cf. *Roubini/Setser* (2004).

creasingly vulnerable to a sudden stop. While a sudden funding reversal and abrupt deleveraging can indeed exert pressure on the current account to revert, it may be associated with a sharp contraction in domestic demand, an increase in banking sector vulnerabilities and large economic and social costs.

The possibility to revert the current account through a nominal devaluation or through drastic measures such as capital controls or import tariffs are eliminated in a monetary union. According to *Jaumotte/Sodsriwiboon* (2010), the policy options left to re-balance the current accounts are then

- Fiscal measures: Consolidation of public deficits, sufficiently large to offset counteracting developments in private saving and investment.
- Structural measures: Policies that foster productivity growth to regain competitiveness in the medium- to long-run, including labour market reforms, investments in education etc.
- Internal devaluation: Reducing labor costs relative to most important competitors. This can be achieved by e.g. changing the weight of tax bases or by pegging the wage growth rate to the lowest inflation neighbor.
- Regulatory financial policies: Strengthening financial supervision to limit growth of private sector credit and improve overall loan quality.

However, the implementation of any of the above measures takes time and it takes even more time before they become effective. But when a crisis hits a deficit country in full force, capital flows in the form of “bad cholesterol” usually revert much more rapidly and in much less time than would be needed for such reforms to effectively stop them. The factors underlying the current account deficits in CCCs and the way in which capital inflows were financed therefore contributed to the outbreak of the crisis and partly paved the way for the build-up of T2 balances.⁴⁶

However, large current account deficits and the existence of large net capital inflows are neither a necessary nor a sufficient precondition for the possibility of experiencing large capital outflows and corresponding T2 liabilities. First and foremost, large current account deficits render a country vulnerable to illiquidity as they may create doubts about the

⁴⁶ The deposit shift scenario in section V applies of course also to transactions that affect the current account.

country's future solvency. But illiquidity can be triggered by other factors as well. It is then *gross capital flows* and the way they have been financed as well as the preference of domestic households to shift savings to other countries, which are crucial determinants of euro area members exposure to capital outflows via T2. Ireland is a case in point where changes in T2 liabilities have dwarfed current account deficits (i.e. net capital inflows).⁴⁷

2. The “Adjustment-Buffer” Function of T2

Under a regime of pegged exchange rates, the ability to maintain the peg depends on the central bank's stock of anchor-currency reserves. When reserves run dry and capital outflows have not yet stopped, the peg eventually breaks down and the currency may devalue (and only then the current account may revert), which goes along with widespread default and recessionary contractions in domestic demand. In contrast, membership in the monetary union lends deficit countries a greater stability as the intra-union liquidity is in principle unlimited, and depends indirectly only on the stock of central bank eligible collateral. Concretely, lending stability means lending time to implement reforms which would not only reduce the current account deficit but which would cure the underlying distortions which have caused it.

The operational tool creating this stability in the euro area is, again, the T2 system and one may therefore speak of an “adjustment-buffer” function of T2. Is then the conclusion of e.g. *Sinn* (2011b) or *Sinn/Wollmershäuser* (2011) justified that the current account deficits are *financed* via T2? Such a claim is mistaken. It confuses the *payment system* with a credit-generating mechanism. Central bank liquidity is generated through refinancing operations, currently under a fixed-rate full allotment regime, against eligible collateral. Payment flows are transferred via T2, thereby allowing deficit countries to harness their liquidity and thus preventing default due to illiquidity. This in turn buys the time to fight the root causes of the crisis without having to deal with additional default costs and resulting severe debt-deflation spirals. As also emphasized by *Goldman Sachs* (2011), this does not stall the underlying economic forces and political efforts that re-balance current account defi-

⁴⁷ Cf. *Bindseil/Koenig* (2011) where we compare Irish T2 liabilities and current account deficits and show that there is only little correlation between the two. A similar conclusion is reached by *Buiter et al.* (2011).

cits. Yet, detrimental forces are prevented from materializing (too fast). Moreover, the idea that a limit on T2 payment flows would create incentives for deficit countries to become more competitive and reduce deficits is dangerous. It tacitly accepts huge unnecessary costs of negative externalities due to illiquidity default.

IX. Limiting and Re-Balancing T2 Balances

1. Imposing Limits

In order to limit the exposure of the T2-creditors, *Sinn* (2011c) or *Sinn/Wollmershäuser* (2011) propose to put such limits on T2 accounts in order to keep the current account deficits in check. As *Sinn* writes,

(T)ight national caps on Target balances could provide the right incentive to comply. Such a cap would not eliminate current-account deficits, but it would reduce deficits to the flow of private capital willing to finance them.⁴⁸

Sinn's proposal to limit T2 balances essentially implies that a euro in the form of a deposit with one national central bank is no longer the same as a euro held as a deposit with another national central bank. This however contradicts the core constituting element of a monetary union – namely that one euro is equal to one euro – across the entire monetary base. Moreover, when announced in advance, such a policy would probably lead to an intensification of capital flight away from countries being potentially constrained by T2 limits.

Sinn (2011b) goes even further and suggests to settle T2 liabilities once a year by transferring gold, exchange reserves or other marketable assets from T2 debtor NCBs to T2 creditor NCBs. This proposal goes further than simply putting a cap on T2 liabilities in *particular* countries, because it implies that *all* countries that may end the year with net T2 liabilities face the threat of being cut off from the monetary union.⁴⁹

⁴⁸ *Sinn* (2011c).

⁴⁹ *Sinn/Wollmershäuser* (2011) propose to adopt a settlement procedure for T2 balances similar to that used by the Federal Reserve System in the United States. They point out that under such a system, the Bundesbank would receive marketable assets in the amount of its T2 claims. As we have already pointed out in *Bindseil et al.* (2011), in our opinion, *Sinn/Wollmershäuser's* description of the Fed settlement system is not correct. The annual settlement of the Fed's Interdistrict Balances does *not* lead to a neutralizing capital flow. The settlement serves firstly to maintain a constant ratio of banknotes to gold certificate holdings, a left-over from the gold standard. Secondly, in a mere accounting operation, the relative shares of individual Reserve Banks in the securities booked in the System

In our opinion, such a proposal is tantamount to abandon the monetary union and to replace it by a hybrid system: a monetary union between T2 creditor countries to which T2 debtor countries peg their exchange rates. This proposal would immediately give rise to self-aggravating speculation against all T2 debtor countries. Similar to the situation under the gold standard, gold and convertible currency reserves would determine the available buffer against capital flight and this regime would inherit the poor properties of the gold standard with respect to the ability of central banks to fight banking crises as well as to the ability to re-balance external accounts. A cautionary tale for the former is the run on Germany and the German banking crisis of 1931. The run triggered the depletion of German gold reserves and led to a monetary contraction thereby rendering banks vulnerable to illiquidity. The Reichsbank's room for maneuver was small since liquidity injections would have (even when combined with interest hikes in the flavor of Bagehot's rules) create doubts about the Reichsmark's convertibility. The crisis was exacerbated by the failure of the Danatbank in July 1931. The run intensified and triggered bank holidays and bank closures, which were rather measures of last resort. Deflationary policies and an ensuing unprecedented credit crunch caused a severe recession in Germany. Moreover, in the aftermath of the Danat failure, the government imposed exchange controls which effectively meant the abolishment of the gold standard.⁵⁰

Under a regime of T2 limits, central banks would face similar difficulties in assuming their role as lender of last resort as under the gold standard. Moreover, it is also not clear how exactly the external adjustment mechanism would work under such a regime. Sinn's remark that such limits would provide incentives for countries to reduce external imbalances seems rather farfetched. To compare again to the gold standard, under the pre-war gold standard external re-balancing worked almost automatically because central banks could "play by the rules of the game" and were credible in doing so as they were largely insulated from political pressure and from the need to focus on internal balance. But already under the interwar gold standard, central banks' objectives shifted towards domestic factors and necessary deflationary policies were not

Open Market Account are adjusted. This only leads to a re-allocation of profits and losses between the Reserve Banks. Adopted by the Eurosystem, such a settlement procedure would indeed reduce the T2 positions on the balance sheets of NCBs. Yet, this would only be a mere accounting operation and would *not* reduce the net capital flows via the T2 system.

⁵⁰ See *Kindleberger* (1984) or *James* (1984).

enacted with the needed rigor. Instability of deficit countries spilled over, in particular because surplus countries were unwilling to let go of the once accumulated gold reserves. Therefore, before proposing to impose such an inflexible system on the European monetary union, one should recall the warnings uttered by the *Macmillan Committee* in the agony of the gold standard,

Creditor countries must, unless they are ready to upset the economic conditions, first of the debtor countries and then of themselves, be prepared to lend back their surplus, instead of taking it in gold.⁵¹

Finally it is worth noting that a limit on T2 liabilities would not prevent agents from moving their funds away from individual banks. If an electronic transfer via the payment system became impossible, accounts could be depleted by withdrawing banknotes. This would increase the amount of banknotes in circulation in the respective countries and would therefore increase the liquidity deficit of the banking sector. Again, the central bank would need to close the resulting larger liquidity gap by increasing its lending operations to the banks in question.

2. Restoring Mean-Reversion of T2 Balances While Maintaining an Elastic Framework

In the period 1999–2009, T2 balances remained moderate, suggesting that there was a mean reverting tendency of the balances despite current account deficits in a number of countries. What exactly was the market mechanism that supported this property of T2 balances in times of well-functioning capital markets? First of all, banks desire, in general, to not finance a disproportionate part of their balance sheet through central bank borrowing. Banks usually aim at a diversified funding to demonstrate their ability to access various financial sources (deposits, capital markets, central bank) and to not appear to be weaker than their peers in terms of market access. They may also fear to become subject to moral suasion by the central bank in case of over-proportional central bank reliance. Indeed, such reliance usually draws the attention of central bank and supervisors to the bank. A moderate recourse to the central bank signals to the market and to supervisors that ample buffers of non-encumbered central bank eligible collateral are likely available, implying that the bank is resilient to liquidity shocks.

⁵¹ *Committee on Finance and Industry* (1931), Para. 184.

This however relies on two essential conditions: (i) Feasibility through access to capital markets and to depositors; (ii) no strong financial incentives to rely on central bank funding (if e.g. market funding costs are 5% but central bank credit costs are 1%, the incentives to substitute central bank funding with market funding and thus the mean-reverting mechanism of T2 balances are weak).

Restoring capital market access of euro area banks depends essentially on finding solutions to the sovereign debt crisis. In particular, it requires governments to restore reasonable credit ratings. This is outside of the hands of banks and of the Eurosystem. It should also be noted that even if confidence has been restored, it will still take time to regain an investor and deposit base. One can neither expect that within a year all debt instruments of, say, Greek banks which were outstanding before the crisis will have been re-issued, nor that pre-crisis levels of retail deposits will have been restored.

Funding costs may remain somewhat more elevated for banks in CCCs for a longer period of time. The pre-crisis times where spreads across different sovereigns and across different issuer classes were rather low will unlikely return quickly. Currently, major Greek banks have ratings in the area of B- and CDS spreads of around 2000 basis points. The relative cheapness of central bank funding may at some stages undermine the incentives of banks to restore market funding. However, it should also be noted that many banks have been running out of their Eurosystem eligible collateral anyway and are, at the margin, taking recourse to ELA. This in turn has been priced recently at around 175 basis points above the main refinancing rate (marginal lending facility rate + 100 basis points). Moreover, ELA is subject to intense central bank and supervisory scrutiny and banks typically undertake tremendous efforts and costs in order to reduce ELA reliance as soon as markets would allow this.

A number of measures may be considered, if, after the re-opening of capital markets, reliance of banks on central bank funding remains over-proportional and if the efforts of banks to reduce this reliance appear to be insufficient. The following possibilities to address over-proportional reliance on central bank funding are universally valid, they are neither specifically related to the Eurosystem, nor are they in any sense related to T2 balances.

- Moral suasion;
- Gradually phasing in discretionary limits to central bank borrowing;

- Gradually tightening the collateral framework, such that total central bank borrowing declines due to collateral constraints;
- Imposing interest rate surcharges on over-proportional central bank borrowing. Proportionality measures can be based, for example, on banks' total assets (or some other subset of balance sheet items). For example, if the average euro area bank was borrowing around 3% of some balance sheet item from the Eurosystem, a fee of, say, 100 or 200 basis points could be superimposed on any recourse exceeding, say, 10% of the respective item.

The Eurosystem could either implement any measure individually or combine several of these. There is no reason to doubt their effectiveness. Yet, imposing such measures *before* markets have re-opened would be detrimental as it would undermine the restoration of confidence. Some residual uncertainty about the ability of individual banks to access all market segments can remain even after markets have re-opened for most banks. In such a case, measures based on interest rate surcharges appear to be less risky than measures that induce limits on volumes. This is independent of whether the limit is gradually phased in, or whether it refers to central bank credit or to collateral availability. It must be stressed that all these measures are better and more effective than a direct limit on T2 balances which would contradict the monetary union and would create unprecedented capital dislocations.

X. Conclusion

This article has provided a framework of financial accounts that can be used to analyze the development of T2 positions, Eurosystem refinancing credit and the liquidity deficit during the recent crisis. Such a framework is needed in order to understand the mechanics and economics behind T2 developments in the euro area. We explained that central banks world-wide (including the Eurosystem) assumed the role of an interbank market maker to counter the halt of interbank lending during the crisis and to secure the financial stability of their respective economies. While this caused a lengthening of the respective central banks' balance sheets, it helped to close the funding gaps of financial institutions that would have otherwise led to devastating asset fire sales spirals and a credit crunch.

We further explained that T2 constitutes the backbone of a well-functioning euro area and performs an adjustment-buffer function in the cur-

rent crisis which buys the time to implement reforms that may revert the detrimental developments in crisis-ridden euro area economies. Accordingly, limiting T2 liabilities would not realign the incentives of governments to implement needed structural reforms. It would, however, put into question the existence of the monetary union, and therefore, if anything, create unprecedented capital dislocation.

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Summary

TARGET2 and the European Sovereign Debt Crisis

The TARGET2 (T2) positions on the balance sheets of euro area national central banks (NCBs) have increased unprecedentedly since the beginning of the financial crisis. Currently only four euro area NCBs record T2 claims, while the remaining NCBs are T2 debtors. During the last twelve months, these developments were accompanied by a large public debate. The present article adds to the bulk of exist-

ing literature on this topic as it explains the origins and development of T2 positions by means of a stylized framework of financial accounts. It is stressed throughout the article that T2 positions constitute merely a reflex of underlying adverse developments in financial markets and respective counteracting measures of the Eurosystem that are necessary to maintain the financial stability of the euro area. Furthermore, the financial risks behind T2 positions, and the relationship to the monetary base, the euro area's liquidity deficit and intra-euro-area current account deficits are discussed in greater detail. Finally, we discuss recent proposals to limit T2 positions and we provide several superior measures of how to re-balance T2 positions. (JEL E58, F33, F55)

Zusammenfassung

TARGET2 und die europäische Staatsschuldenkrise

Seit dem Ausbruch der Finanzkrise haben sich die TARGET2-Positionen in den Bilanzen der nationalen Notenbanken des Eurosystems erheblich verändert. Während aktuell die Notenbanken von lediglich vier Ländern Forderungpositionen ausweisen, stehen in den Bilanzen der restlichen Notenbanken der Eurozone TARGET2-Verbindlichkeiten. Diese Entwicklung wurde, besonders in Deutschland, während der vergangenen zwölf Monate von einer breiten öffentlichen Debatte begleitet. Der vorliegende Artikel ergänzt die bisher erschienenen Beiträge, indem er die Entstehung und Entwicklung der TARGET2-Positionen anhand einer vereinfachten Bilanzdarstellung der Volkswirtschaft erläutert. Es wird dabei betont, dass TARGET2-Positionen lediglich ein Reflex der zugrunde liegenden geldpolitischen Schutzmaßnahmen und für die Aufrechterhaltung der Finanzstabilität in der Eurozone unabdingbar sind. Ferner werden die finanziellen Risiken hinter den TARGET2-Positionen, sowie die Beziehungen dieser Positionen zur Geldbasis, dem Liquiditätsdefizit und den intra-europäischen Leistungsbilanzdefiziten, ausführlich diskutiert. Abschließend werden die bestehenden Vorschläge zur Beschränkung des Wachstums der TARGET2-Positionen einer kritischen Würdigung unterzogen und verschiedene überlegene Möglichkeiten erörtert, wie die Positionen nach dem Ende der Krise wieder abgebaut werden können.