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**The True Size of the ECB:
New Insights from National Central
Bank Balance Sheets**

Charmaine Portelli

University of Malta

and

Birkbeck, University of London

Stephen Wright

Birkbeck, University of London

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Charmaine Portelli¹

Stephen Wright²

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Abstract

The balance sheet of the European Central Bank (ECB) represents a very small fraction (one-tenth) of the reported balance sheet of the Euro Area system as a whole. This paper presents evidence that the effective size of the ECB's balance sheet is massively higher than this, and indeed is significantly higher even than the reported balance sheet of the Eurosystem as a whole. We point to strong evidence that most NCBs (especially those of the larger countries) effectively act on autopilot, as branches of a near-monolithic institution which we term the "Mega-ECB". The lending behaviour of the "Mega-ECB" appears to have been driven primarily by the borrowing needs of the distressed countries of the EU's southern periphery.

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Keywords: central bank balance sheet, capital key, ECB, Eurosystem, national central banks, Target2,

¹ Department of Economics, University of Malta and Birkbeck College, University of London, charmaine.portelli@um.edu.mt

² Birkbeck College, University of London, s.wright@bbk.ac.uk

Introduction

How big is the ECB? According to the official data, the European Central Bank (ECB) represents only a very small fraction (one-tenth) of the reported balance sheet of the Euro Area system of National Central Banks (NCBs), known as the Eurosystem. This paper argues that the effective size of the ECB's balance sheet is significantly higher, and has grown even faster, than the reported balance sheet of the Eurosystem as a whole. We point to strong evidence that most NCBs (especially those of the larger countries) effectively act on autopilot, as branches of what we term the "Mega-ECB".

We are not the first to argue that the reported balance sheet of the Eurosystem understates its true size, because it nets off intra-Eurosystem balances (see for example Whelan, 2012 and Tornell, 2012). But the magnitude of this understatement has not as yet been quantified. We first do the quantification, and then examine the relationship between the true balance sheet and those of the NCBs. It is the nature of this relationship that leads us to refer to the concept of the "Mega-ECB".

We³ collate data from each of the NCBs' published balance sheets over the period 2006-2016, each of which includes data on intra-Eurosystem claims, and then aggregate to produce a new gross balance sheet of total Eurosystem assets (ESTA) that, in contrast to the official balance sheet data published by the ECB, does *not* net these claims. This total has a number of key features:

- It is (unsurprisingly) distinctly larger, and has grown more rapidly than the official published figure.
- This alternative measure reveals a strong systematic relationship with the balance sheets of NCBs, which suggests that these more or less run on autopilot: expanding their balance sheets closely in line with shares in the (ostensibly tiny) paid-up equity in the ECB. This relationship is much less evident in official published figures for the Eurosystem.
- This relationship leads us to view this alternative measure as the balance sheet of the "Mega-ECB" – a near-monolithic entity, whose balance sheet dwarfs that of the actual ECB.
- Over the period for which we have data, the lending behaviour of the "Mega-ECB" appears to have been driven primarily by the borrowing needs of the distressed countries of the EU's southern periphery.

The first part of the paper presents a new historical dataset of the balance sheets of all the nineteen individual NCBs and the ECB spanning over the 2006 to 2016 period drawing on annual central bank reports. Drawing on this dataset, a balance sheet of the Eurosystem is

³ One of the authors, Stephen Wright, wishes to acknowledge that all the hard work on this front, and indeed on the paper as a whole, was carried out by his co-author Charmaine Portelli.

compiled through a simple amalgamation of all the nineteen individual NCBs and the ECB – a detailed set of disaggregated accounts of the Eurosystem. This balance sheet is compared with the Eurosystem balance sheet as published by the ECB – a set of consolidated accounts of the Eurosystem. Our data show that the balance sheet of the Eurosystem as compiled in this way was significantly larger than that published by the ECB over the crisis period. This is because the ECB eliminates particular items on the balance sheet of the NCBs, mainly related to intra-Eurosystem transactions, as part of the consolidation process and therefore these do not feature in the Eurosystem balance sheet.

Based on the data presented here, the paper then compares the distribution of total assets amongst the NCBs and the distribution of the paid-up ECB capital. It shows that, for most NCBs, their shares in the (tiny) capital of the ECB, to a very good approximation, drive their shares of total assets. In other words, the NCBs appear to expand their balance sheet on auto-pilot, in line with their share of the capital of the ECB. This predictive power is striking particularly as the paid-up capital of the ECB accounts for a mere 0.1 per cent of total assets. On this tiny fulcrum, the ECB achieves effective control of a massively larger balance sheet: thus we refer to this as the balance sheet of the “Mega-ECB”. Strikingly, this relationship is distinctly stronger for the large NCBs while smaller NCBs illustrate at least some degree of autonomy.

We then show that if we examine the relationship between NCB balance sheets and the published balance sheet of the Eurosystem, the relationship is distinctly weaker. Nor indeed should this weaker relationship be surprising, since, as we also document, the behaviour of intra-Eurosystem balances varies very significantly between countries.

Finally, we examine some of the details of intra-Eurosystem transactions, as revealed by NCB balance sheets. In particular, we focus on the emerging pattern of lending and borrowing between countries as well as the relation between the different type of intra-transactions and the capital shares of the NCBs.

While the dataset is the cornerstone of the analysis of this paper, it also provides a detailed breakdown of the balance sheets of all NCBs within the Eurosystem, which offers scope for use in a wide range of empirical investigations. We are happy to make the dataset available for other researchers on request. It is also intended to lay the groundwork for our own econometric investigations of the nature of the link between the “Mega-ECB” and the NCBs.

1. A New Dataset of NCB Balance Sheets: 2006 - 2016

Since the onset of the financial crisis in 2007, despite their somewhat different focus, there has been a rapid ballooning of central banks' balance sheets: at their respective peaks, the Bank of England's balance sheet had grown by 398 per cent (Nov 2012), the Eurosystem's (as defined by the ECB) had grown by 196 per cent (Dec 2017); and the Fed's had grown by 421 per cent (Jan 2015). In the existing literature on the central bank's balance sheet, such as in Borio and Disyatat (2009), Lenza et al, (2010) and Pattipeilohy (2016), more attention has been paid to the published Eurosystem balance sheet in general than to the individual balance sheets of the NCBs. A simple explanation for this may be the fact that no detailed information is provided about the composition by country of the Eurosystem assets and liabilities besides the scattered dispersed information published by the individual NCBs in their annual financial accounts. Indeed, prior to 2016, the ECB used to publish only the consolidated Eurosystem balance sheet and not a disaggregation for each NCB. This paper goes back to the original NCBs' balance sheets, because only by looking at a breakdown of how the individual NCBs and the ECB contribute to the consolidated Eurosystem balance sheet can one reveal important aspects of the Eurosystem balance sheet developments that otherwise remain concealed.

In order to reach this aim, this paper presents a new dataset spanning the past 11 years and including a comprehensive record of the balance sheets of the individual NCBs and the ECB as published in their respective end-of-year financial accounts provided in their annual reports. We refer to the summation of the total assets of all NCBs and the ECB as 'Eurosystem Total Assets' in short 'ESTA'⁴. The complete dataset is presented in the Appendix to this paper and includes information on the main components of the asset and liability sides of the balance sheet of each NCB and the ECB for the 2006-2016 period.⁵

In a bid to strengthen the Eurosystem's accountability and transparency, as from July 2016, the Governing Council of the ECB decided to publish monthly breakdowns showing how the ECB and the NCB balance sheets contribute to the Eurosystem statistical balance sheet. However, this measure differs from ESTA since it includes a consolidation adjustment that nets out the intra-Eurosystem transactions. Indeed, Eurosystem total assets as published by the ECB, as noted earlier, are (unsurprisingly) significantly lower than the total we derive by summing the assets of all the NCBs and the ECB.

Table 1 shows total assets for each individual NCB and the ECB between 2006 and 2016. The year 2006 is chosen as a pre-crisis benchmark for these financial positions. Between 2006 and 2012, the ESTA almost tripled. The table shows that the Banque de France, Deutsche Bundesbank, Banca d'Italia, Banco de Espana and De Nederlandsche Bank jointly contributed

⁴ The term 'ESTA' refers to Eurosystem Total Assets defined as the summation of the Total Assets of all the NCBs and the ECB, without any netting of intra-Eurosystem balances.

⁵ The dataset is freely available on request from the authors.

towards three-quarters of this expansion in the ESTA. In contrast, the ECB itself contributed less than 4 per cent of the expansion of the ESTA.

Table 1: Eurosystem Total Assets (ESTA) (Euro Billions)

Country	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
AT	53.4	61.9	83.8	71.6	79.8	99.3	109.4	97.5	92.8	107.0	122.6
BE	82.8	112.4	153.2	101.5	74.7	127.7	109.8	77.8	75.5	89.0	131.2
CY			10.7	13.5	11.9	15.2	15.1	14.3	11.7	12.0	13.8
EE						3.1	4.3	4.3	6.0	6.7	6.8
FI	19.8	22.8	30.0	35.6	46.0	98.1	101.2	49.7	47.7	57.4	79.5
FR	232.2	360.7	553	506.1	481.6	709.3	731.8	550.0	577.7	710.4	845.4
DE	373.5	483.7	612.6	588.0	671.3	837.6	1,025.30	801.0	770.8	1012.0	1,393.0
GR	34.9	42.7	70.9	86.6	138.6	168.4	159.8	109.5	103.2	163.5	142.4
IE	40.3	53.5	116.1	124.9	204.5	176.2	137.5	108.1	81.3	77.2	82.8
IT	218.6	244.4	267.4	301.3	333.0	539.0	610.0	554.4	530.6	587.4	773.7
LU	52.4	59.0	100.6	77.0	79.7	127.2	120.4	118.6	117.1	159.0	200.9
MT			2.7	3.2	3.6	3.6	3.6	3.6	4.3	4.5	5.5
NL	67.2	102.1	114.6	131.2	133.4	266.6	254.4	158.5	140.2	210.4	290.3
PT	32.7	38.7	50.7	62.5	99.7	109.8	119.4	111.6	105.6	116.9	137.7
SK				25.4	25.5	27.2	24.7	22.1	23.1	23.1	27.9
SL		8.4	9.3	10.0	8.6	10.2	12.6	10.8	10.9	10.3	12.7
LT										11.3	14.5
LV									8.0	11.1	14.8
ES	137.8	175.2	209.0	218.0	202.6	355.6	549.7	381.0	359.3	444.9	577.0
ECB	105.8	126	383.9	138.0	163.5	230.9	207.3	174.2	185.3	256.6	349.0
ESTA*	1,451.4	1,891.5	2,768.7	2,494.4	2,758.0	3,905.0	4,296.1	3,347.0	3,251.3	4,070.7	5,221.3
Published Total Assets**	1,150.0	1,507.9	2,075.1	1,903.0	2,002.0	2,733.3	2,962.7	2,273.3	2,208.2	2,780.5	3,662.9

*Eurosystem Total Assets (ESTA) are calculated as the summation of the total assets of each national central bank and the ECB as published in the financial statements of the respective Annual Reports (including claims and liabilities between Eurosystem central banks).

**Total Assets as published by the ECB in the Annual Consolidated Balance Sheet of the Eurosystem, which comprises assets and liabilities of the Eurosystem NCBs and the ECB after netting out claims and liabilities between Eurosystem central banks.

Source: Annual Reports of the National Central Banks and the ECB

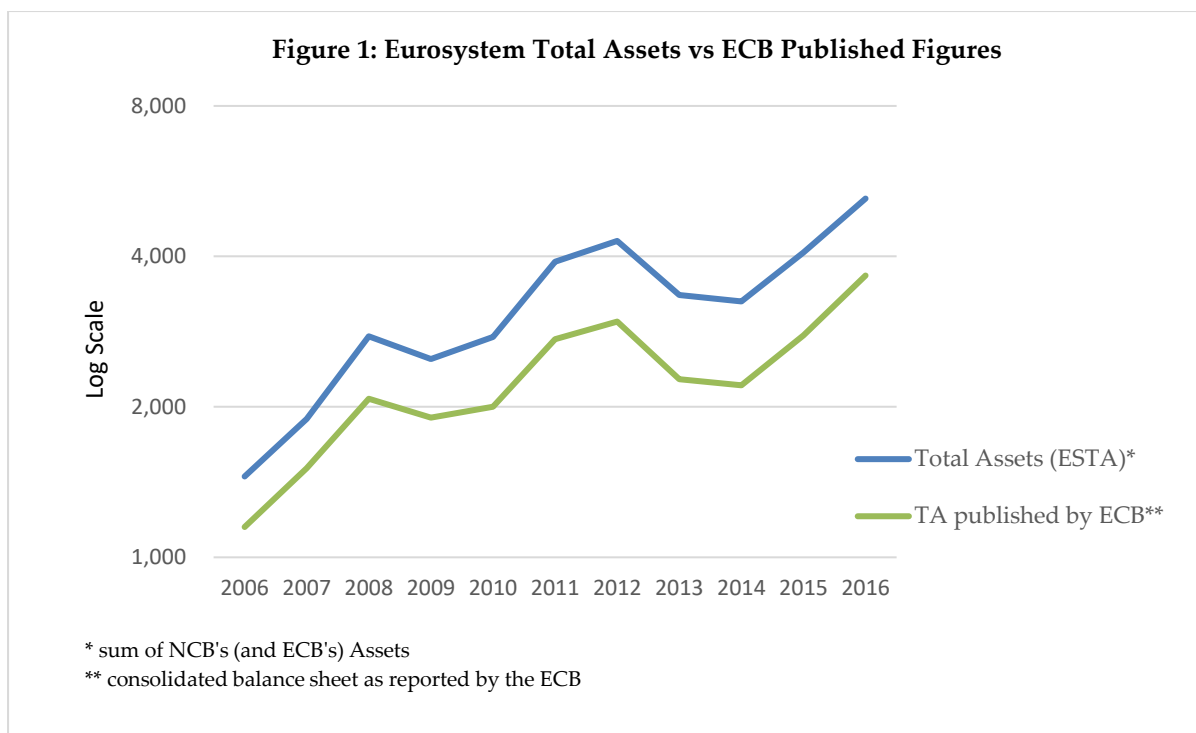


Figure 1 compares Eurosystem Total Assets (ESTA) as compiled in this dataset with the Eurosystem Total Assets as published by the ECB over the 2006-2016 period. Unsurprisingly, aggregation of the individual balance sheets of the NCBs results in a significantly larger total than that published by the ECB since the latter nets out intra-Eurosystem transactions. It also grew more rapidly, by 231 percent (Dec 2007-Dec 2017) compared to growth of 196 per cent in the official published figure, cited above.⁶ Figure 2 shows that the percentage gap between the two measures has expanded during almost the whole sample period, and is essentially entirely accounted for by intra-Eurosystem claims⁷.

The logic of this difference was noted in Whelan (2012): *'Target2 intra-Eurosystem balances disappear from the consolidated Eurosystem balance sheet, so the sum of all NCB balance sheets is greater than the Eurosystem balance sheet'*; however the data have not until now been collated to allow a direct comparison between the two measures.

Also evident from Figures 1 and 2 is the fact that, while there is no doubt that the Eurosystem balance sheet expanded significantly since 2007, the inclusion of intra-Eurosystem balances as a balance sheet item in the Eurosystem balance sheet (as compiled here) reveals a growing

⁶ Since our complete dataset only runs to end-2016, the figure for ESTA at Dec 2017 is an approximation based on data published in the disaggregated balance sheet of the ECB rather than calculated as the summation of all the NCBs plus the ECB as in the rest of the paper. However, this should be a close approximation since it captures intra-ES transactions which account for most of the discrepancy between the two versions of total assets.

⁷ The percentage gap between the two definitions of total assets registered a steady increase except for 2009 and 2016, when the gap was slightly lower than that noted in the previous year. In all years except 2008, intra-Eurosystem claims accounted for the entire difference between the two measures.

proportional gap between the two definitions of Eurosystem Total Assets. The nature of this expansion is investigated later on in the paper.

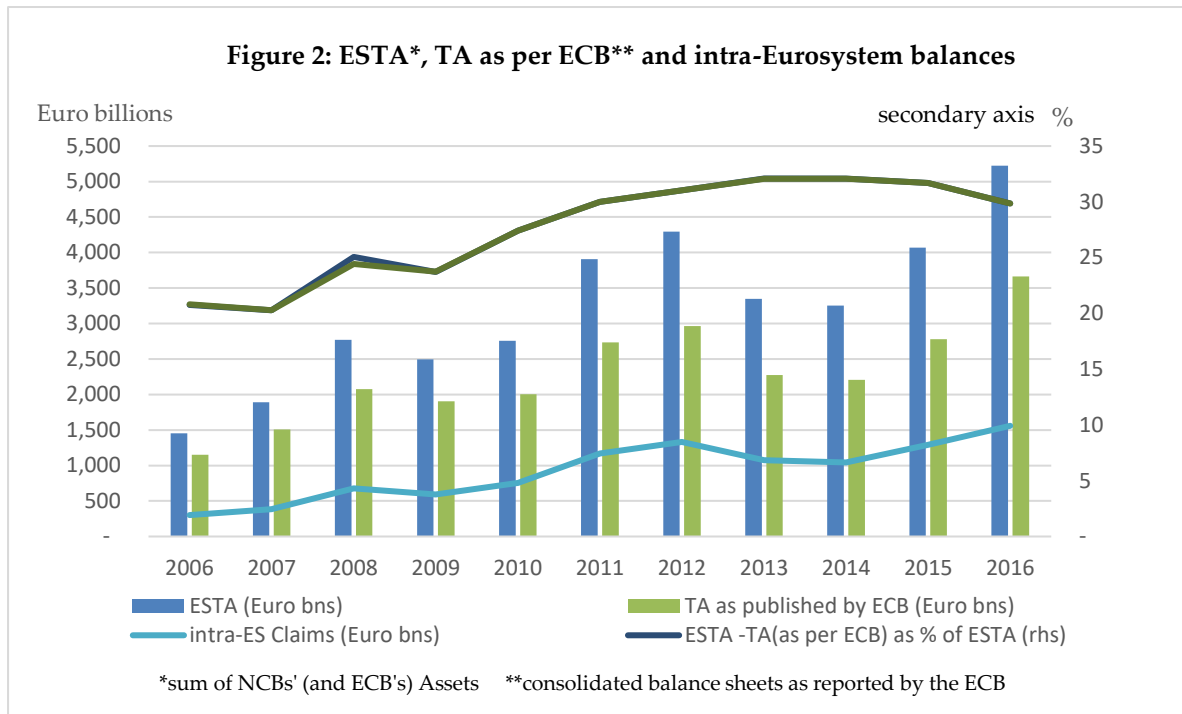
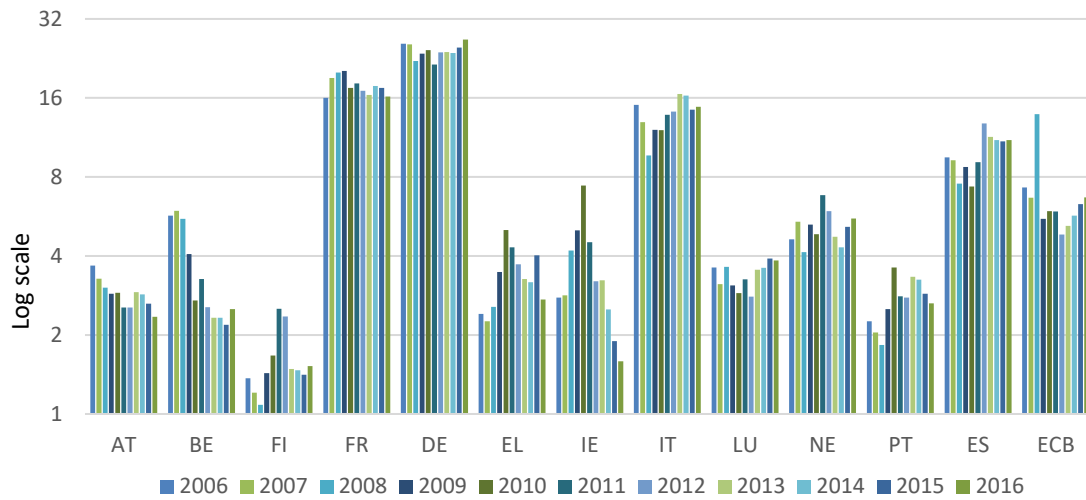


Figure 3 shows the share of each NCB in the Eurosystem balance sheet (defined by ESTA). The striking stability of these shares, especially for the larger NCBs is investigated further in Section 2 below.

Figure 3: Share of NCB's Total Assets to ESTA*



*share to ESTA defined as the sum of NCBs' (and ECB's) Assets

NCBs of Cyprus, Estonia, Malta, Slovenia, Slovakia, Latvia and Lithuania do not feature in this figure since their share of total assets to ESTA is relatively small.

The aim of the dataset presented here goes beyond offering an alternative definition of the Eurosystem Total Assets; it also provides a new perspective on the behaviour of national central banks (NCBs) within the Eurosystem, leading us to posit the existence of a “mega-ECB”, of which the NCBs simply act as local branches.

Tornell (2012) provides a motivation for our analysis. Despite that the Eurosystem balance sheet grew with a similar magnitude to that of other main central banks such as the Bank of England and the Fed⁸, as Tornell (2012) puts it: *‘this aggregate number, however, masks a huge cross-country asymmetry: central bank domestic credit to private banks in the Eurozone periphery has increased massively’*. Indeed, as illustrated in the Figure 4, the domestic credit of NCBs for Greece, Ireland, Italy, Portugal and Spain has increased eight-fold since 2006 (until 2012). This domestic credit creation has been financed by borrowing from other Euro Area NCBs facilitated by the Target2 mechanism – the leading European platform for processing large-value payments (see Section 5 for a detailed description). Figure 4 shows a notable similarity between the increase in NCB domestic credit and Target2 liabilities⁹. Therefore, Tornell (2011) suggests: *‘in order to analyse Eurozone dynamics, Target2 balances must be added as a new item in the standard textbook central bank’s balance sheet’*:

⁸ Such an expansion is even more accentuated if one follows the ESTA definition presented here.

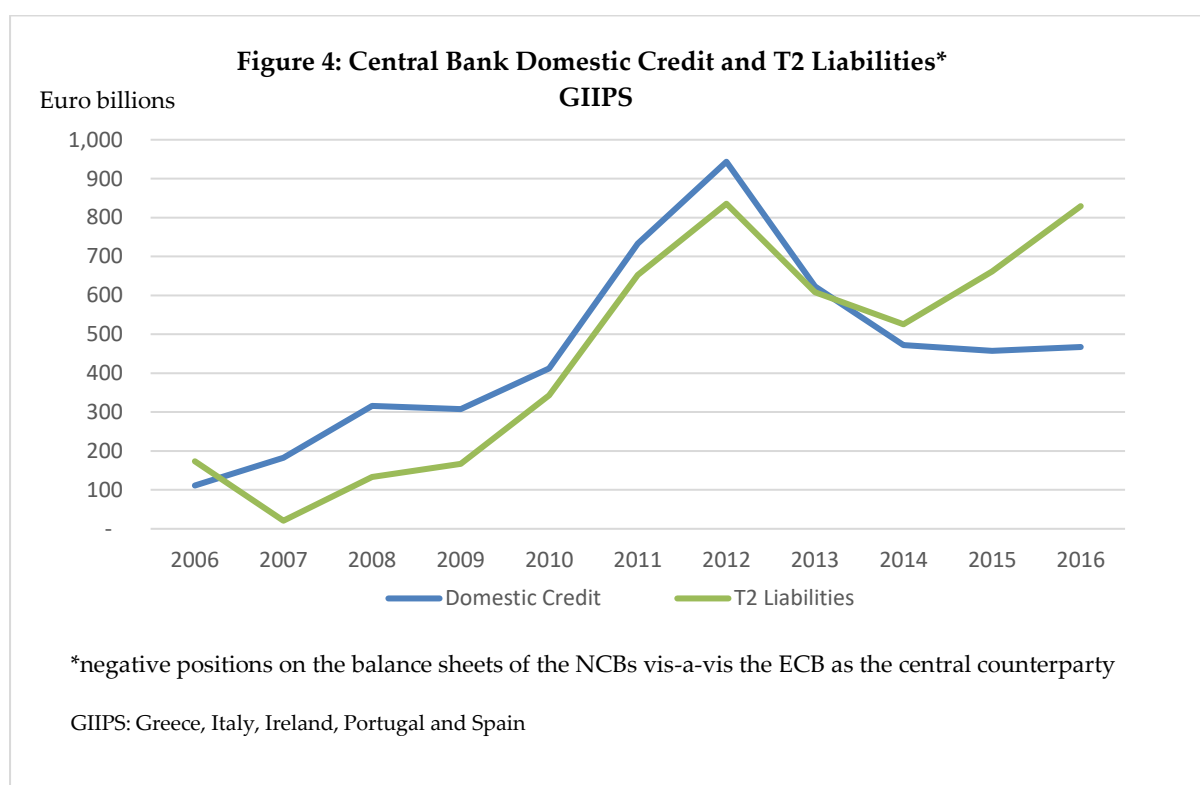
⁹ Target2 liabilities are defined by Tornell as: *‘automatic loans from the Eurosystem to a national central bank within the Eurosystem.’*

Table 2: Stylized Balance Sheet of a National Central Bank in the Eurozone

ASSETS	LIABILITIES
Credit to Domestic Agents	Money Balances
Gold and Reserves	Target2 Liabilities
Target2 Claims	

Source: Tornell (2012)

It is possible to ‘unmask’ this asymmetric behaviour only by digging deeper into the aggregate number.



The dataset presented in this paper allows investigation of the contribution of each National Central Bank to the Eurosystem and of the relationship between the NCBs and the ECB. Indeed, based on this dataset, the next section observes the relationship between the share of total assets of each NCB to the ESTA and their shares in the ECB’s paid-up capital. Subsequently, this dataset is used to investigate the relationship between the NCBs’ balance sheets and the published balance sheet of the Eurosystem.

2. Are National Central Banks on auto-pilot? The predictive power of the ECB's capital

Similar to any financially independent institution with its own legal personality, the financial endowment of the ECB is provided by its shareholders. However, the financial arrangements of the ECB are unique. Unlike any other central bank, the ECB's shareholders are the NCBs of all EU member states¹⁰, with each NCB owning a share of the ECB's equity. In other words, pursuant to Article 28 of the ESCB Statute, the NCBs are the sole subscribers to and holders of the capital of the ECB¹¹.

At the end of 2016, the total subscribed capital¹² of the ECB amounted to €10.8 billion, of which €7.6 billion had been paid-up by the Eurosystem NCBs and €0.12 billion by the non-Euro Area NCBs. Each NCB owns a notional share of the ECB's subscribed capital which is given formulaically by its "capital key": an equal weighting of the respective country's share in the total population and GDP of the EU¹³. But as a measure of the true shares in the equity of ECB, the officially published "capital key" is a fiction, given the gap between subscribed and paid-up capital. (The official capital key represents the notional share of each NCB in a counterfactual world where all EU countries had adopted the euro). In the calculations below, therefore, the shares of fully paid-up capital are, instead, considered as the true capital shares of each NCB in the ECB. A further minor adjustment¹⁴ is then carried out so that when we exclude the nine non-Euro Area NCBs, the capital shares of the Eurosystem members (based on the paid-up capital) are rebased to sum to 100 per cent. We refer to the resultant shares as the 'Adjusted Capital Key (ACK)'.

As an example, in 2016, while the Deutsche Bundesbank's official "capital key" was 18.0 per cent, its share of paid-up capital was 25.2 per cent. When the non-Euro Area countries are excluded, this share is then minimally adjusted upwards to 25.6 per cent (for details, see Appendix Table B1).

Since the ESTA includes the summation of the total assets of all NCBs as well as the total assets of the ECB, the latter was apportioned across the nineteen NCBs in order to eliminate the ECB. This implies that the level of total assets for each NCB was adjusted to include the apportionment of the ECB's assets. The adjusted total assets for each NCB are therefore larger than the level published in their respective Annual Reports. This apportionment was necessary so that when the ECB is not included in the analysis (such as when investigating

¹⁰ In turn, these NCBs are fully or substantially owned by their respective governments.

¹¹ The Eurosystem NCBs are required to pay up their subscribed capital in full while the non-Euro Area NCBs pay up only a minimal percentage (3.75%) of their subscribed capital as a contribution to the operational costs of the ECB.

¹² The subscribed capital of the ECB was originally set at ECU 5 billion. It is automatically increased when new Member States accede to the EU, pro rata to their weighting in the ECB's expanded capital key.

¹³ Article 29 of the Protocol on the Statute of the European System of Central Banks and of the European Central Bank annexed to the Treaty establishing the European Community (OJ C 191, 29.7.1992, p. 68).

¹⁴ Such adjustment makes a trivial difference, however, to the "capital key" based on the shares of the paid-up capital.

relationships with the capital key presented later on in this section) the nineteen NCBs assume a portion of the ECB's assets (as ECB part-owners) in order to reach the same level of ESTA (Appendix Table B1).

According to the framework set by the European System of Central Banks (ESCB) and the ECB, very few components of the NCBs' balance sheets are distributed amongst the central banks of the Euro Area members in line with their respective ECB capital key¹⁵. Indeed, for most of the components there is no formal regulation indicating the proportions in which the NCBs contribute towards the Eurosystem total assets. If a relationship exists between the composition by country of Eurosystem total assets and the adjusted shares of the NCBs in the ECB capital, it implies that the ECB capital, despite its relative small size, has the power to determine the size of the NCBs balance sheet. In other words, the ECB's capital base, despite its miniscule size, has very strong predictive power. Notwithstanding its fundamental implications, literature on this issue, so far, remains rather scarce. Ingram (2011) hints on this subject matter in his contribution to the book 'The Capital Needs of Central Banks': *'it may be that (NCBs) balance sheet contents will gradually tend towards harmonization; their components will tend to be distributed across the Eurosystem's consolidated balance sheet more in line with their capital key shares'*. This is, in fact, the subject matter investigated in this section.

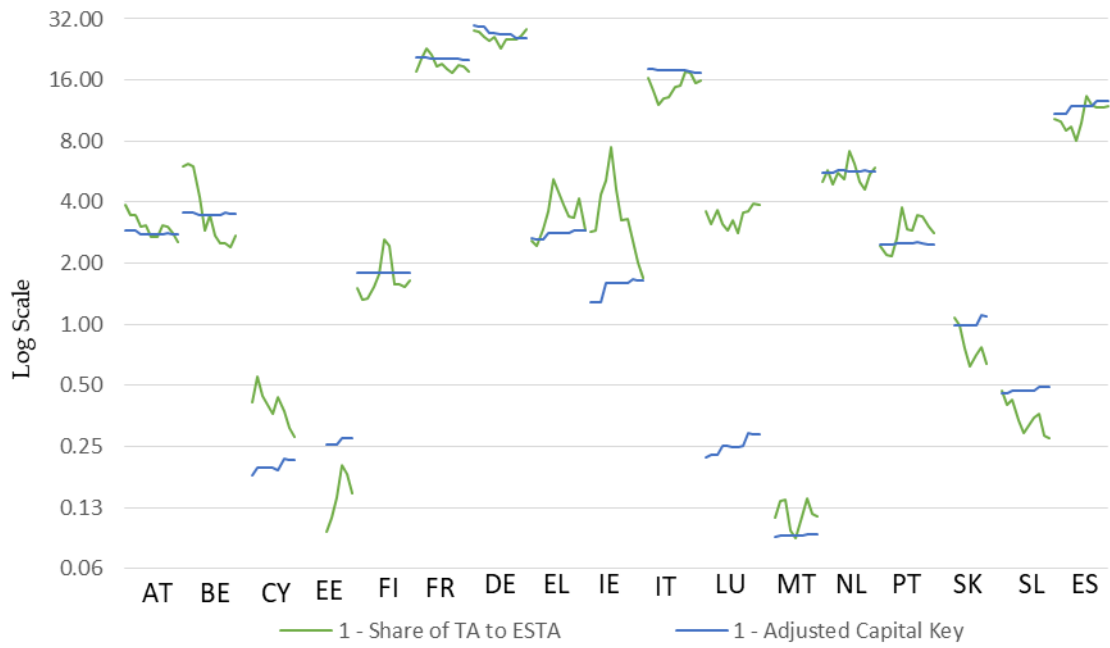
Figure 5 and Table 3 compare the shares of total assets of each NCB to the total assets of the Eurosystem (ESTA) to the adjusted capital key; while Figure 6 plots the actual and implied total assets for each NCB separately.

The key features revealed by Table 3 and Figures 5 and 6 are:

- For most NCBs, the adjusted capital key is close to the share of total assets (ESTA)
- This relationship is distinctly stronger for the larger National Central Banks.
- Even when the level of the share differs from the adjusted capital key (as, most strikingly, for Luxembourg), the growth rates of most NCB's assets still track the growth rate of ESTA quite closely.

¹⁵ The ECB's capital key is the mechanism for regulating the contribution of the ECB's foreign reserve assets, the allocation of its profits and losses, the allocation of the Eurosystem's monetary income and the allocation of the total euro banknote issue (Ingram, 2010).

Figure 5: Shares of ESTA* vs Adjusted Capital Key, 2006-2016**



*shares of NCBs' Total Assets to ESTA (sum of NCBs' and ECB's Total Assets)

**shares of NCBs in the ECB paid-up capital rebased after exclusion of non-EA NCBs

Table 3: The Actual Share of ESTA and the Adjusted Capital Key

Country		2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
AT	Actual Share of ESTA	3.89	3.47	3.43	3.02	3.06	2.71	2.68	3.06	3.01	2.80	2.53
	Adjusted Capital Key^	2.91	2.90	2.89	2.78	2.78	2.78	2.78	2.78	2.81	2.79	2.79
BE	Actual Share of ESTA	5.96	6.18	6.03	4.26	2.91	3.48	2.72	2.51	2.52	2.41	2.75
	Adjusted Capital Key	3.57	3.55	3.55	3.48	3.48	3.47	3.47	3.48	3.54	3.52	3.52
CY	Actual Share of ESTA			0.41	0.55	0.44	0.40	0.36	0.44	0.37	0.31	0.28
	Adjusted Capital Key			0.18	0.20	0.20	0.20	0.20	0.19	0.22	0.21	0.21
EE	Actual Share of ESTA						0.09	0.11	0.14	0.20	0.18	0.15
	Adjusted Capital Key						0.26	0.26	0.26	0.28	0.27	0.27
FI	Actual Share of ESTA	1.50	1.33	1.33	1.53	1.77	2.62	2.44	1.58	1.57	1.52	1.64
	Adjusted Capital Key	1.80	1.79	1.79	1.80	1.80	1.79	1.79	1.79	1.80	1.78	1.78
FR	Actual Share of ESTA	17.51	20.45	22.84	21.41	18.67	19.36	18.01	17.49	18.92	18.72	17.54
	Adjusted Capital Key	20.80	20.70	20.64	20.38	20.38	20.32	20.32	20.32	20.26	20.14	20.14
DE	Actual Share of ESTA	27.89	27.54	26.21	25.08	25.95	23.05	25.17	25.34	25.17	26.47	28.39
	Adjusted Capital Key	29.57	29.52	29.44	27.13	27.13	27.06	27.06	26.97	25.72	25.57	25.57
GR	Actual Share of ESTA	2.60	2.43	2.92	3.63	5.19	4.48	3.85	3.42	3.34	4.20	2.92
	Adjusted Capital Key	2.65	2.61	2.61	2.82	2.82	2.81	2.81	2.80	2.91	2.89	2.89
IE	Actual Share of ESTA	2.87	2.92	4.37	5.10	7.51	4.61	3.28	3.31	2.60	2.00	1.70
	Adjusted Capital Key	1.29	1.28	1.27	1.59	1.59	1.59	1.59	1.60	1.66	1.65	1.65
IT	Actual Share of ESTA	16.39	14.12	12.15	13.07	13.13	14.86	15.06	17.50	17.32	15.54	15.99
	Adjusted Capital Key	18.26	18.03	17.98	17.91	17.91	17.86	17.86	17.91	17.59	17.49	17.49
LU	Actual Share of ESTA	3.63	3.13	3.67	3.10	2.91	3.27	2.82	3.56	3.62	3.92	3.87
	Adjusted Capital Key	0.22	0.23	0.23	0.25	0.25	0.25	0.25	0.25	0.29	0.29	0.29
MT	Actual Share of ESTA			0.11	0.14	0.14	0.10	0.09	0.11	0.14	0.12	0.11
	Adjusted Capital Key			0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09
NL	Actual Share of ESTA	5.04	5.77	4.91	5.58	5.18	7.16	6.20	5.03	4.64	5.53	5.94
	Adjusted Capital Key	5.59	5.60	5.59	5.71	5.71	5.70	5.70	5.70	5.72	5.69	5.69
PT	Actual Share of ESTA	2.44	2.21	2.17	2.65	3.77	2.96	2.90	3.47	3.39	3.03	2.80
	Adjusted Capital Key	2.47	2.47	2.46	2.51	2.51	2.50	2.50	2.54	2.49	2.48	2.48
SK	Actual Share of ESTA				1.07	0.98	0.75	0.62	0.71	0.77	0.64	0.61
	Adjusted Capital Key				0.99	0.99	0.99	0.99	0.99	1.10	1.10	1.10
SL	Actual Share of ESTA		0.47	0.40	0.43	0.34	0.29	0.32	0.35	0.36	0.28	0.28
	Adjusted Capital Key		0.46	0.46	0.47	0.47	0.47	0.47	0.47	0.49	0.49	0.49
ES	Actual Share of ESTA	10.29	9.99	9.05	9.40	8.05	9.81	13.37	12.00	11.77	11.72	11.89
	Adjusted Capital Key	10.88	10.86	10.83	11.90	11.90	11.87	11.87	11.87	12.63	12.56	12.56

Figure 6: Actual Total Assets (ESTA) vs Implied Total Assets for each NCB

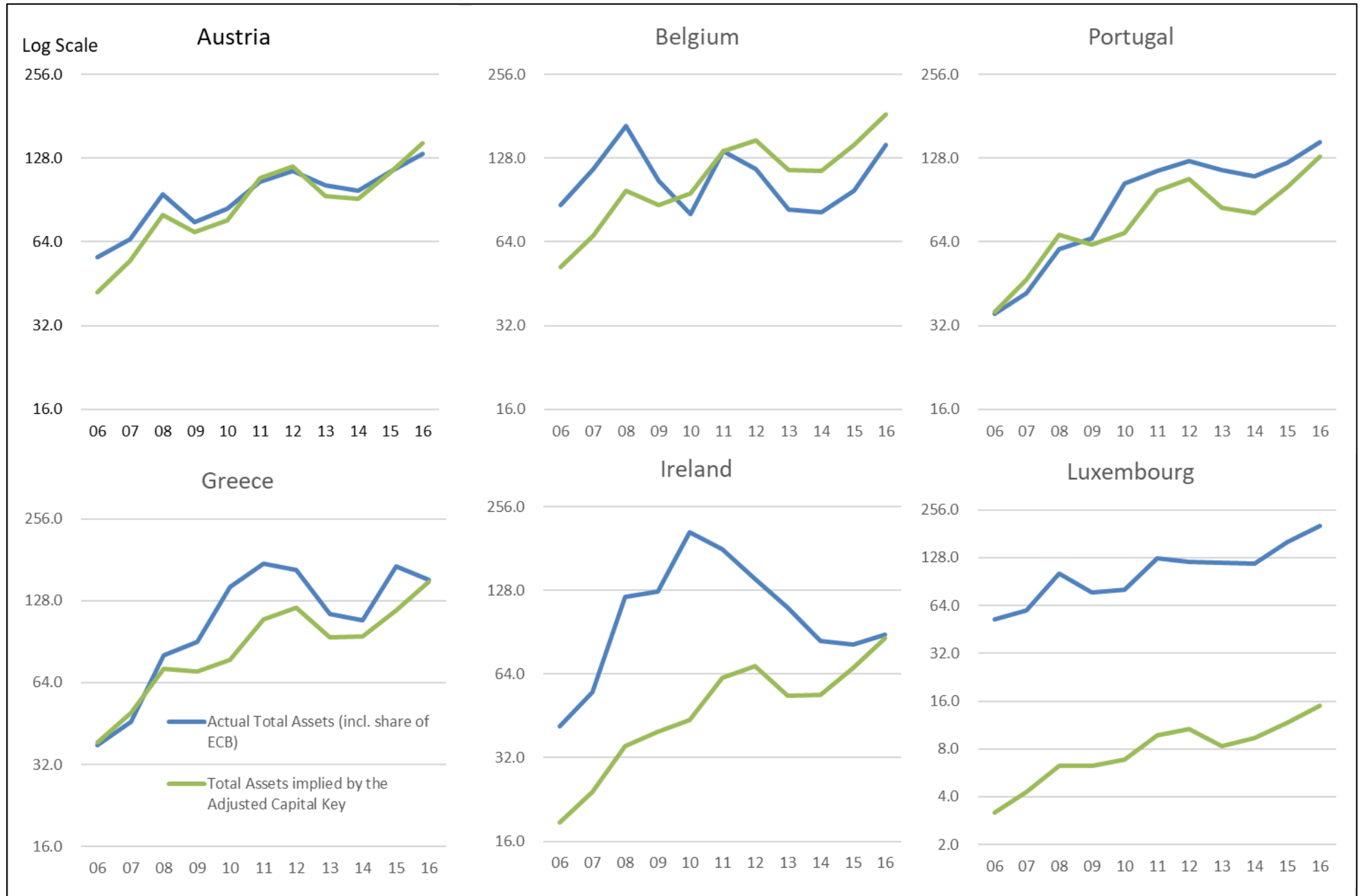


Figure 6 cont.: Actual Total Assets (ESTA) vs Implied Total Assets for each NCB

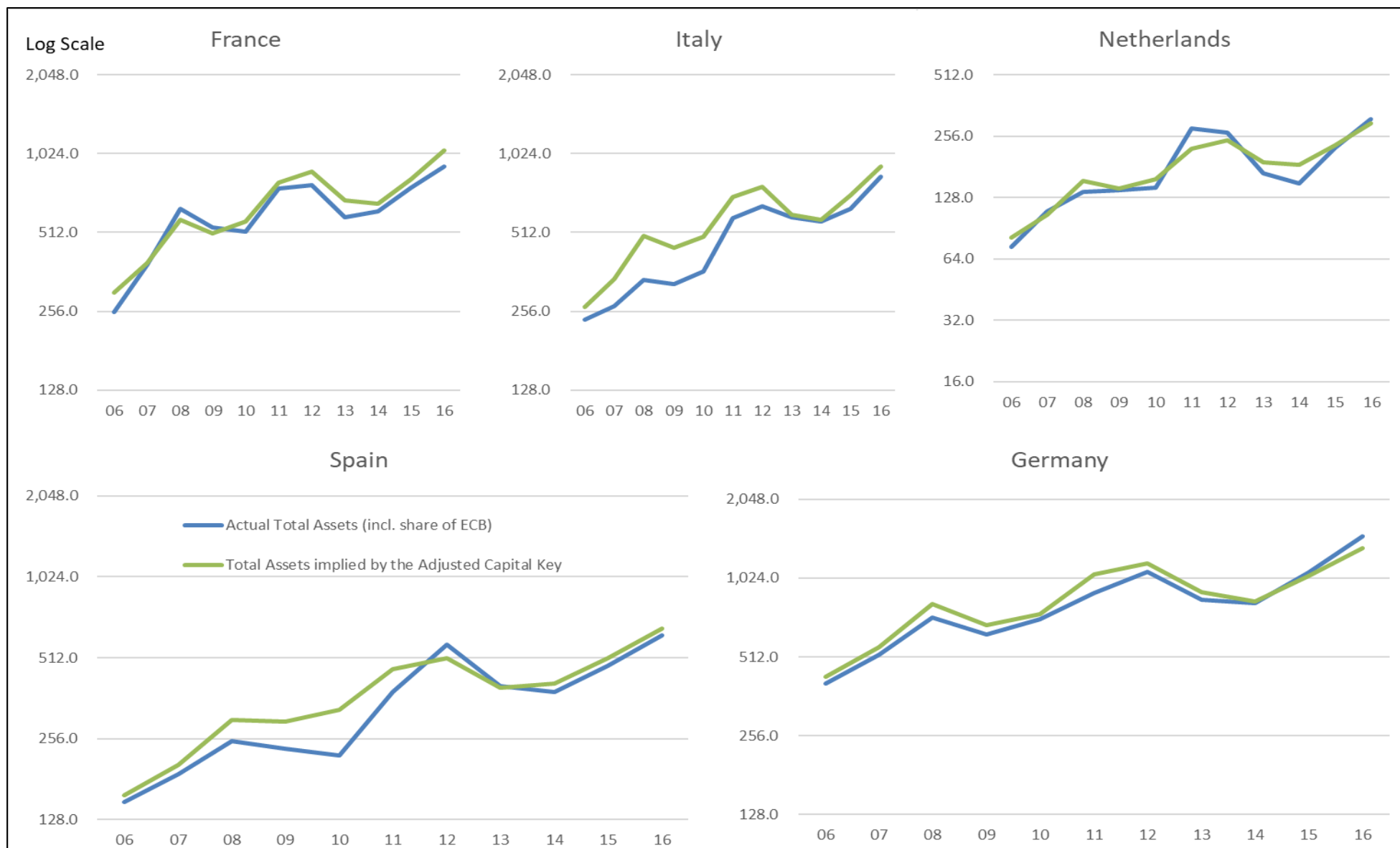


Figure 6 cont.: Actual Total Assets (ESTA) vs Implied Total Assets for each NCB

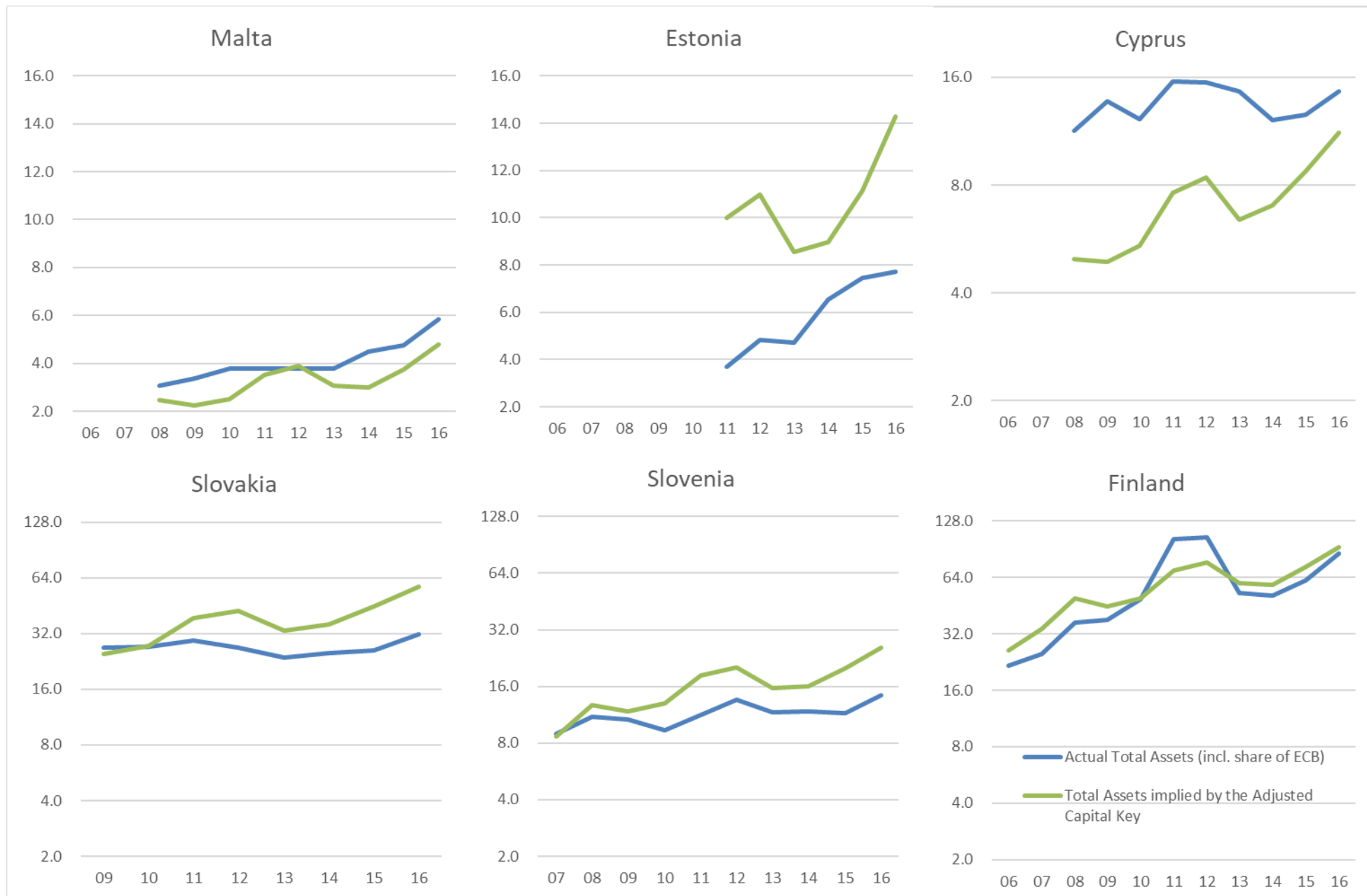


Table 3 shows that if we compare the ratio of actual total assets of each NCBs to total assets of the Eurosystem (ESTA) with the adjusted capital key of each NCB (implied shares of total assets), the differences are mostly quite small and stable. In the case of NCBs such as France, Germany, Netherlands and Austria the discrepancy between the actual share of ESTA and the adjusted share of the ECB capital decreased over time up to 2015, though widened slightly again in 2016. In the case of the central banks of Portugal, Ireland, Greece, Spain, Italy and Finland, the two ratios widened for the first few years of the crisis but got closer again over the more recent years as the crisis subsided.

It is evident from Figures 5 and 6 that the correlation between NCB shares of ESTA and the adjusted capital key is distinctly higher for the larger NCBs. This implies that as the true balance sheet of the Eurosystem expands, the relatively large NCBs expand in line. In contrast, the smaller is the NCB the weaker is the correlation between the ratio of total assets and the respective adjusted capital key. For instance, as the central banks of Germany, France and Italy are the largest three ECB owners, their level of total assets follow the level implied by the capital key very closely. The behaviour of the relatively large NCBs being distinct from that of the relatively small NCBs may be explained by the fact that their behaviour reflects the common good of the unified whole. On the other hand, as the behaviour of the relatively small NCBs will not lead to any material consequence on the “Mega-ECB” they can act as free riders. The more significant deviations by the relatively smaller NCBs between their actual total assets and that implied by the adjusted capital key may indicate some level of autonomy in their behaviour which is not evident in case of the larger NCBs.

It is clear that a close, albeit not perfect, relationship exists between the share of total assets of the NCBs to ESTA and their adjusted share of the ECB capital in case of nearly all the NCBs.¹⁶ This result is even more striking since the paid-up capital of the ECB constitute an extremely small proportion of the ESTA¹⁷, a mere 0.1 per cent. This implies that the activities of the NCBs are driven by their adjusted share of the ECB capital; shedding doubt on whether NCBs have any discretion to determine the size of their own balance sheets.

Our conclusion from this relationship is that to a quite good approximation the NCBs are effectively operating on auto-pilot: expanding their balance sheets in line with the total balance sheet of what we therefore refer to as the “Mega-ECB”.

¹⁶ This result is strongly supported by preliminary econometric investigations: panel regressions of $\log(\text{NCB assets})$ on $\log(\text{ESTA})$ result in slope estimates trivially different from unity.

¹⁷ The total balance sheet size of the ECB stood at €349.0 billion at the end of 2016, implying a ratio of paid-in capital (as of end-2016) to total assets of 2 per cent. In turn, the total assets of the ECB constitute almost 7 per cent of the Eurosystem total assets (ESTA).

3. An anatomy of intra-Eurosystem transactions

Having described how the summation of all the NCBs and the ECB balance sheet (the ESTA) differs from the Eurosystem balance sheet published by the ECB, this section focuses on the impact of intra-Eurosystem transactions on the balance sheet of individual NCBs. Most of the literature discusses only one particular sub-component of these intra-Eurosystem balances, namely TARGET2. Nevertheless, as considerable balances may arise in the other sub-components, an investigation of all the main sub-components of these intra-Eurosystem balances is carried out in Section 5.

As discussed earlier, the balance sheet item ‘intra-Eurosystem claims/liabilities’ do not feature in the Eurosystem consolidated balance sheet published by the ECB. However, this item appears on the NCBs’ balance sheets and is therefore included in the Eurosystem balance sheet compiled in this paper as the aggregation of the NCB’s balance sheets. For this reason, the sum of all the NCBs’ balance sheets is greater than the Eurosystem balance sheet as published by the ECB. This observation, which is also noticed by Whelan (2012), is evident graphically in Figure 1 above which compares the ESTA (the sum of the NCBs balance sheets) and the consolidated Total Assets – as published by the ECB.

Since the beginning of the global financial crisis, the size of the NCB’s balance sheets has changed significantly. A closer look at the NCB’s balance sheets reveals the role that developments in the intra-Eurosystem claims/liabilities had in these balance sheet expansions. In particular, the size of the balance sheet of the Bundesbank (as measured by total assets), which represents to around one quarter of the total Eurosystem balance sheet, more than tripled between the end of 2006 and the end of 2016. A closer look at the balance sheet reveals that around ninety per cent of this expansion was attributed to the intra-Eurosystem claims by the Bundesbank. Similarly, the size of the balance sheet of the central bank of Netherlands more than quadrupled over the same period, with half of this expansion reflecting increases in intra-Eurosystem claims.

The counterpart of these developments on the Bundesbank’s and the Netherland central bank’s balance sheet are the periphery’s intra-Eurosystem liabilities. Indeed, a significant increase in intra-Eurosystem liabilities financed almost three quarters of the expansion on the balance sheet of Greece, which more than quadrupled during the 2006-2016 period. Similarly, the balance sheets of the central bank of Italy tripled while that of Portugal and Spain quadrupled, financed by a robust expansion in their intra-Eurosystem liabilities.

For ten of the Eurosystem’s NCBs, intra-Eurosystem claims/liabilities are the largest item on the balance sheets either on the asset side or on the liabilities side. By the end of 2016, this balance sheet item totalled more than one and a half trillion euros in aggregate claims or aggregate liabilities, equivalent to roughly 14 per cent of Euro Area GDP, more than quadrupling since 2006.

Figure 7 shows that the intra-Eurosystem claims of both Germany and the Netherlands comprised around half of their balance sheet over the past recent years, or around twenty per cent of their GDP. On the liabilities side, it shows that the intra-Eurosystem liabilities were around half the size of the balance sheets of the central banks of Greece, Italy, Portugal and Spain.

Figure 7: Intra-Eurosystem Balances

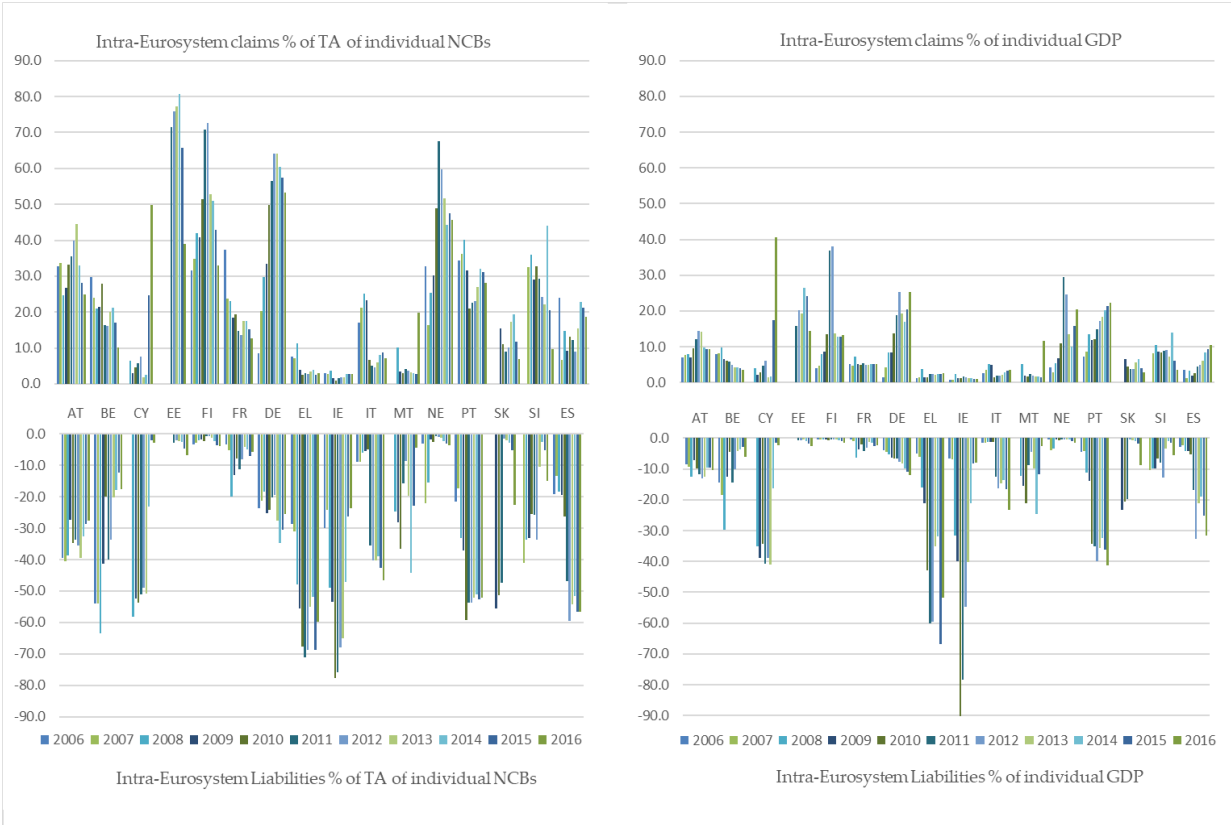
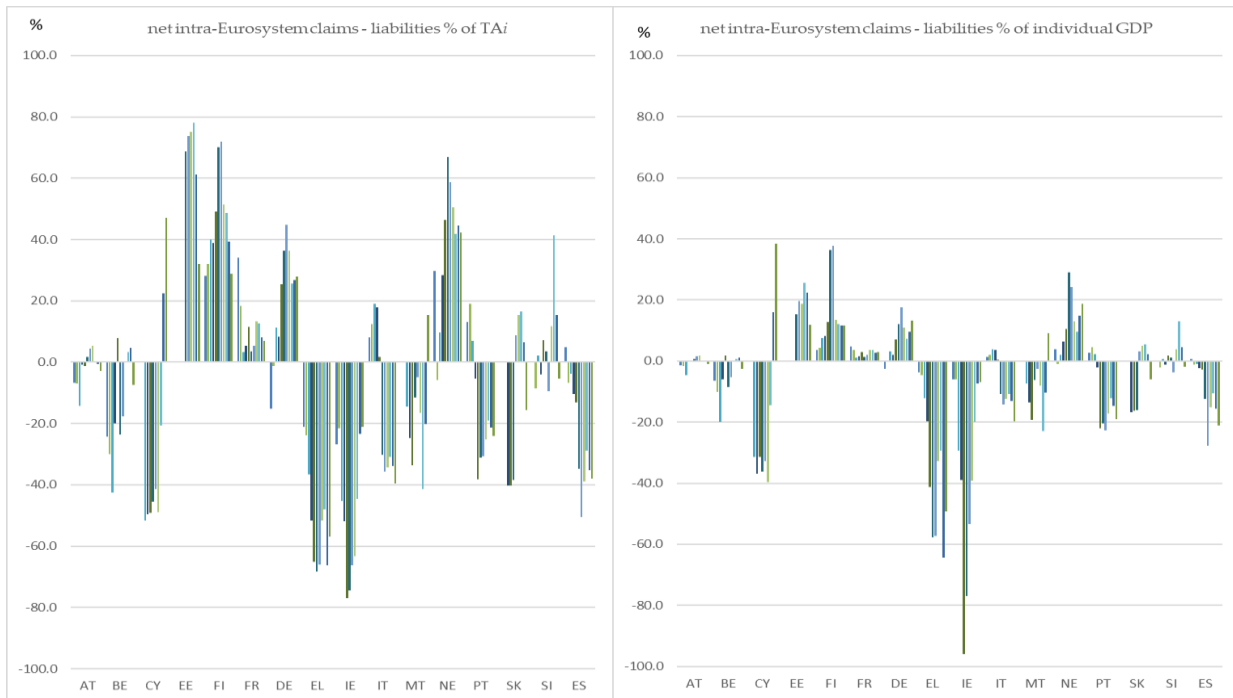


Figure 7 also shows that each NCB balance sheet includes an intra-Eurosystem balance on the asset side as well as an intra-Eurosystem balance on the liability side. However, typically, an NCB has either mostly intra-Eurosystem claims or mostly intra-Eurosystem liabilities. Figure 8 shows the net intra-Eurosystem balance (intra-Eurosystem claims less intra-Eurosystem liabilities) which is equivalent to the netting-out of the top panel of Figure 7 with the corresponding bottom panel. For most NCBs, the net intra-Eurosystem balance remains significant when compared to their respective total assets (see also Appendix Chart C1). The balance sheets of the central banks of Germany, Finland and the Netherlands reveal a net intra-Eurosystem balance (claims) equivalent to more than one quarter of their balance sheets. On the other hand, net intra-Eurosystem liabilities are very significant in the case of the central banks of Greece, Italy, Spain and Ireland (approaching 100 per cent of GDP at its peak).

Figure 8: Net intra-Eurosystem Balances



The offsetting of intra-Eurosystem claims and intra-Eurosystem liabilities may conceal important interpretations of developments in intra-Eurosystem claims/liabilities. Moreover, intra-Eurosystem claims/liabilities are made up of more than one component and therefore, intra-Eurosystem claims/liabilities may materialize due to different reasons. This implies that an investigation of the sub-components of the intra-Eurosystem balances merits consideration and is therefore the subject matter of Section 5.

4. The NCBs' Balance Sheets and the Eurosystem Balance Sheet as published by the ECB - the weaker link

This section investigates whether a relationship exists between the capital key and the distribution of the Eurosystem total assets among the NCBs when the intra-Eurosystem transactions are eliminated in the process of consolidating total assets for the Eurosystem¹⁸ as published by the ECB.

As identified earlier, a relationship exists between the contribution of each NCB towards Total Assets of the Eurosystem (ESTA) and their respective adjusted share in the ECB capital. In this section, a similar investigation is carried out to determine whether such a relationship remains

¹⁸ All claims and liabilities between Eurosystem central banks, including the ECB, are netted out and are not presented at all in any of the Eurosystem's consolidated financial statements published by the ECB.

evident when intra-Eurosystem balances are not taken into account. In other words, a comparison is made between the share of consolidated Total Assets as published by the ECB after deducting intra-Eurosystem claims for each NCB¹⁹ and the respective adjusted capital key. An examination of such a relationship is only possible on the basis of the collection of the dataset described in Section 2 above, since, prior to 2016, the ECB used to publish only the consolidated Eurosystem balance sheet and not a disaggregation for each NCB.

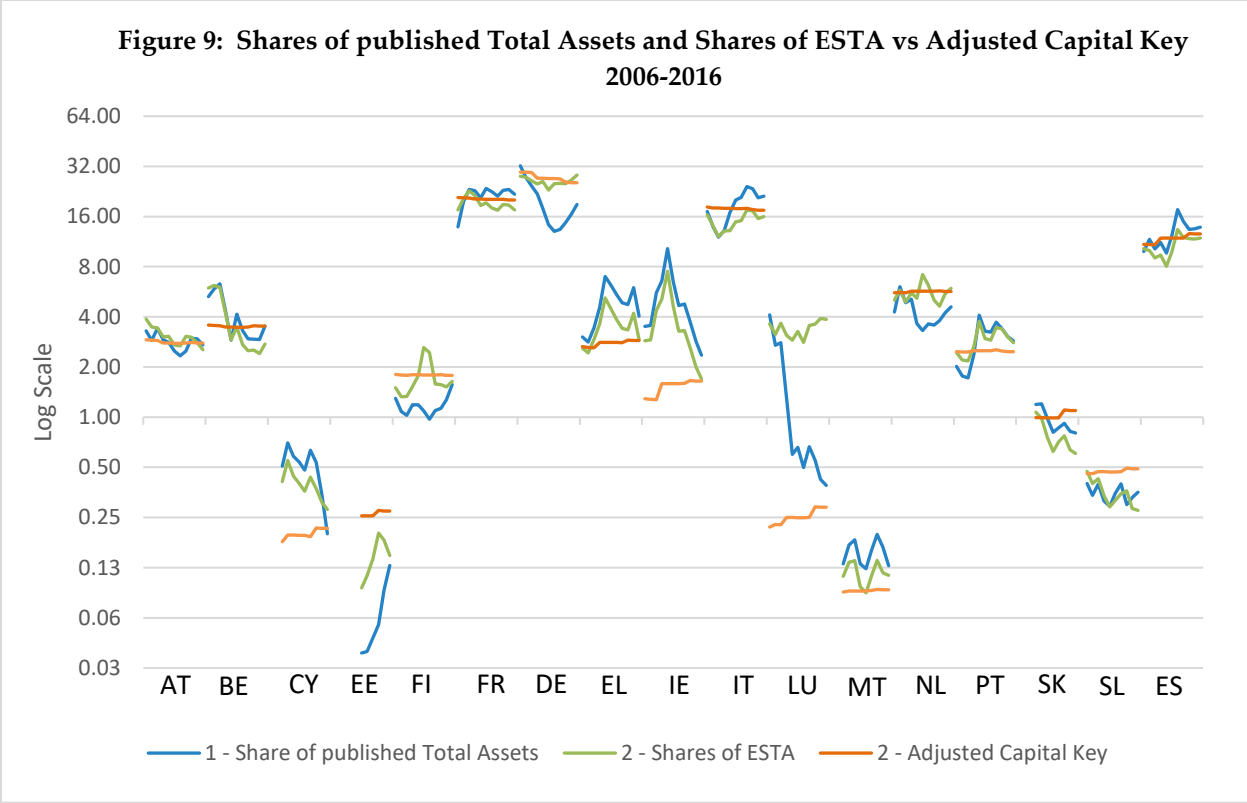
As discussed in the previous sections, the difference between the Eurosystem Total Assets published by the ECB and that calculated by summing up all the balance sheets of the NCBs and the ECB is entirely accounted for by intra-Eurosystem claims. This latter item comprised around 21 per cent of total assets in 2006 but grew up to 31 per cent by 2016 (Figure 2), also explaining the widening in the divergence between the two datasets of the Eurosystem balance sheet.

Based on the same methodology as that applied in Section 2, a comparison is made between the actual total assets less intra-Eurosystem claims of each NCB with those predicted by applying the adjusted capital share of each NCB to the ESTA less intra-Eurosystem claims²⁰ for the 2006-2016 period. Therefore, different from the earlier analysis, the intra-Eurosystem balances are here consolidated.

As evident in Appendix Table B5, the shares of actual total assets less intra-ES claims and the adjusted capital key for each NCB are close or get closer over time in most of the cases. This observation is similar to that made earlier in the case of TA (including intra-ES claims). However, it is noteworthy, that in the case of Germany, Greece and Italy, the divergence between their share of actual total assets excluding intra-ES claims and their respective capital key widens over time (Appendix Table B6). In the case of Germany, the share of total assets (excl. intra-ES claims) fails to sustain the level recorded prior to the crisis, which was relatively close to the Germany's adjusted share of ECB capital. In contrast, in 2016, in the case of Italy and Greece, the share of their assets (excl. intra-ES claims) exceeded their respective adjusted share in the ECB capital (see Figure 9 and 10). A graphical investigation (Appendix Chart C2) into the relationship between shares of total assets excluding intra-ES liabilities and the adjusted capital key also indicate that there is a weak link between the two.

¹⁹ Based on the definitions explained earlier, the summation of Total Assets less intra-Eurosystem claims for each NCB is equal to Total Assets as published by the ECB in the consolidated Eurosystem balance sheet.

²⁰ Based on the methodology applied earlier, the ESTA less intra-Eurosystem claims is calculated as the summation of total assets of all NCBs plus an apportionment of the ECB Total Assets less the summation of the intra-Eurosystem claims of all NCBs and the ECB.



At this juncture, it is interesting to analyse how the exclusion of intra-ES claims from total assets affects the closeness of the share of total assets to the adjusted share of the ECB capital. If one were, therefore, to compare the observations presented in Section 2 to those presented here, it is evident that, with some exceptions, total assets including intra-ES claims follow the adjusted share of the ECB capital markedly more closely than when intra-ES claims are excluded. Most noticeable is the case of Germany. As the central bank of Germany's total assets accounted for 28.4 per cent of ESTA in 2016, the bank's adjusted share of the ECB capital stood at a close 25.6 per cent. However, when intra-ES claims are excluded, the share of total assets declined to 16.5 per cent in 2015 and 18.9 per cent in 2016. That is, as we show below, the Bundesbank very significantly increased its lending to other NCBs. This implies that the central bank of Germany sustained a share of total assets in line with its adjusted capital key but this relationship is disguised when intra-ES claims are consolidated. In contrast, a minimal level of intra-ES claims on the balance sheet of the central bank of Greece explain the fact that, by 2016, the share of total assets exceeded the adjusted capital key for Greece when intra-ES claims are excluded.

Figure 10: Actual Total Assets (excl. intra-ES balances) vs Implied Total Assets (excl. intra-ES balances) for each NCB

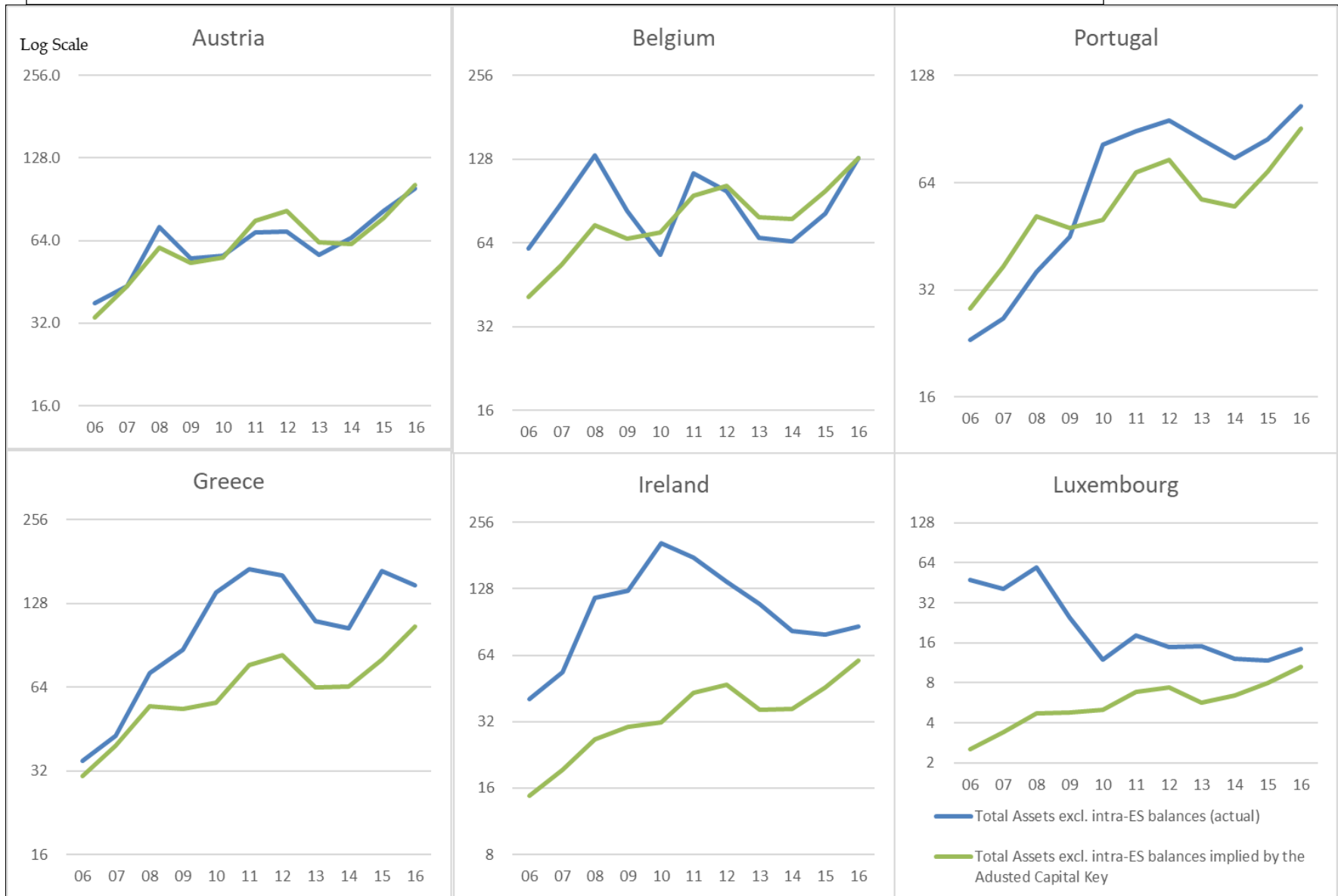


Figure 10 cont.: Actual Total Assets (excl. intra-ES balances) vs Implied Total Assets (excl. intra-ES balances) for each NCB

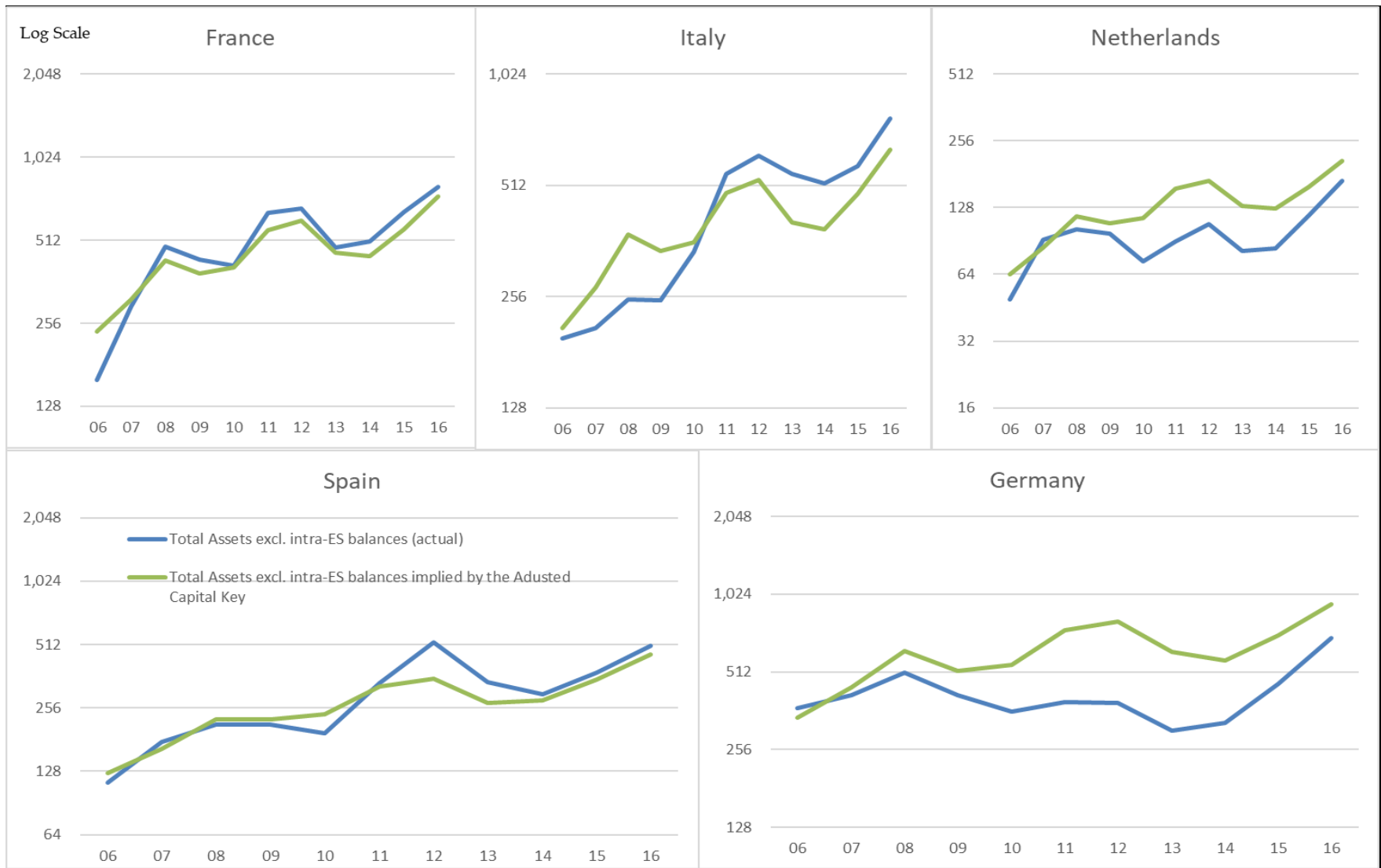
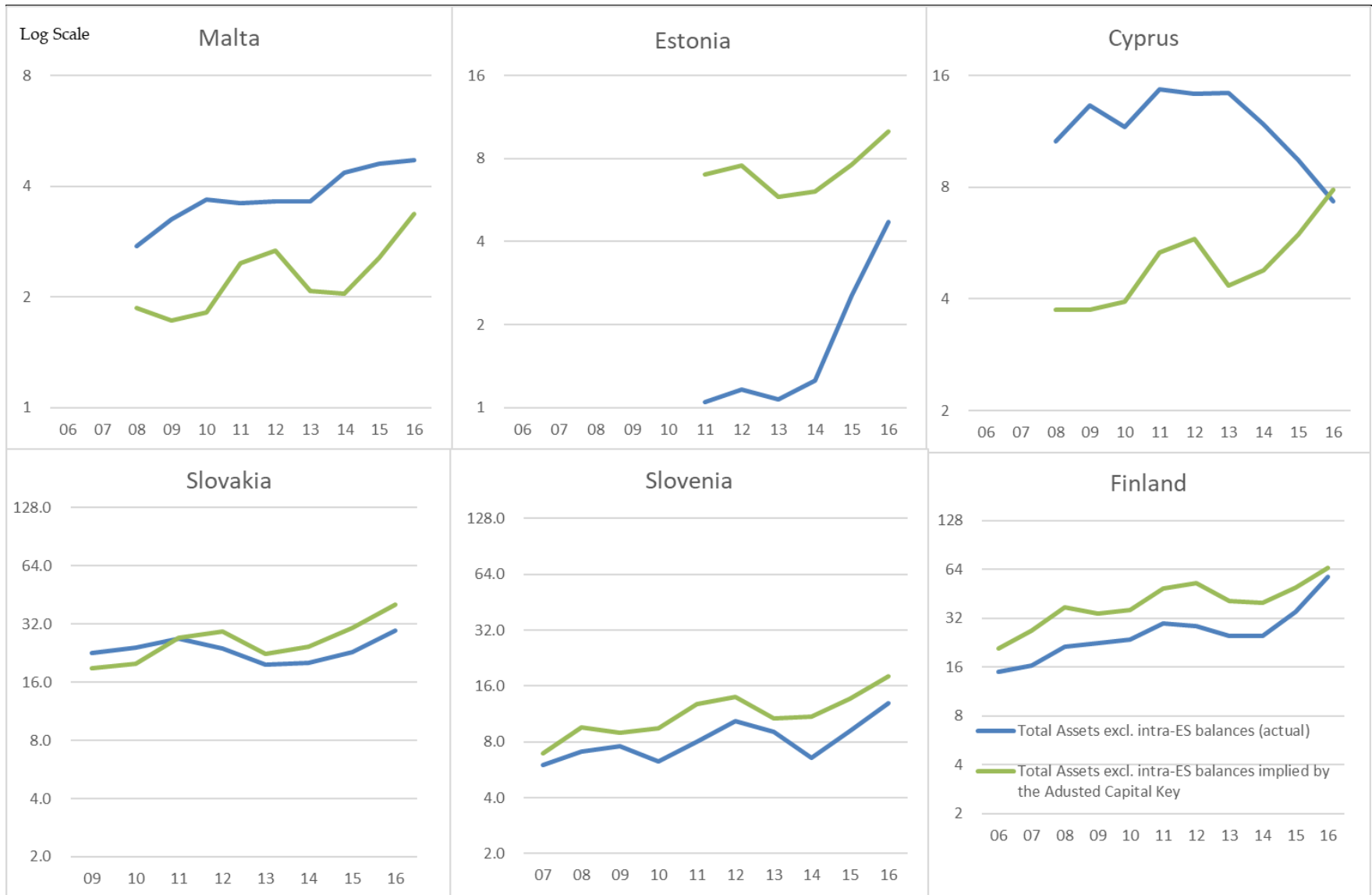


Figure 10 cont.: Actual Total Assets (excl. intra-ES balances) vs Implied Total Assets (excl. intra-ES balances) for each NCB



Based on the above observations, one can conclude that, the underlying relationship identified earlier is disguised when intra-ES claims are consolidated (that is, in line with the ECB definition of the Eurosystem).

5. The relation between sub-components of intra-Eurosystem claims/liabilities and the capital shares of the NCBs

Thus far we have focussed on total intra-Eurosystem balances. In this section, we examine the composition of these balances in more detail. Intra-ES balances comprise:

- i) the participating interest of the NCB in the ECB
- ii) the NCB's euro-denominated claims/liabilities arising from the transfer of foreign reserves to the ECB
- iii) claims/liabilities related to the allocation of euro banknotes within the Eurosystem (net)²¹ and
- iv) claims/liabilities arising from balances of TARGET2 accounts.

While the first two sub-components – participating interest in the ECB²² and transfer of foreign reserves²³ - are recorded as an asset on the NCBs' balance sheet, the other two sub-components – adjustment of banknotes in circulation and Target2 balances – appear on either the asset side or the liabilities side of the NCBs' balance sheet (see Appendix A). This has two important implications:

First, as highlighted earlier, the fact that a sub-component/s of intra-Eurosystem balances may appear on either the asset side or the liabilities side implies that looking merely at the net intra-Eurosystem claims or net intra-Eurosystems liabilities disguises distinctly different patterns in the components listed above. In particular, for Belgium, Italy, Portugal and Spain significant intra-Eurosystem claims partly offset intra-Eurosystem liabilities. In contrast, France's, Germany's and Luxembourg's intra-Eurosystem claims were diluted by intra-Eurosystem liabilities; while in the case of Austria intra-Eurosystem claims were almost equal to intra-Eurosystem liabilities, resulting in a minimal net intra-Eurosystem position (see Figure 7 and

²¹ The adjustment of banknotes in circulation represents the difference between the banknotes physically issued by a given NCB and the share of all circulating euro banknotes that has been assigned to that NCB according to a specific key.

²² This balance sheet item mainly comprise the share of each NCB in the capital of the ECB – the capital key (see Appendix Table B3.1).

²³ As evident in Appendix Table B3.2, this item, which is recorded on the asset side of the NCBs balance sheet, reflects transfers of foreign exchange reserves to the ECB. An equivalent amount is recorded as an intra-Eurosystem liability on the ECB balance sheet.

Figure 8). In sum, gross and net intra-Eurosystem balances are strongly, but imperfectly, correlated.

Second, the reasons why intra-Eurosystem claims and intra-Eurosystem liabilities arise and fluctuate can vary extensively amongst NCBs. Most of the existing literature consider only Target2 as the main reason for raising intra-Eurosystem claims/liabilities while, in contrast, the literature considering the other sub-components is scarce. This makes it even more relevant to investigate the sub-components to understand the core reasons for developments in the intra-Eurosystem balances.

For the 2006-2016 period, data reported in this paper on intra-Eurosystem claims/liabilities and their sub-components (apart from T2) were collected from the balance sheets of the NCBs published annually in their financial statements. In most of the NCBs balance sheets, data on T2 balances are recorded under ‘other claims/liabilities on the Eurosystem’ and do not feature as a separate item. Therefore, data on T2 balances were collected from the dataset published by the ECB since 2008 and by the ‘Euro Crisis Monitor’ of the Institute for Empirical Economic Research at the University of Osnabrueck (see Steiankamp and Westermann, 2012) for the remaining years.

Figure 11: Components of intra-Eurosystem balances (percentage shares)

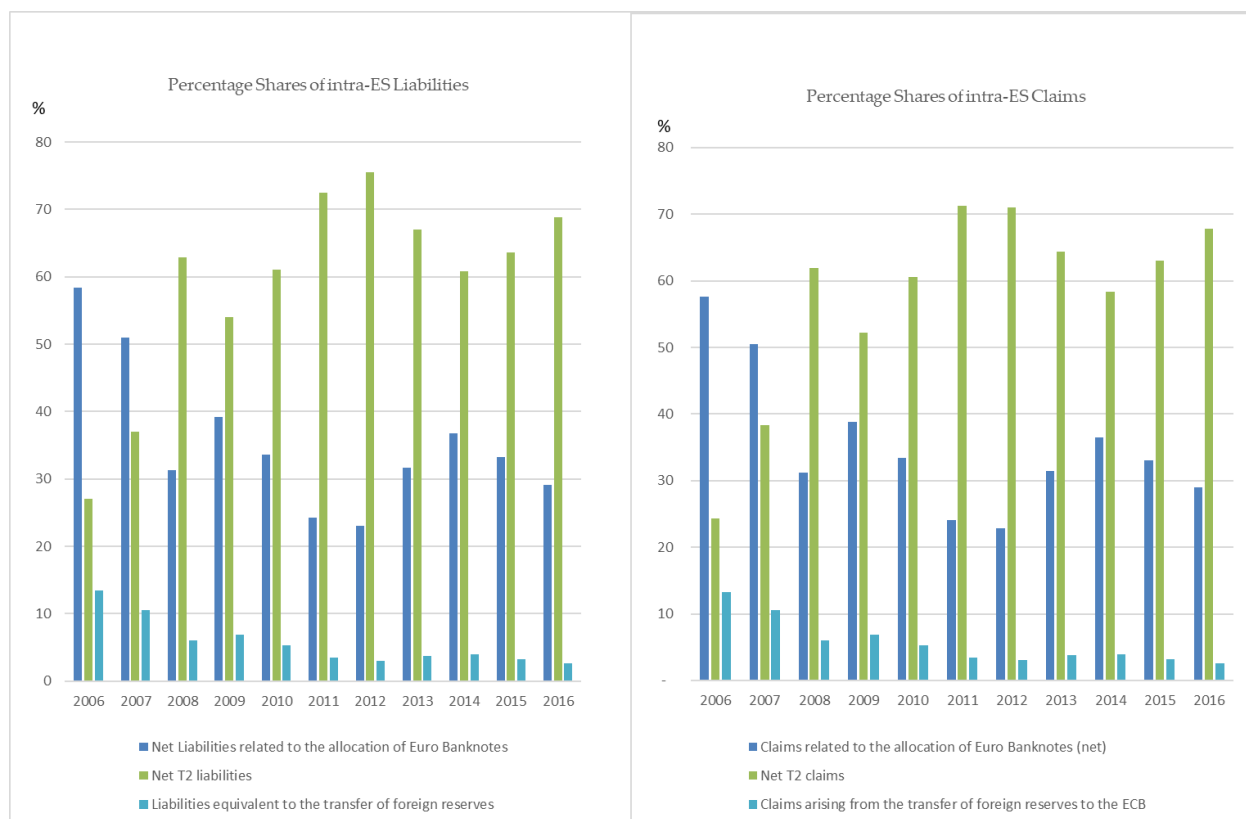


Figure 11 shows that the adjustment of banknotes in circulation and Target2 positions comprise the two main sub-components of total intra-Eurosystem balances.²⁴ The share of net claims/liabilities related to the adjustment of banknotes in circulation decreased as net T2 claims/liabilities became more prominent.

As noted earlier, intra-Eurosystem claims/liabilities for different NCBs may be very similar, but for fundamentally different reasons. Jobst et al. (2012) provide examples relevant to this point – while Greece built-up intra-Eurosystem liabilities by raising negative Target2 balances, Germany recorded intra-Eurosystem liabilities prior to 2007 in the form of a liability arising from the adjustment of banknotes in circulation (we discuss this component further below). Moreover, Jobst et al. (2012) draws on the case of Austria to highlight that Target2 positions may reflect other intra-flows such as the adjustments of euro banknotes in circulation. This emphasises the point that looking at the other sub-components is a pre-requisite not only to understand the source of intra-Eurosystem claims/liabilities but also for a correct interpretation of Target2 balances.

Looking at the data for these sub-components by country (see Figure 13 and Figure 14), one can draw on various other examples similar to the ones highlighted by Jobst et. al (2012) mentioned earlier. For instance, while France recorded net intra-ES claims on the basis of claims related to the allocation of euro banknotes, Luxembourg built-up intra-ES claims through positive T2 balances. Meanwhile, intra-ES claims recorded on the balance sheet of the central bank of Netherlands reflects both claims related to the adjustment of banknotes in circulation as well as net T2 claims. Similarly, on the liabilities side, net Eurosystem balances for France consist entirely of T2 liabilities while for Luxembourg net Eurosystem balances reflected liabilities related to the allocation of euro banknotes.

Accounting for more than one-third of Eurosystem total assets, the importance of intra-Eurosystem claims as an item on the NCBs balance sheet is certain. Moreover, the role of intra-Eurosystem balances as a means to disguise the relationship between total assets and the capital key cannot be ignored. It is therefore interesting to investigate the relationship between the main sub-components of intra-Eurosystem claims/liabilities²⁵ and the adjusted capital key.

One of the main sub-components of intra-Eurosystem balances constitute the net claims and liabilities of the Euro Area NCBs vis-à-vis the ECB as the central counterpart. These arise

²⁴ The two panels of Figure 11 are virtually identical but differ slightly due to small statistical discrepancies between the totals of intra-ES claims and liabilities.

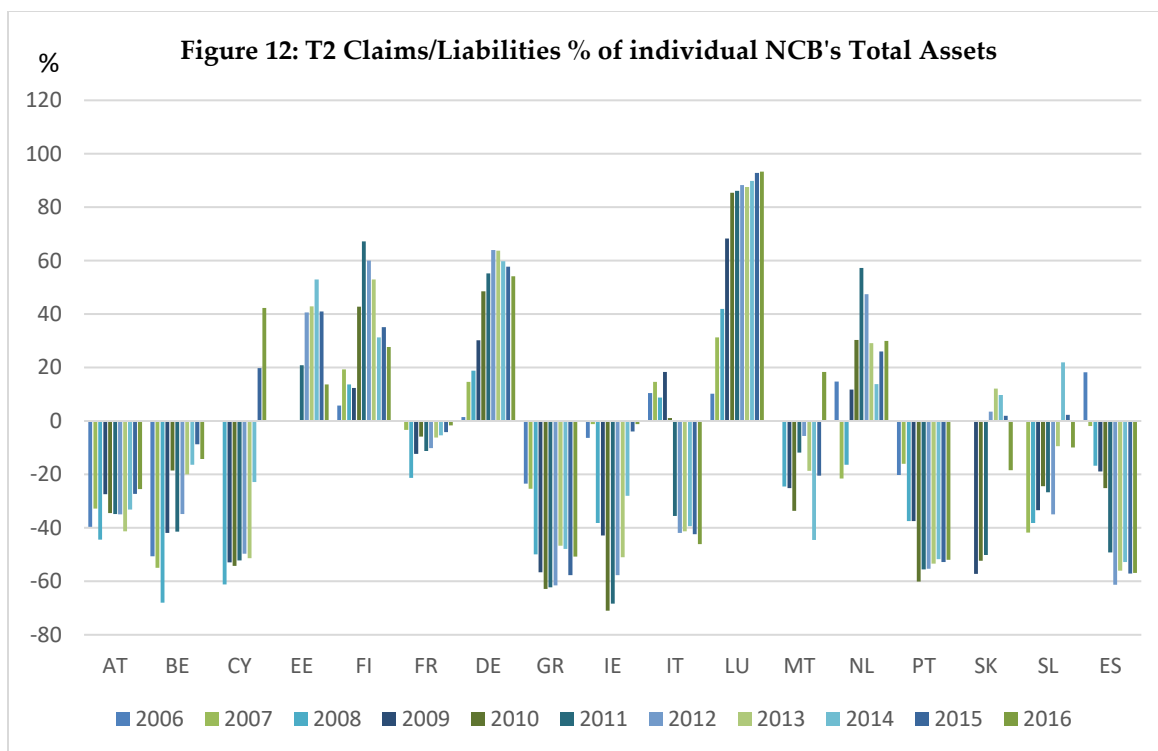
²⁵ The participating interest in the ECB and the NCB's euro-denominated claims arising from the transfer of foreign reserves to the ECB together accounted for a less than 1 per cent of total assets in 2016 and around 3 per cent of intra-ES claims and are therefore not considered in this analysis.

through cross-border payments settled in central bank money of the respective national banking sectors or the NCBs themselves and are executed through the common euro area payment platform known as Target2. Through Target2, NCBs can borrow from or lend to other NCBs²⁶ .

Prior to the start of the financial crisis in 2007, T2 balances were small in magnitude and mostly reflected differences in payment habits across countries. Since the onset of the crisis in mid-2007, however, T2 balances have become more pronounced. Indeed, balances of most countries increased significantly and peaked in 2012, declining slowly thereafter before peaking again in 2016. For instance, the T2 balance of the central bank of Germany reached a peak of €754 billion at the end of 2016, roughly equivalent to 25 per cent of Germany's annual GDP. The central bank of Italy, which had net T2 claims of €23 billion in 2008, had a net T2 liabilities of €357 billion by the end of 2016. Similarly, the central bank of Spain's T2 liabilities reached €328 billion at the end of 2016 from a surplus of €25 billion in 2008 (Figure 12). The renewed widening of T2 imbalances since 2015 is linked to the implementation of the ECB Asset Purchase Programme²⁷ (APP) (Castillo and Varela (2017)).

²⁶A Target claim on a NCBs balance sheet means that overall there has been a net inflow of euro payments to that country's banking system; in case of a Target liability, a net outflow has taken place.

²⁷ According to the ECB, the Bundesbank and the Bank of International Settlements (BIS), the implementation of the APP cause a direct impact on T2 balances as it could involve cross-border payment by the purchasing NCB as securities could be bought from a range of counterparties. On the other hand, the central bank of the Netherlands attach the renewed rise in the T2 balances to the sustained fragmentation and risk perceptions within the Euro Area. There is an ongoing debate on this issue particularly concerning the recent surge of T2 liabilities in Italy (Dor 2016).



A controversial debate in the literature evolved on the likely causes and consequences of this sharp increase in Target2 balances. While some maintain that the high balances pose a problem (Sinn and Wollmershauser, 2012), others interpret them as merely a by-product of the banking and sovereign debt crisis (Buiter et al. 2011, Auer 2012 and Jobst 2009). Most literature points towards the premise that T2 balances reflect the high strains in the financial markets (De Grauwe and Ji, 2012) while others consider Target2 balances as a consequence of current account imbalances (Sinn 2011 and Sinn and Wollmershaeuser 2012).

The fact that T2 balances became highly negative for NCBs in countries experiencing financial strain like Greece, Italy, Portugal and Spain and highly positive in countries where payments were inflowing like Germany²⁸, contributed towards an escalated debate. In this context, a common viewpoint on T2 balances has been that they represent a 'bailout' for the periphery countries and interpret the accumulation of balances by the German central bank as 'lending funds to strapped governments' (Tornell and Westermann 2011). In contrast, others oppose this view and interpret T2 balances as a side effect of monetary policy decisions rather than as a bailout requested by national governments (Whelan, 2013). This latter view is supported by the

²⁸ For an explanation of the main reason of the dramatic increase in the T2 liabilities of most peripheral European countries and the coincidental increase in Germany's T2 claims see Dullien and Schieritz (2012).

ECB (2015) who declared that T2 balances *'do not provide a complete picture of the net financial flows between countries'*.

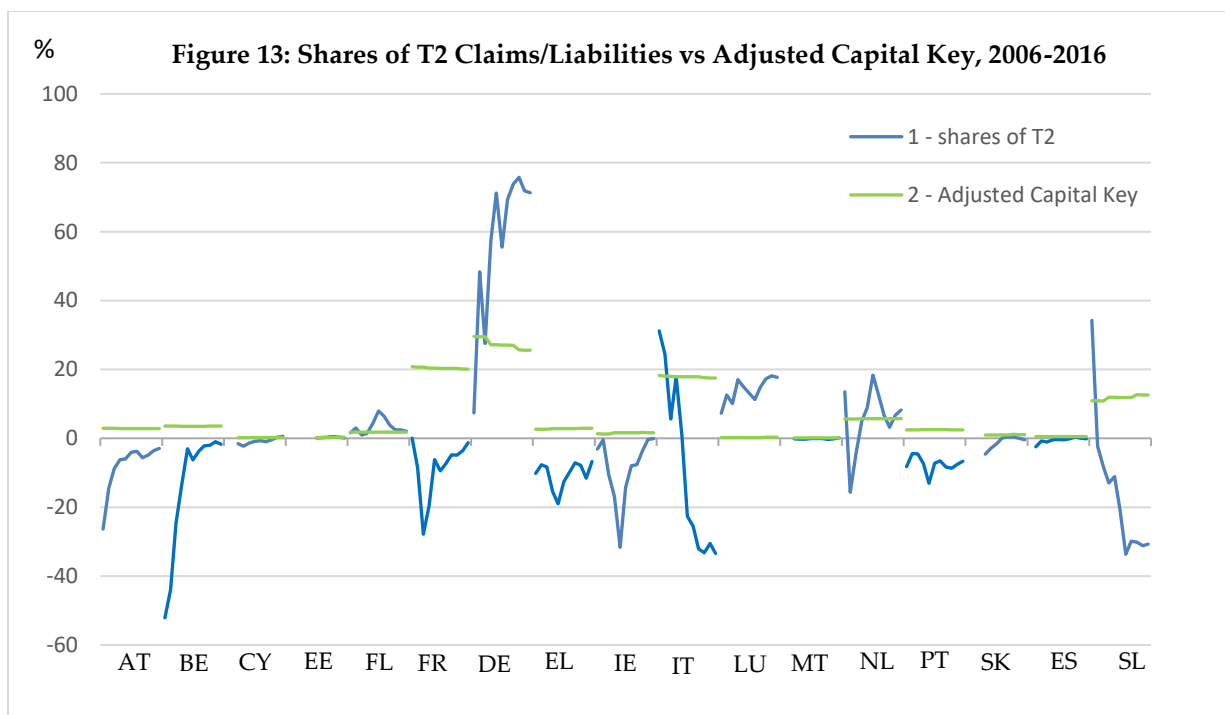
Being one of the main forms of lending²⁹ during the Eurozone crisis, another branch of literature on this subject examined the relationship between T2 liabilities and developments in the sovereign bond market. De Grauwe and Ji (2012) observed both graphically and through a regression strategy, that, for the period after 2008, high government bond yields were associated with large T2 liabilities, and low government bond yields with large T2 claims. Similarly, Steinkamp and Westermann (2012) observe a close relationship between lending (80 per cent of which is made up of T2 balances) and the interest rate spread (as well as bond prices) in the recent sovereign debt crisis in Europe. This link between the spreads³⁰ and T2 balances is theoretically explained by the fact that sovereign bondholders sell bonds of distressed countries pushing up their government bond yields and buy bonds of countries they trust lowering the bond yields. In turn, distressed countries are associated with relatively high T2 imbalances while safer countries are characterised by T2 claims.

The same methodology presented in the previous analysis is applied to identify whether a relationship exists between the share of T2 claims/liabilities (for each NCB) to total T2 claims/liabilities and the respective Adjusted Capital Key³¹. As displayed in Figure 13, at the end of 2016, a large positive German claim accounted for over 70 per cent of total T2 claims while its share in ECB capital stood at a much lower 26 per cent. Similarly, the aggregate T2 balance for Greece, Italy, Portugal and Spain accounts for around 80 per cent of the total net T2 liabilities of EA NCBs. However, these countries together own only a quarter of the ECB capital. This is suggestive of the conclusion that no relationship exists between the share of net T2 claims/liabilities to total T2 claims/liabilities and the share of ECB capital for each NCB.

²⁹ T2 is considered lending by the markets because it is collateralized to a large extent by the country government bonds (see Steinkamp and Westermann (2012), Garber (1999), Sinn and Wollmershauser (2012)).

³⁰ Spreads are usually defined as the differences between 10-year government bond rates of a country and that of German government bond.

³¹ In cases when an NCB records T2 claims (rather than T2 liabilities), the share is calculated as a ratio of the summation on T2 claims (taking into account only NCBs with T2 claims). Similarly, when an NCB records T2 liabilities, the share is calculated as a ratio of total T2 liabilities (ignoring NCBs with T2 claims).



The other main sub-component of intra-Eurosystem claims/liabilities relate to the allocation of euro banknotes in circulation and account for around one-third of total intra-ES claims/liabilities of the Eurosystem. Euro banknotes are issued by all Euro Area NCBs. However, for accounting purposes, the ECB reports 8 per cent of total banknotes in circulation in its own balance sheet while the remaining 92 per cent is presented in the balance sheets of the NCBs in proportion to their paid-up shares in the capital of the ECB (the banknote allocation key). Thus, the difference between the net amounts of banknotes put into circulation by the individual NCBs and the amounts of banknotes allocated to them (on the basis of the banknote allocation key) gives rise to intra-Eurosystem claims or liabilities. If the share of net value of banknotes put into circulation by an NCB is higher than its share based on the banknote allocation key, that NCB reports a corresponding net liability arising from the allocation of euro banknotes in circulation within the Eurosystem. If an NCB issues fewer banknotes than that, it accumulates a net claim³².

Data pertaining to net claims/liabilities related to the allocation of euro banknotes within the Eurosystem for each NCB indicate that during the 2006-2016 period, the Bundesbank recorded an increasing share of net liabilities related to the allocation of euro banknotes³³ (see Appendix

³²These procedures are set out in 'Decision of the European Central Bank on the issue of euro banknotes' (ECB/2010/29); Official Journal of the European Union L35, 9 February 2011, page 26.

³³Total liabilities related to the allocation of euro banknotes is calculated as the summation of the net liabilities related to the allocation of euro banknotes on the NCBs balance sheet (see Appendix A).

Table B4.1). In fact, for Germany, this share increased from 50 per cent in 2006 to around 70 per cent by 2016. Meanwhile, France, Netherlands, Portugal and Spain recorded increasing net claims related to the allocation of euro banknotes.

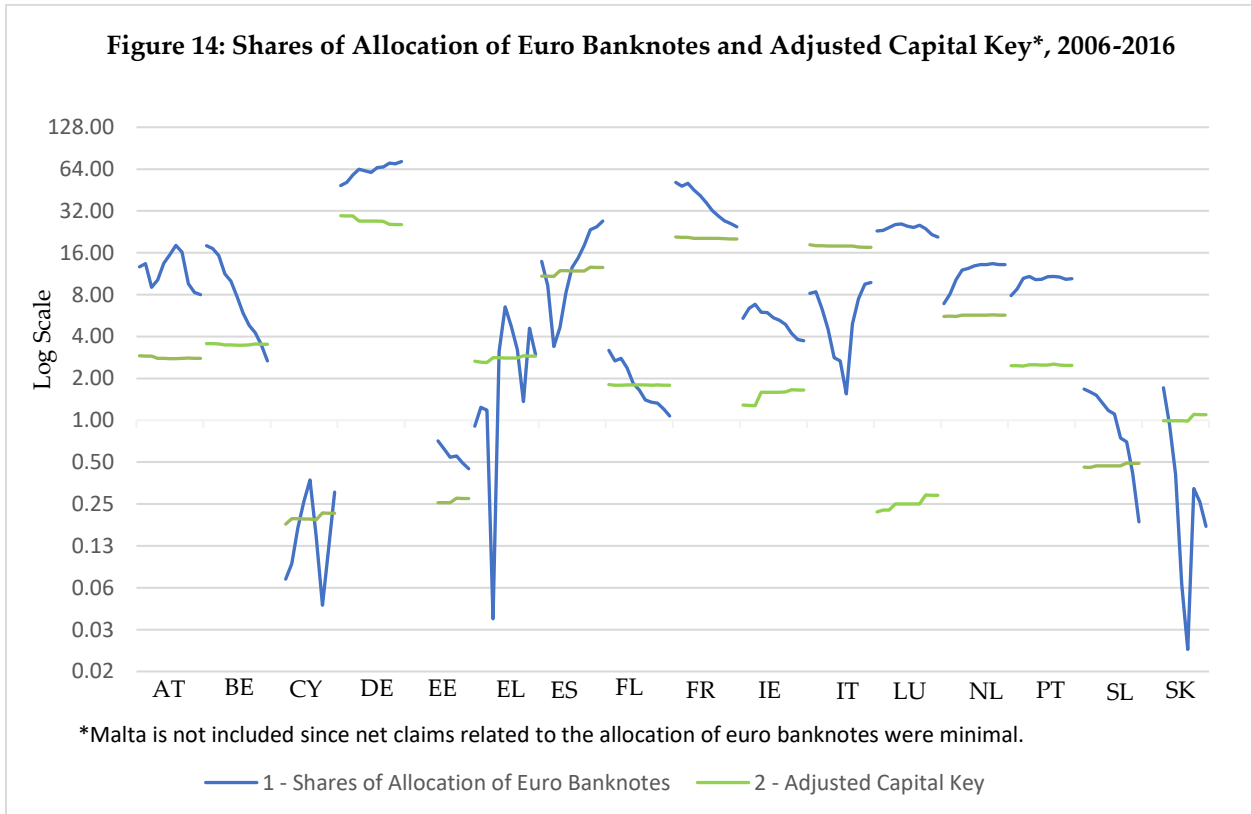
Being the world's number one country in the use of cash (Bundesbank, 2016), it is not surprising that the central bank of Germany not only reported an intra-ES liability related to the allocation of euro banknotes, but the share of this balance sheet item to the total for all NCBs (70 per cent in 2016) significantly exceeded Germany's share of the ECB capital (26 per cent). This implies that the banknotes in circulation in Germany were significantly higher than the amount allocated on the basis of the banknote allocation key. Jobst et al. (2012) distinguish two main reasons why this may take place – international travel and foreign exchange trading services. Though this merits further investigation, these channels seem to be plausible reasons for the relatively high level of banknotes in circulation, which led to a share of net liabilities related to the allocation of euro banknotes significantly exceeding the share of the ECB capital in Germany. Note issues in Greece and Ireland are also higher than their allocation, in the latter case also leading to a net liability that exceeds the Irish share of the ECB capital (see Appendix Table B4.3).

Also noteworthy is the fact that although the central bank of Luxembourg own a mere 0.3 per cent of the ECB capital, it holds 21 per cent (2016) of total net liabilities related to the allocation of euro banknotes therefore putting a substantially high level of banknotes in circulation. It is, however, quite difficult to attribute this to one particular reason.

The Netherlands, Austria and Portugal put a lower amount of euro banknotes in circulation than their allocation resulting in net claims on their central bank's balance sheets. Together, they account for one quarter of the total net claims related to euro banknotes despite that they hold only less than ten per cent of the ECB capital. The central bank of France issued a significantly lower amount of euro banknotes than allocated particularly in the early years of the financial crisis.

To conclude, the share of net claims/liabilities related to the allocation of euro banknotes seem to be uncorrelated with the NCBs adjusted capital share. The existent literature identified a number of channels that may be responsible for the migration of banknotes issued by each NCB. The NCBs do not have control of this movement of currency since the issuance of euro banknotes is entirely demand-driven. This may lead to a NCB to use more than its allocation such as Germany, Greece and Ireland or underuse their allocation such as Spain and Portugal. Irrespective of whether the NCBs under or overutilise their allocation of euro banknotes (leading to either net claims or net liabilities related to euro banknotes in circulation), it seems

that there is no relation between the magnitude at which they diverge from their allocation and their share of ECB capital (see Figure 14).



6. Concluding Remarks

This paper presented a new dataset on national central bank balance sheets over the 2006-2016 period. Based on this dataset, an alternative balance sheet of the Eurosystem is assembled through a simple summation of the nineteen NCBs' and the ECB's balance sheets. This balance sheet for the Eurosystem is significantly larger than that published by the ECB. It is a balance sheet for the "Mega-ECB" – an institution that is larger than the Eurosystem - that considers intra-Eurosystem claims/liabilities of each NCB as contributing to the asset/liabilities side of its balance sheet. Based on this dataset, the goal of this paper was to investigate the relationship between the ECB and the NCBs in order to determine any possible evidence of distinctive power by the ECB over the NCBs. Being the main discrepancy between the balance sheet presented here and that published by the ECB, the intra-Eurosystem transactions were the subject matter dealt with in the second part of this paper.

It was shown, firstly, that a correlation exists between the share of total assets of each NCB to ESTA (total assets for the "Mega-ECB") and their respective adjusted capital key. Moreover, it was evident that in case of the relatively larger NCBs, the correlation between their share of total assets and their adjusted capital key is even stronger. On the other hand, for smaller NCBs, some degree of autonomy was detected as the correlation between the share of total assets and their capital key is weaker. It was also shown that, over the period under investigation, in cases where total assets of a NCB were below the level determined by the capital key, total assets increased over time.

Finally, this paper investigates the relationship between the share of total assets of each NCB and their respective adjusted capital key when intra-Eurosystem transactions are consolidated – in line with the Eurosystem balance sheet published by the ECB. It is shown that for some of the larger NCBs, when intra-ES claims are excluded from their balance sheet (in line with the ECB methodology) the correlation between their share of total assets and their adjusted capital key is weaker than that observed when intra-ES transactions are not consolidated (as in the dataset in this paper). We show that this weaker correlation reflects the fact that no correlation is observed between the share of each sub-component of intra-Eurosystem transactions for each NCB and the respective ACK.

Comparing the Eurosystem balance sheet published by the ECB with that presented here indicates that systematic behaviour of NCBs is being disguised by the way the balance sheet of the Eurosystem is being published by the ECB. In other words, the systematic behaviour of NCBs is distinctly harder to detect when intra-Eurosystem transactions are netted off in the Eurosystem balance sheet. This is enough evidence for one to conclude that the way data is published by the ECB obscure the fact that NCBs (or at least some of them) act on an auto-pilot

system. The puzzle is not entirely solved yet – these observations pose further questions. If we conclude that the “Mega-ECB” exists, then the obvious follow-on question is: who runs it? Is it driven by the needs of distressed central banks with the rest of the NCBs lending the money as the ECB prescribes? This paper suggests an affirmative answer; but this merits further investigation.

This paper is part of a series of papers. Indeed, the findings of this paper suggest a number of avenues for further research that will be dealt with in the papers to follow. Firstly, since the empirical evidence presented in this first paper is only of a graphical nature, the next paper will offer a systematic regression-type analysis based on an econometric testing procedure based on the dataset established here. Moreover, further research aims to focus on a systematic comparison between the ECB published data for each NCB and that published by the Federal Reserve System for each District. Another important consideration in this respect is a similar comparison between the Federal Reserve System data and the dataset presented in this paper.

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Appendix A

Figure A1. Stylized National Central Bank Balance Sheet			
Assets		Liabilities	
FA_j	Foreign Assets (A.1 + A.2 + A.3)	Foreign liabilities (L.6 + L. 7 + L.8)	FL_j
	A.1 Gold and gold receivables	L.6 Liabilities to EA residents denominated in foreign currency	
	A.2 Claims on non-euro residents denominated in foreign currency	L.7 Liabilities to non-EA residents denominated in foreign currency	
	A.3 Claims on euro-area residents denominated in foreign currency	L.8 Counterpart of special drawing rights allocated by the IMF	
DA_j	Domestic Assets (A.4 + A.6 + A.7.2 + A.8)	Liabilities denominated in euros (L.3. + L.4 + L.5)	DL_j
	A.4 Claims on non-euro residents denominated in euro	L.3 Other liabilities to EA credit institutions denominated in euro	
	A.6 Other claims on euro-area credit institutions denominated in euro	L.4 Liabilities to other EA residents denominated in euro	
	A.7.2 Other securities	L.5 Liabilities to non-euro area residents denominated in euro	
	A.8 General Government debt denominated in euro	Banknotes in circulation (L.1)	BN_j
MP_j	Lending to euro area credit institutions related to monetary policy operations denominated in euro (A.5)	Liabilities to EA credit institutions related to monetary policy operations denominated in euro (L.2)	MP_j
SMPP_j	Securities held for monetary policy purposes (A.7.1)	Capital and Reserves (L.14)	CR_j
	Intra-Eurosystem Claims (A.9)	Intra-Eurosystem Liabilities (L.9)	
P_j	A.9.1 Participating interest in the ECB	Target2 gross debit positions (L.9.2)	C_j
CTR_j	A.9.2 Claims re transfer of reserves to ECB	Liabilities re allocation of euro banknotes (L.9.3)	LBN_j
CBN_j	A.9.3 Claims re allocation of euro banknotes	Other liabilities (L.9.4 + L.10 + L.11 + L.12 + L.13 + L.15)	OL_j
D_j	A.9.4 Target2 gross credit position	L.9.4 Liabilities related to other operational requirements within the Eurosystem	
OA_j	Other assets (A.10 + A.11)	L.10 Items in course of settlement	
	A.10 Items in course of settlement	L.11 Other liabilities	
	A.11 Other assets	L.12 Provisions	
		L.13 Revaluation Accounts	
		L.15 Profit for the year	

Source: own compilation

Note: The composition of the balance sheet may slightly vary between balance sheets published by the National Central Banks in their annual reports or by the ECB; the above composition closely follow that used in the balance sheet of the Deutsche Bundesbank in their annual report.

Figure A2. Deutsche Bundesbank Balance Sheet 31.12.2016

Assets (€ bn)		Liabilities (€ mn)	
177.6	Foreign Assets (A.1 + A.2 + A.3)	Foreign liabilities (L.6 + L. 7 + L.8)	16.6
119.3	A.1 Gold and gold receivables	L.6 Liabilities to EA residents denominated in foreign currency	0
56.5	A.2 Claims on non-euro residents denominated in foreign currency	L.7 Liabilities to non-EA residents denominated in foreign currency	1.2
1.8	A.3 Claims on euro-area residents denominated in foreign currency	L.8 Counterpart of special drawing rights allocated by the IMF	15.4
3.5	Domestic Assets (A.4 + A.6 + A.7.2 + A.8)	Liabilities denominated in euros (L.3. + L.4 + L.5)	223.3
0.4	A.4 Claims on non-euro residents denominated in euro	L.3 Other liabilities to EA credit institutions denominated in euro	0.5
3.0	A.6 Other claims on euro-area credit institutions denominated in euro	L.4 Liabilities to other EA residents denominated in euro	105.8
0	A.7.2 Other securities	L.5 Liabilities to non-euro area residents denominated in euro	117.0
7.9	A.8 General Government debt denominated in euro	Banknotes in circulation (L.1)	264.9
65.5	Lending to euro area credit institutions related to monetary policy operations denominated in euro (A.5)	Liabilities to EA credit institutions related to monetary policy operations denominated in euro (L.2)	411.4
357.7	Securities held for monetary policy purposes (A.7.1)	Capital and Reserves (L.14)	5.6
766.9	Intra-Eurosystem Claims (A.9)	Intra-Eurosystem Liabilities (L.9)	327.3
1.9	A.9.1 Participating interest in the ECB	Target2 gross debit positions (L.9.3)	0
10.4	A.9.2 Claims re transfer of reserves to ECB	Liabilities re allocation of euro banknotes (L.9.2)	327.3
0	A.9.3 Claims re allocation of euro banknotes	Other liabilities (L.9.4 + L.10 + L.11 + L.12 + L.13 + L.15)	144.0
754.5	A.9.4 Other net claims ³⁴	L.9.4 Liabilities related to other operational requirements within the Eurosystem	0
17.5	Other assets (A.10 + A.11)	L.10 Items in course of settlement	0
0	A.10 Items in course of settlement	L.11 Other liabilities	2.1
17.5	A.11 Other assets	L.12 Provisions	21.9
		L.13 Revaluation Accounts	119.7
		L.15 Profit for the year	0.4
1,393.0	TOTAL ASSETS	TOTAL LIABILITIES	1,393.0

Source: Deutsche Bundesbank Annual Report 2016

³⁴ Consists almost entirely of Target2 claims

**Table B1: The ECB Capital and Total Assets
as at the end of 2016**

Country	Capital Key	Shares of paid-up Capital	Adjusted Capital Key (%)¹	Total Assets (ESTA) (€ mn)	Adjusted Total Assets (ESTA) (€ mn)
AT	2.0	2.7	2.8	122,556	132,288
BE	2.5	3.5	3.5	131,180	143,464
CY	0.2	0.2	0.2	13,845	14,595
EE	0.2	0.3	0.3	6,761	7,717
FI	1.3	1.8	1.8	79,504	85,733
FR	14.2	19.8	20.1	845,362	915,659
DE	18.0	25.2	25.6	1,393,014	1,482,240
GR	2.0	2.8	2.9	142,384	152,464
IE	1.2	1.6	1.6	82,786	88,540
IT	12.3	17.2	17.5	773,673	834,707
LU	0.2	0.3	0.3	200,851	201,857
MT	0.1	0.1	0.1	5,536	5,858
NL	4.0	5.6	5.7	290,326	310,174
PT	1.7	2.4	2.5	137,717	146,361
SK	0.8	1.1	1.1	27,870	31,700
SL	0.3	0.5	0.5	12,666	14,379
LT	0.4	0.6	0.6	14,464	16,512
LV	0.3	0.4	0.4	14,772	16,171
ES	8.8	12.4	12.6	577,000	620,831
ECB	-	-	-	348,984	-
Non-Euro Area	29.6	1.6	-	-	-
Total	100	100	100	5,221,252	5,221,252

Source: Annual Reports of the National Central Banks, Annual Reports of the ECB and own calculations

¹ The adjusted capital share is computed such that the capital shares of the EA NCBs sum to 100 per cent.

**Table B2: Actual and Implied Total Assets
(€ Billions)**

		2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
AT	Actual TA	56.5	65.6	94.9	75.5	84.3	105.8	115.1	102.3	98.0	114.1	132.3
	Implied TA	42.2	54.9	80.1	69.4	76.7	108.4	119.2	93.2	91.2	113.5	145.6
	Ratio of Actual to Implied TA	1.3	1.2	1.2	1.1	1.1	1.0	1.0	1.1	1.1	1.0	0.9
BE	Actual TA	86.5	116.8	166.8	106.3	80.4	135.7	116.9	83.9	82.1	98.0	143.5
	Implied TA	51.8	67.2	98.2	86.7	95.9	135.4	148.9	116.3	115.1	143.3	183.8
	Ratio of Actual to Implied TA	1.7	1.7	1.7	1.2	0.8	1.0	0.8	0.7	0.7	0.7	0.8
CY	Actual TA			11.4	13.7	12.2	15.6	15.5	14.6	12.1	12.6	14.6
	Implied TA			5.0	4.9	5.4	7.6	8.4	6.4	7.0	8.7	11.2
	Ratio of Actual to Implied TA			2.3	2.8	2.3	2.0	1.8	2.3	1.7	1.4	1.3
EE	Actual TA						3.7	4.8	4.7	6.5	7.4	7.7
	Implied TA						10.0	11.0	8.6	9.0	11.1	14.3
	Ratio of Actual to Implied TA						0.4	0.4	0.6	0.7	0.7	0.5
FI	Actual TA	21.7	25.1	36.9	38.1	48.9	102.3	104.9	52.9	51.0	62.0	85.7
	Implied TA	26.2	33.9	49.4	44.8	49.6	70.0	77.0	59.9	58.4	72.7	93.2
	Ratio of Actual to Implied TA	0.8	0.7	0.7	0.9	1.0	1.5	1.4	0.9	0.9	0.9	0.9
FR	Actual TA	254.2	386.8	632.3	534.2	514.9	756.2	773.9	585.4	615.3	762.1	915.7
	Implied TA	301.9	391.5	571.5	508.3	562.0	793.7	873.2	680.1	658.8	820.0	1,051.7
	Ratio of Actual to Implied TA	0.8	1.0	1.1	1.1	0.9	1.0	0.9	0.9	0.9	0.9	0.9
DE	Actual TA	404.8	520.9	725.6	625.5	715.6	900.1	1,081.4	848.0	818.5	1,077.6	1,482.2
	Implied TA	429.1	558.4	815.2	676.8	748.4	1,056.9	1,162.7	902.7	836.2	1,040.8	1,334.9
	Ratio of Actual to Implied TA	0.9	0.9	0.9	0.9	1.0	0.9	0.9	0.9	1.0	1.0	1.1
GR	Actual TA	37.7	46.0	80.9	90.5	143.2	174.9	165.6	114.4	108.5	170.9	152.5
	Implied TA	38.5	49.4	72.2	70.2	77.6	109.7	120.6	93.7	94.5	117.6	150.8
	Ratio of Actual to Implied TA	1.0	0.9	1.1	1.3	1.8	1.6	1.4	1.2	1.1	1.5	1.0
IE	Actual TA	41.6	55.1	121.0	127.1	207.1	179.9	140.8	110.9	84.4	81.5	88.5
	Implied TA	18.7	24.2	35.3	39.7	43.9	62.0	68.2	53.5	53.9	67.1	86.1
	Ratio of Actual to Implied TA	2.2	2.3	3.4	3.2	4.7	2.9	2.1	2.1	1.6	1.2	1.0
IT	Actual TA	237.9	267.1	336.4	326.0	362.2	580.2	647.0	585.6	563.2	632.3	834.7
	Implied TA	265.0	341.0	497.7	446.6	493.8	697.4	767.3	599.4	572.0	711.9	913.1
	Ratio of Actual to Implied TA	0.9	0.8	0.7	0.7	0.7	0.8	0.8	1.0	1.0	0.9	0.9
MT	Actual TA			3.1	3.4	3.8	3.8	3.8	3.8	4.5	4.7	5.9
	Implied TA			2.5	2.3	2.5	3.5	3.9	3.1	3.0	3.7	4.8
	Ratio of Actual to Implied TA			1.2	1.5	1.5	1.1	1.0	1.2	1.5	1.3	1.2
NL	Actual TA	73.1	109.2	136.1	139.1	142.8	279.7	266.2	168.5	150.8	225.0	310.2
	Implied TA	81.1	106.0	154.7	142.5	157.6	222.6	244.9	190.8	186.0	231.5	297.0
	Ratio of Actual to Implied TA	0.9	1.0	0.9	1.0	0.9	1.3	1.1	0.9	0.8	1.0	1.0

PT	Actual TA	35.4	41.8	60.1	66.0	103.9	115.5	124.6	116.0	110.2	123.3	146.4
	Implied TA	35.8	46.6	68.1	62.6	69.2	97.7	107.5	84.9	81.0	100.8	129.3
	Ratio of Actual to Implied TA	1.0	0.9	0.9	1.1	1.5	1.2	1.2	1.4	1.4	1.2	1.1
SK	Actual TA				26.8	27.1	29.5	26.8	23.8	25.1	25.9	31.7
	Implied TA				24.8	27.4	38.7	42.6	33.1	35.9	44.7	57.3
	Ratio of Actual to Implied TA				1.1	1.0	0.8	0.6	0.7	0.7	0.6	0.6
SL	Actual TA		8.9	11.1	10.6	9.3	11.3	13.6	11.6	11.8	11.5	14.4
	Implied TA		8.7	12.7	11.8	13.0	18.3	20.2	15.7	16.1	20.0	25.6
	Ratio of Actual to Implied TA		1.0	0.9	0.9	0.7	0.6	0.7	0.7	0.7	0.6	0.6
LT	Actual TA										12.8	16.5
	Implied TA										23.9	30.6
	Ratio of Actual to Implied TA										0.5	0.5
LV	Actual TA									8.8	12.1	16.2
	Implied TA									13.1	16.3	20.9
	Ratio of Actual to Implied TA									0.7	0.7	0.8
ES	Actual TA	149.3	188.9	250.6	234.4	222.1	383.0	574.3	401.6	382.7	477.1	620.8
	Implied TA	157.9	205.4	299.9	296.8	328.2	463.4	509.9	397.1	410.8	511.3	655.8
	Ratio of Actual to Implied TA	0.9	0.9	0.8	0.8	0.7	0.8	1.1	1.0	0.9	0.9	0.9

Table B3.1: Participating interest in the ECB
(€ Millions)

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
AT	116	117	117	112	144	177	209	212	222	222	222
BE	143	144	144	140	180	221	261	264	287	287	287
CY			23	27	29	31	34	32	39	39	39
EE						80	83	83	89	89	89
FI	74	73	73	78	99	120	141	141	144	144	144
FR	835	836	836	825	1,062	1,299	1,536	1,535	1,545	1,545	1,545
DE	1,183	1,196	1,196	1,091	1,407	1,722	2,038	2,031	1,948	1,948	1,948
GR	393	390	390	435	468	501	534	531	565	565	565
IE	57	57	57	121	139	158	176	179	199	199	199
IT	726	722	722	736	945	1,153	1,361	1,377	1,333	1,333	1,333
LU	10	11	11	16	19	22	25	25	36	36	36
MT			11	12	13	14	15	15	16	16	16
NL	230	235	235	269	336	402	469	469	482	482	482
PT	100	101	101	114	144	173	202	213	204	204	204
SK				194	206	217	229	229	263	263	263
SL		55	55	58	64	69	75	75	82	82	82
LT										207	207
LV									115	115	115
ES	433	438	438	663	802	940	1,079	1,078	1,313	1,313	1,313
Total NCBs	4,300	4,374	4,409	4,892	6,056	7,298	8,465	8,490	8,881	9,088	9,088

Table B3.2: Claims arising from the transfer of foreign reserves to the ECB
(€ Millions)

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
AT	1,157	1,161	1,161	1,119	1,119	1,119	1,119	1,123	1,138	1,138	1,138
BE	1,419	1,423	1,423	1,397	1,397	1,397	1,397	1,401	1,436	1,436	1,436
CY			72	79	79	79	79	77	88	88	88
EE						103	103	103	112	112	112
FI	717	717	717	722	722	722	722	722	728	728	728
FR	8,476	8,569	8,577	8,283	8,263	8,281	8,255	8,230	8,229	8,221	8,218
DE	11,762	11,821	11,821	10,909	10,909	10,909	10,909	10,872	10,430	10,430	10,430
GR	1,056	1,047	1,047	1,132	1,132	1,132	1,132	1,129	1,178	1,178	1,178
IE	513	512	512	640	640	640	640	644	673	673	673
IT	7,263	7,218	7,218	7,199	7,199	7,199	7,199	7,219	7,134	7,134	7,134
LU	87	91	91	101	101	101	101	101	118	118	118
MT			36	36	36	36	36	37	38	38	38
NL	2,223	2,243	2,243	2,297	2,297	2,297	2,297	2,299	2,320	2,320	2,320
PT	982	987	987	1,008	1,008	1,008	1,008	1,022	1,010	1,010	1,010
SK				399	399	399	399	399	448	448	448
SL		184	184	189	189	189	189	190	200	200	200
LT										239	239
LV									163	163	163
ES	4,327	4,349	4,349	4,784	4,784	4,784	4,784	4,783	5,123	5,123	5,123
Total (NCBs)	39,983	40,322	40,438	40,294	40,274	40,395	40,369	40,350	40,565	40,797	40,797
ECB (liability side)	39,782	40,042	40,150	40,204	40,204	40,308	40,308	40,310	40,553	40,793	40,793
Discrepancy (Total NCBs and ECB)	-200	-280	-288	-90	-70	-88	-62	-40	-12	-4	-4

Table B4.1: Claims/Liabilities related to the allocation of Euro Banknotes
(€ Millions)

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
AT	15,677	18,686	13,560	16,915	24,920	32,799	41,956	42,173	28,664	28,235	28,959
BE	22,241	23,935	22,807	18,698	18,475	16,354	13,686	12,579	12,706	11,847	9,657
CY			108	154	311	552	864	-502	-178	402	1,100
EE						1,502	1,446	1,413	1,655	1,672	1,620
FI	3,938	3,724	4,174	3,945	3,414	3,485	3,248	3,522	3,962	4,103	3,879
FR	63,452	67,312	75,572	74,811	76,506	77,576	74,845	76,822	81,199	88,022	88,864
DE	-84,334	-99,498	-121,759	-146,806	-157,105	-170,489	-200,308	-224,251	-267,914	-297,786	-327,262
GR	-1,569	-2,399	-2,485	-86	-7,922	-18,437	-14,460	-10,839	-5,183	-19,591	-13,314
IE	-9,388	-12,301	-14,376	-13,715	-14,996	-15,436	-15,941	-6,477	-16,022	-16,250	-16,880
IT	-14,209	-16,245	-13,313	-10,358	-7,093	-7,553	3,605	12,867	22,368	32,296	35,254
LU	-39,812	-44,786	-51,035	-58,701	-64,975	-69,995	-74,257	-85,327	-90,777	-92,618	-93,600
MT			-55	-95	-105	-130	-91	-37	-3	-53	-77
NL	8,508	11,281	15,385	19,919	22,939	27,278	30,569	34,314	39,907	44,729	47,449
PT	9,755	12,305	15,679	17,945	19,043	21,821	25,025	28,198	31,920	35,080	37,636
SK				2,836	1,728	859	155	-76	966	879	515
SL		2,335	2,398	2,505	2,474	2,477	2,575	1,951	2,088	1,407	673
LT										3,751	3,556
LV									3,115	3,495	3,902
ES	-24,114	-17,904	-7,125	7,674	15,360	26,454	34,216	47,244	70,250	83,718	97,970
Total NCBs (claims)	173,830	193,709	210,706	229,916	252,346	282,247	305,197	337,578	380,123	426,311	451,133
Total NCBs (liabilities)	173,426	193,133	210,148	229,761	252,194	282,040	305,056	337,509	380,077	426,298	451,133

Table B4.2: net Claims/Liabilities arising from balances of Target 2 accounts
(€ Millions)

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
AT	-21,160	-20,301	- 37,168	-19,630	-27,467	-34,591	-38,212	- 40,249	-30,811	-29,147	-31,182
BE	-41,921	-61,663	-104,233	-42,520	-13,859	-52,845	-38,161	-15,495	-12,373	-7,748	-18,583
CY			-6,542	-7,122	-6,441	-7,908	-7,468	-7,343	-2,678	2,380	5,865
EE						648	1,741	1,836	3,191	2,761	924
FI	1,157	4,403	4,114	4,426	19,686	66,008	60,725	26,362	14,915	20,144	22,031
FR		-11,935	-117,684	-62,008	-28,349	-79,629	-73,899	-34,100	-30,900	-29,242	-13,803
DE	5,399	71,046	115,295	177,723	325,556	463,134	655,670	510,201	460,846	584,210	754,263
GR	-8,184	-10,797	-35,348	-49,036	-87,088	-104,750	-98,355	-51,116	-49,319	-94,387	-72,257
IE	-2,545	-595	-44,364	-53,519	-145,185	-120,434	-79,259	-55,117	-22,745	-3,037	-952
IT	22,856	35,804	23,452	55,276	3,699	-191,379	-255,102	-229,128	-208,945	-248,859	-356,559
LU	5,327	18,428	42,225	52,618	68,043	109,547	106,286	103,793	105,238	147,571	187,381
MT			-667	-814	-1,225	-422	-201	-672	-1,927	-922	1,019
NL	9,931	-21,949	-18,786	15,429	40,500	152,783	120,772	46,115	19,412	54,727	87,000
PT	-6,601	-6,206	-18,952	-23,436	-59,912	-60,923	-66,025	-59,564	-54,591	-61,687	-71,588
SK				-14,521	-13,311	-13,622	877	2,687	2,241	461	-5,119
SL		-3,490	-3,555	-3,333	-2,092	-2,728	-4,409	-1,024	2,386	240	-1,248
LT										240	-3,590
LV									-797	-1,312	-5,292
ES	25,075	-3,238	-34,921	-41,034	-50,864	-174,826	-336,831	-213,382	-189,718	-254,115	-328,075
ECB	3,546	17,241	234,095	3,971	-22,370	42,159	-2,197	-6,721	-23,639	-83,756	-159,741
Total claims (T2)	73,291	146,922	419,182	309,443	457,484	834,279	946,071	690,994	608,228	812,735	1,058,483
Total liabilities (T2)	-80,411	-140,174	-422,222	-316,974	-458,165	-844,057	-1,000,121	-713,913	-628,443	-814,220	-1,067,991

Table B4.3: Claims/Liabilities related to the allocation of Euro Banknotes
(Shares)

		2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
AT	Adj. re BN	12.7	13.4	9.1	10.2	13.5	15.5	18.1	16.2	9.6	8.3	8.0
	Capital Key	2.9	2.9	2.9	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8
BE	Adj. re BN	18.0	17.1	15.2	11.3	10.0	7.7	5.9	4.8	4.3	3.5	2.7
	Capital Key	3.6	3.6	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
CY	Adj. re BN			0.1	0.1	0.2	0.3	0.4	-0.1	0.0	0.1	0.3
	Capital Key			0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
EE	Adj. re BN						0.7	0.6	0.5	0.6	0.5	0.4
	Capital Key						0.3	0.3	0.3	0.3	0.3	0.3
FI	Adj. re BN	3.2	2.7	2.8	2.4	1.8	1.7	1.4	1.3	1.3	1.2	1.1
	Capital Key	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
FR	Adj. re BN	51.3	48.2	50.5	45.2	41.3	36.7	32.2	29.4	27.2	25.9	24.6
	Capital Key	20.8	20.7	20.6	20.4	20.4	20.3	20.3	20.3	20.3	20.1	20.1
DE	Adj. re BN	-48.6	-51.5	-57.9	-63.9	-62.3	-60.4	-65.7	-66.4	-70.5	-69.9	-72.5
	Capital Key	29.6	29.5	29.4	27.1	27.1	27.1	27.1	27.0	25.7	25.6	25.6
GR	Adj. re BN	-0.9	-1.2	-1.2	0.0	-3.1	-6.5	-4.7	-3.2	-1.4	-4.6	-3.0
	Capital Key	2.7	2.6	2.6	2.8	2.8	2.8	2.8	2.8	2.9	2.9	2.9
IE	Adj. re BN	-5.4	-6.4	-6.8	-6.0	-5.9	-5.5	-5.2	-4.9	-4.2	-3.8	-3.7
	Capital Key	1.3	1.3	1.3	1.6	1.6	1.6	1.6	1.6	1.7	1.6	1.6
IT	Adj. re BN	-8.2	-8.4	-6.3	-4.5	-2.8	-2.7	1.6	4.9	7.5	9.5	9.8
	Capital Key	18.3	18.0	18.0	17.9	17.9	17.9	17.9	17.9	17.6	17.5	17.5
LU	Adj. re BN	-23.0	-23.2	-24.3	-25.5	-25.8	-24.8	-24.3	-25.3	-23.9	-21.7	-20.7
	Capital Key	0.2	0.2	0.2	0.3	0.3	0.2	0.2	0.3	0.3	0.3	0.3
MT	Adj. re BN			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Capital Key			0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
NL	Adj. re BN	6.9	8.1	10.3	12.0	12.4	12.9	13.2	13.1	13.4	13.2	13.1
	Capital Key	5.6	5.6	5.6	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7
PT	Adj. re BN	7.9	8.8	10.5	10.8	10.3	10.3	10.8	10.8	10.7	10.3	10.4
	Capital Key	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
SK	Adj. re BN				1.7	0.9	0.4	0.1	0	0.3	0.3	0.2
	Capital Key				1.0	1.0	1.0	1.0	1.0	1.1	1.1	1.1
SL	Adj. re BN		1.7	1.6	1.5	1.3	1.2	1.1	0.7	0.7	0.4	0.2
	Capital Key	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
LT	Adj. re BN										1.1	1.0
	Capital Key										0.6	0.6
LV	Adj. re BN									1.0	1.0	1.1
	Capital Key									0.4	0.4	0.4
ES	Adj. re BN	-13.9	-9.3	-3.4	4.6	8.3	12.5	14.7	18.1	23.5	24.6	27.1
	Capital Key	10.9	10.9	10.8	11.9	11.9	11.9	11.9	11.9	12.6	12.6	12.6

**Table B4.4: net Claims/Liabilities arising from balances of Target 2 accounts
(Shares)**

		2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
AT	T2	-26.3	-14.5	-8.8	-6.2	-6.0	-4.1	-3.8	-5.6	-4.9	-3.6	-2.9
	Capital Key	2.9	2.9	2.9	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8
BE	T2	-52.1	-44.0	-24.7	-13.4	-3.0	-6.3	-3.8	-2.2	-2.0	-1.0	-1.7
	Capital Key	3.6	3.6	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
CY	T2			-1.5	-2.2	-1.4	-0.9	-0.7	-1.0	-0.4	0.3	0.6
	Capital Key			0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
EE	T2						0.1	0.2	0.3	0.5	0.3	0.1
	Capital Key						0.3	0.3	0.3	0.3	0.3	0.3
FI	T2	1.6	3.0	1.0	1.4	4.3	7.9	6.4	3.8	2.5	2.5	2.1
	Capital Key	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
FR	T2	0.0	-8.5	-27.9	-19.6	-6.2	-9.4	-7.4	-4.8	-4.9	-3.6	-1.3
	Capital Key	20.8	20.7	20.6	20.4	20.4	20.3	20.3	20.3	20.3	20.1	20.1
DE	T2	7.4	48.4	27.5	57.4	71.2	55.5	69.3	73.8	75.8	71.9	71.3
	Capital Key	29.6	29.5	29.4	27.1	27.1	27.1	27.1	27.0	25.7	25.6	25.6
GR	T2	-10.2	-7.7	-8.4	-15.5	-19.0	-12.4	-9.8	-7.2	-7.8	-11.6	-6.8
	Capital Key	2.7	2.6	2.6	2.8	2.8	2.8	2.8	2.8	2.9	2.9	2.9
IE	T2	-3.2	-0.4	-10.5	-16.9	-31.7	-14.3	-7.9	-7.7	-3.6	-0.4	-0.1
	Capital Key	1.3	1.3	1.3	1.6	1.6	1.6	1.6	1.6	1.7	1.6	1.6
IT	T2	31.2	24.4	5.6	17.9	0.8	-22.7	-25.5	-32.1	-33.3	-30.6	-33.4
	Capital Key	18.3	18.0	18.0	17.9	17.9	17.9	17.9	17.9	17.6	17.5	17.5
LU	T2	7.3	12.5	10.1	17.0	14.9	13.1	11.2	15.0	17.3	18.2	17.7
	Capital Key	0.2	0.2	0.2	0.3	0.3	0.2	0.2	0.3	0.3	0.3	0.3
MT	T2			-0.2	-0.3	-0.3	-0.1	0	-0.1	-0.3	-0.1	0.1
	Capital Key			0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
NL	T2	13.6	-15.7	-4.5	5.0	8.9	18.3	12.8	6.7	3.2	6.7	8.2
	Capital Key	5.6	5.6	5.6	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7
PT	T2	-8.2	-4.4	-4.5	-7.4	-13.1	-7.2	-6.6	-8.3	-8.7	-7.6	-6.7
	Capital Key	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
SK	T2				-4.6	-2.9	-1.6	0.1	0.4	0.4	0.1	-0.5
	Capital Key				1.0	1.0	1.0	1.0	1.0	1.1	1.1	1.1
SL	T2		-2.5	-0.8	-1.1	-0.5	-0.3	-0.4	-0.1	0.4	0	-0.1
	Capital Key		0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
LT	T2										0	-0.3
	Capital Key										0.6	0.6
LV	T2									-0.1	-0.2	-0.5
	Capital Key									0.4	0.4	0.4
ES	T2	34.2	-2.3	-8.3	-13.0	-11.1	-20.7	-33.7	-29.9	-30.1	-31.2	-30.7
	Capital Key	10.9	10.9	10.8	11.9	11.9	11.9	11.9	11.9	12.6	12.6	12.6

Table B5: Actual and Implied Total Assets – Intra-Eurosystem claims
(€ Billions)

		2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
AT	Actual TA – intra ES claims	37.9	43.6	71.5	55.3	56.3	68.3	69.1	56.7	65.7	82.1	99.5
	Implied TA – intra ES claims	33.4	43.7	60.5	52.9	55.7	75.9	82.2	63.3	62.0	77.6	102.1
	Ratio of Actual to Implied TA	1.1	1.0	1.2	1.0	1.0	0.9	0.8	0.9	1.1	1.1	1.0
BE	Actual TA – intra ES claims	60.8	88.8	132.0	83.6	58.0	113.6	98.2	67.0	64.8	81.4	128.9
	Implied TA – intra ES claims	41.0	53.6	74.2	66.1	69.6	94.8	102.7	79.0	78.2	97.9	128.9
	Ratio of Actual to Implied TA	1.5	1.7	1.8	1.3	0.8	1.2	1.0	0.8	0.8	0.8	1.0
CY	Actual TA – intra ES claims			10.6	13.3	11.7	14.7	14.3	14.4	11.8	9.5	7.3
	Implied TA – intra ES claims			3.7	3.7	3.9	5.3	5.8	4.4	4.8	6.0	7.9
	Ratio of Actual to Implied TA			2.8	3.6	3.0	2.8	2.5	3.3	2.5	1.6	0.9
EE	Actual TA – intra ES claims						1.1	1.2	1.1	1.3	2.6	4.7
	Implied TA – intra ES claims						7.0	7.6	5.8	6.1	7.6	10.0
	Ratio of Actual to Implied TA						0.2	0.2	0.2	0.2	0.3	0.5
FI	Actual TA – intra ES claims	14.9	16.3	21.4	22.6	23.8	29.8	28.8	24.9	25.0	35.3	57.5
	Implied TA – intra ES claims	20.7	27.0	37.4	34.2	36.0	49.0	53.1	40.7	39.7	49.6	65.4
	Ratio of Actual to Implied TA	0.7	0.6	0.6	0.7	0.7	0.6	0.5	0.6	0.6	0.7	0.9
FR	Actual TA – intra ES claims	159.5	295.3	486.0	435.6	415.3	644.1	668.9	482.9	507.5	646.7	798.7
	Implied TA – intra ES claims	239.1	312.1	431.9	387.6	408.0	555.6	602.2	462.0	447.5	560.3	737.6
	Ratio of Actual to Implied TA	0.7	0.9	1.1	1.1	1.0	1.2	1.1	1.0	1.1	1.2	1.1
DE	Actual TA – intra ES claims	370.6	415.9	510.2	416.6	359.6	391.6	387.1	304.0	324.6	458.5	692.3
	Implied TA – intra ES claims	339.8	445.1	616.0	516.2	543.3	739.8	801.9	613.2	568.0	711.1	936.2
	Ratio of Actual to Implied TA	1.1	0.9	0.8	0.8	0.7	0.5	0.5	0.5	0.6	0.6	0.7
GR	Actual TA – intra ES claims	34.9	42.6	71.8	86.9	139.8	169.9	161.0	110.5	104.4	166.6	148.0
	Implied TA – intra ES claims	30.5	39.4	54.5	53.6	56.4	76.8	83.2	63.7	64.2	80.3	105.8
	Ratio of Actual to Implied TA	1.1	1.1	1.3	1.6	2.5	2.2	1.9	1.7	1.6	2.1	1.4
IE	Actual TA – intra ES claims	40.4	53.7	116.7	125.2	205.2	177.2	138.3	108.8	82.1	79.2	86.2
	Implied TA – intra ES claims	14.8	19.3	26.7	30.3	31.9	43.4	47.0	36.3	36.6	45.9	60.4
	Ratio of Actual to Implied TA	2.7	2.8	4.4	4.1	6.4	4.1	2.9	3.0	2.2	1.7	1.4
IT	Actual TA – intra ES claims	197.2	210.5	252.0	250.1	338.4	550.3	617.4	550.4	518.1	576.8	775.2
	Implied TA – intra ES claims	209.9	271.8	376.1	340.6	358.5	488.2	529.2	407.2	388.5	486.4	640.4
	Ratio of Actual to Implied TA	0.9	0.8	0.7	0.7	0.9	1.1	1.2	1.4	1.3	1.2	1.2
MT	Actual TA – intra ES claims			2.7	3.3	3.7	3.6	3.7	3.6	4.4	4.6	4.7
	Implied TA – intra ES claims			1.9	1.7	1.8	2.5	2.7	2.1	2.0	2.6	3.4
	Ratio of Actual to Implied TA			1.5	1.9	2.0	1.5	1.4	1.8	2.1	1.8	1.4
NL	Actual TA – intra ES claims	49.2	91.4	101.7	97.3	73.1	90.4	107.4	81.3	84.0	118.0	168.2
	Implied TA – intra ES claims	64.2	84.5	116.9	108.7	114.4	155.8	168.9	129.6	126.4	158.2	208.3
	Ratio of Actual to Implied TA	0.8	1.1	0.9	0.9	0.6	0.6	0.6	0.6	0.7	0.7	0.8
PT	Actual TA – intra ES claims	23.2	26.6	36.0	45.1	82.0	89.5	95.8	84.6	75.0	84.8	105.2
	Implied TA – intra ES claims	28.4	37.2	51.4	47.7	50.2	68.4	74.1	57.6	55.0	68.9	90.7
	Ratio of Actual to Implied TA	0.8	0.7	0.7	0.9	1.6	1.3	1.3	1.5	1.4	1.2	1.2

SK	Actual TA – intra ES claims				22.6	24.1	26.8	24.0	19.7	20.2	22.9	29.5
	Implied TA – intra ES claims				18.9	19.9	27.1	29.4	22.5	24.4	30.5	40.2
	Ratio of Actual to Implied TA				1.2	1.2	1.0	0.8	0.9	0.8	0.7	0.7
SL	Actual TA – intra ES claims	6.0	7.1	7.6	6.3	8.0	10.3	9.1	6.6	9.1	13.0	
	Implied TA – intra ES claims	6.9	9.6	9.0	9.4	12.8	13.9	10.7	10.9	13.7	18.0	
	Ratio of Actual to Implied TA	0.9	0.7	0.8	0.7	0.6	0.7	0.8	0.6	0.7	0.7	
LT	Actual TA – intra ES claims										7.8	11.9
	Implied TA – intra ES claims										16.3	21.5
	Ratio of Actual to Implied TA										0.5	0.6
LV	Actual TA – intra ES claims									5.1	8.0	11.6
	Implied TA – intra ES claims									8.9	11.1	14.7
	Ratio of Actual to Implied TA									0.6	0.7	0.8
ES	Actual TA – intra ES claims	113.6	176.4	213.8	212.8	193.1	336.5	522.6	339.5	295.8	376.0	505.1
	Implied TA – intra ES claims	125.0	163.8	226.6	226.3	238.2	324.4	351.6	269.8	279.0	349.3	459.9
	Ratio of Actual to Implied TA	0.9	1.1	0.9	0.9	0.8	1.0	1.5	1.3	1.1	1.1	1.1

Table B6: The Actual Share of ESTA – intra ES claims and the Adjusted Capital Key

Country		2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
AT	Actual Share of TA – intra ES Claims	3.3	2.9	3.4	2.9	2.8	2.5	2.3	2.5	3.0	3.0	2.7
	Adjusted Capital Key	2.9	2.9	2.9	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8
BE	Actual Share of TA – intra ES Claims	5.3	5.9	6.3	4.4	2.9	4.2	3.3	2.9	2.9	2.9	3.5
	Adjusted Capital Key	3.6	3.6	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
CY	Actual Share of TA – intra ES Claims			0.5	0.7	0.6	0.5	0.5	0.6	0.5	0.3	0.2
	Adjusted Capital Key			0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
EE	Actual Share of TA – intra ES Claims						0.0	0.0	0.0	0.1	0.1	0.1
	Adjusted Capital Key						0.3	0.3	0.3	0.3	0.3	0.3
FI	Actual Share of TA – intra ES Claims	1.3	1.1	1.0	1.2	1.2	1.1	1.0	1.1	1.1	1.3	1.6
	Adjusted Capital Key	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
FR	Actual Share of TA – intra ES Claims	13.9	19.6	23.2	22.9	20.7	23.6	22.6	21.2	23.0	23.3	21.8
	Adjusted Capital Key	20.8	20.7	20.6	20.4	20.4	20.3	20.3	20.3	20.3	20.1	20.1
DE	Actual Share of TA – intra ES Claims	32.2	27.6	24.4	21.9	18.0	14.3	13.1	13.4	14.7	16.5	18.9
	Adjusted Capital Key	29.6	29.5	29.4	27.1	27.1	27.1	27.1	27.0	25.7	25.6	25.6
GR	Actual Share of TA – intra ES Claims	3.0	2.8	3.4	4.6	7.0	6.2	5.4	4.9	4.7	6.0	4.0
	Adjusted Capital Key	2.7	2.6	2.6	2.8	2.8	2.8	2.8	2.8	2.9	2.9	2.9
IE	Actual Share of TA – intra ES Claims	3.5	3.6	5.6	6.6	10.3	6.5	4.7	4.8	3.7	2.8	2.4
	Adjusted Capital Key	1.3	1.3	1.3	1.6	1.6	1.6	1.6	1.6	1.7	1.6	1.6
IT	Actual Share of TA – intra ES Claims	17.2	14.0	12.0	13.1	16.9	20.1	20.8	24.2	23.5	20.7	21.2
	Adjusted Capital Key	18.3	18.0	18.0	17.9	17.9	17.9	17.9	17.9	17.6	17.5	17.5
MT	Actual Share of TA – intra ES Claims			0.1	0.2	0.2	0.1	0.1	0.2	0.2	0.2	0.1
	Adjusted Capital Key			0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
NL	Actual Share of TA – intra ES Claims	4.3	6.1	4.9	5.1	3.7	3.3	3.6	3.6	3.8	4.2	4.6
	Adjusted Capital Key	5.6	5.6	5.6	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7
PT	Actual Share of TA – intra ES Claims	2.0	1.8	1.7	2.4	4.1	3.3	3.2	3.7	3.4	3.0	2.9
	Adjusted Capital Key	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
SK	Actual Share of TA – intra ES Claims				1.2	1.2	1.0	0.8	0.9	0.9	0.8	0.8
	Adjusted Capital Key				1.0	1.0	1.0	1.0	1.0	1.1	1.1	1.1
SL	Actual Share of TA – intra ES Claims		0.4	0.3	0.4	0.3	0.3	0.3	0.4	0.3	0.3	0.4
	Adjusted Capital Key		0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
LT	Actual Share of TA – intra ES Claims										0.3	0.3
	Adjusted Capital Key										0.6	0.6
LV	Actual Share of TA – intra ES Claims									0.2	0.3	0.3
	Adjusted Capital Key									0.4	0.4	0.4
ES	Actual Share of TA – intra ES Claims	9.9	11.7	10.2	11.2	9.6	12.3	17.6	14.9	13.4	13.5	13.8
	Adjusted Capital Key	10.9	10.9	10.8	11.9	11.9	11.9	11.9	11.9	12.6	12.6	12.6

Appendix C

Figure C1: Intra ES claims - Intra ES liabilities (€bn)

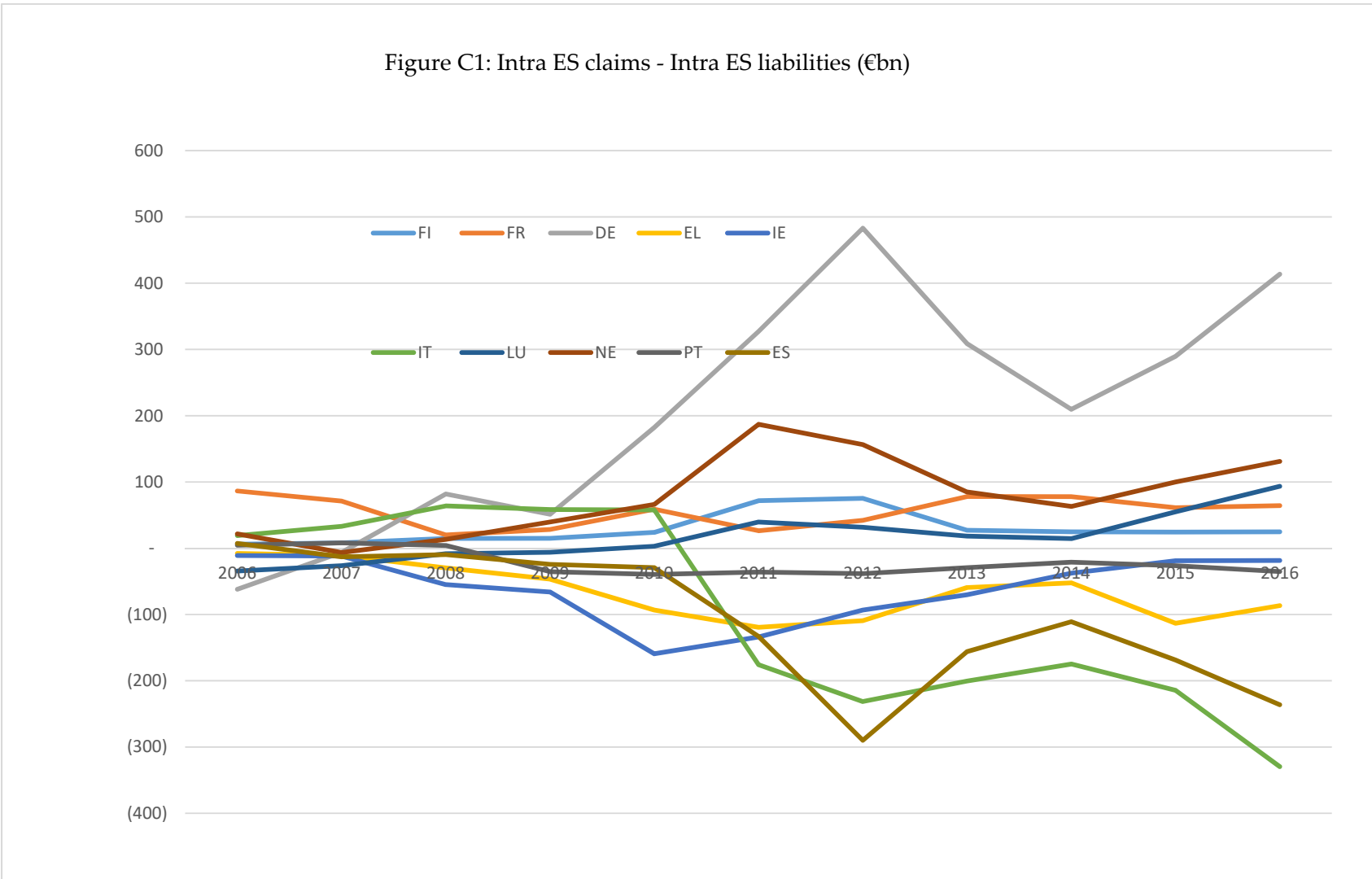


Figure C2: TA - intra-ES liabilities and Adjusted Capital Key

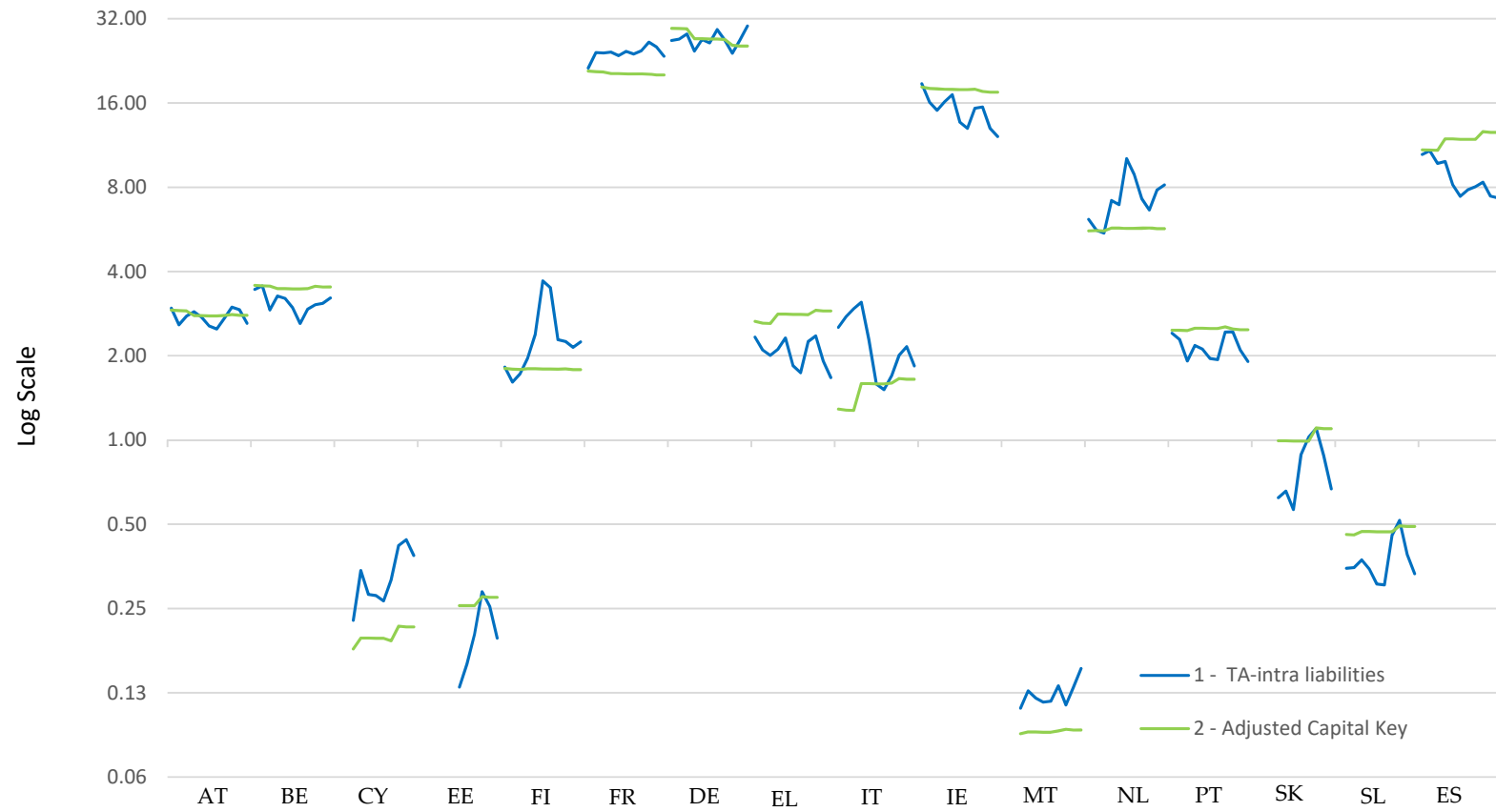


Figure C3: Target 2 balances and claims/liabilities related to the allocation of euro banknotes
2006-2016

