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A FEASIBLE UNEMPLOYMENT-BASED SHOCK ABSORBER FOR THE EURO AREA

by Andrea Brandolini*, Francesca Carta* and Francesco D'Amuri*

Abstract

This paper contributes to the debate on the design of a centralised fiscal tool absorbing country-specific negative shocks in the euro area. Based on theoretical insights, it identifies the broad characteristics that a shock absorber based on unemployment should have in order to be incentive-compatible and politically feasible. It then derives empirically the combination of activation thresholds, experience rating, eligibility criteria, and benefit generosity which define the systems offering the highest stabilisation for given levels of redistribution, accounting for the large variation in benefit take-up rates across European countries. The analysis suggests that the shock absorber should: *i)* give rise to macro cross-national transfers, mimicking those that would be generated by a notional euro-wide unemployment benefit scheme of minimal coverage and generosity; *ii)* be activated by a trigger; and *iii)* feature partial experience rating. The simulation results, confirmed by robustness checks, show that even systems that do not redistribute resources between countries can have a considerable stabilisation impact in the medium run. Low benefit take-up in Southern Europe substantially reduces the stabilisation properties and the size of the scheme.

JEL: E6, J65, H53.
Keywords: unemployment benefits, absorption of macroeconomic shocks, fiscal union.

Contents

* Bank of Italy, DG Economics, Statistics and Research.
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1. Introduction

The European sovereign debt crisis of 2011-13 has exposed the limits of a monetary union with fully decentralised fiscal policies. In the impossibility of managing country specific negative income shocks through monetary policy and exchange rate fluctuations, national governments need to implement counter-cyclical fiscal policy to stabilise the economy (e.g. Galì and Monacelli, 2008; Ferrero, 2009). Yet, in practice, the room for manoeuvre for such interventions is rather restricted, due to the interplay of the union fiscal rules and the fact that governments' access to capital markets could be limited in countries with a deteriorated fiscal position or a high level of debt. A case can be made for a centralised fiscal tool that helps absorbing nation-specific negative shocks (Bordo et al., 2013; Farhi and Werning, 2014). Such a possibility was already recognised at the highest European political level in the so-called Delors Report (1989). Recently, it has been restated by the report of the Four Presidents which has foreseen the creation of "An EMU fiscal capacity with a limited asymmetric shock absorption function" (Van Rumpuy, 2012, p. 11). Critics fear that a centralised fiscal capacity could entail permanent redistribution of income across countries, fostering moral hazard and weakening the incentive to promote painful, yet necessary, growth-enhancing reforms. One of the proposed centralised shock absorbers is a Euro-wide unemployment benefit scheme, as either a complement or an alternative to the differentiated national schemes already in place.[1] Several papers, discussed below, have recently simulated the extent of the stabilisation and redistribution across member states generated by such a scheme.

This paper contributes to this discussion in three ways. First, based on theoretical insights, it identifies the broad characteristics that a shock absorber based on unemployment dynamics should have in order to be incentive compatible and politically feasible. Second, within these boundaries, it derives empirically the desirable combination of activation thresholds, experience rating, eligibility criteria, and benefit generosity defining a desirable system, offering the highest stabilisation for given levels of redistribution. Third, it takes into account the large variability in benefit take-up rates in Europe when simulating the functioning of the capacity.

More specifically, we envisage a scheme for the Euro-Area (EA) which works at the macro

[1] Andor (2014) summarises arguments in favour of a euro-wide unemployment benefit scheme. Dolls et al. (2013) discuss instead implications of deeper fiscal integration in the Euro-Area. Holzmann (2006) suggests the introduction of a coordinated pan-European pension system with the purpose of fostering labour mobility within the monetary union. It is conceived as a multi-pillar system, with a Notional Defined Contribution (NDC) system at its core and supplementary funded and social pensions at its wings. Balassone et al. (2014) examine the merit of the proposed NDC scheme: if properly designed, it would have the advantage to prevent any redistribution not only across and within generations but also across countries.

level by means of aggregate contributions to or withdrawals from a common fund available to each country. In every year each country would be entitled to transfers parameterised to the unemployment expenditure that would be incurred in presence of a common euro-wide benefit.[2] In presence of asymmetric information, such transfers would be activated only in case of large negative shocks and should be parameterised to benefits of limited duration and replacement rate. National schemes would remain the front line facing unemployed workers in each individual country and would be continued to be shaped by national governments according to the established subsidiarity principle. The contribution of the scheme – the "European unemployment subsidy" – would be however explicitly acknowledged in order to make citizens aware of the existence of a EU solidarity scheme. Payments to the scheme would instead be determined by a fixed contribution rate that balances it in the medium run for each country (full experience rating) or for the whole area (no experience rating). Different levels of generosity of the system and of the degree of experience rating would imply different levels of macroeconomic stabilisation and cross-country redistribution.

Within these boundaries, we simulate the functioning of 72 schemes and evaluate the extent of macroeconomic stabilisation and cross-country redistribution that they would imply. These schemes differ for the funding equilibrium condition, the eligibility criteria, the maximum duration of the benefit, and the trigger activating the program. For contributors, net transfers imply a rise in the consumption tax, while for beneficiaries they release resources that are supposed to be employed in financing public investments. Multipliers adopted by the European Commission in its forecasting exercises are used to determine the impact on GDP of such transfers.

Simulations are run over the period 2002–12 for ten of the twelve countries that continuously adopted the euro over that period (EA10) under two different scenarios: full coverage (every job loser applies and receives the benefits) or actual national take-up rates. Empirical results, robust to the choice of the multipliers and of the estimation period, show that the most stabilizing scheme features a 50 per cent replacement rate for all employees experiencing a job termination, eight months maximum duration, and a trigger based on employment dynamics. Assuming full coverage, the coefficient of variation of the EA10 GDP is reduced by 0.03 per cent with full experience rating. Schemes with partial or no experience rating would offer up to three times this level of stabilisation but would imply cross country redistribution. With actual take-up, particularly low in Southern European countries, the stabilisation performance is reduced (0.02 per cent

[2] Our scheme is in the spirit of Farhi and Werning's conclusion that "the constrained efficient risk sharing arrangement can then be implemented through ex-post transfers or 'bailouts' that are contingent on the shocks experienced by each country" (2014, p. 3).

reduction in GDP volatility with full experience rating).

While with full experience rating each country's position would be balanced over time, Spain and, to a less extent, Portugal would be the biggest beneficiaries in case of partial or no experience rating. The greatest contributors would instead be Italy, France and Germany. Considering only the sub-period 2002–08, the biggest beneficiaries would be Finland, Spain and Germany, while the biggest contributors would be Belgium, France, Greece, Italy and Luxembourg.

The rest of the paper is organised as follows. Section 2 provides some theoretical insights on how to draw a feasible and incentive compatible shock-absorber. Section 3 introduces the data and provides descriptive evidence on labour market dynamics and unemployment benefit recipients in the euro area. Section 4 describes the alternative hypotheses used in the simulations of the unemployment-based shock absorber for the euro area, and discusses its possible interactions with the short-time compensation schemes existing at the national level. Section 5 presents the basic results of the evaluation, tests their robustness to alternative assumptions, examines the financial flows generated by the best models in each country, and discusses how this paper relates to the existing literature. Section 6 concludes.

2. Theoretical insights: how to draw a feasible and incentive-compatible scheme

Even before the launch of the Euro, many researchers underlined the need for a centralised fiscal policy to guarantee inter-regional redistribution vis-à-vis asymmetric shocks; in absence of it, the stability of the monetary union could have been undermined (Fatàs et al, 1998). The EA satisfies the conditions which make a centralised fiscal policy desirable, even more than other federations (the United States, Canada, Belgium): reduced labour mobility across member states, sticky prices and wages, incompleteness of financial markets which limits the scope for counter-cyclical fiscal policy at country level. In this paper we take as given the need for an integrated fiscal intervention and we outline some theoretical issues arising, in this second best framework, in the design of an unemployment insurance scheme at supranational level.

First, there are incentive problems due to the imperfect verifiability of national behaviours. Federal risk sharing creates familiar moral hazard problems, which stem from both the adoption of poor policies and the possibility of administrative manipulation (Vandenbroucke, 2013). National governments having a buffer system in case of adverse shocks could refrain from carrying out structural reforms to reduce the national risk or to help the economy to stabilise (Persson and Tabellini, 1996a). Moreover, the imperfect information and commitment problems create a trade-off between risk sharing and redistribution: low risk countries might not accept full risk sharing since it

involves a large redistribution towards high risk countries (Persson and Tabellini, 1996b). At the limit, they may opt for leaving the federation (Aronsson et al., 2012): member states have already in place national automatic stabilisers and taking part in the scheme has to be beneficial for all of them. On the other hand, the decentralised implementation of a supranational scheme faces asymmetric information problems on the way in which beneficiaries of the scheme are identified by national authorities, which might overestimate them to get more funds. This raises the further question of whether it is necessary to create a supranational entity with centralised control or it is instead possible to rely on the already existing national entities.

Second, there is the moral hazard problem at the individual level, as distinct from the one at the national level, which is typically associated with the specific policy under consideration: a generous unemployment benefit might induce individuals to stay longer in the unemployment status and reduce their effort in looking for a job.[3] On the other hand, it should be borne in mind that the aim of income support in the case of job loss is also to provide liquidity to the unemployed and hence to allow them to find a better matching between their skills and job offers (Chetty, 2008; Card et al., 2007).

Finally, there are constraints imposed by the subsidiarity principle, given the large differences persisting in the generosity of unemployment benefit schemes in Europe (Paetzold and Van Vliet, 2014). A scheme increasing the generosity of unemployment insurance beyond the existing settings could be seen as overruling a country's specific preferences. Such an intervention could be however motivated by reference to best practices as well as by the need to harmonise existing schemes.

In line with these considerations, a feasible risk sharing scheme targeting labour market dynamics could be based on the following criteria.

1. Entitlements, replacement rate and duration of the benefit bounded by the corresponding features of the national schemes currently in place. This option does not affect the *individual* moral hazard problem, since it does not alter the entity and the duration of the benefits that each individual already receives; it respects the subsidiarity principle, as it does not modify national schemes with a top-down approach; it limits the amount of resources involved.

2. Coverage restricted to individuals losing their job and for a limited period after job termination. Excluding long-term unemployed, whose incidence tends to be associated with a country's structural problems, this option diminishes the risk of permanent redistribution across

[3] For recent evidence on this issue, see Arpaia et al (2014).

countries and contains the *country* moral hazard problem, as it does not reduce the incentive to pursue reforms which improve the functioning of the labour market. Such a system is also easier to administer, since it does not target all the unemployed but only those who are already eligible for the unemployment benefit; as a consequence, it would not prompt the creation of a new scheme and it could be run by existing agencies.

3. Experience rating. Assuming that countries receiving more should also contribute proportionately more reduces the *country* moral hazard problem and enhances the feasibility of the scheme, since in the medium run implies no cross-national redistribution.

4. Activation trigger. The existence of a trigger activating the system only in case of negative shocks of sizeable proportions would strengthen the insurance aspect of the scheme (Gros, 2014) and could further limit the amount of transferred resources; however, it would not impair the capacity of providing stabilisation in very critical situations without the need of a discretionary political decision.

We envisage a scheme that is micro based, as it targets a subgroup of transfers (a basic unemployment benefit) in a way that tries to be incentive-compatible both for countries and individuals, not intrusive of national systems, and easy to be run by existing agencies. The further advantage of this microeconomic scheme is that it would make the existence of the risk sharing mechanism within the monetary union clearly visible to European citizens, enhancing the sense of solidarity as well as trust in European institutions. On the other hand, the scheme works at the macro level, through variations in the funds available to each country; such variations could be obtained by altering yearly contributions to the EU budget. From this perspective, it mainly alleviates countries' fiscal constraints, acting as a rainy-day fund.

While these considerations help us thinking about the design of the scheme, they still allow for a great number of alternatives. How can we evaluate them? Two aspects are critical in this evaluation: the degree of macroeconomic stabilisation, on one side, and the extent of cross-country redistribution, on the other. There is intuitively a trade-off between these two dimensions, and our aim is to locate each alternative scheme in this bi-dimensional space. Drawing an efficiency frontier makes transparent to policy makers which scheme is to be preferred to the others in terms of both stabilisation and redistribution. To this aim, we have to introduce further assumptions, beyond those made on the design of the benefits, concerning its financing and the utilisation of the resources freed by its introduction. We assume that the scheme is financed by a consumption tax, although alternative assumptions such as a tax levied on wages and salaries could also be considered. We further assume that only net transfers matter for estimating the stabilisation effects: thus, for contributor countries the net transfer implies a rise in the consumption tax, while for beneficiary

countries it releases resources that are used to finance public investments. In order to gauge the impact on GDP, we use the multipliers adopted by the European Commission in its forecasting exercises (European Commission, 2010): a 0.4 multiplier for consumption tax increases and a 0.9 multiplier for increases in public investment.

3. Data and descriptive statistics

The main data source that we exploit in this paper is the European Union Labour Force Survey (EU-LFS), which homogenises country-specific labour force surveys at the European level (Eurostat, 2012).[4] The analysis focuses on the time interval 2002–2012 for ten of the twelve countries that continuously adopted the euro over that period: Austria (AT), Belgium (BE), Germany (DE), Spain (ES), Finland (FI), France (FR), Greece (GR), Italy (IT), Luxembourg (LU), Portugal (PT); Ireland and the Netherlands are not included because of data problems.

Figure 1 reports the dynamics of the incidence of unemployment and of unemployment benefit (UB) recipients on working age population for each of the considered countries. While we follow the standard ILO definition for unemployment, unemployment benefit recipients are defined as individuals (unemployed or inactive) receiving some form of unemployment related transfers. The one thing to note is that the two variables broadly share the same tendencies in *each* country, but their relative incidence substantially varies *across* countries.

In a first group of countries (Austria, Germany, Finland, France, Luxembourg), the incidence of UB recipients over working age population always tracks very closely the one of the unemployed; their relative incidence is close to one and steady over time. This evidence hints at the fact that in those countries: *i)* eligibility rules for unemployment are not too stringent (most unemployed workers have access to unemployment benefits); *ii)* take-up rates are high (most eligible workers actually claim the benefits); *iii)* conditionality is stringent (individuals who stop actively looking for a job - becoming inactive - also stop receiving the benefits). In one country, Belgium, the UB recipient incidence on working age population is much higher than the one of the unemployed; such a result is expected since the Belgian welfare system features virtually open-ended unemployment benefits. Finally, in a third group of countries, all from Southern Europe

[4] Where missing, we impute the following information: employee status a year before the survey, reason for job termination, benefit claim, unemployment duration. We do so through a country by country regression-based imputation where the independent variables are: gender, age, and education. We assign each individual with missing information a probability of experiencing the relevant event that we use when calculating the total number of individuals experiencing that particular event.

(Spain, Greece, Italy, Portugal), the incidence of UB claimants is substantially lower than the one of the unemployed. Many factors could lie behind such a result: *i)* stricter eligibility rules and shorter duration, implying that larger fractions of the workforce are not covered at all or that the maximum duration is limited; *ii)* lower take-up rates, that is a lower share of individuals that, even if eligible for the benefits, actually claims them. [5]

In order to investigate further the determinants of the differences between the incidences of the ILO unemployed and the UB beneficiaries, in Figure 2 we restrict the analysis to a subgroup of individuals that is generally entitled to benefits in each country: those who declared to have been employed with a permanent contract in the year prior to the survey and that were later dismissed. Results show that most countries have take-up rates around 75 per cent, both at short (six months or less) and medium durations (7 months or more); Southern countries show much lower take-up rates, in particular Greece, Italy and Portugal. In Spain, take-up rates were low at the beginning of the decade, but steadily increased over time, and are now in line with the ones seen in Northern Europe. A deeper analysis of the determinants of such large cross-country differences between the shares on the working age population of the ILO unemployed and of the UB beneficiaries is beyond the scope of the current paper. Nevertheless, when discussing a European unemployment benefit scheme, it is important to note that schemes working at the macro level through financial flows can target either group, with different results. On the other hand, schemes simulating a micro-level system featuring the direct payment of unemployment benefits need to take into account the fact that, in many countries, not all the unemployed receive the benefits and not all the claimants are unemployed according to the ILO definition. As a consequence, realistic estimates should closely mimic country specific eligibility rules and actual take-up. In the rest of this paper, we simulate the financial flows associated with the schemes under both hypotheses of full coverage (all job terminations are insured) and actual take-up (only eligible claimants are covered).

Before moving to the simulations, it is important to note that a euro-wide shock absorber parameterised to actual benefit claims introduces strong incentives for national authorities to raise take-up rates in order to take full advantage of the scheme. This would be a positive side effect, since the scheme would provide right incentives to countries where take-up rates are low due to a poor functioning of employment services. Our estimates based on actual take-up rates represent a lower bound, as they do not incorporate such dynamic responses.

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[5] See Blank and Card (1991) for an early discussion of differences in take-up rates in the United States. Using EU-SILC data for the 2005-2008 period, also Giulietti et al. (2013) find large differences in take-up rates across EU countries, even after conditioning for socio-demographic characteristics.

4. Alternative euro-wide unemployment benefit schemes and the simulation set-up

We simulate 72 different settings for the euro-wide insurance unemployment scheme that are broadly compatible with the theoretical insights sketched above. The schemes vary along five dimensions (summarised in Table 1): three define the unemployment benefit used as a parameter (coverage, replacement rate, duration); two define the rules governing the functioning of the absorber (existence of a trigger, degree of experience rating). In the following subsections we describe the alternative hypotheses. Moreover, we examine the problems posed by the interaction of the euro-wide unemployment insurance with existing short-time compensation schemes. Lastly, we discuss the evaluation of the alternative schemes simulated below.

4.1. Coverage, replacement rate and duration of the benefit

Coverage, replacement rate and duration of the benefit are the central features of any unemployment insurance scheme (Atkinson and Micklewright, 1990). As shown in Table 2, there are noticeable differences among the EA countries with regards to the qualifying period, the replacement rate and the duration, although it must be borne in mind that many more aspects distinguish the various systems (e.g. Esser et al. 2013; Venn, 2012). Moreover, the number of actual beneficiaries depends also on the behaviour of potential claimants, so that the level of benefit take-up can be partial, as seen above.

The qualifying period indicates the number of the monthly contributions that are necessary to be entitled to receive the subsidy and is the main determinant of eligibility and, hence, coverage. Unfortunately, the EU-LFS data do not report any information about the eligibility of workers to the unemployment insurance, neither any satisfactory proxy such as the number of months of paid work before job termination. Thus, to gauge the impact of eligibility criteria we assume that the simulated scheme covers either all employees experiencing a job termination (dismissals and contract expiration), or the dismissed employees only. The first coverage is too broad, whereas the second is too narrow. These assumptions are illustrative and not to be taken literally, as in European countries temporary workers are generally entitled to receive the unemployment subsidy provided that they have a sufficient contributory record. On the other hand, assuming full coverage of dismissals and contract expirations provides upper bounds to the actual level of unemployment related expenditure. Hence, we enrich existing estimates by simulating a scenario which embodies the actual take-up of benefits and reduces the spending overstatement. Lastly, consistently with the idea that the euro-wide scheme is encompassed by the national schemes currently in place, we set the replacement rate

equal to either 35 or 50 per cent of the average wage and the maximum duration to either 3 or 8 months. These figures are lower than the national values reported in Table 2 (except for the replacement rate in AT and DE that is slightly lower than 50 per cent).

4.2. Activation and funding

According to Gros, the EA does not need "… a system that offsets all shocks by some small fraction, but a system that protects against shocks that are rare, but potentially catastrophic" (2014, p. 203). To allow for this possibility, we simulate systems which vary by the condition which activates the scheme in response to a country-specific shock. Linking the activation of the scheme to the severity of the shock hitting a country has the twofold advantage of reducing the size of cross-country financial flows, while offering a stabilizing tool when this is needed the most, and of limiting the room for individual counties' opportunistic behaviour by reducing the possibilities of long term redistribution across countries.

The main issue is the choice of the trigger variable. A natural candidate here would be the output gap, a variable extensively used in the European fiscal surveillance framework. Nevertheless, estimates of output gaps released in real time often suffer from big revisions that can sometimes even change in sign (Caudal et al., 2013; Dullien, 2013; Kempkes, 2012). Employment is less liable to this criticism, but follows the economic cycle with a lag (amplified by the delay in the release of relevant statistics), holding up the activation of the scheme during the early phases of a downturn. Beblavy et al. (2014a, 2014b) and Epaulard (2014) study euro-wide unemployment schemes that are only activated in response to large negative employment shocks. Beblavy et al. (2014a, 2014b) suggest that the scheme could operate whenever the short-term unemployment rate exceeds its 10-years average plus a fraction comprised between 1 and 2 standard deviations of the same rate across EU countries. Epaulard (2014) focuses on the case where the scheme is triggered by a 3-12 month unemployment rate exceeding its 5-year average by at least 1 percentage point (conversely, it would stop operating when the 3-12 month unemployment rate falls below its 5-year average). Finally Dolls et al. (2014) simulate the implications of a trigger based on one to three year unemployment rate dynamics. Here, we consider three hypotheses: *i)* the scheme is always active; *ii)* the scheme is active only for countries experiencing a drop in the output gap greater than or equal to half standard deviation of the output gap calculated across all considered countries; *iii)* the scheme is active only for countries experiencing a fall in employment greater than or equal to 20 per cent of the standard deviation of the changes in employment levels calculated across all considered countries.

As regards funding, a natural starting point is to assume that the insurance scheme is in

equilibrium over a period of *T* years (Brandolini, 2013). The balanced budget condition can be written as:

(1) $$\sum_{i=1,...,I}\sum_{t=1,...,T}\tau_{it}c_{it}=\sum_{i=1,...,I}\sum_{t=1,...,T}\min\left[Rw_{it}M_{it},B_{it}\right]U_{it}\ .$$

The left-hand side is the total revenue, which is the sum of all payments made to the scheme by each country *i*, $i=1,...,I$, in each year *t*, $t=1,...,T$. The annual payments are computed by applying the national rate τ_{it} to the chosen tax base c_{it}. The right-hand side is the total expenditure and is similarly computed by summing annual expenditures across all countries. These are computed by multiplying the mean benefit by the number of beneficiaries U_{it}. In the general case of condition (1), the benefit is capped to a level B_{it}, which can be set equal to a fraction of the median national income: the actual benefit is then the minimum between this value B_{it} and the product of the fixed replacement rate *R*, the average monthly wage w_{it}, and the number of monthly benefits paid by the scheme M_{it}. In what follows we assume that there is no benefit cap and we simplify the equilibrium condition (1) to:

(2) $$\sum_{i=1,...,I}\sum_{t=1,...,T}\tau_{it}c_{it}=\sum_{i=1,...,I}\sum_{t=1,...,T}Rw_{it}M_{it}U_{it}\ .$$

As the expenditure side is defined by the assumptions made above, equation (2) can be used to define the national contribution rates. We assume that these rates are fixed over time, so that we can drop the subscript *t*, and consider the two extreme cases of full and no experience rating.

With *full experience rating* each country is assumed to be in equilibrium over the whole time period *T*. Thus, (2) turns into

(2a) $$\sum_{t=1,...,T}\tau_{i}c_{it}=\sum_{t=1,...,T}Rw_{it}M_{it}U_{it},\quad for\ any\ i=1,...,I\ ,$$

which yields the country-specific equilibrium contribution rate:

(3a) $$\tau_{i}=\frac{\sum_{t=1,...,T}Rw_{it}M_{it}U_{it}}{\sum_{t=1,...,T}c_{it}}\ .$$

In this case, country *i* could be benefitting from or contributing to the system in a given year *t*, but its position would be balanced over *T* years. There is no redistribution across countries over the time period, but the scheme may alleviate liquidity constraints of countries in recessions, as it can run surpluses and deficits. On the other hand, countries with higher unemployment related expenditures are bound to set higher τ_{i}.

At the other extreme, assuming that there is *no experience rating*, the contribution rate is the same for all countries, and the balanced budget condition (2) becomes

(2b) $$\sum_{i=1,\ldots,I}\sum_{t=1,\ldots,T}\tau c_{it} = \sum_{i=1,\ldots,I}\sum_{t=1,\ldots,T} Rw_{it}M_{it}U_{it}\ .$$

which defines the common contribution rate

(3b) $$\tau = \frac{\sum_{i=1,\ldots,I}\sum_{t=1,\ldots,T} Rw_{it}M_{it}U_{it}}{\sum_{i=1,\ldots,n}\sum_{t=1,\ldots,T} c_{it}}$$

In this case, income is redistributed from low-unemployment expenditure countries to high-unemployment expenditure ones. The net position of country *i* over the *T* years would be equal to $(\tau - \tau_i)\sum_{t=1,\ldots,T} c_{it}$: countries with $\tau > \tau_i$ ($\tau < \tau_i$) would be net contributors (beneficiaries), although total transfers and payments of the scheme would net out over the whole period *T*.

Finally, we also explore a system of *partial experience rating* that is halfway between the two previous options. In this case, individual countries' equilibrium rates are calculated as in the case of full experience rating (formulas (2a) and (3a)), up to a yearly threshold of 0.2 per cent of GDP. In order to make up for the loss in contributions to keep the fund balanced over the whole interval, countries below the cap contribute to the fund an additional fixed proportion of their GDP relative to what they would pay under (3a).

As regards the tax base *c*, the natural solution would be to take the employees' compensation to mimic the existing national systems, although this could represent a further burden on labour cost should this contribution add to those already in place. Choosing consumption as the tax base would not run into this difficulty, but would raise the problem that a solidarity mechanism paid by all is targeted only to some in the labour force (e.g. job-losers vis-à-vis first-job-seekers). As this aspect is not the main concern of the simulation exercise, we assume that contributions are levied through a consumption tax.

In principle, transfers across countries could take place through appropriate variations of the contributions of each country to the European Union budget, with no actual payments occurring across countries, or through a centralised fund as suggested by Lellouch and Sode (2014). In any case, we suppose that there are no interest payments to be paid (received) when a country is in deficit (surplus).

4.3. Interaction with short-time compensation schemes

When facing negative demand shocks, employers may rely on short-time compensation (STC) schemes, where available, in order to temporarily reduce labour input without massive layoffs. The rationale of an STC scheme is to avoid the destruction, driven by liquidity constraints, of worker-firm matches that could be viable in the long-run. During the Great Recession, the

adoption of such schemes has been encouraged (OECD, 2010). Differently from the United States, where only seventeen out of fifty states have put in place a STC scheme, in Europe this tool has been more extensively used (Boeri and Bruecker, 2011). In all countries included in our simulations, except Greece, STC schemes were already in place before the crisis and they have been temporarily extended in response to it (Table 3).[6]

The introduction of a shock absorber parameterised to notional expenditure for unemployment benefit might affect the incentives of countries to use STC schemes (Fuchs, 2013): without full experience rating, there would be strong incentives for national governments to reduce STC funding and encourage layoffs. Such crowding out could be avoided by considering as partially eligible for the scheme not only the job losers but also the workers on STC.[7] However such choice might be problematic. First, STC and UB schemes might differ within countries for coverage, duration and eligibility. Among the countries analysed here, STC schemes show higher replacement rates but shorter duration, in line with the transitory nature of the measure (Figure 3). Only in Spain and Finland the two schemes are perfectly equivalent: workers on STC receive unemployment benefits proportional to working-hour reductions. Moreover, eligibility conditions for STC are usually less strict than the ones for UB schemes. Second and most important, covering also workers in STC might arise opportunistic behaviours by firms, workers and national agencies which are difficult to be detected. In fact, while UB requires a formal "destruction" of the worker-employer match, the reduction of working hours is more difficult to verify and it might drive to a misuse of the tool to obtain more funds in absence of full experience rating. Even with these caveats in mind, it might be interesting to simulate the functioning of our schemes including workers in STC programmes among the beneficiaries; unfortunately the EU-LFS does not contain information on STC utilisation.

4.4. Evaluation

A characterising feature of this paper is that we explicitly explore in the simulations the

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[6] Recent empirical works show that the STC programmes have effectively saved jobs during the Great Recession (Abraham and Houseman, 2014; Boeri and Bruecker, 2011; Hijzen and Martin, 2013).

[7] There are both efficiency and equity reasons in favour of STC schemes that encourage the use of work sharing in lieu of layoffs during recessions. For the employer, work sharing may be a means of retaining valued employees during a temporary downturn. For employees, it avoids unemployment and the costs associated to search for another job. It may also have a positive effect on their morale and productivity. On equity grounds, work sharing spreads the burden of recession across a larger number of workers rather than concentrating it on the minority of workers who lose their jobs. However, the drawback of using STC to keep workers with their current employers is that it may impede needed reallocations from declining to growing enterprises and sectors.

trade-off between macroeconomic stabilisation and cross-country redistribution for each scheme. Stabilisation is measured by the reduction in GDP volatility, that is the percentage reduction in the Coefficient of Variation $\left(CV = \sigma/\mu\right)$ of the GDP series over the time period under consideration. The GDP series that would have obtained in the presence of the euro-wide insurance scheme is simulated by multiplying each net transfer to the scheme by 0.4 (the consumption multiplier) and each net transfer from the scheme by 0.9 (the investment multiplier). The robustness of main results to this choice of multipliers is assessed in Subsection 5.2. The index of redistribution is given by the sum of the squared deviations of the unique contribution rate that balances the system for the area as a whole from the national contribution rate that balances the system for each country: $\sum_{i=1,\ldots,I}(\tau - \tau_i)^2$. This formulation is preferred to half the sum of the absolute deviations to give more weight to larger deviations.

Schemes with similar stabilisation properties could entail different cross-country redistribution levels, and consequently be more or less politically feasible. In the next section we determine quantitatively which systems minimise financial transfers across countries for any given level of stabilisation.

5. Results of the simulations

5.1. Basic results

For each of the 72 schemes obtained by combining the alternative hypotheses indicated in Table 1, we estimate the reduction in GDP volatility and the extent of cross-country redistribution by considering the period 2002–12. In these simulations we estimate the number of beneficiaries U_{it} in country *i* and year *t* from the EU-LFS, while we calculate the average monthly wage w_{it} as the mean employees' compensation per employee from the national accounts.

We first identify the scheme with full experience rating that offers the maximum level of stabilisation over the cycle. Such a scheme does not entail any cross-country redistribution over the time period under consideration, but can still offer some stabilisation by enabling a country to reduce its contribution to the EU budget in the downturns and to pay back higher contributions when the situation improves.[8] For the same level of stabilisation, these systems are preferred to

[8] In order to ease computations, in these simulations we assume that each country knows in advance the future unemployment-related expenditures. In a real world scenario, countries could create a common fund in the first year of operation of the scheme in order to face unexpected shocks, while contribution rates could be gradually adjusted ex post

those with no or partial experience rating, which entail some form of cross-country redistribution and are thus less appealing from the political standpoint. Systems with no or partial experience rating offering higher levels of stabilisation are selected by taking, for each quintile of the distribution of stabilisation, the model implying the lowest redistribution. As a consequence, the efficiency frontier always features a scheme with full experience rating and the five best schemes with no or partial experience rating (provided that at least five out of the 48 simulated models without full experience rating offer higher stabilisation than the best full experience rating one). For each of the six best schemes, we calculate the associated financial flows and impact on GDP either assuming full or actual take-up.

Assuming full coverage of job terminations, systems with full experience rating can offer a maximum stabilisation equal to a 0.03 per cent reduction in the coefficient of variation of GDP for the considered countries (Table 4). GDP would increase by 0.04 per cent on average in EA10. Models with partial experience rating outperform those without any link between benefits and contributions (the latter are never on the efficiency frontier: Figure 4). Schemes with partial experience rating can offer up to three times the level of stabilisation achievable with full experience rating, and a substantially higher boost to GDP (0.1 per cent in EA10). Moreover, all the schemes on the efficiency frontier feature a trigger and cover both dismissed individuals and those with an expired contract; no clear pattern emerges concerning replacement rates while, with one exception, schemes with a 8 months maximum duration are preferred to schemes with shorter durations. These regularities are confirmed when simulating the schemes with actual take-up (Figure 5). However, the stabilisation performance is always reduced in this case, and the most stabilising scheme without experience rating offers a 0.05 per cent reduction in GDP volatility (Table 5; Figure 6). Irrespective of the presence of experience rating and both taking into account full coverage of dismissals and contract expirations, or actual take-up rates, the scheme offering the highest stabilisation is the one envisaging a 50 per cent replacement rate for all the employees experiencing a job termination, eight months duration, and a trigger based on employment dynamics.

The analysis conducted so far provides clear insights into the main features that a desirable unemployment-based shock absorber should have. Concerning the parameterisation of the scheme, systems lying on the efficiency frontier always cover both job dismissals and terminations, and tend to offer a maximum duration of 8 months; results are less clear-cut on the preferable level of the

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in order to achieve no cross-country redistribution.

replacement rate, since both schemes with a 35 and a 50 per cent replacement rate offer good results. Concerning the other two main features of the scheme, the results suggest that: *i)* systems activated only in presence of large shocks are preferred to those who are always active; *ii)* schemes with full experience rating can still offer non negligible levels of stabilisation; *iii)* among the schemes without full experience rating, those featuring a contribution rate cap (partial experience rating) are preferred to those with no experience rating at all.

5.2. Robustness checks

We test the robustness of these conclusions to the values chosen for the multipliers and to the exact time interval considered. Concerning multipliers, we consider two alternative hypotheses: in one case we raise the values for both inflows and outflows to 1; in the other case, we increase the multiplier for transfers received to 1.5, from the 0.9 used by the European Commission in its forecasts, while retaining the standard value of 0.4 for transfers paid; the higher value of the multiplier for inflow corresponds to the one estimated by the Commission for investment subsidies. Moreover, we examine three alternative eight-year time intervals, in addition to the basic period: 2002–10, 2003–11 and 2004–12. We re-run the whole evaluation exercise for all twelve possible combinations of the three pairs of multipliers and the four time periods, separately for full coverage and actual take-up. In Table 6, we indicate the schemes that provide maximum stabilisation with and without full experience rating. Results are surprisingly robust: after considering a total of 864 (=12×72) schemes, the scheme lying on the efficiency frontier in the majority of cases is the one foreseeing a 50 per cent replacement rate, eight months duration, covering both dismissals and contract expirations, and activated by an employment-based trigger. This is true regardless of the assumption on experience rating; apart from few exceptions, partial experience rating dominates no experience rating.

5.3. Cross-national financial flows

Assuming the standard values for the multipliers, the cross-national financial flows that would have been generated over the whole 2002–12 by the preferred scheme are reported in Table 4 and Figure 7 (full coverage) and Table 5 and Figure 8 (actual take-up). In any case, the position of the fund for the EA10 as a whole can be negative or positive in each year, but is balanced over the interval. With full coverage and full experience rating, the shock absorber would have generated no cumulated cross-country cash flows during the entire period. Nevertheless, all countries would have been net beneficiaries in at least one year. The impact on GDP would have been positive in each country, with those hardest hit by the crisis (Spain, Portugal, Greece) being the biggest

beneficiaries. Looking at the system with full coverage, but partial experience rating, cumulated cash flows for each country can deviate significantly from zero, but the system balances over the time interval. Also in this case, Spain would have been the biggest beneficiary of the scheme, receiving a total of almost 36 billion euros (0.3 per cent of its GDP), with a 0.5 per cent additional GDP growth. Other beneficiaries would again have been Portugal and Greece, while the biggest contributors, in GDP terms, would have been Luxembourg, Austria and Belgium.

These are upper bound simulations assuming that all dismissed workers or whose contract expired are covered by the scheme. If we consider instead actual take-up, reflecting country specific eligibility rules and take-up rates (Table 5), the size of financial flows is reduced. With full experience rating, the impact of the scheme on GDP would have been considerably smaller than with full coverage, in particular for countries with relatively lower take-up rates. It would not change for example in Germany (0.02 per cent of GDP), while in Italy it would decrease from 0.03 to 0.01 per cent of GDP. Such tendencies are confirmed when looking at a scheme with partial experience rating.

The period 2002–12 includes the most acute post-war recession and represents a test of the scheme in an unusually stressed environment. To simulate the functioning of the scheme in more normal times, we estimate the financial flows for the shorter pre-crisis period 2002–08. Assuming full coverage (Table 7), the biggest beneficiary of the scheme without full experience rating would have been Finland (receiving 0.07 per cent of its GDP), followed by Spain and Germany (0.06 and 0.02 per cent, respectively), while the biggest contributors would have been Belgium, France, Greece, Italy and Luxembourg (0.03 per cent). Beneficiaries and contributors are the same when considering actual take-up (Table 8), but the dimensions of the flows are smaller. The sensitivity of the net position of countries to different time intervals suggests that it is misleading to judge the political feasibility of the shock absorber by focusing on recent years only.

5.4. Relations with existing literature

The topic discussed in this paper has received considerable attention in the last couple of years. How does this paper relate to other studies? Table 9 compares some features of six of these works with those of this paper. Differences concern the data (micro/macro), the time period, the country coverage, the design of the simulated unemployment benefit schemes, and the assumptions on UB claimants. We use micro data in order to identify the unemployed entitled to the subsidy and their heterogeneous characteristics, as Dolls et al. (2014), Jara and Sutherland (2014a,b) and Lellouch and Sode (2014). Consistently with these works, we focus on the EA rather than the whole EU, since a currency area is in greater need of an asymmetric shock absorber. Jara and Sutherland

(2014a,b) focus on the stabilisation effects of a common unemployment benefit scheme, topping up national ones, on individual disposable incomes by applying the EUROMOD tax-benefit calculator to EU-SILC data. They do not discuss the financing features of the scheme and simulate only one year. Using the same data source, Dolls et al. (2014) apply a similar methodology to evaluate – assuming no experience rating - the stabilisation effect and cross-country redistribution implied by six basic schemes, varying by coverage, duration, and contribution rate. For one of the schemes they also simulate the properties of two alternative experience rating options and of a trigger. Differently from these two works we analyse a wider variety of options concerning main features of the scheme, while we prefer using the EU-LFS, rather than the EU-SILC, data for the longer time series available and for the information on actual take-up. While our simulations consider both full coverage and actual take-up rates, previous works assume that all the eligible unemployed receive the benefit, or that take-up is some fixed fraction of the full rate (e.g. Lellouch and Sode, 2014 and Dolls at al., 2014).

6. Conclusions

In this paper we have described a euro-wide, unemployment-based, shock absorber that is incentive compatible, politically feasible and easy to be run by existing agencies. The capacity gives rise to macro cross-national transfers, mimicking those that would be generated by a notional euro-wide unemployment benefit scheme minimal in terms of coverage and generosity. The scheme thus works at the macro level, through variations in the funds available to each country, acting as a rainy-day fund. At the same time, the fact that net transfers are parameterised at the micro level improves targeting and makes more visible to European citizens the existence of a risk sharing mechanism within the monetary union.

Such a scheme could vary along several dimensions concerning both the unemployment benefit taken as a parameter (coverage, replacement rate, duration) and the rules governing the functioning of the shock absorber (existence of a trigger, degree of experience rating). In order to select the preferable combination of these characteristics, we have simulated the functioning of 72 schemes and evaluated the extent of macroeconomic stabilisation and cross-country redistribution that they would imply. The results, which are robust to the choice of the multipliers and of the estimation period, show that the most stabilizing scheme foresees a 50 per cent replacement rate for all employees experiencing a job termination, eight months maximum duration, and a trigger based on employment dynamics. Even systems that do not redistribute resources cross-country in the medium run can have a sizeable stabilisation impact.

Considering the period 2002–12 and assuming full coverage, the coefficient of variation of the EA10 GDP is reduced by 0.03 per cent with full experience rating. Schemes with partial experience rating would offer up to three times this level of stabilisation but would imply cross-country redistribution. With actual take-up, particularly low in Southern European countries, the stabilisation performance is reduced (0.02 per cent reduction in GDP volatility with full experience rating). While with full experience rating each country's position would be balanced over time, Spain and, to a less extent, Portugal would be the biggest beneficiaries in case of partial experience rating; the greatest contributors would instead be Italy, France and Germany. Considering only the pre-crisis period 2002–08, the biggest beneficiaries would be Finland, Spain and Germany, while the biggest contributors would be Belgium, France, Greece, Italy and Luxembourg. This evidence is a warning that the conclusions on cross-country redistribution are highly sensitive to the simulation period as well as to the assumption made on the take-up of the benefit.

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Table 1: Alternative options considered in the design of an EA wide unemployment-based shock absorber

Coverage	All employees experiencing job termination (dismissals and contract terminations)		Dismissed employees only
Eligibility and Take-up	100%		Actual value
Replacement rate	50% of average wage		35% of average wage
Duration	3 months		8 months
Activation trigger	Always active	Active if variation in output gap ≥ 0.5 SD of changes in output gap across all countries	Active if variation in employment ≥ 0.2 SD of changes in employment across all countries
Experience rating	Full (Countries contribute and receive money from a common fund in each year, but zero cross country redistribution over the time period)	Partial (full experience rating with a yearly ceiling at 0.02 per cent of GDP, no experience rating above the ceiling).	None

See Section 4 for details.

Table 2: Main elements of unemployment insurance systems in EA10 countries

Country	Qualifying period (number of months)	Replacement rate (% of gross wage)	Duration (1) (number of months)
AT	13	40	9
BE	13	50	No limit
DE	12	42	12
ES	12	63	23.7
FI	8.5	54	23
FR	4	57	24
GR	7	58	12
IT	13	50	8
LU	6.5	83	12
PT	12	65	27.6

Source: Stovicek and Turrini (2012) and del Monte and Zandstra (2014). (1) Duration is computed for a single, low-wage person, 40 years old, and with a contribution period of 22 years.

Table 3: Main elements of STC public programmes in the selected EA countries

Country	Employers' eligibility (sector, economic condition)	Workers' eligibility	Replacement rate and duration	Financing
AT	Private employers, disruptions >3 months	No specific UB rights	Share of UB for reduced working hours × 6 months (up to 24)	UB funds through employers
BE	Short time working or temporary lay-off	Blue collar workers, eligibility to UB	70-75% RR × 4 weeks (full suspension) or 3-12 months (partial suspension)>UB	UB funds plus other contributions, through UI system
DE	Working hours reduction affecting at least 1/3 of the staff and income loss more than 10% of monthly gross salary	No specific UB rights. Open-ended contracts	50% by PES first 6 months, then 100% up to 18 months	UB funds through employers
ES	Ordinary working day reduced by 1/3	UB eligibility	As UB	UB funds through employers and UI system
FI	Amount of work (or its potential) reduced for production or financial reasons	UB eligibility	As UB	UB funds
FR	No requirements	Open-end contracts, blue and white collars with wage≥18×hourly min wage, no seasonal unemployed. 600 hours of insurance	60% RR (min 6.84 euro per hour) × 6 months	UB funds, reimbursements to employers
IT	CIGO: temporary market difficulties not due to employer or employee CIGS: persistent and structural labour market surpluses CIGD: residual tool for firms not covered by CIGO	CIGO: no specific UB rights. Blue and white collars CIGS: sector thresholds. Workers employed at least 3 months before CIGD: at least 3 months employment	CIGO: 80% RR × 4 months (maximum 12) CIGS: 80% RR × 4 months (maximum 36) CIGD: sector agreements	Different from UB funds, partial ER, workers' contributions for CIGS CIGD: government's financing, no ordinary contributions by firms
LU	Reductions of no more than 50% of monthly normal working time (4 types of partial employment)	All employees, excluding temporary agency workers and apprentices; they have to take part to training	90% RR × 4.5months. in RR larger than UB	UB funds, through employers
PT	Reductions for business cycle and technological reasons or natural disaster	No specific requirement	70% RR × 6-12 months	UB funds

Sources: Arpaia et al. (2010) and Boeri and Bruecker (2011).

Table 4: Main outcomes of the most stabilising scheme, full coverage, 2002–12

Country	Full Experience Rating			Partial Experience Rating		
	Cumulated cash flow - million €	Cumulated cash flow - % of GDP	Impact on GDP – %	Cumulated cash flow - million €	Cumulated cash flow - % of GDP	Impact on GDP – %
AT	0.00	0.00	0.01	-2,312	-0.08	0.05
BE	0.00	0.00	0.01	-2,679	-0.07	0.05
DE	0.00	0.00	0.02	-13,251	-0.05	0.08
ES	0.00	0.00	0.12	35,901	0.34	0.49
FI	0.00	0.00	0.04	-313	-0.02	0.12
FR	0.00	0.00	0.02	-11,707	-0.06	0.07
GR	0.00	0.00	0.05	885	0.04	0.16
IT	0.00	0.00	0.03	-7,987	-0.05	0.08
LU	0.00	0.00	0.01	-341	-0.09	0.04
PT	0.00	0.00	0.07	1,805	0.10	0.22
EA10	0.00	0.00	0.04	0	0	0.10
Redistribution index			0.00			1.7
Variation in GDP dispersion			-0.03			-0.11

Source: authors' elaboration on EU-LFS data. The most stabilising scheme has a replacement rate of 50 per cent, covers the termination of both open-ended and fixed-term contracts, has a maximum duration of eight months, and is activated by an employment-based trigger. See Section 5 for details.

Table 5: Main outcomes of the most stabilising scheme, actual take-up, 2002–12

Country	Full Experience Rating			Partial Experience Rating		
	Cumulated cash flow - million €	Cumulated cash flow - % of GDP	Impact on GDP – %	Cumulated cash flow - million €	Cumulated cash flow - % of GDP	Impact on GDP – %
AT	0.00	0.00	0.01	-1,105	-0.04	0.02
BE	0.00	0.00	0.01	-1,151	-0.03	0.03
DE	0.00	0.00	0.02	-4,597	-0.02	0.04
ES	0.00	0.00	0.07	18,308	0.17	0.25
FI	0.00	0.00	0.02	-132	-0.01	0.06
FR	0.00	0.00	0.01	-5,350	-0.03	0.03
GR	0.00	0.00	0.03	-184	-0.01	0.05
IT	0.00	0.00	0.01	-6,197	-0.04	0.02
LU	0.00	0.00	0.00	-143	-0.04	0.02
PT	0.00	0.00	0.04	550	0.03	0.10
EA10	0.00	0.00	0.02	0	0	0.1
Redistribution index			0.00			0.43
Variation in GDP dispersion			-0.02			-0.05

Source: authors' elaboration on EU-LFS data. The most stabilising scheme has a replacement rate of 50 per cent, covers the termination of both open-ended and fixed-term contracts, has a maximum duration of eight months, and is activated by an employment-based trigger. See Section 5 for details.

Table 6: Robustness analysis

Eligibility and take-up	Multipliers	Time interval	Best out of 24 schemes with full ER	Best out of 48 schemes without full ER
Full	Inflows: 0.9 Outflows 0.4	2002-2012	**RR 50%; OEC+FTC; 8m; E trigger**	**RR 50%; OEC+FTC; 8m; E trigger; partial ER**
		2002-2010	RR 50%; OEC+FTC; 8m; OG trigger	RR 50%; OEC+FTC; 8m; partial ER
		2003-2011	**RR 50%; OEC+FTC; 8m; E trigger**	RR 50%; OEC+FTC; 8m; partial ER
		2004-2012	**RR 50%; OEC+FTC; 8m; E trigger**	**RR 50%; OEC+FTC; 8m; E trigger; partial ER**
	Inflows: 1 Outflows: 1	2002-2012	RR 50%; OEC ;8m; E trigger	**RR 50%; OEC+FTC; 8m; E trigger; No ER**
		2002-2010	RR 50%; OEC ;8m; OG trigger	RR 50%; OEC+FTC; 8m; partial ER
		2003-2011	RR 50%; OEC ;8m; OG trigger	RR 50%; OEC+FTC; 8m; partial ER
		2004-2012	RR 50%; OEC ;8m; E trigger	**RR 50%; OEC+FTC; 8m; E trigger; partial ER**
	Inflows: 1.5 Outflows: 0.4	2002-2012	**RR 50%; OEC+FTC; 8m; E trigger**	**RR 50%; OEC+FTC; 8m; E trigger; no ER**
		2002-2010	RR 50%; OEC+FTC; 8m; OG trigger	RR 50%; OEC+FTC; 8m; partial ER
		2003-2011	**RR 50%; OEC+FTC; 8m; E trigger**	**RR 50%; OEC+FTC; 8m; E trigger; partial ER**
		2004-2012	**RR 50%; OEC+FTC; 8m; E trigger**	**RR 50%; OEC+FTC; 8m; E trigger; partial ER**
Percentage of times RR 50%; OEC+FTC; 8m; E trigger is best model			*50%*	*58%*
Actual	Inflows: 0.9 Outflows 0.4	2002-2012	**RR 50%; OEC+FTC; 8m; E trigger**	**RR 50%; OEC+FTC; 8m; E trigger; partial ER**
		2002-2010	RR 50%; OEC+FTC; 8m;	RR 50%; OEC+FTC; 8m; OG trigger; partial ER
		2003-2011	RR 50%; OEC+FTC; 8m;	**RR 50%; OEC+FTC; 8m; E trigger; partial ER**
		2004-2012	**RR 50%; OEC+FTC; 8m; E trigger**	**RR 50%; OEC+FTC; 8m; E trigger; partial ER**
	Inflows: 1 Outflows: 1	2002-2012	**RR 50%; OEC+FTC; 8m; E trigger**	**RR 50%; OEC+FTC; 8m; E trigger; no ER**
		2002-2010	RR 50%; OEC; 8m; OG trigger	RR 50%; OEC+FTC; 8m; OG trigger; partial ER
		2003-2011	RR 50%; OEC; 8m; OG trigger	**RR 50%; OEC+FTC; 8m; E trigger; partial ER**
		2004-2012	**RR 50%; OEC+FTC; 8m; E trigger**	**RR 50%; OEC+FTC; 8m; E trigger; no ER**
	Inflows: 1.5 Outflows: 0.4	2002-2012	**RR 50%; OEC+FTC; 8m; E trigger**	**RR 50%; OEC+FTC; 8m; E trigger; partial ER**
		2002-2010	RR 50%; OEC+FTC; 8m;	RR 50%; OEC+FTC; 8m; OG trigger; partial ER
		2003-2011	RR 50%; OEC+FTC; 8m;	**RR 50%; OEC+FTC; 8m; E trigger; partial ER**
		2004-2012	**RR 50%; OEC+FTC; 8m; E trigger**	**RR 50%; OEC+FTC; 8m; E trigger; partial ER**
Percentage of times RR 50%; OEC+FTC; 8m; E trigger is best model			*50%*	*75%*

Source: authors' elaboration on EU-LFS data. Each row identifies a set of combinations of multipliers and time intervals; the two main columns indicate the characteristics of the best model in terms of the stabilisation/redistribution trade-off as regards: replacement rate (RR), coverage (OEC: open-ended contracts; FTC: fixed-term contracts); months of maximum duration (m); trigger variable (E: employment; OG: output gap); experience rating (ER). Preferred scheme, that is the one implying lowest redistribution for given levels of stabilization, is in **bold**. See section 5.2 for details.

Table 7: Financial flows of most stabilising schemes, full coverage, 2002–08

Country	Full Experience Rating			Partial Experience Rating		
	Cumulated cash flow - million €	Cumulated cash flow – % of GDP	Impact on GDP – %	Cumulated cash flow - million €	Cumulated cash flow – % of GDP	Impact on GDP – %
AT	0	0	-0.02	-309	-0.02	0.03
BE	0	0	-0.03	-602	-0.03	0.00
DE	0	0	0.02	3,202	0.02	0.08
ES	0	0	0.06	3,641	0.06	0.13
FI	0	0	0.07	778	0.07	0.14
FR	0	0	-0.03	-3,411	-0.03	0.00
GR	0	0	-0.03	-385	-0.03	0.00
IT	0	0	-0.03	-2,842	-0.03	0.00
LU	0	0	-0.03	-61	-0.03	0.03
PT	0	0	0.00	-10	0.00	0.05

Source: authors' elaboration on EU-LFS data. The most stabilising scheme has a replacement rate of 50 per cent, covers the termination of both open-ended and fixed-term contracts, has a maximum duration of eight months, and is activated by an employment-based trigger. See Section 5 for details.

Table 8: Financial flows of most stabilising scheme, actual take-up rates, 2002–08

Country	Full Experience Rating			Partial Experience Rating		
	Cumulated cash flow - million €	Cumulated cash flow – % of GDP	Impact on GDP – %	Cumulated cash flow - million €	Cumulated cash flow – % of GDP	Impact on GDP – %
AT	0	0	-0.01	-214	-0.04	0.01
BE	0	0	-0.01	-263	-0.03	0.00
DE	0	0	0.01	2,231	-0.02	0.05
ES	0	0	0.02	987	0.17	0.05
FI	0	0	0.03	312	-0.01	0.07
FR	0	0	-0.01	-1,487	-0.03	0.00
GR	0	0	-0.01	-168	-0.01	0.00
IT	0	0	-0.01	-1,239	-0.04	0.00
LU	0	0	-0.01	-27	-0.04	0.01
PT	0	0	-0.01	-134	0.03	0.01

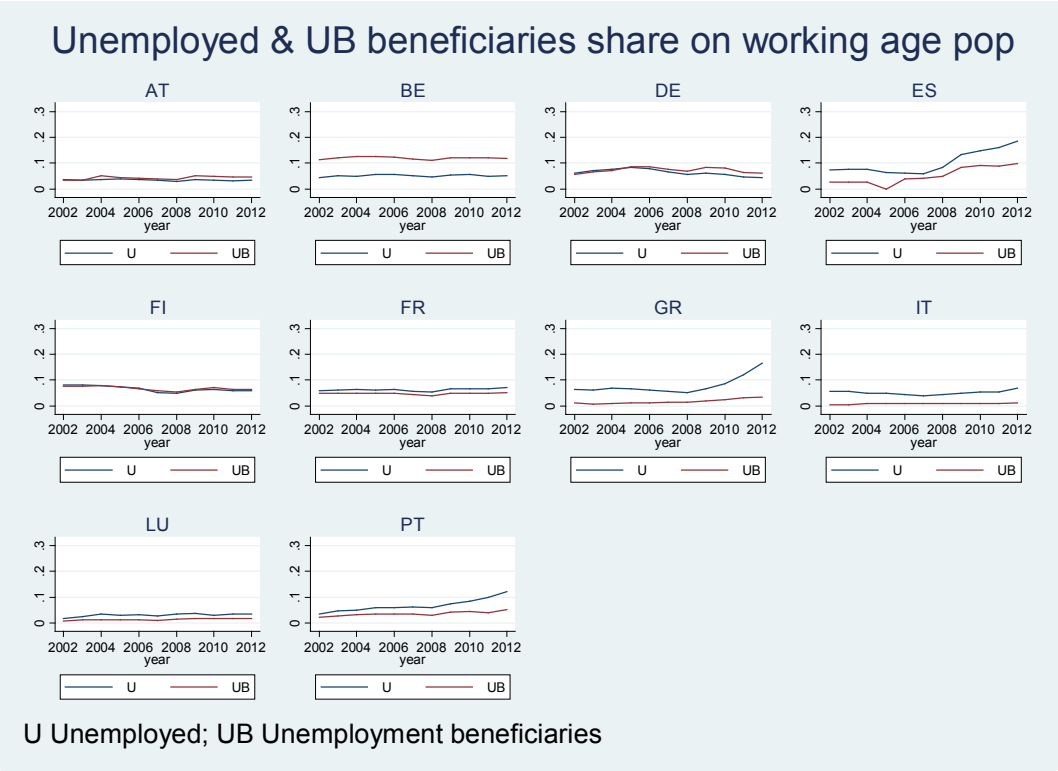
Source: authors' elaboration on EU-LFS data. The most stabilising scheme has a replacement rate of 50 per cent, covers the termination of both open-ended and fixed-term contracts, has a maximum duration of eight months, and is activated by an employment-based trigger. See Section 5 for details.

Table 9: Related literature

Work	Data	Period	Countries	No. of simulated schemes	Coverage	Trigger	Experience rating	Tax base	Take-up
Beblavy et al. (2014)	Macro	2000–12	EU27	1	80% of short-term unemployed	Yes	Yes	GDP	Full
Dolls et al. (2014)	Micro, EUROMOD, One year data (2008)	2000–13	EA18	6 differing by replacement rate, eligibility, coverage	New employed or short-term unemployed with previous employment income	Yes/No	Yes/no	Employment income	One scheme features an approximation of national take-up
Dullien (2014)	Macro	1999–2012	EA13	1	Fraction of short-term unemployed	Yes	No	Wage bill	Full
Epaulard (2014)	Macro	2000–15	EA12	1	80% of 3-12 month unemployed	Yes	Yes	Wage bill	Full
Fichtner and Haan (2014)	Macro	1999–2012	EA12	2 differing by replacement rate and duration	Fraction of short-term unemployed	No	No	Wage bill	Full
Jara and Sutherland (2014a,b)	Micro, EUROMOD One year data (2008)	2012	EA10	2 differing by replacement rate	4-12 month unemployed, incl. self-employed, 3 month contri-butions in last 12 months	No	No	–	Full
Lellouch and Sode (2014)	Micro, LFS	2002–12	EA10	1	Unemployed with previous work experience	No	Yes/No (ex-ante neutrality)	Wage bill	Average between country historical average and overall average
This study	*Micro, LFS*	*2002–12*	*EA10*	*72 differing by replacement rate, coverage, dura-tion, trigger, funding*	*Termination of open-ended and fixed-term contracts*	*Yes (employment or output gap)/No*	*Yes/No*	*Consumption*	*Full/Actual*

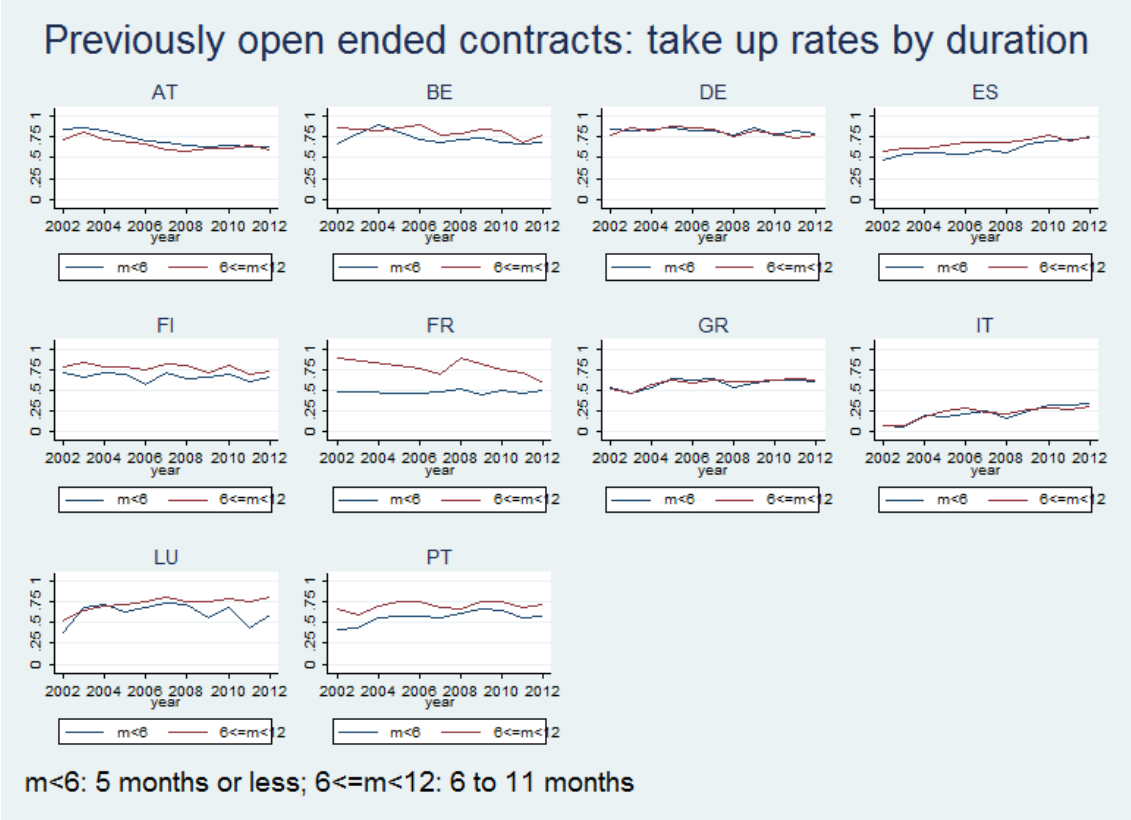
See Section 5 for details.

Figure 1: Unemployment and UB beneficiaries: shares on working age population



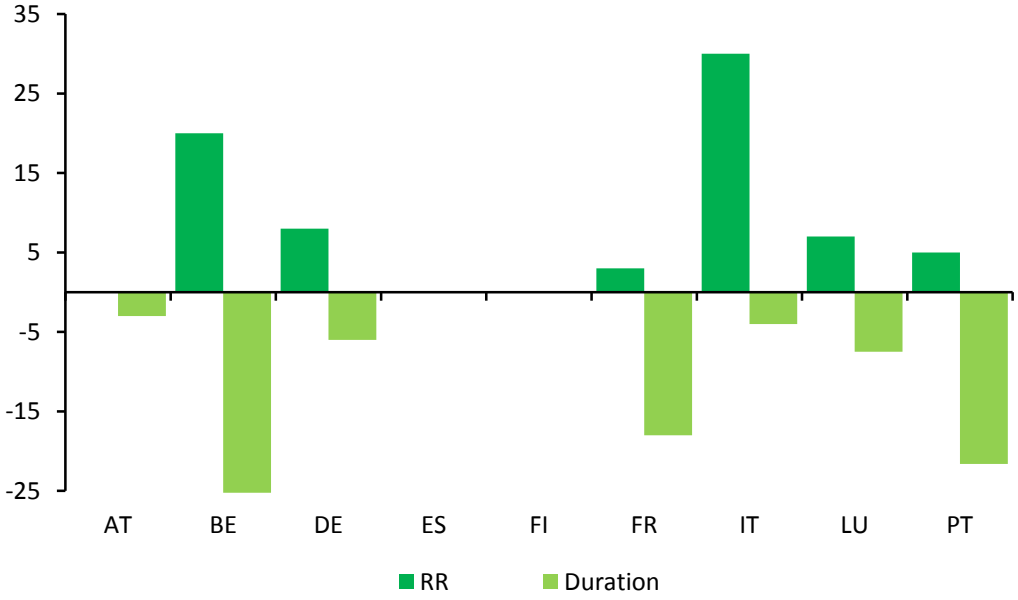
Source: authors' elaboration on EU-LFS data.

Figure 2: Previously open-ended contracts: take-up rates by duration



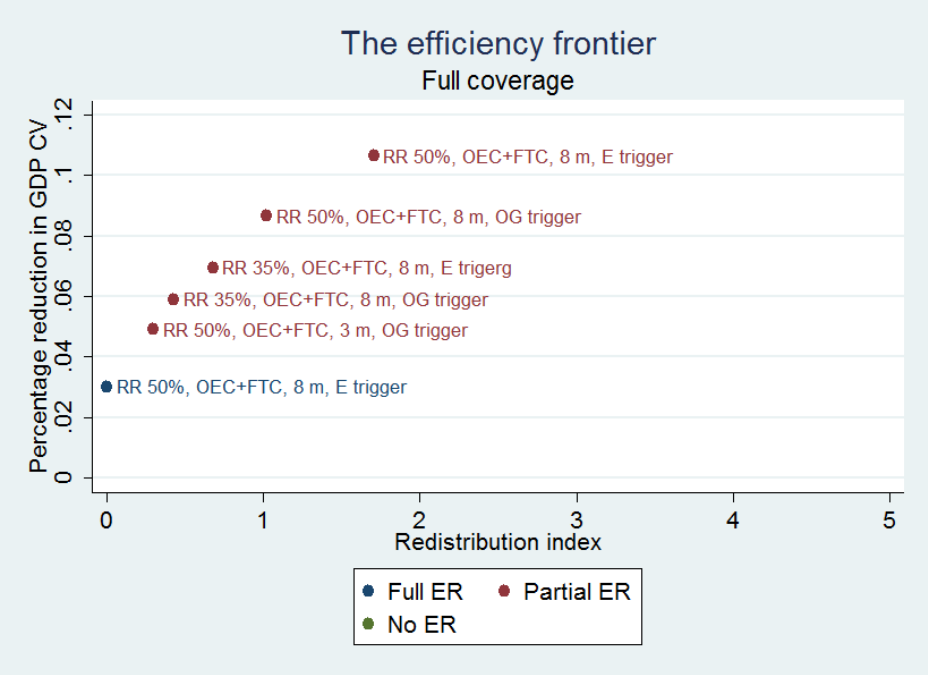
Source: authors' elaboration on EU-LFS data. The graph shows the incidence of individuals receiving unemployment benefit over the group of individuals who were employed with an open-ended contract a year before.

Figure 3: Differences between STC and UB



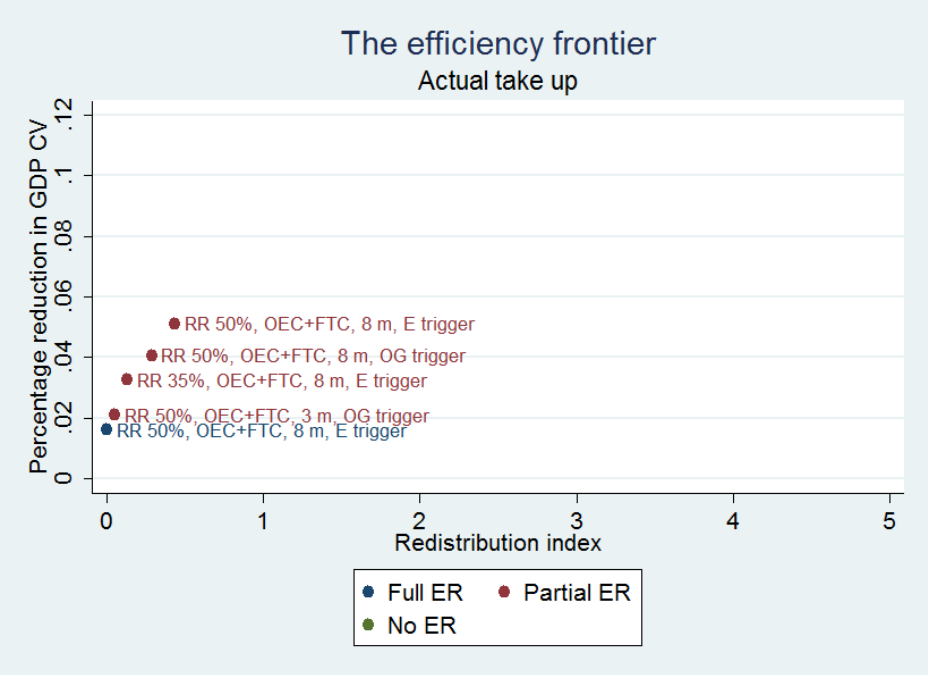
Source: authors' elaboration on EU-LFS data. Differences in percentage point for Replacement Rates (RR) and in months for Duration.

Figure 4: The efficiency frontier with full coverage



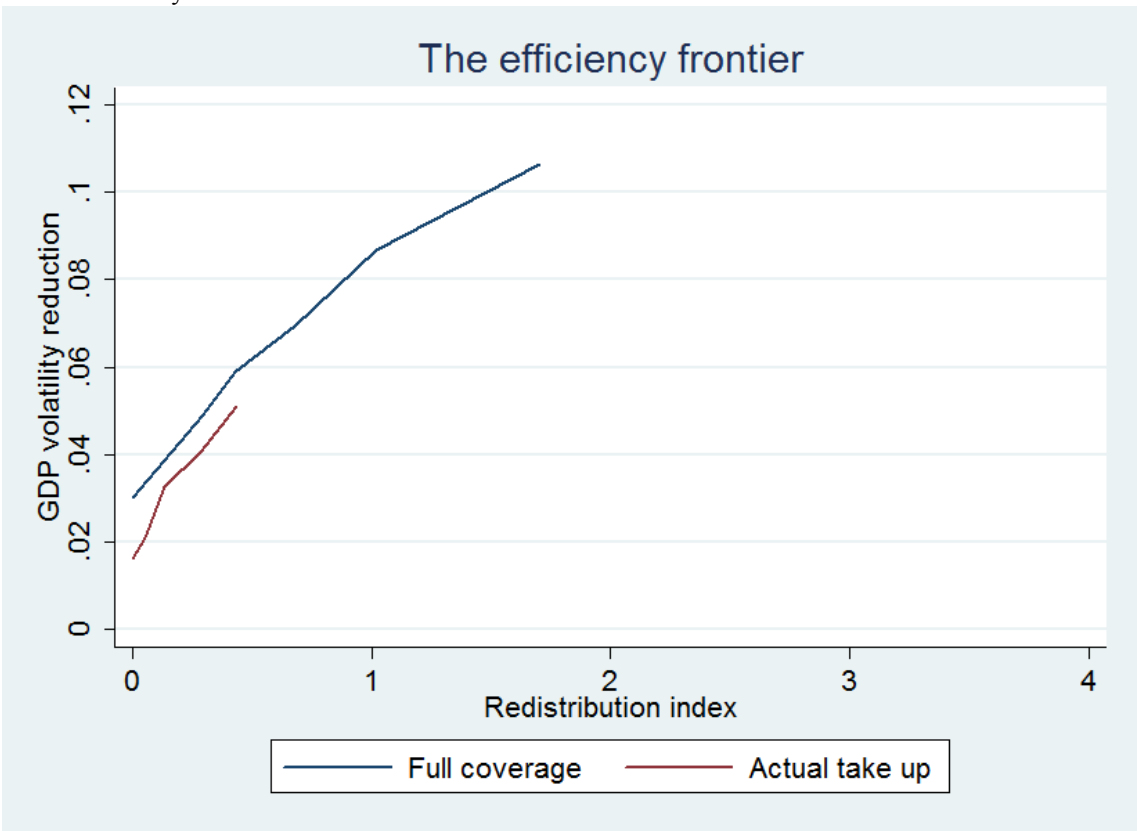
Source: authors' elaboration on EU-LFS data. The GDP volatility reduction is equal to the reduction in the GDP coefficient of variation. The redistribution index is equal to the sum of the squared deviations of the unique contribution rate that balances the system for the area as a whole from the contribution rates that balances the system for each country, multiplied by a million. Legend: RR: replacement rate; OEC: open-ended contract; FTC fixed-term contract; m: months of maximum duration; E (OG) trigger: employment (output Gap) trigger; ER: experience rating.

Figure 5: The efficiency frontier with actual take-up



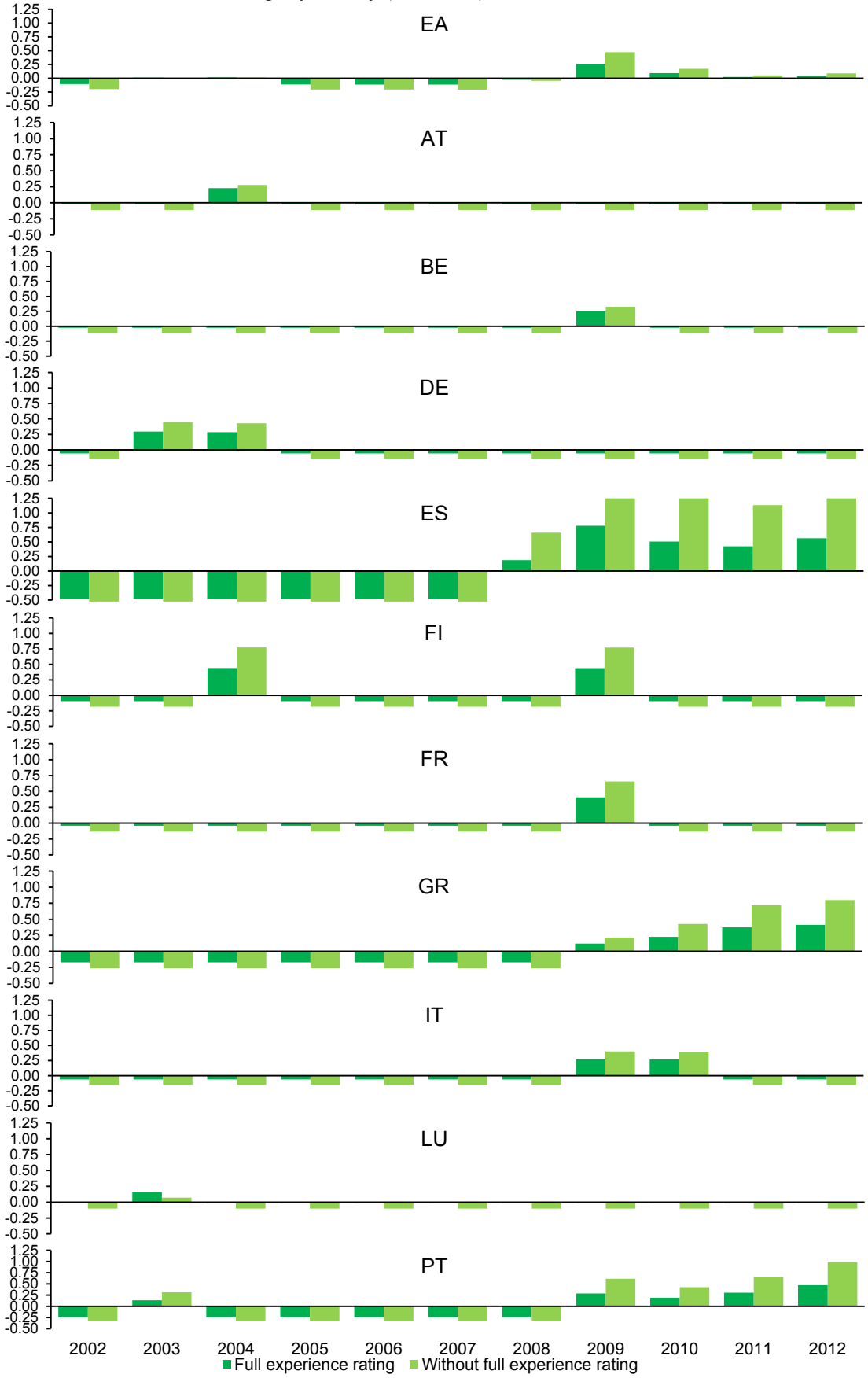
Source: authors' elaboration on EU-LFS data. The GDP volatility reduction is equal to the reduction in the GDP coefficient of variation. The redistribution index is equal to the sum of the squared deviations of the unique contribution rate that balances the system for the area as a whole from the contribution rates that balances the system for each country, multiplied by a million. Legend: RR: replacement rate; OEC: open-ended contract; FTC fixed-term contract; m: months of maximum duration; E (OG) trigger: employment (output Gap) trigger; ER: experience rating.

Figure 6: The efficiency frontier



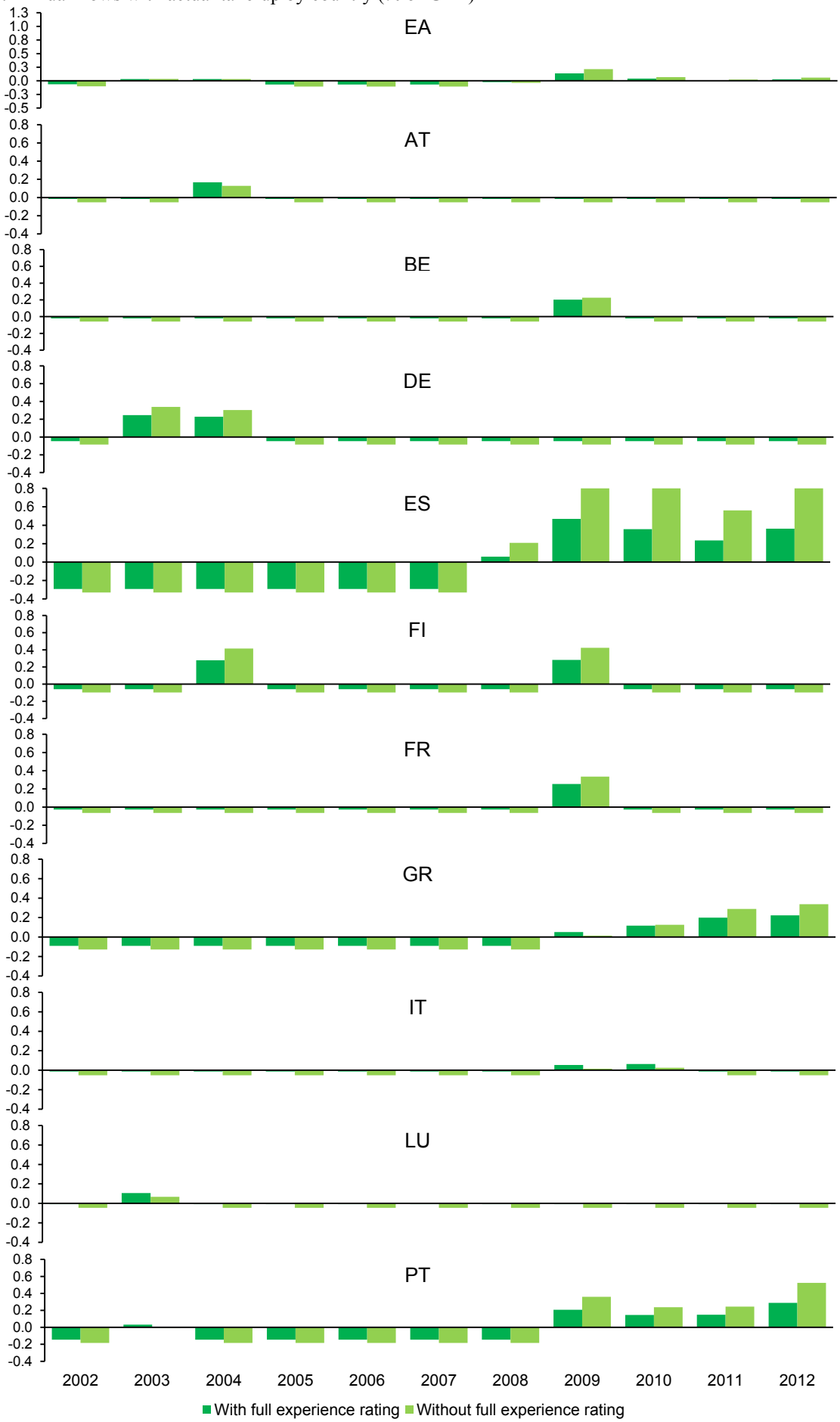
Source: authors' elaboration on EU-LFS data. The GDP volatility reduction is equal to the reduction in the GDP coefficient of variation. The redistribution index is equal to the sum of the squared deviations of the unique contribution rate that balances the system for the area as a whole from the contribution rates that balances the system for each country, multiplied by a million.

Figure 7: Annual flows with full coverage by country (% of GDP)



Source: authors' elaboration on EU-LFS data.

Figure 8: Annual flows with actual take-up by country (% of GDP)



Source: authors' elaboration on EU-LFS data.