

The Political Economy of Risk-sharing in a Diverse Union

WALTRAUD SCHELKLE (European Institute, LSE)*

Abstract: Both the economic mainstream theory of optimal currency areas and the literature on incompatible varieties of capitalism regard the diversity of members as the union's fundamental problem. The political economy of monetary solidarity (Schelkle 2017) argues, by contrast, that diversity is an opportunity for pooling risks for mutual benefit, notably through a common currency that can bring other risk-sharing institutions in its wake. However, risk-sharing between states is a public good and its provision therefore beset with collective action problems. This theory expects deliberate risk-sharing, ie solidarity, to come about as a "by-product" of selective incentives by key players, for instance protection of the national export industry against exchange rate instability or investing firms against high interest rates. Once established, governing the commons of a stable currency becomes an ongoing task. This theoretical lens focuses the analysis on the extent of risk-sharing that the Maastricht framework already incorporated, for instance in the guise of the cross-border payments system TARGET. Such a payments system distinguishes a monetary union from a fixed exchange rate system. It effectively insured trade between EU member states against the sudden stop of capital flows, but also insured those who wanted to hedge against a break-up of the euro area. The puzzle is two-fold: how could an institution like TARGET acquire this insurance function even though it was never designed as a risk-sharing scheme? And why was cooperation between central banks never in doubt even though a Eurosceptic campaign in Germany challenged TARGET aggressively?

Introduction

The systemic crisis of the North-Atlantic financial system since 2008 tested not only the resilience of institutions but also our theories concerning these institutions. Risk management institutions of a currency area are a case in point, specifically the payments system as maintained by central banks. It has fallen into oblivion because advances in central banking have made bank runs and capital controls a phenomenon of a distant past, at least in the rich OECD world. The systemic crisis of 2008-09 did not seem to require a revision of this view although in Iceland, later in Cyprus and Greece, one could observe exactly such controls imposed on deposit withdrawal by savers; and there was a bank run in one of the world's financial centres, namely on Northern Rock in the UK. But the systemic crisis since 2008 concerned the freezing of wholesale markets. It was a flight by banks from

* This paper draws heavily on Schelkle (2017). I gratefully acknowledge the support by a Leverhulme fellowship in 2014-15 as well as the hospitable research environment of CES at Harvard University where a lot of this work was done. Comments are most welcome (w.schelkle@lse.ac.uk).

other banks, taking recourse instead to central banks as lenders and money market makers of last resort (Buiter 2012).

This raised potentially the problem of inter-state cooperation in monetary unions like the euro area (EA) but also the United States (US) where payments systems are operated by a system of member central banks. The freezing of interbank markets and extraordinary monetary policy responses showed up in anomalies of cross-border payments systems in both currency unions. But only in the EA was there a political “uproar” concerning the alleged abuse of the institution (Wolman 2013: 128). It triggered a lively and increasingly heated debate, the so-called TARGET2 debate, in Germany, at some point leading to a charge of criminal neglect raised against the Bundesbank management (Schelkle 2017: 270-271).

The mainstream economics of monetary integration does not speak to any of this. The so-called theory of Optimum Currency Areas (OCA) does not talk about systemic shocks, not even about monetary policy, central banking or the financial system. The path-breaking contributions, by Mundell (1961), McKinnon (1963) and Kenen (1969), focus on “asymmetric”, that is country-specific, shocks as the greatest problem for a monetary union; the most important selection criterion for members are the openness of member states or the diversity of their industries but not the financial system and its transmission of monetary policy; and they consider labor mobility and fiscal transfers as the most relevant adjustment mechanisms replacing the exchange rate but not about central banking.

Why this theory should have any relevance to present circumstances is not obvious, to say the least. Yet, a veritable renaissance of OCA theory has taken place over recent years because the EA crisis since 2010 has apparently proven that the EA is not an optimal currency area. Exactly this message can be found in a contribution for the NBER Macroeconomics Annual written by Paul Krugman (2013), even though this directly contradicts some of his earlier work. Another of the greatest economists there ever were, Joe Stiglitz (2016: 15), endorses the OCA “consensus among economists that for the single currency to work, what was required is that there be *sufficient* similarity among the countries”. He thus contradicts his crucial point in the preface: “The key reforms that are needed are in the structure of the currency union itself, not in the economies of the individual countries.” (Stiglitz 2016: xii) The latter is exactly what OCA theory points to.¹

Given this respectable support for the existing economic theory of monetary integration, the next section outlines an alternative approach, which combines insights from the political economy of cooperation (Keohane and Ostrom 1995) with recent advances in macroeconomics (Brunnermeier et al 2009). Then I explain the single most important institution that distinguishes a monetary union from a fixed-exchange rate system and show how it extended insurance to countries afflicted by a sudden stop of capital flows, to deficit and surplus countries alike. The last section explains why this arcane institution was not subject to collective action failure, notably moral hazard of distressed countries and renegeing of commitments by the fortunate countries after the veil of ignorance has been lifted.

¹ For more details, see my review of Stiglitz (2016) at URL: <https://www.eustudies.org/eusa-review-of-books/11>

A short introduction to the political economy of monetary solidarity

Monetary solidarity is not what many readers would spontaneously associate with the euro experiment. Deliberate or at least consciously tolerated risk-sharing between members of a currency union – which is how monetary solidarity is defined here – is indeed an inconspicuous feature of the euro area (EA). But it exists, yet the potential for mutually beneficial cooperation in this regard is not exploited. The reason for this is a political-economic paradox of diversity: the more diverse potential members of a cooperative arrangement are, the larger the potential economic gains from mutual insurance, yet the more difficult it may be to realize these gains politically

A diverse union brings with it large potential gains from risk diversification (Imbs and Mauro 2007). Joining a heterogeneous union can help a member state to reduce, shift and spread downside risks for national income, employment and consumption. The risk of each member in the pool becomes smaller, the less common the national risks are. If national or regional risks do not all materialize at the same time, there will always be some that are lucky and can support the unlucky. This is the case of asynchronous business cycles, where economic paths are only weakly correlated. The risk of the overall pool can even be reduced if the fortune of one member is directly linked to the misfortune of another (negatively correlated risks). A strengthening currency vis-à-vis the US dollar may be a boon for a region depending on oil imports as they get cheaper while a region depending on car exports to the US market finds it harder to sustain its business.

The introduction of a single currency can spread risk more widely and even reduce it. To give three specific examples: first, the liquidity risk of assets denominated in one currency diminishes for each investor as the pool of these assets becomes larger. Second, the risk of running out of foreign exchange reserves is reduced as more trade with other member states is conducted in the same currency. Third, there is an immediate benefit in terms of a lower risk premium paid by firms, households and the government in former soft currency areas. Those in former hard currency areas lose a general competitive advantage but this can be compensated by more real exchange rate stability as well as expanding markets in the other member states.

Finally and less conventionally, the benefits of risk-sharing can also be reaped by enabling members to take more gainful risks without raising the potential damage to themselves. Greater economic specialization has been the route to higher income for individuals as well as geopolitical entities. But specialization is a form of risk-taking and brings with it vulnerability: that technological advances and changes in taste make a particular skill or sector obsolete, or that a crucial ingredient becomes so scarce that it renders production unprofitable. If monetary union can diversify the risk of economic specialization, for instance by making cross-border financial investors share it, then this could benefit the risk pool as a whole as it raises potential aggregate growth (Obstfeld 1984: 1311).

But cooperation is needed to realize these gains. Collective action problems beset all policy cooperation, but they become more intractable as the parties become more heterogeneous (Snidal 1995: 62-67; Imbs and Mauro 2007: 26-30). Mistrust, misperception and lack of information stand in the way of risk pooling. Different preferences and power asymmetries may also lead to conflict in setting the priorities for collective action. Some may want to internalize all externalities in a central budget; others will fear the excessive risk taking that comprehensive insurance may incentivize.

This shifts the focus on problems and promises of inter-state cooperation, away from a sole focus on economic adjustment mechanisms like price and wage flexibility. The literature on this is large and varied. For the political economy of monetary solidarity, Axelrod (1984), Keohane (1984) and the

contributions to Keohane and Ostrom (1995) are highly relevant. This literature has explored the conditions under which different interests, power asymmetries and varying time horizons facilitate or obstruct cooperation when hierarchy as a solution is not available. These scholars explained the evolution or failure of these institutions with rational self-interest so as to avoid presumptions of identity and solidarity for cooperation in the absence of an effective hegemon or other strong hierarchical mechanisms. A monetary union among formally sovereign states can be seen as an international regime of interlinked institutions dealing with their collective action problems. Elinor Ostrom (1990) explored individuals' drive and capacity for self-organization. Like her colleagues from International Relations, she challenged the need for a supreme power to counter the destructive tendencies of rational egoists in the realm of institutional economics.

Still, plenty of political market failures make cooperation difficult (Keohane 1984: 85; Schelkle 2017: 46-56). There is the notorious moral hazard problem on the part of the insured unfortunate: if they receive compensation, they may have fewer incentives to adjust. But there is also the commitment problem of the insurers and fortunate of a risk pool: once the veil of ignorance has been lifted, they find all kinds of reasons for why they should not have to compensate the unfortunate because supposedly they were careless or reckless and deserve their bad luck. This can be reinforced by misperceptions, such as stereotyping, that behavioural political economists stress as a form of rational ignorance. Finally, more comprehensive insurance also creates more interdependence and the bad luck of one affects everybody: this fear of interdependence sustains uninsured externalities.

Time and again, the management of the EA crisis has seen manifestations of these collective action problems that hampered bold steps to end the crisis. For instance, the governments of distressed countries keep on being accused, some rightly and some wrongly, to refrain from necessary reforms because the extraordinary monetary measures of the ECB take pressure off them. Hence, the conditionality imposed on them was perceived as a punishing form of co-payment, rather than as a constructive feedback and signaling mechanism for collective action. Nordic member states have blamed distressed countries for their fiscal profligacy and failures in prudential regulation, even though the extent and underlying causes for country crises were quite different and many of the Northern countries showed similar symptoms. The first reforms of EA economic governance were driven by this attempt to renationalize responsibilities in an integrated financial area.

What this crisis has amply illustrated is that a single currency can be seen as a common pool resource. It has to be maintained and stabilized in continuous cooperation. If left to spontaneous market forces, monetary-financial integration can also lead to concentration and accumulation of risks or to shifting of risks onto those that are least able to bear them. Policies and markets have to be developed and maintained with a view to what they do to common (systemic) risks that emerge from integration itself (endogenously).² OCA theory, by contrast, keeps on barking up the wrong tree (Krugman 2013). Not labour market reforms but rules on financial innovation and competition, prudential supervision and lending of last resort are important, along with the upholding of commitments between governments.

Each of these interventions may have a specific rationale and be done on their own merit rather than with a view to risk-sharing at large (Jones 2012: 58). They are more likely to emerge as a by-product of collective action driven by individual incentives. Olson (1971: 132-135) has formulated

² See Jones and Underhill (2014) for a full set of institutions that have made monetary-financial integration viable in a number of currency unions.

this *by-product theory* of collective action as an alternative to his preferred *privileged-group theory*. The former applies when the distribution of benefits is not unequal enough to make a select group provide the collective good. In this case, private benefits can be dispersed rather than concentrated and cannot be enjoyed without providing the collective good. Lawrence Broz (1997, 1998) has used Olson's by-product theory of collective action to explain how the US eventually got a national central bank, after at least two failed attempts.

Avoiding the next crisis is and has been a prime instigator of monetary solidarity in Europe (and the US), making risk-sharing a by-product of crisis management that is preoccupied with shielding the lucky from the fall-out of crisis in unlucky countries. The power asymmetries that come to the fore in these situations make solidarity typically feel like tough love rather than tender care. A prime example of such tough love are the emergency funds created in the EU after 2010 which combine historically unprecedented amounts of sovereign lending with harsh and intrusive conditionality. The theory of collective action can explain why monetary solidarity is not necessarily a pretty sight. But it also explains how the EA managed to extend unprecedented amounts of insurance to its members and has now consciously institutionalized some of these risk-sharing mechanisms, such as the European Stability Mechanism or the banking union. The following gives an inconspicuous example: how the cross-border payments system became arguably the single most effective institution of risk sharing and sustained cooperation despite a severe political challenge.

Cross-border payments systems as universal insurance

In a monetary union operated by several member central banks, payments cross internal borders between these members. This crucial institution distinguishes a currency union from a fixed exchange rate system (Bindseil and König 2011: 4; Garber 2010; Whelan 2014: 112). TARGET²³, the cross-border payments system of the EA, ensures that a euro is accepted as a euro in payment irrespective of whether it is drawn on a bank account in Portugal or the Netherlands, just as a dollar is a dollar throughout the United States even if one district experiences for several years a high inflow of bank deposits from virtually every other district. Normally, payment systems work smoothly and consumers and firms do not even notice whether one or two central banks are involved in its operation. Before the crisis, hardly anybody paid attention to this arcane institution.

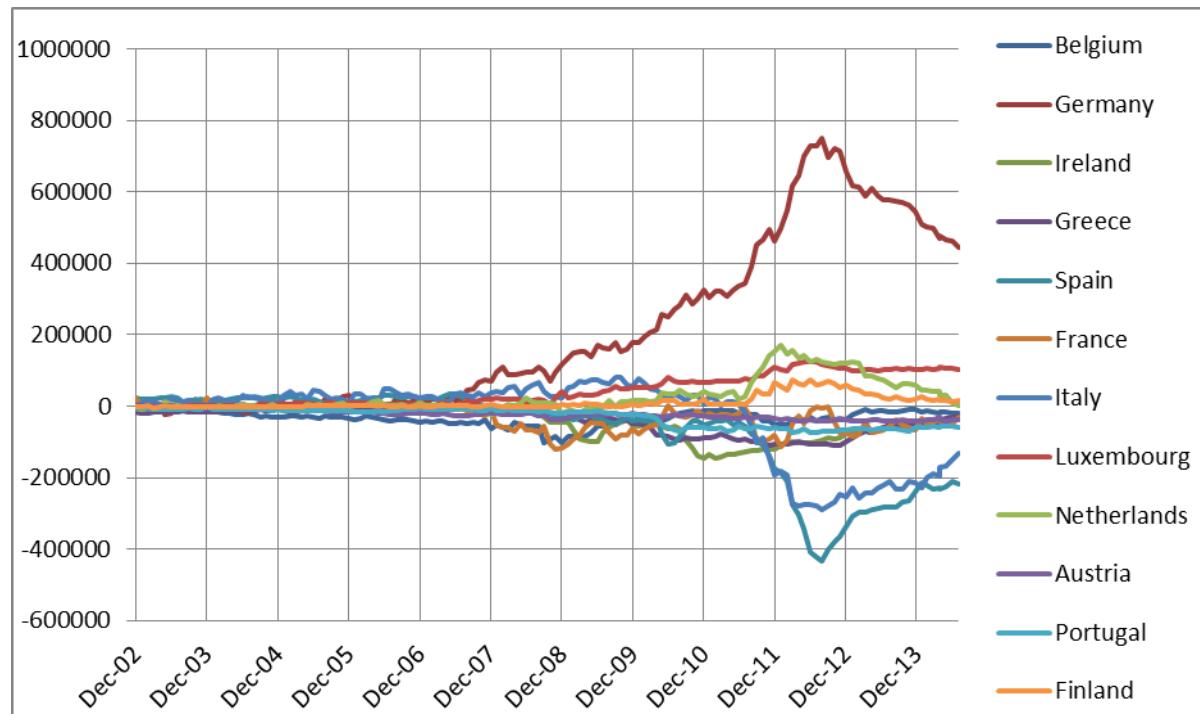
The sudden interest in TARGET was triggered by anomalous imbalances which Figure 1 shows. The top line represents the Bundesbank surplus of bank reserves which has its counterpart in claims against other central banks, while the lowest two lines represent the liabilities of the central banks of Spain and Italy. By mid-2014, the Bank of Italy switched places with the Bank of Spain, bearing the largest liabilities in the TARGET system.⁴ At its peak in August 2012, when there was a real prospect of the euro area breaking up, it was understandably worrying that the Bundesbank held claims of more than €750 bn against the TARGET system. To put this figure into perspective: the new permanent emergency fund of the EU, the European Stability Mechanism, has a lending capacity of €500 bn.

³ TARGET stands for Trans-European Automated Real-time Gross settlement Express Transfer System. This characterizes a "settlement system in which processing and settlement [of payments] take place on an order-by-order basis (without netting) in real time (continuously)" (ECB n.d.: 6). TARGET2 stands for the first fully unified system introduced after the EA had already started.

⁴ This data has to be extracted from national central bank balance sheets and was collected by Steinkamp and Westermann (2014) from the University of Osnabrück.

The iconography of exploding TARGET claims and liabilities came to popular attention when Hans-Werner Sinn, tipped off by a former Bundesbank director, raised the alarm with a series of articles in the German media, alongside a co-authored scholarly paper (Sinn and Wollmershäuser 2012). An open letter to the Bundesbank was sent by the Bavarian section of the German taxpayers association in February 2012, 31 pages long with 87 footnotes (Bund der Steuerzahler 2012). The open letter was the prelude to a charge of criminal negligence against the Bundesbank management in April 2012, although the criminal court in Frankfurt refused to open procedures. Sinn's campaign resonated with the German media, organized interests like the Bavarian taxpayers association, a new Eurosceptic party (*Alternative für Deutschland*, that made a cap on TARGET balances an item in its party manifesto) and even the wider public. There was some concern in other countries: in the lower house of the Austrian parliament, questions were raised about the size of the Austrian TARGET balances (Jobst et al 2012: fn 1). Apparently, the Finnish central bank Governor expressed his worries behind the closed doors of an ECB meeting.

Fig. 1 TARGET claims and liabilities of the EA-12 member states, 2002-2014-6, in € millions



Source: monthly data from Institute of Empirical Economic Research - Osnabrück University, URL: www.eurocrisismonitor.com

On May 31st, 2011, Sinn's propositions received world-wide publicity when Martin Wolf (2011) took them up in his widely read blog for the *Financial Times*. Wolf's blog "Intolerable choices for the Eurozone" was in turn endorsed, on June 1st, by Paul Krugman (2011). He argued that the TARGET claims and liabilities are evidence for a "slow-motion bank run [...] in the European periphery". While this diagnosis was correct, Krugman ended on a note that made even Sinn sound hopeful: "If you ask me, the water level has now dropped so far that the fuel rods are exposed. We really are in meltdown territory." This was a non-sequitur and the metaphor proved to be misleading: the accumulation of TARGET balances showed a safety valve at work when there is a systemic bank run, not a hazardous failure of the main mechanism.

The functioning of a cross-border payments system

The euro area is like the dollar area “composed of a system of central banks that together administer a single currency” (Wolman 2013: 128).⁵ The ECB is the sole issuer of central bank money and has its own balance sheet. Commercial banks established in each member state maintain an account with the national central bank. A bank is established if it has its headquarters there or is incorporated as a subsidiary, in contrast to merely operating a branch. Payment flows between banks in different member states go through these central bank accounts. Without a highly liquid intermediary and central clearing house, payments would be rather costly as every bank would have to maintain links with every other bank. Payments would also be susceptible to cash flow interruptions, as information about partners and events elsewhere is even less complete than in domestic transactions, leading to cycles of complacency and panic. In the euro area, the payment system TARGET fulfilled these functions from January 1999 by connecting national systems. It was replaced by TARGET2, a single platform, in May 2008.

How does a cross-border payments system work (fig.2)? To take the example of a current account transaction first: a wholesale wine importer in B wants to buy produce from a vineyard in A, financed by funds held with her bank in B. The exporting vineyard owner wants to hold all financial wealth with his bank in A. Thus, the bank in B has to make a payment to the bank in A. It does so by instructing the payment system to transfer deposits it holds with the central bank in B (or can get via an overdraft against collateral) to credit the account of the bank in A, which it holds with the central bank there.

This current account transaction gives rise to claims and liabilities in the central bank balance sheets of each member -- and in the consolidated balance sheet of the currency union. As regards the two member central banks, the central bank in B will have a longer balance sheet because it gave (possibly just intra-day) credit to bank B (booked on its asset side) and has now a liability towards the central bank in A booked on the other side. The central bank in A, by contrast, just notes an asset swap, namely a claim on the central bank in B for a lower amount of credit to bank A.

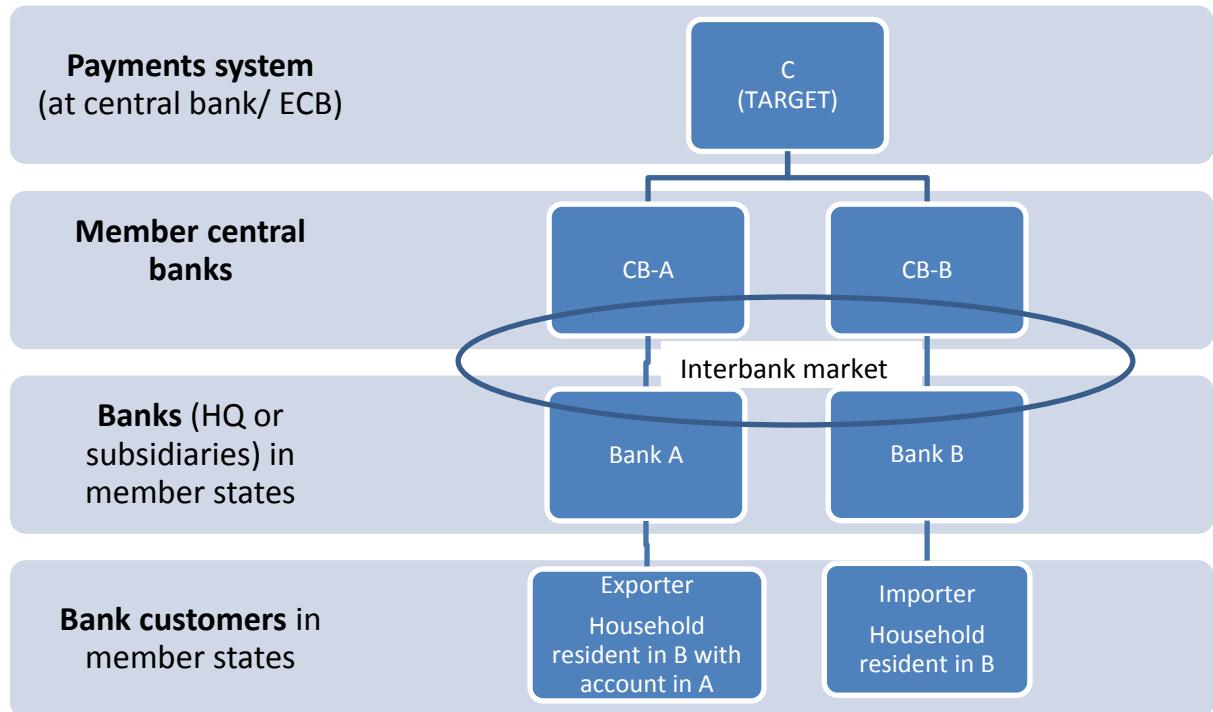
Any credit that a bank (here possibly B) may take out to make a payment must be collateralized so as to secure the crediting central bank against default. The claims and liabilities between central banks and vis-à-vis the central bank (C) are not collateralized. This makes sense: they are claims on and liabilities in central bank money that the system itself creates. The joint central bank C shows on the asset side that banks in B took out more credit, offset by the claims banks in A acquired, ultimately against C. This is how TARGET operates: at the end of each day, the claims that member central banks acquired during a business day are netted and become a claim against the ECB. The ECB is the hub in the “hub-and-spoke-structure” of the Eurosystem (Whelan 2014: 83).

In normal times, bank A may now consider that it holds excess reserves with its central bank given the payment it received. Excess reserves carry a low interest rate and bank A may therefore want to lend them at a slightly higher interest rate in the interbank market. In the simplest case, bank B is in a matching position. It may want to replenish its reserves or reduce its borrowing from the central bank, if that borrowing is more expensive than what it has to pay in the interbank market. When the interbank market is functioning, matching occurs: banks in the position of A lend to banks like B. The

⁵ In Schelkle (2017: ch.9), I compare the functioning of TARGET systematically to that of ISA, the Interdistrict Settlement Account of the US Federal System, which showed similar imbalances that went, however, largely unnoticed.

resulting interbank flow undoes the intra-system claims and liabilities between the two central banks, including the net claim of bank A on the consolidated bank C. The availability of funds in the interbank market is one of the reasons why before 2007, the intra-payment system claims and liabilities were fairly balanced: liquidity-rich banks financing exporters were happy to lend to liquidity-seeking banks financing importers. The nationality of trading firms and the banks that finance them do not have to be the same. Even a non-euro bank, for instance from the UK, can participate in TARGET via subsidiaries in the euro area.

Fig.2: Schematic representation of cross-border payments



A capital movement, such as a portfolio investment, generates similar accounting transactions in the payments system. Take the example of wealthy households in B wanting to transfer part of their deposits to banks in A. The reasons can vary: because they often spend their holidays in A, because they want to diversify their bank connections to enjoy full deposit insurance or because they no longer trust the banks in B. Households would therefore instruct their bank to make a payment to their newly opened account in A. As before, the bank in B requests the central bank in B to take from its reserves or give it credit and transfer the funds to the central bank in A which credits bank A. Deposit holdings and thus liquidity of the banking system in B are reduced, while both have increased for banks in A. As before, the consolidated balance sheet C only shows a change on the asset side to the effect that banks in A need less, and those in B more, central bank liquidity. And again, these traces of a capital transaction would be undone if banks in A lent their excess reserves to banks in B via the interbank market. Bank B may have a liquidity or funding shortage that made it run down its central bank reserves or even take out credit; but in normal times, the interbank market evens out such liquidity shortages and excess holdings promptly.

The financial crisis in 2007-08 meant that the interbank market froze. Banks like A refused to lend their excess reserves to banks like B (and vice versa), neither within-country nor cross-border. By holding their excess reserves with the central bank instead, they offloaded the credit risk they perceived in bank B to the central bank. Central banks became the market-makers, not only the

lenders, of last resort (Buiter 2012). In this situation of a sudden stop, the cross-border payments system kept the monetary union going in three ways (Cecchetti et al 2012; Whelan 2014):

1. TARGET insured trade finance against a sudden stop of private capital flows;
2. TARGET facilitated capital and deposit flight between member states but helped to keep fugitive investments inside the monetary union;
3. TARGET allowed banks to hedge against the break-up of the EA.

To see how TARGET replaced the interbank markets that no longer functioned and thus insured member states, it is helpful for the following to briefly recall the basic balance of payments identity (Cecchetti et al 2012: 4):

$$\text{Current Account (Ex-Im)} + \text{Capital Account (KIm-KEx)} \equiv \text{Official Settlement Balance (FEx-FIm)}$$

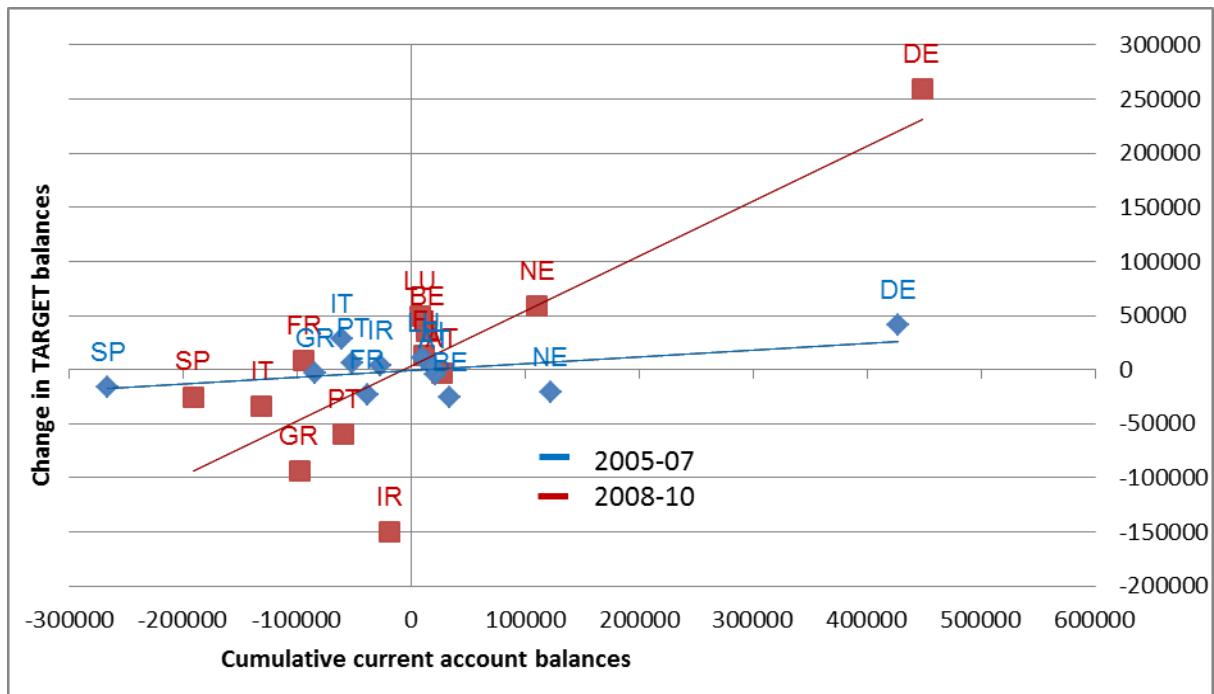
The identity sign means that a balance of payments is by necessity balanced. So if Sinn (2012) talks of a balance of payments crisis, he means that the current account deficit ($\text{Ex-Im} < 0$) is no longer paid for by a private net capital import ($\text{KIm-KEx} > 0$). Thus, the Official Settlement Balance or Financial Account, which normally consists of foreign exchange and gold reserves, becomes negative. The Official Settlement Balance can restrict imports of goods and services if private capital inflows are not forthcoming under a fixed exchange rate system and the central bank cannot borrow foreign exchange in large enough quantities in the market or from other central banks.

For national central banks in the Eurosystem, TARGET balances play the role of foreign exchange reserves (Buiter and Rhabari 2012: 12-13). Current account deficits can be financed by a capital import from TARGET ($\text{FEx-FIm} < 0$) and current account surpluses can continue because TARGET provides the capital export ($\text{FEx-FIm} > 0$) that banks are no longer ready to take onto their books. But even if the current account were balanced, as it was roughly the case for Ireland and Italy, a TARGET deficit may be generated ($\text{FEx-FIm} < 0$) by an exodus of capital ($\text{KIm-KEx} < 0$) and vice versa for the member state that becomes the safe haven for these capital movements ($\text{KIm-KEx} > 0$ leads to $\text{FEx-FIm} > 0$). All three balances can be imbalanced of course: before the crisis, Spain had such high net capital imports from German and French banks that they overcompensated even high current account deficits and the country accumulated small TARGET surpluses and foreign exchange reserves (Chen et al 2012: 19-20).

Insurance against sudden stops of trade finance

One interpretation of the TARGET imbalances was that they sustain current account deficits that can no longer be financed by private capital flows (Merler and Pisani-Ferry 2012; Tornell and Westermann 2012). It is tempting to make this connection but not self-evident: nobody ever suggested that similar imbalances in the US payments system (Schelkle 2017: fig. 9.3) were driven by a balance of payments crisis between Federal Reserve districts. So it would have to be shown that that current account surpluses lead to increases in TARGET balances and vice versa for deficits (Cecchetti et al 2012: 6-7). The following graph shows this relationship for the EA-12 in the three years before the crisis (2005-07), and at the height of the North Atlantic financial crisis (2008-10). The cumulative current account balance over each three year period is plotted against the corresponding change in the TARGET balance.

Fig. 3 Current account balances and TARGET balances for EA-12, 2005-2010, in millions of € (annual data)



Sources: AMECO, University of Osnabrück (eurocrisismonitor.com); own calculations

We can see that before the crisis (blue trend line and diamonds) there was virtually no relationship between the volumes needed for trade finance and official payments balances of central banks; instead, private capital and credit financed current account imbalances. This changed in 2008-10 (red trend line and squares) when changes in TARGET claims and liabilities become correlated to the current account imbalances. Cecchetti et al (2012: 6) consider this to be evidence in favor of a "(trade) flow interpretation" of TARGET imbalances, at least for this phase of the financial crisis. If so, the correlation implies that up to half of the current account imbalances of deficit and surplus countries could be financed thanks to TARGET (the trendline has a slope of 0.5). Notably, banks financing the importers could obtain credit from the ECB despite being shut out of interbank lending while banks financing the export side could offload the perceived credit risk. This positive relationship still holds if Germany is excluded from the sample.

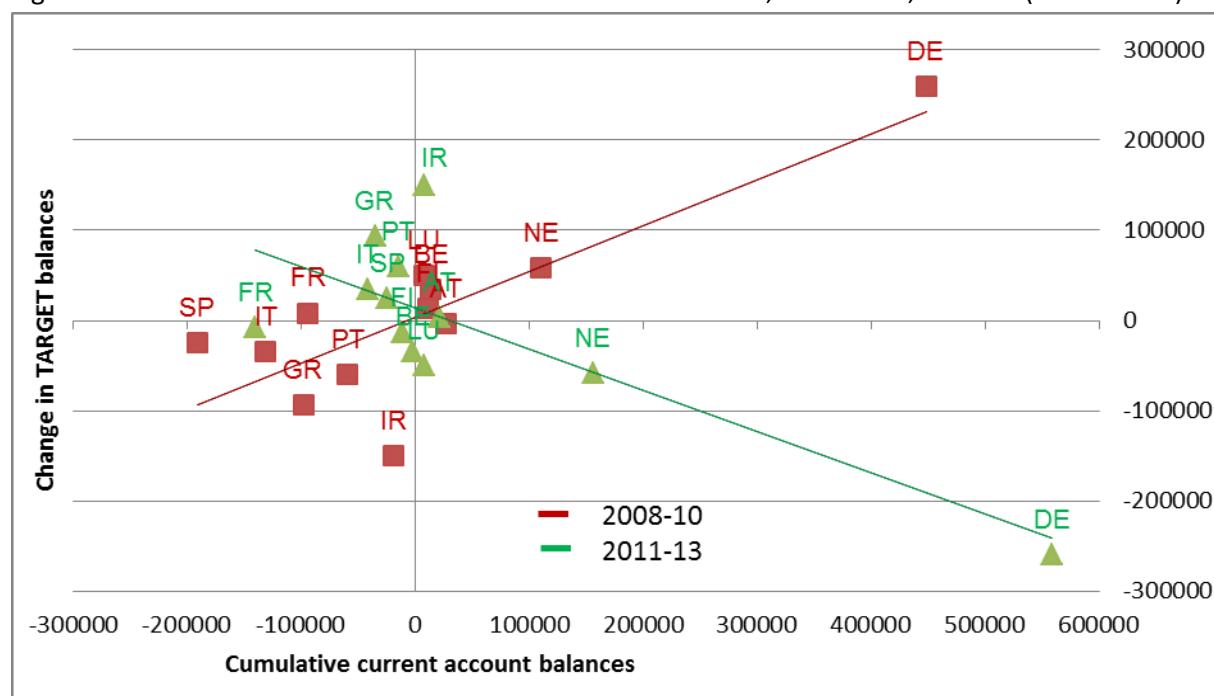
This change between 2005-07 and 2008-10 is *prima facie* evidence for TARGET acting as an insurance mechanism against a sudden stop of trade finance. Strictly speaking, this would mean that payments imbalances compensated for the drying up of trade-related capital inflows, rather than for capital outflows (Calvo 1998: 36). Such insurance would be extremely valuable because the international experience of more than 100 sudden stop incidents between 1985-2010 suggests that output falls on average by almost 10%, possibly more if other measures are used (Hutchinson et al 2010: 2). There is also evidence for developing economies that sudden stops lead to persistent decline in GDP growth rates, which is largely due to a collapse in investment; smaller firms in the formal sector are the hardest hit, compared to big firms and small informal businesses (Dagher 2010: 5-7). Thus, not only banks but also the non-financial economy, firms and their employees, might benefit from insurance in the countries afflicted by a sudden stop. This extends of course also to exporting sectors in countries that trade with these countries.

Protection of property rights but also a conduit for capital flight

The majority of those who analyzed the sudden rise in TARGET imbalances concluded that “capital account reversals” were responsible as Mody and Bornhorst (2012) put it. In this view, the imbalances were not primarily driven by the drying up of trade finance but by savers and financial investors reconsidering where to hold their assets. This then triggered capital outflows that may subsequently have forced countries into current account (over-)adjustment.

If TARGET imbalances are primarily driven by capital flight, the relationship with current account deficits becomes uncertain. In terms of Fig. 4, the regression line might become very steep, if capital flight afflicts the deficit countries most (Cecchetti et al 2012: 7-8). If capital flight is more selective, there may simply be no positive relationship. As the graph below shows for the three year period, which includes the first half of 2012, the relationship became negative (green line and triangles). It is shown in contrast to the data for 2008-10 reproduced from Fig. 4.

Fig. 5 Current account balances and TARGET balances for EA-12, 2008-2013, in mio € (annual data)



Sources: AMECO, University of Osnabrück (eurocrisismonitor.com); own calculations

Despite persistent and even rising current account surpluses, Germany, the Netherlands and Luxembourg experienced a reduction in their claims in the latter period (negative TARGET flows). Moreover, the reversal was almost a mirror image of the one for 2008-10. This suggests that capital flight may already have played a role in 2008-10: those who fled into the safe haven of the Bundesbank were unwinding their excess reserves in 2011-13. Moreover, the negative relationship is entirely driven by the Netherlands and Germany – without them, the line of best fit becomes vertical, suggesting no relationship.

Against what risk does TARGET protect if it is a conduit for capital flight? And is this insurance in the public interest of any member state? After all, one might see economic value in a payments system that protects trade between the members of a monetary union against the disruption from financial instability. But such value is not obvious if it protects presumably wealthier sections of society and banks whose flight triggered the financial instability in the first place. It might lead to regressive

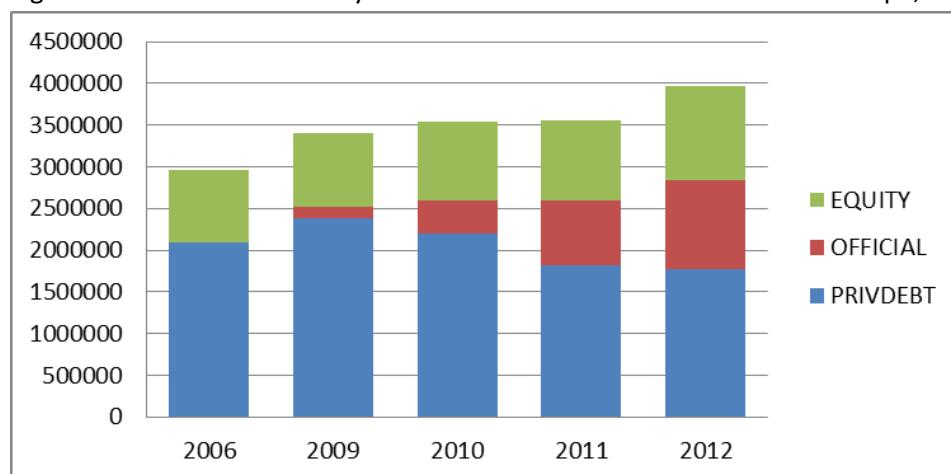
redistribution: the main beneficiaries of the Bundesbank's TARGET claims would be banks in Germany and other rich member states (Cecchetti et al 2012: 7-8, Hobza and Zeugner 2014a: 12).

If capital flight was occurring, the financial exposure of creditor countries' banks and residents should have declined rapidly. A new database created by Hobza and Zeugner (2014b) from the European Commission allows us to decipher the asset holdings of major creditor countries in Ireland and the Southern European countries between 2010 and 2012. Their database shows privately held stocks and their annual changes as well as the bilateral stock holdings created by official assistance via ESM/EFSD programs and the government bond-buying program of the ECB.

The share that countries receive in stabilization programs is known, while it has to be estimated which (mostly Southern) European Treasury bonds were bought by the ECB under its Securities Market Programme (SMP). Those member states whose bonds were not bought are then considered holders of the SMP bonds according to their share in the capital of the ECB (Hobza and Zeugner 2014a: 7). Similarly, TARGET balances are assigned to bilateral holdings as if the ECB were a mutual fund. Thus, if 21% of all TARGET liabilities are owed by Spain, 21% of TARGET claims by Germany are assumed to be held vis-à-vis Spain. In legal terms, however, Germany holds a claim against the ECB and if Spain would default on its obligations, German losses would lose only according to its share in the ECB capital stock, about a third of the 21%.

Asset holdings of two groups of countries - the six countries exposed to bond market attacks and the rest of the euro area – are shown in Figure 6. Holdings in a pre-crisis year (2006) are compared with those with the height of the North-Atlantic and the Euro area crisis (2009-2012). The graph shows that overall asset holdings of the rest of the euro area in Cyprus, Greece, Ireland, Italy, Portugal and Spain, do not fall during the financial crisis. A rise of official claims slightly overcompensates for the decline in private debt, from a peak of €2.386 trn in 2009 to €1.778 trn in 2012. Equity stays fairly constant, which confirms the expectation in the risk-sharing literature that equity is a (more) reliable source of private insurance than debt. The official interventions through stabilization programs by the EU (with the IMF as the junior partner), the SMP of the ECB, and finally TARGET expand rapidly. There was an astonishing mobilization of official funds within just a few years. Of these official financial stocks, TARGET claims comprise a substantial, albeit falling share, from 100% in 2009 to just over 75% in 2012, when the remainder is made up of funds from stabilization programs (14%) and the SMP (10%).

Fig. 6: Financial assets held by rest of the EA in Ireland and Southern Europe, in millions of €



Source: Hobza and Zeugner (2014b), own calculations

A closer look at the exposure of Germany shows that, by 2012, Germany counts for less than 14% of equity in these troubled countries (slightly down from 16% in 2006) and for almost 30% of private debt (slightly up from its pre-crisis share: 26.9% in 2006, 28.4% in 2012). The credit claims correspond fairly closely to Germany's economic size in GDP terms while the country is underrepresented in equity terms, indicating that the country acquires its claims through trade, not so much through FDI. However, Germany held almost 63% of all official claims of the rest of the euro area in 2012. This is largely due to its high net TARGET claims (almost 70% of all TARGET claims) that are attributed to it by the Hobza and Zeugner (2014a) methodology. Together, these figures mean that there was capital flight by German banks but not more than by the rest of euro area banks generally. TARGET was the vehicle for all of them to reduce their exposure.

Both the flight from deposits and a withdrawal of claims by international banks made domestic financial institutions lose their sources of funding.⁶ Given the breakdown of the interbank market, they faced an extreme version of funding illiquidity, which means that borrowing from alternative sources was prohibitively expensive and drove them to the central bank. TARGET, and the ECB interventions which it transmitted, could help with funding liquidity and thus rein in the fall in asset prices. To the extent that investors (and savers) are assured that they can exit at short notice and return without penalty, TARGET helped to retain trust in the currency if not in the banks of some countries. While it was a vehicle for capital flight, the quick unwinding of positions as shown in Figures 5 and 6 also suggests that this was a reversible process. TARGET thus helped to deal with the crisis on the liabilities side of banks (Brunnermeier et al 2009: 16) which is crucial for containing its spread. In sum, TARGET was the vehicle for capital flight with its regressive tendencies but it also served a valid function of macrostabilization during a systemic crisis by keeping the flight inside the currency area.

Hedging against the break-up of the euro area

Capital flight was not confined to banks inside the euro area. Cecchetti et al (2012: 9-12) present circumstantial evidence that non-euro banks, mainly from the UK, instructed their subsidiaries to reduce their asset holdings in Greece, Ireland, Italy, Portugal and Spain while they maintained their funding (deposit) base in those countries. With these funds, UK banks bought Treasury bonds in the core instead, again using their subsidiaries inside the EA. For example, the Spanish subsidiary of a UK bank bought Bunds, funded by Spanish deposits and possibly credit from the Eurosystem, while the German subsidiary held the payment it received from the Spanish partner institution as excess reserves in the Bundesbank. The authors emphasize that this capital flow reversal via TARGET cannot have been triggered by perceived credit risk since UK banks maintained their stakes in their periphery subsidiaries.

These operations of UK banks amounted to hedging against the break-up of the euro. In the event of breakup, the assets in the core were likely to revalue while the liabilities in the periphery were expected to devalue. Hedging was better conducted through subsidiaries residing in the EA rather than through the headquarters in London: the management presumably feared that in the case of a break-up, banks established inside the euro area would be treated more favorably than those from

⁶ See Brunnermeier et al (2009: 13-18) for an intricate analysis of this "amplifying dynamic" of asset price falls when banks experience funding and market illiquidity. The alternative view is summarized by Westermann (2014: 118-121) who stresses the policy failure (dynamic inconsistency and risk shifting) that results from maintaining payments despite capital flight.

outside (Cecchetti et al 2012: 10-11; Chen et al 2012: 20). The graphs below provide evidence, showing how UK banks increased their exposure to the German public sector dramatically, if only temporarily. At the same time, the overall exposure to the five countries under siege dropped, albeit less dramatically (Fig. 7). With the exception of Ireland, UK banks shunned the periphery public sector in particular, and this tended to be persistent (Fig. 8).

Fig. 7: Exposure of UK banks on an ultimate risk basis (in millions €)

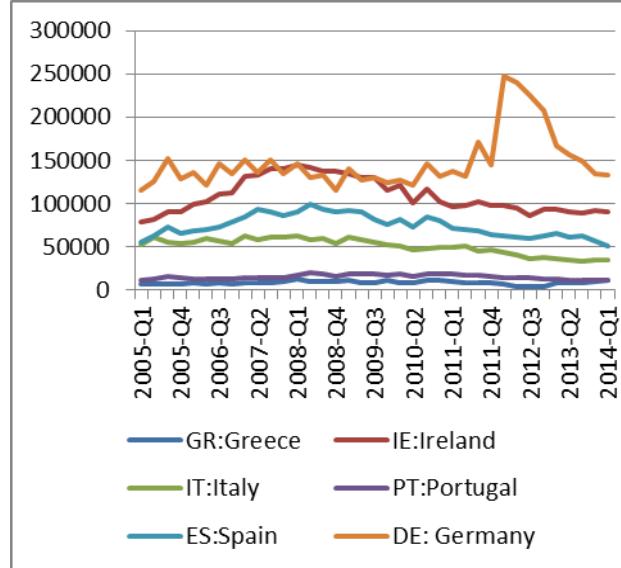
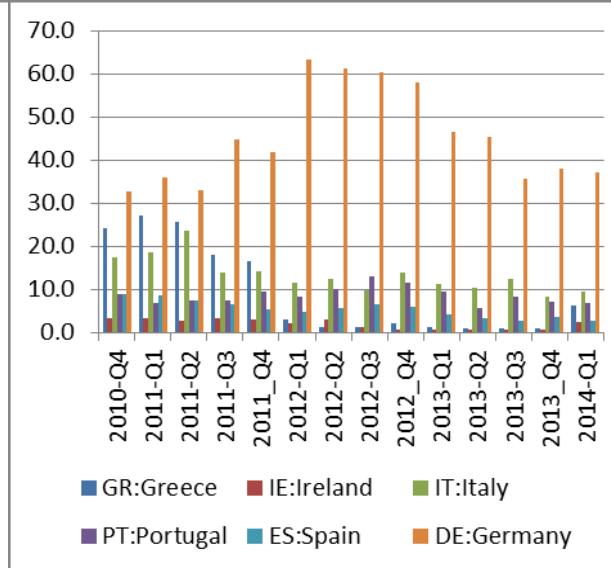


Fig. 8: Share of UK bank exposure to public sectors (in percent), 2010-Q4 to 2014-Q1



Source: BIS consolidated banking statistics, own calculations

This situation arose in the six months before ECB President Mario Draghi gave his momentous speech to an investment bankers forum in London, assuring them that the ECB would “do whatever it takes” to save the euro (Draghi 2012). At the same time, the TARGET debate reached a boiling point in Germany. It is arguable that Draghi’s speech, announcing a new monetary instrument full of legal uncertainties, could not have achieved quite the impact it did if there had not been an institution to underpin his claim. TARGET processed the capital flight to hedge against redenomination risk but also prevented it from causing massive disruption. The underlying risk, a break-up of the euro area, was beyond any market actors’ control; yet collective panic could bring it about. TARGET was an insurance mechanism that helped to sustain the euro despite this existential threat (Bordo 2014).

Conclusion: TARGET as an institution of financial solidarity

The main section above has demonstrated how a cross-border payments system spreads and contains risks from a systemic crisis. The economic underpinning is provided by financial macroeconomics, a rapidly evolving field at the moment. It can grasp the essentials of this crisis but also the rising frequency of banking crises ever since the waves of financial liberalization since the mid-1980s (Babecký et al 2012: fig.1). TARGET provided an effective substitute for systemically failing markets that translated a common shock into self-fulfilling crises of a few member states (De Grauwe and Ji 2013). I would go beyond the scope of this paper to explain fully why this happened. But a diabolic loop of weakening bank balance sheets and weakening public balance sheets in the wake of the financial crisis was the one common element of otherwise quite different member states in distress (Schelkle 2017: ch.6). This suggests that a missing risk sharing mechanism and not

some structural cause like a Southern growth regime (Hall 2012, Johnston and Regan 2016) was to blame for their plight.

This final section tries to explain why TARGET could play such an effective insurance role. We should be surprised, as outlined above, because insurance is prone to collective action failure, both in markets and in inter-state cooperation. In particular misperception of the functioning of TARGET was a real possibility, since nobody had paid much attention to it before and even the best economists, Martin Wolf and Paul Krugman, fell for Sinn's distorted portrayal of TARGET. So, the first version of the puzzle is: how come that such an effective, open-ended insurance mechanism has been created when member states typically agree only on limited risk-sharing?

The simple answer is that it was not created as an insurance mechanism for a systemic banking crisis of the EA. It was seen as an element of technical infrastructure for private parties, necessary to operate a currency union. Garber (1998), a research economist at Deutsche Bank, was one of the very few who wrote about its potential to become a vehicle for a currency crisis in the run-up to EMU; an alarm that was eagerly received by US economists, notably Martin Feldstein, then President of the prestigious NBER, giving Peter Garber an outlet for his notes. Private payments service providers were available, were used and could have been used to process payments in the EA. But the ECB was strongly pushing for a more robust and later uniform platform, against the resistance of some member states, to ensure a smooth transmission of monetary policies.⁷ TARGET has now a near-monopoly in the EA.

The insurance that TARGET provided was thus a joint or by-product of selective incentives that the ECB had, supported by transnational banks. The previous section has shown that the benefits were varied and dispersed, the public benefits came on the back of private motives in each case. The public good of universal insurance that TARGET provided was thus rather accidental, a joint product with its operation as a technically efficient payments processing platform, analogous to what Broz (1997, 1998) has shown for the Federal Reserve System.

This still leaves a second version of the puzzle, namely how come that the mutual insurance did not collapse when tested so severely? There is a historical example for non-cooperation under strain: in 1933, the Chicago Fed and other district central banks tried to protect their gold reserves by refusing to accept checks from New York at par. The institutions of federal monetary policymaking before the 1935 Act provided both incentives and the capacity for non-cooperation (Eichengreen et al 2014: 18-19). This would have meant that a dollar issued in New York would no longer be worth as much as a dollar issued in Chicago. This incident forced Roosevelt to declare a bank holiday for an extended period and his administration to prepare legislation that took away all monetary policy powers from district central banks. It also shows that quiet cooperation is not guaranteed even if members are part of a larger political union. This US example makes it even more puzzling why it is that TARGET came to be explicitly acknowledged as a rescue mechanism and thus mutated from an institution of accidental to one of deliberate risk sharing, ie of financial solidarity.⁸

A first answer is that TARGET proved to be so useful to a variety of interests, ie it was universal insurance rather than a redistributive mechanism (however hard Hans-Werner Sinn tried to argue to the contrary). It was universal collective insurance in that it became quasi-mandatory, basic in its

⁷ Interviews at the ECB, June 2015.

⁸ ECB President Draghi ([2013](#)) stated that "a decrease in TARGET2 balances is the best sign we have that there has been a gradual return of confidence".

benefits, covering a broad range of economic sectors against a risk that had not been anticipated and for which coverage was not pre-defined. It could therefore not only deal with interdependent risks but also uncertainty. Ex ante, universalism is a demanding form of solidarity. It requires considerable trust in other members and/ or the robustness of the institution since risk sharing is not conditional on prior contributions and not targeted on the “deserving”. This should have made it susceptible to all kinds of political market failure: from adverse selection (no prior contributions), moral hazard (no co-payments), commitment (no targeting) and misperception (no targeting on the “deserving”). Hence, the by-product theory of collective action tells us that TARGET had to be universal insurance by accident for it to come about. The wide-spread benefits then validated it: importers and exporters benefit from its services in the case of a sudden stop; the wealthy and small savers could protect their property rights in a way that did not lead to major disruptions in currency markets; it benefitted those who could hedge against the break-up of the EA, thus preventing their exodus and the potential of a self-fulfilling break-up.

This is a necessary but not a sufficient part of the answer. The political campaign against TARGET in Germany was both an indication of the commitment and the misperception problems that could have led to changes in its set-up, for instance to prevent capital flight. It is likely that such changes would have made capital flight worse. They did not come to pass. Ironically, this political robustness was partly a consequence of the political attack on TARGET: it provoked a very public defense from a wide variety of sources, not only the central banks themselves but also scholars and journalists, not only in Europe but also in the US (Wolman 2013).

The political economy of insurance helps us to explain more specifically why German authorities were unresponsive to the TARGET debate and did not question the rules of the payments system. Subgroups within risk pools are a threat to insurance if they can (a) identify their interests, for instance as nation states, and if they can (b) act on their interests, for instance because they are indispensable (vetoplayers). While current account flows give rise to identifiable deficit and surplus members, smooth processing of payments benefits exporters and importers alike. In the case of capital flight, it is even difficult to identify the nationality of those on the run and the banks receiving them, although the receding demand of German banks for Bundesbank credit suggests that they were main beneficiaries of Germany’s safe haven status. Hence, even though Germany is a strong economy and not a financial center that would necessarily welcome financial inflows, its government and monetary authorities had no interest in disrupting a mechanism that was supporting its strong export economy and providing an exit route for its banks. Even the prospect of losses in the case of major defaults of a banking system on TARGET claims did not give the German authorities more cause for concern than everybody else, as every member is liable for their pro rata share in the loss (Buiter and Rhabari 2012: 56). Only in the catastrophic scenario of a break-up of the EA would balances have to be settled and losses will materialize. This aligned members’ interests as regards the desirability of maintaining a functioning payments system and of preventing a break-up of the euro area. These incentives to maintain the status quo is a stark difference to fixed-exchange rate systems where revaluing countries have much less reason to hang in there.

The safe haven status of some members affected, however, the availability of credit in other countries from which capital fled. This created pressure for adjustment in countries with current account deficits. A credit squeeze would reduce net imports over time. But this might not be the “right” amount of pressure: the payments system may make capital flight much easier and cheaper than it would be otherwise (Garber 2010: 5; De Grauwe 2011: 3-5), inflicting even more credit

squeeze on countries already in dire straits. That capital flight was cheap and easy is undeniable and the flip-side of the insurance service to the currency union provided. The painful credit squeeze laid to rest the ever-present concerns about moral hazard.

The euro area's payments system thus functioned like universal insurance that covers both anticipated and unanticipated risks. Coverage is not based on contributions but on membership. The payments system has created "a community of risk" different from the nation state while the insurance provided does not depend on political union. In other words, TARGET served the "generalized and reciprocal self-interest" (Baldwin 1990: 299) of member states on which financial and monetary solidarity rests.

References:

- Axelrod, R. M. (1984). *The evolution of cooperation*. New York: New York : Basic Books.
- Babecký, J., Havránek, T., Matějů, J., Rusnák, M., Šmídková, K., and Vašíček, B. (2012). Banking, debt, and currency crises. Early warning indicators for developed countries. *ECB Working Paper, No 1485*. Frankfurt: ECB.
- Baldwin, P. (1990). *The Politics of Social Solidarity*. Cambridge: Cambridge University Press.
- Bindseil, U., and König, P. (2011). *The economics of TARGET2 balances*. SFB 649 Discussion Paper, 2011-035.
- Bordo, M. (2014). TARGET balances, Bretton Woods, and the Great Depression. *VoxEU blog*. March 21, URL: voxeu.org/article/historical-lessons-target-imbalances (last accessed 8 June 2015)
- Broz, J. L. (1997). *The international origins of the Federal Reserve System*. Ithaca and London: Cornell University Press.
- Broz, J. L. (1998). The origins of central banking: solutions to the free-rider problem. *International Organization*, 52(2), 231-268.
- Brunnermeier, M., Crockett, A., Goodhart, C., Persaud, A. D., and Shin, H. S. (2009). *The Fundamental Principles of Financial Regulation*, : Geneva and London: International Center for Monetary and Banking Studies and Centre for Economic Policy Research.
- Buiter, W. (2012). The role of central banks in financial stability: How has it changed? *CEPR Discussion Paper, No.8780*, London: CEPR.
- Buiter, W. H., and Rahbari, E. (2012). Target2 redux: the simple accountancy and slightly more complex economics of Bundesbank loss exposure through the eurosystem. *CEPR Discussion Paper 9211*, London: CEPR.
- Bund der Steuerzahler (2012). Strafanzeige in Sachen Target2. Web document at URL: <http://www.querschuesse.de/strafanzeige-in-sachen-target2/> (accessed 26 November 2014)
- Calvo, G. A. (1998). Capital flows and capital-market crises: the simple economics of sudden stops. *Journal of Applied Economics*, 1(1), 35-54.
- Cecchetti, S. G., McCauley, R. N., and McGuire, P. M. (2012). Interpreting TARGET2 balances. *BIS Working Papers No 39,3* Basel: Bank for International Settlement.

- Chen, R., Milesi-Ferretti, G. M., and Tressel, T. (2012). External Imbalances in the Euro Area. *IMF Working Paper, WP/12/236*, Washington DC: IMF.
- Dagher, J.C. (2010). Sudden Stops, Output Drops, and Credit Collapses. *IMF Working Paper 10/176*, Washington, DC: IMF.
- De Grauwe, P. (2011). The Governance of a Fragile Eurozone. CEPS Working Document 346. Brussels: CEPS.
- De Grauwe, P. and Ji, Y. (2013). Self-fulfilling Crises in the Eurozone: An Empirical Test. *Journal of International Money and Finance*, 34(April), 15-36.
- Draghi, M. (2012). Speech by Mario Draghi, President of the European Central Bank at the Global Investment Conference in London 26 July [[Press release](#)] (accessed November 25, 2014).
- Draghi, M. (2013). Introductory statement to the press conference (with Q&A). Bratislava, 2 May [[Press release](#)] (accessed November 4, 2016).
- ECB (n.d.). TARGET2 Glossary. Frankfurt a.M.: ECB. URL:
http://www.ecb.europa.eu/paym/t2/shared/pdf/target2_glossary.pdf.
- Eichengreen, B., Mehl, A., Chitu, L., and Richardson, G. (2014). Mutual assistance between Federal Reserve Banks, 1913-1960 as prolegomena to the TARGET2 debate. *NBER Working Paper 20267*: Cambridge, MA: NBER.
- Garber, P. (1998). Notes on the role of TARGET in a stage III crisis (Vol. NBER Working Paper). Cambridge, MA: National Bureau of Economic Research.
- Garber, P. (2010). The mechanics of intra euro area capital flight. *Special Report*. Deutsche Bank Securities.
- Hobza, A., and Zeugner, S. (2014a). The ‘imbalanced balance’ and its unravelling: current accounts and bilateral financial flows in the euro area. *European Economy Economic Papers* 520. European Commission Directorate-General for Economic and Financial Affairs. (also published in *Journal of International Money and Finance*).
- Hobza, A., and Zeugner, S. (2014b). Current accounts and financial flows in the euro area. Web Appendix. URL: www.zeugner.eu/studies/finflows/ (accessed 17 August 2016).
- Hutchinson, M. M., Noy, I., and Wang, L. (2010). Fiscal and monetary policies and the cost of sudden stops. *Journal of International Money and Finance*, online, 1-15.
- Imbs, J., and Mauro, P. (2007). Pooling risks among countries. *IMF Working Paper, 07/132*, Washington DC: IMF.
- Jobst, C., Handig, M., and Holzfeind, R. (2012). Understanding TAR GET 2: The Eurosystem’s Euro Payment System from an Economic and Balance Sheet Perspective. *Monetary Policy and the Economy*, Q1/12, 81-91.
- Jones, E. (2012). The JCMS Annual Review Lecture. European Crisis, European Solidarity. *Journal of Common Market Studies*, 50(2), 53-67.
- Jones, E., & Underhill, G. (2014). Theory of Optimum Financial Areas: Retooling the Debate on the Governance of Global Finance. *SWIFT Institute Working Paper, NO. 2013-001*.

Kenen, P. B. (1969). The theory of Optimum Currency Areas: an eclectic view. In R. A. Mundell and A. Swoboda, K. (Eds.), *Monetary Problems of the International Economy* (pp. 41-60). Chicago: University of Chicago Press.

Keohane, R. O. (1984). *After hegemony : cooperation and discord in the world political economy*. Princeton: Guildford : Princeton University Press.

Keohane, R. O., and Ostrom, E. (Eds.). (1995). *Local commons and global interdependence: heterogeneity and cooperation in two domains*. London: Sage Publications.

Krugman, P. (2011). The euro living dangerously. URL:

http://krugman.blogs.nytimes.com/2011/06/01/the-euro-living-dangerously/?_r=0

Krugman, P. (2013). Revenge of the Optimum Currency Area. In D. Acemoglu, J. Parker and M. Woodford (Eds.), *NBER Macroeconomics Annual 2012* (Vol. 27 pp. 439 - 448). Chicago: University of Chicago Press.

McKinnon, R. J. (1963). Optimum currency areas. *American Economic Review*, 53, 717-725.

Merler, S., and Pisani-Ferry, J. (2012). Sudden stops in the euro area *Bruegel Policy Contributions*. Brussels: Bruegel.

Mody, A., and Bornhorst, F. (2012). TARGET imbalances: Financing the capital-account reversal in Europe. VoxEU blog, URL: <http://www.voxeu.org/article/target-imbalances-financing-capital-account-reversal-europe> (last accessed 22 November 2014).

Mundell, R. (1961) "A Theory of Optimum Currency Areas", *American Economic Review*, 51(4), 657–665.

Olson, M. (1971). *The logic of collective action; public goods and the theory of groups*. Cambridge, MA: Harvard University Press.

Schelkle, W. (2016). Review of Stiglitz (2016). *EUSA Review of Books*, URL:
<https://www.eustudies.org/eusa-review-of-books/11>.

Schelkle, W. (2017). *The political economy of monetary solidarity: understanding the euro experiment*. Oxford: Oxford University Press.

Sinn, H.-W. (2012). The European Balance of Payments Crisis: An introduction. *CESifo Forum*, 13(January), 3-10.

Sinn, H.-W., and Wollmershäuser, T. (2012). Target loans, current account balances and capital flows: the ECB's rescue facility. *International Tax and Public Finance*, 19(4), 468-508. (first published as CESifo working paper in 2011).

Snidal, D. (1995). The politics of scope: endogenous actors, heterogeneity and institutions. Keohane and Ostrom (eds), pp. 47-70.

Steinkamp, S., and Westermann, F. (2014). The role of creditor seniority in Europe's sovereign debt crisis. *Economic Policy*, 29(79), 495-552.

Stiglitz, J.E. (2016). *The Euro. How a common currency threatens the future of Europe*. New York and London: W.W. Norton & Company.

- Tornell, A., and Westermann, F. (2012). Greece: the sudden stop that wasn't. *CESifo Forum*, 13(January), 102-103.
- Westermann, F. (2014). Comment on Whelan (2014). *Economic Policy*, 29(77), 117-125.
- Whelan, K. (2014). TARGET2 and central bank balance sheets. *Economic Policy*, 29(77), 79-137.
- Wolf, M. (2011). Intolerable choices for the eurozone. *Financial Times* online, 31 May, URL: <http://www.ft.com/cms/s/0/1a61825a-8bb7-11e0-a725-00144feab49a.html#ixzz3L9tvwGX9>.
- Wolman, A. L. (2013). Federal Reserve Interdistrict Settlement. *Federal Reserve Bank of Richmond Economic Quarterly*, 99(2), 117–141.