European Stability Mechanism

A case for a European rainy day fund

This paper draws on the US experience with state rainy day funds (RDFs) and develops a proposal to build a fiscal stabilisation function for the euro area in the format of a common non-mutualised European RDF. The design of the fund is based on a saving-loan structure, which would preclude permanent fiscal transfers and minimise moral hazard. Moral hazard would be further reduced by imposing ex-ante eligibility criteria and limiting pay-outs to severe shocks. Simulation results show that the proposed model produces stabilisation effects comparable to a fund based on transfers. We also show that the European RDF would have limited external borrowing needs. These could be practically eliminated by adding a ramp-up period or limiting pay-outs to severe shocks.

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Executive summary

One of the missing pieces in the architecture of the Economic and Monetary Union (EMU) is a fiscal capacity that would support the members' ability to withstand severe economic shocks when these cannot be tackled by a common monetary policy. Timely access to additional fiscal space provided by a fiscal stabilisation function when facing country-specific shocks or an asymmetric propagation of a common shock can prevent sovereigns from suffering a serious liquidity crisis. Improving countries' ability to stabilise their economies against severe asymmetric shocks thus reduces the need to access the crisis resolution framework and reinforces the stability of the entire monetary union.

EMU lacks a fiscal capacity to support members' ability to withstand severe economic shocks that a common monetary policy cannot address.

Building on lessons from the United States (US), this paper proposes a new model of fiscal stabilisation function to repair the EMU's widely recognised weakness. We demonstrate that it is possible to design such a function in a way that can prevent the politically difficult-to-accept permanent transfers and reduce moral hazard, without sacrificing effectiveness. Our proposal translates a decentralised system of rainy day funds (RDFs), as implemented in the US, into a fiscal stabilisation function that could work in the European setting.

This paper builds on lessons from US rainy day funds proposing a fiscal stabilisation function that avoids permanent transfers and reduces moral hazard without sacrificing effectiveness.

The fund we propose would operate as a common, non-mutualised European RDF, composed of national compartments. In good times, countries would accumulate savings in their compartments, accruing self-insurance. In bad times, they would be entitled to use the savings in their own compartment, and – if needed – could access limited borrowing from the rest of the fund. This saving-loan structure is a key feature of the model, as it excludes permanent transfers by construction.

Countries could tap their accumulated savings in national compartments in bad times along with limited borrowing from the rest of the fund.

Further, the rules for national contributions, pay-outs, and repayment of any loans would be based on changes in unemployment rates, rather than on levels, which precludes the mechanism from supporting structural issues. The European RDF would follow the Carnot et al. (2017) "double condition" rule which assumes payments to the fund when unemployment is low and decreasing and disbursements when it is high and increasing. Countries would repay their loans according to rules similar to those for fund contributions, while observing a final maturity linked to the average length of the business cycle. If a country obtained ESM financial assistance, it could be excluded from the borrowing framework for the programme period. The repayments could be financed from the programme envelope, at the latest, as they would fall due.

The rules for national contributions, pay-outs, and repayment of any loans would be based on changes in unemployment rates, while observing the fund's compartmental structure.

Allowing the fund to borrow would strengthen the financing structure by avoiding the first-come, first-served problem, but it may effectively not be necessary. Our simulations show that external borrowing needs would be limited and could largely be avoided with certain operating rules. A ramp-up period to build balances, and asymmetric payment rules that provide for pay-out only when a large shock hits a member can eliminate borrowing needs based on historical experience. Starting the European RDF in good times would deliver buffers before the next downturn occurs.

Limiting pay-outs to severe shocks and introducing a ramp-up period effectively limit the need for external borrowing.

We examined various specifications including overall fund target sizes. Our simulations support previous literature suggesting that 1-2.5% of GDP would be an effective target. The smooth functioning of an arrangement on this scale ultimately hinges on two factors. First, the European RDF must be robust, buttressed by clearly enforceable rules. Second, participating members' commitment to the rules established, in particular vis-à-vis the transfer of savings to the fund, must be firm.

Our simulations show that 1-2.5% of GDP would be an effective target, in line with previous literature.

The saving-loan structure is a key feature that can produce payouts comparable to transfer-based funds, while precluding permanent transfers.

Compared to other proposals for fiscal stabilisation funds, the main advantage of a European RDF lies in its saving-loan structure. Simulation results indicate that a specific structure with saving in national compartments and the requirement to repay loans within a business cycle can in most cases effectively produce payouts comparable to transfer-based funds, such as in Carnot (2017), but without permanent transfers. The saving-loan structure also helps reduce moral hazard; it creates an obligation to build up savings during good times, which are consumed first in bad times, before the country can receive loans. Limiting the payouts to episodes of large shocks would also mitigate moral hazard.

Transparent country positions and entry criteria linked to fiscal discipline would further reduce moral hazard.

Institutional features could further diminish moral hazard. Each member's balance could be monitored and regularly made public to enable market scrutiny and increase confidence in each country's sound conduct of public finances. While withdrawals would not be subject to ex-post conditionality, the participating countries should comply with ex-ante eligibility criteria, for instance with the European fiscal rules and the Macroeconomic Imbalance Procedure. Lessons from the US indicate that anchoring the national compartments in both national law and domestic budget procedures and scaling them to business cycle and revenue volatility support effectiveness.

The European rainy day fund offers important economic and political advantages: no permanent transfers, low moral hazard, counter-cyclicality of fiscal policy, and the possibility to earmark the funds for specific purpose.

The European RDF described in this paper addresses policymakers' key concerns. It does not lead to permanent transfers and minimises the risk of moral hazard. The inter-compartmental borrowing within the fund could be cheap and external borrowing needs largely avoided. This also limits the need for any credit enhancement. In terms of governance, regular reporting on countries' positions and clear ex-ante eligibility criteria would increase transparency and further mitigate moral hazard. An effective European RDF could complement hotly debated EU fiscal rules by introducing counter-cyclicality in fiscal policy. Finally, the model could help reduce the social costs of crises by earmarking the pay-outs for a reinsurance of the national unemployment systems.

1. Introduction

One of the missing pieces in the architecture of the EMU is a fiscal capacity that would improve the ability of EMU members to withstand severe economic shocks, when these cannot be addressed by a common monetary policy, for example country-specific shocks or an asymmetric propagation of a common shock. The need for a fiscal stabilisation function in a union with a single monetary and a set of decentralised fiscal authorities, was recognised prior to the introduction of the common currency and setting-up of the EMU (see McDougall et al., 1977) but it was not (politically) possible to develop such a capacity at that stage. The monetary union was instead designed in a way where its resilience to economic shocks would rely on fiscal discipline of its members, which should provide sufficient fiscal space to address the shocks.

The global financial crisis revealed the fragility of this arrangement. The crisis struck each euro area country to a different extent, depending on the robustness and structure of its economy and banking system, and on their possibility to implement fiscal stimulus. Some countries had to introduce counterproductive fiscal austerity in the attempt to improve market perceptions and financing costs and some had to ask for international financial assistance. While we now have new institutions providing financial assistance to countries that have lost market access, a fiscal stabilisation function would provide additional fiscal space earlier on and thus also potentially prevent a serious liquidity crisis of the sovereign. Further, as stressed by Allard et al (2013), fiscal risk sharing in the euro area that would smooth country-specific shocks would be beneficial due to their size and potential for contagion. A fiscal stabilisation function has thus also positive indirect effects on the stability of the monetary union, as it reduces uncertainty and spill-overs from affected countries.

Numerous proposals for a common fiscal stabilisation function have been discussed and analysed by academia and policymakers, yielding a rich set of options. The proposals range from a common unemployment insurance,[1] an unemployment reinsurance fund[2] to various types of macroeconomic stabilisation funds[3] and a euro area budget based on cyclical revenues.[4] The proposals also differ in whether they are aiming to address asymmetric shocks only or both asymmetric and symmetric shocks. Further, they differ in terms of whether they are addressing any downturn or only large shocks.

The aim of this paper is to add to the debate by exploring a possibility to build a limited euro area fiscal stabilisation function in the format of a rainy day fund (RDF) that would provide funding in the case of severe shocks. We first draw lessons from the design of the system of RDFs in the US and explore how it could be translated to the European setting. The US experience indicates that 1) a RDF should be created with a clear objective goal, valid regardless of the changes in political circumstances, legislation and business cycle, 2) contributions and disbursements should be governed by clear rules, based on indicators of economic activity, and not on budget-related variables, 3) the size of the fund should be a function of the economy's volatility, and 4) the funds should not be used for problems of structural nature.

Further, building on the decentralised system of the US type, **we describe how to construct a potential common European RDF**, and analyse the underlying mechanics and possible benefits of such a facility. The European RDF could be built on an intergovernmental basis and would consist of national compartments in the com-

[1] A non-exhaustive list includes Dullien (2013), Lellouch and Sode (2014), Dolls et al. (2017), and for a summary of a comprehensive project on European Unemployment Benefit Scheme led by CEPS, see Beblavý and Lenaerts (2017).
[2] See for instance Beblavý et al. (2015), Brandolini et al. (2015) and Italian Ministry of Finance(2017).
[3] Some examples are Enderlein et al. (2013), Delbecque (2013), Furceri and Zdzienicka (2013), Carnot et al. (2015) and Carnot et al.(2017) and recently Arnold et al. (2018), Beetsma et al. (2018) and Benassy-Quere et al. (2018).
[4] See Bara et al. (2017) and proposals in the European Commission 2017 December package on stabilisation function that would support investment.

mon fund. The countries would commit to accumulate funds in their compartment in good times, in the same way as US states deposit their savings in the state RDFs. Following a large enough trigger event, as specified in a common rule for disbursements, the country would have access to its own compartment. As a second layer of insurance, the countries would have access to a limited amount of borrowing from other compartments of the fund, after having drawn down own savings and against interest. Amounts would be determined following the same rule for disbursement, as for consumption of own compartment. Any borrowing from the rest of the fund would be capped at x% of the size of own compartment, whereby the exact multiple would be calibrated based on policy and funding considerations. As a third layer, the European RDF could have its own borrowing capacity.

The European RDF would **address severe asymmetric shocks or severe asymmetries in propagation of a common shock**. In the latter case, it is assumed that the symmetric part of the shock would have been addressed by the common monetary policy. This links also to the size of the European RDF. Recent literature suggests that when focusing on severe asymmetric shocks, the size of the fund can be relatively limited and still provide good stabilising properties. Following Furceri and Zdzienicka (2013) and Carnot et al. (2017), we conclude that 1% to 2.5% of euro area GDP could be a sufficient size of the European RDF to supplement national countercyclical policies and to support macroeconomic stability in the EMU. We remain silent on the use of the funds, as the pay-outs from the fund could be either earmarked for a specific purpose, for instance to reinsure national unemployment insurance systems or investment, or the decision on the use of the funds could be left to the governments.

Payment of contributions and access to the funds in the proposed European RDF would be triggered following a Carnot et al. (2017) "double condition" rule, which is based on changes in the unemployment rate and has been shown to trigger contributions and disbursements in a way that complements the national automatic stabilisers in event of larger shocks. As in Carnot et al. (2017), the rule could optionally include also some thresholds for triggering to limit disbursements to more severe shocks.

The European RDF would be built in a way that should prevent permanent transfers. First, rules for disbursements would be based on changes in variables rather than on their levels. With this, the function is by construction limited to cyclical stabilisation and would not address structural issues. Second, the pay-outs would be in the form of loans rather than grants. Alternative would be to design the fund in a way that would be fiscally neutral over the cycle for each country. In the case of the European RDF, the countries would save and borrow, thus excluding permanent transfers. The repayment schedule for the loans could be flexible enough to accommodate prolonged or double-dip recessions, and thus lessen the negative impact of repayment on the economy.

The European RDF could also have a **capacity to borrow on financial markets in order to mitigate the "first come, first served" problem** in case of several countries experiencing a severe shock, or in case of a composition problem in members needing assistance (e.g. when large economies as borrowers overwhelm small ones as savers). In this case, it is important to achieve high creditworthiness of the fund to guarantee reasonable borrowing costs, that will be ultimately carried by the receiving countries. Against this background, we analyse the determinants of the creditworthiness of the proposed fund and find that it would rely on the credit standing of the countries that need to repay the funds. In this respect, a structure with savings and loans, like the European RDF, leads to more certainty regarding repayment and has therefore an advantage over stabilisation funds with a grant structure, where there are no claims and no repayment horizons.

The proposal developed in the paper has several advantages, in particular, it does not lead to permanent transfers, it minimises the issue of moral hazard, it leads to limited borrowing needs and finally, inter-compartmental borrowing within the fund could be cheap. Higher costs would only apply if the fund would need to borrow on the market. The saving-borrowing nature provides a better incentive structure, improves political acceptance and it could also improve the fund's creditworthiness. In terms of governance, benefits of the European RDF could be derived from regular reporting about the countries' positions, which would increase transparency and confidence in sound conduct of public finances by participating countries. Finally, the access to the European RDF could be made ex-ante conditional on the country complying with the European fiscal rules and with the Macroeconomic Imbalance Procedure, which would create incentives for running sound economic policies.

The European RDF we describe differs from some other proposals for a fiscal stabilisation function in the literature, also dubbed as "rainy day funds". Many discussion papers, including Thirion (2017), mention "rainy day fund" as an instrument that would provide "temporary transfers between member states according to their relative position in the cycle". One of the more prominent models of this type is a cyclical shock insurance fund, proposed by Tommaso Padoa-Schioppa Group (Enderlein et al., 2013). They propose a common European RDF that would provide transfers based on the relative distance of national output gaps with respect to the euro area average output gap. The main critique of this proposal, expressed by several scholars (e.g. Caudal et al., 2013; Balassone et al., 2014 and Thirion, 2017) is that it could lead to a situation where in a euro area wide recession, the countries least hit by the shock, and thus with a positive difference with respect to the euro area average, would need to pay into the fund despite being themselves in recession. A recent proposal by Beetsma et al. (2018) also addresses asymmetric shocks in relative terms. Their model links contributions and transfers to country's share in total euro area exports in each sector relative to overall share and shocks to euro area exports in different sectors.

The European RDF is closer to proposals that address large shocks, and do not focus strictly on the asymmetries in the business cycle. Delbecque (2013), for instance proposes a stabilisation fund that would smooth both positive and negative shocks, measured as deviations from country-specific forecasts of long term growth. Pisani-Ferry at al. (2013) propose a scheme where the payments would be triggered by sufficiently large output gaps and the size of the transfers would be determined by the absolute size of the shock. A proposal by Furceri and Zdzienicka (2013) entails transfers that are paid out in the case of an adverse shock, and their size is determined by the absolute (and not relative) size of the shock, relative size of the economy and resources available in the fund.[5] The model of European RDF is in terms of rules for payments the closest to two recent proposals by Carnot et al. (2017) and Arnold et al. (2018) that include rules where payments are linked to the size of the shock relative to country's own history.

To analyse how the European RDF would have operated if it had been in place in the past, we carried out simulations based on historical data for 11 euro area countries (EA11), starting in 1995. In terms of disbursements, our simulations show that the **countries would have been able to receive up to 2.8% of their GDP** in the worst years, assuming a target size of the fund of 2% of euro area GDP. We also show that imposing a specific structure with compartments on top of the "double condition" rule of Carnot et al. (2007) does not lead to significantly more restricted payments. An exception are some countries that were most severly affected by the

[5] With this set-up, they show that even for small gross contributions in the range between 1.5-2.5% of GNP, about 80% of GDP shocks could be smoothed. At the same time, for the period from 1999 to 2013, the net contribution of countries would have been close to zero. Their results are robust to the use of several different shock measures (residuals from AR (2) process of GDP growth rates, output gaps or growth deviations from historical averages).

latest crisis and also had to ask for official financial assistance. Similarly, in most cases the requirement to repay loans within a business cycle would not have represented a heavy burden, with the exception of one programme country during the last crisis.

The amounts accumulated and disbursed depend also on the target size of the RDF and the rule for disbursements. If we for instance decrease the target size to 1% of euro area GDP, the size of disbursements would become limited. If we instead introduce thresholds for activation, to let the European RDF address only larger shocks, the size of the disbursements would not change significantly but they would become less frequent. If we assume symmetric thresholds for payments into the fund, these would also become less frequent, which would lead also to lower levels of accumulated savings in the fund. However, the latter two issues can be mitigated by combining thresholds with an increase in the size of payments. In this case, the countries would have received support less often but in higher amounts, and the evolution of the fund would be less gradual.

The results also show that the fund's borrowing needs would be limited. Several countries would have built up sufficient savings to finance the disbursements according to the rule without reaching their borrowing limit. Some would not need to borrow from the fund at all. The fund itself would have needed to borrow only at the beginning of its operation, if starting empty, and during the last crisis, when several countries would have been borrowing from the fund at the same time. These external borrowings would have been limited and would not surpass 0.3% of EA11 GDP in our baseline simulation. Results however depend on the time of introduction of the fund. If the fund was introduced in 1990, the borrowing needs of the fund could have reached 1.3% of EA11 GDP. Simulations show that to avoid such an outcome, it is sufficient to introduce a ramp-up period during which the countries would build their compartments while the disbursements would not yet be possible. An alternative way to avoid external borrowing is to introduce an asymmetric threshold in the rule for payments, which would allow for disbursements only in the case of a large shock, while there would be no equivalent threshold for contributions.

The rest of the paper is structured as follows. The second section describes the system of RDFs in the US and some of the lessons learned. The third section describes how the concept of a RDF could be applied in the euro area, considering the differences between the US and the euro area and presenting a proposal for a common European RDF. It also presents options for supporting a fund's borrowing capacity and discusses governance issues and the benefits of the proposal. We present simulations of payments from and to the fund in 11 euro area member states in section four. Section five concludes.

2. System of rainy day funds in the US

The RDFs in the US are one of the elements of a complex multi-layered fiscal framework. The RDFs constitute a part of the state budget that is made up of (1) a general fund, financed through taxes and fees, paying out current expenditure, (2) a capital fund, financed through debt and motor fuel taxes, pays out infrastructure investments and (3) RDF(s). The balanced-budget requirement usually refers to the general fund and corresponding balance is measured including transfers to/from the RDF.[6] In 2017, all US states, with an exception of Colorado, Illinois and Montana, operated one or several RDFs.[7] The purpose of most RDFs in the US is to provide stability to the general part of the state budget by cushioning the cyclical fluctuations in tax and other state revenues. The states save a proportion of revenues during periods when these revenues are higher than anticipated and draw on the saved funds during periods when fluctuations in the drivers of revenues (e.g. in oil and gas prices, consumption or capital gains) reduce tax revenues below expected levels.

Thanks to this, **the RDFs help stabilise the economy as it decouples state expenditure from short-term changes in revenues**. The RDFs thus provide more fiscal space to the state, allow the automatic stabilisers to operate and prevent cuts in the general part of the state budget, which is generally required to be balanced. Zahradnik and Johnson (2002) stress that if correctly used, the RDFs have another important benefit. They help avoid expenditure cuts and/or tax increases within a budget year, which are often those that can be enacted and implemented quickly, but have usually high multipliers, e.g. cuts in programmes for low-income households and increase in excise and sales taxes (VAT or similar). Zahradnik and Johnson (2002) highlight that such taxes are regressive, and place a disproportionate burden on lower or middle income households, where also the negative effect on consumption is the largest. Hence, RDFs have benefits also in terms of avoiding the most damaging fiscal stabilisation policies.

General features of the US RDFs

The RDFs in the US have been established under state level legislation, thus resulting in state-to-state variation. The differences arise along four dimensions: the purpose, the funding means, the size and the mechanism to disburse and reimburse. Note also that the term "rainy day fund" is a notional term and in fact not many of them in the US are called this way.

Purpose. Whereas some states run one general RDF, others run two or three RDFs simultaneously which are earmarked for specific expenditures. Most of the RDFs are reserved for closing fiscal gaps in the current year or maintaining government spending when revenues are projected to decline. However, in some states, general RDFs work in tandem with one or more specific funds, dedicated to educational, medical or other purposes. The idea is to retain flexibility to tailor fund usage according to the needs of the state.

Financing means and rules vary considerably between funds. Many states use the surpluses of the state General Budget.[8] Some states link contributions to specific budget revenues. For example, the State of Virginia ties fund contributions to growth in major taxes, Massachusetts to the collection of high capital gains, while Alaska and Texas set aside oil and gas revenues above a certain level. Other states' contributions are linked to GDP growth, revenue forecast errors or are based on static an-

[6] See Balassone et al. (2007).
[7] Based on Pew Charitable Trusts (2017a, 2017b). Other sources cite that Colorado has a RDF, but can only be used for the purpose of natural disasters.
[8] This is the case for example in Alabama, California, Iowa, Massachusetts, Nevada and Texas, among others. In terms of amounts, Utah for instance requires to save 25% of its general fund surplus, while New Jersey, West Virginia and Wisconsin require 50% (see Haggerty and Griffin, 2014).

nual contributions or a target balance.[9] In terms of triggers, Haggerty and Griffin (2014) give the example of Indiana, where deposits are triggered when the annual growth rate in adjusted personal income exceeds 2%, and Idaho, where deposits are triggered when revenue growth exceeds the average growth rate of the previous six years.

Size. The way in which the RDFs are financed is also linked to the size of the funds. There is however no uniform rule how the size is determined, and the rules can be different also for different funds in the same state.[10] Most states allow some or all year-end general budget surplus to flow to the RDF. Other states require specified set-asides every year until the fund reaches its cap. About half of the US states have some cap on the size of their RDFs, which is usually based on either previous year's budget, an average budget across past years, or set as a fixed amount. Some States have also set a minimum size to keep the fund at a certain level (e.g. South Carolina has set a floor of 5% of revenues for its General Fund, and a floor of 2% for its Capital Reserve Fund). In some cases, there are no size requirements (e.g. none of the three RDFs in Indiana have a target size).

Overall, the target sizes of the RDFs vary significantly. The rule of thumb in the past was around 5% of the state budget expenditures, but following the Great Recession it became questionable if this was sufficient. The Government Finance Officers Association therefore recommended two months of expenditures, or about 15%, which was in the recent past surpassed only by states rich in natural resources (e.g. Alaska, North Dakota, West Virginia and Wyoming).[11] Haggerty and Griffin (2014) report that in 2014, most states cap RDFs between 5% and 15% of their General Fund revenues.

Pew Charitable Trusts (2014a, 2014b, 2015, 2017a) stress that when setting up the RDFs, the states should match their target size with the volatility of state revenues. More volatile state revenues imply bigger down- and upturns, requiring a larger buffer. In most states the RDF deposit rules and target size are still unrelated to volatility of state revenues. In 2015, only five states required by law regular, periodic evaluations of revenue volatility patterns in order to determine a sufficient maximum or targeted balance for their funds. In 2017, 15 states were linking their deposits to volatility.

Disbursements. The procedure to disburse from the funds also differs across states and funds. For example, the Californian RDF can be accessed subject to the Governor's declaration of a budgetary emergency in the state. In Mississippi and North Dakota, the Governors have authority to use RDFs to cover cash deficits during the budget year.[12] Conversely, RDFs in several states are subject to appropriation by state legislatures, with various voting thresholds, most often with a supermajority required. In many states the access is rules-based and the funds are paid out following a trigger, for instance a large enough revenue shortfall, unemployment shock or other business cycle indicators. The amounts can also be determined through a mathematical formula. An example of rule-based access is Arizona's RDF, where automatic deposits are transferred if growth is either less than 2% or less than the seven-year average of growth in the state. In Indiana access is automatic, based on the deficits in the general fund. In some states the approaches are combined, for example rules for withdrawals are combined with voting procedures. Finally, in six states there are no defined conditions for withdrawal from RDFs.[13]

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[9] Based on Pew Charitable Trusts (2014b, 2017a).
[10] Minnesota's Budget Reserve Account has a maximum size requirement based on the revenues of the General Fund and the volatility of tax structure, whereas its Cash Flow Account Fund is set at $350 million in its statute.
[11] Pew Charitable Trusts (2014b) and http://www.taxpolicycenter.org/briefing-book/what-are-state-rainy-day-funds-and-how-do-they-work.
[12] See Haggerty and Griffin (2014).
[13] See Pew Charitable Trusts (2017a).

Replenishing. In the majority of the cases, there is a broad discretion regarding how the fund needs to be reimbursed. In 10 states, however, the disbursed funds need to be repaid over a fixed period. For instance, in Iowa the reimbursement needs to happen by the end of the fiscal year; several other states extend the repayment period to up to three fiscal years, while for example Alabama, New York and South Carolina laws allow longer periods. In the case of Minnesota, the repayment is required only upon the improvement in the economy.[14]

Lessons learned from the US experience with RDFs

Authors studying the use of US RDFs in the past two decades have noted several aspects where the building up and the use of the funds could be improved.

First, the accumulated funds were not sufficient for bigger and longer crises. Both recessions in the 2000-2015 period show that the funds saved were not sufficient to cover the budget gaps. Haggerty and Griffin (2014) report that in fiscal year 2002, for example, the median RDF balance stood at $95.7 million while the median budget gap was $394.8 million. This difference was even more pronounced in fiscal year 2010, when the median RDF was $105.7 million and the median budget gap was $1.3 billion. Note also that these are yearly figures, while in both recessions, the needs in terms of budget gaps lasted for several years in a row. Excluding the outliers of Alaska and Texas, state RDFs in the US fell from a total of $25.9 billion in fiscal year 2007 to $10.4 billion in fiscal year 2010, and amounted to about $21.6 billion in 2014. Several US states have recently reacted to this experience by increasing the size limits of their RDFs and have altered their methods for withdrawing funds. Some states have established additional RDFs. Murphy and Bailey (2018) report that the 2018 fiscal year shows continued improvement in savings to the RDFs.

Second, the states are sometimes not using the RDFs to the extent they should. During the early 2000s recession, when in 2002 revenues underperformed compared to estimates, the states were unwilling to tap the funds RDFs that they had accumulated and rather resorted to expenditure cuts and tax increases, as documented and criticised by Zahradnik and Johnson (2002). The main reason they cite is the fear of policymakers that the economic problems may be worse in the following years.

Another reason for not using the funds is that state officials often fear that credit rating agencies (CRAs) would treat the use of RDF as credit negative. Pew Charitable Trusts (2017b) examined the changes in credit ratings and the use of RDFs in the US and found that CRAs:

- Pay attention to how states integrate RDF policy with spending and revenue decisions.

- Typically favour states that design their RDFs to align with the business cycle, saving during upturns and spending those reserves during downturns.

- Tend to prefer states that consistently follow their own established RDF policies and where the policymakers exert discipline in controlling deposits and withdrawals.

- Will not necessarily take rating actions in a state that makes withdrawals from its RDF during recessions, or in case of a natural disaster, as long as other budgetary actions meant to address the decline in revenue are also taken.

[14] See Haggerty and Griffin (2014) and Pew Charitable Trusts (2017a).

Third, strong rules for payments and disbursements lead to better results. Balassone et al. (2007) highlight that the criteria for disbursement from RDFs are quite different and range from "strong rules" that rely on a mathematical formula to residual determination and legislative appropriation, that can be subject to considerable discretion and are thus considered "weak rules". Empirical evidence shows that RDFs with supermajority or other stricter rules for disbursements lead to better results (see Balassone et al. 2007, Wagner, 2003, Wagner and Elder, 2005). Pew Charitable Trusts (2017b) also recommends US states to introduce clear, objective goals of using RDFs that policymakers can refer to regardless of changes in governors, legislatures, and business cycles.

Fourth, deposits, withdrawals and size targets should be informed by economic factors, including business cycle and states' revenue volatility**.** Pew Charitable Trusts (2017a) argue that disbursements should not be based on budget gap alone, as lower revenues can be a consequence of policymakers' decisions and should therefore not be compensated by a RDF. Similarly, Zahradnik and Johnson (2002) warn that the funds should not be used in situation when the underlying reason for the lower revenues is structural. The RDFs should cover only the budgetary needs of cyclical nature, and it is crucial to distinguish between structural and cyclical problems. Further, Pew Charitable Trusts (2014b, 2017a) stress that rebuilding the funds should be in line with broader economic and fiscal conditions. Refilling timeframes should not be too short, since this would deter the country from using the RDF. The deposits should be commensurate with economic and revenue growth.

Finally, experience regarding the impact of RDFs on fiscal discipline and the cyclicality of fiscal policy is mixed. Empirical research shows that in a majority of US states, the RDFs did not solve the problem of pro-cyclicality of fiscal policy, due to the failure to accumulate sufficient reserves during good times and the requirement of a balanced general part of the state budget (Balassone et al. 2007). Yet, while there are special cases, there is evidence that state legislators drew lessons from the great financial crisis as about half (26) of the states ended the 2017 fiscal year with larger RDFs as a proportion of operating costs than before the recession (Pew Charitable Trusts 2018).

3. RDF in the euro area context

The concept of a RDF as developed in the US could be used in the European context, as both jurisdictions combine a common monetary policy with a decentralised fiscal policy. As the monetary policy cannot respond to asymmetric shocks hitting some states in the union, or to an asymmetric propagation of common shocks, fiscal policy is the remaining stabilising tool. In this context, additional fiscal buffers accumulated in good times can support the functioning of automatic stabilisers in the bad times, when the fiscal space becomes constrained.

Based on the analysis of the RDFs in the US above, we first review the relevant differences between the US and the euro area that we should consider when using elements from the US system of RDFs to build a fiscal stabilisation function for the euro area. Next, we describe how to set up a common European RDF that would mimic some of the elements of the US system, while catering for specific European needs.

Differences between the euro area and the US

Differences between the US and euro area fiscal rules and statistical framework impact on how the idea of the US RDF system could be transposed to the euro area.

Differences in fiscal rules

Most US states have so called "balanced budget requirements". Balassone et al. (2007) describe that this requirement is imposed either ex-ante, when planning for the fiscal year, or ex-post, in which case the revenues or expenditures have to be adjusted mid-year to avoid a deficit. In this context, RDFs are a tool that prevents abrupt changes in tax and spending policy, and are not meant to provide active fiscal stabilisation. However, the state balanced budget requirements in the US do generally not apply to public investment, which is financed from the capital fund.[15] Further, US state budgets do not include unemployment insurance or pension funds, the only link to these two funds are the unemployment insurance and pension contributions that are paid from the state budget into these two funds for the state employees.

In contrast, EU fiscal rules allow for a general government deficit up to 3 % of GDP, while prescribing a budgetary objective of close-to-balance in cyclically adjusted terms in the medium-term. We note that the EU general government balance includes public investment expenditures, pension funds and unemployment insurance, which is not the case in the US.[16]

General deficit rules can be disregarded in exceptional circumstances, both in the US and in the EU. In the US, Balassone et al (2007) describe that in almost all states some deficit financing is allowed under very strict limits, with the amount depending on the resources accumulated in good times. Further, the definition of exceptional circumstances is not the same in the two set-ups and not harmonised even within the US. In the US, exceptional times are defined, according to Hou (2005), in a broad sense as times when a gap between revenue and expenditure opens either because of the adverse cyclical conditions or because of any unexpected adverse shock. In a strict sense, the bad times are limited to the presence of adverse cyclical conditions. In Europe, the Stability and Growth Pact provision identifies as exceptional the unusual events outside the control of the Member State and severe economic downturns.[17]

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[15] See National Council of State Legislatures (2010) for a discussion on the strictness of state budget laws and practices. They particularly highlight that most state governments, unlike the federal government, have separate operating and capital budgets.
[16] For illustration purposes, in the euro area, government gross investment stood at 3.1% of GDP, over the period 2006-2016.
[17] See Council Regulation (EU) No 1177/2011 amending Council Regulation (EC) No 1467/97.

These **differences in definitions and rules lead to large differences in the size of public debt** when comparing the US states with the euro area member states. Overall, the US states do accumulate some public debt, but shares in the state GDP are low, compared to Europe. In 2016, the average public debt across the US states was 6.23% of their GDP.[18]

Statistical treatment of deposits and withdrawals from an RDF

Deposits and withdrawals from the state RDFs in the US are treated differently from the way they would most likely be treated in the EU, under current statistical rules. Deposits and withdrawals from the RDFs in the US form a part of revenues and expenditures of the budget. Balassone et al. (2007) highlights that this contrasts with the European setting, where deposits to and withdrawals from any RDF in Europe would be statistically recorded as changes in financial assets which would not affect the deficit level, but the composition of its financing. Thus, the transactions from and to the RDF would constitute another way of financing the budgetary deficit or using the surplus. In case of a surplus, it could be used to reduce outstanding debt or acquire financial assets, including savings in the RDF.[19]

Proposal for Europe – a non-mutualised European RDF

Our proposal translates a decentralised system of the RDFs, as implemented in the US, into a stabilisation function that could work in the European setting. The fiscal stabilisation function would operate in the form of a common, non-mutualised European RDF, composed of national compartments. In good times, countries would accumulate savings in their compartments. In bad times, they would be entitled to use the savings in their own compartment and to borrow from the rest of the fund. The stabilisation function would thus have a saving-loan structure, which excludes permanent transfers ex ante.

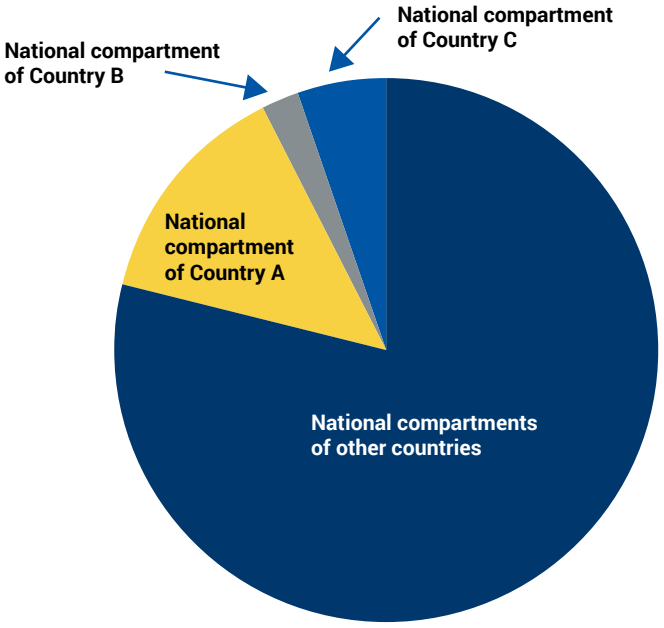
The European RDF would be built on an intergovernmental basis and administered by a central entity that would monitor, invest funds, and borrow if necessary from the markets. Each member's balance would be made public on a frequent basis to enable market scrutiny and increase confidence among members on compliance issues. While withdrawals would not be subject to ex-post conditionality, the countries participating in the fund would need to comply with a set of ex-ante eligibility criteria. The fund would have the following structure:

First layer provides self-insurance

The fund would be composed of national compartments, where countries would accumulate savings following pre-specified automatic rules, at a yearly frequency. Following a large enough trigger event, the countries would be able to draw from their own compartment according to the rule for payouts.

[18] See http://www.usgovernmentdebt.us/state_debt_rank.
[19] These assumptions are based on Balassone et al. (2007) interpretation of ESA95 rules that might not apply in the case of ESA2010 which is currently in force. Additionally, statistical treatment could be different if so decided in the future.

Figure 1
European RDF would consist of national compartments of participating countries



Source: Authors

The rules for accumulating funds could be linear, where the compartments would be paid into over a certain number of years. Alternatively, the rules for accumulating funds could be symmetric to the rules for payouts, and would thus imply paying contributions only in good times. One option would be to follow the "double condition" rule by Carnot et al. (2017). This rule, based on changes in the unemployment rate, has been shown to trigger contributions and disbursements in a manner that complements national automatic stabilisers. The benefits of such a rule are threefold. First, rules based on the unemployment rate, which is a highly cyclical, harmonised, and little revised variable, are expected to work better than rules based on output gaps, which are subject to measurement problems, or rules based on changes in GDP growth, which are reported with a lag and subject to revisions. Second, since the rule is based on changes rather than on levels, it targets cyclical variation by construction and will not lead to significant net transfers in one direction. Third, the size of payments is linked to the size of the shock. This is in line with the experience from the US showing that the stabilisation results are better if size of withdrawals from the RDFs matches the volatility of the economy. As in Carnot et al. (2017), the rules for contributions and drawings from the European RDF could optionally include also some triggering thresholds that would limit activation to large shocks.

The fund would have a limited overall target size. Previous literature (Allard et al. 2013), Furceri and Zdzienicka (2013), IMF euro area Article IV Report (2016) and Carnot et al. (2017)) show that about 1-2.5% of GDP would be sufficient to supplement national countercyclical policies.

The target size for each compartment would be agreed taking into account the overall size of the European RDF and the size and volatility of each economy (for example, the ESM capital contribution key, corrected for volatility). This is in line with the recommendations of literature on the US RDFs (Pew Charitable Trusts, 2014b, 2017a). In principle, the countries would not be prevented from saving more than the target size of their compartment, but the automaticity of the deposit could be relaxed beyond a technical ceiling. Countries would receive some compensation for

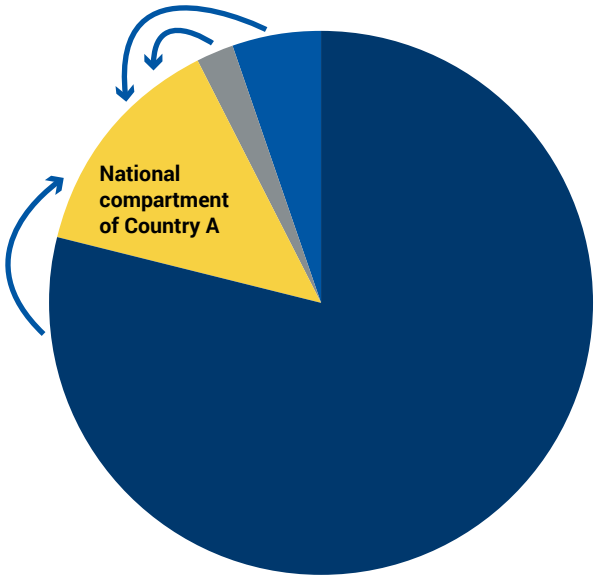
accumulated savings, financed from interest charged on loans provided by the fund and from the proceeds from investing the funds.

An interesting open question is the **statistical treatment of loans and savings** in the context of the European RDF. According to our interpretation of the current accounting framework ESA2010, own savings accumulated in the fund would most likely be considered as assets, while the loans from the fund would be treated as a change in the country's liabilities. Neither would impact budgetary expenditures or revenues.[20]

Second layer enables borrowing between the fund's compartments

After consuming their own compartments, countries would have access to limited borrowing from other compartments of the fund at a relatively low cost. The access and the amounts available would be guided by the rule for payouts, whereby the amounts would also be capped at x% of the target size of their own compartment. The factor of x would be calibrated based on policy and funding considerations, in particular possible effects on the creditworthiness of the fund. Note that the borrowing within a fund would be accounted as an increase in the debt of a country that would borrow.

Figure 2
Country A would borrow from the rest of the fund after consuming its savings in the fund



Source: Authors

Countries would need to repay the loan according to rules similar to those for contributions to the fund, while having also a final maturity linked to the average length of the business cycle. The repayment of the loans could therefore take into account economic conditions and relax the negative effects of a clawback.[21] The clawbacks have been shown to reduce the stabilisation effects of the schemes, in particular if there is little flexibility with respect to the economic conditions at the time the funds would need to be repaid (Dolls et al., 2014 and Beblavý et al., 2015).

[20] Note that contributions and disbursements of the stabilisation function with a grant structure (e.g. Carnot et al. (2017) model or Furceri and Zdzienicka (2013)) would instead impact the budgetary balance and thus provide fiscal space also in the context of fiscal rules.
[21] Clearly, linear rules for contributions would not respond to economic conditions, while rules based on macroeconomic developments, like the "double condition" rule by Carnot et al. (2017), can deliver flexibility in repayment.

A possible solution is to make the repayment schedule flexible enough to accommodate prolonged or double-dip recessions or to allow a renewed withdrawal of funds if the rule for drawing would indicate that the country is eligible for another payout. In practical terms, the loan could be set up with a fixed maturity, which would be calibrated to match the average business cycle duration in the euro area. At the same time, there would be mandatory early repayments according to a rule, analogous to the rule for contributions. If the loan were not repaid via early repayments according to the rule, the country would then be obliged to repay as the loan matures.

Third layer represents fund borrowing

In severe recessions affecting a number of countries, the savings in the European RDF might not suffice to cover all the outlays defined by the rules and **the fund would need to borrow**. This challenge is not unique to this particular set-up but applies to many other proposals for a fiscal stabilisation function addressing large shocks, for instance Beblavy et al. (2015) or Carnot et al. (2016). These proposals, including the European RDF described here, can in principle work without a borrowing capacity. This would however imply a first-come, first-served problem and a limited stabilisation capacity if several large economies needed to borrow at the same time.[22]

A stabilisation fund with a borrowing capacity can improve its stabilising properties and fairness in countries' access to the funds. The borrowing needs of any fiscal stabilisation fund would depend on the precise design of the stabilisation function, calibration of the rules prescribing contributions and disbursements, and during which phase of the business cycle it would initally be set up. The latter would determine how much could be accumulated in the fund before the first disbursements are made.

In order to avoid or lower the need for borrowing, one option is to start the operation of the fund with a ramp-up period. During this period, the countries would pay into the stabilisation fund, but would not receive any payouts. These payments could be in the form of a fixed annual contribution or follow the agreed rules for contributions. The latter option for the transition period would be more attractive in the case of a saving-loan structure, where the assets and liabilities are clearly accounted for. **Another option is to introduce asymmetry in the rules** prescribing payments from and to the fund, allowing for faster accumulation of funds in good times, and limiting the spending in bad times to larger shocks.

In situations when the fund would nevertheless need to borrow, **it would be important to achieve and maintain high creditworthiness of the fund to guarantee reasonable borrowing costs**. As the only purpose of the fund's market borrowings would be to bridge one or several countries' financing needs until these funds are recouped, the credit rating of the fund would likely depend upon that of the countries that need to repay the funds and those that are about to contribute to the fund. This will necessarily vary in time, and undermine the stability of the rating. Further, in the case of a conservative rating approach, the stabilisation fund's creditworthiness could be aligned with the lowest-rated sovereign expected to repay the loans, as a proxy of the risk of a missed payment. It is unlikely that the rating of a standalone fund could be aligned with a weighted average rating of all euro area countries. Note also that borrowing needs would typically arise in bad times, when several countries are hit by the shock at the same time.

[22] The only type of proposals that avoid these issues are the models of the stabilisation funds that aim at smoothing differences in the business cycle relative to the euro area average (for example Enderlein et al., 2012).

Options for credit enhancement

There are several options to enhance the creditworthiness of a stand-alone fiscal stabilisation fund, like the European RDF described in this paper. First, the fund could benefit from **capital support** akin to the one backing the ESM. The advantages of this approach are that it provides a strong credit enhancement, that the paid-in capital is treated as equity in national accounts, and that the borrowings of the fund would not be rerouted to the national debt.

Second, as an alternative measure, the **participating countries could issue national guarantees on the borrowing instruments** of the stabilisation fund. With some overguarantees, such a structure could provide a strong credit enhancement, as is the case for the European Financial Stability Facility (EFSF). On the downside, fund borrowing would be statistically treated as contingent liabilities and would be rerouted to the national public debt. Alternatively, the guarantees could be provided by the ESM or the EU budget.

Third, the fund could also issue a **covered bond secured by pledging its outstanding loans and future contributions** to the fund. This could work under two conditions. First, strong and commonly agreed rules for payment to the fund would be needed. Second, the fund would need to have a saving-loan structure, like the European RDF described above, in order to have claims to pledge. A higher rating could be achieved by overcollateralisation. An advantage of this approach would be that if a country defaults on a loan, this would likely be penalised or preceded by the loss of market access, in which case the country would ask for an ESM programme. The ESM would thus indirectly provide additional security for such covered bonds. On the downside, the cost of borrowing would be higher in this case than in the first two options. The underlying could be poorly diversified, if only a few countries borrowed and would vary across each issuance, implying a variation in rating and lower liquidity of resulting covered bonds. Also, earmarked contributions would not be available for stabilisation purposes. Finally, the asset-liability management to match the contributions and repayments of the bond and to redistribute the costs could be quite complex.

Fourth, **credit ratings would also be favourable if the stabilisation fund had taxation powers, which would bring the format of the fund closer to a euro area budget.** In this case, the stabilisation fund would need to have a dedicated stream of revenues, like the investment budget in Bara et al. (2017), or a rule for contributions as proposed by Furceri and Zdzienicka (2013) that includes yearly contributions and a rate of contribution that could be increased if needed to guarantee the repayment. On the one hand, such a set-up could be more straightforward. On the other hand, it could lead to pro-cyclicality and would in any case require an additional safety cushion, to cover for potential time gaps between repayment of borrowing and collection of increased revenues.

Credit enhancement would reduce the fund's borrowing cost. However, if the fund was an infrequent issuer without a stable investor base, the costs would also include some premium for this and potentially for not having developed a full yield curve. Further, there would also be a premium for low liquidity. As a new borrower on the market, the fund would need to compete with existing supranational issuers.

The amounts that the fund could borrow in the cases above would depend on the amount of capital or guarantees provided by the participating countries. If the stabilisation fund issued covered bonds as described above, the amounts would depend also on possibility of overcollateralisation. Finally, the amounts the fund could borrow would depend also on the regulatory treatment of the fund's borrowing instruments and their eligibility under central bank collateral policy rules.

The above list shows that it is very **difficult, if not impossible, to build credit enhancements for a standalone stabilisation function without the support of the participating countries**. Alternatively, the fund could borrow directly from a backstop when needed (e.g., the EU budget or the ESM). This solution would avoid parallel structures and most likely lead to significantly lower borrowing costs.

Governance and Conditionality

Frequent reporting of countries' positions by a centralised fund would increase transparency on the members' performance, and sustain confidence in sound conduct of public finances by other members, particularly in good times. Clarity of member saving and fund payout rules would further sustain governance. The legal strength of the founding text is also important. Rodriquez-Tejedo (2012) finds that legal strength supports the effectiveness of RDFs. In the US states, when the RDF was anchored in state constitution and appointed authorities, it had better means to operate under short-term political pressures.

The European RDF should set incentives for good policy conduct. The eligibility to access the European RDF could be made conditional ex-ante on the country conducting sound economic policies. This could strengthen the compliance with the European fiscal framework and the coordination of economic policy through the Macroeconomic Imbalance Procedure.

Further, fiscal rules could be adjusted if payments to and from the European RDF were treated statistically as part of the general government budget balance. In this case, the European RDF would give extra fiscal space to the countries in bad times, which could justify removing discretion and exceptions in the current fiscal rules.

In the event where a country obtained ESM financial assistance, the country could be excluded from the borrowing framework for the programme period. The repayments could be financed from the programme envelope, at the latest, as they would fall due.

Ultimately **the smooth functioning of an arrangement of this scale would be based on the institutional strength and participating member commitment to the established rules,** in particular vis-à-vis payments to the fund (i.e. savings). While built on an intergovernmental basis, that is through a treaty, it would require a strong anchoring of the national compartments into national law and domestic budget procedures. Such strong legal framework should also provide a strong basis for credit assessments of the fund.

Benefits of the RDF idea in the EA context

Setting up a fiscal stabilisation function in a format of a European RDF, as described in previous chapters, **has a number of benefits**. Some of them pertain to the specific format described, others are more general. First, a European RDF, as any other stabilisation function where the countries are obliged to save or contribute in the good times, and transfer funds in the bad times, would provide the countries with additional fiscal space when needed and generally help establishing countercyclical fiscal policy, which the countries in the euro area generally failed to follow in the past.[23] Overall, increasing the ability of single countries to stabilise their econo-

[23] For example, Balassone et al (2007) estimate the fiscal reaction function for several euro area countries in an unbalanced panel of euro area member states over 1970-2004. They find pro-cyclicality in Belgium, France, Italy, the Netherlands, an asymmetric stance in Ireland, Portugal and Spain, and a systematic counter-cyclical fiscal policy across good and bad times only in Austria and Finland. Alesina et al. (2014) find that majority of the countries in their sample of 14 OECD countries adopted counter-cyclical fiscal

my against severe shocks would have positive effects on the stability of the whole euro area, as it would decrease spillovers. Spillovers from abroad may account for two-thirds of negative effects (Biljanovska et al., 2017). Pre-defined fiscal insurance would also reduce uncertainty and could on this account alone stimulate consumption or prevent a fall in consumption.

As noted in several other more recent proposals (Carnot et al., 2017, Furceri and Zdzienicka, 2013), **the European RDF would not condition the direction and size of payments on a country's relative position with respect to the euro area average**. With this it avoids the problem of requiring a country in mild recession to contribute to transfers to countries experiencing a deep recession.

The European RDF would include safeguards that preclude permanent transfers. First, the underlying rules for contributions, payouts and repayment are based on changes in unemployment rates, rather than levels, which precludes the mechanism from supporting structural issues. Second, the payouts from the fund are either based on savings in own compartment or are structured as loans. Disbursements in the form of loans could lead to weaker stabilising properties, however, the repayment schedule for these loans could be flexible enough to accommodate prolonged or double-dip recessions.

Several elements of the proposal help avoid the moral hazard of running suboptimal economic policies. First, the RDF anchors the obligation to build up savings during good times. Second, strict eligibility rules linked to the European fiscal framework support the conduct of appropriate fiscal policies and support fiscal discipline. Further, thresholds for activation, if included, would limit the use of a European RDF to addressing large shocks only and would imply that first losses are borne at the national level. Finally, the proposal involves strong monitoring of payments and disbursements by a supranational body that would also enhance transparency by frequent reporting.

A system with national compartments in the common European RDF, where the size of compartments would be linked to the size and volatility of a country's economy, and where the rules would be linked to the size of the shock, would provide **a strong alignment between the business cycle and the need for fiscal space**.

Depending on statistical treatment of payments to and from the European RDF, **there could be scope for simplification of fiscal rules.** If payments were treated as part of budgetary revenues and expenditures, the additional fiscal space provided this way could reduce the need to define exceptional circumstances and a tighter implementation of the excessive deficit procedures. It should be noted however that most likely such payments would be treated as changes in financial assets, which do not affect the deficit level.

policies at the beginning of the recession (2008-09) but turned pro-cyclical after 2009, namely fiscal consolidations started when recessions were not over yet.

4. Empirical simulation

In this section, we simulate how the European RDF would operate using ex-post data for EA11 starting in 1995.[24] Payments to and from the fund are prescribed by the "double-condition" rule by Carnot et al. (2017) and are further limited by the target size of the national compartment and by the admissible amount of borrowing, after the national compartment has been exhausted. In this baseline simulation, we assume the overall target size of the European RDF to be 2% of nominal GDP of countries included in the simulation. The relative size of each national compartment is based on the ESM capital contribution key, corrected for GDP volatility and we apply a borrowing limit of 90% to each national compartment. Further, we impose that all loans need to be repaid within 8 years,[25] either via early repayments, if so prescribed by the "double condition" rule, or when the loan matures. No ramp-up period is assumed in the baseline simulation.

We present how savings and borrowing in the European RDF would evolve over time per country and for the overall fund for the baseline simulation in Table 1. The corresponding payments to and from the fund are presented in Table A.1 in the Annex. The evolution of positions is very diverse across the countries, depending whether they had managed to save in their compartment before they were hit by a shock, and on the degree of changes in the unemployment rate. For some countries (e.g. France and the Netherlands), savings would have been sufficient to cover the outflows in the recent crisis, while Spain for instance would have had to borrow up to the limit from the fund even if it had accumulated a full compartment prior to the crisis. One should note that due to different dynamics in each compartment, the European RDF would never reach its full size. The highest value reached is 0.82% of EA11 GDP in 2008. The fund would have had to borrow in two periods. At the beginning of fund's operation, when there would be insufficient inflow and no past savings to cover the outflows, the fund would have reached its highest borrowing position of 0.3% of EA11 GDP (in 1997), which would have translated into €17.8 billion. In the latest crisis, the peak borrowing position would have amounted to €7.9 billion in 2014.

Next **we plot payments to and from the European RDF, along with the evolution of the unemployment rate and the cyclically adjusted budget balance**. We compare the payments from our baseline simulation to the ones that would be prescribed by the Carnot et al. (2017) rule and would not be subject to the compartmental structure or loan repayment. As comparison, we also add payments to and from the European RDF excluding the requirement to repay the loans within eigth years. We show examples of Germany, Spain, Italy and Portugal in Figure 3. The results for other countries are reported in Figure A.1 in Annex.

We can observe that in the baseline simulation, **in most episodes the payments to and from the European RDF correspond to those that would be paid if one was simply following the Carnot et al. (2017) rule**. In some cases, for instance in Portugal in the last crisis, loans would have needed to be repaid at the time when the Carnot et al.(2017) rule would have triggered disbursements from the fund. A further calibration of the maturities could improve on this. It should be noted also that Portugal would have reached its borrowing limit and needed to repay in the period when it was receiving financial assistance from the EFSF. Conversely, in the simulation Italy never reached the borrowing limit, as its savings during the good times and limited borrowing in the bad times were sufficient to cover the drawings from the fund prescribed by the Carnot et al. (2017) "double condition" rule. Consequently, there is no difference between the drawings from the European RDF and those resulting from simply applying the "double condition" rule. Finally, Spain would have filled its compartment in 2005 and therefore, in Figure 3 we can see somewhat lower payments to the fund in years 2005-2006 compared to the Carnot et al. (2017) model. Despite that, it would have been able to obtain considerable support in the first years of crisis before hitting the borrowing constraint.

[24] GDP in current prices from OECD National Accounts Statistics. Unemployment rate and cyclically adjusted budget balance from the AMECO database.
[25] We chose eight years to approximate the average length of the euro area business cycle.

Table 1:
Evolution of positions in national compartments and European RDF overall, baseline simulation

	AT	BE	DE	ES	FI	FR	IE	IT	LU	NL	PT	EA11
1995	0.00	0.00	0.00	0.00	0.00	0.00	0.10	-0.14	0.00	-0.18	-0.05	-0.07
1996	-0.16	0.00	-0.20	0.00	0.00	-0.11	0.13	-0.14	0.00	-0.15	-0.06	-0.22
1997	-0.16	0.00	-0.38	0.00	0.00	-0.18	0.23	-0.13	0.00	0.19	-0.06	-0.30
1998	-0.15	-0.04	-0.36	0.25	0.00	-0.18	0.38	-0.15	0.00	0.59	0.17	-0.15
1999	-0.15	0.10	-0.35	0.67	0.00	-0.17	0.49	-0.14	0.02	0.83	0.27	0.04
2000	-0.14	0.66	-0.33	0.90	0.00	0.12	0.57	-0.14	0.05	0.94	0.33	0.26
2001	-0.16	0.73	-0.32	1.00	0.11	0.41	0.57	0.11	0.11	1.00	0.32	0.49
2002	-0.29	0.71	-0.51	0.97	0.11	0.40	0.55	0.23	0.06	0.97	0.31	0.39
2003	-0.41	0.67	-0.76	0.94	0.12	0.39	0.53	0.25	-0.19	0.94	0.08	0.21
2004	-0.49	0.57	-0.76	1.00	0.16	0.37	0.52	0.33	-0.44	0.90	0.01	0.24
2005	-0.51	0.51	-0.76	1.00	0.22	0.36	0.52	0.39	-0.42	0.80	-0.18	0.24
2006	-0.48	0.49	-0.72	1.00	0.34	0.38	0.49	0.59	-0.40	0.95	-0.19	0.36
2007	-0.46	0.75	-0.60	1.00	0.47	0.66	0.47	0.73	-0.38	1.00	-0.22	0.59
2008	-0.28	0.91	-0.33	0.98	0.55	0.87	0.46	0.71	-0.55	1.00	-0.22	0.82
2009	-0.52	0.95	-0.34	0.15	0.57	0.90	-0.07	0.73	-0.61	1.00	-0.58	0.50
2010	-0.50	0.88	-0.19	-0.25	0.56	0.80	-0.25	0.71	-0.60	0.97	-0.81	0.40
2011	-0.43	1.00	0.10	-0.53	0.65	0.78	-0.31	0.69	-0.48	0.94	-0.90	0.48
2012	-0.30	1.00	0.20	-0.90	0.67	0.55	-0.32	0.22	-0.35	0.69	-0.90	0.16
2013	-0.45	0.77	0.24	-0.90	0.66	0.35	-0.32	-0.09	-0.58	0.21	-0.74	-0.05
2014	-0.51	0.72	0.29	-0.88	0.59	0.34	-0.31	-0.22	-0.60	0.17	-0.71	-0.08
2015	-0.53	0.69	0.38	-0.85	0.44	0.29	-0.30	-0.21	-0.73	0.16	-0.65	-0.04
2016	-0.62	0.71	0.49	-0.83	0.43	0.29	-0.22	-0.21	-0.56	0.16	-0.64	0.04

borrowing

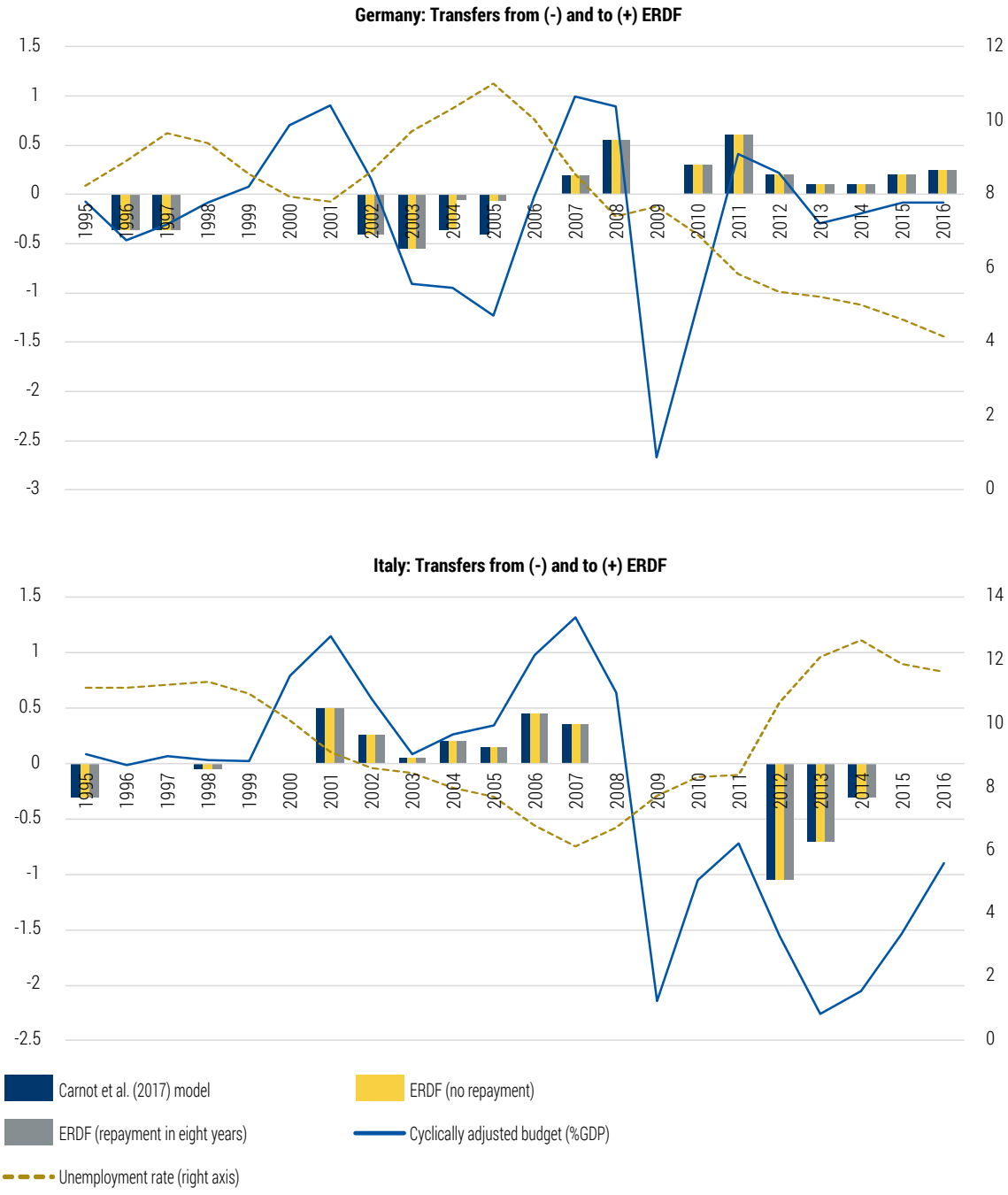
full compartment

borrowing up to the borrowing limit

Notes: Positions in national compartments are expressed as share of compartment target size and the position of the European RDF in terms of EA11 GDP. The baseline simulation assumes a borrowing limit of 90% and an overall RDF target size of 2% of EA11 GDP. There is an obligation of loan repayment in eight years.

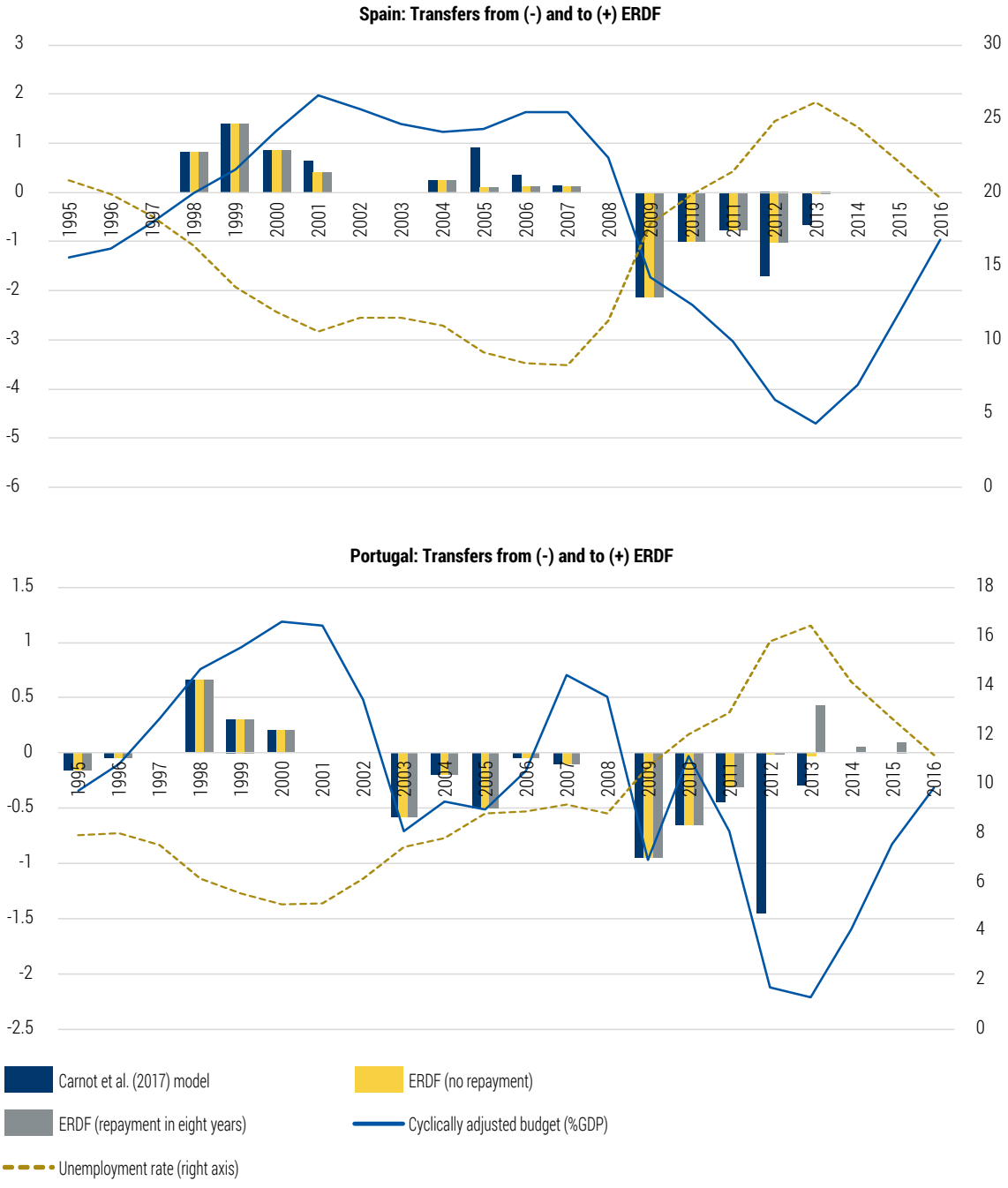
Sources: Own calculations, OECD, AMECO, Carnot et al. (2017)

Figure 3
Payments to (+) and from (-) European RDF, baseline simulation and comparison with Carnot et al. (2017)



Notes: Payments are expressed in % of national GDP. Simulation assumes a borrowing limit of 90% and an overall RDF target size of 2% of EA11 GDP. In the case with loan repayment, the maturity of the loan is assumed to be eight years.

Sources: Own calculations, OECD, AMECO, Eurostat, Carnot et al. (2017)



Notes: Payments are expressed in % of national GDP. Simulation assumes a borrowing limit of 90% and an overall RDF target size of 2% of EA11 GDP. In the case with loan repayment, the maturity of the loan is assumed to be eight years.

Sources: Own calculations, OECD, AMECO, Eurostat, Carnot et al. (2017)

Alternative specifications

Changing the size. A smaller target size of the European RDF, while keeping all other parameters the same, would lead to lower savings in good times and a lower capacity to spend and borrow in bad times. Payments to and from the fund would therefore be more restricted and the stabilisation capacity of the fund weaker. In Figure A.2 in the Annex we report examples of Germany, Italy, Portugal and Spain for the case of a European RDF with a target size of 1% of EA11 GDP, with a borrowing constraint at 90% of the national compartment.

Alternatively, one could increase the size of payments to and from the fund, while keeping the target size of the fund unchanged. If the size of payments was doubled, the savings in the fund would accumulate more quickly, but would also be spent more quickly and the countries would hit the borrowing limit earlier. We present the evolution of fund's compartments in Table A.2 in the Annex.

Borrowing constraints. Borrowing constraints imposed on each national compartment would have an important effect on the borrowing needs of the fund. In Table A.3 in the Annex we report the evolution of savings and borrowings in the European RDF for cases where borrowing is constrained at 50%, 90% and 150% of each national compartment. The borrowing needs of the fund would have varied most depending on the borrowing constraints during the last crisis, where several countries would have reached the borrowing limit in their compartments due to a severe prolonged shock.

Further, we explore in Table A.4 in the Annex how limitations to the fund's borrowing affect the dynamics in different compartments. We observe that such limitations would have only affected some countries in the beginning of the fund's operation, as a result of not having accumulated sufficient savings, and in the last crisis. In Figure A.3 in the Annex we show the cases of Austria, Germany and Italy that would have received a bit less in the mid-1990s. Austria, Italy and Luxembourg would also have received slightly less during the last crisis, while for other countries, the borrowing constraint of the European RDF would not have affected their drawings.

Starting time and ramp-up period. The starting period is another element that has implications for the evolution of positions in the national compartments and the European RDF as a whole. If the fund starts operating in relatively good times, buffers can be accumulated before the next downturn occurs. As the shock hits, the countries then first consume their savings and borrow only in extremely bad situations. This scenario roughly corresponds to our baseline simulation starting in 1995. In Table A.5 in the Annex, we show an alternative scenario, where a number of countries would have had to borrow in the starting years of the fund's operation. This would have happened if the European RDF had existed since 1990. In this case, several countries would have never managed to build any savings, and overall the fund would have remained in a negative net position for a significant part of its operating period.

The introduction of a ramp-up period in which the countries build their savings prior to any disbursements can improve the dynamics at the compartment and fund level. We show this in an alternative simulation in Table A.6 in the Annex, where the fund also starts operating in 1990 but has been fully filled prior to that.

Addressing only large shocks. Adding thresholds to the rule for payments to and from the fund limits the fund's intervention to more significant shocks, which is in line with the idea of insurance against large shocks and also helps avoid moral hazard. In Tables A.7 and A.8 in the Annex, we show the development of the fund when thresholds were added to the Carnot double condition in a symmetric fashion. The threshold that we implemented limits the payments to cases where the unemploy-

ment rate increases or decreases by more than 5% (or 10%) compared to the previous period. The size of the payments is also adjusted using these thresholds. Tables A.9 and A.10 present the payments to and from the fund for the two thresholds. We also compare the payments under baseline and two threshold options for selected countries in Figure A.4.

Overall, we can observe that with symmetric thresholds, the savings in the fund build up more slowly and payouts happen less often. This leads to more protracted cycles of saving and drawing and countries reach the borrowing limit and build a full national compartment less often. For the higher threshold of 10%, the borrowing needs of the European RDF would have doubled during the last crisis, as the fund would have accumulated less savings in good times.

The thresholds for payments to and from the fund can also be applied in an asymmetric manner. A sensible option would be to model payments to the fund without a threshold, while the payouts would be subject to a threshold, i.e. they would be triggered only in the event of larger shocks. In this case, the accumulation of savings would be faster and the borrowing needs of the fund reduced. We present the evolution of the fund with asymmetric thresholds in Tables A.11 and A.12 in the Annex, focusing on the case where the fund starts operating in 1990. Comparing to the no-threshold scenario in Table A.5, the fund would have still needed to borrow in the beginning of its operation but not during the recent crisis. At the same time, the countries would have received comparable amounts during the episodes of large shocks.

Finally, there is a possibility to combine thresholds with a ramp-up period to further reduce the need for external funding. Table A.13 in the Annex compares the evolution of the overall European RDF with or without a ramp-up period when the thresholds are added in an asymmetric way, limiting only the payouts. We can see that starting off with a full, or partially full national compartment eliminates the need to borrow in the first years of the fund's operation. The benefits of the ramp-up period then fade away in time, as can be seen from very similar positions of the fund at the end of the period. This is due to asymmetric thresholds, which lead to sufficient accumulation of funds to cover the payouts of the fund, including during the last crisis.

5. Conclusion

The paper analyses the functioning and lessons learned from the RDFs operated by the US states and describes how to set up a fiscal stabilisation function as a non-mutualised European RDF. Compared to other proposals for the design of the fiscal stabilisation function, the main advantage of the European RDF is in its saving-loan structure. This structure has several benefits.

The empirical analysis shows that a fund with a sufficient target size and with a saving-loan structure has equivalent stabilisation properties as a fund based on transfers. The simulations indicate that it can effectively produce comparable payouts. Thus, the concern that stabilisation properties would be significantly affected by capped payments and withdrawals and by the fact that a loan is a clawback mechanism does not apply in the case of our model.

The savings-loan structure by construction excludes permanent transfers. This is not the case for a model based on transfers where countries can have positive or negative balances, i.e. transfers, for extended periods of time. An exception would be a case where one of the countries fails to repay its loan and therefore legally defaults. However, this would only arise in a very extreme situation where the current crisis resolution system for the euro area would fail.

The saving-loan structure also helps in terms of lower moral hazard. It creates an obligation to build up savings during good times, which are consumed first in the bad times, before the country can receive other funds. The funds beyond own savings are given in the form of a loan that needs to be repaid, thus further reducing moral hazard. Several other features, such as strict eligibility criteria, strong monitoring of payments and limiting the payouts only to episodes of large shocks, also contribute to lower moral hazard.

The additional advantages of the saving-loan structure include limited borrowing needs and cheap borrowing within the stabilisation fund. Higher costs would only apply if the fund needed to borrow on the market and there would not be sufficient credit enhancement in place. External borrowing needs can be further reduced by adding a ramp-up period or allowing for payouts from the fund only when the country suffers from a large shock.

Finally, the saving-loan structure incorporated in our model could make the proposal also politically more acceptable. Indeed, recently the political leaders have - again – acknowledged the need for a macroeconomic stabilisation function for the euro area that would support its member states in deep recessions, allowing automatic stabilisers to operate. Following the crisis period, the political leaders have grown increasingly sensitive to the related social costs. For example, a recent Franco-German statement includes reference to a European Unemployment Stabilization Fund that would support the national safety nets for unemployment in deep recessions and would be based on loans. The European RDF described in this paper provides the right format, as it does not lead to permanent transfers, while the funds distributed to countries could be earmarked to be used for the reinsurance of the national unemployment systems.

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Annex

Table A.1
Payments to (+) and from (-) the fund, baseline simulation

	AT	BE	DE	ES	FI	FR	IE	IT	LU	NL	PT
1995	0.00	0.00	0.00	0.00	0.00	0.00	1.00	-0.30	0.00	-0.33	-0.15
1996	-0.25	0.00	-0.35	0.00	0.00	-0.15	0.30	0.00	0.00	0.04	-0.05
1997	0.00	0.00	-0.35	0.00	0.00	-0.10	0.90	0.00	0.00	0.60	0.00
1998	0.00	-0.05	0.00	0.83	0.00	0.00	1.20	-0.05	0.00	0.70	0.66
1999	0.00	0.19	0.00	1.40	0.00	0.00	0.85	0.00	0.04	0.45	0.30
2000	0.00	0.80	0.00	0.85	0.00	0.38	0.65	0.00	0.10	0.25	0.20
2001	-0.05	0.15	0.00	0.41	0.31	0.40	0.15	0.50	0.15	0.16	0.00
2002	-0.20	0.00	-0.40	0.00	0.00	0.00	0.00	0.25	-0.13	0.00	0.00
2003	-0.20	-0.04	-0.55	0.00	0.05	0.00	0.00	0.05	-0.60	0.00	-0.58
2004	-0.16	-0.10	-0.05	0.25	0.10	0.00	0.05	0.20	-0.60	-0.02	-0.20
2005	-0.05	-0.05	-0.06	0.10	0.20	0.00	0.05	0.15	0.00	-0.10	-0.50
2006	0.00	0.00	0.00	0.12	0.35	0.05	0.00	0.45	0.00	0.29	-0.05
2007	0.00	0.40	0.19	0.13	0.40	0.40	0.00	0.35	0.00	0.16	-0.10
2008	0.26	0.25	0.55	0.00	0.25	0.30	0.00	0.00	-0.35	0.03	0.00
2009	-0.34	0.00	0.00	-2.13	0.00	0.00	-2.82	0.00	-0.10	-0.06	-0.95
2010	0.00	-0.05	0.30	-1.00	0.00	-0.10	-0.95	0.00	0.00	0.00	-0.65
2011	0.09	0.19	0.60	-0.75	0.30	0.00	-0.40	0.00	0.18	0.00	-0.30
2012	0.18	0.00	0.20	-1.02	0.05	-0.30	-0.05	-1.05	0.23	-0.40	-0.01
2013	-0.21	-0.28	0.10	-0.03	0.00	-0.25	0.00	-0.70	-0.40	-0.75	0.42
2014	-0.10	-0.05	0.10	0.00	-0.16	0.00	0.00	-0.30	-0.05	-0.05	0.05
2015	-0.05	0.00	0.20	0.00	-0.35	-0.05	0.00	0.00	-0.25	0.00	0.10
2016	-0.15	0.05	0.25	0.00	0.00	0.00	0.26	0.00	0.25	0.00	0.00

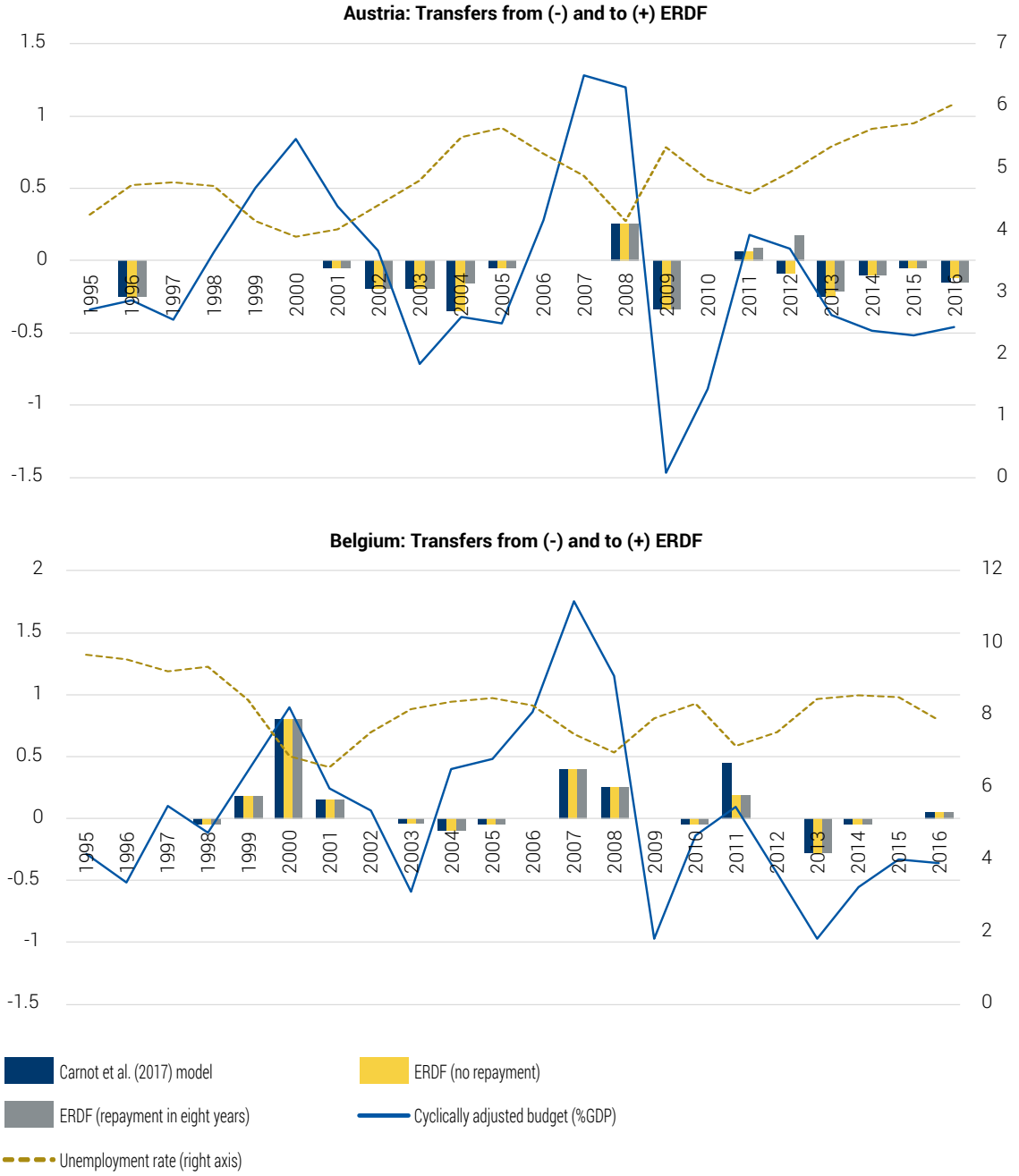
payments into the fund

payments from the fund

Notes: Payments are expressed in % of national GDP. The baseline simulation assumes a borrowing limit of 90%, an overall RDF target size of 2% of EA11 GDP and loan repayment in eight years.

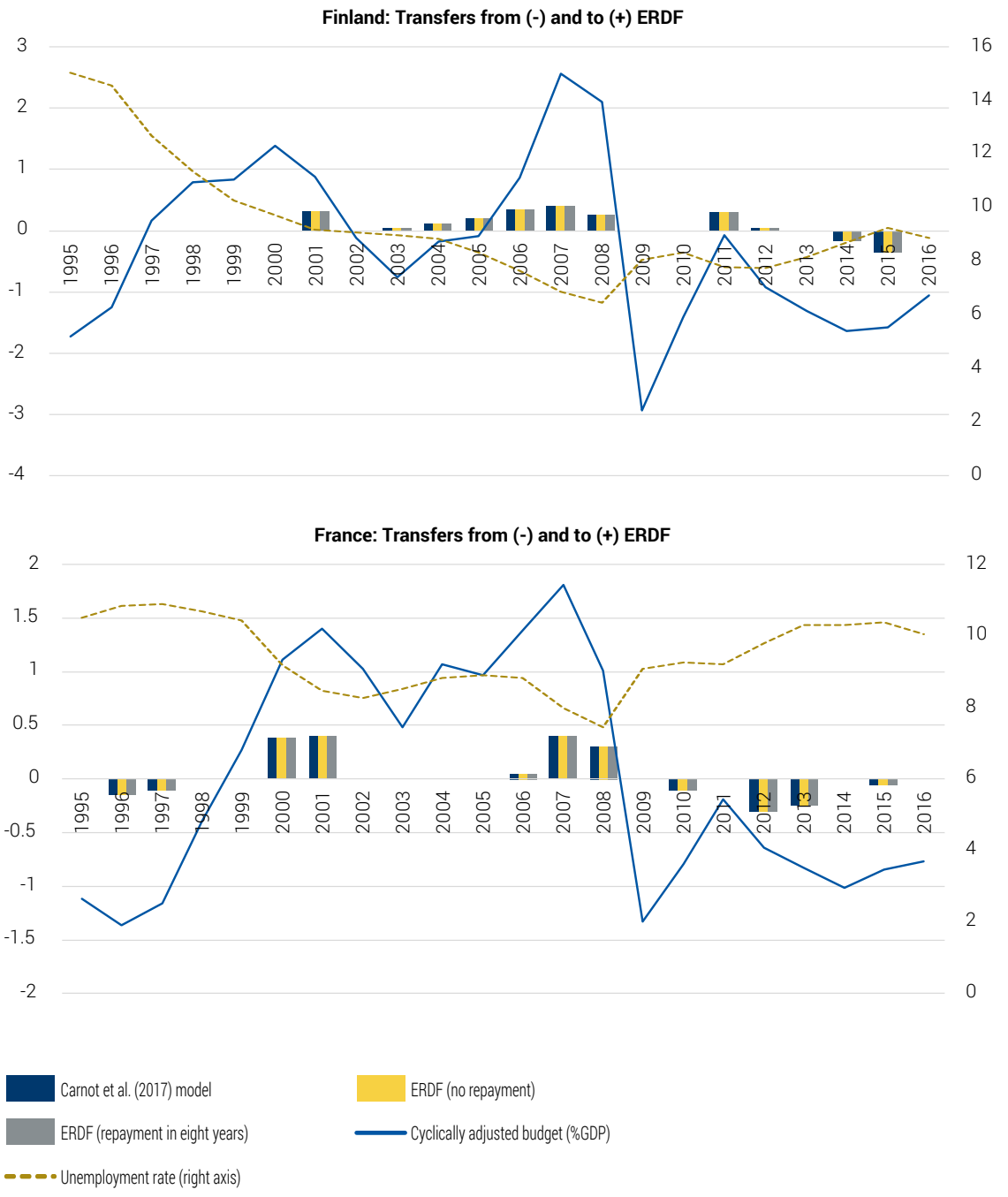
Sources: ESM calculations, OECD, AMECO, Carnot et al. (2017)

Figure A.1
Payments to (+) and from (-) European RDF, baseline simulation and comparison with Carnot et al. (2017)



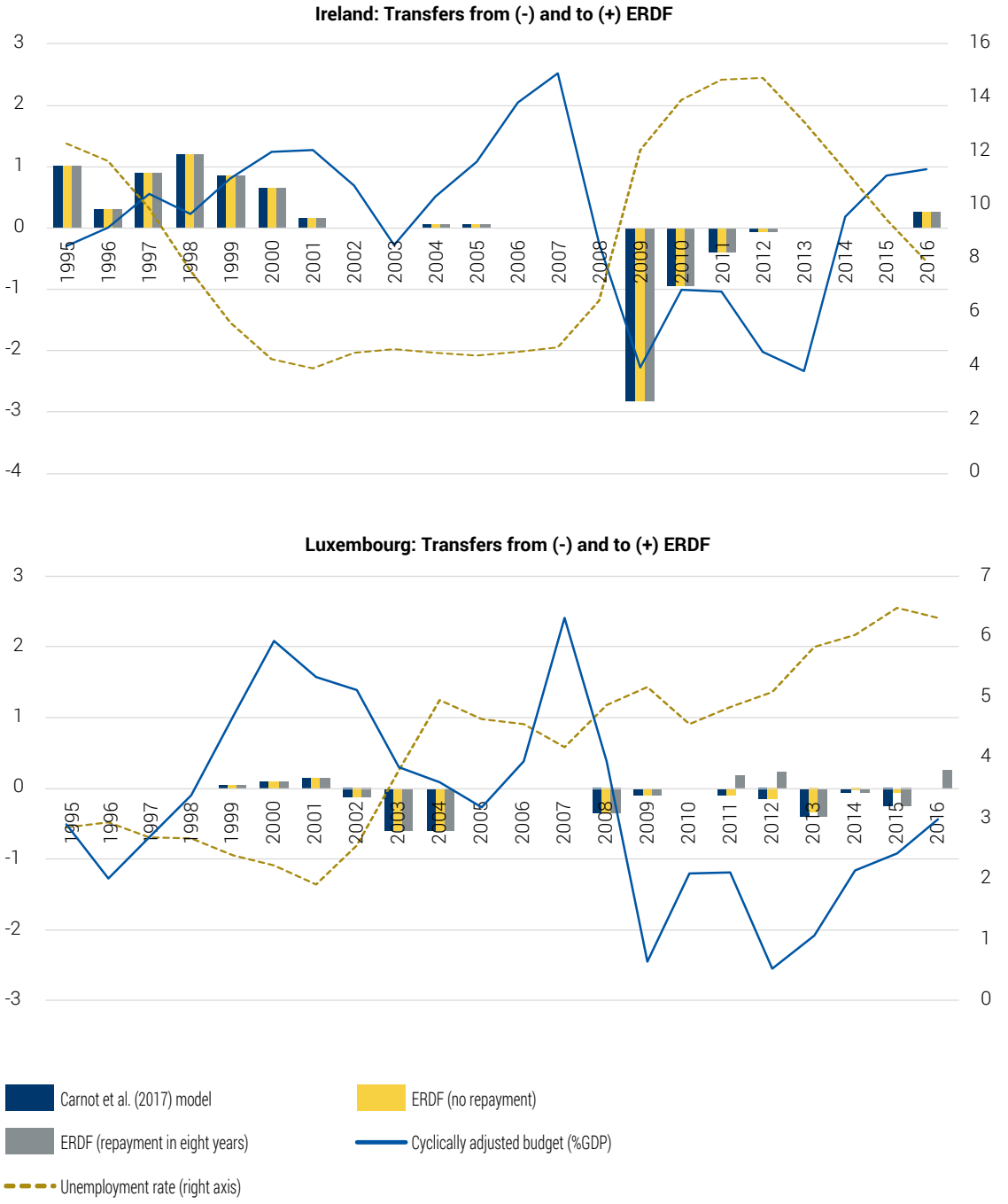
Notes: Payments are expressed in % of national GDP. The baseline simulation assumes a borrowing limit of 90% and an overall RDF target size of 2% of EA11 GDP. In the case with loan repayment, the maturity of the loan is assumed to be 8 years.

Sources: ESM calculations, OECD, AMECO, Eurostat, Carnot et al. (2017)



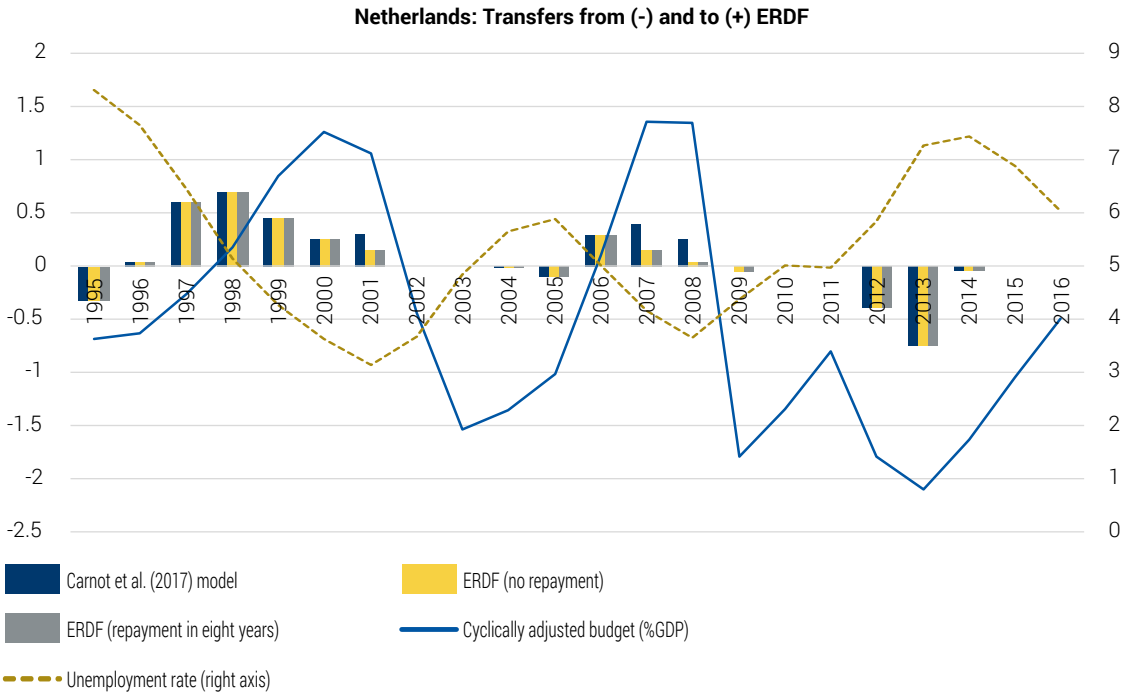
Notes: Payments are expressed in % of national GDP. The baseline simulation assumes a borrowing limit of 90% and an overall RDF target size of 2% of EA11 GDP. In the case with loan repayment, the maturity of the loan is assumed to be 8 years.

Sources: ESM calculations, OECD, AMECO, Eurostat, Carnot et al. (2017)



Notes: Payments are expressed in % of national GDP. The baseline simulation assumes a borrowing limit of 90% and an overall RDF target size of 2% of EA11 GDP. In the case with loan repayment, the maturity of the loan is assumed to be 8 years.

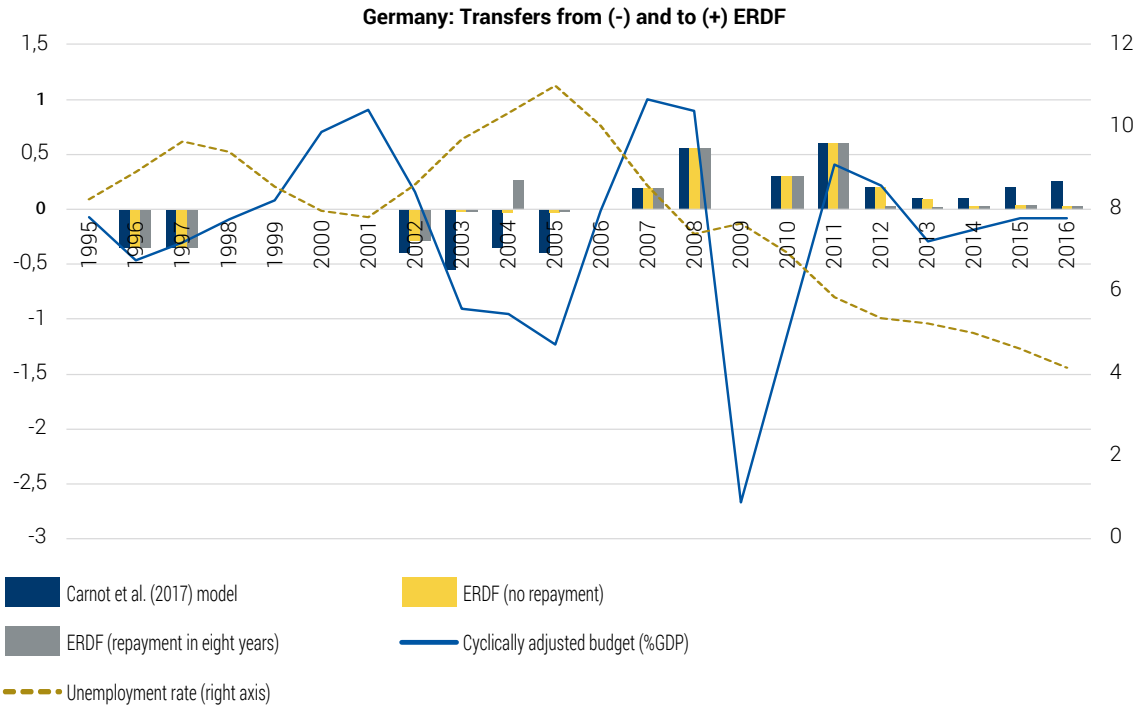
Sources: ESM calculations, OECD, AMECO, Eurostat, Carnot et al. (2017)



Notes: Payments are expressed in % of national GDP. The baseline simulation assumes a borrowing limit of 90% and an overall RDF target size of 2% of EA11 GDP. In the case with loan repayment, the maturity of the loan is assumed to be 8 years.

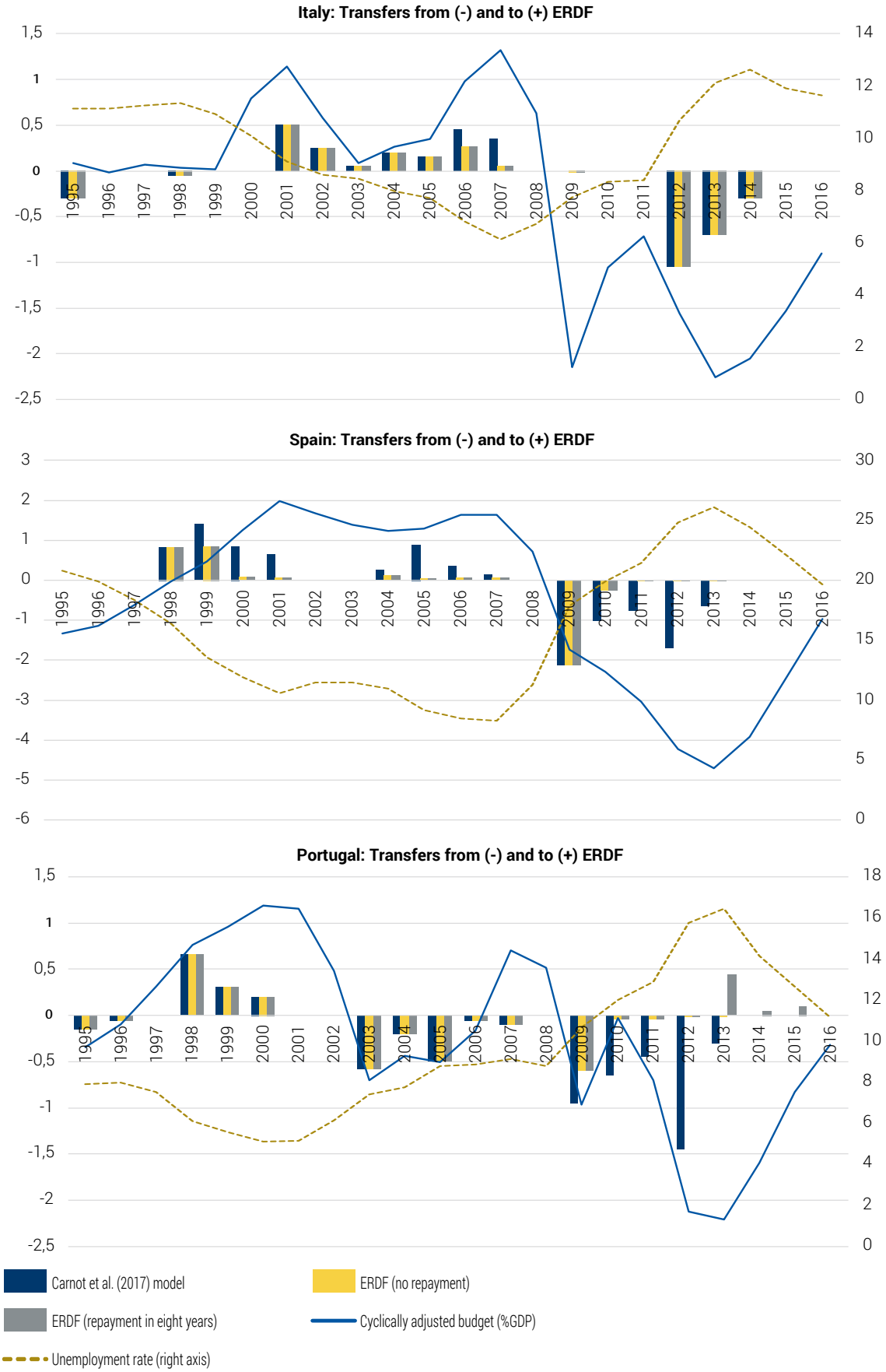
Sources: ESM calculations, OECD, AMECO, Eurostat, Carnot et al. (2017)

Figure A.2
Payments to (+) and from (-) the European RDF, lower target size of the fund



Notes: Payments are expressed in % of national GDP. Simulation assumes a borrowing limit of 90% and an overall RDF target size of 1% of EA11 GDP. In the case with loan repayment, the maturity of the loan is assumed to be 8 years.

Sources: ESM calculations, OECD, AMECO, Eurostat, Carnot et al. (2017)



Notes: Payments are expressed in % of national GDP. Simulation assumes a borrowing limit of 90% and an overall RDF target size of 1% of EA11 GDP. In the case with loan repayment, the maturity of the loan is assumed to be 8 years.

Sources: ESM calculations, OECD, AMECO, Eurostat, Carnot et al. (2017)

Table A.2
Evolution of positions in national compartments and European RDF overall
(all payments multiplied by 2)

	AT	BE	DE	ES	FI	FR	IE	IT	LU	NL	PT	EA11
1995	0.00	0.00	0.00	0.00	0.00	0.00	0.20	-0.28	0.00	-0.35	-0.09	-0.13
1996	-0.33	0.00	-0.39	0.00	0.00	-0.23	0.26	-0.27	0.00	-0.30	-0.12	-0.43
1997	-0.32	0.00	-0.76	0.00	0.00	-0.37	0.46	-0.26	0.00	0.39	-0.12	-0.60
1998	-0.30	-0.07	-0.73	0.49	0.00	-0.35	0.75	-0.30	0.00	1.00	0.35	-0.32
1999	-0.29	0.20	-0.70	1.00	0.00	-0.34	0.97	-0.29	0.03	1.00	0.55	-0.10
2000	-0.28	1.00	-0.66	1.00	0.00	0.24	1.00	-0.27	0.11	1.00	0.66	0.15
2001	-0.33	1.00	-0.64	1.00	0.22	0.83	1.00	0.22	0.22	1.00	0.63	0.53
2002	-0.57	0.97	-0.90	0.97	0.22	0.80	0.97	0.45	0.11	0.97	0.61	0.42
2003	-0.81	0.89	-0.90	0.94	0.25	0.78	0.94	0.49	-0.38	0.94	0.17	0.38
2004	-0.66	0.71	-0.62	1.00	0.31	0.75	0.93	0.67	-0.87	0.89	0.01	0.60
2005	-0.70	0.62	-0.62	1.00	0.44	0.72	0.92	0.79	-0.84	0.73	-0.36	0.60
2006	-0.67	0.59	-0.59	1.00	0.68	0.76	0.87	1.00	-0.80	1.00	-0.39	0.75
2007	-0.63	1.00	-0.38	1.00	0.94	1.00	0.83	1.00	-0.76	1.00	-0.44	0.98
2008	-0.28	1.00	0.13	0.98	1.00	1.00	0.81	0.98	-0.90	1.00	-0.43	1.29
2009	-0.75	1.00	0.14	-0.71	1.00	1.00	-0.25	1.00	-0.90	1.00	-0.90	0.64
2010	-0.73	0.90	0.42	-0.90	0.97	0.82	-0.60	0.97	-0.87	0.97	-0.90	0.65
2011	-0.59	1.00	0.98	-0.90	1.00	0.80	-0.73	0.94	-0.62	0.94	-0.90	0.97
2012	-0.61	1.00	1.00	-0.90	1.00	0.34	-0.74	0.00	-0.37	0.43	-0.90	0.44
2013	-0.85	0.56	1.00	-0.90	0.99	-0.04	-0.74	-0.62	-0.82	-0.52	-0.59	-0.04
2014	-0.90	0.47	1.00	-0.88	0.85	-0.04	-0.72	-0.87	-0.87	-0.57	-0.54	-0.14
2015	-0.90	0.45	1.00	-0.85	0.56	-0.12	-0.69	-0.84	-0.90	-0.55	-0.46	-0.15
2016	-0.90	0.51	1.00	-0.83	0.54	-0.11	-0.54	-0.82	-0.74	-0.54	-0.45	-0.11

borrowing

full compartment

borrowing up to the borrowing limit

Notes: Positions in national compartments are expressed as share of compartment target size and the position of the European RDF in terms of EA11 GDP. Simulation assumes a borrowing limit of 90% and an overall RDF target size of 2% of EA11 GDP. In the case with loan repayment, the maturity of the loan is assumed to be 8 years.All payments are the double of those in the baseline simulation.

Sources: ESM calculations, OECD, AMECO, Eurostat, Carnot et al. (2017)

Table A.3
Evolution of the overall European RDF in case of different borrowing limits

Borrowing limit	0.5	0.9	1.5	Carnot et al. (2017)
1995	-0.07	-0.07	-0.07	-0.07
1996	-0.22	-0.22	-0.22	-0.22
1997	-0.30	-0.30	-0.30	-0.31
1998	-0.15	-0.15	-0.15	-0.18
1999	0.04	0.04	0.04	0.01
2000	0.26	0.26	0.26	0.23
2001	0.49	0.49	0.49	0.51
2002	0.40	0.39	0.39	0.43
2003	0.37	0.21	0.21	0.26
2004	0.49	0.24	0.24	0.20
2005	0.48	0.24	0.23	0.20
2006	0.59	0.36	0.35	0.36
2007	0.81	0.59	0.58	0.63
2008	1.04	0.82	0.81	0.89
2009	0.73	0.50	0.49	0.55
2010	0.64	0.40	0.39	0.46
2011	0.73	0.48	0.47	0.56
2012	0.51	0.16	0.05	0.13
2013	0.29	-0.05	-0.24	-0.16
2014	0.26	-0.08	-0.26	-0.19
2015	0.29	-0.04	-0.21	-0.15
2016	0.37	0.04	-0.13	-0.15

borrowing

Notes: Position of the European RDF is expressed in terms of EA11 GDP. Simulation assumes an overall RDF target size of 2% of EA11 GDP and loan repayment in 8 years.

Sources: ESM calculations, OECD, AMECO, Carnot et al. (2017)

Table A.4

Evolution of positions in national compartments and the European RDF overall, assuming no external borrowing

	AT	BE	DE	ES	FI	FR	IE	IT	LU	NL	PT	EA11
1995	0.00	0.00	0.00	0.00	0.00	0.00	0.10	-0.01	0.00	-0.05	0.00	**0.00**
1996	0.00	0.00	-0.01	0.00	0.00	0.00	0.13	-0.01	0.00	-0.03	0.00	**0.00**
1997	0.00	0.00	-0.09	0.00	0.00	0.00	0.23	-0.01	0.00	0.31	0.00	**0.00**
1998	0.00	-0.04	-0.08	0.25	0.00	0.00	0.38	-0.03	0.00	0.70	0.23	0.13
1999	0.00	0.10	-0.08	0.67	0.00	0.00	0.49	-0.03	0.02	0.94	0.33	0.31
2000	0.00	0.66	-0.08	0.90	0.00	0.28	0.57	-0.03	0.05	1.00	0.38	0.52
2001	-0.03	0.73	-0.07	1.00	0.11	0.57	0.57	0.21	0.11	1.00	0.37	0.73
2002	-0.16	0.71	-0.27	0.97	0.11	0.55	0.55	0.32	0.06	0.97	0.35	0.63
2003	-0.28	0.67	-0.53	0.94	0.12	0.53	0.53	0.34	-0.19	0.94	0.13	0.44
2004	-0.49	0.57	-0.67	1.00	0.16	0.51	0.52	0.42	-0.44	0.90	0.05	0.37
2005	-0.51	0.51	-0.78	1.00	0.22	0.50	0.52	0.48	-0.42	0.80	-0.14	0.30
2006	-0.48	0.49	-0.74	1.00	0.34	0.51	0.49	0.67	-0.40	0.95	-0.15	0.42
2007	-0.46	0.75	-0.62	1.00	0.47	0.78	0.47	0.80	-0.38	1.00	-0.18	0.65
2008	-0.28	0.91	-0.35	0.98	0.55	0.99	0.46	0.79	-0.55	1.00	-0.18	0.88
2009	-0.52	0.95	-0.36	0.15	0.57	1.00	-0.07	0.82	-0.61	1.00	-0.55	0.55
2010	-0.50	0.88	-0.21	-0.25	0.56	0.90	-0.25	0.79	-0.60	0.97	-0.78	0.45
2011	-0.43	1.00	0.08	-0.53	0.65	0.87	-0.31	0.77	-0.48	0.94	-0.90	0.53
2012	-0.30	1.00	0.18	-0.90	0.67	0.64	-0.32	0.30	-0.35	0.69	-0.90	0.21
2013	-0.43	0.77	0.23	-0.89	0.66	0.44	-0.32	0.00	-0.56	0.21	-0.78	**0.00**
2014	-0.42	0.72	0.27	-0.87	0.59	0.43	-0.31	-0.06	-0.55	0.17	-0.75	**0.00**
2015	-0.45	0.69	0.36	-0.84	0.44	0.38	-0.30	-0.06	-0.68	0.16	-0.69	0.04
2016	-0.54	0.71	0.48	-0.82	0.43	0.37	-0.22	-0.06	-0.51	0.16	-0.67	0.12

borrowing

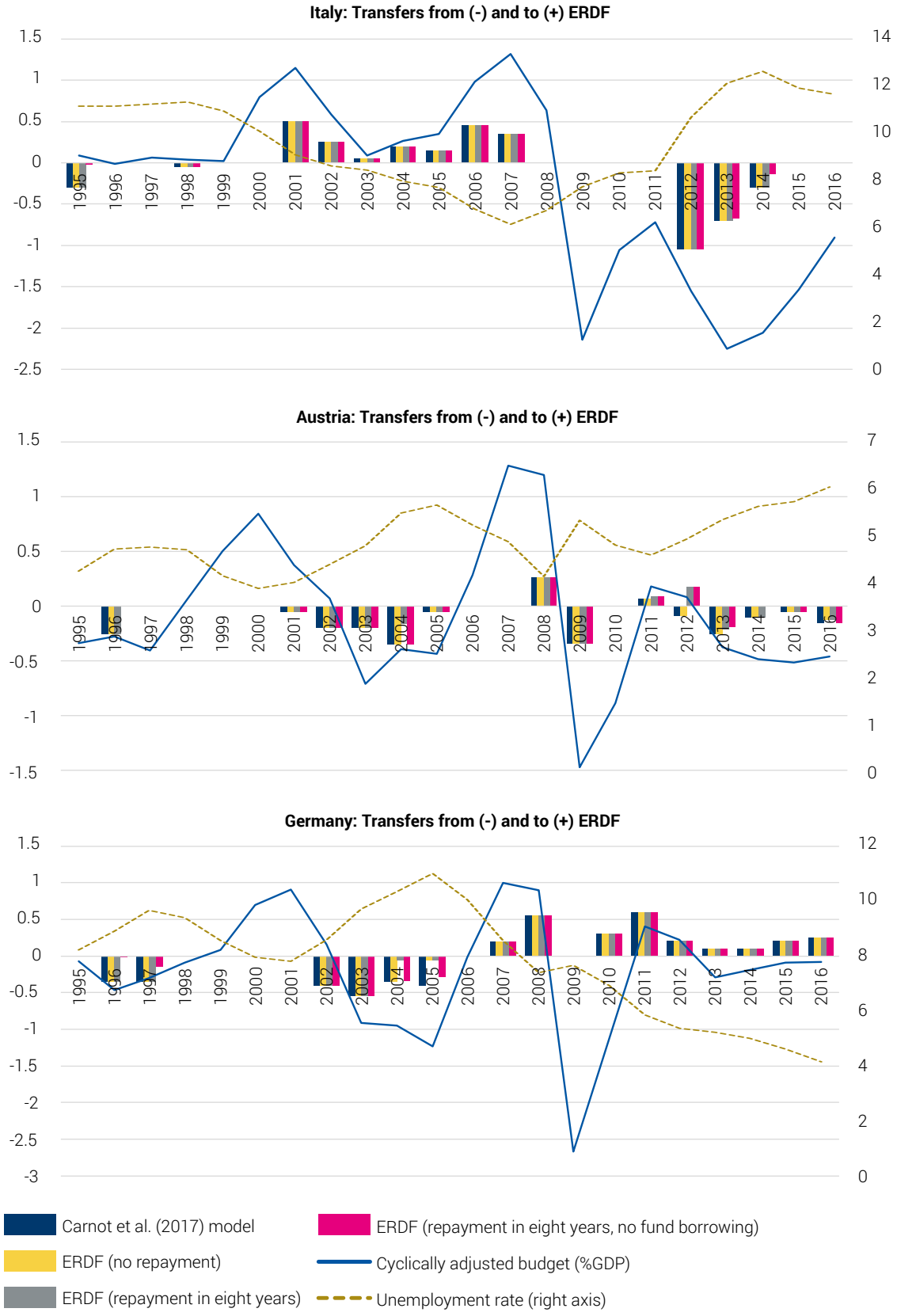
full compartment

borrowing up to the borrowing limit

Notes: Positions in national compartments are expressed as share of compartment target size and the position of the European RDF in terms of EA11 GDP. Simulation assumes a borrowing limit of 90%, an overall RDF target size of 2% of EA11 GDP and loan repayment in 8 years. The fund is not allowed to borrow externally.

Sources: ESM calculations, OECD, AMECO, Carnot et al. (2017)

Figure A.3
Payments to (+) and from (-) the European RDF and comparison with an option without funds' external borrowing



Notes: Payments are expressed in % of national GDP. Simulation assumes a borrowing limit of 90% and an overall RDF target size of 2% of EA11 GDP. In the case with loan repayment, the maturity of the loan is assumed to be 8 years.

Sources: ESM calculations, OECD, AMECO, Carnot et al. (2017)

Table A.5
Evolution of positions in national compartments and the European RDF overall, starting in 1990

	AT	BE	DE	ES	FI	FR	IE	IT	LU	NL	PT	EA11
1990	-0.10	0.29	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.17	0.05	0.03
1991	-0.19	0.35	0.01	0.00	-0.28	-0.08	-0.06	0.00	0.03	0.26	0.13	0.01
1992	-0.18	0.33	-0.22	-0.20	-0.90	-0.43	-0.08	-0.07	0.03	0.25	0.12	-0.36
1993	-0.37	0.32	-0.56	-0.70	-0.90	-0.85	-0.09	-0.27	-0.02	0.24	0.12	-0.93
1994	-0.46	-0.08	-0.71	-0.83	-0.90	-0.90	-0.09	-0.46	-0.13	0.23	0.09	-1.17
1995	-0.43	-0.07	-0.68	-0.79	-0.86	-0.86	0.02	-0.58	-0.12	0.04	0.04	-1.18
1996	-0.58	-0.07	-0.85	-0.76	-0.83	-0.90	0.05	-0.56	-0.12	0.06	0.03	-1.28
1997	-0.56	-0.07	-0.90	-0.73	-0.80	-0.90	0.15	-0.54	-0.11	0.40	0.02	-1.25
1998	-0.47	-0.10	-0.86	-0.45	-0.76	-0.86	0.30	-0.54	-0.11	0.79	0.25	-1.06
1999	-0.38	0.03	-0.83	-0.01	-0.54	-0.77	0.42	-0.52	-0.09	1.00	0.35	-0.80
2000	-0.36	0.60	-0.63	0.26	-0.05	-0.45	0.50	-0.45	-0.04	1.00	0.40	-0.41
2001	-0.24	0.68	-0.35	0.46	0.06	-0.13	0.50	-0.19	0.02	1.00	0.39	0.02
2002	-0.29	0.66	-0.42	0.45	0.06	-0.08	0.49	-0.06	-0.03	0.97	0.37	0.03
2003	-0.41	0.61	-0.68	0.44	0.08	-0.08	0.47	-0.02	-0.28	0.94	0.15	-0.14
2004	-0.49	0.52	-0.67	0.51	0.11	-0.03	0.47	0.08	-0.52	0.90	0.07	-0.08
2005	-0.51	0.46	-0.78	0.84	0.18	0.00	0.46	0.15	-0.50	0.80	-0.12	-0.03
2006	-0.48	0.44	-0.74	0.94	0.30	0.04	0.44	0.36	-0.48	0.95	-0.14	0.13
2007	-0.46	0.71	-0.62	0.95	0.43	0.33	0.42	0.50	-0.46	1.00	-0.17	0.38
2008	-0.28	0.87	-0.35	0.93	0.52	0.55	0.41	0.49	-0.62	1.00	-0.16	0.61
2009	-0.52	0.90	-0.36	0.10	0.53	0.57	-0.12	0.51	-0.69	1.00	-0.53	0.29
2010	-0.50	0.84	-0.21	-0.30	0.52	0.48	-0.30	0.49	-0.58	0.97	-0.76	0.19
2011	-0.43	1.00	0.08	-0.58	0.62	0.46	-0.36	0.48	-0.48	0.94	-0.90	0.28
2012	-0.32	1.00	0.18	-0.90	0.63	0.23	-0.37	0.01	-0.35	0.69	-0.90	-0.03
2013	-0.47	0.77	0.23	-0.90	0.63	0.04	-0.37	-0.30	-0.58	0.21	-0.80	-0.24
2014	-0.53	0.72	0.27	-0.88	0.55	0.04	-0.36	-0.43	-0.60	0.17	-0.76	-0.27
2015	-0.54	0.69	0.36	-0.85	0.40	0.00	-0.35	-0.41	-0.73	0.16	-0.70	-0.22
2016	-0.63	0.71	0.48	-0.83	0.39	0.00	-0.27	-0.40	-0.56	0.16	-0.68	-0.13

borrowing

full compartment

borrowing up to the borrowing limit

Notes: Positions in national compartments are expressed as share of compartment target size and the position of the European RDF in terms of EA11 GDP. Simulation assumes a borrowing limit of 90%, an overall RDF target size of 2% of EA11 GDP and loan repayment in 8 years.

Sources: ESM calculations, OECD, AMECO, Carnot et al. (2017)

Table A.6

Evolution of positions in national compartments and the European RDF overall, starting in 1990 and assuming a ramp up period

	AT	BE	DE	ES	FI	FR	IE	IT	LU	NL	PT	EA11
1990	0.90	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.00
1991	0.75	1.00	0.94	0.94	0.66	0.85	0.88	0.94	0.95	1.00	1.00	1.84
1992	0.71	0.95	0.66	0.69	-0.17	0.45	0.80	0.82	0.90	0.95	0.95	1.36
1993	0.49	0.92	0.30	0.16	-0.86	0.01	0.77	0.59	0.83	0.92	0.92	0.71
1994	0.37	0.50	0.11	-0.01	-0.87	-0.11	0.74	0.36	0.68	0.88	0.86	0.39
1995	0.35	0.47	0.11	0.00	-0.83	-0.10	0.80	0.20	0.65	0.66	0.77	0.30
1996	0.17	0.46	-0.09	0.00	-0.80	-0.21	0.81	0.20	0.63	0.66	0.73	0.14
1997	0.17	0.44	-0.28	0.00	-0.77	-0.28	0.88	0.19	0.61	0.97	0.70	0.04
1998	0.16	0.39	-0.27	0.24	-0.74	-0.27	1.00	0.16	0.58	1.00	0.90	0.14
1999	0.15	0.50	-0.26	0.66	-0.71	-0.26	1.00	0.15	0.57	1.00	0.98	0.28
2000	0.15	1.00	-0.25	0.90	-0.55	0.04	1.00	0.14	0.59	1.00	1.00	0.48
2001	0.11	1.00	-0.24	1.00	-0.03	0.33	0.98	0.38	0.62	1.00	0.96	0.72
2002	-0.02	0.97	-0.43	0.97	0.00	0.32	0.95	0.49	0.55	0.97	0.93	0.61
2003	-0.15	0.92	-0.68	0.94	0.02	0.31	0.93	0.50	0.29	0.94	0.69	0.43
2004	-0.37	0.81	-0.76	1.00	0.05	0.30	0.90	0.58	0.02	0.90	0.58	0.39
2005	-0.39	0.75	-0.76	1.00	0.12	0.29	0.88	0.63	0.02	0.80	0.38	0.39
2006	-0.37	0.71	-0.72	1.00	0.24	0.32	0.84	0.81	0.02	0.95	0.34	0.50
2007	-0.35	0.96	-0.60	1.00	0.38	0.60	0.80	0.94	0.02	1.00	0.28	0.73
2008	-0.17	1.00	-0.33	0.98	0.47	0.81	0.78	0.92	-0.15	1.00	0.28	0.95
2009	-0.41	1.00	-0.34	0.15	0.48	0.84	0.26	0.95	-0.21	1.00	-0.07	0.63
2010	-0.39	0.93	-0.19	-0.25	0.47	0.74	0.08	0.92	-0.20	0.97	-0.32	0.53
2011	-0.34	1.00	0.10	-0.53	0.57	0.72	0.00	0.90	-0.25	0.94	-0.47	0.60
2012	-0.30	1.00	0.20	-0.90	0.58	0.49	-0.01	0.42	-0.33	0.69	-0.90	0.25
2013	-0.45	0.77	0.24	-0.90	0.58	0.29	-0.01	0.11	-0.56	0.21	-0.90	0.02
2014	-0.51	0.72	0.29	-0.88	0.50	0.28	-0.01	-0.03	-0.58	0.17	-0.88	-0.01
2015	-0.53	0.69	0.38	-0.85	0.36	0.24	-0.01	-0.03	-0.71	0.16	-0.85	0.03
2016	-0.62	0.71	0.49	-0.83	0.35	0.23	0.06	-0.02	-0.56	0.16	-0.83	0.11

borrowing

full compartment

borrowing up to the borrowing limit

Notes: Positions in national compartments are expressed as share of compartment target size and the position of the European RDF in terms of EA11 GDP Simulation assumes a borrowing limit of 90%, an overall RDF target size of 2% of EA11 GDP and loan repayment in 8

years.

Sources: ESM calculations, OECD, AMECO, Carnot et al. (2017)

Table A.7
Evolution of positions in national compartments and the European RDF overall, with a 5% threshold

	AT	BE	DE	ES	FI	FR	IE	IT	LU	NL	PT	EA11
1995	0.00	0.00	0.00	0.00	0.00	0.00	0.06	-0.02	0.00	-0.18	0.00	-0.02
1996	-0.10	0.00	-0.08	0.00	0.00	0.00	0.06	-0.02	0.00	-0.15	0.00	-0.07
1997	-0.09	0.00	-0.15	0.00	0.00	0.00	0.13	-0.02	0.00	0.09	0.00	-0.08
1998	-0.09	0.00	-0.14	0.16	0.00	0.00	0.25	-0.01	0.00	0.39	0.18	0.03
1999	-0.08	0.12	-0.14	0.46	0.00	0.00	0.34	-0.01	0.02	0.57	0.22	0.16
2000	-0.08	0.53	-0.13	0.60	0.00	0.28	0.42	-0.01	0.03	0.63	0.23	0.32
2001	-0.08	0.50	-0.12	0.69	0.04	0.41	0.41	0.11	0.07	0.73	0.22	0.45
2002	-0.14	0.49	-0.22	0.67	0.04	0.39	0.40	0.12	0.01	0.71	0.22	0.37
2003	-0.19	0.45	-0.38	0.65	0.04	0.38	0.39	0.11	-0.21	0.69	0.05	0.25
2004	-0.26	0.43	-0.36	0.62	0.03	0.37	0.38	0.11	-0.41	0.65	0.04	0.24
2005	-0.25	0.42	-0.36	0.84	0.03	0.36	0.36	0.10	-0.40	0.63	-0.08	0.29
2006	-0.24	0.40	-0.34	0.85	0.08	0.34	0.34	0.22	-0.38	0.78	-0.07	0.36
2007	-0.23	0.52	-0.24	0.80	0.16	0.46	0.33	0.30	-0.36	0.92	-0.07	0.49
2008	-0.05	0.55	-0.08	0.79	0.18	0.52	0.32	0.29	-0.47	0.99	-0.07	0.62
2009	-0.28	0.57	-0.08	-0.05	0.19	0.54	-0.16	0.30	-0.49	1.00	-0.35	0.31
2010	-0.28	0.55	-0.02	-0.27	0.18	0.52	-0.28	0.29	-0.48	0.97	-0.48	0.24
2011	-0.27	0.79	0.18	-0.35	0.21	0.51	-0.28	0.28	-0.30	0.94	-0.52	0.34
2012	-0.24	0.79	0.20	-0.78	0.21	0.45	-0.28	-0.14	-0.13	0.77	-0.90	0.02
2013	-0.33	0.62	0.20	-0.78	0.21	0.44	-0.28	-0.33	-0.29	0.37	-0.82	-0.11
2014	-0.32	0.61	0.20	-0.77	0.19	0.43	-0.27	-0.32	-0.28	0.37	-0.81	-0.11
2015	-0.31	0.58	0.23	-0.74	0.13	0.42	-0.26	-0.31	-0.30	0.35	-0.78	-0.09
2016	-0.30	0.57	0.22	-0.72	0.13	0.41	-0.22	-0.30	-0.19	0.34	-0.76	-0.08

borrowing

full compartment

borrowing up to the borrowing limit

Notes: Positions in national compartments are expressed as share of compartment target size and the position of the European RDF in terms of EA11 GDP. Simulation assumes a borrowing limit of 90%, an overall RDF target size of 2% of EA11 GDP and loan repayment in e ight years. A threshold of 5% change in unemployment rate is applied to the Carnot et al. (2017) double condition rule.

Sources: ESM calculations, OECD, AMECO, Carnot et al. (2017)

Table A.8

Evolution of positions in national compartments and the European RDF overall, with a 10% threshold

	AT	BE	DE	ES	FI	FR	IE	IT	LU	NL	PT	EA11
1995	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.00	-0.10	0.00	-0.01
1996	-0.03	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.00	-0.10	0.00	-0.01
1997	-0.03	0.00	0.00	0.00	0.00	0.00	0.06	0.00	0.00	0.03	0.00	0.01
1998	-0.02	0.00	0.00	0.02	0.00	0.00	0.15	0.00	0.00	0.24	0.11	0.05
1999	-0.02	0.00	0.00	0.20	0.00	0.00	0.22	0.00	0.01	0.35	0.11	0.12
2000	-0.02	0.27	0.00	0.24	0.00	0.15	0.28	0.00	0.01	0.36	0.10	0.20
2001	-0.02	0.25	0.00	0.25	0.00	0.14	0.27	0.00	0.02	0.41	0.10	0.21
2002	-0.02	0.25	0.00	0.24	0.00	0.14	0.26	0.00	-0.03	0.40	0.09	0.20
2003	-0.02	0.24	-0.06	0.24	0.00	0.13	0.25	0.00	-0.22	0.39	-0.02	0.15
2004	-0.07	0.23	-0.06	0.23	0.00	0.13	0.24	0.00	-0.39	0.36	-0.02	0.14
2005	-0.07	0.22	-0.06	0.35	0.00	0.13	0.23	0.00	-0.37	0.35	-0.06	0.17
2006	-0.06	0.21	-0.06	0.34	0.00	0.12	0.22	0.03	-0.36	0.43	-0.05	0.18
2007	-0.06	0.20	0.03	0.32	0.01	0.11	0.21	0.03	-0.34	0.50	-0.05	0.24
2008	0.04	0.20	0.09	0.31	0.01	0.11	0.21	0.03	-0.40	0.52	-0.05	0.28
2009	-0.18	0.20	0.10	-0.54	0.01	0.11	-0.27	0.03	-0.41	0.54	-0.25	-0.04
2010	-0.18	0.20	0.09	-0.57	0.01	0.11	-0.32	0.03	-0.38	0.52	-0.28	-0.06
2011	-0.17	0.29	0.21	-0.55	0.01	0.11	-0.31	0.03	-0.21	0.51	-0.26	0.02
2012	-0.17	0.29	0.21	-0.78	0.01	0.11	-0.31	-0.30	-0.07	0.41	-0.54	-0.20
2013	-0.17	0.27	0.21	-0.77	0.01	0.11	-0.31	-0.37	-0.15	0.11	-0.49	-0.25
2014	-0.17	0.27	0.20	-0.75	0.01	0.10	-0.30	-0.36	-0.15	0.11	-0.48	-0.25
2015	-0.16	0.26	0.19	-0.73	0.00	0.10	-0.29	-0.34	-0.14	0.11	-0.47	-0.24
2016	-0.16	0.25	0.19	-0.71	0.00	0.10	-0.25	-0.34	-0.08	0.10	-0.45	-0.23

borrowing

Notes: Positions in national compartments are expressed as share of compartment target size and the position of the European RDF in terms of EA11 GDP. Simulation assumes a borrowing limit of 90%, an overall RDF target size of 2% of EA11 GDP and loan repayment in 8 years. A threshold of 10% change in unemployment rate is applied to the Carnot et al. (2017) double condition rule.

Sources: ESM calculations, OECD, AMECO, Carnot et al. (2017)

Table A.9
Payments to (+) and from (-) the fund,with a 5% threshold

	AT	BE	DE	ES	FI	FR	IE	IT	LU	NL	PT
1995	0.00	0.00	0.00	0.00	0.00	0.00	0.64	-0.03	0.00	-0.33	0.00
1996	-0.15	0.00	-0.14	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.00
1997	0.00	0.00	-0.13	0.00	0.00	0.00	0.61	0.00	0.00	0.41	0.00
1998	0.00	0.00	0.00	0.54	0.00	0.00	0.95	0.00	0.00	0.54	0.51
1999	0.00	0.17	0.00	0.99	0.00	0.00	0.71	0.00	0.04	0.32	0.15
2000	0.00	0.59	0.00	0.51	0.00	0.38	0.56	0.00	0.04	0.14	0.06
2001	0.00	0.00	0.00	0.35	0.10	0.19	0.09	0.25	0.10	0.21	0.00
2002	-0.10	0.00	-0.21	0.00	0.00	0.00	0.00	0.03	-0.13	0.00	0.00
2003	-0.09	-0.04	-0.33	0.00	0.00	0.00	0.00	0.00	-0.54	0.00	-0.45
2004	-0.12	0.00	0.02	0.00	0.00	0.00	0.00	0.00	-0.51	-0.02	-0.02
2005	0.00	0.00	-0.03	0.63	0.00	0.00	0.00	0.00	0.00	0.00	-0.31
2006	0.00	0.00	0.00	0.12	0.14	0.00	0.00	0.26	0.00	0.29	0.00
2007	0.00	0.19	0.19	0.00	0.21	0.18	0.00	0.18	0.00	0.28	0.00
2008	0.26	0.06	0.34	0.00	0.08	0.10	0.00	0.00	-0.25	0.14	0.00
2009	-0.34	0.00	0.00	-2.13	0.00	0.00	-2.56	0.00	0.00	-0.04	-0.73
2010	0.00	0.00	0.11	-0.55	0.00	0.00	-0.65	0.00	0.00	0.00	-0.38
2011	0.00	0.34	0.42	-0.25	0.09	0.00	-0.05	0.00	0.31	0.00	-0.15
2012	0.04	0.00	0.06	-1.17	0.00	-0.07	0.00	-0.94	0.29	-0.28	-1.10
2013	-0.13	-0.21	0.00	-0.03	0.00	-0.01	0.00	-0.43	-0.27	-0.61	0.19
2014	0.00	0.00	0.00	0.00	-0.05	0.00	0.00	0.00	0.00	0.00	0.00
2015	0.00	0.00	0.08	0.00	-0.13	0.00	0.00	0.00	-0.05	0.00	0.00
2016	0.00	0.00	0.00	0.00	0.00	0.00	0.12	0.00	0.18	0.00	0.00

payments into the fund

payments from the fund

Notes: Payments are expressed in % of national GDP. Simulation assumes a borrowing limit of 90%, an overall RDF target size of 2% of EA11 GDP and loan repayment in 8 years. A threshold of 5% change in unemployment rate is applied to the Carnot et al. (2017) double condition rule.

Sources: ESM calculations, OECD, AMECO, Carnot et al. (2017)

Table A.10

Payments to (+) and from (-) the fund, with a 10% threshold

	AT	BE	DE	ES	FI	FR	IE	IT	LU	NL	PT
1995	0.00	0.00	0.00	0.00	0.00	0.00	0.29	0.00	0.00	-0.19	0.00
1996	-0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1997	0.00	0.00	0.00	0.00	0.00	0.00	0.32	0.00	0.00	0.21	0.00
1998	0.00	0.00	0.00	0.08	0.00	0.00	0.70	0.00	0.00	0.38	0.33
1999	0.00	0.00	0.00	0.58	0.00	0.00	0.53	0.00	0.02	0.20	0.00
2000	0.00	0.37	0.00	0.17	0.00	0.20	0.41	0.00	0.00	0.04	0.00
2001	0.00	0.00	0.00	0.05	0.00	0.00	0.00	0.00	0.04	0.12	0.00
2002	0.00	0.00	-0.01	0.00	0.00	0.00	0.00	0.00	-0.13	0.00	0.00
2003	0.00	0.00	-0.12	0.00	0.00	0.00	0.00	0.00	-0.47	0.00	-0.29
2004	-0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.41	-0.02	0.00
2005	0.00	0.00	0.00	0.35	0.00	0.00	0.00	0.00	0.00	0.00	-0.11
2006	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.00	0.16	0.00
2007	0.00	0.00	0.19	0.00	0.01	0.00	0.00	0.01	0.00	0.15	0.00
2008	0.16	0.00	0.12	0.00	0.00	0.00	0.00	0.00	-0.14	0.04	0.00
2009	-0.34	0.00	0.00	-2.13	0.00	0.00	-2.48	0.00	0.00	0.00	-0.51
2010	0.00	0.00	0.00	-0.11	0.00	0.00	-0.35	0.00	0.05	0.00	-0.12
2011	0.00	0.14	0.25	0.00	0.00	0.00	0.00	0.00	0.29	0.00	0.04
2012	0.00	0.00	0.00	-0.63	0.00	0.00	0.00	-0.73	0.26	-0.15	-0.81
2013	-0.01	-0.02	0.00	0.00	0.00	0.00	0.00	-0.17	-0.15	-0.46	0.10
2014	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2015	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2016	0.00	0.00	0.00	0.00	0.00	0.00	0.12	0.00	0.10	0.00	0.00

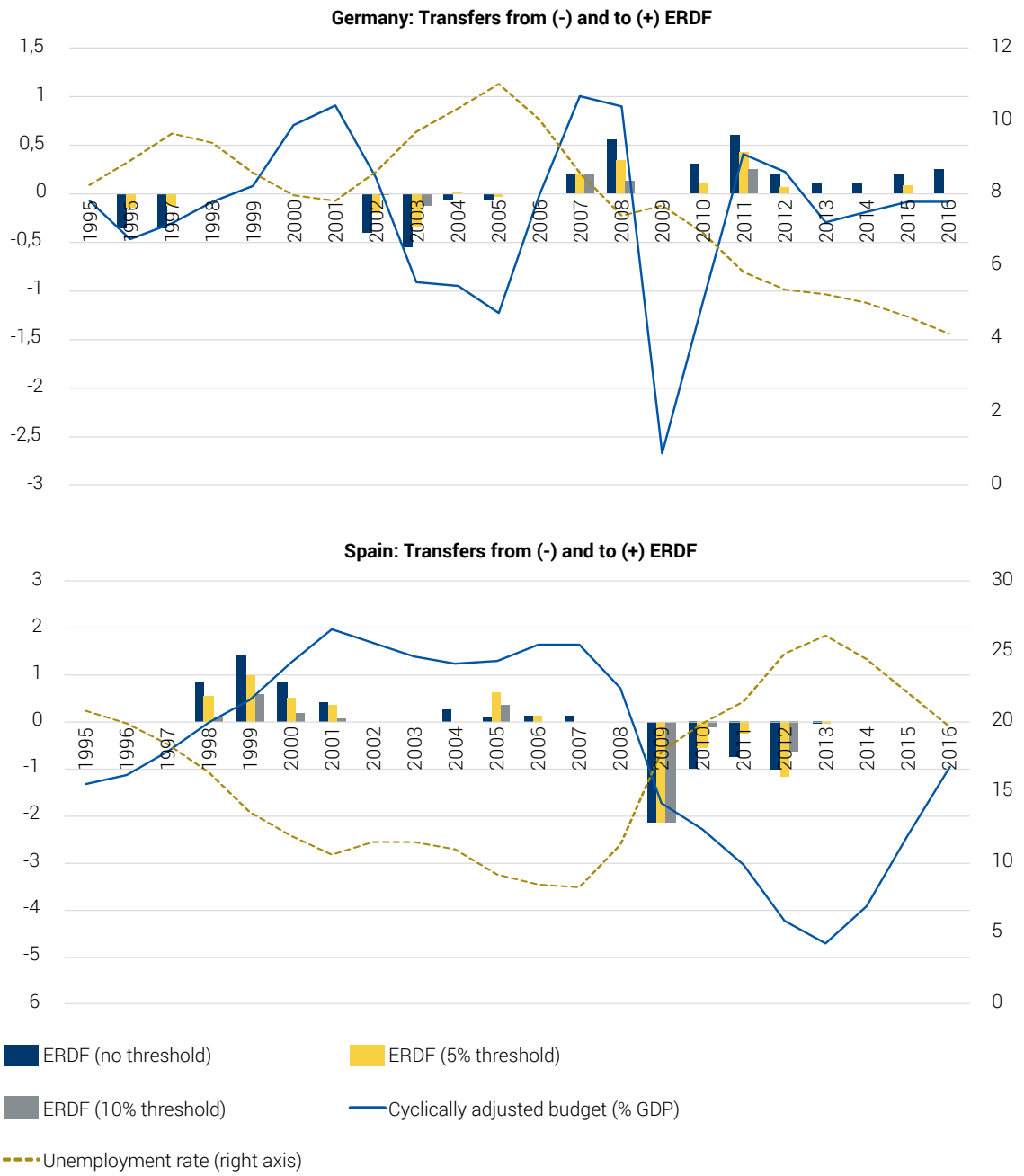
payments into the fund

payments from the fund

Notes: Payments are expressed in % of national GDP. Simulation assumes a borrowing limit of 90%, an overall RDF target size of 2% of EA11 GDP and loan repayment in 8 years. A threshold of 10% change in unemployment rate is applied to the Carnot et al. (2017) double condition rule.

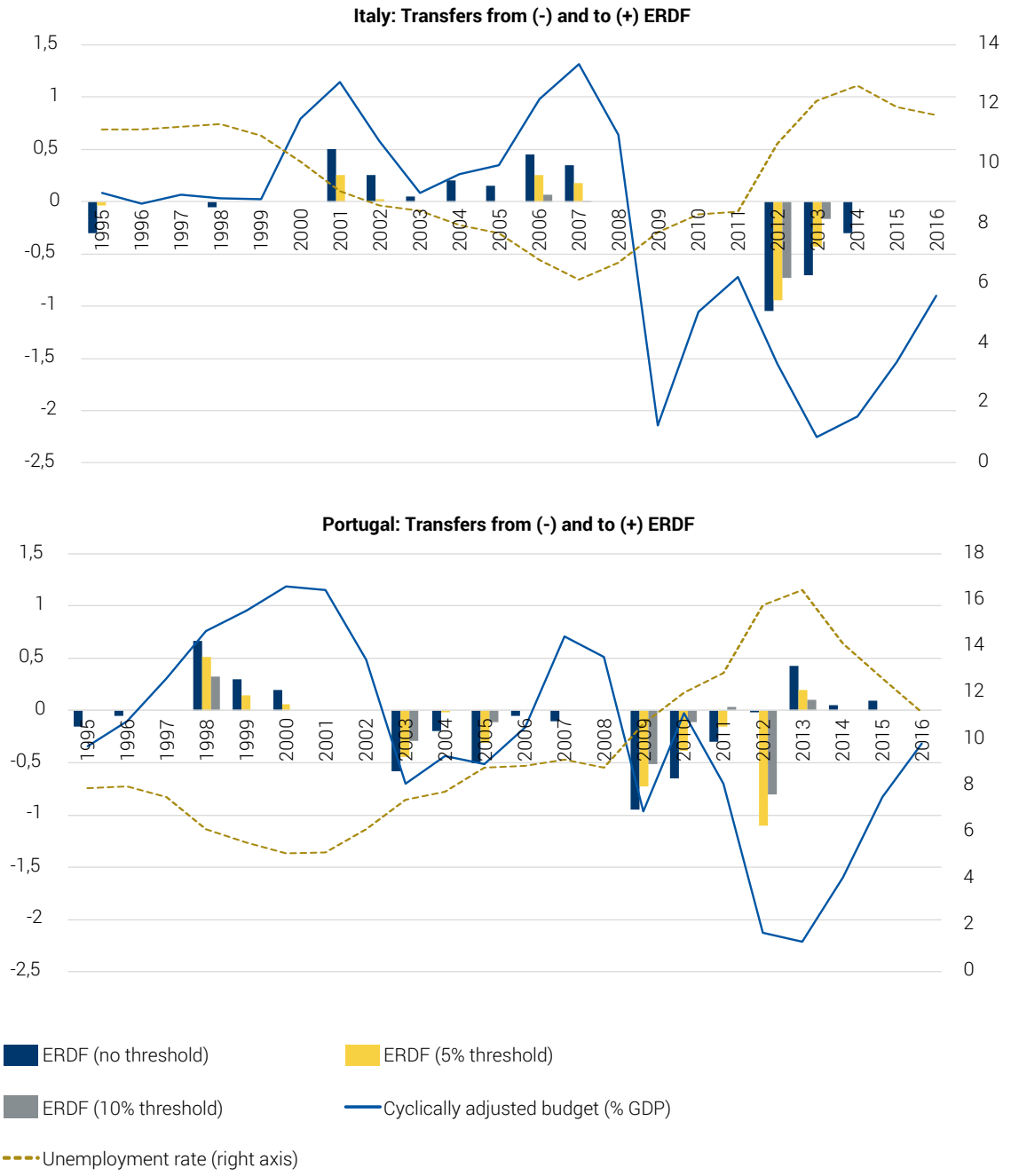
Sources: ESM calculations, OECD, AMECO, Carnot et al. (2017)

Figure A.4
Payments to (+) and from (-) the European RDF, with and without additional thresholds



Notes: Payments are expressed in % of national GDP. Simulation assumes a borrowing limit of 90%, an overall RDF target size of 2% of EA11 GDP and loan repayment in 8 years. Thresholds of 5% and 10% change in unemployment rate are applied to the Carnot et al. (2017) double condition rule.

Sources: ESM calculations, OECD, AMECO, Carnot et al. (2017)



Notes: Payments are expressed in % of national GDP. Simulation assumes a borrowing limit of 90%, an overall RDF target size of 2% of EA11 GDP and loan repayment in 8 years. Thresholds of 5% and 10% change in unemployment rate are applied to the Carnot et al. (2017) double condition rule.

Sources: ESM calculations, OECD, AMECO, Carnot et al. (2017)

Table A.11

Evolution of positions in national compartments and the European RDF overall with a 5% asymmetric threshold

	AT	BE	DE	ES	FI	FR	IE	IT	LU	NL	PT	EA11
1990	-0.05	0.29	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.17	0.05	0.03
1991	-0.10	0.35	0.01	0.00	-0.28	0.00	-0.03	0.00	0.03	0.26	0.13	0.04
1992	-0.09	0.33	-0.20	-0.10	-0.90	-0.20	-0.03	0.00	0.03	0.25	0.12	-0.21
1993	-0.23	0.32	-0.44	-0.49	-0.90	-0.45	-0.02	-0.10	-0.02	0.24	0.12	-0.60
1994	-0.25	0.03	-0.48	-0.48	-0.86	-0.43	-0.02	-0.19	-0.10	0.23	0.09	-0.67
1995	-0.24	0.03	-0.46	-0.46	-0.82	-0.40	0.08	-0.20	-0.10	0.04	0.09	-0.65
1996	-0.33	0.03	-0.53	-0.45	-0.79	-0.39	0.11	-0.19	-0.09	0.06	0.09	-0.68
1997	-0.32	0.02	-0.58	-0.43	-0.76	-0.38	0.21	-0.19	-0.09	0.40	0.08	-0.65
1998	-0.27	0.02	-0.55	-0.16	-0.73	-0.36	0.36	-0.18	-0.09	0.79	0.31	-0.47
1999	-0.22	0.15	-0.53	0.27	-0.50	-0.35	0.47	-0.17	-0.07	1.00	0.40	-0.26
2000	-0.21	0.71	-0.36	0.53	-0.02	-0.05	0.55	-0.16	-0.03	1.00	0.45	0.08
2001	-0.10	0.79	-0.17	0.72	0.10	0.25	0.55	0.08	0.04	1.00	0.44	0.45
2002	-0.14	0.76	-0.22	0.70	0.09	0.24	0.53	0.20	-0.02	0.97	0.42	0.44
2003	-0.19	0.71	-0.38	0.68	0.11	0.24	0.52	0.22	-0.24	0.94	0.24	0.33
2004	-0.26	0.69	-0.36	0.74	0.14	0.23	0.51	0.31	-0.44	0.90	0.23	0.38
2005	-0.25	0.66	-0.36	1.00	0.21	0.22	0.50	0.37	-0.43	0.87	0.11	0.47
2006	-0.24	0.63	-0.34	1.00	0.32	0.25	0.48	0.57	-0.41	1.00	0.10	0.58
2007	-0.23	0.89	-0.24	1.00	0.46	0.53	0.45	0.70	-0.38	1.00	0.10	0.80
2008	-0.05	1.00	0.02	0.98	0.54	0.74	0.44	0.69	-0.50	1.00	0.09	1.02
2009	-0.28	1.00	0.02	0.15	0.56	0.77	-0.08	0.71	-0.51	1.00	-0.18	0.71
2010	-0.28	0.97	0.16	-0.07	0.54	0.75	-0.19	0.69	-0.44	0.97	-0.32	0.69
2011	-0.22	1.00	0.45	-0.17	0.64	0.73	-0.20	0.67	-0.30	0.94	-0.36	0.83
2012	-0.24	1.00	0.54	-0.60	0.66	0.67	-0.19	0.25	-0.13	0.77	-0.75	0.54
2013	-0.33	0.82	0.58	-0.60	0.65	0.66	-0.19	0.05	-0.29	0.37	-0.74	0.43
2014	-0.32	0.80	0.62	-0.59	0.62	0.64	-0.19	0.05	-0.28	0.37	-0.72	0.45
2015	-0.31	0.78	0.70	-0.57	0.55	0.62	-0.18	0.05	-0.33	0.35	-0.70	0.49
2016	-0.30	0.79	0.81	-0.55	0.53	0.61	-0.11	0.05	-0.22	0.34	-0.68	0.56

borrowing

full compartment

borrowing up to the borrowing limit

Notes: Positions in national compartments are expressed as share of compartment target size and the position of the European RDF in terms of EA11 GDP. Simulation assumes a borrowing limit of 90%, an overall RDF target size of 2% of EA11 GDP and loan repayment in 8 years. An asymmetric threshold of a 5% change in unemployment rate is applied to the Carnot et al. (2017) double condition rule, limiting only the payments from the fund.

Sources: ESM calculations, OECD, AMECO, Carnot et al. (2017)

Table A.12

Evolution of positions in national compartments and the European RDF overall, with a 10% asymmetric threshold

	AT	BE	DE	ES	FI	FR	IE	IT	LU	NL	PT	EA11
1990	-0.01	0.29	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.17	0.05	0.04
1991	-0.01	0.35	0.01	0.00	-0.28	0.00	0.00	0.00	0.03	0.26	0.13	0.04
1992	-0.01	0.33	-0.12	0.00	-0.90	-0.04	0.00	0.00	0.03	0.25	0.12	-0.08
1993	-0.09	0.32	-0.27	-0.28	-0.90	-0.11	0.00	0.00	-0.02	0.24	0.12	-0.29
1994	-0.09	0.18	-0.26	-0.27	-0.86	-0.11	0.00	0.00	-0.08	0.23	0.09	-0.28
1995	-0.08	0.17	-0.25	-0.25	-0.82	-0.10	0.10	0.00	-0.07	0.12	0.09	-0.27
1996	-0.11	0.17	-0.24	-0.25	-0.79	-0.10	0.13	0.00	-0.07	0.13	0.09	-0.26
1997	-0.10	0.16	-0.23	-0.24	-0.76	-0.10	0.23	0.00	-0.07	0.47	0.08	-0.20
1998	-0.09	0.15	-0.22	0.02	-0.73	-0.09	0.38	0.00	-0.07	0.85	0.31	-0.05
1999	-0.09	0.28	-0.21	0.45	-0.50	-0.09	0.49	0.00	-0.05	1.00	0.40	0.14
2000	-0.09	0.83	-0.12	0.70	-0.02	0.20	0.57	0.00	-0.01	1.00	0.45	0.42
2001	-0.02	0.90	0.00	0.88	0.10	0.49	0.57	0.24	0.05	1.00	0.44	0.74
2002	-0.02	0.87	0.00	0.85	0.09	0.47	0.55	0.35	0.00	0.97	0.42	0.75
2003	-0.02	0.85	-0.06	0.83	0.11	0.46	0.53	0.37	-0.19	0.94	0.30	0.70
2004	-0.07	0.82	-0.06	0.89	0.14	0.44	0.52	0.45	-0.36	0.90	0.29	0.74
2005	-0.07	0.79	-0.06	1.00	0.21	0.43	0.52	0.51	-0.35	0.87	0.24	0.79
2006	-0.06	0.75	-0.06	1.00	0.32	0.44	0.49	0.70	-0.33	1.00	0.23	0.88
2007	-0.06	1.00	0.03	1.00	0.46	0.72	0.47	0.83	-0.31	1.00	0.22	1.08
2008	0.11	1.00	0.29	0.98	0.54	0.93	0.46	0.81	-0.37	1.00	0.21	1.29
2009	-0.11	1.00	0.30	0.15	0.56	0.96	-0.03	0.84	-0.39	1.00	0.03	1.01
2010	-0.11	0.97	0.43	0.10	0.54	0.93	-0.09	0.81	-0.38	0.97	-0.02	1.04
2011	-0.06	1.00	0.71	0.10	0.64	0.91	-0.09	0.79	-0.21	0.94	-0.02	1.20
2012	-0.06	1.00	0.80	-0.13	0.66	0.90	-0.09	0.46	-0.07	0.84	-0.29	1.03
2013	-0.07	0.97	0.84	-0.13	0.65	0.89	-0.09	0.38	-0.15	0.54	-0.29	0.99
2014	-0.07	0.95	0.87	-0.13	0.63	0.87	-0.08	0.37	-0.15	0.53	-0.28	1.00
2015	-0.06	0.91	0.94	-0.12	0.61	0.84	-0.08	0.36	-0.14	0.51	-0.27	1.02
2016	-0.06	0.93	1.00	-0.12	0.60	0.82	-0.01	0.35	-0.08	0.50	-0.27	1.06

borrowing

full compartment

borrowing up to the borrowing limit

Notes: Positions in national compartments are expressed as share of compartment target size and the position of the European RDF in terms of EA11 GDP. Simulation assumes a borrowing limit of 90%, an overall RDF target size of 2% of EA11 GDP and loan repayment in 8 years. An asymmetric threshold of a 10% change in unemployment rate is applied to the Carnot et al. (2017) double condition rule, limiting only the payments from the fund.

Sources: ESM calculations, OECD, AMECO, Carnot et al. (2017)

Table A.13
Evolution of the overall European RDF overall, impact of the ramp up period and asymmetric thresholds

	Fund starts operating in 1995						Fund starts operating in 1990					
Threshold on payouts	5%			10%			5%			10%		
Saved upfront	0%	50% of com-part-ment	full com-part-ment	0%	50% of com-part-ment	full com-part-ment	0%	50% of com-part-ment	full com-part-ment	0%	50% of com-part-ment	full com-part-ment
1990							0.03	1.03	2.00	0.04	1.04	2.00
1991							0.04	0.97	1.87	0.04	0.98	1.87
1992							-0.21	0.67	1.52	-0.08	0.80	1.65
1993							-0.60	0.24	1.05	-0.29	0.55	1.37
1994							-0.67	0.13	0.91	-0.28	0.52	1.30
1995	-0.02	0.98	1.97	0.00	1.00	1.99	-0.65	0.11	0.85	-0.27	0.49	1.24
1996	-0.06	0.90	1.86	0.00	0.97	1.93	-0.68	0.06	0.77	-0.26	0.48	1.20
1997	-0.06	0.87	1.78	0.05	0.98	1.87	-0.65	0.06	0.75	-0.20	0.51	1.20
1998	0.09	0.98	1.75	0.19	1.07	1.84	-0.47	0.19	0.82	-0.05	0.61	1.24
1999	0.27	1.07	1.71	0.37	1.16	1.80	-0.26	0.34	0.94	0.14	0.75	1.31
2000	0.48	1.16	1.71	0.57	1.25	1.80	0.08	0.56	1.04	0.42	0.93	1.37
2001	0.70	1.32	1.77	0.79	1.40	1.84	0.45	0.80	1.22	0.74	1.11	1.51
2002	0.66	1.26	1.66	0.80	1.40	1.79	0.44	0.78	1.16	0.75	1.11	1.50
2003	0.54	1.12	1.51	0.75	1.33	1.71	0.33	0.66	1.03	0.70	1.05	1.43
2004	0.59	1.10	1.46	0.78	1.34	1.69	0.38	0.69	1.02	0.74	1.07	1.43
2005	0.60	1.06	1.39	0.80	1.33	1.66	0.47	0.70	0.98	0.79	1.08	1.41
2006	0.70	1.14	1.39	0.89	1.39	1.65	0.58	0.80	1.04	0.88	1.16	1.41
2007	0.91	1.26	1.48	1.09	1.50	1.72	0.80	1.00	1.18	1.08	1.32	1.51
2008	1.13	1.40	1.62	1.31	1.64	1.86	1.02	1.21	1.33	1.29	1.48	1.65
2009	0.82	1.10	1.32	1.02	1.35	1.57	0.71	0.91	1.02	1.01	1.18	1.36
2010	0.80	1.06	1.28	1.05	1.37	1.57	0.69	0.88	0.99	1.04	1.21	1.38
2011	0.93	1.19	1.39	1.21	1.52	1.55	0.83	1.01	1.11	1.20	1.36	1.51
2012	0.64	0.90	1.08	1.04	1.30	1.33	0.54	0.72	0.82	1.03	1.19	1.29
2013	0.53	0.78	0.94	1.00	1.23	1.26	0.43	0.61	0.71	0.99	1.15	1.22
2014	0.55	0.80	0.94	1.01	1.21	1.24	0.45	0.63	0.73	1.00	1.15	1.21
2015	0.59	0.82	0.92	1.03	1.19	1.22	0.49	0.66	0.76	1.02	1.16	1.19
2016	0.66	0.89	0.92	1.07	1.19	1.21	0.56	0.73	0.82	1.06	1.16	1.18

Notes: The position of the European RDF is expressed in terms of EA11 GDP. Simulation assumes a borrowing limit of 90%, an overall RDF target size of 2% of EA11 GDP and loan repayment in 8 years. Asymmetric thresholds of a 5% or 10% change in unemployment rate are applied to the Carnot et al. (2017) double condition rule, limiting only the payments from the fund. The ramp up period is assumed to lead to savings in national compartments equal to 50% or 100% of their target size.

Sources: ESM calculations, OECD, AMECO, Carnot et al. (2017)

Country codes

COUNTRY CODE	COUNTRY NAME
BE	Belgium
DE	Germany
IE	Ireland
ES	Spain
FR	France
IT	Italy
LU	Luxembourg
NL	Netherlands
AT	Austria
PT	Portugal
FI	Finland

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