Fiscal Union in Europe? Redistributive and Stabilising Effects of a European Tax-Benefit System and Fiscal Equalisation Mechanism

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Fiscal Union in Europe? Redistributive and Stabilising Effects of a European Tax-Benefit System and Fiscal Equalisation Mechanism [1]

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Abstract: The current debt crisis has given rise to a debate about deeper fiscal integration in Europe. The view is widespread that moving towards a 'fiscal union' would have a stabilising effect in the event of macroeconomic shocks. In this paper we study the economic effects of introducing two elements of a fiscal union: Firstly, an EU-wide tax and transfer system and secondly, an EU-wide system of fiscal equalisation. Using the European tax-benefit calculator EUROMOD, we exploit representative household micro data from 11 Eurozone countries to simulate these policy reforms and to study their effects on the distribution of income as well as their impact on automatic fiscal stabilisers. We find that replacing one third of the national tax and transfer systems by a European system would lead to significant redistributive effects both within and across countries. These effects depend on income levels and the structures of the existing national tax and transfer systems. The EU system would improve fiscal stabilisation especially in credit constrained countries. It would absorb between 10 and 15 per cent of a macroeconomic income shock. Introducing a fiscal equalisation system based on taxing capacity would redistribute revenues from high to low income countries. The stabilisation properties of this system, however, are ambiguous. This suggests that not all forms of fiscal integration will improve macroeconomic stability in the Eurozone.

JEL codes: H2, H3, J22

Keywords: European income tax, automatic stabilisation, fiscal union

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1 Introduction

The process of European unification, which started with the creation of the European Coal and Steel Community in 1951, has slowly but surely moved into the direction of increasing economic and political integration. The creation of a customs union and a common market followed, and the adoption of a single currency in the European Monetary Union (EMU) in 1999 was the latest major step (Sapir, 2011). But EMU is unlikely to be the final step. Proponents of deeper political integration in Europe have repeatedly argued that the European Union (EU) needs a larger budget and the right to levy taxes. For instance, Sijbren Cnossen argues in favour of "*a federal government with real taxing powers and financial leverage over the Member States to mitigate adverse effects that might arise from Member State tax policies*" (Cnossen, 2001, p. 466f). Lambert (2011) goes even further and develops a normative concept of an equitable EU tax redistribution system.

Until recently the idea of introducing federal fiscal structures in the EU was mostly discussed in academic circles and think tanks but played only a minor role in the policy debate. However, the current debt crisis in the Eurozone has brought the idea of deeper fiscal integration to the top of the European policy agenda. Many observers argue that the currency union cannot survive unless it is complemented by a 'fiscal union'. The concept of creating a fiscal union has many interpretations, ranging from the rather limited approach of introducing a set of balanced budget rules to the more ambitious project of creating a federal government with significant tax and spending powers comparable to existing federations like the US (see e.g. Bordo et al., 2011, Fuest and Peichl, 2012).

While deeper fiscal integration in Europe is thus a widely debated issue, little is known about its economic implications. This paper contributes to filling this gap by analysing the economic effects of two key elements of fiscal integration, i) the introduction of an EU-wide integrated tax and transfer system which partly or fully replaces the existing national systems and ii) the introduction of a system of fiscal equalisation. These reforms would be far reaching, but they do reflect the widespread view that radical steps towards more fiscal integration are necessary to improve the stability of the Eurozone. Even if these reforms seem unlikely to find political support in the short term, it is important to understand why this might be the case and whether much is lost if fiscal integration fails to proceed into this direction. Our analysis includes 11 Eurozone countries.[2] We employ the European tax-benefit calculator EUROMOD which uses harmonised and representative household micro data and allows calculating taxes, transfers and disposable incomes for each household type and country. EUROMOD allows us to run counterfactual simulations so that we can analyse policy reforms and their effects on tax revenues, the income distribution and labour supply. We proceed as follows. First, we construct

[2] These are the founding members of the EMU (except Luxemburg) and include Austria, Belgium, Finland, France, Germany, Greece, Ireland, Italy, the Netherlands, Portugal and Spain. In the following we will refer to this group as 'the EU', neglecting that the European Union has 27 member countries. We focus on these 11 countries because of data availability and because we are primarily interested in studying fiscal integration in the Eurozone.

a European tax and transfer system, which can be interpreted as an average of the national tax and transfer systems. The system is designed such that it generates the same net revenue on the EU level but not necessarily at the level of each member state. Second, we consider various scenarios where the European tax and transfer system (fully or partly) replaces the national systems. In the first scenario, we assume that the national tax and transfer systems are reduced by one third and this gap is filled by the European system. In other scenarios we look at a full substitution of the national systems and at a more progressive European system.

Regarding the economic impact of these reforms, we focus on two issues. Firstly, we consider the distributional effects of the reform scenarios, which are of key importance for the political feasibility of fiscal integration. The reforms lead to a redistribution of tax burdens between member states and across individuals, where some member states benefit and others lose. Within member states, households at different income levels can be affected very differently. We measure the redistributive effects taking into account behavioural responses in the form of labour supply adjustments (Bargain et al., 2012).[3]

Secondly, we are interested in the impact of the different reforms on the ability of the tax and transfer system to act as an automatic stabiliser in the presence of macroeconomic shocks. This aspect is highly relevant for the debate on the role of fiscal integration for the future of the Eurozone. In particular, fiscal integration is expected to improve the resilience of the Eurozone in the event of asymmetric shocks. Building on Dolls et al. (2012), we study simulated shocks on gross income and we investigate to which extent the existence of the European tax and transfer system contributes to macroeconomic stabilisation. We are especially interested in a scenario where individual countries are unable to let automatic stabilisers of the national tax and transfer system work because they cannot borrow. In this case the automatic stabilisers of the European tax and transfer system are of key importance.

Our analysis leads to the following results. The introduction of a European tax and transfer system which replaces one third of the national systems would increase the disposable income of a small majority of households in Europe. At the same time it would lead to significant redistribution between countries. The winners include Greece, Portugal, Spain, Italy and, surprisingly, Germany. The average gains range between roughly 8 per cent of disposable income in Greece and one per cent in Germany. The gains in the southern European countries come at the cost, however, of a decline in labour supply. Austria, France, Ireland and the Netherlands lose on average. The finding that Germany benefits, is surprising, because intuitively, one would expect gains and losses to be driven by differences in income levels between countries. This is true up to a point, but the structure of the existing tax and transfer systems plays a role as well. In France, for instance, average per capita income is lower than in Germany but the national tax and transfer system is less progressive than the German one and relies more on indirect taxes than on income taxes. Within countries, households at different

[3] Note that the simulation model we are using assumes full benefit take-up and no tax evasion. In addition, other margins of adjustment than labor supply cannot be captured. This includes, but is not limited to, tax evasion or avoidance and income shifting. The implications of relaxing these assumptions will be discussed further below.

income levels are affected differently. In the southern European countries, the gains are concentrated among the low income quintiles. In high income countries, the high income quintiles gain on average. The middle class loses in many countries. We also analyse the impact of the reform on income inequality. Overall, introducing the EU tax system reduces EU-wide income inequality. In most cases, this also holds for inequality within countries. In sum however, these findings cast doubts on the political feasibility of the reform under consideration. While a small majority of EU citizens would gain, this is not true for a majority of countries. We analyse the implications considering current and prospective voting mechanisms of the Council of the European Union.

How does the introduction of the EU tax-benefit system affect automatic fiscal stabilisers? Unsurprisingly, the reform will increase automatic stabilisers in countries where the national tax systems have smaller stabilisers compared to the European average – this applies in particular to the southern European countries. A key question is by how much the EU tax and transfer system contributes to overall fiscal stabilisation. In the case where the EU tax and transfer system replaces one third of the national system, the EU system would absorb between 10 per cent (Ireland) and 15 per cent (Germany) of a shock to gross income. In the case of the more progressive EU tax system, the stabilisation properties remain similar.

Finally, what are the implications of introducing a system of fiscal equalisation, rather than a common tax and transfer system? Note that with this scenario, the national tax and transfer systems stay in place and tax revenues are now redistributed across countries. The fiscal equalisation system we consider compensates countries for differences between their national and the EU average taxing capacity. As those differences are fully equalised, the redistributive effects are considerable. As one would expect, the system implies transfers flowing from high to low income countries.

How does this system of fiscal equalisation perform when it comes to providing stabilisation in the event of an asymmetric shock? We consider a shock in the form of a decline in gross income by 5 per cent which hits Greece, Italy, Spain, Portugal and Ireland (the 'GIIPS' group). In all other countries, income remains constant. Interestingly, in terms of the stabilisation effects it offers, the fiscal equalisation mechanism performs rather poorly. In Greece, fiscal equalisation even leads to a destabilising effect. In Portugal, the stabilisation effect is close to zero. The reason is that, in the situation before the shock, Greece and Portugal are the countries which benefit most from fiscal equalisation. The shock reduces their taxing capacity, but it also reduces the taxing capacity of the union as a whole. Since other large countries like Spain and Italy and even a net contributor (Ireland) are affected, the sum of money available for fiscal equalisation declines, and countries which benefited initially may even lose transfers. Those findings become even more prevalent when simulating a shock comparable to the 2008-09 recession which has hit not just a few but all countries under analysis.

Our findings have important policy implications. In order to achieve significant income stabilisation through the introduction of an EU tax and transfer system, the magnitude of the simulated system would have to be considerable. Replacing one third of the national systems by a European system would lead to stabilisers absorbing between 10 and 15 per cent of a

macroeconomic shock. But establishing such a system would give rise to significant redistributive effects, which will make political acceptance difficult.

The alternative of setting up a fiscal equalisation system could give rise to even larger redistributive effects, depending on the design of the system. But a high degree of fiscal equalisation does not imply that the system always offers a high degree of fiscal stabilisation in the presence of asymmetric shocks. The stabilisation effect may be different for different countries, and the example considered here shows that even a destabilising effect is possible.

The setup of the rest of this paper is as follows. Section 2 describes the related literature and the concept and design of a fiscal union in our simulation scenarios. Section 3 introduces the empirical strategy, i.e. the micro data and the tax-benefit calculator EUROMOD, the different scenarios as well as some descriptive information. The results are presented in Section 4. Section 5 concludes.

2 Conceptual framework and related literature

2.1 Related literature

The related literature about European integration in the area of fiscal policy can be divided into two broad areas.[4] The first strand of literature focuses on the EU budget, its expenditure and its revenue sources. This literature discusses issues like the size and structure of the EU budget as well as its current revenue sources (see, e.g., Atkinson, 2002; Begg, 2005). One important issue is whether the EU should be allowed to levy taxes. Currently the EU is essentially financed through contributions from the member states. Most of the literature about EU taxes focuses on indirect taxes like a European VAT or an environmental tax. Other proposals include a European corporate income tax or, more recently, a European financial transactions tax (see e.g. Le Cacheux, 2007, Begg, 2011). In this literature the key arguments in favour of a European tax are that such a tax would increase the transparency and improve democratic control of EU policies. Wigger and Wartha (2003) take a different approach and develop a theoretical model which focuses on the interaction between tax coordination and the allocation of taxing rights between the national and the EU level. They argue that, in the presence of tax coordination between member states, giving the EU the power to tax is not desirable because the coexistence of taxing powers at the national and the EU level will lead to overtaxation.

The key difference of this literature to the present paper is that none of these contributions looks at the quantitative economic effects of introducing a European tax while our focus is on the quantitative effects in terms of redistribution, labour supply, and macroeconomic stabilisation.

The second strand of literature related to the present paper is the large body of work on the implications of EMU for fiscal policy integration. An important early discussion of the key issues

[4] There is a third strand of literature which discusses the coordination and harmonisation of taxes and tariffs required to create a common market. This literature is surveyed, for instance, in Keen (1993). For the present paper this literature is less relevant because our focus is not on tax obstacles for border crossing economic activity.

can be found in the MacDougall Report (1977), which had the broad objective to analyse the role of public finances for European integration. One of the key findings of the report is that "*public finance in existing economic unions plays a major role in cushioning short term and cyclical fluctuations ... there is no such mechanism in place ... between member countries and this is an important reason why in present circumstances monetary union is impracticable*" (p.12). This view has been confirmed by most of the later literature on the implications of EMU for fiscal policy in Europe. Eichengreen (1990) compares Europe to the US and emphasises that the federal income tax in the US provides significant insurance against asymmetric macroeconomic shocks. He argues that, since regional problems are likely to be greater in Europe than in the US, fiscal shock absorbers would have to be significantly larger.

Along similar lines, many economists have warned that the Euro area is too heterogeneous and thus far away from being an optimum currency area along the lines of Mundell (1961) and Kenen (1969). Therefore, the EMU will be fragile and vulnerable to economic shocks unless it is complemented by more fiscal integration (see e.g. Sala-i-Martin and Sachs, 1992; Buiter et al., 1993; Masson, 1996; Eichengreen and Wyplosz, 1998; Engwerda et al., 2002; Uhlig, 2003). Several authors have proposed an increase in the European budget in order to establish a horizontal fiscal equalisation mechanism (Italiener and Vanheukelen, 1993; Hammond and von Hagen, 1998; Dullien and Schwarzer, 2005; Marzinotto et al., 2011). Schuknecht et al. (2011) emphasise fiscal discipline and propose an independent fiscal council for the Euro area with the aim to improve governance and compliance.

Some economists have taken the opposite view and argue that the '*unprecedented divorce between the main monetary and fiscal authorities*' (Goodhart, 1998) also has advantages because it limits political influence on monetary policy (e.g. Beetsma and Bovenberg, 1998; Dixit and Lambertini, 2003; Beetsma and Giuliodori, 2010). However, the current debt crisis in the Eurozone has renewed doubts about the wisdom of this construct. Today, the view seems to prevail that a monetary union like the EMU cannot work without a major policy shift towards a fiscal union.

2.2 What is a 'fiscal union'? Simulation scenarios

In the debate on reforms of fiscal institutions in the Eurozone, it is not always clear what exactly the term 'fiscal union' is supposed to mean and different people use it very differently. Fuest and Peichl (2012) suggest five possible elements of a European fiscal union. These are (i) fiscal rules for the member states as well as rules concerning policy coordination and supervision, (ii) a crisis resolution mechanism, (iii) a joint guarantee for government debt, (iv) a fiscal equalisation and/or other mechanisms for transfers between countries and (v) an extended EU budget and European taxes.

While much of the current political debate focuses on short term crisis management and therefore emphasises elements (i) - (iii), the focus of this paper is on elements (iv) and (v), which are more relevant in the long term.

Of course, a significant shift of policy responsibilities to the European level raises many questions in terms of construction and how the central budget is used. More precisely, one key

question is how the fiscal equalisation mechanism combined with a European income tax will function. In order to choose scenarios for the type of a fiscal union we are going to model, we distinguish three dimensions which serve as a framework for the specific design of a European tax-benefit system: (1) overall revenue, (2) the design of the EU tax and transfer system and its share in overall taxes and transfers and (3) the assignment of revenues and the existence of a fiscal equalisation mechanism.

First, for overall revenue, we assume our reforms to be revenue neutral at the EU level. This choice appears to be a natural solution for two reasons. First, it ensures the comparability of different scenarios. Second, by keeping the overall budget constant, we avoid the debate about increasing (decreasing) the size of government. This, however, does not imply revenue neutrality at the national level, as will be discussed further below.

Second, for the design of the EU tax-benefit system, several approaches are possible in principle. The system could be designed from scratch. A simple way of doing so would be to introduce an EU tax surcharge, where the surcharge could simply be a percentage of national income tax payments. But this approach raises various difficulties. Most importantly, since national income tax systems differ widely across member states, such a system would benefit countries with low income taxes, and it would create incentives for individual member states to rely more on revenue sources other than income taxes like e.g. social insurance contributions or replace transfers by tax credits which reduce income taxation.

Therefore, we consider the introduction of a separate tax and transfer system which would partly or fully replace the national systems. What we will use here is an 'average system' which leads to the same revenue and progressivity at the EU level as a combination of the existing national systems. At least with view to progressivity, this is an arbitrary choice even when conditioning on revenue neutrality. Thus, we will also consider a scenario that increases progressivity of the overall system, while again ensuring that overall revenue remains constant.

Regarding the share of the EU system in overall taxes and transfers, a wide range of scenarios could be considered. At one extreme, we could assume that the EU tax-benefit system completely replaces national systems. However, in most existing fiscal unions, there are tax-benefit systems at different levels of government. For instance, in the US, two thirds of overall tax revenue are collected at the federal level versus one third at the state and local level. However, moving two thirds of the national tax and transfer systems to the EU level seems implausible. In our analysis, we will therefore look at two scenarios: in the first scenario the EU system replaces one third of the national systems; in the second scenario, the national systems are replaced entirely. Clearly, the latter scenario is more relevant as a theoretical benchmark whereas the former might be something that might happen if the EU decides to move to a federal fiscal system.

Third, we have to make assumptions regarding the assignment of tax revenues and the existence of a fiscal equalisation mechanism. We do this as follows. In our simulations of the introduction of a European tax and transfer system, we assume that any net revenues (revenues after taxes and transfers) generated by the EU system will be pooled, and each country will receive a transfer from this pool which is equal to the initial net revenue collected under the national tax systems. This assumption implies that redistribution between countries in our simulations is

driven by the fact that the EU average system changes the net tax burdens of households. We hold constant the net tax revenue each member state receives, so that the provision of public goods is kept constant in all countries, as are budget deficits. An alternative assumption would be to assume that net tax revenues are redistributed as well.

This issue will be discussed in the simulations about fiscal equalisation. For this purpose we will assume that member states keep their tax and transfer systems but the EU average tax and transfer system will be used as an indicator of taxing capacity. Member states with a taxing capacity below the EU average will be recipients in the fiscal equalisation mechanism and vice versa. We will then investigate to which extent i) the fiscal equalisation mechanism redistributes income between member states compared to a situation without equalisation and ii) the fiscal equalisation mechanism cushions the impact of an asymmetric economic shock.

2.3 Conceptual framework

In this section we describe the income concept used in our simulations, we illustrate the idea of constructing an average tax system with a simple example and we explain how our simulations deal with government budget constraints. Our simulations proceed as follows. We start with representative micro data from each of the 11 EU member states which enter our simulations. Gross market income X_i of individual i is defined as the sum of all incomes from market activities:

$$X_i = E_i + Q_i + I_i + P_i + O_i, \tag{1}$$

where E_i is labour income, Q_i business income, I_i capital income, P_i property income, and O_i other income. Disposable income Y_i is defined as market income minus net government intervention $G_i = TAX_i + SIC_i + BEN_i$:

$$Y_i = X_i - G_i = X_i - (TAX_i + SIC_i - BEN_i), \tag{2}$$

where TAX_i are direct taxes, SIC_i employee social insurance contributions, and BEN_i are cash benefits (i.e. negative taxes). Note that, due to a lack of micro data, we cannot include indirect taxes and in-kind benefits in our analysis. In the following, we refer to the difference between taxes and social insurance contributions paid and transfers received as net taxes.

For an illustrative example of a common tax and transfer system, assume two countries A and B with individual net tax schedules $T_i = f_i(X_i\mathbf{z}_i)$. To keep the example as simple as possible, consider a linear progressive net tax schedule independent of characteristics $\mathbf{z}_i$, i.e. $T_i = f_i(X_i\mathbf{z}_i) = t_iX_i - a_i$ with t_i the marginal tax rate and a_i a refundable tax credit (equal to a benefit if t_i is negative). A simple way to introduce a revenue neutral common tax system is to use the average system

$$T^{Avg} = \frac{t_AX_i - a_A + t_BX_i - a_B}{2} = \frac{t_A + t_B}{2}X_i - \frac{a_A + a_B}{2}, \tag{3}$$

i.e. applying the average marginal tax rate and tax credit. In reality, tax-benefit systems do not only depend on income but on other characteristics, too. In addition, the observed tax-benefit systems are directly progressive. We therefore construct the EU average tax and transfer system

using a regression approach as described in section 3.2, but the economic intuition is as in our simple example.

How do we take into account the government budget constraints in our simulations? Assume that country A has N_A citizens with characteristics (X_A, z_A), and country B has N_B citizens with characteristics (X_B, z_B). Under the national tax and transfer systems, the national government budget constraint of country k (k=A,B) in period t is given by

$$\sum_{j=1}^{N_k} T_{ikt} + T_{kt}^R - B_{kt} = E_{kt} \qquad (4)$$

where $\sum_{j=1}^{n} T_{jkt}$ is revenue from 'net taxes' (income taxes and social insurance contributions net of transfers), T_{kt}^R is revenue from other taxes like consumption taxes or corporate income taxes, B_{kt} is the budget deficit and E_{kt} is public expenditure excluding transfers. This would include spending on defence, infrastructure, police, education and other public services, but also interest payments on government debt.

In the following, we omit the time index t to keep the notation simple. Equations (4) holds in the reference scenario in our simulations – a scenario with no supranational tax and transfer system. In this reference scenario the aggregate disposable income of the citizens of country k (k=A,B) is given by

$$\sum_{i=1}^{N_k} Y_{ik} = \sum_{i=1}^{N_k} (X_{ik} - T_{ik}). \qquad (5)$$

Now assume that both countries form a union and define a common tax and transfer system denoted by $T_{EU} = f_{EU}(X, \boldsymbol{z})$. In the following, we denote by T_{iEUk} the net tax payment that arises if the common tax system is applied to citizen i residing in country k (k=A,B). This tax system is constructed so that, for the union as a whole, and for given market incomes, it generates the same net tax revenue as the national tax systems: $\sum_{i=1}^{N_A} T_{iA} + \sum_{j=1}^{N_B} T_{jB} = \sum_{i=1}^{N_A} T_{iEUA} + \sum_{j=1}^{N_B} T_{jEUB}$.

In the next step, countries A and B reduce their national net taxes by a factor $1 - \alpha$ and fill the gap by introducing the common tax system. As a result aggregate disposable income of the citizens of country k (k=A,B), becomes $\sum_{i=1}^{N_k} Y_{ik} = \sum_{j=1}^{N_k} (X_{ik} - (1-\alpha) T_{ik} - \alpha T_{iEUk})$.

So far, we have assumed that market incomes remain constant. But the reform of the tax and transfer system will affect market incomes because it affects labour supply. Denote the market income of individual i residing in country k before the reform by X_{ik}^0 and market income after the reform by X_{ik}^1. Then the change in aggregate disposable income of citizens of country k, $\sum_{j=1}^{N_k} [Y_{ik}^1 - Y_{ik}^0]$ can be expressed as

$$\sum_{i=1}^{N_k} [Y_{ik}^1 - Y_{ik}^0] = \sum_{i=1}^{N_k} [X_{ik}^1 - X_{ik}^0 - [(1-\alpha) f_k(X_{ik}^1, \boldsymbol{z_{ik}}) - \alpha f_{EU}(X_{ik}^1, \boldsymbol{z_{ik}}) - f_k(X_{ik}^0, \boldsymbol{z_{ik}})]] \qquad (6)$$

In our analysis, we focus on the change in disposable income as an indicator of whether countries or individuals benefit or lose from a reform.[5] What are the factors driving changes in

[5] Here one may object that welfare should be used as an indicator because more labour supply may increase disposable income but not welfare. We use disposable income because this is a widespread and easily understandable

disposable income in different countries? Firstly, countries where the national tax and transfer system implies a low net tax burden compared to the European average will suffer a loss in disposable income as a result of the reform simply because European taxes are higher. Secondly, low income countries will tend to experience an increase in disposable incomes because they benefit from the fact that they now share a tax and transfer system with richer taxpayers in other countries. Thirdly, changes in disposable income will occur as taxpayers adjust their labour supply.

How does the reform affect overall tax revenue and the budget constraints of the national governments? Consider first the impact on the national budgets. National net tax revenue changes for two reasons. Firstly, the national tax and transfer system is cut by a factor $1-\alpha$. Secondly, the net revenue generated by what remains of the national system changes due to labour supply adjustments. The change in net tax revenue collected by country k due to the reform is given by

$$\sum_{i=1}^{N_k}[T_{ik}^1 - T_{ik}^0] = \sum_{i=1}^{N_k}[(1-\alpha)f_k(X_{ik}^1, \boldsymbol{z_{ik}}) - f_k(X_{ik}^0, \boldsymbol{z_{ik}})] \quad (7)$$

The net revenue collected by the common tax system, which we denote by R_{EU}, is given by

$$R_{EU} = \alpha[\sum_{i=1}^{N_A} f_{EU}(X_{iA}^1, \boldsymbol{z_{iA}}) + \sum_{j=1}^{N_B} f_{EU}(X_{jB}^1, \boldsymbol{z_{jB}})]. \quad (8)$$

This net tax revenue collected at the European level is equal to the net revenue the national governments lose by abolishing a share α of their national tax and transfer systems if market income is constant. The reason is that the new tax system was designed to assure revenue neutrality ex ante, before labour supply adjustments. Without changes in labour supply, the tax revenue collected at the European level would be exactly sufficient to compensate the governments of the member states for their net tax revenue losses (or gains). No further adjustments to balance the government budgets would be required: The variables 'other' taxes (T^R), the budget deficits (B) and expenditures on public services (E) could be the same before and after the reform

But since we do take into account changes in labour supply caused by the reform, revenue neutrality ex post is not guaranteed. The net revenue collected by the common tax system may differ from the revenue required to compensate the national governments for the changes in their net tax revenue. Assume that the European budget nevertheless compensates the national governments for the changes in national net tax revenue caused by the reform, after labour supply adjustments. In this case, the European budget constraint can be written as

$$B_{EU} = \sum_{i=1}^{N_A}[T_{iA}^1 - T_{iA}^0] + \sum_{j=1}^{N_B}[T_{iB}^1 - T_{iB}^0] - R_{EU} \quad (9)$$

where B_{EU} is the deficit (or, if negative, surplus) in the EU level budget. A deficit $B_{EU} > 0$ arises in the European budget if the reform leads to behavioural adjustments which reduce EU-wide net tax revenue. In contrast, if EU-wide net tax revenue increases, the EU budget would be in

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indicator, but we will also report results for welfare changes as well as disposable income changes without labour supply adjustments. The pattern of the results is the same for all indicators.

surplus. If there is a deficit, the question arises how that deficit is financed and how the burden is distributed across countries. Likewise, if there is a surplus, this money can be distributed to the national governments. As we will show in the simulations, this effect is quantitatively so small that it can be neglected.[6]

3 Empirical strategy

3.1 EUROMOD: model and database

In order to analyse the hypothetical introduction of a EU-wide tax-benefit system, we need to run counterfactual simulations. We use the microsimulation technique to calculate taxes, benefits and disposable income under different scenarios for a representative micro-data sample of households. Simulation analysis allows conducting a controlled experiment by changing the parameters of interest while holding everything else constant. Therefore, the researcher does not have to deal with endogeneity problems when identifying the effects of the policy reform under consideration.

Simulations are carried out using EUROMOD, a static tax-benefit model for the EU countries, which was designed for comparative analysis. Through a common framework, which has a greater flexibility than typical national models to accommodate a range of different tax-benefit systems, it allows the comparison of countries in a consistent way. EUROMOD was originally created in the late 1990s, by a consortium of research institutions from each EU15 country with a good knowledge and expertise in their respective national tax-benefit systems. The tax-benefit systems included in the model (1998 and 2001 for the EU-15, 2003 for a subset of countries and 2005 for four new member states) have been validated against aggregated administrative statistics as well as national tax-benefit models (where available), and the robustness has been checked through numerous applications (see, e.g., Bargain, 2007).

The model can simulate 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 and social assistance, housing benefits, family and child benefits) except those based on previous contributions as this information is usually not available from the cross-sectional survey data used as input datasets. Information on these instruments is taken directly from the original data sources. 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.

Information on consumption is missing in the data; hence indirect taxes as well as taxes on corporate profits are not included in the model. The same is true for in-kind benefits. Clearly,

[6] In the different scenarios the deviations from revenue neutrality range between a surplus of 0.44 Euros per household and week to a deficit of 0.64 Euros per week. Table C2 in the appendix reports these numbers as a percentage of net tax payments.

these elements differ between countries and affect the results presented. Table A.1 in the Appendix reports the shares of taxes which are captured by the model for the different countries. Clearly, these shares vary across countries - between 44 per cent (Ireland, Portugal) and 66 per cent (Germany). We do not find a systematic relationship between these shares and our results. In addition, the table contains information about the deficit and debt ratios for each country. In our analysis we do not impose a balanced budget rule and hence keep these initial conditions fixed.

EUROMOD assumes full benefit take-up and tax compliance, focusing on the intended effects of tax-benefit systems, which may influence the results in terms of the redistributive and stabilizing effects of fiscal reforms when this behaviour varies substantially across countries.

The main stages of the simulations are the following. First, a representative micro-data sample of individuals in households (including information on gross income from various sources as well as demographic characteristics which are relevant to determine taxes and benefits such as household size, age and number of children, marital status, employment status, disability status, region of living; see also below) and the respective tax-benefit rules (e.g. for singles or couples) are read into the model. Then for each tax and benefit instrument, the model constructs corresponding assessment units (for instance the individual, family or household), ascertains which are eligible for that instrument and determines the amount of benefit or tax liability for each member of the unit (for instance accounting for the individual or joint assessment of taxes or benefits for each household member). Finally, after all taxes and benefits are simulated, disposable income is calculated. This simulated disposable income includes all monetary incomes, except capital gains and irregular incomes.[7]

Due to data limitations, our analysis is based on the 2001 tax-benefit systems, two years after the introduction of the Euro for the EURO-12 countries.[8] This is important to keep in mind, especially given that many countries implemented significant reforms in their tax and transfer systems in the last decade. The input datasets for these countries are summarised in Table A.2 in the Appendix. The sample sizes vary across countries from 7,000 to more than 25,000 households. All monetary variables are updated to the 2001 year using country-specific uprating factors, as the income reference period varies from 1999 to 2001.

3.2 Scenarios

In this section we explain in a more technical manner how we conduct the simulations of the different reform scenarios introduced in Section 2.2. We proceed in four steps.

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[7] For further information on EUROMOD, see Sutherland (2007). There are also country reports available with detailed information on the modelling and validation of each tax benefit system, see http://www.iser.essex.ac.uk/research/euromod.

[8] Unfortunately, this is the most recent year for which all countries and data is available. For later years, Germany and France would be missing. At the time of writing this paper, a more recent version of Euromod for the EU-27 countries is being constructed.

1. We use EUROMOD, which contains an exact representation of the (direct) tax-benefit systems of the Eurozone countries in 2001, to extract net taxes for each individual (and household) *i* in representative samples for each country *c*. In particular, EUROMOD simulates the country specific net taxes (income and payroll taxes minus benefits) $T_{ic} = f_c(X_i \mathbf{z}_i)$ as a function of gross market income X_i and a vector of non-income factors $\mathbf{z}_i$ (e.g. marital status, number and age of children) taken from the data.

2. Using those simulated net taxes T_{ic} for all European citizens, we obtain the average EU tax function $T_{i,EUavg}$ such that it yields the same net revenue at the EU level as the sum of the national systems. In order to calculate this average system, we adopt a regression approach and estimate the following reduced form tax function on the pooled sample:

   $$T_{ic} = \omega_i f_{EU}(X_i \mathbf{z}_i) + \varepsilon_i. \qquad (10)$$

   Function f_{EU} is specified as a flexible transformation of $(X_i \mathbf{z}_i) \rightarrow T_{ic}$. ε_i is the OLS residual and ω_i the household sample weight. We use a very flexible functional form with higher order polynomials and interaction terms of income and basically all characteristics observed in the data which are relevant for taxes and benefits (such as gross income from various sources, household size, age and number of children, marital status, employment status, disability status, region of living). Table A.3 in the Appendix reports the mean values of the main variables in each country. Given that weights sum up to the EU population size this function directly accounts for a population weighted average tax function at the EU level. The fit of this tax regression in terms of the *R2*-measure is close to 1. It is not equal to 1, though, because by regressing on the pooled sample, differences across countries will be explicitly captured, which is exactly the differences we need to keep for the average system.

3. The estimated function is then used to predict net tax payments for the EU average tax system $T_{i,EUavg}$ for each individual and household in the sample.

4. Next, we use the predicted EU average tax system to construct different scenarios of replacing the national tax-benefit systems with an EU-wide system (again, yielding the same revenue on the EU-level, but not for each country). In principle, a continuum of scenarios for introducing a fiscal union is possible. We focus on two different tax systems. We either replace the current national systems T_{nat} with the EU average system T_{EUavg} or with a system $T_{i,EUavg\_p}$ with increased progressivity compared to $T_{i,EUavg}$ (again yielding revenue neutrality).[9] The latter scenario can be seen as a proxy for a switch towards a more "Northern" European system with higher progressivity. For both

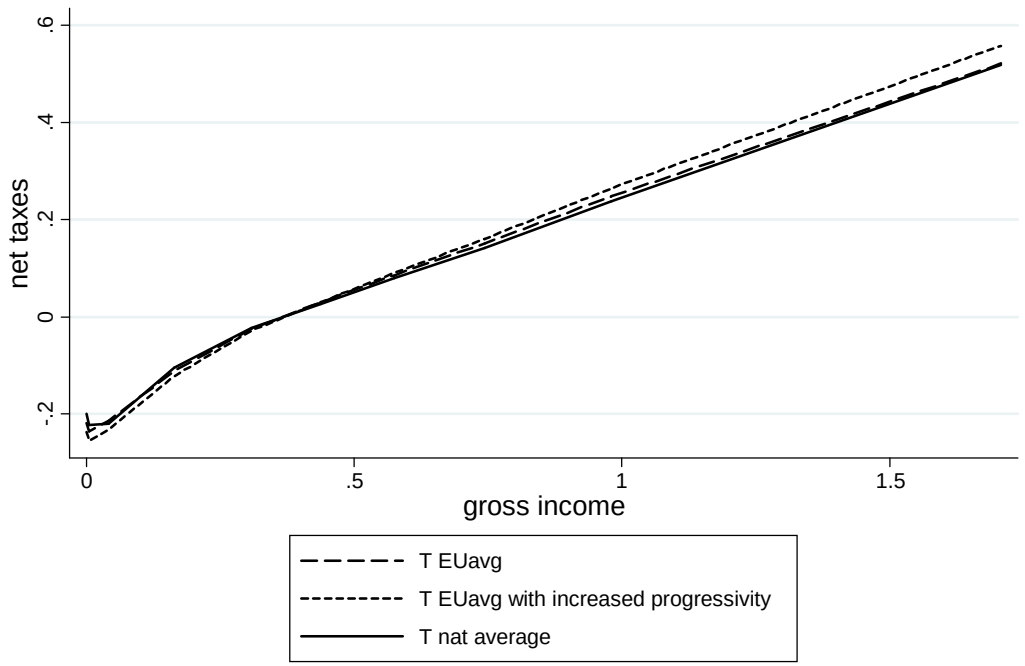
[9] Precisely, we calculate T_{EUavg_p} by first introducing a proportional surcharge of 7.5% to T_{EUavg} which subsequently will be fully redistributed across all households in the pooled sample via a lump sum transfer equal to its mean value across households, i.e. $T_{i,EUavg\_p} = T_{i,EUavg} + T_{i,EUavg} * 0.075 - b$ with $b = \frac{1}{N}\sum_{i=1}^{N} T_{i,EUavg} * 0.075$ Results for a surcharge of 5% (10%) are qualitatively in line with the results presented here and simply less (more) pronounced with view to the expected effects when increasing progressivity for the EU average system (detailed results available upon request).

systems, we simulate two different weighted combinations of the current national system and the EU average system resulting in a total of four different scenarios. Here, we simply look at full integration (the share of the average system is 100%) and a partial integration (which could be seen as a first step for such a major reform) of 33%. The benchmark is the current national system of each country (i.e. the share of the average system is 0%). Formally, we calculate for each household *i* of country *c*

$$T_i = wT_{i,EUavg} + (1-w)T_{ic}; w \in \left\{\frac{1}{3}, 1\right\}.^{10} \quad (11)$$

Subsequently, the four scenarios are labelled *EUavg-Sc. 1, Sc. 2* and *EUavg_p-Sc. 1, Sc. 2*. Figure 1 plots the current national tax-benefit function as well as the two EU average functions. While the EU average function is, by construction, basically identical to the average of the national systems, the increased progressivity for the second function becomes visible especially at the top of the distribution.

Fig. 1: EU average tax-benefit schemes and average of national systems



Note: Based on overall means for gross income deciles; weekly thousand 2001 EUR.
Source: Own calculations based on EUROMOD.

What are the general implications of this approach with view to the resulting new tax-transfer systems of the different countries? By construction and as described in Section 2.3, we assume that all of the revenue collected from T_{EUavg} as well as T_{EUavg_p} goes to the central EU budget (which remains unchanged) and is immediately redistributed across countries and households (note that the tax function based on the pooled sample predicts household net tax payments as a fraction of the central budget, not as a fraction of national budgets). The structure of national

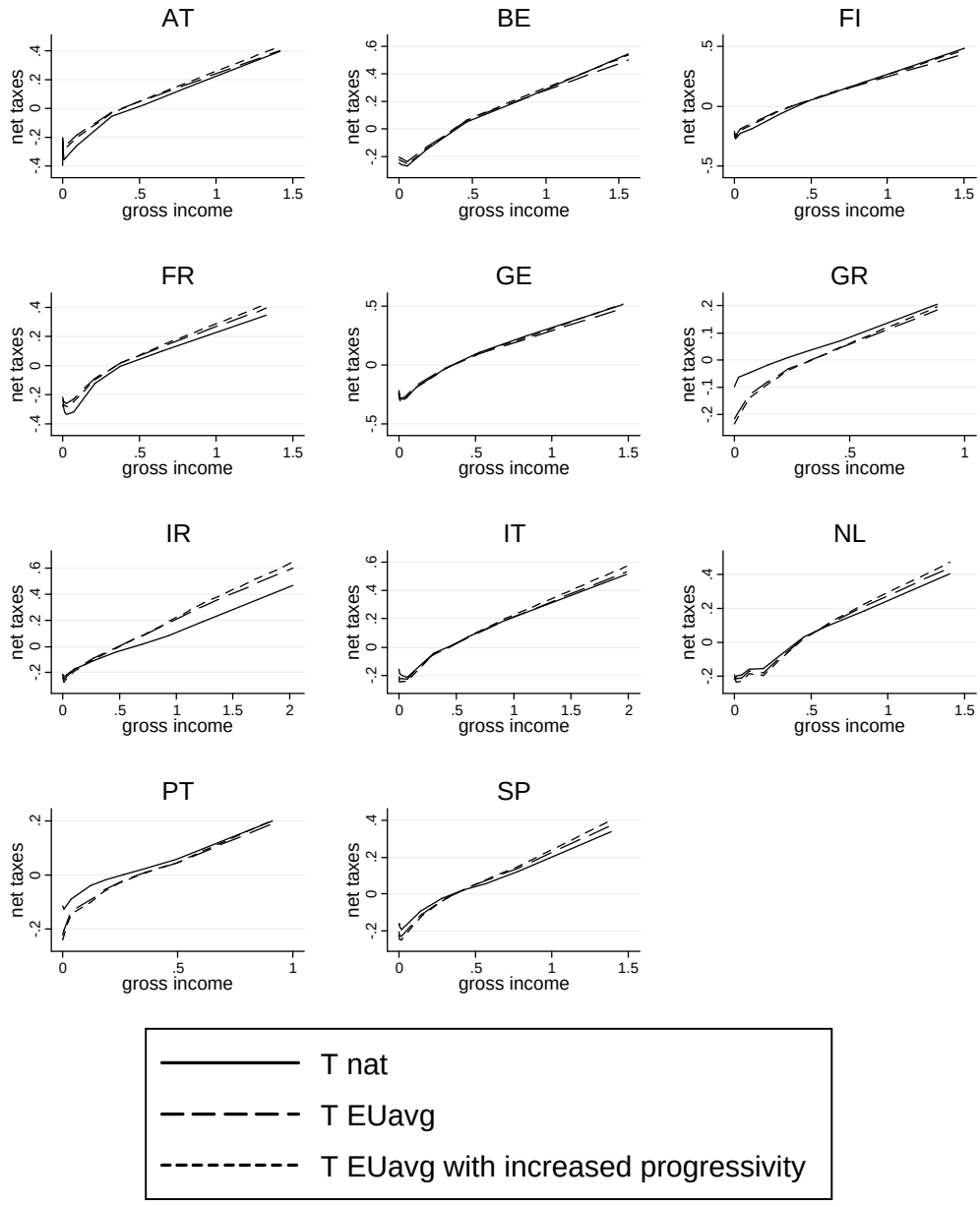
[10] For $w = \frac{2}{3}$, results are qualitatively similar and lie in between the results for $w = \frac{1}{3}$ and $w = 1$. We thus do not report these results due to lack of space.

budgets is affected in the sense that the importance of the simulated elements is reduced according to the weighting factor $(1 - w)$. In the extreme scenario with $w = 1$ it is decreased to zero and fully replaced by the EU system. This leads to redistribution of (simulated) net tax revenues between countries. This also implies that revenues and expenditures which are not captured by our data – like revenues from indirect or corporate income taxes or expenditures on defence and other publicly provided goods, as well as deficit (or surplus) levels – remain constant for each country. Especially the absence of a balanced budget in the analysis is important since, following the recent crisis, fiscal consolidation and the size of governments have become central to the debate on fiscal reforms in Europe.[11] In principle, countries with a deficit (surplus) would need to raise more (less) revenue – or spend less (more) on benefits – and hence the households in those countries would, c.p., lose (gain) in terms of disposable income.

Figure 2 includes plots of the current national tax-benefit functions as well as the two EU average functions for each country in the sample. It is immediately evident that the redistributive effects of the different reforms under consideration will differ between countries. In some cases the EU average function is always below (above) the national tax-benefit system and sometimes there are crossings. Hence, different parts of the income distributions will be affected differently. A first visual inspection suggests that low income households in Greece and Portugal as well as high income households in Belgium, Finland and Germany will gain, while especially high income households in France, Ireland, the Netherlands and Spain will pay higher taxes.

[11] It would be, in principle, possible to increase or decrease the revenues from each country but then the question is how this should be achieved (e.g. in a proportional or progressive manner). This would then have additional distributional and stabilizing effects which are not in the focus of the present paper. Hence, we abstract from modelling changes to the fiscal position of each country in our analysis.

Fig. 2: National tax-benefit schemes compared to EU average systems



Note: Based on country means for gross income deciles; weekly thousand 2001 EUR.
Source: Own calculations based on EUROMOD.

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 reform scenarios. We report values of these variables at the overall EU level as well as for individual countries (population share in the first column of Table 1).

Tab. 1: Weekly household gross and disposable income, benefits, SIC and taxes (2001 EUR)

	Pop. share	Gross income	Disp. income	Gross taxes baseline	Gross SIC baseline	Gross benefits baseline	Net taxes baseline	Net taxes *EUavg*	Net taxes *EUavg_p*
EU	1.00	491.0	466.4	83.6	68.9	127.8	24.7	24.7	24.7
AT	0.03	544.3	539.9	104.0	94.1	193.6	4.5	42.2	43.5
BE	0.04	547.2	502.2	146.1	54.0	155.1	45.0	52.7	54.8
FI	0.02	507.9	464.4	159.3	35.0	150.8	43.5	45.5	47.0
FR	0.21	463.7	487.3	42.9	89.1	155.6	-23.6	16.2	15.6
GE	0.32	519.5	457.4	100.3	86.8	124.9	62.1	48.3	50.1
GR	0.03	259.4	254.4	25.4	34.4	54.7	5.1	-59.4	-65.8
IR	0.01	699.8	661.9	116.3	25.8	104.3	37.8	91.4	96.4
IT	0.17	498.4	485.0	104.6	40.6	131.8	13.4	2.3	0.6
NL	0.06	614.6	537.0	75.5	106.2	104.1	77.6	83.3	87.7
PT	0.03	314.2	308.9	35.4	31.6	61.7	5.4	-36.4	-41.0
SP	0.10	430.9	434.4	68.0	26.1	97.6	-3.5	-13.8	-16.7

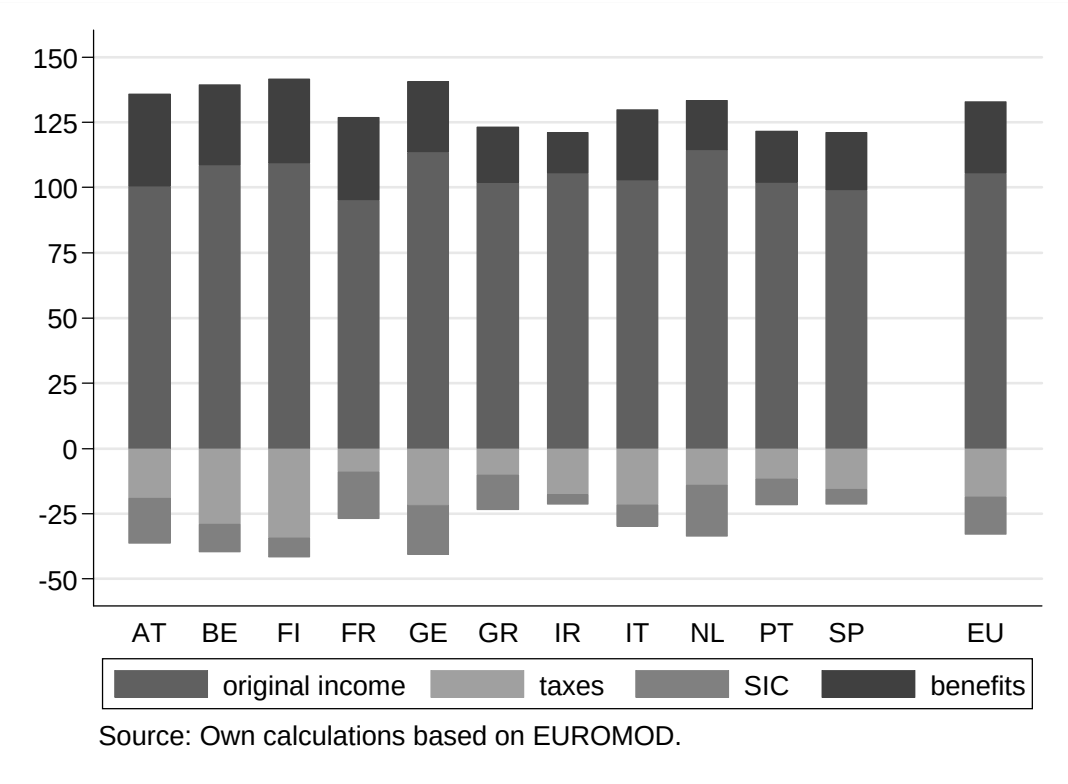
Note: *EUavg* indicates the EU average tax system, *EUavg_p* the same system with increased progressivity. We show deficit shares for 1998 additionally for those countries for which 1998 data is taken and uprated to 2001. Source: Own calculations based on EUROMOD.

Columns 2 and 3 of Table 1 show the average weekly gross and disposable incomes per household, respectively. Columns 4 to 6 include initial gross taxes, employee social insurance contributions (SIC) and benefits. Column 7 reports initial net taxes that is income taxes plus SIC paid minus cash benefits received. In France and Spain average net taxes are negative. This reflects that benefits paid by the government exceed revenue from income taxes and SIC. These countries need other revenue sources like, for instance, indirect taxes to finance transfers.

Figure 3 illustrates how gross income is transformed into disposable income and shows that the structures of tax and transfer systems differ considerably across member states. For instance, in France income taxes play a relatively small role in financing transfers, i.e. SIC and other revenue sources, which are not included in our analysis, play a much more significant role than in countries like Germany or Belgium.

The last two columns of Table 1 report net taxes that emerge under the EU average system (without and with increased progressivity in columns 8 and 9, respectively). Note that, at the EU level, both systems lead to the same average net tax revenue as the sum of the national systems in the baseline.

Fig. 3: Composition of 100 Euros disposable income by country



Source: Own calculations based on EUROMOD.

Table 1 and Figure 3 reveal that there are considerable differences across individual countries with respect to both income levels and the structure of the tax-benefit level. Average gross income ranges from almost 700 Euros in Ireland, which is 42 per cent above the EU average of 491 Euros, to a value of 259 Euros in Greece, just 52 per cent of the EU average. One should note, however, that these income levels are not adjusted for differences in purchasing power. If differences in purchasing power are taken into account, income differentials are somewhat smaller[12]. Initial net taxes also differ considerably, between 76 Euros in the Netherlands and -24 Euros in France. Under a common tax system, the EU average system, net taxes would change significantly. In the Netherlands they would increase to 83 Euros while the countries with the largest net transfers would now be Greece (-59 Euros) and Portugal (-36 Euros). This is plausible because these countries have the lowest gross income levels. In the EU average system with higher progression these effects are reinforced, as one would expect.

[12] This leads to slight changes when recalculating the results presented in section 4 for PPP-EUR. The main difference is that Spain now shows a majority of gainer households for the reforms considered while the rest of the findings are qualitatively broadly in line with the results presented here, i.e. for not PPP-adjusted 2001 EUR (detailed results available upon request).

4 Results: Economic effects of a 'fiscal union'

In this section we present and discuss the key results of our simulated policy scenarios. The results are presented in five subsections. Section 4.1 focuses on the impact of introducing the common EU tax system on the distribution of income. We consider the four scenarios described in the previous section (share of the EU average system of 33.3% and 100%, respectively, with and without increased progressivity). Throughout the analysis, behavioural effects in the form of labour supply adjustments are accounted for. In the Appendix we summarise these effects (Table C.2) and we also report results without behavioural adjustments (Table B.1).

In Section 4.2, we look at changes in inequality and a measure of social welfare which takes into account inequality as a welfare reducing factor. For instance, a country with significant income redistribution in its national system might not find a reform which increases average disposable income of its households beneficial if this comes at the cost of an increase in inequality. Subsequently, changes for income quintiles in the different countries are considered. In section 4.3, we are interested in whether a majority of voters benefits or loses because this may affect political feasibility.

Section 4.4 investigates the potential of the EU average tax system to act as an automatic fiscal stabiliser in presence of an asymmetric shock, compared to that of the current national tax-benefit systems. While by construction, fiscal stabilisation is provided as a sum of national and EU average stabilisation (in the scenarios where the EU system does not take over 100%), we also look at the sole stabilisation effect of the EU average system. This is relevant in cases where countries are credit constrained at the capital market, as is currently the case for some countries in the Eurozone.

Finally, Section 4.5 turns to the issue of fiscal equalisation. There we propose a system of fiscal equalisation which is based on differences in taxing capacity across countries. We calculate transfers between countries that would be generated by this type of system and we consider a scenario where a subset of countries – the GIIPS group – is affected by a negative macroeconomic shock. We then calculate to which extent a fiscal equalisation mechanism would provide insurance against this type of shock as well as against a shock comparable to the 2008-09 recession.

4.1 Changes in disposable income and labour supply

We report the effects on disposable income accounting for labour supply effects which we discuss first. We follow van Soest (1995) or Hoynes (1996) and estimate a structural discrete choice labour supply model by specifying consumption-leisure preferences in a very flexible way (and without imposing separability between consumption and leisure). The model is estimated from the micro data and then used to predict the potential effects of a switch to the European system. The labour supply model is described in detail in Appendix C, where also estimated elasticities (Table C.1) as well as the labour supply effects (Table C.2 for the full population and Tables C.3 and C.4 for subgroups) are reported.

The labour supply effects are negative in all winner countries except Germany and Finland. For instance, in Greece and Spain overall labour supply falls, measured in full time equivalents, by

more than 2 per cent. However, in countries, where the most significant income losses occur, labour supply effects are mostly positive, except for Ireland and Austria. Most substantial reactions are observable for women in couples and single females, which corresponds to the relatively high labour supply elasticities for this group as reported in Table C.1 in the Appendix. For Austria, women in couples are the only group reducing their labour supply due to the reform, which determines the direction of overall change in labour supply. For Germany, single men are the only group reacting negatively to the introduction of the average system which might reflect a substitution effect for those who initially worked full- or over-time and now benefit from a reduced progressivity compared to the German tax-benefit system. For all other countries the direction of overall labour supply effects and those for the subgroups is the same, though, with substantial differences in magnitudes. Particularly large negative responses can be observed for married and single women in Greece and Spain. For Greece, this will be partly due to substitution effects initiated by the substantial increases in transfers while for Spain this might reflect both, a substitution effect for those experiencing a shift in disposable income due to more generous benefits and an income effect for higher income earners suffering from increased progressivity (see also again Figure 2).

How does the introduction of the common tax and transfer system redistribute income between households in Europe? Table 2 summarises information on changes in disposable income for all four scenarios. The first column for each scenario simply reports the fraction of winners in terms of changes in disposable income – for the EU as a whole as well as for each country. While this information does not account for the size of gains or losses (an increase in disposable income by one cent already constitutes a winner), the average size is given in the second column for each scenario. Even if a country shows a majority of winners (losers) it might be the case that the average gain (loss) of the winners (losers) is lower than the average loss (gain) of the losers (winners). This additional information is summarised in the last two columns for each scenario.

As can be seen from Table 2, a partial introduction (*EUavg - Sc. 1*) of the EU average system leads to a slight majority of winners at the EU level (while weekly disposable income on average slightly decreases and the average loss is higher than the average gain for the first scenario). The share of winners increases again slightly when moving to full integration (*EUavg - Sc. 2*). Note that, by construction, the shares of losers and winners do not change over these two scenarios in case of fixed labour supply (Table B.1 in the Appendix). Therefore the change in the fraction of winners/losers can only be due to behavioural responses. At the level of the individual member states, a majority of winners is given in 6 out of 11 countries, namely Greece, Italy, Portugal, Spain and, perhaps surprisingly, Germany as well as Finland which is only slightly above the margin with 51% gainers – in Belgium it is 50-50. In Spain and Germany, average gains in disposable income are rather small (they are zero in Finland). As one would expect the gains in terms of disposable income are largest in Greece, on average more than 8 per cent, and Portugal (4.5 per cent). The most significant income losses occur in Austria, Ireland and France, where average disposable incomes decline by between 2 and 3 per cent.

Tab. 2: % gainers, overall %-change, mean gain and loss in weekly disposable income (2001 EUR)

	EUavg – Sc. 1				*EUavg – Sc. 2*				*EUavg_p – Sc. 1*				*EUavg_p – Sc. 2*			
	%+	%dY	Gap+	Gap-	%+	%dY	Gap+	Gap-	%+	%dY	Gap+	Gap-	%+	%dY	Gap+	Gap-
EU	55	0.0	19.9	-23.6	56	0.5	60.0	-70.5	53	0.0	21.1	-23.8	54	0.4	63.8	-70.8
AT	35	-2.2	17.2	-28.3	36	-6.5	51.1	-85.0	32	-2.4	18.7	-27.7	33	-6.8	54.7	-83.0
BE	50	-0.3	19.2	-22.3	51	-0.5	58.0	-66.6	44	-0.5	19.1	-19.8	46	-1.2	56.6	-59.1
FI	51	0.0	19.1	-19.6	53	0.7	57.1	-58.6	49	-0.1	18.4	-19.3	51	0.1	54.9	-57.4
FR	31	-2.8	14.5	-26.5	32	-7.9	42.5	-78.6	30	-2.8	17.3	-26.9	31	-7.9	51.0	-79.6
GE	66	1.0	20.0	-24.5	68	3.6	60.7	-74.0	64	0.8	19.3	-23.2	66	3.0	58.7	-69.6
GR	80	8.5	30.8	-12.7	80	26.1	93.6	-38.2	79	9.3	34.0	-13.4	80	28.8	103.4	-40.5
IR	28	-2.7	21.2	-33.8	29	-7.6	63.3	-98.4	28	-3.0	25.6	-38.0	29	-8.2	76.5	-109.9
IT	63	0.9	19.6	-21.8	63	2.8	59.7	-65.8	62	1.0	21.7	-22.1	62	3.3	66.1	-66.6
NL	40	-0.6	16.8	-16.5	41	-1.3	50.1	-47.4	38	-0.9	19.9	-20.6	39	-2.2	59.0	-58.9
PT	68	4.5	29.4	-17.9	69	13.6	87.8	-54.0	67	5.0	33.0	-18.6	67	15.0	99.2	-55.7
SP	60	0.9	20.1	-20.2	61	3.1	61.0	-60.8	59	1.1	23.2	-21.3	61	4.0	70.1	-63.5

Note: %+ is the percentage of reform gainers (100 minus %+ is the percentage of reform losers); %dY the overall %-change in household weekly mean disposable income; Gap+ (Gap-) the mean difference from zero for positive (negative) dY. Source: Own calculations based on EUROMOD.

An interesting aspect of this result is that intuitively, one would assume that the rich countries systematically lose in a common system. This is only partly true. It is particularly puzzling that Germany and France are affected very differently, with France losing significantly although its average income is lower. The explanation for this finding is that the national tax and transfer systems of these two countries are very different, despite their similarity in other dimensions. Inspecting Figure 2 shows that, indeed, the EU tax system implies higher taxes and lower transfers than the French national system. This implies that the net tax burden on the French population increases. In addition, French income levels are close to the EU average, so that the country cannot hope to benefit from participating in a system with higher average incomes. Figure 5 shows that in France the low income quintiles suffer more than the high income quintiles. In Germany, however, the situation is different. The national tax and transfer system is characterised by higher progressivity and slightly higher taxes for high income earners. For lower income levels, the distance between the national and the EU tax and transfer system is rather small. As a result, all quintiles in Germany gain from the introduction of the EU tax.

The general pattern of results in terms of losers and winners at the country level (as well as in terms of the direction in labour supply responses) is robust when switching to the EU average tax system with an increase in tax progressivity (*EUavg_p - Sc. 1, Sc. 2*). The numbers of winners and losers change slightly, as do the magnitudes of average gains and losses. But – except for the case of partial integration where Finland now has slightly less gainers (49%) than losers - no country shows a shift from a majority of losers to a majority of winners or vice versa.

4.2 Effects on welfare and inequality

Changes in inequality due to the redistributive effects of tax-benefit reforms will also be a relevant indicator to policy makers. Therefore, Table 3 additionally reports the Gini coefficient across countries as well as its percentage change due to the introduction of the different scenarios. Next, this information is integrated with the change in disposable income into a social welfare function (SWF) of the Yitzhaki-type (Yitzhaki, 1979), i.e. $W = \mu * (1 - G)$ with μ the mean disposable income of the respective population and G the accordant Gini index.[13]

Table 3 reveals that, at least in the first two scenarios, the pattern of winner and loser countries does not change when looking at welfare instead of disposable income, i.e. it is again the same group of countries - Germany, Greece, Italy, Portugal and Spain (but not Finland) - that benefits in terms of the percentage change in social welfare. Inequality also declines in the EU as a whole, as well as in all individual countries except Belgium and Finland. Greece is again the country that benefits most, showing the largest decrease in the Gini coefficient (having the highest level of initial inequality). When moving to the average system with increased progressivity, the overall pattern again does not change (minor changes can be observed for Finland and the Netherlands). However, as can be expected, decreases (increases) in inequality (increases (decreases) in welfare) become stronger (less strong or even negative) compared to the scenarios without increased progressivity.

Tab. 3: Gini-Index (G, %-changes dG) and Welfare (W, %-changes dW)

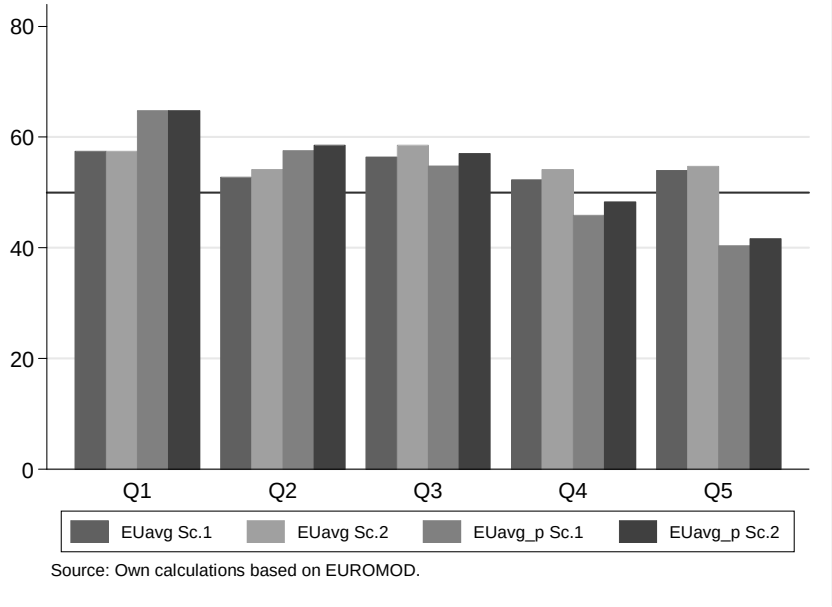
	Baseline		*EUavg – Sc. 1*		*EUavg – Sc. 2*		*EUavg_p – Sc. 1*		*EUavg_p – Sc. 2*	
	G	W	dG	dW	dG	dW	dG	dW	dG	dW
EU	0.34	315	-3.2	1.7	-6.4	3.8	-4.5	2.4	-10.5	6.0
AT	0.31	382	-0.4	-2.1	3.5	-7.9	-1.8	-1.6	-1.2	-6.3
BE	0.33	347	1.8	-1.2	8.1	-4.4	0.1	-0.6	2.9	-2.6
FI	0.34	315	1.0	-0.5	5.1	-2.0	-0.4	0.1	1.2	-0.6
FR	0.31	343	-2.1	-1.9	-2.4	-6.9	-3.5	-1.2	-6.9	-5.0
GE	0.33	323	-2.8	2.4	-5.5	6.3	-4.4	3.0	-10.3	8.2
GR	0.42	151	-12.8	18.4	-27.4	50.7	-14.3	20.5	-29.8	56.2
IR	0.36	432	-1.3	-2.0	-3.1	-6.0	-2.4	-1.7	-6.2	-5.1
IT	0.37	307	-4.0	3.2	-9.5	8.6	-5.2	4.1	-13.0	11.2
NL	0.31	391	-1.1	-0.1	-2.2	-0.3	-2.4	0.2	-5.9	0.3
PT	0.40	191	-8.0	10.1	-16.3	25.9	-9.4	11.5	-18.7	29.3
SP	0.37	281	-4.5	3.5	-10.9	9.6	-5.7	4.4	-14.1	12.5

Source: Own calculations based on EUROMOD.

[13] In Appendix D, we show that the results do no change when aggregating the individual utilities from the labor supply model using a utilitarian SWF.

Related to that, Figure 4 shows the share of winners within gross income quintiles of the overall sample population by scenario. The effects are rather similar for all quintiles of the overall EU income distribution. The effect of increased progressivity becomes visible as well: the share of winners increases with higher progressivity for quintiles 1 and 2 while for the fourth and the fifth quintile, it is the share of losers that increases.

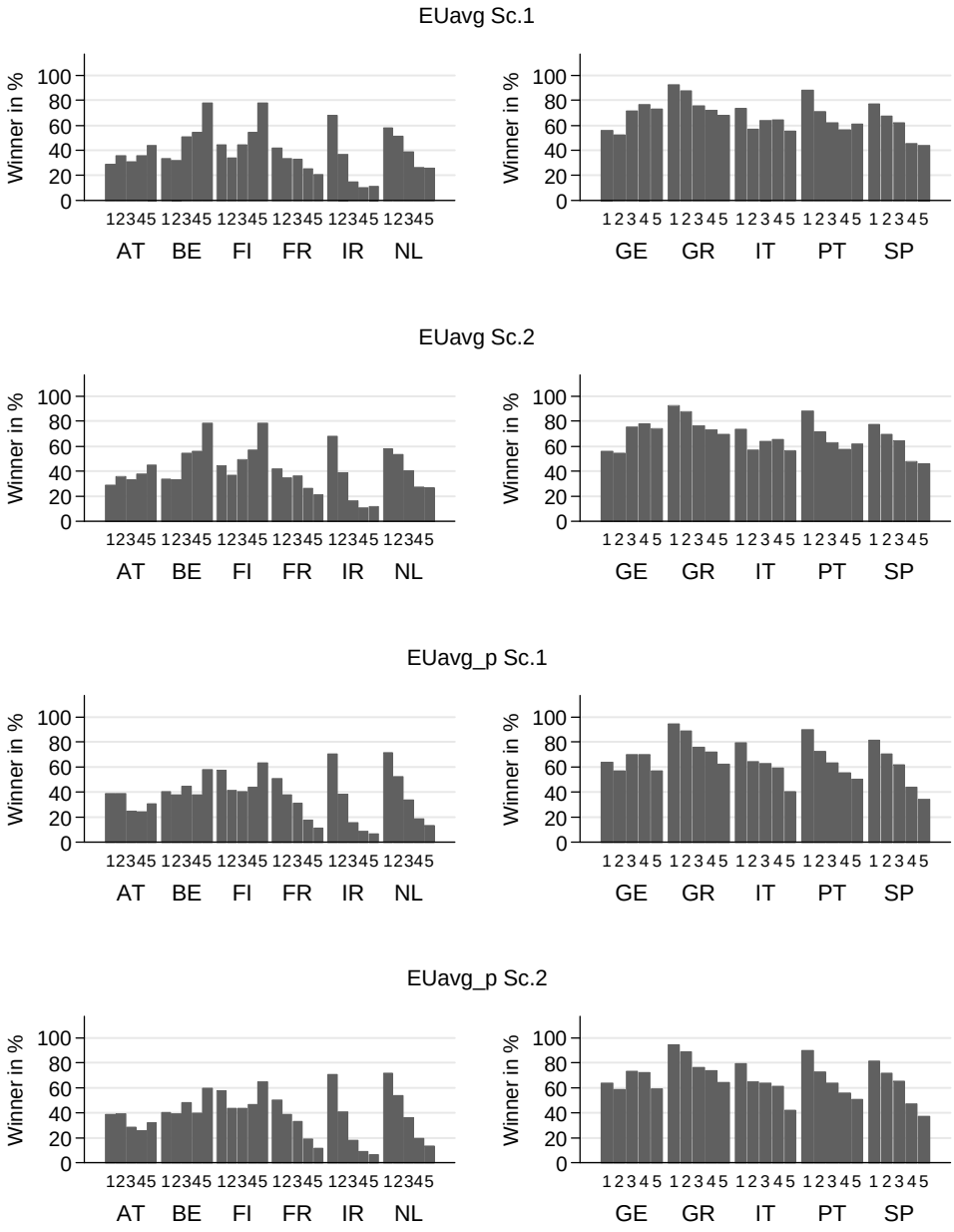
Fig. 4: Share of winners in global quintiles by reform scenario



Source: Own calculations based on EUROMOD.

This can be compared to the share of winners within gross income quintiles for the different scenarios by countries in Figure 5. The left (right) panel displays the 6 (5) countries which on average suffer (benefit) from the EU tax reforms (with switching countries Belgium and Finland on the left hand side). Consider first the countries which benefit on average. In the four southern European countries, low income quintiles benefit most because the transfers in the EU system are more generous than the transfers in the national systems. In Italy and Spain high income quintiles mostly lose. In Germany, the pattern is different. The share of winners is slightly higher in the middle to upper quintiles than in the lower ones. This pattern can also be observed for Austria, Belgium and Finland. In France, Ireland and the Netherlands, the losses mostly fall on the high income quintiles.

Fig. 5: Share of winners in country gross income quintiles by scenario



Source: Own calculations based on EUROMOD.

4.3 Political Feasibility

The introduction of a common tax and transfer system in Europe would be a major reform, and generating political support for such a project would be difficult. This section tries to provide some insights into how difficult this might be by discussing how redistributive effects of the reform could translate into voting behaviour at the national and at the European level. In order to do this we make the following assumptions. Firstly, if a majority of taxpayers in a country benefits from a reform in terms of changes in disposable income, we assume that the

government of this country will support the reform when it comes to voting at the European level, independently of the extent of gains and losses.

Secondly, we assume that decisions at the European level will require qualified majorities. Currently, decisions of the Council of the European Union in tax matters would usually require unanimity, which implies that none of the reforms we consider will be implemented unless side payments are possible. But as political integration in Europe proceeds, it may well be that the role of decisions by qualified majority increases.

We consider two voting rules for Council decisions which can currently be found in the EU Treaties. The first rule has been established with the Lisbon Treaty and is supposed to be in practice from 2014 on. It is referred to as the 'double majority rule'. This rule states that a qualified majority decision requires support of at least 55 per cent of the member states and, in addition, a positive vote of member states representing at least 65 per cent of the population. The second rule is stipulated in the Treaty of Nice and currently in force. This rule has three elements. It requires a simple majority of the member states and support of member states representing at least 62 per cent of the population. In addition, this rule uses voting weights that have been given to countries to reflect size differences. Here, the required quorum is 74 per cent. Table 4 illustrates this for the two groups of countries we consider, the larger group of 11 countries and the smaller 'core union' consisting of 5 countries.[14]

We focus on scenarios *EUavg –Sc.1* and *EUavg_p –Sc.1*. In sum we find that would be difficult to generate the required political support for the two reforms under consideration. In the case of scenario 1, we observe a narrow majority of countries in favour of the reform, i.e. 6 versus 5 votes. This simple majority represents 67 per cent of the population. Thus, the reform would pass under the double majority rule of the Treaty of Lisbon. With the Treaty of Nice rule, however, the reform would be rejected. It fails to achieve the required majority under weighted voting (116 versus 139 votes). Surprisingly, for the smaller core union, the reform would fail under both rules. This reflects the results for and the political weight of France. The same holds true for both groups of countries for the scenario with increased progressivity.

[14] The results in terms of the EU average tax system for changes in disposable income as well as inequality and welfare are reported in Appendix E. A general pattern which seems to be consistent across various different combinations of countries for the core union is that, as long as the reform is revenue-neutral, there will always be winner and loser countries as there will be redistribution between countries. Which countries will win and lose will depend, among other things on where the households are situated in the European income distribution. Hence, there does not seem to be a combination of countries which will unambiguously favor the introduction of a fiscal union.

Tab. 4: Political implementability of *EUavg - Sc. 1* and *EUavg_p – Sc. 1* using different voting rules

	EUavg - Sc. 1						*EUavg_p – Sc. 1*					
	Eurozone			***Core Union***			***Eurozone***			***Core Union***		
	+/-	Pop.	Votes	+/-	Pop.	Votes	+/-	Pop.	Votes	+/-	Pop.	Votes
AT	-	0.03	10	-	0.04	10	-	0.03	10	-	0.04	10
BE	-	0.04	12	+	0.05	12	-	0.04	12	+	0.05	12
FI	+	0.02	7	+	0.03	7	-	0.02	7	+	0.03	7
FR	-	0.21	29	-	0.31	29	-	0.21	29	-	0.31	29
GE	+	0.32	29	+	0.48	29	+	0.32	29	+	0.48	29
GR	+	0.03	12				+	0.03	12			12
IR	-	0.01	7				-	0.01	7			7
IT	+	0.17	29				+	0.17	29			29
NL	-	0.06	13	-	0.09	13	-	0.06	13	-	0.09	13
PT	+	0.03	12				+	0.03	12			12
SP	+	0.10	27				+	0.10	27			27
SUM	11	1.00	187	6	1.00	100	11	1.00	187	6	1.00	100
Lisb.	6	0.65		4	0.65		6	0.65		4	0.65	
Nice	6	0.62	139	4	0.62	74	6	0.62	139	4	0.62	74
SUM+	**6**	**0.67**	116	3	0.56	48	5	0.65	109	3	0.56	48

Note: A qualified majority according to the Treaty of Nice requires a simple majority of member states + 74 per cent of the votes + 62 per cent of the population (on demand of one member); the Treaty of Lisbon requires 55 per cent of the member states + 65 per cent of the population being represented. Source: Own calculations based on EUROMOD.

These results suggest that a move towards a common tax and transfer system would be unlikely to happen even if qualified majority rules were applied to reforms as fundamental as the introduction of a common tax and transfer system. Clearly, from a political economy perspective, the resistance of those who would lose from moving to fiscal union can only be overcome if something can be offered to the losers to compensate them. To make this possible, the reform would either have to be linked to other issues, or it would have to generate significant benefits beyond those considered so far in the analysis. One possible source of benefits would be an improvement in macroeconomic stability through automatic fiscal stabilisers. This issue will be analysed in the next section.

4.4 Automatic fiscal stabilisation

What is the impact of introducing the EU system on the ability of the tax and transfer systems to act as an automatic stabiliser? Automatic fiscal stabilisation is associated with the ability of taxes and transfers to stabilise income and in consequence consumption automatically in the face of economic downturns. The stabilising character of the tax and transfer system relies on a simple mechanism: In the presence of a given negative shock to gross income, taxes decline and transfers increase, so that the decline in disposable income is smaller than the shock to gross income. Several components of government budgets are impacted 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 stabilisation might have effects not only on disposable income but also on GDP itself. If in a recession fewer taxes are collected and more transfers are paid, this should support private incomes and dampen adverse movements in aggregate demand.

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

The extent to which automatic stabilisers mitigate the impact of income shocks on household demand essentially depends on the tax and transfer system which determines 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. A progressive tax, in turn, would have a stronger stabilising effect (van den Noord, 2000; Girouard and André, 2005).

A common measure for estimating automatic stabilisation is the "normalised 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, in Dolls et al. (2012) define the "*income stabilization coefficient*" τ which shows how changes in market income (defined as the sum of all incomes from market activities such as (self)-employment, business and property income) Y^M translate into changes in disposable income (market income minus taxes plus benefits) Y^D through changes in net tax payments *G*. They extend the concept of normalised tax change to include other taxes as well as social insurance contributions and transfers like e.g. unemployment benefits. We follow their approach and take into account personal income taxes (at all government levels), social insurance contributions as well as payroll taxes and transfers to private households such as unemployment benefits. τ is computed using arithmetic changes (Δ) in total disposable income ($\sum_i \Delta Y_i^D$) and market income ($\sum_i \Delta Y_i^M$) based on household micro level information:

$$\tau = 1 - \frac{\sum_i \Delta Y_i^D}{\sum_i \Delta Y_i^M} = \frac{\sum_i (\Delta Y_i^M - \Delta Y_i^D)}{\sum_i \Delta Y_i^M}. \qquad (12)$$

In order to compute the coefficients of automatic stabilisation, we compute their income shock measure defined as a proportional decrease of gross income by 5% for all households. The results are presented in Table 5. The levels and differences across countries in the baseline scenario are in line with the calculations in Dolls et al. (2012).

Tab. 5: Automatic fiscal stabilisation (income shock 5%)

		EUavg			*EUavg_p*		
	Baseline	*Sc. 1*	*Sc. 1cc*	*Sc. 2*	*Sc. 1*	*Sc. 1cc*	*Sc. 2*
EU	0.40	0.40	0.13	0.40	0.41	0.15	0.45
AT	0.43	0.43	0.14	0.42	0.44	0.15	0.45
BE	0.51	0.45	0.11	0.34	0.46	0.12	0.37
FI	0.42	0.42	0.14	0.42	0.44	0.16	0.47
FR	0.36	0.38	0.14	0.41	0.39	0.15	0.45
GE	0.49	0.47	0.15	0.44	0.48	0.16	0.48
GR	0.29	0.30	0.11	0.34	0.31	0.12	0.36
IR	0.38	0.36	0.10	0.31	0.38	0.13	0.38
IT	0.34	0.35	0.12	0.37	0.38	0.15	0.46
NL	0.40	0.41	0.14	0.43	0.42	0.15	0.46
PT	0.30	0.31	0.11	0.32	0.31	0.11	0.34
SP	0.30	0.32	0.12	0.36	0.33	0.13	0.39

Note*: Sc. 1cc* indicates credit constraints for countries.

Source: Own calculations based on EUROMOD.

When moving towards a EU tax-benefit system, most countries gain in terms of automatic stabilisation – except Belgium and Germany, which are the countries with the highest automatic stabilisers in their national tax and transfer systems, as well as Ireland. In the case of a fully integrated system (*Sc. 2*), these patterns are enforced. The qualitative results are rather similar for the scenarios with increased progressivity. The low income, southern European countries have significantly higher stabilisers in the progressive system. We can thus conclude that a more progressive EU tax system does not necessarily increase automatic stabilisers for all countries. For the high income countries, the opposite may occur.

How does an EU tax-benefit system cushion asymmetric shocks in individual countries? In the case of full integration, this cushioning is given by the stabilisation coefficient for *Sc. 2* independent of a single country's access to credit markets. The stabilisation coefficient in the case of partial integration, where only a third of the national tax and transfer systems is replaced by the European system, is a combination of the national and European tax and transfer systems and given in column *Sc. 1*. But if the individual countries are credit credit-constrained, they cannot let the automatic stabilisers work. Instead they would have to adjust taxes or expenditures to keep the budget balanced. In this case automatic stabilisation can only come from the European tax and transfer system where the assumption is that the EU budget deficit can be financed by issuing debt. Hence, we re-compute the stabilisation coefficient for this case (*Sc. 1cc*). The values for the income stabilisation of the coefficients range between 0.1 for Ireland

and 0.15 for Germany and are at approximately one third (i.e. its share) of the EU average system. In the case of the more progressive EU system, the automatic stabilisers slightly increase for all countries. On average, the automatic stabilisers of the EU budget would absorb approximately 15 per cent of an income shock. This illustrates that even a rather radical reform, which replaces one third of the national tax and transfer systems by a supranational system, would have only rather moderate fiscal stabilisation effects in the event of country specific shocks.

4.5. Fiscal Equalisation

We now turn to the second element of a fiscal union in our analysis, the introduction of a fiscal equalisation mechanism. Fiscal equalisation, in contrast to the creation of a common tax and transfer system, leaves the national tax and transfer systems in place but redistributes tax revenue across countries. This redistribution is based on the hypothetical ability of a country to generate tax revenue, to which we refer as its taxing capacity. In existing fiscal equalisation systems this is a common approach (see e.g. Boadway, 2004, or Büttner, 2006). We define the taxing capacity of a country as the net tax revenue a country would raise if it fully applied the 'EU average' tax and transfer system used in the preceding section (compare Table 1, column 'Net taxes *EUavg*'). This taxing capacity can be interpreted as an indicator of the amount of tax revenue that could be raised by a country if tax rates and transfers were set as in other countries and serves as the basis for equalisation payments. Countries above (below) the average taxable capacity will pay (receive) transfers to (from) the equalisation mechanism. This setup can be interpreted as a simple version of a European 'transfer union'. Note that the scenario considered here is quite ambitious in that the fiscal equalisation scenario fully compensates for differences in taxing capacity. In practice one might expect a more moderate system which would compensate countries for a share of the differences in taxing capacity only.

It is clear that in such a system, a country as a whole either gains or loses, depending on whether the country is a net donor or recipient of fiscal equalisation payments. The distribution of taxes and transfers within a country, however, is less straightforward. For simplicity, and in order not to alter existing redistribution within a country, we assume that the equalisation of taxes and transfers are shared among households proportionally to existing net tax payments. What are the implications for automatic stabilisation properties of the tax and transfer system? Table 6 shows the net tax payments in the baseline as well as for the EU average system which serves as our measure of taxable capacity. The resulting fiscal equalisation payments are reported in column 3 (a positive (negative) value indicates a net contributing (receiving) country). Column 4 includes the new distribution of net taxes.

Consider first the direct cross country distributional effect of the fiscal equalisation system. As one would expect, the high income countries are net contributors to the system. Contributions per household range from 66.7 Euros in the case of Ireland to 17.5 Euros in Austria. These are huge contributions, equivalent to 9.6 per cent of gross income in Ireland and 3.2 per cent of gross income in Austria. Clearly, these unrealistically large contributions reflect the fact that the degree of fiscal equalisation is 100 per cent. Accordingly, the countries with below average taxing capacity receive huge transfers. The recipients include Greece, Portugal, Spain, Italy and France. In Greece the fiscal equalisation payment is equal to 84 Euros, an implausible 33 per cent

of average gross income. France receives the lowest payment per household, just 8.5 Euros, which equals 1.7 per cent of average gross income.

What are the implications of this system for automatic stabilisers? As long as governments can cushion income shocks by increasing debt financing, the stabilisers in the system are the same as under the national systems. But things are different if governments cannot borrow without restrictions. Consider an asymmetric shock in the form of a decline in gross incomes by 5% which hits the periphery of the Eurozone, i.e. the GIIPS countries. This corresponds to a 2% shock at the EU 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 taxable capacity (column 7). As a result, the fiscal equalisation payments for all countries have to be adjusted (column 8) resulting in a new distribution of net taxes (column 9). Finally, column 10 reports the automatic stabilisation effect of the fiscal equalisation scheme in the affected countries. It measures the change in fiscal equalisation payments as a percentage of the change in income caused by the shock. Negative values of dAS imply that payments received from the fiscal equalisation scheme decline in response to the negative shock or contributions a country has to make to the scheme increase, so that a *destabilising* effect arises.

Tab 6: 5% asymmetric shock to GIIPS countries with fiscal equalisation mechanism

	Net taxes baseline	Net taxes *EUavg*	Fiscal eq.	Fiscal eq. taxes	Gross income shock %	New net taxes nat.	New net taxes *EUavg*	New fiscal. eq.	New fiscal eq. taxes	dAS fiscal eq.
EU	24.5	24.5	0.0	24.5	2	22.0	22.0	0.0	22.0	7
AT	4.5	42.2	17.5	22.0	0	4.5	42.2	20.1	24.6	0
BE	45.0	52.7	28.0	73.0	0	45.0	52.7	30.6	75.6	0
FI	43.5	45.5	20.8	64.3	0	43.5	45.5	23.4	66.9	0
FR	-23.6	16.2	-8.5	-32.1	0	-23.6	16.2	-5.9	-29.5	0
GE	62.1	48.3	23.6	85.7	0	62.1	48.3	26.2	88.3	0
GR	5.1	-59.4	-84.1	-79.1	5	1.1	-61.9	-84.0	-82.9	-1
IR	37.8	91.4	66.7	104.5	5	23.3	77.4	55.3	78.6	33
IT	13.4	2.3	-22.4	-9.0	5	4.5	-7.0	-29.1	-24.6	27
NL	77.6	83.3	58.6	136.2	0	77.6	83.3	61.2	138.8	0
PT	5.4	-36.4	-61.1	-55.7	5	0.5	-40.2	-62.3	-61.8	8
SP	-3.5	-13.8	-38.5	-42.0	5	-9.8	-21.1	-43.2	-53.1	22

Note: Monetary values are in weekly 2001 EUR. Source: Own calculations based on EUROMOD.

Maybe the most striking result is that the fiscal equalisation system may have a destabilising, rather than a stabilising impact on some of the countries hit by the shock. In our scenario this applies to Greece, the country most favoured by the initial fiscal equalisation system. Although its fiscal capacity declines as a consequence of the shock, the payment it receives from the fiscal equalisation system declines slightly. The payment received by Portugal is almost unchanged.

Only the countries which are closer to average taxing capacity experience a stabilising effect in the form of higher fiscal equalisation payments. The reason is that the shock has two effects on each affected country. Firstly, the taxing capacity of the country declines. Other things equal, this increases equalisation payments. But there is a second effect. Since other countries are affected by the shock, too, overall taxing capacity in the union declines as well. This reduces fiscal equalisation payments for all receiving countries. Together these two effects may imply that individual countries hit by the shock may end up receiving lower payments, so that the fiscal equalisation scheme has a destabilising, rather than a stabilising effect.

Tab 7: 2008-2009 shock to all countries with fiscal equalisation mechanism

	Net taxes baseline	Net taxes *EUavg*	Fiscal eq.	Fiscal eq. taxes	Gross income shock %	New net taxes nat.	New net taxes *EUavg*	New fiscal. eq.	New fiscal eq. taxes	dAS fiscal eq.
EU	24.5	24.5	0.0	24.5	4	14.8	15.0	0.0	14.8	-8
AT	4.5	42.2	17.5	22.0	4	-5.0	32.0	17.0	12.0	2
BE	45.0	52.7	28.0	73.0	3	36.0	46.1	31.0	67.0	-18
FI	43.5	45.5	20.8	64.3	8	24.4	26.3	11.2	35.7	23
FR	-23.6	16.2	-8.5	-32.1	3	-28.1	10.2	-4.8	-33.0	-26
GE	62.1	48.3	23.6	85.7	5	47.8	35.5	20.5	68.3	12
GR	5.1	-59.4	-84.1	-79.1	3	2.7	-60.9	-76.0	-73.2	-105
IR	37.8	91.4	66.7	104.5	7	17.6	71.8	56.7	74.3	20
IT	13.4	2.3	-22.4	-9.0	6	2.7	-8.9	-23.9	-21.2	5
NL	77.6	83.3	58.6	136.2	4	65.9	70.8	55.8	121.7	11
PT	5.4	-36.4	-61.1	-55.7	3	2.4	-38.6	-53.7	-51.3	-78
SP	-3.5	-13.8	-38.5	-42.0	4	-8.6	-19.7	-34.7	-43.3	-22

Note: Monetary values are in weekly 2001 EUR. Source: Own calculations based on EUROMOD. Changes in GDP from OECD.

This issue becomes even more relevant when considering a more extreme shock scenario, as the recent economic crisis. Therefore, we take the observed reduction in GDP for all 11 countries under analysis from 2008 to 2009 (4 per cent on average). All countries experienced a substantial reduction in GDP in that period, ranging from 3 to 8 per cent. In such a situation, the average taxing capacity substantially declines on the EU level from 24.5 Euros per household before to 15 Euros per household after the shock. Consequently, the fiscal equalisation payments after the shock substantially decrease for Greece, France, Spain and Portugal. As a result, all of those countries experience a significant destabilising effect (the exception is Italy, where fiscal equalisation payments once again increase). This effect is most striking for Greece, where payments received from the scheme fall by more than 100 per cent of the income shock. However, now also one of the donor countries faces a destabilising effect. While in the former scenario, Ireland as the only donor country was hit by a shock, but had to contribute less to the equalisation system and thus, experienced a stabilising effect, Belgium has to contribute more to

the system in the situation after the crisis. Clearly, the effects reported seem unrealistically large. This is again due to the assumption that the mechanism fully equalizes taxing capacities across countries. Also, all countries experience a large shock to gross income at the same time in this scenario. This necessarily undermines the overall redistributive capacity of the mechanism. Nevertheless, such a scenario emphasizes the finding from the previous analysis, i.e. that a fiscal equalisation mechanism can have a destabilising effect.

5 Conclusions

The current debt crisis in the Eurozone has brought the idea of deeper fiscal integration to the top of the European policy agenda. Many observers argue that the currency union cannot survive unless it is complemented by a 'fiscal union'. In this paper, we have analysed the economic effects of two important elements of fiscal integration, i) the introduction of an EU-wide integrated tax and transfer system which partly or fully replaces the existing national systems and ii) the introduction of a system of fiscal equalisation.

Our analysis shows that the introduction of an EU tax and transfer system would increase the disposable income of a small majority of households in Europe. At the same time it would lead to significant redistribution between countries. In Greece, Portugal, Spain, Italy and, surprisingly, Germany, a majority of household would benefit and average disposable income would increase. But in the remaining six countries, Austria, Belgium, Finland, France, Ireland and the Netherlands, a majority would lose. In many of the high income countries including Germany, the middle income quintiles fare worse as a result of the reform than households at the two ends of the income distribution. Choosing a more progressive variant of the EU tax system would change the magnitudes of gains and losses, but the patterns would be similar. All this suggests that generating political support for such a reform may be difficult.

Another key question is how the introduction of the EU tax-benefit system would affect automatic fiscal stabilisers in the different member countries. In the case, where the EU tax and transfer system replaces one third of the national systems, the EU system would absorb between 10 per cent (Ireland) and 15 per cent (Germany) of a shock to gross income. In the case of the more progressive EU tax system, the stabilisation properties changes only slightly. Given that replacing one third of the existing national tax and transfer systems by an EU system seems rather ambitious, and given that the more progressive system has stronger redistributive effects, which may reduce its political viability, this may seem disappointing.

Regarding the implications of introducing a system of fiscal equalisation, our findings are even less appealing. We consider a system of strong fiscal equalisation, where differences between the taxing capacity of individual countries and average EU taxing capacity are fully neutralised. Unsurprisingly, this system leads to a massive transfer of tax revenue from high to low income countries. These redistributive effects are much larger than those of introducing the common tax and transfer system, at least in the scenarios without increased progressivity, but the achievements in terms of macroeconomic stabilisation in the presence of asymmetric shocks are disappointing. For some countries, the fiscal equalisation mechanism even has a destabilising effect. An important policy implication of this analysis is that it is important to distinguish

between the redistributive effects of steps towards fiscal integration and its stabilisation effects in the presence of an asymmetric macroeconomic shock.

These results should be interpreted in the light of the limitations of our analysis and the simplifying assumptions we have made. Most importantly, we should emphasise that our simulations focus on particular scenarios, and although we have looked at different variants of the reforms to explore robustness, the results do depend on the specific properties of the reforms we have considered, and other reforms will have different effects. This also applies to the macroeconomic shock scenarios we have analysed. We have focused on proportional income shocks which affect all households equally, but macroeconomic shocks often affect households very differently. As shown in Dolls et al. (2012), the impact of automatic fiscal stabilisers depends on the type of shock. We have also neglected the impact of reforms on indirect taxes and government expenditure other than monetary transfers. In addition, we have abstracted from a balanced budget in the analysis.

Note also that our analysis abstracts from a number of behavioural effects apart from potential labour supply reactions that were taken into account. First, we did not account for other margins like tax evasion or avoidance or income shifting. In addition, we did not take into account differences in the size of the shadow economy and the enforcement and collection of taxes across countries. Hence, given that there are considerable differences across countries, an important element of introducing a common tax system would be to address the issue of equal tax administration and enforcement. 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. Second, we have abstracted from potential effects of tax harmonisation on cross country migration. For instance, more generous transfers to households in poor income countries could prevent them from migrating to high income countries if they are unemployed. Among other things, this would make adjustment to asymmetric shocks more difficult.

Future research should try to tackle these issues. In addition, the analysis could be extended to all 17 Eurozone countries or even the EU-27. However, in general, as long as the reform will be revenue-neutral at the EU-level, there will always be winner and loser countries. Which countries will win and lose will depend, among other things, on where the households are situated in the European income distribution and on how the (progressivity of the) EU system is designed. It would also be interesting to analyse some kind of optimal EU tax system in future research.

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APPENDIX

A Descriptive Data

Tab. A.1: Taxes captured and not by EUROMOD as % of total taxation in 2001

	Taxes captured			*Taxes not captured*			Deficit %GDP	Debt %GDP
	Income	*SIC*	*SUM*	*VAT*	*Corp.*	*SUM*		
AT	23.9	32.9	56.8	33.8	6.9	40.7	0.0	66.8
BE	30.1	31.4	61.5	29.2	7.2	36.4	0.4	106.5
FI	31.5	26.9	58.4	30.0	9.4	39.4	5.1	42.5
FR	18.8	36.8	55.6	35.1	7.0	42.1	-1.5	56.9
GE	23.2	42.8	66.0	28.2	4.3	32.5	-3.1	59.1
GR	13.6	31.9	45.5	41.5	10.1	51.6	-4.5	103.7
IE	29.3	15.2	44.5	41.9	12.1	54.0	0.9	35.1
IT	26.7	28.6	55.3	35.5	7.8	43.3	-3.1	108.2
NL	16.1	35.7	51.8	33.7	11.0	44.7	-0.2	50.7
PT	17.4	26.7	44.1	43.6	10.6	54.2	-4.8	53.5
SP	20.2	36.1	56.3	34.4	8.5	42.9	-0.5	55.6

Source: OECD Taxation trends in Europe. Deficit and debt shares from Eurostat.

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Tab. A.2: Data sources used by EUROMOD

Country	Data	Years			No of observations (original samples)
		Data collection	Incomes	Simulated policy	
Austria	European Community Household Panel	1999	1998	2001	7.386
Belgium	Panel Survey on Belgian Households	2002	2001	2001	7.335
Finland	Income Distribution Survey	2001	2001	2001	25.010
France	Household Budget Survey	2000-01	2000-01	2001	25.803
Germany	German Socio-Economic Panel	2001	2000	2001	16.874
Greece	Household Budget Survey	1995	1994	2001	15.062
Ireland	Living in Ireland Survey	2000	2000	2001	11.436
Italy	Survey of Households Income and Wealth	1996	1995	2001	23.924
Netherlands	Sociaal-Economisch Panelonderzoek	2000	1999	2001	10.344
Portugal	European Community Household Panel	2001	2000	2001	13.092
Spain	European Community Household Panel	2000	1999	2001	14.787

Tab. A.3: Cross-country heterogeneity in main characteristics for tax functions (2001)

	Av. *n* HH Mem.	Av. *n* Child. 0-17	Av. *n* Old 65+	Av. Age HH head	Share Couple HH	Share Prop. Income	Share Pension Eligib.	Share UB Eligib.	Share Self Employed
EU	2.50	0.51	0.38	50.47	23.83	30.37	16.06	1.75	5.15
AT	2.45	0.52	0.38	49.75	23.14	8.53	17.82	1.37	5.66
BE	2.39	0.55	0.39	52.29	25.71	11.68	16.80	2.61	5.99
FI	2.16	0.48	0.29	48.54	22.49	20.58	17.14	4.86	6.02
FR	2.42	0.57	0.35	49.96	25.13	33.60	14.97	1.85	2.87
GE	2.08	0.40	0.33	51.00	24.26	39.87	16.93	2.66	4.16
GR	2.83	0.60	0.46	52.33	25.14	7.75	15.97	0.98	10.38
IR	2.98	0.80	0.32	46.21	19.82	14.07	11.40	3.35	6.16
IT	2.89	0.54	0.44	51.16	23.94	31.98	17.89	0.42	6.91
NL	2.25	0.54	0.30	48.79	27.28	25.07	14.14	0.92	2.74
PT	3.24	0.69	0.45	48.42	22.14	4.49	13.97	1.05	8.22
SP	3.23	0.61	0.51	49.96	19.71	30.78	14.34	1.69	6.28

Source: Own calculations based on EUROMOD.

B Income changes without behavioural adjustments

Tab. B.1: % gainers, overall %-change, mean gain and loss in weekly disposable income (2001 EUR) – for baseline labour supply

	EUavg – Sc. 1				*EUavg – Sc. 2*				*EUavg_p – Sc. 1*				*EUavg_p – Sc. 2*			
	%+	%dY	Gap+	Gap-	%+	%dY	Gap+	Gap-	%+	%dY	Gap+	Gap-	%+	%dY	Gap+	Gap-
EU	54	-0.1	19.8	-23.7	54	-0.1	59.5	-71.1	52	-0.1	21.1	-24.0	52	-0.3	63.3	-71.9
AT	34	-2.3	17.4	-28.3	34	-6.8	52.0	-84.8	31	-2.4	18.9	-27.8	31	-7.2	56.7	-83.3
BE	48	-0.4	19.3	-22.3	48	-1.2	57.9	-66.9	43	-0.6	19.1	-20.1	43	-1.8	57.4	-60.3
FI	50	-0.1	19.1	-19.8	50	-0.2	57.3	-59.4	48	-0.3	18.6	-19.5	48	-0.7	55.7	-58.6
FR	30	-2.8	14.7	-26.6	30	-8.5	43.9	-79.9	29	-2.8	17.6	-27.1	29	-8.5	52.9	-81.3
GE	65	0.9	19.9	-24.7	65	2.8	59.8	-74.1	63	0.7	19.2	-23.4	63	2.2	57.6	-70.3
GR	79	8.4	30.6	-12.7	79	25.2	91.8	-37.9	79	9.2	33.8	-13.4	79	27.6	101.5	-40.1
IR	28	-2.8	21.3	-34.3	28	-8.4	63.8	-102.8	28	-3.1	25.7	-38.6	28	-9.2	77.1	-115.7
IT	63	0.8	19.5	-21.7	63	2.5	58.5	-65.0	61	1.0	21.5	-22.1	61	2.8	64.5	-66.2
NL	40	-0.6	16.9	-17.0	40	-1.9	50.7	-51.0	38	-1.0	20.0	-21.1	38	-3.0	60.0	-63.4
PT	68	4.5	29.3	-17.9	68	13.4	87.9	-53.8	66	4.9	33.0	-18.6	66	14.8	99.1	-55.9
SP	59	0.8	20.1	-20.2	59	2.3	60.2	-60.6	58	1.0	23.2	-21.4	58	2.9	69.5	-64.1

Note: %+ is the percentage of reform gainers (100 minus %+ is the percentage of reform losers); %dY the overall %-change in household weekly mean disposable income; Gap+ (Gap-) the mean difference from zero for positive (negative) dY. Source: Own calculations based on EUROMOD.

C Behavioural adjustment

We follow van Soest (1995) or Hoynes (1996) in the choice of a structural discrete choice labour supply model. In this framework, labour supply decisions are reduced to choosing among a discrete set of possibilities, e.g., inactivity, part-time and full-time. This modelling includes non-participation as one of the options so that both the extensive margin (participation) and the intensive margin (working hours) are directly estimated. We assume that there are K=7 discrete hour possibilities for each potential worker (0, 10, 20, 30, 40, 50, 60 hours per week). We specify consumption-leisure preferences in a very flexible way (and without imposing separability between consumption and leisure) using a quadratic utility function as in Blundell et al. (2000). That is, the deterministic utility of a couple i at each discrete choice j = 1;…;J can be written as:

$$U_{ij} = \propto_{ci} C_{ij} + \propto_{cc} C_{ij}^2 + \propto_{h_f i} H_{ij}^f + \propto_{h_m i} H_{ij}^m + \propto_{h_{ff}} \left(H_{ij}^f\right)^2 + \propto_{h_{mm}} \left(H_{ij}^m\right)^2$$
$$+ \propto_{ch_f} C_{ij} H_{ij}^f + \propto_{ch_m} C_{ij} H_{ij}^m + \propto_{h_m h_f} H_{ij}^f H_{ij}^m - \eta_j^f * 1(H_{ij}^f > 0) - \eta_j^m * 1(H_{ij}^m > 0) \quad (13)$$

with household consumption C_{ij} and spouses' work hours Hf_{ij} and Hm_{ij}. The J choices for a couple correspond to all combinations of the spouses' discrete hours, that is, J = 7*7=149. For singles, the model above is simplified to only one hour term H_{ij}, and J is simply the number of discrete hour choices K=7. Coefficients on consumption and work hours are specified as:

$$\alpha_{ci} = \alpha_c^0 + Z_i^c \alpha_c + u_i \quad (14)$$

$$\alpha_{h_f i} = \alpha^0_{h_f} + Z^f_i \alpha_{h_f} \quad (15)$$

$$\alpha_{h_m i} = \alpha^0_{h_m} + Z^m_i \alpha_{h_m}, \quad (16)$$

i.e. they vary linearly with several taste-shifters Z_i (including polynomial form of age, presence of children or dependent elders and region). The term α_{ci} also incorporates unobserved heterogeneity, in the form of a normally-distributed term u_i, for the model to allow random taste variation and unrestricted substitution patterns between alternatives. The fit of the model is improved by the introduction of fixed costs of work, estimated as model parameters. Fixed costs explain the fact that there are very few observations with a small positive number of worked hours. These costs, denoted η^k_j for $k = f;m$, are non-zero for positive hour choices and depend on observed characteristics (e.g., the presence of young children).

For each labour supply choice j, disposable income (equivalent to consumption in the present static framework) is calculated as a function $C_{ij} = d(w^f_i H^f_{ij}, w^m_i H^m_{ij}, y_i, X_i)$ of female and male earnings, non-labour income y_i and household characteristics X_i. The tax-benefit function d is simulated using EUROMOD. In the discrete choice approach, disposable income needs to be assessed only at certain points of the budget curve, so that nonlinear budget constraints resulting from nonlinear taxes, joint filing and unemployment benefits can be taken into account very easily. Male and female wage rates w^f_i and w^m_i for each household i are calculated by dividing earnings by standardized work hours. We assume that hourly wages are constant across the working hour categories and do not depend on the actual working time, which is standard in the literature. For unemployed people we estimate their (potential) hourly wages by using the Heckman correction for sample selection. The stochastic specification of the labour supply model is completed by i.i.d. error terms e_{ij} for each choice $j = 1;...;J$. That is, total utility at each alternative is written

$$V_{ij} = U_{ij} + \epsilon_{ij} \quad (17)$$

with U_{ij} as previously defined. Error terms are assumed to represent possible observational errors, optimization errors or transitory situations. Under the assumption that they follow an extreme value type I (EV-I) distribution, the (conditional) probability for each household i of choosing a given alternative j has an explicit analytical solution:

$$P_{ij} = exp(U_{ij}) / \sum_{k=1}^{J} exp(U_{ik}) \quad (18)$$

The unconditional probability is obtained by integrating out the disturbance terms (unobserved heterogeneity in preferences) in the likelihood. In practice, this is done by averaging the conditional probability P_{ij} over a large number of draws (here 100) for these terms, so the parameters can be estimated by simulated maximum likelihood.

The model is estimated separately for each country, so that estimated parameters are country-specific. These estimates are used to calculate the probabilities of changing working time categories due to a marginal change in wage rates or non-labour incomes can be predicted. Resulting elasticities are reported in Table C.1. We see that elasticities are relatively small and similar across countries. Nonetheless, some country differences can be observed: these mainly respect differences in preferences and childcare institutions, as shown in Bargain et al. (2012).

Tab C.1: Estimated labour supply elasticities by subgroups

	AT	BE	FI	FR	GE	GR	IE	IT	NL	PT	SP
Married women											
Wage elasticities											
Total hours	.34	.31	.13	.13	.31	.62	.32	.33	.32	.14	.51
Intensive margin (hour)	.05	.05	.01	.02	.08	.03	.05	.05	.13	.05	.08
Extensive margin (particip.)	.27	.23	.12	.10	.22	.57	.27	.28	.20	.11	.43
Income elasticity											
Total hours	-.0011	-.0018	.0010	-.0023	-.0057	-.0039	-.0069	.0010	-.0008	.0000	.0004
Extensive margin (particip.)	-.0008	-.0012	.0010	-.0016	-.0038	-.0035	-.0071	.0009	-.0008	.0000	.0003
Married men											
Wage elasticities											
Total hours	.07	.12	.10	.06	.14	.11	.15	.04	.06	.04	.08
Total hours (compensated)	.07	.12	.10	.06	.14	.11	.16	.05	.06	.04	.08
Intensive margin (hour)	.02	.02	.00	.02	.03	.01	.03	-.01	.01	.03	.07
Extensive margin (particip.)	.05	.09	.10	.04	.11	.10	.12	.05	.06	.03	.07
Income elasticity											
Total hours	-.0003	-.0019	.0010	-.0004	-.0036	-.0047	-.0036	-.0168	-.0017	-.0001	-.0024
Extensive margin (particip.)	-.0001	-.0011	.0010	.0001	-.0022	-.0034	-.0022	-.0129	-.0008	.0000	-.0016
Single women											
Wage elasticity											
Total hours	.14	.59	.21	.12	.18	.41	.37	.67	.16	.08	.20
Intensive margin (hour)	.01	.07	.00	.02	.01	-.01	.06	.05	.02	.04	.04
Extensive margin (particip.)	.13	.41	.20	.09	.17	.43	.24	.58	.11	.05	.19
Income elasticity											
Total hours	-.0006	-.0038	.0287	.0011	-.0061	-.0102	-.0025	.0189	-.0034	-.0002	-.0072
Extensive margin (particip.)	-.0003	-.0016	.0278	.0023	-.0026	-.0092	-.0012	.0187	-.0020	-.0002	-.0053
Single men											
Wage elasticity											
Total hours	.14	.28	.33	.14	.20	.19	.67	.22	.08	.03	.57
Intensive margin (hour)	.05	-.01	-.01	.02	.01	.05	.03	.02	.01	-.02	.09
Extensive margin (particip.)	.08	.27	.34	.12	.21	.15	.62	.22	.08	.04	.47
Income elasticity											
Total hours	-.0003	-.008	.112	-.002	-.007	-.0002	-.028	-.003	-.003	.000	-.012
Extensive margin (particip.)	-.0001	-.005	.104	.000	-.003	-.0001	-.021	.000	-.001	.000	-.012

Note: wage (income) elasticities are computed numerically as the responses to a 1% uniform increase in wage rates (unearned income). The intensive margin corresponds to the response in work hours among workers, the extensive margin to the participation response (measured either in % change in participation rate).Source: Own calculations based on EUROMOD, see also Bargain et al. (2012).

The model is used to predict a change in disposable income induced by the EU tax reform. The expected working hours for each individual as well the whole population are calculated after implementation of the reform. Results are reported in Table C.2. The first row shows results for the whole sample of countries while subsequently, figures on the national level are presented.

Tab. C2: Mean hours worked, fulltime equivalents (FTE) and %-changes in labour supply (FTE) –singles and couples (N=30382)

	Baseline		*Reform scenarios*			
	Hours worked		Change labour supply (FTE) in %			
	Mean/	FTE	*EUavg*		*EUavg_p*	
	week	in Mio.	*Sc. 1*	*Sc. 2*	*Sc. 1*	*Sc. 2*
EU	29.9	71.1	-0.1	-1.0	-0.6	-2.6
AT	32.0	2.1	-0.1	-0.9	-0.6	-2.2
BE	32.7	2.6	2.5	5.6	1.8	3.7
FI	33.2	1.7	2.0	4.6	1.6	3.6
FR	30.8	17.3	0.5	1.3	0.3	0.6
GE	30.0	23.5	0.4	0.0	-0.3	-2.3
GR	25.3	1.3	-3.1	-10.2	-3.7	-12.1
IR	28.1	0.7	-1.3	-4.7	-1.8	-6.6
IT	26.7	8.4	-1.4	-4.9	-1.9	-6.6
NL	31.3	5.2	0.2	-0.2	-0.3	-1.7
PT	34.5	2.0	-0.3	-1.2	-0.5	-2.0
SP	27.7	6.4	-2.4	-8.0	-2.9	-9.9
	net taxes base		*relative change in net taxes*			
EU	26.3		1.8	-2.4	0.5	-2.6

Source: Own calculations based on EUROMOD.

Tab. C.3: Fulltime equivalents (FTE) and %-changes (FTE) –single men and women

	Single men					Single women				
		EUavg		*EUavg_p*			*EUavg*		*EUavg_p*	
	SQ	Sc.1	Sc.2	Sc.1	Sc.2	SQ	Sc.1	Sc.2	Sc.1	Sc.2
EU	7.8	0.3	-1.3	-0.4	-3.7	8.1	0.5	0.4	-0.3	-2.2
AT	0.3	0.8	1.8	0.5	0.9	0.3	0.6	0.8	0.1	-0.9
BE	0.2	6.0	9.6	5.3	7.9	0.2	7.7	17.5	6.2	14.1
FI	0.2	5.3	13.5	4.5	11.4	0.2	3.0	7.7	2.5	6.5
FR	1.6	2.6	6.1	2.2	5.0	2.0	2.5	7.6	2.2	6.7
GE	3.5	-0.4	-3.4	-1.3	-6.6	3.2	0.4	-0.3	-0.7	-3.8
GR	0.1	-1.4	-4.8	-1.7	-5.8	0.1	-9.7	-27.9	-11.0	-31.5
IR	0.1	-1.7	-8.0	-3.1	-12.4	0.1	-1.3	-5.1	-2.1	-7.8
IT	0.6	-1.1	-3.6	-1.7	-5.6	0.7	-3.9	-13.4	-5.2	-18.0
NL	0.5	1.3	2.6	1.0	1.8	0.5	2.5	6.1	2.0	4.6
PT	0.1	-0.1	-1.4	-0.4	-2.3	0.2	-1.6	-5.3	-2.1	-7.0
SP	0.6	-4.9	-18.9	-6.3	-23.9	0.6	-3.2	-11.4	-3.8	-13.7

Source: Own calculations based on EUROMOD.

Tab. C.4: Fulltime equivalents (FTE) and %-changes–married men and women

	Married men					Married women				
		EUavg		*EUavg_p*			*EUavg*		*EUavg_p*	
	SQ	Sc.1	Sc.2	Sc.1	Sc.2	SQ	Sc.1	Sc.2	Sc.1	Sc.2
EU	37.4	0.0	-0.3	-0.8	-0.4	17.8	-0.5	-1.9	-1.1	-3.7
AT	1.1	0.2	0.2	0.2	-0.2	0.5	-1.9	-6.0	-2.7	-8.4
BE	1.4	1.6	2.8	3.8	1.0	0.8	1.6	4.1	0.8	1.7
FI	0.7	1.7	2.9	3.8	1.3	0.5	0.8	1.1	0.6	0.6
FR	8.7	0.1	0.1	0.0	-0.1	5.0	-0.1	-0.5	-0.4	-1.2
GE	11.2	0.6	0.9	0.9	0.1	5.5	0.5	0.5	-0.2	-1.6
GR	0.9	-1.8	-4.0	-6.7	-2.2	0.3	-5.3	-15.8	-6.3	-18.7
IR	0.4	-0.6	-1.4	-2.4	-0.9	0.2	-2.7	-8.8	-3.2	-10.8
IT	5.1	-1.1	-2.5	-4.1	-1.4	2.0	-1.4	-4.5	-2.1	-6.7
NL	2.9	0.0	-0.2	-0.6	-0.4	1.3	-0.8	-2.9	-1.7	-5.5
PT	1.1	-0.1	-0.3	-0.6	-0.3	0.7	-0.4	-1.3	-0.6	-2.1
SP	4.0	-1.2	-2.6	-4.3	-1.5	1.2	-4.5	-13.5	-5.6	-16.5

Source: Own calculations based on EUROMOD.

D Individual Welfare

In addition to using a very simple Yitzhaki-type SWF, it would be possible to somehow aggregate the individual utilities from the labour supply model. This is not uncontroversial because one has to deal with interpersonal comparisons of preferences. The common approach adopted in the literature on welfare analysis in labour supply models (see e.g. Aaberge and Colombino 2008) is to specify a representative utility function (according to estimated preferences of the median income household) to be the same for all individuals in one subgroup of one country.[15] Note, however, that utility functions are still country and subgroup specific and total changes cannot be compared across countries and/or subgroups.

Table D.1 shows the share of gainers according to individual welfare as well as the sign of the total change in social welfare for single men, single women and couples for the four scenarios as defined above. Overall, countries are very similar affected in terms of (individual and social) welfare compared to the redistributive changes in income. For almost all subgroups and scenarios the reforms lead to a slight majority of gainers on the EU level and also to a positive change in social welfare. On the country level, we again observe the pattern of clear gainers (GE, GR, IT, PT, SP) and losers (AT, FR, IR, NL switches for single women in EUavg_p Sc.2) with two switching countries (BE and FI).

Tab. D.1: Share winners in individual welfare (%+) and total change in social welfare (dW)

	EUavg – Sc. 1						*EUavg – Sc. 2*					
	Sing m		*Sing f*		*Couples*		*Sing m*		*Sing f*		*Couples*	
	%+	dW	%+	dW	%+	dW	%+	dW	%+	dW	%+	dW
EU	54	+	57	+	54	+	56	+	59	+	56	+
AT	33	-	41	-	41	-	34	-	42	-	43	-
BE	53	-	47	-	52	-	55	-	50	-	53	-
FI	40	-	46	-	53	-	45	-	49	-	55	-
FR	35	-	36	-	29	-	38	-	39	-	32	-
GE	65	+	63	+	69	+	68	+	65	+	70	+
GR	76	+	88	+	76	+	77	+	88	+	77	+
IR	38	-	45	-	20	-	40	-	46	-	20	-
IT	53	+	64	+	66	+	53	+	65	+	67	+
NL	43	-	46	-	38	+	45	-	48	-	39	+
PT	70	+	55	+	63	+	67	+	76	+	63	+
SP	57	+	71	+	53	-	59	+	73	+	56	-

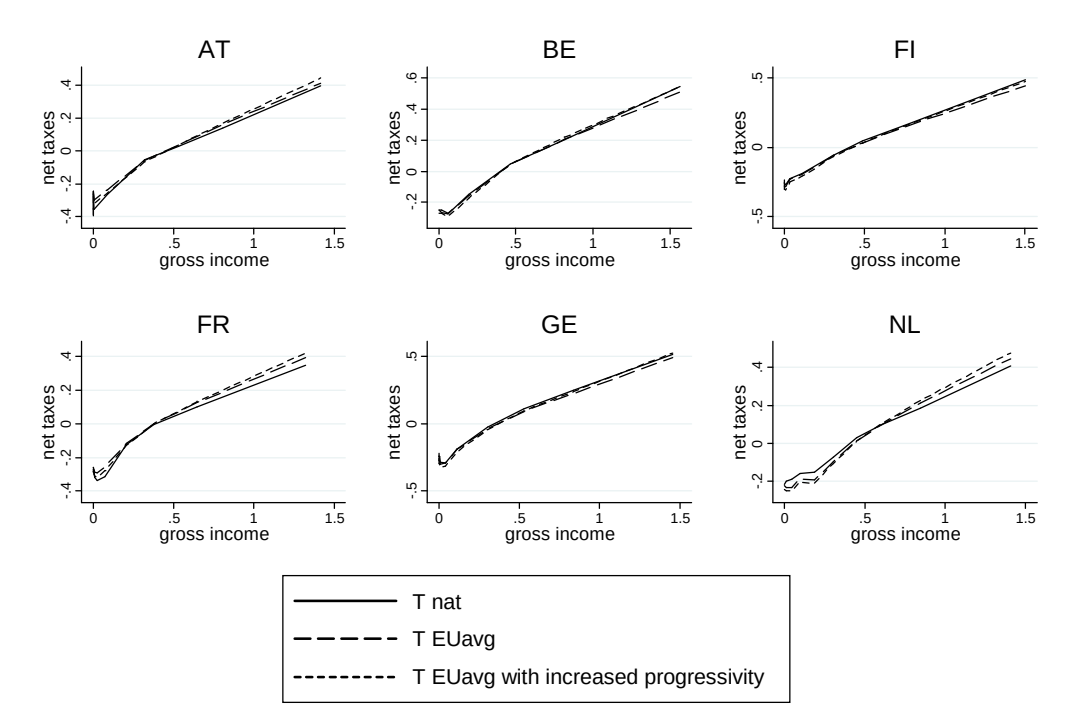
[15] While this approach ensures the comparability of individual welfare and thus allows performing consistent welfare analyses, it assumes away the preference heterogeneity that is used to estimate individual labor supply behavior. See Bargain et al. (2012) for an illustration of how to respect individual and cross-country heterogeneity in consumption-leisure preferences for welfare measurement.

	EUavg_p – Sc. 1						*EUavg_p – Sc. 2*					
	Sing m		*Sing f*		*Couples*		*Sing m*		*Sing f*		*Couples*	
	%+	dW	%+	dW	%+	dW	%+	dW	%+	dW	%+	dW
EU	54	+	60	+	50	+	56	+	62	+	52	+
AT	29	-	44	-	33	-	30	-	45	-	36	-
BE	50	-	48	-	43	-	52	-	50	-	43	-
FI	42	-	51	-	48	-	45	-	53	-	50	-
FR	35	-	40	-	27	-	37	-	42	-	30	-
GE	65	+	67	+	62	+	68	+	69	+	63	+
GR	77	+	89	+	75	+	78	+	89	+	76	+
IR	39	-	48	-	20	-	41	-	49	-	20	-
IT	56	+	68	+	63	+	55	+	68	+	64	+
NL	39	-	53	-	32	+	40	-	56	-	34	+
PT	70	+	55	+	61	+	67	+	78	+	61	+
SP	58	+	73	+	51	-	60	+	74	+	54	-

Note: %+ is the share of households in the respective subgroup experiencing a gain in *individual* welfare (100 minus %+ is the percentage of reform losers); dW reports the sign of the total change in *social* welfare. Source: Own calculations based on EUROMOD.

E Core union

Fig. E.1: National tax-benefit schemes compared to EU average systems – core union



Note: Based on country means for gross income deciles; weekly thousand 2001 EUR.
Source: Own calculations based on EUROMOD.

Tab. E.1: Weekly household gross and disposable income, benefits, SIC and taxes (2001 EUR)

	Pop. share	Gross income	Disp. income	Gross taxes baseline	Gross SIC baseline	Gross benefits baseline	Net taxes baseline	Net taxes *EUavg*	Net taxes *EUavg_p*
EU	1.00	510.6	475.9	138.0	87.6	85.1	34.7	34.7	34.7
AT	0.04	544.3	539.9	193.6	104.0	94.1	4.5	27.6	27.1
BE	0.05	547.2	502.2	155.1	146.1	54.0	45.0	36.0	36.1
FI	0.03	507.9	464.4	150.8	159.3	35.0	43.5	29.8	29.5
FR	0.31	463.7	487.3	155.6	42.9	89.1	-23.6	0.1	-2.5
GE	0.48	519.5	457.4	124.9	100.3	86.8	62.1	46.2	47.1
NL	0.09	614.6	537.0	104.1	75.5	106.2	77.6	80.4	83.8

Note: *EUavg* indicates the EU average tax system, *EUavg_p* the same system with increased progressivity.
Source: Own calculations based on EUROMOD.

Tab. E.2: % gainers, overall %-change, mean gain and loss in weekly disposable income (2001 EUR)

	EUavg – Sc. 1				*EUavg – Sc. 2*				*EUavg_p – Sc. 1*				*EUavg_p – Sc. 2*			
	%+	%dY	Gap+	Gap-	%+	%dY	Gap+	Gap-	%+	%dY	Gap+	Gap-	%+	%dY	Gap+	Gap-
EU	54	-0.1	18.6	-22.1	55	0.3	56.1	-65.9	51	-0.1	20.0	-22.5	53	0.2	60.4	-66.5
AT	43	-1.3	18.4	-27.2	45	-3.7	54.3	-82.9	41	-1.4	21.0	-27.3	43	-3.6	61.7	-81.9
BE	56	0.7	19.6	-17.2	58	2.4	59.4	-51.3	52	0.6	20.9	-16.5	53	2.1	63.2	-48.6
FI	59	1.0	20.0	-16.8	61	3.5	59.9	-50.4	57	1.0	21.4	-17.3	58	3.4	64.3	-51.3
FR	36	-1.8	17.6	-23.8	38	-4.9	51.8	-70.7	36	-1.6	21.4	-24.5	37	-4.5	63.1	-72.5
GE	67	1.1	18.8	-21.8	68	3.8	57.5	-65.2	64	1.0	19.0	-20.7	66	3.5	58.4	-61.9
NL	45	-0.3	18.1	-17.7	46	-0.5	54.1	-51.2	43	-0.6	21.8	-22.3	44	-1.2	65.1	-63.7

Note: %+ is the percentage of reform gainers (100 minus %+ is the percentage of reform losers); %dY the overall %-change in household weekly mean disposable income; Gap+ (Gap-) the mean difference from zero for positive (negative) dY. Source: Own calculations based on EUROMOD.

Tab. E.3: Gini-Index (G, %-changes dG) and Welfare (W, %-changes dW)

	Baseline		*EUavg – Sc. 1*		*EUavg – Sc. 2*		*EUavg_p – Sc. 1*		*EUavg_p – Sc. 2*	
	G	W	dG	dW	dG	dW	dG	dW	dG	dW
EU	0.32	338	-2.9	1.3	-5.8	3.0	-4.5	2.0	-10.4	5.1
AT	0.31	382	-2.6	-0.2	-3.6	-2.2	-4.1	0.4	-8.5	0.0
BE	0.33	347	-0.7	1.0	0.4	2.2	-2.6	1.8	-5.1	4.7
FI	0.34	315	-1.5	1.8	-2.0	4.6	-3.0	2.5	-6.0	6.5
FR	0.31	343	-3.6	-0.2	-7.1	-1.9	-5.0	0.6	-11.5	0.4
GE	0.33	323	-3.2	2.6	-6.7	7.2	-4.8	3.3	-11.5	9.3
NL	0.31	391	-2.1	0.6	-5.1	1.8	-3.6	1.0	-8.9	2.7

Source: Own calculations based on EUROMOD.

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