The real costs and profits of TARGET 2 balances

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Abstract

The paper assesses the real costs and profits of German claims on the Eurosystem through TARGET2. While Germany’s nominal profits from holding TARGET2 claims depend on the development of the nominal interest rate, the real profits are determined by the real interest rate as well as the real exchange rate. The paper finds that at the end of 2013 Germany faces current costs of around 15 billion euros in real terms. Calculating the costs and profits of every member country in the euro area reveals that the TARGET2 system mirrors an implicit distribution mechanism with a volume of about 30 billion euros. The results underline the aspect that even without an euro area break-up or exit of one member-country, holding TARGET2 claims can cause high economic costs in real terms.

Key words: TARGET2, Real costs and profits, Euro Area

JEL classification: E42, E44, F32

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1 Motivation

The existence of German claims on the Eurosystem through TARGET2\(^1\) has gained increasing attention since the beginning of the financial crisis in 2007 as well as during the twin debt and banking crisis in the euro area. Figure 1 shows that claims of the Deutsche Bundesbank on the Eurosystem increase from close to zero to more than 700 billion euros at the end of 2012. During 2013 the claims reduce slightly to around 600 billion euros.\(^2\)

\[ \text{Figure 1: Germany’s TARGET2 claims on the Eurosystem (in bn. euros).} \]

A closer look at the TARGET2 balances within the European Monetary Union (EMU) reveals that TARGET2 imbalances are concentrated on a few member countries (see Figure 2). Apart from Germany’s almost 600 billion euros, Luxembourg, the Netherlands and Finland additionally accumulated 200 billion euros of TARGET2

\(^1\) TARGET denotes *Trans-European Automated Real-Time Gross Settlement Express Transfer* and refers to the European transaction settlement system through which commercial banks make payments.

\(^2\) For a detailed balance sheet description of the TARGET2 mechanism, see, e.g., Cecchetti *et al.* (2012). For a more analytical framework of the origins and development of TARGET2 positions and their potential financial risks, see Bindseil and König (2012).
claims vis-à-vis Austria, Greece, Ireland, Portugal, Italy, and Spain. Particularly Italy and Spain are solely associated with TARGET2 liabilities of about 550 billion euros.

The literature on TARGET balances has become quite extensive over the last three years. While some authors deal with several problems at once and others with specific aspects, the academic literature on TARGET2 balances cannot easily be classified. To highlight two main directions, one strand focuses specifically on the time period during the financial crisis in 2007 when countries like Greece and Portugal apparently financed their current account deficits through TARGET2 liabilities (see, e.g., Sinn and Wollmershäuser, 2012a,b; Cecchetti et al., 2012; Mayer et al., 2012). This interpretation is confirmed, for instance, by a panel analysis by Auer (2013). He finds that current account balances were entirely unrelated to the evolution of TARGET2 balances before the onset of the financial crisis 2007, however, in the period after 2007 a correlation of 0.808 is convenient with the interpretation that current account imbalances are being financed by central bank liquidity that has replaced private capital flows. The other strand argues that TARGET2 balances reflect a funding crisis within the euro area since 2011 (see, e.g., Buiter et al., 2011;
Bindseil and König, 2012; Cecioni and Ferrero, 2012; Mody and Bornhorst, 2012). Mody and Bornhorst (2012) argue that TARGET2 mirrors a reversal of capital flows within Europe. During the European debt and banking crisis, increasing capital flows from southern European economies to Germany, which is still running a current account surplus, hint to capital flight that led to a lack of financial resources in the distressed economies. Additionally, Cour-Thimann (2013) provides a comprehensive analysis and an extensive literature review of TARGET2 balances in the context of the crisis in the euro area.

The studies above have in common that they focus on the dynamics of the TARGET2 system, in particular, by answering questions like, how do TARGET2 balances arise, and what are the economic implications of holding TARGET2 claims. CESifo (2014), for instance, calculates the potential losses for Germany in case of a euro area collapse and the subsequent insolvencies of the respective crisis economies. The calculation points out that holding TARGET2 claims might lead to potential losses of about 470 bn. euros. Contrary, Fahrholz and Freytag (2012) discuss potential economic costs in real terms, which would be associated with the future developments of TARGET2 balances – however, these costs are not quantified.

Summarizing, the existing literature primarily focuses on potential risks and costs, which are associated with the TARGET2 system, e.g. the costs in case of a euro area collapse or a member country exit. However, this paper evaluates the current economic costs incurred from holding TARGET2 claims in real terms. Since TARGET2 claims and liabilities are interest-bearing and generally remunerated at the interest rate of the ECB’s main refinancing operations (Deutsche Bundesbank, 2011), Germany receives, on the one hand, nominal interest gains for holding TARGET2 claims vis-à-vis the deficit countries. On the other hand, the nominal gains have to be adjusted by price level changes over time, i.e. by the real exchange rate, to account for real structural imbalances within the euro area. Due to the focus on real terms, this approach is able to shed light on the dimension of TARGET2 to misallocations of real resources within the euro area.

Using a stylized two-period model based on the approach by Jin and Choi (2013), the paper finds that at the end of 2013 Germany faces current accumulated costs
of around 15 billion euros in real terms. Additionally, calculating the real costs and profits for every euro area member country reveals that the TARGET2 systems mirrors an implicit distribution mechanism with a distribution volume of about 30 billion euros.

The paper is organized as follows. Section 2 presents the stylized background of TARGET2 as a balance of payment adjustment mechanism. Section 3 describes the empirical framework and evaluates as well as discusses the real costs and profits of TARGET2 balances. The main findings are summarized in section 4.

2 Adjustment mechanism in a currency union through TARGET2

In order to assess the real costs and profits of Germany’s TARGET2 claims we follow the approach by Jin and Choi (2013) and compare the accumulation of TARGET2 claims in a currency union with an accumulation of foreign reserves in a fixed exchange rate regime. Analogously to, e.g., Sinn and Wollmershäuser (2012b), Neumann (2012) and Homburg (2012), we make use of the balance of payment identity:

\[ CA + KA + \Delta S \equiv 0 \]  

where \( KA = KI - KE \). The current account balance, \( CA \), mirrors the capital account balance, \( KA \), defined as the difference of private and public capital imports \( KI \) over capital exports \( KE \). The term \( \Delta S \) displays the balance of payment equilibrating mechanism and should be zero in floating exchange rate regimes. In a fixed exchange rate regime the term \( \Delta S \) corresponds to the changes in foreign exchange reserves. Assuming a country whose current account deficit cannot be financed by capital inflows (net borrowing), the central bank sells her foreign reserves to provide domestic debtors with foreign currency to balance their liabilities. In a currency union, e.g. the EMU, the foreign reserves \( (\Delta S) \) are replaced by TARGET2 balances due to the loss of autonomous monetary policy and the abandonment of national currencies (see Sinn and Wollmershäuser, 2012a).

\[ \text{Footnote 3} \] For further discussions about the similarities between TARGET2 balances and balance of payment crisis in fixed exchange rate regimes, see, e.g., Kohler (2012); Bernholz (2012).
The similar adjustment mechanism of foreign reserves and TARGET2 balances is illustrated in a very stylized balance sheet of a central bank (see Figure 3). We assume two current account surplus countries, one in a fixed exchange rate regime (e.g. China) and one in a currency union (e.g. Germany as member of the EMU).

![Balance Sheet]

Figure 3: Central bank’s balance sheet.

Basically, assets like gold, government bonds, and foreign reserves (Reserves) as well as loans granted to commercial banks (Domestic Credit) are booked on the left-hand side, while the financing base (Base Money), which has been created by the central bank, is booked on the right-hand side among the liabilities. In a fixed exchange rate regime without corresponding net private capital outflows the central bank of a current account surplus economy has to accumulate foreign exchange reserves to avoid an appreciation pressure on the nominal exchange rate, and hence, increasing the monetary base. Accompanying risks of inflation and required sterilizing options by reducing domestic credit have been left out for the sake of simplicity. In the case of a currency union the accumulation of foreign reserves is replaced by creating TARGET2 claims vis-à-vis the deficit countries to substitute for private capital flows. These similarities are also described in Sinn and Wollmershäuser (2012a,b). However, the authors point out that contrary to a fixed exchange rate regime there is no natural restriction in the sense of a limited stock of foreign reserves in the deficit countries. The central bank of a deficit country can incur as much TARGET2 liabilities as the banking system of the deficit country is able to provide sufficiently good collaterals. Since the standard of eligible collaterals can be lowered by the central bank there are de facto no limits for TARGET2 liabilities and claims, respectively.
3 Quantifying real TARGET2 profits and losses

As long as trade is financed by private capital flows, TARGET2 does not play an important role. Accordingly, figure 4 depicts that during the pre-crisis period (2002–2007) current account balances are financed by private capital flows as no clear relationship between TARGET2 balances and the current account can be observed. Since the beginning of the European debt and banking crisis in 2010 there seems to be a one-to-one relationship between current account balances and TARGET2 balances. This supports the assumption that private capital flows are replaced by TARGET2 balances (see, e.g. Cecchetti et al., 2012; Sinn and Wollmershäuser, 2012b).

![Figure 4: Cumulative current account balances and changes in TARGET2 balances in bn. euros (based on Cecchetti et al., 2012).](image)

To keep the calculation of current costs and profits as simple as possible, we subsume the dynamics of the TARGET2 mechanism in a two-period framework, following the approach by Jin and Choi (2013). In order to justify the simplification of our calcu-

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4 Data of the national central bank TARGET2 balances were obtained from the CESifo institute and current account data from the European Commission.
Inflation approach, we show impulse response functions of a stylized small open economy model to gain some intuition behind the dynamics of the TARGET2 system.\(^5\) Macroeconomic data indicate that during the last decade Germany faced a persistent real exchange rate depreciation vis-à-vis the rest of the euro area (RoEA), which boosted exports and led to a growing trade surplus. We therefore simulate dynamic responses to a negative price shock in order to imitate Germany’s real exchange rate depreciation.\(^6\) Figure 5 shows that a decline in domestic prices depreciates (increase) the real exchange rate, implying a current account surplus through an improvement of international competitiveness. Based on our assumption that private capital flows are substituted by TARGET2 balances, an increase in the current account is accompanied by an increase in TARGET2 claims.

\(^5\) The simulation is based on a small open economy model within a monetary union according to Herz and Hohberger (2013). Some stylized information about the model structure and model equations can be found in the appendix. For a detailed description of the model see Herz and Hohberger (2013).

\(^6\) A productivity shock or a risk premium shock would have similar effects on the real exchange rate (depreciation) and the current account.
The crucial point for the subsequent simplification derives from the adjustment dynamics to the steady state. A future appreciation (decrease) of the real exchange rate induces a reduction of the current account surplus as well as the TARGET2 claims. Hence, a real exchange rate depreciation today must be balanced by a real exchange rate appreciation in the future to ensure stationarity in the long-run. In Figure 5, the first period reflects the real exchange rate depreciation and the accumulation of TARGET2 claims, the second period (shaded gray) reflects the real exchange rate appreciation and the reduction of TARGET2 claims.

3.1 Real profits and losses in a two-period model

Within our two-period framework, we follow the approach by Jin and Choi (2013) who analyze the profits and losses from China’s currency intervention. We assume that Germany’s trade surplus is financed by holding TARGET2 claims as private capital flows suddenly stop between countries (see, e.g. Cecchetti et al., 2012; Sinn and Wollmershäuser, 2012b). Furthermore, we assume that trade depends on the real exchange rate ($\epsilon$).

As baseline scenario we assume that trade is balanced at the equilibrium real exchange rate $\epsilon_0$. If the real exchange rate differs from the equilibrium rate, Germany faces a trade surplus or deficit. For example, if Germany faces a real exchange rate depreciation vis-à-vis the RoEA ($\epsilon_1 \uparrow$, since $\epsilon_1 = g[CA]$ with $g'[CA] > 0$), a trade surplus ($+CA$) occurs given the Marshall-Lerner-condition holds. Since trade must be balanced over two periods, Germany must have a trade deficit ($-CA$) in period 2. As private capital flows between both countries are replaced by TARGET2 balances ($TB$), the RoEA’s trade deficit is financed through Germany’s TARGET2 claims vis-à-vis the ECB, thus $TB = CA$, whereas $TB_0 = 0$.

Given that TARGET2 balances are remunerated at the ECB’s main refinancing rate $i$, Germany’s real trade surplus measured in foreign goods (TARGET2 claim vis-à-vis RoEA) grows to $TB(1 + r)$ in the second period, where $r = i - \pi^*$, with $\pi^*$ being RoEA’s inflation. Disposing this amount in period 2 to finance the trade deficit, it

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7 For the sake of simplicity we assume that the equilibrium real exchange rate is unity.
has to be adjusted by the real exchange rate in period 2 to measure the revenues in domestic goods, \( TB(1 + r)\epsilon_2 \), where \( \epsilon_2 = g[-TB(1 + r)] \).

Hence, the total real profit in period 1, which is realized in the second period is:

\[
\pi_1 = TB_1((1 + r_1)g[-TB_1(1 + r_1)] - g[TB_1])
= TB_1(1 + r_1)\epsilon_2 - TB_1\epsilon_1 = TB_1\epsilon_2 + r_1TB_1\epsilon_2 - TB_1\epsilon_1
\]  
(2)

The profit equals the market value of the TARGET2 balance in period 2 plus the interest rate income in period 2 stemming from holding the TARGET2 balance in period 1 less the costs of setting up the balance in period 1.

If Germany faces a real depreciation in period 1 and chooses to hold TARGET2 claims in order to finance its exports – private capital flows are no longer available – then \( \epsilon_1 > 1 \) and \( TB_1 > 0 \). Under this scenario, the development of profits and losses particularly depends on the real interest rate \( r \). This can be seen by differentiating (2) with respect to \( TB \):

\[
\frac{\partial \pi}{\partial TB} = (1 + r)g[-TB(1 + r)] - g(TB) - TB((1 + r)^2g'[-TB(1 + r)] + g'(TB))
\]  
(3)

Evaluating equation (3) at \( TB = 0 \), we get

\[
\frac{\partial \pi}{\partial TB} = (1 + r)g(0) - g(0) = r < 0,
\]  
(4)

which implies that profit is decreasing in \( TB \). In case of positive (negative) real interest rates, i.e. \( r > 0 \) (\( r < 0 \)), Germany gains profits (incurs losses) by holding TARGET2 claims.

3.2 Cumulative real profits and losses

Since TARGET2 balances are not completely liquidated in each period, it is of particular interest to assess the cumulative profits and losses of Germany’s TARGET2 claims. In order to accumulate the profits in each period, we assume that \( TB_i \)
is the TARGET2 balance in period $i$, which is zero at the beginning of period 1. Hence, at the end of period 1, the TARGET2 balance ($TB_1$) equals the trade surplus ($TB_1 = CA_1$). Depending on whether the TARGET2 balance increases in period 2 through a trade surplus ($\Delta TB_2 = CA_2 > 0$), or reduces through a trade deficit ($\Delta TB_2 = CA_2 < 0$), the corresponding TARGET2 balance in period 2 is given by $TB_2 = TB_1 + \Delta TB_2$. As Germany holds a TARGET2 balance in period 2 ($TB_2$) its costs are mirrored by $TB_2\epsilon_2$. Therefore, the corresponding profit in period 2 can be formulated as:

$$\pi_2 = TB_2(1 + r_2)\epsilon_3 - TB_2\epsilon_2 = TB_2\epsilon_3 + r_2TB_2\epsilon_3 - TB_2\epsilon_2$$  \hspace{1cm} (5)$$

The profit of period 2 equals the market value of the TARGET2 balance in period 3 plus the interest rate income in period 3 stemming from holding the TARGET2 balance in period 2 less the costs of holding the balance in period 2.\(^8\)

In order to get the real value of cumulative TARGET2 profits at the end of period 2, the profit has to be evaluated with the real exchange rate in period 3 (market value of $TB_2$). Additionally, the interest rate income resulting from previous TARGET2 balances and the costs of TARGET2 "interventions" in previous periods have to be considered. The cumulative profit in period 2 is given by:

$$\Pi_2 = TB_2\epsilon_3 + r_1TB_1\epsilon_2 + r_2TB_2\epsilon_3 - (\Delta TB_1\epsilon_1 + \Delta TB_2\epsilon_2)$$  \hspace{1cm} (6)$$

Since $TB_0 = 0$ and $\Delta TB_2 = TB_2 - TB_1$, equation (6) can be rewritten as:

$$\Pi_2 = TB_2\epsilon_3 + r_1TB_1\epsilon_2 + r_2TB_2\epsilon_3 - (TB_1\epsilon_1 + (TB_2 - TB_1)\epsilon_2)$$
$$= TB_1\epsilon_2 + r_1TB_1\epsilon_2 - TB_1\epsilon_1 + TB_2\epsilon_3 + r_2TB_2\epsilon_3 - TB_2\epsilon_2$$
$$= \pi_1 + \pi_2$$  \hspace{1cm} (7)$$

\(^8\) Analogously, the profit of period $t$ can be expressed as follows: $\pi_t = TB_t(1 + r_t)\epsilon_{t+1} - TB_t\epsilon_t = TB_t\epsilon_{t+1} + r_tTB_t\epsilon_{t+1} - TB_t\epsilon_t$.  \hspace{1cm} (7)
According to equation (7), the cumulative real profit of holding a TARGET2 balance in period $T$ is:

$$
\Pi_T = TB_T \epsilon_{T+1} + \sum_{t=1}^{T} r_t TB_t \epsilon_{t+1} - \sum_{t=1}^{T} \Delta TB_t \epsilon_t = \sum_{t=1}^{T} \pi(t) \quad (8)
$$

In other words, the cumulative real profit of holding TARGET2 claims or liabilities can be obtained by adding up the real profits of each previous period.

### 3.3 Data

The calculation of real profits and losses is based on monthly data and covers the years from 1999 to 2013.

The real exchange rate between Germany and RoEA – based on seasonally adjusted HCPIs$^9$ – is calculated with data from the European Commission. Precisely, the real exchange rate is given by $\epsilon = P^*/P$, where $P^*$ is the HCPI of the euro area without Germany and $P$ is the HCPI of Germany, respectively. Both HCPIs are set to 100 in January 1999. As the RoEA’s HCPI is not available by itself, it was constructed by the following steps: Firstly, the monthly relative changes of the HCPI of the euro area and the HCPI of Germany were calculated. Secondly, based on the ECB’s CPI weights, the German contribution to the monthly change of the HCPI of the euro area was removed to obtain a time series that only mirrors the monthly changes of the HCPI of the euro area without Germany. Lastly, these changes were accumulated to construct the HCPI of the rest of the euro area (RoEA).

The monthly real interest rate is computed by dividing the difference between the ECB’s main refinancing rate and the RoEA’s annual inflation rate by 12. Specifically, $r = (i - \pi^*)/12$.

Data of the national central bank TARGET2 balances are available at the CESifo institute.$^{10}$ In order to take into account price differentials between Germany and RoEA, profits and losses are adjusted by the real exchange rate. Therefore, the Ger-

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$^9$ Seasonally adjusted HCPIs were constructed by using the X-12 procedure.

$^{10}$ For more detailed information, see [http://www.cesifo-group.de/ifoHome/policy/Spezialthemen/Policy-Issues-Archive/Target.html](http://www.cesifo-group.de/ifoHome/policy/Spezialthemen/Policy-Issues-Archive/Target.html).
man TARGET2 balance needs to be measured in units of foreign goods. Accordingly, the nominal TARGET2 balance of Germany is deflated by the HCPI of the RoEA.

3.4 Current profits and losses for Germany

Based on equation (2), we calculate Germany’s real monthly profits from holding TARGET2 balances. According to the implementation of the common currency in January 1999 we compute the respective profits and losses in real terms for the period 1999m1 – 2013m6. The results for the accumulated profits are shown in figure 6. It illustrates that in the early years of the currency union the accumulated profits in real terms, namely in constant 1999 prices, were close to 0 until 2007. The profits started to increase with the beginning of the global financial crisis, reaching its peak of nearly 4 billion euros in 2010. However, since the end of 2011 Germany’s profits decline sharply and turn into losses. Since 2012, Germany’s real losses increase to around 13 billion euros. The results underline the aspect that even without an euro area break-up or exit of one member country, holding TARGET2 claims can cause high economic costs in real terms.
On the contrary, looking at TARGET2 balances in nominal terms would draw a different picture. As TARGET2 balances are remunerated at the ECB’s main refinancing rate – which is still positive – and because of the absence of nominal exchange rate fluctuations, holding TARGET2 claims would result in respective profits in nominal terms. Adjusting for (real) structural differences, i.e. by incorporating the real exchange rate between Germany and the RoEA, it becomes evident that holding nominal TARGET2 claims incurs losses in real terms, however.

After calculating Germany’s current losses it is of particular interest to assess what future profits and losses can be expected from holding TARGET2 claims. To analyze the driving forces of profits and costs of TARGET2 balances, we differentiate equation (2) with respect to $TB_t$, $r_t$, $\epsilon_t$, $\epsilon_{t+1}$, in order to gain some intuitions on the general properties concerning the profit development:

$$\frac{\partial \pi_t}{\partial TB_t} = \epsilon_{t+1}(1 + r) - \epsilon_t - TB_t \frac{\partial \epsilon_t}{\partial TB_t}$$ (9)
\[
\frac{\partial \pi_t}{\partial r_t} = TB_t \epsilon_{t+1} \tag{10}
\]

\[
\frac{\partial \pi_t}{\partial \epsilon_t} = -TB_t + (\epsilon_{t+1}(1 + r_t) - \epsilon_t) \frac{\partial TB_t}{\partial \epsilon_t} \tag{11}
\]

\[
\frac{\partial \pi_t}{\partial \epsilon_{t+1}} = TB_t(1 + r_t) \tag{12}
\]

Although future profits depend on the change of TARGET2 balances (see eq. 9), the TARGET2 balances itself might be considered an endogenous process in the sense that a change in the trade balance is automatically accompanied by a change in the TARGET2 balance. Nevertheless, evaluating equation 9 at \(TB = 0\) implies that the development of profits in real terms depends on the real interest rate \(r\). For instance, in case of positive real interest rates, holding TARGET2 claims is associated with real profits and vice versa. This effect is based on the balance of payment adjustment mechanism in the currency union when private capital does not flow between member countries.

Likewise, an increase in the real interest rate increases c.p. Germany’s profits from holding TARGET2 claims (see eq. 10).

A real exchange rate depreciation (\(\epsilon_t \uparrow\)) in the sense that domestic prices decrease relative to foreign prices, decreases Germany’s profit in real terms due to a deterioration of the terms of trade (see eq. 11), i.e. a given amount in foreign goods fetches a smaller amount in domestic goods. On the other hand, a future real exchange rate appreciation (\(\epsilon_{t+1} \downarrow\)) decreases current profits (see eq. 12).

Based on the partial derivatives (see eqs. 9–12), we are able to decompose the respective profit evolution of Germany (see figure 8). In particular, since 2008 the decomposition illustrates that the losses are mainly driven by decreasing real interest rates and real exchange rate depreciations.
3.5 Future profits and losses for Germany

Having calculated the current costs, an important question arises: What can we expect to be a likely scenario concerning the future development of profits and losses in real terms? In order to shed some light on this issue we calculate real profits and losses under 4 different scenarios within our two-period framework. Specifically, we focus on the question what would happen if Germany liquidated its TARGET2 balance in period 2.\footnote{For simplicity reasons, the 4 scenarios are based on annual calculations.} We assume that the German economy has TARGET2 claims in real terms of about 418.5 bn. euros in period 1 and liquidates its claims in period 2. The theoretical discussion at the beginning of this sections points out that – from a German point of view – a real appreciation is needed in order to return to a balanced current account. As the recent ratio of the German consumer price index...
Table 1: Liquidation of the German TARGET2 balance in 4 scenarios (1999 constant prices)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Scenario (1)</th>
<th>Scenario (2)</th>
<th>Scenario (3)</th>
<th>Scenario (4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal interest rate</td>
<td>0.00</td>
<td>2.00</td>
<td>4.00</td>
<td>6.00</td>
</tr>
<tr>
<td>TARGET2 balance₁</td>
<td>418.50</td>
<td>418.50</td>
<td>418.50</td>
<td>418.50</td>
</tr>
<tr>
<td>ΔTARGET2 balance₂</td>
<td>−418.50</td>
<td>−418.50</td>
<td>−418.50</td>
<td>−418.50</td>
</tr>
<tr>
<td>ϵ₁</td>
<td>1.08</td>
<td>1.08</td>
<td>1.08</td>
<td>1.08</td>
</tr>
<tr>
<td>ϵ₁+₁</td>
<td>0.92</td>
<td>0.92</td>
<td>0.92</td>
<td>0.92</td>
</tr>
</tbody>
</table>

*Domestic adjustment*

| InflationGermany              | 17.05        | 17.05        | 17.05        | 17.05        |
| InflationRoEA                 | 0.00         | 0.00         | 0.00         | 0.00         |
| Real interest rate            | 0.00         | 2.00         | 4.00         | 6.00         |
| Cumulative profits            | −78.94       | −71.29       | −63.81       | −55.80       |

*RoEA adjustment*

| InflationGermany              | 0.00         | 0.00         | 0.00         | 0.00         |
| Real interest rate            | 14.57        | 16.57        | 18.57        | 20.57        |
| Cumulative profits            | −22.76       | −15.04       | −7.33        | 0.38         |

(HCPI) to the RoEA consumer price index is 1.08, Germany seems to be undervalued by 8%. Based on a linear relationship between the TARGET2 balance and the real exchange rate, an appreciation rate of more than 15% would be necessary to reduce the TARGET2 balance to zero. Precisely, TARGET2 claims in real terms of about 418.5 bn. euros associated with a real exchange rate of about 1.08 in period 1 implies a real exchange rate of 0.92 in period 2 in order to liquidate TARGET2 claims completely. This hypothetical scenario, namely a future real appreciation, can basically be achieved in two ways, all other things being equal: (i) inflation in Germany (*domestic adjustment*) or (ii) deflation in RoEA (*RoEA adjustment*).

Table 1 reports the expected profits and losses from the liquidation of the German TARGET2 claims in case of domestic adjustment (i) and in case of RoEA adjustment (ii) with respect to 4 different nominal interest rate scenarios.

Table 1 indicates that both adjustment scenarios would imply different costs and highlight the sensitivity to alternative macroeconomic developments. If, for instance, Germany would liquidate its TARGET2 claims in period 2, the accumulated profits would be substantial higher in case of a German inflation compared to a deflation in RoEA. As monetary policy is typically interested in preventing deflation, it is in our sense more plausible to assume that the real appreciation will be attained through an
increasing price level in Germany. For that reason the current German accumulated losses of about 13 bn. euros are expected to increase even further.

Concerning the interest rate development, an increasing nominal interest rate would increase the profits from holding TARGET2 claims in period 1. As the current interest rate level appears to be very low in a historical context, we can expect rising interest rates that would in general contribute to increasing profits or decreasing losses, respectively. Nevertheless, it is difficult to imagine that interest rate increases might lead to profits which would outweigh the losses stemming from the real appreciation.

Table 1 also indicates that – in theory – it would be possible to reduce the real TARGET2 balance back to zero without incurring any losses (scenario 4, RoEA adjustment). Though, this scenario seems to be unlikely as in this situation the RoEA would face a sharp deflation accompanied by high nominal interest rates.

Summarizing the potential future developments – from a German perspective – further losses in real terms seem to be a likely scenario. Basically, the results are in line with Fahrholz and Freytag (2012). They argue that the emergence of TARGET2 balances contributes to persistent real misalignments. These misalignments are in principle mirrored by our quantified TARGET2 profits and losses in real terms. Fahrholz and Freytag (2012) point out that the TARGET2 system has been substituted for the missing private capital flows between EMU countries. Thus, the TARGET2 balances can be considered non market based subsidies. In particular they help current account deficit economies to receive the necessary capital imports, which financial markets no longer offer to these economies. As long as these capital flows are non market based they no longer reflect the decision-making process of private agents and will therefore lead to an inefficient capital allocation. Accordingly, this development will result in high economic costs, which mainly have to be borne by economies that are associated with positive TARGET2 balances such as Germany.
3.6 Distribution across EMU member countries

The TARGET2 system by itself is a “closed” system between EMU countries, i.e. if there is a country that incurs losses then there also has to be a country, which gains profits. Therefore, the question arises how the profits and losses are distributed across the EMU member countries.

Adapting the profit calculation approach to each member country of the EMU, the results indicate that the TARGET2 system can be currently interpreted as a distribution mechanism. Figure 9 shows that especially northern European countries are associated with losses, while southern European countries benefit from the TARGET2 system. The respective profits and losses in figure 9 are calculated in real terms but are reported in current prices for comparison reasons. The gross distribution volume is about 30 billion euros. Compared to all European “rescue packages” this volume appears to be relatively small. However, compared to the EU budget (payments appropriations) of about 130 billion euros in 2013, the volume seems to be relatively high (nearly 25%). To some extent the implicit distribution mechanism

![Figure 9: Cumulative profits and losses in bn. euros (in current prices).](image-url)
of the TARGET2 system is similar to the economic effects of the introduction of Eurobonds, which would also lead to distributional effects between euro area member countries (see, e.g., Homburg, 2012). Through the adaption of Eurobonds, member countries with recently higher interest rates would benefit from the lower average interest rate of the Eurobond. In contrast, countries with relatively low interest rates, e.g., Germany, would face higher interest rate payments.

In line with Bindseil and König (2012), the TARGET2 system is a fundamental component of a well-functioning euro area and serves as an adjustment-buffer mechanism in the current European debt and banking crisis. TARGET2 balances buy time to implement structural reforms that may remove the intra-European real structural imbalances. The aim of the paper was to gain some insights into the distributional effects that come along with the TARGET2 system. Therefore, it is not only the southern European countries who provide an essential contribution to the structural adjustment process within the euro area. Certainly, TARGET2 balances are economically equivalent to Eurobonds and the ESM, and it should be paid attention to current costs in real terms associated with the TARGET2 system, but doubting the TARGET2 system in general puts into question the existence of the monetary union.

4 Conclusion

It is often stated that TARGET2 balances mirror missing private capital flows due to structural imbalances in the euro area. Economists argue that if structural imbalances have been removed, private capital flows would recover and, thus, TARGET2 balances would disappear. Therefore, holding TARGET2 balances might be interpreted as measures to play for time. In case that structural imbalances will be removed by the implementation of reforms and adequate (fiscal) policies, holding TARGET2 claims will not bear any losses. At least, the existing literature focuses on potential costs and risks, which are associated with the TARGET2 system, e.g., the costs in case of a euro area collapse or a member country exit. These studies, however, seem to neglect the aspect that the TARGET2 system might be associated
with current economic costs. This paper, therefore, evaluates the current economic costs in real terms incurred from holding TARGET2 claims.

Since TARGET2 balances are published in current prices, it seems to be inappropriate to provide arguments concerning the TARGET2 system on a nominal basis, while price differentials between member countries are in place. To take these structural imbalances reliably into account, TARGET2 claims and liabilities have to be examined in real terms, i.e. the development of TARGET2 balances has to be adjusted by the real exchange rate. Incorporating real differences between member countries, holding TARGET2 claims can incur losses in real terms – even without a collapse of the euro area.

Recently, Germany’s real losses from holding TARGET2 claims mounted up to about 13 bn. euros. Adapting the calculation approach to each EMU member country, the results point out that the TARGET2 system can be considered a distribution mechanism. On the one hand, this mechanism might help to finance necessary (real) structural adjustments. On the other hand, as real profits and losses basically mirror real structural differences in the EMU, the TARGET2 system cannot replace necessary reforms, but can provide time to reduce intra-EMU imbalances.

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References


A Appendix

To illustrate the dynamics of the TARGET2 mechanism we use a small open economy approach within a monetary union in the spirit of Galí and Monacelli (2005, 2008). The specific model is based on Herz and Hohberger (2013) who analyze the potential of fiscal policy to stabilize current account imbalances. Figure 10 summarizes the structure of the model.

Given the focus on TARGET2 mechanism, the modeling of the external sector deserves more detail. The following model equations are log-linearized around a deterministic steady state, so that variables are expressed in percent deviations from their respected steady state value. The change in the real exchange rate is defined as change of CPI ratios in a common currency:

\[ \Delta \epsilon_t = \Delta E_t + \pi^*_t - \pi_t, \]  

Due to the same currency, we can set \( \Delta E_t = 0 \). Hence, an increase in foreign inflation
relative to domestic inflation yields to a real exchange rate depreciation (an increase in $\epsilon_t$). The uncovered interest rate parity condition (15) is:

$$i_t = i^*_t + \text{risk}_t$$

where $\text{risk}_t = -\chi nfa_t$ captures a time-varying country risk premium according to Schmitt-Grohe and Uribe (2005) and ensures stationarity of the foreign debt level.

The real net foreign asset position evolves over time according to:

$$nfa_t = (1 + i_{t-1} - \pi_t)nfa_{t-1} + nx_t$$

where $nx_t = y_t - c_t - \alpha \Delta \epsilon_t$ are the net exports in each period. Given the evolution of assets determined by the model, we express the current account as the change in net foreign assets:

$$ca_t = nfa_t - nfa_{t-1}$$

In the current small open economy trade is financed through private capital flows ($nfa_t$). As we assume that private capital flows are totally substituted by TARGET2 since the beginning of the financial crisis in 2007 (see, e.g. Cecchetti et al., 2012; Sinn and Wollmershäuser, 2012b), we substitute $nfa_t$ through $\text{target}_t$ so that a trade balance surplus corresponds with a TARGET2 claim vis-à-vis the deficit country. To illustrate TARGET2 in Figure 10, the financial flows between households and RoEA ($\Delta B^*$ and $i^* B^*_t$) can be replaced by TARGET2 balances and, hence, equation (15) and (16) can be rewritten to:

$$\text{target}_t = (1 + i_{t-1} - \pi_t)\text{target}_{t-1} + nx_t$$

$$ca_t = \text{target}_t - \text{target}_{t-1}$$
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