The international platform of Ludwig-Maximilians University's Center for Economic Studies and the Ifo Institute

Working Papers
www.cesifo.org/wp

Explosive Target Balances

Niklas Potrafke
Markus Reischmann

CESIFO WORKING PAPER NO. 4297
CATEGORY 1: PUBLIC FINANCE
JUNE 2013

CESifo
Center for Economic Studies & Ifo Institute

CESifo *Working Paper No. 4297*

Explosive Target Balances

Abstract

Using the new unit root test by Phillips et al. (2011) we show that the Target balances of the German Bundesbank have been exploding from the beginning of 2009 to the beginning of 2013. By implementing a full-allotment policy and reducing the required minimum quality of collaterals in October 2008, the European Central Bank (ECB) refinanced credits in the GIIPS countries to a large extent. Private capital flowed out of the GIIPS countries (Greece, Italy, Ireland, Portugal and Spain), and the Target claims of the German Bundesbank increased significantly. If the Eurozone collapses, the German Bundesbank would lose its Target claims. Because the German Bundesbank would certainly request a recapitalization from the German federal government, German government debt might increase.

JEL-Code: C220, E500, E580, F320, F340, H630.

Keywords: Eurosystem, Target, recursive unit root test, explosiveness, hidden debt.

Niklas Potrafke
Ifo Institute – Leibniz-Institute
for Economic Research
at the University of Munich
Department of Public Finance
Poschingerstraße 5
Germany - 81679 Munich
potrafke@ifo.de

Markus Reischmann
Ifo Institute – Leibniz-Institute
for Economic Research
at the University of Munich
Department of Public Finance
Poschingerstraße 5
Germany - 81679 Munich
reischmann@ifo.de

June 06, 2013

1. Introduction

A topical issue throughout the European public debt crisis has been central banks' Target balances, "an accounting system hidden in remote corners of the balance sheets of Eurozone´s National Central Banks" (Sinn and Wollmershäuser 2012: 468). "Target" (Trans-European Automated Real-Time Gross Settlement Express Transfer) describes the European transaction settlement system which the commercial banks of one Eurozone country use to make payments to the commercial banks of another Eurozone country via the national central banks and the European Central Bank (ECB). Target balances describe claims and liabilities of the individual central banks of the Eurozone vis-à-vis the Eurosystem. The Target balances show the accumulated deficits and surpluses in each country's balance of payments with other countries in the Eurozone (Sinn and Wollmershäuser 2012).

Hans-Werner Sinn has called attention to the exploding Target imbalances in the Eurozone and has explored why Target imbalances threaten financial stability (see, e.g., Sinn and Wollmershäuser 2012). In April 2013, for example, the German Bundesbank held nominal Target claims of 608 billion euros. If the Eurozone collapsed, the German Bundesbank's basis for these claims would disappear, and the German Bundesbank would experience a loss. Because the German Bundesbank would certainly request a recapitalization, it is conceivable that the German federal government would increase taxes or decrease public pensions to finance the loss of the German Bundesbank. Alternatively, German government debt would increase. Target balances are thus part of the hidden government debt (Sinn 2012a, 2012b, 2013).

Scholars have investigated whether governments pursue sustainable fiscal policies by testing for stationarity of the real debt level or the debt-to-GDP ratio (e.g. Hamilton and

Flavin 1986, Kremers 1988, Wilcox 1989).[3] When the real debt level or the debt-to-GDP ratio contains a unit root, and is thus shown to be nonstationary, scholars describe fiscal policies to be not sustainable. Scholars also use unit root tests to examine the sustainability of external debt and current account deficits (e.g., Wickens and Uctum 1993). Sustainablity tests have as yet ignored hidden government debt such as the Target balances.

Phillips et al. (2011) have introduced a new unit root test on explosive behavior.[4] We use the new unit root test by Phillips et al. (2011) to investigate whether the Target balances of the German Bundesbank are explosive.

2. Hidden debt

Many studies elaborating on government debt and fiscal sustainability deal with non-contingent explicit debt, i.e. obligations that have a written legal basis and must be served in any event, as recorded in the government's accounting system. But governments also have implicit liabilities, i.e. obligations that do not have a written legal basis. Implicit liabilities are "moral" payment obligations of the government which arise as a consequence of public expectations and pressure from interest groups (Polackova 1998). Examples of implicit liabilities include future public pension payment obligations. Explicit and implicit government liabilities may be non-contingent or contingent. Non-contingent (or direct) liabilities give rise to a payment obligation in any event. Contingent liabilities are only realized if a particular event occurs (see, e.g., Polackova 1998, Brixi and Schick 2002, Giammarioli et al. 2007). Contingent explicit liabilities, contingent implicit liabilities, and non-contingent implicit liabilities that are not recorded in the government's accounting system describe hidden debt, which poses a risk to the sustainability of public finances (Hartwig Lojsch et al. 2011).

[3] Other approaches to test for fiscal sustainability include cointegration anaylsis of expenditures and revenues (see, e.g. Trehan and Walsh 1988) and fiscal reaction functions (see, e.g., Bohn 1998, Bohn 2008). On theoretical considerations of public debt sustainability see, e.g., Bohn (1995, 2007).

[4] Yoon (2012a, 2012b) has employed the unit root test by Phillips et al. (2011) and elaborates on explosive public debt and budget deficit in the United States.

The Target claims of the German Bundesbank are a contingent implicit liability of the German government. If Germany exits the Eurozone, the remaining Eurozone member countries would hardly be willing to repay the German Target credit and the German Bundesbank would lose its Target claim. If a country with a large Target liability (such as the GIIPS countries) exits the Eurozone and is not able to honour the liability, the remaining Eurozone countries would have to bear the loss according to their share in the ECB's capital. Germany would have to bear a share of 27 percent of the loss. The capital share, however, is endogenous and depends on how many countries leave the Eurozone. If the Eurozone collapsed, the German Bundesbank would lose its entire Target claim (see Homburg 2012, Cour-Thimann 2013).[5] The Target claims are an implicit liability because the German government would have the "moral" obligation to recapitalize the German Bundesbank in case of a loss of the Target claims. Against the background of the huge amount of the German Target claims, it is conceivable that German government debt would increase (Sinn 2012a, 2012b, 2013).[6]

3. Data

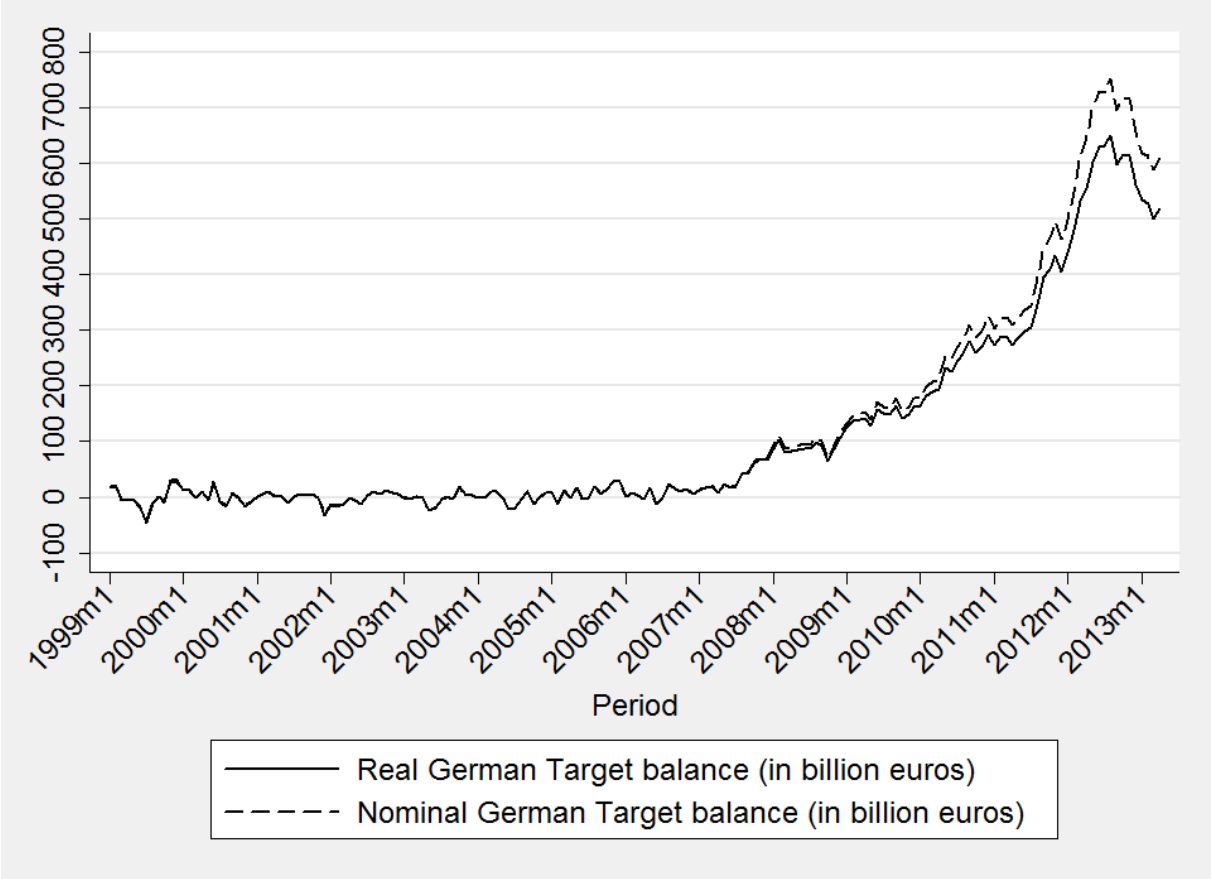
We use monthly data on the German Target balance compiled by the Ifo Institute. We deflate the nominal values by using the Harmonized Index of Consumer Prices (HICP) of the Eurozone. Figure 1 shows the nominal and the real German Target balance (in prices of 2005)

[5] De Grauwe and Ji (2012) do not believe that the German Bundesbank will experience a loss if the Target debtor countries do not repay their Target liabilities. De Grauwe and Ji (2012) argue that all money in the Eurozone is fiat money, which has a value independent of the corresponding national central bank's assets. In contrast, Sinn (2012b, 2013) maintains, that the Target claims do indeed pose a financial risk to the German Bundesbank.

[6] In July 2012 Moody's emphasized the contingent liabilities from the Target claims of the German Bundesbank when considering a downgrading of Germany: "The second and interrelated driver of the change in outlook to negative is the increase in contingent liabilities that is associated with even the most benign scenario of a continuation of European leaders' reactive and gradualist approach to policymaking. […] As the largest euro area country, Germany bears a significant share of these contingent liabilities. The contingent liabilities stem from bilateral loans, the EFSF, the European Central Bank (ECB) via the holdings in the Securities Market Programme (SMP) and the Target 2 balances, and – once established – the European Stability Mechanism (ESM)" (Moody's 2012).

from January 1999 to April 2013. The real Target claims (in prices of 2005) have increased drastically from 12 billion euros in January 2007 to 518 billion euros in April 2013.

Figure 1: Nominal and real German Target balance in billion euros



Note: Positive values of the Target balance describe a Target claim. Real values (in prices of 2005) are calculated with the Harmonized Index of Consumer Prices (HICP) of the euro area. Sources: Ifo Institute, Eurostat.

4. Empirical analysis

4.1 Empirical specification

We employ the recursive unit test proposed by Phillips et al. (2011) to examine explosive behavior in the real German Target balance. Phillips et al. (2011) use sequential right-tailed

augmented Dickey-Fuller (ADF) tests applied to subsamples with increasing observations (PWY test).[7] Our regression model takes the following form:

$$y_t = \alpha + \delta y_{t-1} + \sum_{i=1}^{k} \Phi_i \Delta y_{t-i} + \varepsilon_t, \text{ for } t = 1, \dots, [\tau T], \quad (1)$$

where y_t denotes the real Target balance in period t, α is an intercept, ε_t describes an error term, and k is the lag order. In our baseline model, we estimate equation (1) recursively by gradually enlarging the subsamples with one additional observation. In the first subsample we employ a fraction τ_0 of the total number of observations T=172. We set $\tau_0 = 0.2$ (i.e., the first sample has 34 observations). From equation (1) we obtain the ADF test statistic ADF_τ. SupADF is the maximum of ADF_τ over $\tau \in [0.2,1]$. We test $H_0: \delta = 1$ against the explosive alternative $H_1: \delta > 1$. We reject H_0 when supADF is above the right-tailed critical values provided by Phillips et al. (2012). To select the optimum lag length we use a sequential testing procedure as proposed by Campbell and Perron (1991). Starting with 10 lags we exclude lags that do not turn out to be statistically significant until the last included lag is significant at the 5% level and obtain an optimum lag length of four.[8]

4.2 Results

Table 1 shows the values of the ADF_1 and $sup_{\tau \in [\tau_0,1]} ADF_\tau$ test statistics when 0 to 10 lags are used.[9] The ADF_1 and the $sup_{\tau \in [\tau_0,1]} ADF_\tau$ test show that the German real Target claims have been explosive: we can reject the null hypothesis $H_0: \delta = 1$ at the 1% level for all lag lengths.

[7] Homm and Breitung (2012) evaluate alternative tests for explosive behavior and show that the PWY test is suitable to investigate explosive behavior. Homm and Breitung (2012) also show that the PWY test is more robust against multiple breaks than the other tests considered. On the size and power properties of the PWY test, see Phillips et al. (2013).

[8] The Akaike Information Criterion also selects an optimum lag length of four and the Schwarz Bayesian Information Criterion selects an optimum lag length of one. Ng and Perron (1995) show that the lag selection based on sequential tests has less size distortion and similar power compared to information-based rules. The date on which the Target balances became explosive changes by some months when we use one lag (see Table 2).

[9] ADF_1 corresponds to the standard ADF test over the full sample.

Table 1: ADF_1 and $sup_{\tau\in[\tau_0,1]}ADF_\tau$ test statistics for the real German Target balance

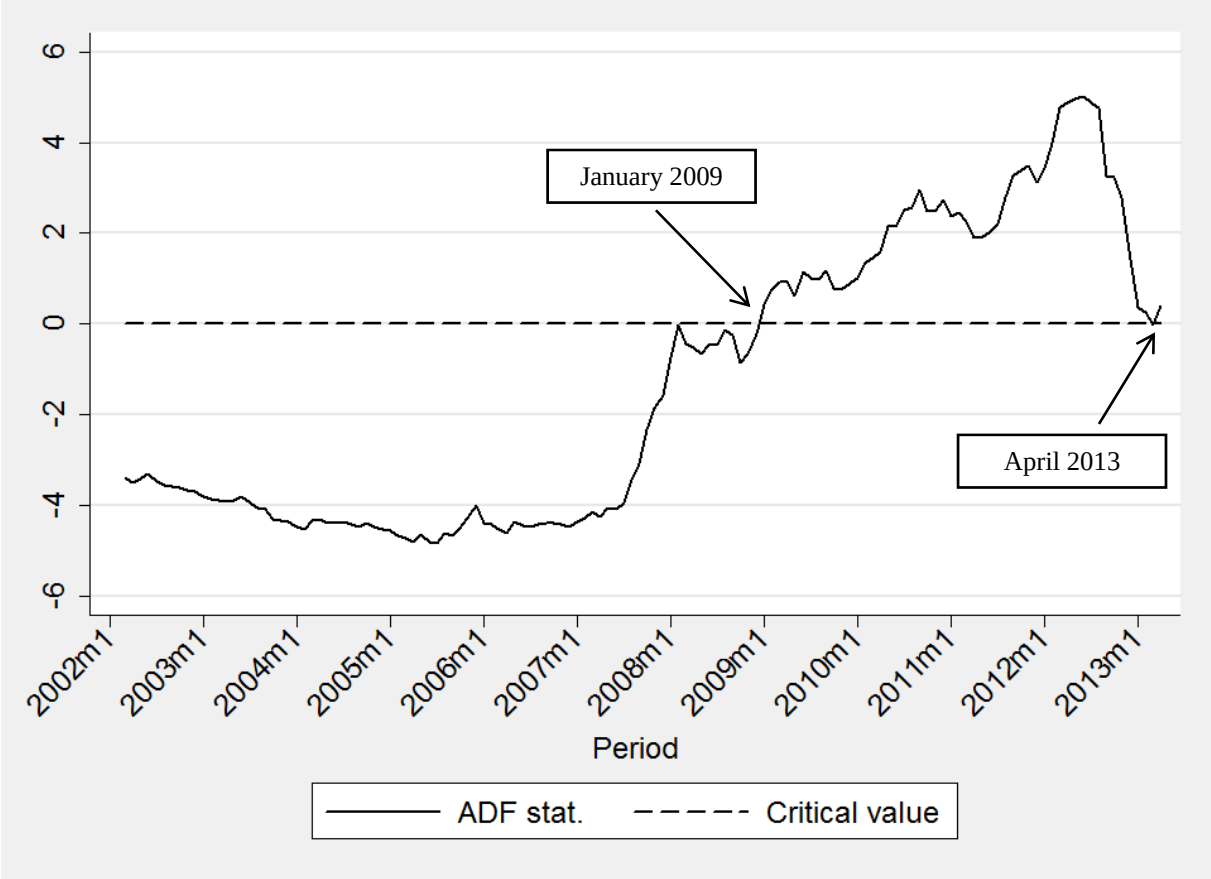
Test statistics		
Lags	ADF_1	$sup_{\tau\in[\tau_0,1]}ADF_\tau$
10	1.717	5.251
9	0.768	4.671
8	0.829	4.368
7	0.224	4.328
6	0.214	5.076
5	0.512	5.400
4	0.381	5.014
3	0.356	4.910
2	1.077	5.908
1	1.319	5.591
0	1.256	4.716
Upper tail critical values		
1%	0.63	1.95
5%	-0.06	1.39
10%	-0.42	1.10

$\boldsymbol{ADF_1}$ and $\boldsymbol{sup_{\tau\in[\tau_0,1]}ADF_\tau}$ test statistics for the German real Target balance for lag orders 0-10. The table also reports the corresponding critical values of the $\boldsymbol{ADF_1}$ test taken from Fuller (1996) for 100 observations and of the $\boldsymbol{sup_{\tau\in[\tau_0,1]}ADF_\tau}$ test taken from Phillips et al. (2013) for 200 observations. The sample period is 01/1999-04/2013.

To determine when the real German Target balance became explosive we follow Phillips et al. (2011) and compare the ADF_τ test statistics of the subsamples with their corresponding right-tailed critical values. We calculate the right-tailed critical values of the ADF test for every subsample using the formula $cv = ln(ln(\tau T))/100$ (Phillips et al. 2011). The critical values range between 0.013 and 0.016 (τT ranges between 34 and 172). The critical values are close to the 4% significance critical value of the standard ADF test provided by Phillips et al. (2011).[10] Our results indicate that the real German Target balance became explosive for the first time in January 2009 and exuberance peaked in June 2012. In March 2013, the real German Target balance was no longer explosive. In April 2013 the real German Target balance became explosive again (see Figure 2).

[10] The 4% critical value for the ADF test estimated by Phillips et al. (2011) is 0.01.

Figure 2: ADF_{τ} test statistics for the real German Target balance ($\tau_0 = 0.2$) from January 1999 to April 2013. Forward recursive regressions with 4 lags.

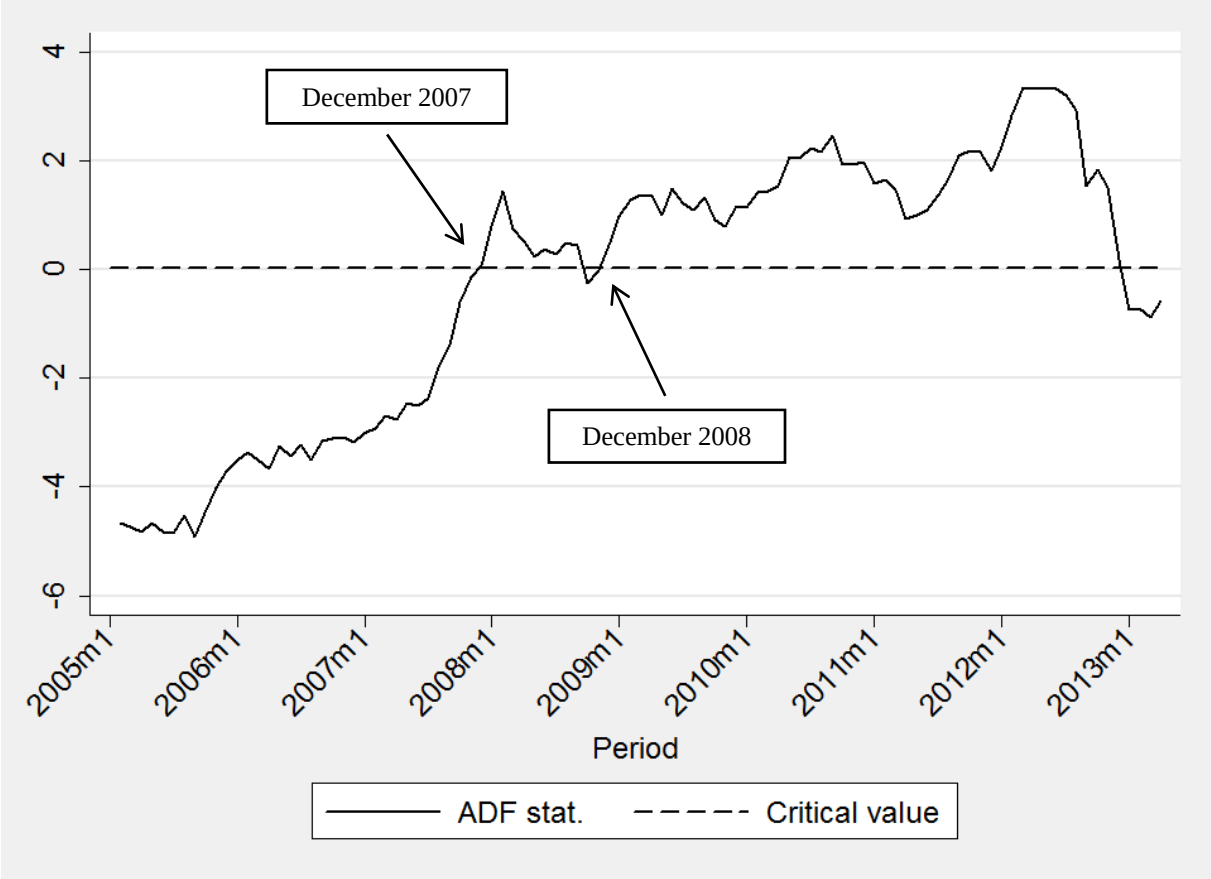


4.3 Robustness tests

As a robustness test we have employed rolling regressions. We have run each regression on a subsample of 40% of the full sample (i.e., 69 observations) and with the initialization date rolling forward. The test based on forward rolling regressions indicates that the real German Target balance became explosive in December 2008.[11] We also find explosive behaviour in the real German Target balance at the beginning of 2008 (see Figure 3).

[11] Alternatively we use moving subsamples of 30% and 50% of the whole sample (52 and 86 observations) and obtain very similar results.

Figure 3: ADF_τ test statistics for the real German Target balance from January 1999 to April 2013. Rolling regressions (68 observations used in each regression) with 4 lags.



We have used a Chow test for a structural break to identify the date when the real German Target balance became explosive. Homm and Breitung (2012) show that the Chow test has a higher power than the Phillips et al. (2011) test when there is only one regime shift. Our results indicate that a second regime shift occurred at the beginning of 2013. When we exclude the last four observations the break date with the largest Chow test statistic is January 2009. Over the full sample the break date with the largest Chow test statistic is October 2008. For multiple breaks, however, the new unit root test by Phillips et al. (2011) is more robust than the Chow test (Homm and Breitung 2012).

We have used the nominal German Target balance and obtain very similar results. Table 2 shows the explosive periods which we obtained in our different test procedures.

Table 2: Explosive periods of the German Target balance for real and nominal values using 1 and 4 lags

Data	Lags	recursive ADF	ADF rolling regressions (30% of the sample)	ADF rolling regressions (40% of the sample)	ADF rolling regressions (50% of the sample)
Real German Target balance	1	2009m6-2009m9, 2009m12-2013m4	2008m2 2009m2-2009m9, 2010m2-2012m11	2008m2 2009m1-2012m12	2008m2 2009m1-2009m4 2009m6-2013m4
	4	2009m1-2013m2 2013m4	2007m11-2008m9 2008m12-2012m11	2007m12-2008m9 2008m12-2012m12	2008m1-2008m9 2008m12-2012m12
Nominal German Target balance	1	2009m2 – 2013m4	2008m1-2008m3, 2008m8 2009m2-2009m9, 2009m12 2010m2-2012m12	2008m2, 2008m8 2009m1-2012m12	2008m2, 2008m82009m1-2013m4
	4	2008m2-2008m3, 2008m8-2008m9 2008m12-2013m4	2007m10-2008m9 2008m12-2012m11	2007m11-2008m9 2008m11-2012m12	2007m12-2008m9 2008m11-2012m12

5. Conclusion

Using the new unit root test by Phillips et al. (2011) we show that the Target balances of the German Bundesbank were explosive from the beginning of 2009 to the beginning of 2013.

Why is it that the Target balances have been explosive since the beginning of 2009?[12] In October 2008 the European Central Bank (ECB) implemented a full-allotment policy. The ECB provided any amount of credit to the commercial banks when the commercial banks were able to offer adequate collateral. The ECB also reduced the required minimum quality of collateral from A- to BBB- in autumn 2008 to enable the commercial banks to use the full-allotment facility, undercutting market conditions. The commercial banks of the GIIPS countries used the "cheap credit from the printing press" (Sinn) to replace the flow of credit from abroad that had financed the current account deficits and to redeem their maturing stocks

[12] In our robustness tests with rolling regressions we also find explosive behavior of the German Target balance at the end of 2007. In autumn 2007 the interbank market had broken down for the first time, the first commercial banks (Northern Rock) began to teeter, and interbank risk premia for the GIIPS countries rose sharply.

of interbank credit. The net payment orders from the GIIPS countries to Germany that resulted from the extra refinancing credit induced the exploding Target balances (Sinn and Wollmershäuser 2012, Sinn 2012a, 2012b).

The real German Target deficits have decreased since autumn 2012. In September 2012 the ECB announced the modalities of the Outright Monetary Transaction (OMT) scheme for buying government bonds to restore confidence in the GIIPS countries. In January 2013 repayments from the three-year longer-term refinancing operations (LTRO) started and reduced the outstanding amount of liquidity of the banks in the Eurozone (see Cour-Thimann 2013). The real German Target balance has not been explosive since March 2013.

An issue is whether the decreasing Target claims of the German Bundesbank and the decreasing Target liabilities of the GIIPS countries indicate that governments are pursuing sustainable fiscal policies. When the Target claims of the German Bundesbank decrease, German hidden government debt decreases. The decreasing Target liabilities of the GIIPS countries imply that capital is flowing back to the GIIPS countries. In Spain, however, the new capital was mainly invested in newly issued government bonds (Westermann 2013). The explicit non-contingent government debt in Spain increased. Increasing public debt gives rise to new risks to fiscal sustainability in the GIIPS countries.

In March 2013, the European Union and the International Monetary Fund tied a rescue package for Cyprus. The rescue package included a levy on bank deposits. When creditors do not trust in bank deposits in the GIIPS countries, capital is likely to flee from the GIIPS countries, and the German Target claims are likely to increase (Boysen-Hogrefe 2013). In April 2013 the real German Target claims increased again.

Consequently, when fiscal policies in the GIIPS countries are not sustainable and new European rescue packages are needed, it is conceivable that German explicit government debt will increase.

References

Bohn H. (1995) The sustainability of budget deficits in a stochastic economy, *Journal of Money, Credit and Banking* 27(1), 257-271.

Bohn H. (1998) The behavior of U.S. public debt and deficits, *Quarterly Journal of Economics* 113(3), 949-963.

Bohn H. (2007) Are stationarity and cointegration restrictions really necessary for the intertemporal budget constraint? *Journal of Monetary Economics* 54(7), 1837-1847.

Bohn H. (2008) The sustainability of fiscal policy in the United States, in: Reinhard Neck and Jan-Egbert Sturm (eds.) *Sustainability of Public Debt*, MIT Press, Cambridge, 15-49.

Boysen-Hogrefe J. (2013) Target2-Positionen nähern sich (vorerst) wieder an, *Wirtschaftsdienst* 93(4), April 2013.

Brixi H. P. and Schick A. (eds.) (2002) *Government at risk – contingent liabilities and fiscal risk*, Oxford University Press, New York.

Campbell J. Y. and Perron P. (1991) Pitfalls and opportunities: What macroeconomists should know about unit roots, in: *NBER Macroeconomics Annual* 6, MIT Press, Cambridge, 141-220.

Cour-Thimann P. (2013) Target balances and the crisis in the euro area, *CESifo Forum* 14 (Special Issue).

De Grauwe P., and Ji Y. (2012) What Germany should fear most is its own fear. An analysis of Target2 and current account imbalances, *CEPS Working Document* No. 368, September 2012.

Fuller W. A. (1996) *Introduction to statistical time series*, John Wiley, New York.

Giammarioli N., Nickel C., Rother P., and Vidal J.-P. (2007) Assessing fiscal soundness: Theory and practice, *ECB Occasional Paper* No. 56, March 2007.

Hamilton J. D. and Flavin M. A. (1986) On the limitations of government borrowing: A framework for empirical testing, *American Economic Review* 76(4), 808-819.

Hartwig Lojsch D., Rodríguez-Vives M., and Slavik M. (2011) The size and composition of government debt in the euro area, *ECB Occasional Paper Series* No. 132, October 2011.

Homburg S. (2012) Notes on the Target2 dispute, *CESifo Forum* Special Issue, January 2012.

Homm U. and Breitung J. (2012) Testing for speculative bubbles in stock markets: A comparison of alternative methods, *Journal of Financial Econometrics* 10(1), 198-231.

Kremers J. J. M. (1988) Long-run limits on the US federal debt, *Economics Letters* 28(3), 259-262.

Moody's (2012) *Moody's changes the outlook to negative on Germany, Netherlands, Luxembourg and affirms Finland's Aaa stable rating*, Global Credit Research, 23 July 2012, http://www.moodys.com/research/Moodys-changes-the-outlook-to-negative-on-Germany-Netherlands-Luxembourg--PR_251214?lang=de&cy=ger.

Ng S. and Perron P. (1995) Unit root tests in ARMA models with data-dependent methods for the selection of the truncation lag, *Journal of the American Statistical Association* 90(429), 268-281.

Phillips P.C.B., Wu Y., and Yu J. (2011) Explosive behavior in the 1990s NASDAQ: When did exuberance escalate asset values? *International Economic Review* 52(1), 201-226.

Phillips P. C. B., Shi S.-P., and Yu J. (2013) Specification sensitivity in right-tailed unit root testing for explosive behavior, *Oxford Bulletin of Economics and Statistics, forthcoming.*

Polackova H. (1998) Contingent government liabilities, *World Bank Policy Research Working Paper* 1989, October 1998.

Sinn H.-W. (2012a) *Die Target Falle*, Hanser, Munich.

Sinn H.-W. (2012b) Target losses in case of a euro break-up, *CESifo Working Paper* No. 3968, October 2012.

Sinn H.-W. (2013) Die Target-Verluste im Fall des Auseinanderbrechens des Euro – eine Replik auf De Grauwe und Ji, *ifo Schnelldienst* 1/2013.

Sinn H.-W. and Wollmershäuser T. (2012) Target loans, current account balances and capital flows: the ECB's rescue facility, *International Tax and Public Finance* 19(4), 468-508.

Trehan B. and Walsh C. E. (1988) Common trends, the government's budget constraint, and revenue smoothing, *Journal of Economic Dynamics and Control* 12(2-3), 425-444.

Westermann F. (2013) Sind fallende TARGET2-Salden ein Zeichen der Stabilisierung? Ökonomenstimme, 8 February 2013, http://www.oekonomenstimme.org/artikel/2013/02/sind-fallende-target2-salden-ein-zeichen-der-stabilisierung/.

Wickens M. R. and Uctum M. (1993) The sustainability of current account deficits, *Journal of Economic Dynamics and Control* 17(3), 423-441.

Wilcox D. W. (1989) The sustainability of governments deficits: implications of the present-value borrowing constraint, *Journal of Money, Credit and Banking* 21(2), 291-306.

Yoon G. (2012a) War and peace: Explosive U.S. public debt, 1791-2009, *Economics Letters* 115(1), 1-3.

Yoon G. (2012b) Explosive U.S. budget deficit, *Economic Modelling* 29(4), 1076-1080.