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Fiscal Integration in the Eurozone: Economic Effects of Two Key Scenarios

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Abstract: The 2008-09 crisis has shown that some euro area member countries were unable to sufficiently stabilize their economies which has given rise to a debate about deeper fiscal integration in Europe. In this paper, we analyze the redistributive and stabilizing effects of two scenarios of fiscal integration in the Eurozone, namely the introduction of i) a joint tax and transfer system that replaces 10 per cent of national systems and ii) a system of fiscal equalization that equalizes 10 per cent of differences in taxing capacity. Based on the European tax-benefit calculator EUROMOD and representative household micro data for the current 17 euro area member states, our conceptual experiment shows that a joint tax and transfer system would only lead to moderate gains in terms of stabilization while redistribution would flow especially towards the Eastern European member states. In contrast, a fiscal equalization mechanism that redistributes revenues across countries could even lead to destabilizing effects.

JEL codes: F55, H23
Keywords: European fiscal integration, redistribution, automatic stabilization

This paper uses EUROMOD version F6.0+. EUROMOD is maintained, developed and managed by the Institute for Social and Economic Research (ISER) at the University of Essex, in collaboration with national teams from the EU member states. EUROMOD is based on the EU-SILC database which is made available by EUROSTAT. We would like to thank all past and current members of the EUROMOD consortium for the construction and development of EUROMOD and the European Commission for providing financial support for it. We are also grateful to O. Bargain, N. Pestel and S. Siegloch for collaboration in a preceding project published as Bargain et al. (2013). All results and their interpretation presented in this paper are the authors' responsibility.
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1. Introduction

The debt crisis in Europe initiated a debate about deeper fiscal integration in the Economic and Monetary Union (EMU). The 2008-09 economic crisis has shown that some euro area (EA) [1] member states were unable to sufficiently stabilize their economies. This was especially true for some Southern European countries where limited access to private credit markets even led to destabilizing effects due to statutory tax increases and benefit cuts (see e.g. Bertola 2013).

In the current policy debate in Europe, the view is widespread that the European currency union will not survive unless it is complemented by a 'fiscal union'. Options discussed range from enforced budget rules to the development of an own 'fiscal capacity' for the EMU. In October 2012, the President of the European Council, Herman van Rompuy, argued: *"Strengthening discipline alone is … not sufficient. In the longer term, there is a need to explore the option to go beyond the current steps to strengthen economic governance by developing gradually a fiscal capacity for the EMU. Such a fiscal capacity could take several forms and various options would need to be explored"*.[2] Subsequently, EU Commissioner László Andor suggested an EU level unemployment insurance scheme that could be introduced complementary to the national unemployment benefit systems.[3] Shortly after this, the European Commission built upon these initiatives when launching its official report entitled "A blueprint for a deep and genuine economic and monetary union - Launching a European Debate" (European Commission 2012).

Since then, the perspectives of a European fiscal union have been discussed in various studies (see e.g. Allard et al. 2013, Dullien 2013, Enderlein et al. 2013). Besides, the question of how to optimally design a (European) fiscal union has also gained renewed interest in the more theoretical literature (see e.g. Drèze and Durré 2013, Engler and Voigts 2013, Evers 2012, Farhi and Werning 2012).[4] These proposals and studies indicate an even more intense debate about fiscal integration in Europe in the future and show that a possible fiscal stabilization mechanism might even include elements of a joint tax and transfer system. This would imply that fiscal institutions in the Eurozone would become more similar to those of existing federations such as the US. While the main argument in favor of integrated fiscal mechanisms in the EMU is that they should act as insurance devices in the presence of asymmetric macroeconomic shocks, the main concern in the debate relates to possible permanent transfers across member countries.

In this paper, we go one step further and set up a conceptual experiment in which we analyze the redistributive and stabilizing effects of two more general scenarios of fiscal integration in the Eurozone, namely first, an EMU-wide tax and transfer system which partly (fully) replaces national systems and second, an EMU-wide system of fiscal equalization. Our study builds on Bargain et al. (2013) which is the first paper that analyzes the economic implications of a European fiscal union using household micro data. Their analysis is based on data from 2001 and includes 11 founding members of the EA. In this paper, we extend the sample to the current 17 EA member states and use representative household micro data from 2007, i.e. the year before the start of the Great Recession. Moreover, we calibrate the size of the EMU tax-transfer system and fiscal equalization system such that transfers across countries are comparable to operating budgetary balances of the EU budget. We follow Bargain et al. (2013) and use the European tax benefit calculator EUROMOD which enables us to calculate taxes, transfers and disposable income for each household in a comparable way across countries. The main feature of EUROMOD is the possibility to run counterfactual simulations such that policy reforms and their effects on tax revenues and the income distribution can be analyzed. We proceed as follows. First, we construct a joint tax and transfer system for

[1] In the following we equivalently use "EA", "EMU" and "Eurozone" to refer to the current 17 member states of the European currency union and thus, only to those EMU members who have already introduced the Euro.

[2] 'Towards a genuine Economic and Monetary Union', Interim Report, The President of the European Council, Brussels, 12 October 2012, p. 4.

[3] László Andor: 'A strong employment agenda – the pathway to economic recovery', dinner speech at the Conference "Jobs for Europe: The Employment Policy Conference", Brussels, 6 September 2012, European Commission, SPEECH/12/588.

[4] For a more comprehensive and historical literature review, see the predecessor paper, Bargain et al. (2013).

the EA which can be interpreted as an average of the national tax and transfer systems. This leads to revenue neutrality of the reform at the EMU level, but redistributes income across households in different member states. Second, we use this estimated average system to construct a fiscal equalization scheme which redistributes tax revenue across countries based on differences in taxing capacities. The mechanisms are introduced such that 10 per cent of the overall tax and transfer system are set up at the EMU level (i.e. the national tax-transfer systems account for 90 per cent) and 10 per cent of the differences in taxing capacities are equalized, respectively. This leads to rather moderate transfers of disposable income/tax revenue across member states which are comparable to today's net contributions to the EU budget. Our method allows us to compare this to the benchmark case of full fiscal integration in both scenarios.

Our main results are as follows. Concerning the first simulation experiment, our analysis shows that the introduction of an EMU-wide tax and transfer system would especially redistribute income towards households in the Eastern European member countries, with gains up to 6 and 7 per cent of monthly disposable income for median voters in Estonia and Slovakia, respectively. The largest contributors (in relative terms) are Ireland and Luxembourg, where median incomes fall by around 2,5 per cent. Further recipient countries are in Southern Europe (e.g. Portugal), yet, with far more modest changes in incomes. Overall, a slight majority of countries' median voters would benefit from this reform. At the same time, harmonizing tax-transfer systems in the EMU would reduce income inequality overall as well as in a majority of the member countries. In order to analyze the stabilizing impact of this reform, we simulate a proportional shock on gross income (following Dolls et al. 2012) and find that the introduction of a tax and transfer system for the EA with an overall share of 10 per cent would only slightly affect automatic stabilization. Yet, small increases can be observed in particular for some Southern European countries such as Cyprus, Greece, or Malta. Assuming that the individual countries have completely lost access to capital markets and are thus not able to provide national stabilization, the EMU system cushions the income shock to an extent of 4-5 per cent (under the assumption that the EMU budget can be financed by issuing debt). Of course, the size of this effect substantially increases when considering a scenario with full integration. Yet, the direction of the effect especially depends on the progressivity of the national systems compared to the EMU average. Overall, in the two latter cases, automatic stabilizers become more homogeneous across countries and only vary due to differences in income conditions and demographic composition.

Our second simulation experiment considers the introduction of a fiscal equalization mechanism where the national tax and transfer systems are assumed to remain in place. The estimated average EMU system is used to determine the taxing capacity/expenditure needs of each country. The fiscal equalization mechanism redistributes tax revenue across countries based on the assumption that 10 per cent of the differences in taxing capacities are equalized. We first consider a shock in the form of a proportional decline in gross income by five per cent which hits Greece, Ireland, Italy, Portugal, and Spain (the 'GIIPS' group). In all other countries, income remains constant. The equalization mechanism can have – moderate – stabilizing effects in such a scenario when only a few countries are hit by a shock. However, we consider a second shock scenario that is comparable to the 2008-09 economic crisis where all EA member states experienced substantial income losses. In such a situation, the taxing capacity of the union as a whole decreases significantly and countries which are in a recession may face reduced transfers or higher contributions due to the shock. In our example, this effect can be observed for 8 out of 17 countries, with a loss in automatic stabilization of up to more than 10 per cent of the income shock. This highlights an important issue which is often neglected in the current policy debate: A fiscal equalization mechanism that solely focuses on inter-regional insurance can have destabilizing effects in scenarios of a severe economic crisis.[5]

The reminder of this paper is structured as follows. Section 2 describes the framework for the design of a fiscal union together with the simulation scenarios. Section 3 introduces the micro data and the tax-benefit calculator EUROMOD, the estimation procedure, as well as some descriptive information. The results for the

[5] Of course, these policy reforms would also impact on a wide range of possible behavioral margins, most importantly labor supply, tax evasion behavior, cross-country migration or administrative adaption. For a discussion of these issues, we refer to Bargain et al. (2013), who also explicitly account for labor supply adjustments in their analysis.

EMU-wide tax and transfer system and fiscal equalization mechanism are presented in sections 4 and 5. Section 6 compares the main results of this paper with those of its predecessor paper, Bargain et al. (2013). Section 7 concludes.

2. Conceptual framework

Generally, different concepts of a 'fiscal union' are possible and options discussed include fiscal rules for the member states for policy coordination and supervision, crisis resolution mechanisms (such as the European Stability Mechanism (ESM) or the ECB Outright Monetary Transaction (OMT) program) and a European fiscal capacity in form of a macroeconomic shock absorption mechanism or an EMU-wide unemployment insurance system (see e.g. Bordo et al. 2011, Fuest and Peichl 2012). The latter element would be a clear step towards an integration (of elements) of the member states' tax and transfers systems. Even if not being on the political agenda in the foreseeable future, a fully integrated fiscal union complementing the European currency union can be seen as a final step of economic integration in Europe and its analysis will provide important insights in general issues of deeper fiscal integration,. In this paper, we focus on an institutional setting in which 10 per cent of national tax-benefit systems are replaced by an harmonized EMU system. In addition, our method easily allows extending the simulation to full integration, i.e. where the integrated system replaces national institutions by 100 per cent. In order to simplify the exposition in this section, we thus define a fiscal union as a complete integration of its member states' tax and transfer systems or as a fiscal equalization mechanism that fully equalizes differences in taxing capacities across countries. A "partly" integrated system will then only be a weighted average of the supra-national and the national institution for each country.

EMU tax-transfer system. Consider first how taxes and transfers at the level of the member countries are derived. In each country, gross market income X_i of household *i* is defined as the sum of all incomes from market activities:

$$X_i = E_i + Q_i + I_i + P_i + O_i + SICER_i, \quad (1)$$

where E_i is labor, Q_i business, I_i capital, P_i property, and O_i other income. We also assume that employer social insurance contributions $SICER_i$ are borne by the employee. Disposable income Y_i is defined as market income minus net government intervention $T_i = TAX_i + SIC_i - BEN_i$:

$$Y_i = X_i - T_i = X_i - (TAX_i + SIC_i - BEN_i), \quad (2)$$

where TAX_i are income taxes, $SIC_i = SICER_i + SICEE_i$ is the sum of employer and employee ($SICEE_i$) social insurance contributions, and BEN_i are cash benefits (i.e. negative taxes). In the following, we refer to the difference between taxes and social insurance contributions paid and transfers received, T_i, as 'net taxes'. Household disposable income will be determined by country specific net tax schedules

$$T_{i,k} = f_k(X_i, \boldsymbol{z_i}), \quad (3)$$

where $\boldsymbol{z_i}$ is a vector of all demographic characteristics relevant for taxation, such as marital status, age or number of children and $f_k(X_i, \boldsymbol{z_i})$ is a function that transforms market income X_i into disposable income $Y_{i,k}$ (which might be non-linear).

Now, we assume that countries *k=1,...,K* introduce a common tax and transfer system denoted $T_{i,EU} = f_{EU}(X_i, \mathbf{z_i})$, (with subscript *EU* denoting the fiscal union). An important precondition for its implementation

is that the reform will be performed in a revenue neutral way at the overall level. Thus, we assume that this tax system is constructed such that, for the union as a whole and given market incomes, it generates the same net tax revenue as the national tax systems in sum do. The easiest way to introduce a revenue neutral common tax system by construction is to use the "average" system over all participating countries, i.e.

$$T_{i,EU} = f_{EU}(X_i, \boldsymbol{z_i}) = \frac{1}{K}\sum_{k=1}^{K} f_k(X_i, \boldsymbol{z_i}). \quad (4)$$

Taking the average of the national systems is certainly a specific assumption in constructing a fiscal union and can be debated. However, we argue that as a first step, it appears to be a natural approach since the national tax systems enter the joint system with the weight of its respective population. Then, the more similar (different) the national tax systems are, the less (more) pronounced will be the "averaging" effect. As shown by Bargain et al. (2013), it is then very straightforward to alter the design of the common system by, for instance, changing its progressivity into the direction of a certain group of countries while compromising on the tax-transfer design of the remaining member states. In the present paper, we do not alter the average system but rather provide a first point of reference without entering the debate about generally increasing or decreasing the size of the government nor the debate about which specific tax-transfer design among different countries should be favored.

One remark has to be made with respect to effects on overall tax revenue and national budgets. As mentioned above, we assume that the fiscal union will be introduced in a revenue neutral way at the overall level. However, this generally implies non-revenue neutrality at the national level. The reason is that the integrated system collects revenue from all citizens in the participating countries and we assume that this revenue goes to a common budget. Thus, the member states lose their tax revenue. We therefore have to make an important further assumption, which is, that the net revenue now available at the union level is redistributed to the member states *after* the implementation of the reform such that each national government is fully compensated for the loss in its *initial* net revenue. The main reason for this assumption is that national expenditures on public goods and services, as well as revenue from other tax sources at the national level and national public deficits should be unaffected by the reform. As we do not consider any behavioral adjustments to the tax reform, the revenue collected at the union level will be sufficient to compensate the governments of the member states for their net revenue losses. In sum, what essentially changes are the revenues from direct taxes and the expenses for cash transfers, collected from and paid to the households within the single countries, affecting their net tax burdens, while all revenues and expenditures outside the direct tax and (cash) transfer system are kept constant. In other words, redistribution is performed between households in terms of disposable income, not between countries in terms of revenues.

EMU fiscal equalization mechanism. The situation is different when introducing a fiscal equalization mechanism for countries *k=1,...,K.* Here, we assume national tax and transfer systems to be unaffected but that tax revenue is redistributed between the member states as in most existing fiscal equalization schemes which are typical for federal states. We take the net revenue from the (hypothetical) EMU average tax and transfer system as an indicator for the taxing capacity of individual member states. Member states in which this indicator is below (above) the EMU average will be recipients (contributors) from (to) the fiscal equalization mechanism.

3. Empirical strategy

3.1 Data: EU-SILC and EUROMOD

We use EUROMOD as a basis for our analysis. EUROMOD is a static tax-benefit calculator for the EU countries which allows for comparative analysis of tax-benefit systems and their impact on the income

distribution in a consistent way through a common framework. EUROMOD input-data are mainly based on the European Union Statistics on Income and Living Conditions (EU-SILC) released by Eurostat.

The simulated components include most direct taxes (especially income taxes on all sources of income including tax credits, payroll taxes and social insurance contributions) and benefits (e.g. welfare benefits, social assistance and some transfers based on previous contributions, e.g. unemployment benefits). Information on consumption is missing in the data; hence indirect taxes and taxes on corporate profits are not included in the model, likewise in-kind benefits. Clearly, these elements differ between countries and would affect the results presented. However, with view to an integration of tax-transfer policies across EMU member states, one can argue that also existing fiscal unions do not cover all taxes and transfers at the federal level. Also, EUROMOD assumes full benefit take-up and tax compliance focusing on the intended effects of tax-benefit systems.

The main stages of the simulations are as follows. First, a representative micro-data sample of households (including information on all gross income components as well as demographic characteristics that are relevant to determine taxes and benefits) and the respective tax benefit rules are read into the model. Subsequently, the model constructs corresponding assessment units (for instance the individual or household) for each tax and benefit instrument according to the underlying eligibility rules. On that basis, all taxes and benefits are simulated and disposable income is calculated.

In this paper, we use the EU-SILC wave of 2008, covering information for 2007, i.e. income data from the year before the crisis, and apply 2007 tax-transfer rules. While simulations are usually carried out for counterfactual situations, EUROMOD also simulates various taxes and transfers for the baseline that are not observed in the original data. For our purpose, we use the original data provided by EUROMOD complemented by those simulated components. For more detailed information on the current version of EUROMOD and the underlying input data, see Sutherland and Figari (2013). In the next section, we explain how the EUROMOD data and model is used to construct an integrated EU-wide tax-benefit model.

3.2 Tax-transfer integration

The simulation of an EMU tax-benefit system, as introduced in Section 2, proceeds in three steps. First, we use EUROMOD to extract net taxes for each individual (and household) *i* in representative samples for each country *k*. In particular, EUROMOD simulates the country-specific net taxes (income and payroll taxes minus benefits) $T_{i,k} = f_k(X_i, \mathbf{z_i})$ as a function of gross market income X_i and a vector of non-income factors $\mathbf{z_i}$ taken from the data.

Second, using those simulated net taxes $T_{i,k}$, we obtain the "average EMU tax function" $T_{i,EU}$ so that it yields the same net revenue at the EMU level as the national systems in sum do. In order to calculate this average system, we adopt an Ordinary Least Squares (OLS) regression approach and estimate the following reduced form tax function on the pooled sample:

$$T_{i,k} = \omega_i f_{EU}(X_i, \mathbf{z_i}) + \varepsilon_i. \qquad (5)$$

Function f_{EU} is specified as a transformation of $(X_i, \mathbf{z_i}) \rightarrow T_{i,k}$. ε_i is the OLS residual and ω_i the household sample weight. We use a flexible functional form with higher order polynomials and interaction terms of income and all relevant characteristics observed in the data for the assignment of taxes and benefits (such as gross income from various sources, household size, age and number of children and old people, marital status, characteristics determining eligibility for certain benefits and pensions, homeownership etc.). Given that weights sum up to the EMU population size, this function directly accounts for a population weighted average tax function at the EMU level. Third, the estimated function is subsequently used to predict net tax payments for the EMU average tax system $T_{i,EU}$ for each household in the sample. In Section 4, net taxes to be paid by each household are then calculated as a weighted average of national and EMU average net taxes:

$$T_i = \alpha T_{i,EU} + (1-\propto) T_{i,k};\ \alpha \in \{0.1,1\}. \qquad (6)$$

3.3 Descriptive information

In this section we report descriptive information on the variables used in our simulation exercise as well as for the estimated tax-benefit scenarios. We report values of these variables at the overall EMU level and for individual countries in Table 1.

Columns 2 and 3 of Table 1 show the average monthly gross and disposable incomes per household, respectively (population shares in the first column). Columns 4 to 6 include initial gross taxes, (employee and employer) social insurance contributions (SIC) and benefits. Column 7 reports initial net taxes, namely income taxes plus SIC paid minus cash benefits received. The final column reports net taxes emerging under the EMU average system. Note that by construction, the EMU system leads to the same net tax revenue as the sum of the national systems.

TABLE 1 ABOUT HERE

Table 1 reveals considerable differences across individual countries with respect to income levels. Average monthly gross income ranges from 6479 Euros in Luxembourg, 169 per cent of the EMU average of 3829 Euros, to a value of 1266 Euros in Slovakia, just 33 per cent of the EMU average. However, one should note that these income levels are not adjusted for differences in purchasing power, which would render income differentials somewhat smaller. Initial net taxes also differ considerably, between 1536 Euros in the Netherlands and 300 Euros in Malta. Net taxes would change significantly if the EMU average system completely replaced the national systems. They would increase to 2522 Euros in Luxembourg while the countries with the largest net transfers would now be Slovakia (273 Euros) and Estonia (31 Euros). This is plausible because these countries have the lowest gross income levels.

4. Economic effects of an integrated EMU tax-transfer system

In this section we present the key results of our first simulated policy scenario, the introduction of an EMU-wide tax and transfer system that replaces 10 per cent of national systems. Section 4.1 focuses on redistributive effects while section 4.2 analyzes the potential of the EMU average tax system to act as an automatic fiscal stabilizer in presence of a proportional income shock.

4.1 Income redistribution

As outlined above, we analyze redistributive effects if 10 per cent of national tax and transfer systems are replaced by the harmonized EMU system. This corresponds to an average of 3 per cent of net EMU taxes relative to average household gross income (cp. Table 2, column 9) or 1.6 per cent relative to EMU GDP, a value close to the size of the EU budget which currently accounts for around 1 per cent of overall EU GDP.
How does the 10%-introduction of the common tax and transfer system redistribute income between households and affects inequality in Europe? Table 2 summarizes information on changes in median disposable income and the Gini coefficient. The median households in Ireland (-2,4 per cent) and Luxembourg (-2,5 per cent) would bear the largest losses whereas the highest gains would occur in Slovakia (+7,3 per cent) and Estonia (+5,9 per cent). In general, countries with median household incomes clearly above (below) the EMU average lose (gain) from the introduction of the common tax and transfer system. This is illustrated in Figure 1 showing the net tax functions for the national and the EMU average tax and transfer system. Compare the two countries with the largest relative changes in disposable income. While households in Slovakia would gain from sharing a joint tax and transfer system with richer countries (illustrated by the national net tax function being constantly above the EMU average function), the opposite is true for Irish households. Yet, most of the countries are only marginally affected, with changes in median

income below 1 per cent. This is due to the relatively modest extent of transfers across households with the 10%-integrated system, as shown in columns (7) and (8) (both equal 0 at the overall level by construction). Table A.1 in the appendix shows that these effects would become much more substantial for the case of full integration. In addition, Tables 2 and Table A.1 reveal that countries whose median household incomes are close to the EMU average might be very ambiguously affected now. This can be explained by the heterogeneity of national tax and transfer systems. Median households in Austria and Belgium, for instance, have similar disposable incomes, but while the median household in Austria loses, the median household in Belgium is almost not affected. Another interesting example is a comparison of Greece and Italy. In Greece (Italy), median disposable income is below (above) the EMU average, but the median household in Greece (Italy) loses (gains) from the introduction of the average EMU tax and transfer system. This (counterintuitive) result can again be illustrated by a comparison of the net tax functions of Greece and Italy (Figure 1). The EMU average is more (less) progressive than the Greek (Italian) system which leads to income losses (gains) for households with gross incomes above a certain income level.

TABLE 2 ABOUT HERE

Column (6) of Table 2 shows that inequality in the EMU as a whole declines while inequality changes in EMU member countries differ substantially. The largest inequality reduction can be observed in Estonia and Slovakia (-5 per cent). The EMU average net tax function is constantly below the national function (Figure 1) and lower income households gain more (both in absolute and relative terms) from the introduction of the common tax and transfer system than higher income households. Malta is another example where inequality would decrease (-2 per cent). As is shown in Figure 1, the EMU and the national function cross, implying that low income households would receive higher transfers whereas high income households would face a larger tax burden under the EMU average system. In Ireland, the Gini coefficient would increase by 1 per cent under the 10%-EMU average system. There, the EMU net tax function is constantly above the national function. All these findings translate into much more substantial changes for the case of full integration, as shown in Table A.1 in the appendix.

FIGURE 1 ABOUT HERE

4.2 Automatic fiscal stabilization

A key argument of proponents of enhanced fiscal integration is an increase in macroeconomic stability, both at the level of individual countries and the Eurozone as a whole. Automatic fiscal stabilization is associated with the ability of taxes and transfers to automatically stabilize disposable income and consequently consumption in the event of macroeconomic shocks. This relies on a simple mechanism: in the presence of a given negative shock to gross income, taxes decline and transfers increase, with the decline in disposable income being smaller than the shock to gross income. Several components of government budgets are affected by the macroeconomic situation in ways that operate to smooth the business cycle, with progressive income taxes and unemployment benefits being the most prominent example. Automatic stabilization might not only have effects on disposable income but also on GDP itself. If fewer taxes are collected and more transfers are paid in a recession, this should support private incomes and dampen adverse movements in aggregate demand.

Naturally, cushioning shocks through taxes and transfers comes at the cost of an increase in the government budget deficit. The usual assumption is for this gap to be closed through debt financing. However, in the current Eurozone debt crisis, some countries have lost access to private capital markets and thus need outside help to close this gap. We will return to this issue further below.

The extent to which automatic stabilizers mitigate the impact of income shocks on household demand essentially depends on the tax and transfer system, determining the way in which a given shock to gross

income translates into a change in disposable income. For instance, in the presence of a proportional income tax with a tax rate of 40%, a shock on gross income of 100 Euros leads to a decline in disposable income of 60 Euros. In this case, the tax absorbs 40% of the shock to gross income. In turn, a progressive tax would have a stronger stabilizing effect (van den Noord 2000, Girouard and André 2005).

A common measure for estimating automatic stabilization is the "normalized tax change" used by Auerbach and Feenberg (2000) which can be interpreted as *"the tax system's built-in flexibility"* (Pechman 1973, 1987). Based on this idea, Dolls et al. (2012) define the *"income stabilization coefficient"*, τ, that shows how changes in market income X (defined as the sum of all incomes from market activities such as (self)-employment, business and property income) translate into changes in disposable income Y (market income minus taxes plus benefits) through changes in net tax payments T. They extend the concept of normalized tax change to include other taxes as well as SIC and transfers. We follow their approach, taking into account personal income taxes (at all government levels), SIC as well as payroll taxes and transfers to private households, such as unemployment benefits. τ is computed using arithmetic changes in total disposable income ($\sum_i \Delta Y_i$) and market income ($\sum_i \Delta X_i$) based on household micro level information:

$$\tau = 1 - \frac{\sum_i \Delta Y_i}{\sum_i \Delta X_i} = \frac{\sum_i (\Delta X_i - \Delta Y_i)}{\sum_i \Delta X_i}. \qquad (7)$$

In order to compute the income stabilization coefficient, we simulate a proportional shock to gross income of 5% for all households. Note that automatic stabilization is a static concept and does not imply any (macro- or microeconomic) feedback mechanism. Results are presented in Table 3, with income stabilization coefficients for the national (see also Dolls et al. 2012) and the EMU average system.

TABLE 3 ABOUT HERE

How does the 10%-EMU tax-benefit system cushion shocks in individual countries? It is not surprising that such a modest level of integration only slightly affects overall automatic stabilization, which is mostly provided by national systems (Table 3, column 2). Yet, given the experience of the recent recession, it is especially important to take a scenario into account in which an individual country loses access to the credit market. In this case, it cannot let the national stabilizers work and would have to adjust taxes or expenditures to keep the budget balanced. In such a scenario, the credit-constrained country would benefit from an EMU tax and transfer system in terms of automatic stabilization under the assumption that the EMU budget deficit can be financed by issuing debt. In the given 10%-scenario, this leads to income stabilization coefficients around 5 per cent for all countries, which are now very similar as they can only differ due to differences in income levels or demographic composition, but not due to the tax-transfer system (column 3). The same is true for the benchmark case of full fiscal integration as shown in Table A.2 in the appendix. Yet, the differences to the national stabilizers are much more pronounced and 9 (7) countries would experience a strengthening (weakening) of automatic stabilizers when completely moving from the national to the average EMU system, with highest gains in Cyprus, Greece and Malta. Germany is the only country whose automatic stabilizers would not be affected by the reform. In sum, these results show that the level of integration would need to be sufficiently high in order to provide significant improvement in automatic stabilization.

5. Economic effects of an EMU fiscal equalization mechanism

In this section, we analyze a system of fiscal equalization based on differences in taxing capacity across countries in the Eurozone, calculating transfers between countries that would be generated by this mechanism and considering two variants of a negative macroeconomic shock. We first calculate the extent to which a fiscal equalization mechanism would provide insurance against a shock specific to a subset of countries (the 'GIIPS' group), and second, a shock comparable to the 2008-09 recession.

More precisely, the simulation experiment is set up as follows. The fiscal equalization system we consider leaves the national tax and transfer systems in place yet redistributes tax revenue across countries. This

redistribution is based on the hypothetical ability of a country to generate tax revenue and its expenditure needs, which we refer to in the following as its (net) taxing capacity. Basing fiscal equalization on indicators of tax revenue and expenditure needs is a common approach in existing federations (see e.g. Boadway, 2004; Büttner, 2006). We define the taxing capacity of a country as the net tax revenue the country would raise from its households if fully applying the EMU average tax and transfer system considered in Section 4. This taxing capacity can be interpreted as an indicator of the amount of net tax revenue raised by a country if tax rates and transfers were set as in other countries, and serves as the basis for equalization payments: countries above (below) the average taxable capacity will pay (receive) transfers to (from) the equalization mechanism.

This setup can be interpreted as a simple version of a European 'transfer union'. In line with our first simulation experiment, we also focus on a fiscal equalization system compensating for 10 per cent of the differences in taxing capacities. This corresponds to rather modest changes in tax revenue, up to 9 per cent (Slovakia) of average household gross income (Tables 4 and 5, column 11). In the appendix, we compare this scenario to the benchmark case of a fiscal equalization system that fully compensates for differences in taxing capacity. One remark has to be made with respect to how these payments affect the distribution of taxes and transfers *within* a country, which is less straightforward. For simplicity we assume that the equalization payments are shared equally among households, i.e. households receive a (positive or negative) lump-sum transfer. Note that this assumption is not crucial for the stabilization effects we focus on. The question here is only whether a country as a whole receives more or less money from the equalization system after being hit by a shock. If it receives more, it can let its own automatic stabilizers work.

Table 4 shows the average household net tax payments by country in the baseline as well as for the EMU average system, which serves as our measure of taxing capacity. The resulting 10%-fiscal equalization payments are reported in column 3 (a positive (negative) value indicates a net contributing (receiving) country), while column 4 includes the new distribution of net taxes.

TABLE 4 ABOUT HERE

Consider first the direct cross country distributional effect of the fiscal equalization system. As expected, the high income countries are net contributors to the system with average contributions per household and month ranging from 120 Euros in the case of Luxembourg to 9 Euros in France. Accordingly, the countries with below average taxing capacity receive transfers including Cyprus, Estonia, Greece, Italy, Malta, Portugal, Slovakia, Slovenia and Spain. In Slovakia and Estonia, the fiscal equalization payments amount to more than 100 Euros.

What are the implications of this system for automatic stabilizers? Consider an asymmetric shock in the form of a decline in gross incomes by 5% hitting the periphery of the Eurozone, i.e. the 'GIIPS' countries, which corresponds to a 2% shock at the aggregate EMU level (column 5). The shock leads to a reduction in the net tax payments collected in the affected countries (column 6), as well as a reduction in their taxing capacity (column 7). Consequently, the fiscal equalization payments have to be adjusted for all countries (column 8), resulting in a new distribution of net taxes (column 9). Finally, column 10 reports the automatic stabilization effect of the fiscal equalization scheme in the affected countries measuring the change in fiscal equalization payments as a percentage of the change in income caused by the shock. The positive values indicate that the affected countries receive higher equalization payments after the shock, i.e. the fiscal equalization mechanism exerts a stabilizing effect. While this effect is moderate in the given scenario, the comparison to Table A.3 in the appendix shows that a full compensation of differences in taxing capacities would have rather extreme implications, yet, preserving the qualitative findings in Table 4.

TABLE 5 ABOUT HERE

Next, we consider a severe shock scenario, such as the recent economic crisis. To illustrate this, we take the observed reduction in GDP for all 17 countries under analysis from 2008 to 2009 (4 per cent on average) in

order to adjust gross incomes. All countries experienced a substantial reduction in GDP during that period, ranging from 2 to 14 per cent. In such a situation, the average taxing capacity substantially declines at the EMU level, from 1191 Euros per household before to 1085 Euros per household after the shock. Fiscal equalization contributions increase for the contributing countries Belgium and France and decrease for the recipient countries Cyprus, Greece, Malta, Portugal, Slovakia and Spain. Consequently, all of these countries experience a destabilizing effect. This effect is most pronounced for Malta and Slovakia, where payments received from the scheme fall by 13 per cent of the income shock. Why do we find a destabilizing effect for some countries in this scenario? The reason is that the shock has two effects. Firstly, the taxing capacity of the countries affected by the shock declines which, all other things being equal, increases (decreases) equalization payments for recipients (contributors). Secondly, since other countries are also affected by the shock, the overall taxing capacity within the union declines as well. This second effect works in the opposite direction of the first one. For those countries whose gross income shock is relatively small compared to the EMU average, the latter effect dominates the former which leads to a destabilizing effect. As above, these effects are substantially larger when considering the case of full equalization in Table A.4 in the appendix, leading to extreme destabilizing effects for Malta and Slovakia of even more than 100 per cent.

6. Discussion of results

How do our results differ from those presented in the predecessor paper Bargain et al. (2013)? Most importantly, we have extended the sample from the 11 founding members of EMU to the current 17 member states and have used more recent income data from 2007, the year before the start of the crisis. Moreover, we have calibrated the size of the EMU tax-transfer system and fiscal equalization system such that transfers across countries are comparable to operating budgetary balances of the EU budget. This necessarily affects the design of the average EMU tax and transfer system and its redistributive effects. However, the general factors driving redistribution across households, namely the level of the net tax burden in a country relative to the EMU average, the income level and changes in labor supply, have not changed. In this paper, we have focused on the first two factors and abstracted from the latter as labor supply adjustments only marginally changed the direct impact of the reforms considered in Bargain et al. (2013). While households in Greece and Portugal would experience largest income gains if only the 11 founding member states shared a joint tax and transfer system, this pattern changes under a joint system for the 17 EA member states with households in Slovakia and Estonia as the main profiteers. This is not surprising given that average incomes in these countries are much lower than in Southern Europe. For the fiscal equalization mechanism, our results are also in line with those in Bargain et al. (2013) with the exception that we do not find a destabilizing effect for Greece in the scenario where only the 'GIIPS' countries are hit by a shock. In our case, the effect of the growing gap between the taxing capacity in the affected countries and the EMU average dominates the effect of a declining taxing capacity in the union as a whole which can be explained by the fact that the new member states in Eastern Europe have rather low taxing capacities.

Our results should be interpreted in the light of the limitations of our analysis, and also the simplifying assumptions made. Our analysis abstracts from a number of behavioral effects. In particular, we do not account for labor supply reactions, tax evasion and avoidance or income shifting. If one assumes that tax evasion is higher in countries with lower incomes, our simulations would underscore the degree of redistribution from high to low income countries caused by the introduction of a common tax system. In addition, we have abstracted from potential effects of fiscal integration on cross country migration. For instance, more generous transfers to households in poor countries or countries affected by macroeconomic shocks could prevent their migration to other countries if they are unemployed. Among other things, this would make adjustments to asymmetric shocks more difficult.

7. Conclusion

The current debt crisis in the Eurozone has brought the idea of deeper fiscal integration to the top of the European policy agenda. In this paper, we have re-assessed the economic effects of two main options for fiscal integration: i) the introduction of an harmonized EMU tax and transfer system that replaces the existing national systems by 10 per cent; and ii) the introduction of a fiscal equalization mechanism that compensates for 10 per cent of the differences in taxing capacities across countries..

With respect to redistributive concerns, our analysis shows that introducing a 10%-EMU tax and transfer system would lead to moderate redistribution between countries. In particular households in Eastern and some Southern European countries would gain from sharing a joint tax and transfer system with other Eurozone countries while households in Ireland and Luxembourg would suffer the largest income losses. A key motivation of introducing an EMU tax-benefit system could be an increase in automatic fiscal stabilization in the different member countries. Yet, our analysis shows that automatic stabilizers would only marginally be strengthened in a majority of EMU countries.

Regarding the system of fiscal equalization, we consider a scheme that neutralizes the difference between the taxing capacity of an individual country and the average EMU taxing capacity by 10 per cent. Unsurprisingly, this system leads to a transfer of tax revenue from high to low income countries. However, the achievements are disappointing in terms of income stabilization in the presence of shocks hitting all member states with the fiscal equalization mechanism having a destabilizing effect for some countries. An important policy implication of this analysis is the necessity of distinguishing between the redistributive effects of fiscal integration and its stabilization effects in the presence of macroeconomic shocks.

To summarize, our analysis highlights that further fiscal integration could indeed improve fiscal stabilizers in the Eurozone and reduce the vulnerability of individual member states to income shocks somewhat. Yet, it seems that this can only be achieved with much higher levels of fiscal integration than considered in our main scenarios, implying also more income redistribution across countries. Thus, it seems unlikely that such reforms will find political support, suggesting that fiscal institutions of existing federations, which typically combine redistributive and stabilizing effects, may not be the way forward for Europe. Instead, it may be necessary to explore ways of improving macroeconomic stability ideally without redistributing income ex ante. Rather than copying fiscal institutions of existing federations, Europe seems to need new concepts to make deeper fiscal integration politically feasible.

This paper points to various opportunities for future research. Firstly, it would be interesting to study particular aspects of a common tax and transfer system, such as a common unemployment insurance system, as recently suggested by EU Commissioner Andor. Secondly, our finding that a fiscal stabilization mechanism may have destabilizing effects in the event of an asymmetric shock suggests that other designs for a ‘fiscal capacity’ that provide such insurance are needed and should be studied. One possible design would be a system where grants are only provided to countries if they are actually hit by a shock, i.e. such a system would only grant transfers to countries in times of crisis. Thirdly, it would be desirable to quantify the potential welfare benefits of improved insurance and stabilization through fiscal integration compared to its redistributive effects. This would require the introduction of some notion of risk aversion into the analysis, which raises a number of interesting challenges (cf. Neumann 2013). Finally, our analysis has taken the policies of the member states as given. However, one can expect the member states to adjust their fiscal policies as a reaction to fiscal integration, which is important to take into account from a political economy perspective on deeper integration in Europe. We intend to pursue these issues in future research.

References

Auerbach, A. and D. Feenberg (2000). 'The significance of federal taxes as automatic stabilizers', *Journal of Economic Perspectives*., 14 (3), pp. 37-56.

Bargain, O., M. Dolls, C. Fuest, D. Neumann, A. Peichl, N. Pestel and S. Siegloch (2013). 'Fiscal Union in Europe? Redistributive and stabilising effects of a European Tax-Benefit System and Fiscal Equalisation Mechanism', *Economic Policy*, July 2013, pp. 375-422.

Bertola, G. (2013). 'Policy coordination, convergence, and the rise and crisis of EMU imbalances, CEPR Discussion Paper 9471.

Boadway, R. (2004). 'The theory and practice of equalisation', *CESifo Economic Studies*, 50 (1), pp. 211-254.

Bordo, M., A. Markiewicz and L. Jonung (2011). 'A fiscal union for the Euro: some lessons from history', NBER Working Paper No. 17380.

Büttner, T. (2006). 'The incentive effect of fiscal equalization transfers on tax policy', *Journal of Public Economics*. 90, pp. 477-497.

Dolls, M., C. Fuest and A. Peichl (2012). 'Automatic stabilizers and economic crisis: US vs. Europe', *Journal of Public Economics*. 96, pp. 279-294.

Drèze, J. and A. Durré (2013). 'Fiscal integration and growth stimulation in Europe', CORE DP 2013/13.

Dullien, S. (2013). 'A euro-area wide unemployment insurance as an automatic stabilizer: Who benefits and who pays', paper prepared for the European Commission.

Enderlein, H., L. Guttenberg and J. Spiess (2013). 'Blueprint for a cyclical insurance in the euro area', Project "EU&Differentiated Integration".

Engler, P. and S. Voigts (2013). 'A transfer mechanism for a monetary union', SFB649 Discussion Paper 2013-013.

EUROMOD (2008). 'EUROMOD statistics on distribution and decomposition of disposable income', accessed at www.iser.essex.ac.uk/msu/emod/statistics/, using EUROMOD version no. D21 (June 2008).

European Commission (2012), 'A blueprint for a deep and genuine economic and monetary union – Launching a European Debate'.

Evers, M. (2012). 'Federal fiscal transfer rules in monetary unions', *European Economic Review*, 56, pp. 507-252.

Farhi, E. and I. Werning (2012). 'Fiscal Unions', NBER Working Paper No. 18280.

Fuest, C. and A. Peichl (2012). 'European fiscal union: What is it? Does it work? And are there really 'no alternatives'?' *CESifo Forum*. 13 (1), pp. 3-9.

Girouard, N. and C. André (2005). 'Measuring cyclically-adjusted budget balances for OECD countries', OECD Economics Department Working Papers No. 434.

IMF (2013). 'Toward a Fiscal Union for the Euro Area', IMF Staff Discussion Note.

Neumann (2013). 'Benefiting from a European fiscal union? Redistribution vs. stabilization', mimeo.

Pechman, J. (1973). 'Responsiveness of the federal income tax to changes in income', *Brookings Papers on Economic Activity*.

Pechman, J. (1987). 'Federal tax policy', Brookings Institution, Washington.

van den Noord, P. (2000): 'The size and role of automatic fiscal stabilisers in the 1990s and beyond', OECD Economics Department Working Papers No. 230.

Sutherland, H. and F. Figuri (2013): 'EUROMOD: The European Union Tax-Benefit Microsimulation Model', EURMOD Working Paper Series: EM8/13.

Figures and Tables

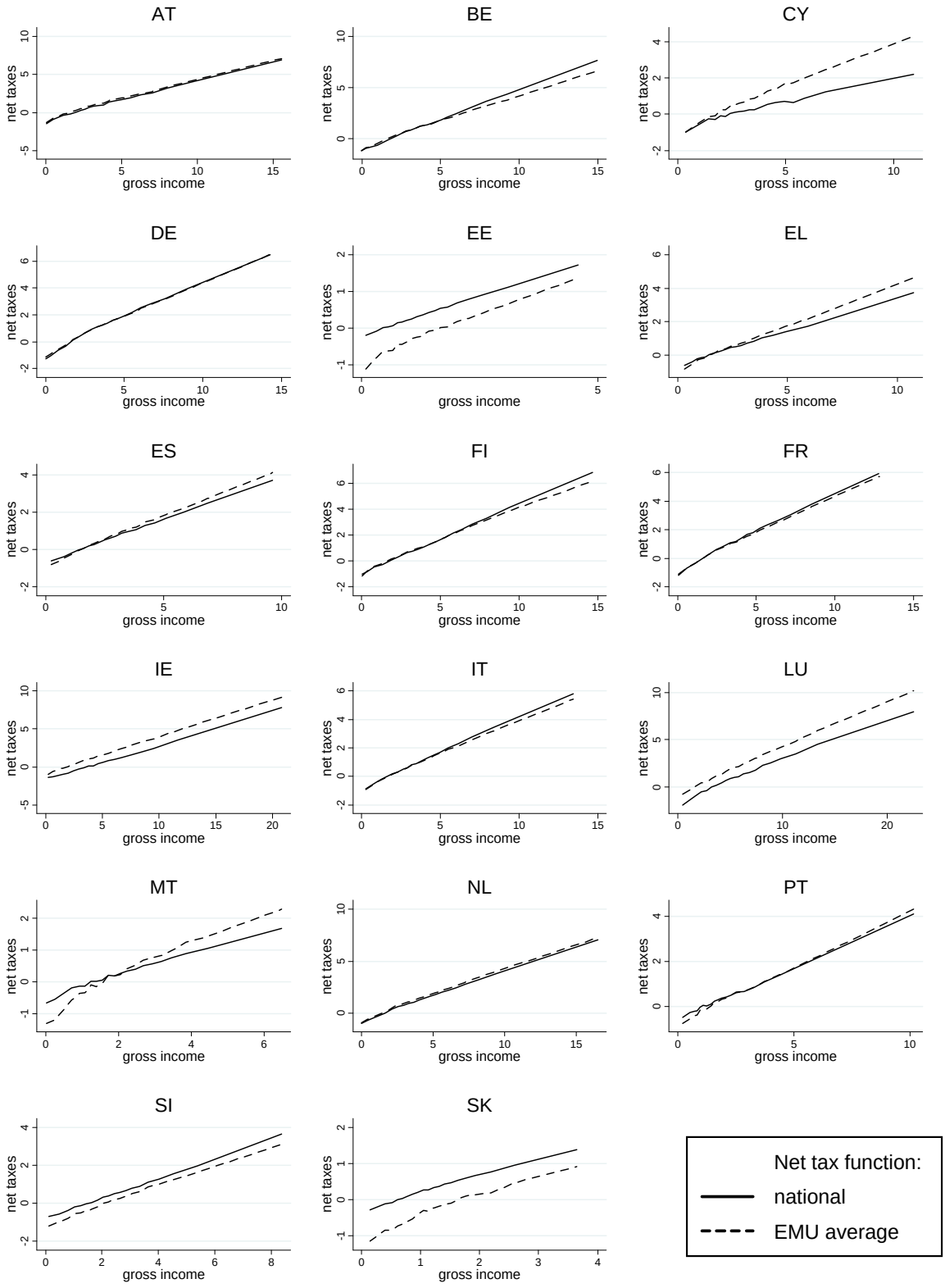

Figure 1 National tax-benefit schemes compared to EMU average system Note: Based on country means for gross income ventiles; monthly thousand 2007 EUR. Sources: Own calculations based on EU-SILC and EUROMOD.

Table 1 Average monthly household income and taxes (2007 EUR)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
EMU	1.000	3829	2625	543	1107	446	1204	1204
AT	0.027	4349	3058	593	1293	594	1291	1464
BE	0.033	4309	2822	861	1143	516	1487	1375
CY	0.002	3598	3264	238	488	392	334	959
DE	0.279	4026	2673	666	1112	424	1353	1367
EE	0.004	1419	975	179	369	104	444	-31
EL	0.030	2675	2138	294	577	334	537	631
ES	0.129	3245	2397	311	851	313	849	940
FI	0.018	4260	2854	938	1001	533	1405	1359
FR	0.188	3994	2610	410	1462	487	1384	1318
IE	0.012	4872	4422	744	635	929	450	1462
IT	0.173	3951	2714	664	1128	555	1237	1146
LU	0.001	6479	5105	794	1426	847	1373	2522
MT	0.001	2245	1944	200	344	244	300	299
NL	0.054	4660	3125	634	1274	372	1536	1694
PT	0.028	2385	1824	243	609	291	561	496
SI	0.005	2587	1942	261	790	406	645	323
SK	0.014	1266	933	69	429	164	333	-273

Note: (1) Population share; (2) gross income; (3) disposable income; (4) gross taxes; (5) gross SIC; (6) gross benefits; (7) net taxes baseline; (8) net taxes EMU average. Sources: Own calculations based on EU-SILC and EUROMOD.

Table 2 Disposable income and income inequality - 10% EMU average system

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
EMU	2298	2297	-0.1	0.326	0.326	-0.3	0	0.0	3.1
AT	2634	2613	-0.8	0.318	0.318	0.2	-17	-0.4	3.4
BE	2609	2613	0.2	0.301	0.302	0.5	11	0.3	3.2
CY	2942	2897	-1.5	0.284	0.281	-1.1	-63	-1.7	2.7
DE	2301	2302	0.1	0.328	0.327	-0.1	-1	0.0	3.4
EE	855	906	5.9	0.347	0.33	-5.0	48	3.3	-0.2
EL	1849	1848	0.0	0.347	0.344	-0.7	-9	-0.4	2.4
ES	2173	2164	-0.4	0.295	0.294	-0.5	-9	-0.3	2.9
FI	2581	2580	-0.1	0.318	0.319	0.3	5	0.1	3.2
FR	2355	2366	0.5	0.299	0.299	-0.1	7	0.2	3.3
IE	3961	3865	-2.4	0.312	0.315	0.9	-101	-2.1	3.0
IT	2426	2429	0.1	0.314	0.315	0.4	9	0.2	2.9
LU	4643	4525	-2.5	0.282	0.284	0.7	-115	-1.8	3.9
MT	1767	1766	-0.1	0.293	0.287	-2.2	0	0.0	1.3
NL	2846	2826	-0.7	0.33	0.331	0.2	-16	-0.3	3.6
PT	1480	1492	0.8	0.351	0.347	-1.2	7	0.3	2.1
SI	1817	1848	1.7	0.282	0.278	-1.3	32	1.2	1.2
SK	854	916	7.3	0.273	0.259	-5.1	61	4.8	-2.2

Note: (1) Median income; (2) median income integrated system; (3) percentage change in median income; (4) Gini; (5) Gini integrated system; (6) percentage change in Gini; (7) average difference in household income from national to integrated system; (8) share of (7) in average gross income in %; (9) share of net taxes under 10%-EMU average system in average gross income in %; incomes in monthly 2007 EUR. Sources: Own calculations based on EU-SILC and EUROMOD.

Table 3 Income stabilization coefficients (for 5% gross income shock) - 10% EMU average system

	(1)	(2)	(3)
EMU	0.51	0.51	0.05
AT	0.57	0.56	0.05
BE	0.63	0.61	0.05
CY	0.28	0.30	0.05
DE	0.51	0.51	0.05
EE	0.42	0.42	0.04
EL	0.38	0.39	0.05
ES	0.42	0.43	0.05
FI	0.55	0.55	0.05
FR	0.53	0.53	0.05
IE	0.46	0.47	0.05
IT	0.54	0.54	0.05
LU	0.46	0.46	0.05
MT	0.31	0.32	0.05
NL	0.48	0.48	0.05
PT	0.44	0.44	0.05
SI	0.48	0.48	0.05
SK	0.45	0.44	0.04

Note: (1) Baseline with national systems; (2) integrated system; (3) 10% EMU average system and national credit constraints. Sources: Own calculations based on EU-SILC and EUROMOD.

Table 4 10%-Fiscal equalization mechanism with 5% gross income shock to 'GIIPS' countries

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
EMU	1185	1191	0	1185	-2	1141	1146	0	1141	2	0.0
AT	1291	1379	19	1310	0	1291	1379	23	1314	0	0.4
BE	1487	1369	18	1505	0	1487	1369	22	1509	0	0.4
CY	334	1031	-16	318	0	334	1031	-11	323	0	-0.4
DE	1353	1362	17	1370	0	1353	1362	22	1375	0	0.4
EE	444	180	-101	343	0	444	180	-97	347	0	-7.1
EL	537	751	-44	493	-5	470	669	-48	422	3	-1.6
ES	849	993	-20	829	-5	755	889	-26	730	4	-0.6
FI	1405	1322	13	1418	0	1406	1322	18	1424	0	0.3
FR	1384	1284	9	1393	0	1384	1284	14	1398	0	0.2
IE	450	1457	27	477	-5	326	1299	15	341	5	0.5
IT	1237	1154	-4	1233	-5	1102	1025	-12	1090	4	-0.1
LU	1373	2395	120	1493	0	1374	2395	125	1499	0	1.9
MT	300	357	-83	217	0	301	357	-79	222	0	-3.7
NL	1536	1587	40	1576	0	1535	1587	44	1579	0	0.8
PT	561	554	-64	497	-5	493	484	-66	427	2	-2.7
SI	645	495	-70	575	0	645	495	-65	580	0	-2.7
SK	333	60	-113	220	0	333	60	-109	224	0	-8.9

Note: Monetary values are in monthly 2007 EUR. (1) Net taxes baseline; (2) net taxes EU average; (3) fiscal equalization (FE); (4) FE taxes; (5) gross income shock in %; (6) net taxes national system after shock; (7) net taxes EMU average after shock; (8) FE after shock; (9) FE taxes after shock; (10) change in automatic stabilization in %; (11) share of (3) in average gross income in %. (3) = (2)–1191; (4) = (1)+(3); (8) = (7)–1146; (9) = (6)+(8). Sources: Own calculations based on EU-SILC and EUROMOD.

Table 5 10%-Fiscal equalization mechanism with 2008-2009 shock to all countries

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
EMU	1185	1191	0	1185	-4	1075	1082	0	1075	-1	0.0
AT	1291	1379	19	1310	-4	1176	1270	19	1195	0	0.4
BE	1487	1369	18	1505	-3	1397	1291	21	1418	-3	0.4
CY	334	1031	-16	318	-2	311	989	-9	302	-10	-0.4
DE	1353	1362	17	1370	-5	1215	1225	14	1230	1	0.4
EE	444	180	-101	343	-14	324	76	-101	223	0	-7.1
EL	537	751	-44	493	-3	495	699	-38	456	-7	-1.6
ES	849	993	-20	829	-4	779	915	-17	762	-3	-0.6
FI	1405	1322	13	1418	-9	1152	1081	0	1152	4	0.3
FR	1384	1284	9	1393	-3	1297	1200	12	1309	-2	0.2
IE	450	1457	27	477	-5	314	1286	20	335	2	0.5
IT	1237	1154	-4	1233	-5	1089	1012	-7	1082	1	-0.1
LU	1373	2395	120	1493	-4	1224	2216	113	1338	3	1.9
MT	300	357	-83	217	-3	277	325	-76	202	-13	-3.7
NL	1536	1587	40	1576	-4	1424	1474	39	1463	0	0.8
PT	561	554	-64	497	-3	521	513	-57	464	-10	-2.7
SI	645	495	-70	575	-8	521	374	-71	451	1	-2.7
SK	333	60	-113	220	-5	296	31	-105	191	-13	-8.9

Note: See Table 4. (8) = (7)–1082. Sources: Own calculations based on EU-SILC and EUROMOD. Changes in GDP (column 5) from IMF.

Appendix

Table A.1 Disposable income and income inequality - 100% EMU average system

	(1)	(2)	(3)	(4)	(5)	(6)
EMU	2298	2276	-0.9	0.289	0.282	-2.4
AT	2634	2413	-8.4	0.253	0.267	5.6
BE	2609	2607	-0.1	0.226	0.26	14.8
CY	2942	2426	-17.5	0.247	0.208	-15.5
DE	2301	2286	-0.6	0.265	0.267	0.9
EE	855	1377	61.0	0.293	0.197	-32.8
EL	1849	1826	-1.3	0.322	0.284	-11.7
ES	2173	2076	-4.5	0.276	0.256	-7.4
FI	2581	2541	-1.6	0.244	0.257	5.5
FR	2355	2415	2.6	0.244	0.246	0.5
IE	3961	2862	-27.7	0.265	0.31	17.0
IT	2426	2471	1.8	0.284	0.278	-2.0
LU	4643	3472	-25.2	0.247	0.286	15.8
MT	1767	1786	1.1	0.264	0.225	-14.9
NL	2846	2656	-6.7	0.264	0.267	1.3
PT	1480	1578	6.7	0.327	0.297	-9.1
SI	1817	2118	16.6	0.226	0.209	-7.3
SK	854	1441	68.7	0.219	0.185	-15.3

Note: (1) Median income; (2) median income EU average; (3) percentage change in median income; (4) Gini; (5) Gini EU average; (6) percentage change in Gini; incomes in monthly 2007 EUR. Sources: Own calculations based on EU-SILC and EUROMOD.

Table A.2 Income stabilization coefficients (for 5% gross income shock) - 100% EMU average system

	(1)	(2)
EMU	0.51	0.51
AT	0.57	0.53
BE	0.63	0.51
CY	0.28	0.49
DE	0.51	0.51
EE	0.42	0.40
EL	0.38	0.46
ES	0.42	0.48
FI	0.55	0.52
FR	0.53	0.52
IE	0.46	0.50
IT	0.54	0.51
LU	0.46	0.51
MT	0.31	0.45
NL	0.48	0.51
PT	0.44	0.46
SI	0.48	0.49
SK	0.44	0.35

Note: (1) Baseline with national systems; (2) EU average system. Sources: Own calculations based on EU-SILC and EUROMOD.

Table A.3 100%-Fiscal equalization mechanism with 5% gross income shock to 'GIIPS' countries

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
EMU	1185	1191	0	1185	-2	1141	1146	0	1141	15
AT	1291	1379	188	1479	0	1291	1379	233	1524	0
BE	1487	1369	178	1665	0	1487	1369	223	1710	0
CY	334	1031	-160	174	0	334	1031	-115	219	0
DE	1353	1362	171	1524	0	1353	1362	216	1569	0
EE	444	180	-1011	-567	0	444	180	-966	-522	0
EL	537	751	-440	97	-5	470	669	-477	-7	27
ES	849	993	-198	651	-5	755	889	-256	499	36
FI	1405	1322	131	1536	0	1406	1322	176	1582	0
FR	1384	1284	93	1477	0	1384	1284	138	1522	0
IE	450	1457	266	716	-5	326	1299	153	479	46
IT	1237	1154	-37	1200	-5	1102	1025	-121	981	42
LU	1373	2395	1204	2577	0	1374	2395	1249	2623	0
MT	300	357	-834	-534	0	301	357	-789	-488	0
NL	1536	1587	396	1932	0	1535	1587	441	1976	0
PT	561	554	-637	-76	-5	493	484	-662	-169	21
SI	645	495	-696	-51	0	645	495	-651	-6	0
SK	333	60	-1131	-798	0	333	60	-1086	-753	0

Note: Monetary values are in monthly 2007 EUR. (1) Net taxes baseline; (2) net taxes EU average; (3) fiscal equalization (FE); (4) FE taxes; (5) gross income shock in %; (6) net taxes national system after shock; (7) net taxes EU average after shock; (8) FE after shock; (9) FE taxes after shock; (10) change in automatic stabilization in %. (3) = (2)–1191; (4) = (1)+(3); (8) = (7)–1146; (9) = (6)+(8). Sources: Own calculations based on EU-SILC and EUROMOD.

Table A.4 100%-Fiscal equalization mechanism with 2008-2009 shock to all countries

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
EMU	1185	1191	0	1185	-4	1083	1085	0	1083	-9
AT	1291	1379	188	1479	-4	1176	1267	182	1358	4
BE	1487	1369	178	1665	-3	1396	1289	204	1601	-22
CY	334	1031	-160	174	-2	311	989	-97	214	-95
DE	1353	1362	171	1524	-5	1227	1228	143	1370	14
EE	444	180	-1011	-567	-14	312	66	-1019	-708	4
EL	537	751	-440	97	-3	483	696	-389	94	-61
ES	849	993	-198	651	-4	777	926	-159	618	-32
FI	1405	1322	131	1536	-9	1184	1109	24	1207	30
FR	1384	1284	93	1477	-3	1309	1204	119	1429	-21
IE	450	1457	266	716	-5	298	1281	196	493	27
IT	1237	1154	-37	1200	-5	1100	1014	-71	1029	16
LU	1373	2395	1204	2577	-4	1206	2213	1128	2333	29
MT	300	357	-834	-534	-3	270	322	-763	-493	-121
NL	1536	1587	396	1932	-4	1443	1478	393	1836	2
PT	561	554	-637	-76	-3	519	511	-574	-55	-90
SI	645	495	-696	-51	-8	521	376	-709	-188	7
SK	333	60	-1131	-798	-5	296	30	-1055	-759	-121

Note: See Table A.4. (8) = (7)–1082. Sources: Own calculations based on EU-SILC and EUROMOD. Changes in GDP (column 5) from IMF.