Inequality neutral flat tax reforms in Europe: differences between East and West

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Abstract

The flat tax idea is becoming increasingly popular, especially in transition countries in Eastern Europe. The introduction of a flat tax is supposed to have several advantages. However, flat taxes can have a serious drawback in terms of their impact on the distribution of tax burdens. The aim of this paper is to analyse the effects of flat tax reforms that do not change the inequality of the income distribution. We undertake a systematic approach for choosing flat tax parameters for a comparative analysis of different flat tax designs for selected Western European countries. Our analysis yields the following results. The revenue and inequality neutral flat tax rates tend to be higher in Continental than in Southern European countries, while being little affected by different measures of income inequality. The high marginal rates imply that revenue and inequality neutral flat reforms are not feasible in most countries, however, there might be scope for non-revenue or non-inequality neutral reforms depending on political preferences.

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1   Introduction

The flat tax idea has given rise to an ongoing debate both in academics and politics. Further on, it is becoming increasingly popular, especially in transition countries in Eastern Europe. Before the 1990s it was only applied in a few countries, most prominently Hong Kong and the Channel Islands. Since 1994 however, after its introduction in Estonia, a number of countries have followed suit. In 2008 there were altogether 26 countries worldwide with flat tax systems, of which about half are in Eastern Europe, and such proposals being discussed in several other countries including some in Western Europe.[1] However, among the latter only Iceland recently adopted a flat tax.

The introduction of a flat tax with a basic tax allowance, a (low) uniform marginal tax rate, and a broad tax base as a reform of existing tax systems is supposed to have several advantages. *"[T]he flat-tax plan we have developed [...] is, we believe, the most fair, efficient, simple, and workable plan on the table"*.[2] Most importantly, positive effects on employment and GDP as well as reduced tax distortions are expected. In addition, flat tax reforms are thought to reduce administration and compliance costs as well as incentives for tax avoidance or evasion, which is often a central argument for this kind of reform in developing and transition countries. Further on, as a flat tax is often a part of more fundamental tax reform, it can simplify income taxation significantly. The current systems in Europe have typically evolved to quite complex entities, often violating the principle that taxes ought to be clear and simple. A simpler system is not only easier to grasp from the point of view of a single taxpayer, but is also more transparent at the aggregated level. Simplification can also decrease the costs of administration and compliance. Therefore, *"the flat tax [...] is probably my favorite one of all. [...] But if we did pass it, all of a sudden, what do you have? You have the whole tax system run by a little old lady on a home computer, doing the work of all these thousands of bureaucrats and accountants. Passing that would be amazing, wouldn't it?"*[3]

However, flat taxes can have a serious drawback in terms of their impact on the distribution of tax burdens which could be the main reason limiting its spread in developed countries with a well established middle class. Previous flat tax reforms and typical proposals lower marginal tax rates at the high income levels but increase the tax burden for middle-income ranges, resulting in a widening of the distribution of after-tax incomes. A reason for the recent flat tax success in transition countries could be the use of the low marginal tax rate by new governments as a signal for a regime shift towards more market-oriented policies (see **?**). Therefore, if such a

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[1] Cf. **?**, Nicodeme (2007) and Mitchell (2007).

[2] Hall and Rabushka (2007), p. xiii-xiv.

[3] Clint Eastwood, Hollywood director and film star, in Denis Mamill, "The age of Eastwood: Clint on fame, directing daughter Alison in Midnight 7, why Dirty Harry is History", New York Daily News, 19 November 1997.

reputation does not need to be acquired (e.g. in Western Europe), the flat tax idea might be less appealing. "*The simple fact though is that most of the world is not using flat taxes, and more seriously, they could not achieve many of these [flat tax] objectives even if they did*".[4] Indeed, the distributional effects seem to prevent a flat tax adoption in democracies with a well-established middle class.

Only two actual reforms have been examined in the literature: the 2001 Russian reform by Ivanova et al. (2005) and the 2004 reform in the Slovak Republic by, among others, Brook and Leibfritz (2005). In the Russian case, the reform was followed by significant real growth in personal income tax revenue, but there was no strong evidence that this was caused by the reform itself or by improved law enforcement, nor could any positive labour supply responses be identified.[5] The Slovakian reform was expected to be revenue neutral, to increase the level and efficiency of capital formation and enhance the incentives of unemployed workers to seek work. However, no evidence apart from revenue-neutrality has been reported yet. While it is true that most real world reforms have been very recent, research on their effects is probably also limited due to the lack in those countries of high-quality (micro-)data for the pre-reform period.

In the discussion of the flat tax "a notable and troubling feature [...] is that it has been marked more by rhetoric and assertion than by analysis and evidence".[6] Given that flat taxes have not yet been implemented in Western countries, the effects of flat tax reforms in these countries can only be studied in detail on the basis of simulation models. There have been several previous studies, focussing on a single country and hypothetical reforms in most cases. In a study for the Netherlands, Caminada and Goudswaard (2001) derive the result that a flat tax would yield redistribution at the expense of the lowest income deciles, but the magnitude of these effects is quite small. Several studies, like Aaberge et al. (2000) for Italy, Norway and Sweden, Kuismanen (2000) for Finland, Adam and Browne (2006) for the UK, Gonzlez-Torrabadella and Pijoan-Mas (2006) for Spain[7], and Decoster and Orsini (2007) for Belgium, find that, in addition to redistribution in favour of high income households, the hypothetical introduction of a flat tax would increase labour supply (incentives). Benedek and Lelkes (2007) simulate a flat tax reform for Hungary. They do not consider work incentives but also find

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[4]Murphy (2006), p. 95.

[5]See also Gaddy and Gale (2005) and Gorodnichenko et al. (2007). Furthermore, the situation in Russia is different in comparison to Western European countries insofar as the latter have a long tradition of taxation and a rather large tax administration to ensure tax compliance. Therefore, we assume effects of a flat tax reform on compliance to be less important than in transition countries of Eastern Europe.

[6]**?**, p. 3.

[7]The findings in Gonzlez-Torrabadella and Pijoan-Mas (2006) differ from the other country studies in the magnitude of the simulated efficiency gains. While most studies find rather small gains, their model predicts an increase in output by more than 5%. They argue that this is driven mostly by an increase in capital formation, not in employment.

that the reform would lead to a sharp increase in after tax income inequality. Fuest et al. (2008) show for Germany that a flat tax with a high basic allowance and a single rate has less harmful distributional effects than a flat tax with a low rate. The latter scenario, however, is the only alternative that leads to positive, albeit small, labour supply and welfare effects. Jacobs et al. (2007) analyse two revenue neutral flat tax scenarios on the basis of a computable general equilibrium model calibrated for the Netherlands. The low flat rate scenario increases inequality because taxes on low incomes increase whereas high income earners benefit. There are positive effects on employment, which increases by 1.4 per cent. In the second scenario, the general tax credit and the marginal rate are higher. Now, also low incomes benefit due to the higher tax credit, while very high incomes gain less than in the low tax scenario. Middle income households, however, face an increasing tax burden. Aggregate labour supply and employment fall. Paulus and Peichl (2008) analyse the distributional and efficiency effects of different flat tax scenarios for 9 Western European countries. The simulations show that flat tax rates required to attain revenue neutrality with existing basic allowances improve labour supply incentives. However, they result in higher inequality and polarisation. Flat rates necessary to keep the inequality levels unchanged allow for some scope for flat taxes to increase both equity and efficiency. The analysis suggests that Mediterranean countries are more likely to benefit from flat taxes.

The aim of this paper is to analyse the effects of flat tax reforms that do not change the inequality of the income distribution. We undertake a systematic approach for choosing flat tax parameters for a comparative analysis of different flat tax designs for selected Western European countries. Davies and Hoy (2002) show that in the case of revenue neutral flat tax reforms there are three sets of critical parameter values in respect to inequality: a lower bound of the flat tax rate below which inequality is always higher compared to a given graduated rate tax, an upper bound above which inequality is always lower and a critical value where inequality does not change for a given measure of inequality. We rely on these theoretical insights to systematically construct hypothetical flat tax reforms that are both revenue and inequality neutral and analyse the distributional and incentive effects of their implementation in European countries. We use EUROMOD, a tax-benefit microsimulation model for the EU, to compare the results across countries in a common framework. Among others, we study the effects on polarisation, which can be used as an indicator of the strength of the middle class. We ask whether different combinations of tax rates and allowances always have an adverse effect on the middle class and if there are indeed positive incentive effects. We concentrate on the short-term static effects assuming that these decide the political feasibility of a tax reform although there are possibly important long-term effects as well.[8]

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[8]People tend to judge future gains and losses asymmetrically (see e.g. the "prospect theory" by Kahneman

Our analysis yields the following results. The revenue and inequality neutral flat tax rates tend to be higher in continental than in Southern European countries, while being less affected by different measures of income inequality. The high marginal rates imply that revenue and inequality neutral flat reforms are not feasible in most countries, however, there might be scope for non-revenue or non-inequality neutral reforms depending on political preferences. Inequality neutrality also shows that high income groups might be 'net-losers' as the share of people not paying income taxes is increasing in all countries.

The rest of the paper is organised as follows: section **??** provides a discussion on the flat tax design. Section 3 contains a short description of the model, datasets and our reform scenarios. Section 4 illustrates the distributional effects in terms of poverty and richness, polarisation, winners and losers as well as the incentive effects in terms of effective marginal and average tax rates. Section 5 concludes.

2   The Flat Tax

2.1   What makes a tax "flat"?

The probably most famous flat tax proposal is associated with Robert Hall and Alvin Rabushka.[9] Their "*Flat Tax*" is defined as a comprehensive income tax with a single marginal tax rate that is also applied to business income on a cash-flow basis. A personal allowance is available for labour income. Therefore, the Hall-Rabushka-Flat-Tax (HR) is essentially a consumption tax (VAT) with a rebate for low income households. However, this proposal has not been implemented in any country yet. Nonetheless, the HR proposal fuelled the political and academic debate about flat taxes around the world, starting in the U.S. and then continuing in Europe, as well. In this debate, the phrase "flat tax" is used more loosely and generally not associated with HR anymore.

Flat tax implies that some sort of proportionality is embedded in the income tax system, i.e. income is taxed at the same (flat) rate along the whole range of income. Its design, however, can be very different. There are two dimensions to be distinguished: tax schedule and tax base.

In general, a tax schedule can apply the same rate on all sources of income (i.e. comprehensive tax) or different rates on different types of incomes (i.e. schedular tax). Most countries with a flat tax system apply different rates to personal and corporate income, although a com-

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and Tversky (1979)). Starting from a reference point (status quo) and given the same variation in absolute values, there is a bigger impact of losses than of gains (loss aversion). Furthermore, people prefer the status quo over uncertain outcomes in the future ("status-quo-bias", see Kahneman et al. (1991)). Therefore, short-term losses in comparison to the status quo can have a much stronger impact than (possible) future gains. Hence, the short term effects presented here could be decisive.

[9]See Hall and Rabushka (1983) and Hall and Rabushka (1985).

mon rate has become more popular among the countries recently implementing these systems. Usually, the tax rate does not vary for components of personal income, i.e. capital and labour income is taxed at the same marginal rate independent of the level of income. There is also a number of countries which tax only capital income at a flat rate and levy a progressive rate schedule on labour income. However, these are usually not considered as flat tax systems but dual or semi-dual income tax systems.[10]

For the tax base one can differentiate between concepts that allow or do not allow for tax reliefs which can be categorised into five groups (see OECD (1996)):

A) *tax exemption (E)*: part of income is tax exempt, i.e. not taxed,

B) *income-related tax deduction (D)*: amount, that is not fixed but that depends on the level of income, is subtracted from taxable income,

C) *tax allowance (A)*: fixed amount (per tax unit) is subtracted from taxable income,

D) *preferential tax rate*: some (sources of) incomes are taxed at a lower rate,

E) *tax credit*: (fixed) amount is subtracted from the tax liability.[11]

Exemptions, deductions and allowances are subtracted from gross income X to determine the tax base:

$$taxbase = X - E - D - A \tag{1}$$

Certainly, only the flat tax without any tax reliefs is a "pure" flat tax as in this case tax payments are indeed proportional to incomes. A flat income tax as such has only been applied in Georgia and recently in Bulgaria. In all other cases, the tax incidence on incomes is progressive, i.e. a single marginal flat tax rate (t_F) is combined with a general personal flat tax allowance (A). Furthermore, in most countries also exist further tax reliefs (on gross income) beyond the basic flat tax allowance:

$$T = t_F * \max(taxbase - A, 0) \tag{2}$$

A further step towards overall flat tax incidence would be integrating income tax with other taxes and benefits. An example of this is a flat tax with a refundable tax credit, effectively combining taxes and benefits due to negative income tax at low-income levels. Depending on

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[10]See OECD (2006) for more about dual income tax systems. These countries include e.g. the Scandinavian countries.

[11]If the tax credit exceeds tax liability two possibilities arise: either the amount of the excess of the tax credit over the tax liability is paid to the taxpayer, in which case it is a "non-wastable" (i.e. refundable) tax credit, or not, in which case the tax credit is "wastable" (i.e. non-refundable).

the generosity of the tax credit, it is either labelled as negative income tax or basic income (flat) tax.[12]

2.2   Why (or why not) introducing a flat tax?

Introducing a flat tax is supposed to have several advantages but also some disadvantages. First of all, a single marginal tax rate can be justified by optimal tax literature. Mirrlees (1971) simulated the optimal tax schedule being close to linearity. However, this seminal contribution rests upon strong assumptions. Loosening these assumptions shows that the optimal tax schedule can be far from linearity (see e.g. Tuomala (1990) or Saez (2002)).[13] Nevertheless, proponents of a flat tax system dream of tax returns fitting on a postcard (Hall and Rabushka (2007)) or a beer coaster (Kirchhof (2003)) because of simplified tax filing. Proponents also expect more prosperity and wealth because of increasing economic growth. How shall this be achieved? There are two main benefits usually associated with flat tax systems: increasing incentives and compliance.[14]

Firstly, flat taxes can enhance incentives for working (labour supply), saving, investing and taking risks (entrepreneurship). This does not necessarily come from the flatness of the tax schedule per se but could also be attributed to other forms of reduction in (average and marginal) tax rates especially at the top of the income distribution. Although there is a trend of lowering marginal statutory tax rates (and reducing the number of tax brackets), top rates can still be rather high in existing systems, e.g. around 40-60% in EU-15 (Eurostat (2007)). While the gains from flat and lower tax rates are explicit for the top income range, they are not so obvious for low incomes. The results here depend on the chosen flat tax parameters and the underlying income distribution. If e.g. effective marginal tax rates (EMTR) decrease for high income households but increase for low to middle income households, the overall incentive effects will be ambiguous ex ante and depend on each group's elasticity.

Secondly, as a flat tax is often part of a more fundamental tax reform, it can simplify income taxation significantly and therefore increase tax compliance and reduce tax planning, avoidance and evasion. This effect is perhaps weaker in developed countries, but it is often central for this kind of reforms in developing and transition countries. Nevertheless, the current systems in Europe on average have evolved to quite complex entities, therefore often violating the principle that taxes ought to be clear and simple. A simpler system is not only easier to grasp from the point of view of a single taxpayer, but is also more transparent at the aggregated

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[12]For more on this see e.g. Atkinson (1995).

[13]However, this does not necessarily imply a progressive tax schedule at all. Diamond (1998) and Saez (2001), for example, derive a U-shaped pattern of marginal tax rates as being optimal.

[14]Cf. e.g. **?**.

level. Simplification can also decrease bureaucracy and therefore the costs of administration and compliance. Flatness itself only simplifies the rate schedule structure which can to some extent reduce tax arbitrage between different sources of income. However, the primary source of complexity is rather the tax base with its various exemptions. Other tax reforms of the type "tax rate cut cum base broadening" simplifying the tax system can as well increase compliance and reduce evasion.[15] Nevertheless, from a political economy point of view, introducing a completely new tax system labelled "flat tax" might be a good chance to fundamentally reform the existing tax system.

Moreover, another political economy argument for a simple tax system and a (linear) tax schedule with some restrictions regarding the tax parameters can be drawn from Brennan and Buchanan (1977). If the government is not benevolent but solely pursuits self-interest of policymakers, a flat tax can restrict the size of government by decreasing the potential to maximise revenue through higher tax rates.[16] This argument, however, can be questioned in various dimensions (see **?**). For instance, the size of government can be limited by other institutional devices. Furthermore, changing the assumptions to a less extreme view of politicians can lead to quite different solutions.

However, flat taxes can have a serious drawback in terms of their impact on the distribution of tax burdens.[17] Previous flat tax reforms and typical proposals lower marginal tax rates at the high income levels but increase the tax burden for middle-income ranges (especially if they are designed to be revenue neutral), resulting in a widening of the distribution of after-tax incomes. Therefore, the crucial question is, if a flat tax system equitably distributes the tax burden. The answer depends on the chosen parameter values (marginal rate and basic allowance) and is not trivial to answer. In terms of progressivity, a flat tax system (with a basic allowance) can be more or less progressive than an existing graduated rate structure again depending on the parameter values. Moreover, choosing these parameters plays a key role for the expected efficiency gains in terms of incentives and compliance. A low marginal rate (and allowance) will lead to higher incentives but redistribution in favour of high income households. A high marginal rate (and allowance) will benefit low income households more but reduce incentives. Nevertheless, the middle income households will likely lose in every (revenue neutral) scenario. These distributional effects could be the main reason limiting the flat tax spread in developed countries with a well established middle class.

To sum up, the expected effects of a flat tax are not thoroughly positive in every dimension (efficiency, equity, simplicity) nor unambiguous. Therefore, the next subsections summarise the existing flat taxes around the world and review the empirical evidence of flat tax reforms in

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[15]Cf. e.g. Gale (1998).

[16]See also Brennan and Buchanan (1980).

[17]Cf. e.g. Slemrod (1997)

the literature.

2.3 Where can flat taxes be found around the world?

Until the first half of the 19th century, flat taxes were common throughout the world.[18] Progressive tax schedules were first called for by Marx and Engels (1848) in their "Manifesto of the Communist Party". Since the rising success of progressive rate structures, flat rate income taxes only existed in tax havens like Hong Kong or the Channel Islands for a long period of time. But during the last decade, the flat tax idea has been remarkably successful, coincidentally especially in former Communist countries in Eastern Europe. In 2008, there were altogether 26 countries in the world having flat tax systems, half of them in Eastern Europe. Since its introduction in Estonia in 1994 several countries followed suit. The two other Baltic countries followed the Estonian example by setting the single tax rate close to the highest marginal rate in the existing system. Russia, however, was not only the first major country to introduce a flat tax, it also started a second flat tax wave with countries setting the tax rate close to the lowest existing marginal rate. Table 1 lists the countries having a flat income tax system in order of the year of adaption.[19]

There are striking differences between the tax systems labelled "flat tax". Most countries have introduced a flat tax rate at or close to the level of previous lowest marginal rate, exceptions are Latvia and Lithuania who have chosen the opposite. Some countries apply the same tax rate on personal and corporate income, the Slovak Republic even on VAT. The pattern of setting general allowances however is less clear. In most countries a fixed allowance was retained or introduced, exceptions include Russia with a gradual withdrawal and Ukraine with a sudden withdrawal above certain income levels which makes the effective marginal tax rate high at some stages. However, the amount of allowance varies significantly. For example, Georgia and Bulgaria have no allowance at all, whereas most countries having it increased during the reforms (**?**). Furthermore, in most countries, the introduction of the flat tax system was accompanied by additional reforms of e.g. the tax base, social insurance contributions, benefits, indirect taxation or tax administration. Therefore, there is not one single flat tax system in practice, but instead many different tax systems labelled as "flat". "*Hence, it is far from obvious that one rate would fit all*"[20].

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[18]Already in the holy bible the tithe, i.e. a 10% flat tax, was paid as a tax or contribution to religious or secularised organisations (see Leviticus 27:30-33).

[19]Several countries have no tax on personal income which could be considered as the flattest of all taxes with a zero marginal rate. These countries include: Andorra, the Bahamas, Bahrain, Bermuda, Burundi, Cayman Islands, Kuwait, Monaco, Nigeria, Oman, Qatar, Saudi Arabia, Somalia, United Arab Emirates, Uruguay and Vanuatu (see Nicodeme (2007)).

[20]Nicodeme (2007), p. 142.

	Year	Personal Income Tax Rates			Corporate Income Tax Rates			Basic allowance
		Before	After	2008	Before	After	2008	
Jersey	1940			20				
Hong Kong	1947			16				
Guernsey	1960			20				
Jamaica	1980		33.3	25		33.3	33.3	
Bolivia	1986		10	13		25	25	
Estonia	1994	16-35	26	22	35	26	22	Modest increase
Lithuania	1994	18-33	33	24	29	29	15	Substantial increase
Latvia	1997	25 and 10	25	25	25	25	15	Slight reduction
Russia	2001	12, 20, 30	13	13	30	35	24	Modest increase
Serbia	2003	10-40	14	14	14	14	10	
Iraq	2004	up to 75	15	15		15	15	
Ukraine	2004	10-40	13	15	30	25	25	Increase
Slovak Rep.	2004	10-38	19	19	25	19	19	Substantial increase
Georgia	2005	12-20	12	12	20	20	20	Eliminated
Romania	2005	18-40	16	16	25	16	16	Increase
Kyrgyzstan	2006	10-20	10	10	20	10	10	Unchanged
Paraguay	2006	none	10	10	20	10	10	
Macedonia	2007	15-24	12	10	15	12	10	Unchanged
Kazakhstan	2007	5-20	10	10	30	30	30	Substantial increase
Mongolia	2007	10-30	10	10	15/30	10/25	10/25	Substantial increase
Iceland	2007	38, 40	36	36	18	18	18	Modest increase
Albania	2007	1-20	10	10	20	20	10	Increase
Montenegro	2007	15-23	15	15	15/20	9	9	Increase
Czech Rep.	2008	12-32	15	15	24	22	24	Substantial increase
Bulgaria	2008	10-24	10	10	10	10	10	Eliminated

Table 1: Flat taxes around the world (rates in percent)
Sources: Nicodeme (2007), Mitchell (2007) and **?**.

To sum up, despite many differences in their design, the existing flat tax systems generally have three elements in common. First, a single positive marginal tax rate below the previous top marginal rate, second, a rather broad tax base in comparison to the previous system, and third, a rather high exemption threshold.

3 Flat tax simulations

3.1 EUROMOD: model and database

We use a microsimulation technique to simulate taxes, benefits and disposable incomes under different scenarios for a representative micro-data sample of households. Simulations are done

with EUROMOD, a static tax-benefit model covering 19 EU countries. Our analysis is based on the 2003 tax-benefit systems, which is the most recent wave currently available in EUROMOD (for at least half of the countries) but limited to the following countries: Austria, Belgium, Finland, Germany, Greece, Luxembourg, the Netherlands, Portugal, Spain, the UK.

The main stages of the simulations are the following. First, a micro-data sample and tax-benefit rules are read into the model. Then for each tax and benefit instrument, the model constructs corresponding units of assessment, ascertains which are eligible for that instrument and determines the amount of benefit or tax liability. The result is then either assigned to an individual or allocated to members of the tax unit. Finally, after all taxes and benefits in question are simulated, disposable income is calculated.

EUROMOD is characterised by greater flexibility than typical national models, to accommodate a range of different tax-benefit systems. For instance, the model can easily handle different units of assessment, income definitions for tax bases and benefit means-tests, the order and structure of instruments. Overall, a common framework allows the comparison of countries in a consistent way.

EUROMOD covers only monetary incomes, excluding capital gains and irregular incomes. It can simulate most direct taxes and benefits except those based on previous contributions as this information is usually not available from the cross-sectional survey data used by EUROMOD as input datasets. Therefore, any non-simulated instrument is taken from data (if available). The model assumes full benefit take-up and tax compliance. Although the latter is an important aspect of flat tax reforms, we do not consider changes in compliance here and limit our analysis to first-order static effects only.

Table 3 in Appendix A gives an overview of the input datasets for EUROMOD. Their sample size varies across countries from less than 2,500 to more than 11,000 households. As the survey period for incomes varies from 1999 to 2003, all monetary variables are updated to year 2003 using country-specific uprating factors. Where net incomes were recorded in the original data, gross incomes have been also imputed. For further information on EUROMOD, see Sutherland (2001) and Sutherland (2007).

3.2   Current income tax systems

The existing income tax systems in the 10 countries under consideration are quite varied. As of 2003, all have graduated rate schedules with a number of brackets ranging from 3 (UK) to 16 (Luxembourg) and the highest marginal tax rate from 38% (Luxembourg) to about 55% (Finland, state and local rate combined). All schedules are piecewise linear except that of Germany which has a unique continuous function for tax rates at some income levels. Seven countries have a general basic allowance, often integrated into the tax schedule; the Netherlands

and Portugal apply general (wastable) tax credits and Austria uses both elements. About half of the countries tax capital income (and property income) together with other income and the rest tax it separately applying a flat rate (of 15-30%), in Belgium this is optional.

The countries also differ in the unit of assessment. Again, half of them allow only individual taxation, four countries apply either optional or compulsory joint taxation and Belgium provides limited income sharing for married couples. Nevertheless, even systems based on individual taxation often have elements assessed at family level or couple level (e.g. family or child allowances) or allow the sharing of non-labour income or household expenditures (e.g. property income, mortgage payments). Table 4 in Appendix A summarises these characteristics.

Overall, although there are few countries with relatively simple income tax systems (e.g. the UK), most of them can be characterised as complex systems with the combination of many different elements and varying tax units. Additional examples of complexities include progression adjustments in Austria and Germany, income taxation both at the state and the local level in Finland, and an integrated schedule of social insurance contributions and income tax in the Netherlands.

3.3 Reform scenarios

An important aspect which was rarely addressed in previous studies is the setting of tax system parameters for the ex ante analysis of hypothetical tax reforms. In terms of flat tax reforms this translates into the question of how to set the flat tax rate and the basic allowance. In our case we are interested in the relationship between flat tax parameters and distributional effects.[21] Davies and Hoy (2002) show theoretically that the inequality of after-tax distribution of income is monotonically declining in the flat tax rate and the associated level of basic allowance generating the same tax yield.[22] Furthermore, for revenue neutral tax reforms replacing a graduated rate tax (GRT) with a flat rate tax (FRT), they prove the existence of critical flat tax rates such that after-tax income inequality is - compared to the (existing) graduated rate tax:

A) the same for a given inequality index I at a certain flat tax rate, $t = t_F^*(I) \in (t_F^l, t_F^u)$,

B) always higher (according to any inequality index) for any flat tax rate equal to or below a lower bound, $t \leq t_F^l$,

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[21]The setting of the key flat tax design features (marginal rate, basic allowance, tax base) crucially depends on the objective of the reform (like simplifying the system, improving compliance, broadening the tax base, increasing or decreasing the tax burden for selected groups, higher, lower or constant revenue) and if other reforms (like shifting tax burden between direct and indirect taxes, social insurance, social security) are planned to accompany the flat tax introduction.

[22]As a flat tax schedule has only two parameters - marginal rate and basic allowance - it is only possible to choose one freely when accounting for revenue neutrality.
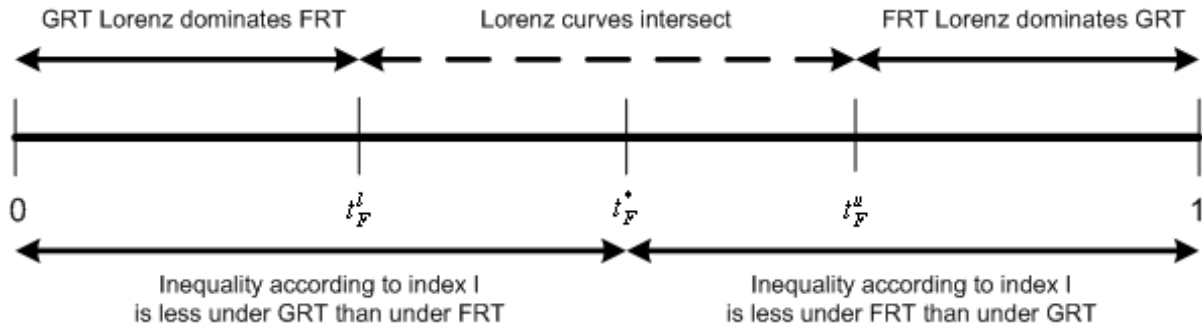
Figure 1: Comparison of critical tax rates

Source: Davies and Hoy (2002), p. 40.

 C) always lower (according to any inequality index) for any flat tax rate equal to or above
  an upper bound, $t \geq t_F^u$.

 Figure 1 illustrates these regularities. In other words: when moving from a graduated income tax to a flat tax system that yields the same revenue, three critical flat tax rate values with respect to after-tax income exist. The first depends on the chosen inequality index, the other two do not, i.e. they stem from the concept of Lorenz dominance. First, for a given inequality index I, a flat rate value $t_F^*(I)$ can be found such that inequality remains unchanged. Further on, inequality in terms of this index is always higher (lower) below (above) this critical value after the flat tax introduction. Second, there exist a lower bound t_F^l such that for all marginal rates below this critical value inequality in terms of any inequality measure is always higher than compared to the existing system (i.e. the existing graduated rate tax Lorenz dominates the flat tax). Third, inequality is always lower above an upper bound t_F^u according to any inequality index (i.e. the flat tax Lorenz dominates the existing graduated rate tax). These results apply to any inequality measure satisfying the Pigou-Dalton principle of transfers and under the assumption that behaviour is not affected by tax system changes.

 The lower bound corresponds to a flat tax rate if the personal allowance is fixed, i.e. is at the same level as for the pre-reform graduated rate tax. The upper bound is such that a person with the highest income pays the same tax under each scheme. Additionally, the flat rate at the lower bound is supposed to exceed the lowest marginal tax rate under the graduated rate and the flat rate at the upper bound remains below the highest marginal tax rate under the graduated rate. The critical value between those boundaries cannot be determined a priori as it depends on a chosen inequality index.

 Chiu (2007) demonstrates further that for an index exhibiting downside inequality aversion this value is determined by the strength of the index's downside inequality aversion against its inequality aversion. In the case of Generalized Entropy Indices $GE(\alpha)$, since a higher α

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indicates a weaker downside inequality aversion against inequality aversion, it also implies a higher critical flat tax rate between the boundaries.

We rely on these theoretical insights to systematically construct hypothetical flat tax reforms. However, these theoretical regularities are only approximations for empirical estimations because existing tax systems are further complicated by the presence of other tax deductions and allowances. Some systems do not even have a (well-defined) basic allowance to start with. More so, the definition of revenue neutrality is not straightforward. If revenue neutrality is only limited to income taxes then it might not preserve the mean of the disposable income distribution, as there are often instruments whose eligibility or amount depend on net income after taxes (e.g. means-tested non-taxable benefits) and, therefore, might change their value when tax systems are modified. If the overall net balance from taxes and benefits is retained then income tax revenues rarely remain constant. Further on, the premise of ex-ante revenue neutrality (i.e. without behavioural responses) is a rather strong assumption but it is necessary to apply the Davies and Hoy (2002) approach.[23]

In our flat tax reform simulations we replace all existing personal income tax deductions, allowances and credits with a single personal allowance (which is equivalent to a wastable, i.e. non-refundable, tax credit), and each graduated rate schedule with a flat rate. We only keep refundable tax credits as these are equivalent to benefits.[24] In countries where capital income was taxed at a separate rate, we abolish this separate rate and include capital income in the flat tax base. Therefore, our reform scenarios have a good potential to simplify the systems (due to fewer specific deductions) and make them more transparent.[25]

We do not attempt to harmonise tax bases across countries, we limit ourselves to income taxes and do not modify existing social insurance contribution schemes (SIC)[26] or benefits. One could also carry out an exercise of simply flattening tax rate schedules without adjusting the tax base, but this would result in higher flat tax rates due to retained exceptions, therefore, limiting gains in terms of incentives.

All scenarios are revenue neutral with the total income tax revenue within ±0.1% limits of its baseline value and do not change the post-government income inequality according to

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[23]If the scenarios were chosen to be revenue neutral ex-post, i.e. after labour supply reactions, the marginal tax rates could be lower (higher) in case of increasing (decreasing) labour supply but the underlying research question would be different. Our aim is to analyse scenarios that are equal ex-ante and to reveal the ex-post differences by analysing the economic effects of the scenarios in terms of equity and efficiency.

[24]Examples include the lone parent tax credit in Austria, the tax credit for families with school children in Greece, working mother tax credit in Spain and working tax credit and child credit in the UK.

[25]Further on, abolishing specific deductions and allowances (that may have different values for different persons or income levels) and replacing them with one general allowance leads to a (slightly) broader tax base.

[26]The use of social insurance contributions differs considerably across European countries. Therefore, a SIC reform would raise further conceptual questions, e.g. if mandatory contributions should be interpreted as taxes or insurance premium.

several indices, i.e. they correspond to the critical values $t_F^*(I)$. In terms of Davies and Hoy (2002) approach, the scenarios correspond to the critical flat tax rates $t_F^*(I)$.[27] As these critical values are dependent on the chosen inequality measure, we use a set of different measures: the Gini coefficient and the Generalized entropy measures $GE(\alpha)$ with $\alpha \in \{-1, 0, 1, 2\}$.

4   Simulation results

In the following section, we first present the values of the revenue and inequality neutral flat tax parameters and compare these against the existing GRT parameters in the same countries and existing flat taxes in general.[28] We further analyse the distributional effects in terms of poverty and richness, polarisation, winners and losers as well as the incentive effects in terms of effective marginal and average tax rates.

4.1   Inequality neutral flat taxes

The resulting inequality and revenue neutral flat tax rates, $t_F^*(I)$, and corresponding basic allowances in terms of euros, A_F^*, are shown in Table 2. First of all, basic allowances in flat tax scenarios are much higher compared (about 3 times on average) to the existing allowances (or their equivalents). The only exception is Finland where existing allowance (€11,600) exceeds those under FRT (€6,196-7,115). However, the existing allowance is the maximum level only applying to the state income tax, while for the local income tax the existing standard allowance is much lower (€1,480). On the other hand, flat tax rates are also rather high compared to the existing tax schedules. With a few exceptions like Finland, Portugal and the UK, the inequality and revenue neutral flat tax rates are close to the existing highest marginal tax rates, indicating probably less political acceptance of flat taxes. However, the effect on the progressivity of the tax systems is not clear ex ante as the basic allowances are also higher. Furthermore, due to the latter, also less people are paying income taxes (see also Figure 6 in section 4.2).

Figure 2 focuses on the point estimates of the inequality and revenue neutral flat tax rates, where inequality is measured by the Gini coefficient, i.e. $t_F^*(Gini)$, plotting also bootstrapped 95% confidence intervals. There is no strong pattern across countries, except that the values are somewhat lower on average for Southern European countries (Portugal, Greece, Spain) than for continental countries (Netherlands, Austria, Germany and Luxembourg). The value for Finland is surprisingly low given the high existing marginal tax rates, but this can be explained to some extent by the dual income tax system in Finland where capital income is subject to a lower marginal flat rate of 29%. As the inequality and revenue neutral flat tax rates exceed

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[27]See Paulus and Peichl (2008) for scenarios focusing on the lower and upper bound (t_F^l and t_F^u).

[28]The results for Belgium are still to be added.

	Existing system			Gini		GE(−1)		GE(0)		GE(1)		GE(2)	
	Lowest	Highest	A_G	t_F^*	$A_F^*(\in)$	t_F^*	$A_F^*(\in)$	t_F^*	$A_F^*(\in)$	t_F^*	$A_F^*(\in)$	t_F^*	$A_F^*(\in)$
AT	21.0	50.0	3,640	44.4	14,567	48.3	15,729	45.5	14,905	44.7	14,660	45.2	14,814
FI	27.0	54.75	11,600	34.2	7,115	33.2	6,612	33.5	6,765	32.4	6,196	27.0	2,969
GE	19.9	48.5	7,235	44.8	19,788	45.4	20,067	45.2	19,974	45.2	19,974	45.7	20,205
GR	15.0	40.0	8,400	37.5	14,077	32.6	12,579	36.9	13,904	38.2	14,277	38.7	14,418
LU	8.0	38.0	9,750	52.2	37,553	52.1	37,504	50.2	36,575	47.9	35,412	45.7	34,251
NL	1.7	52.0	10,258	38.5	21,884	32.3	19,106	40.7	22,763	41.2	22,957	43.7	23,889
PT	12.0	40.0	1,770	28.6	10,092	28.5	10,049	28.7	10,134	28.7	10,134	28.3	9,965
SP	15.0	45.0	3,400	38.7	13,845	37.6	13,448	38.8	13,880	39.5	14,129	40.9	14,618
UK	10.0	40.0	6,632	29.9	12,662	29.3	12,244	30.6	13,140	32.5	14,375	35.3	16,048

Table 2: Tax parameters for the existing 2003 systems and revenue and inequality neutral flat tax scenarios

Source: own calculations using EUROMOD version D5.

Notes:

The Netherlands have an integrated schedule of income tax and social insurance contributions. The latter are kept unchanged, therefore the income tax flat rate is lower than the integrated flat tax rate would have been as the social insurance contributions have a flat rate of 31.2%.

For Finland, the lowest and highest rates are sum of local and state income tax rates. The 11,600$\in$ is allowance for state income tax only while it is much lower for local income tax ($\in$1,480).

the latter they generate more revenue from capital income which compensates the loss of tax revenue from labour income and, therefore, allows keeping the flat tax rate relatively low.

The large confidence interval for Luxembourg is due to outliers with extreme values.[29]

Figure 3 compares inequality and revenue neutral flat tax rates for different inequality indices. The values are remarkably similar across all observed measures and except for the Netherlands, vary less compared to the Davies and Hoy (2002) numeric example for the US. However, the latter was a simplified illustration neglecting other allowances and deductions besides the basic allowance. Furthermore, the ordering between $GE(\alpha)$ measures is as expected, i.e. the flat tax rates are increasing with the inequality aversion parameter α. There are some exceptions like Austria, Finland, Germany and the UK which are related to extreme observations in the data, but then also confidence intervals overlap.

Finally, the inequality and revenue neutral flat tax rates turn out to be high also in comparison to the existing flat tax systems. While our simulated flat tax rates range from 28.6% to 52.2%, the marginal tax rates were 10-25% in the existing flat tax systems in 2008 (see Table 1), except Iceland with 36%. These results could indicate that revenue and inequality neutral flat reforms are unlikely to be implemented in Western European countries.

Figure 4 plots the marginal flat tax rate against the Gini inequality index for the simulated

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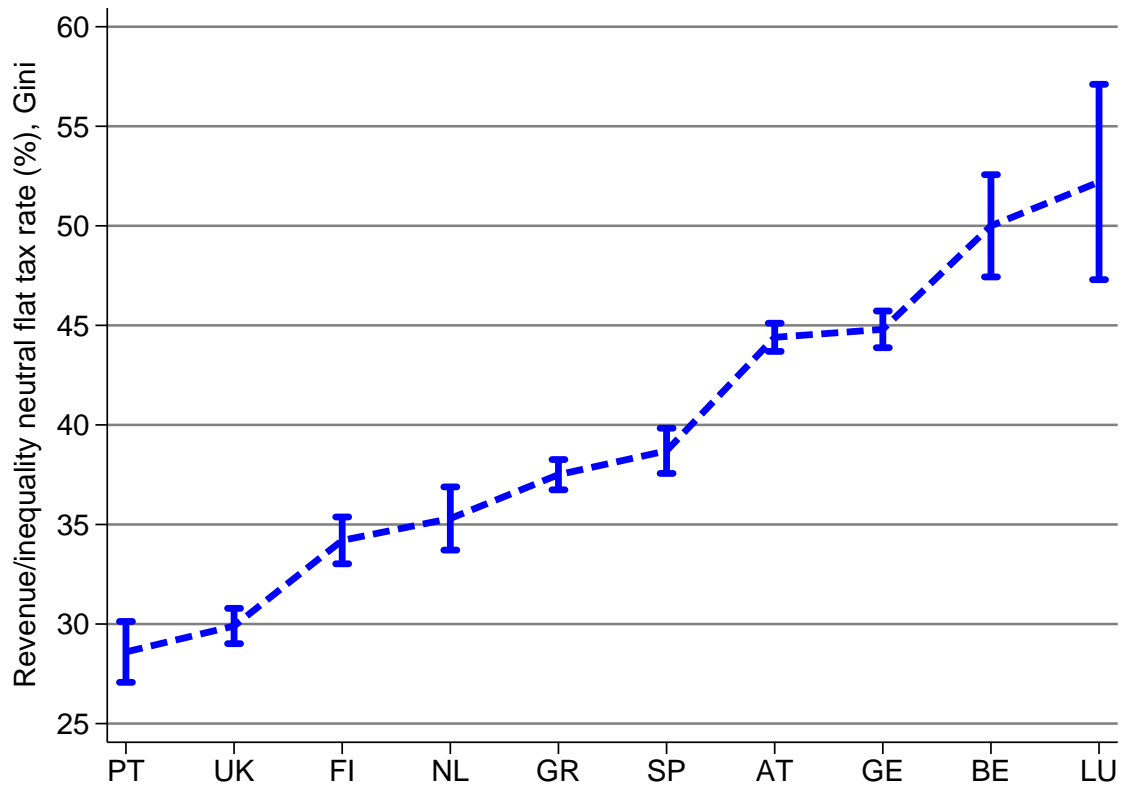[29]Therefore, we will apply top-bottom coding in the next version of this paper.

Figure 2: Revenue and inequality neutral flat tax rates (based on the Gini coefficient)
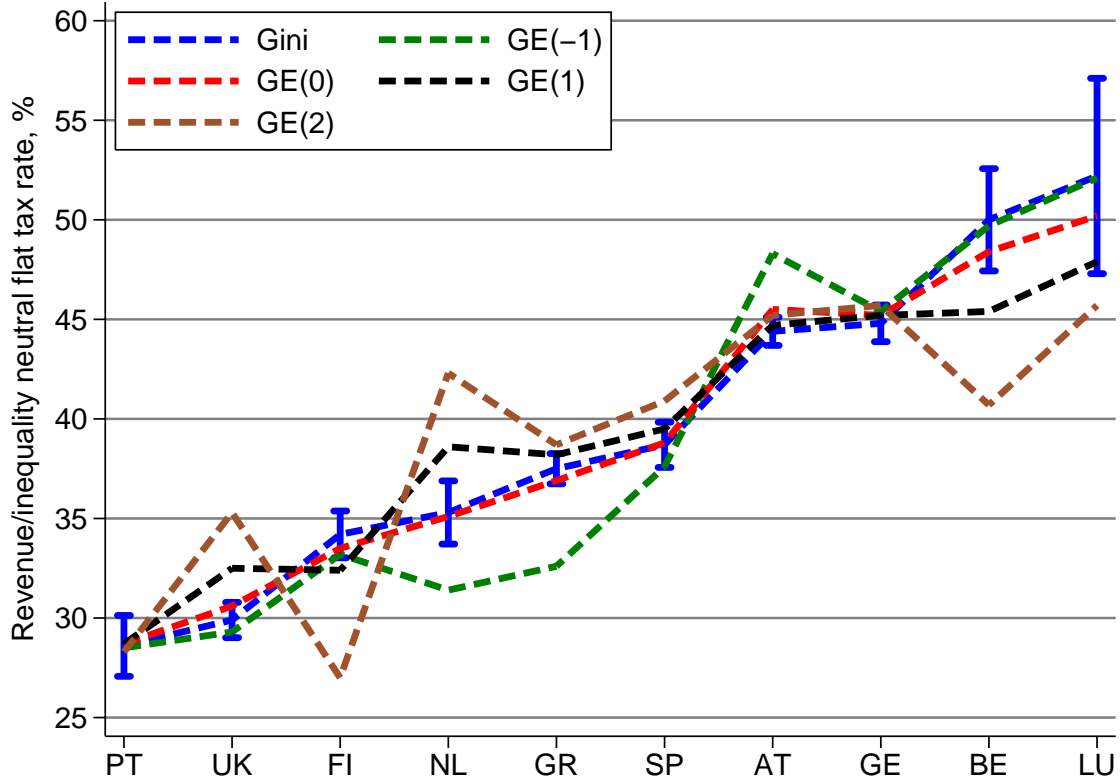Source: own calculations using EUROMOD version D5.

Figure 3: Revenue and inequality neutral flat tax rates: all chosen measures
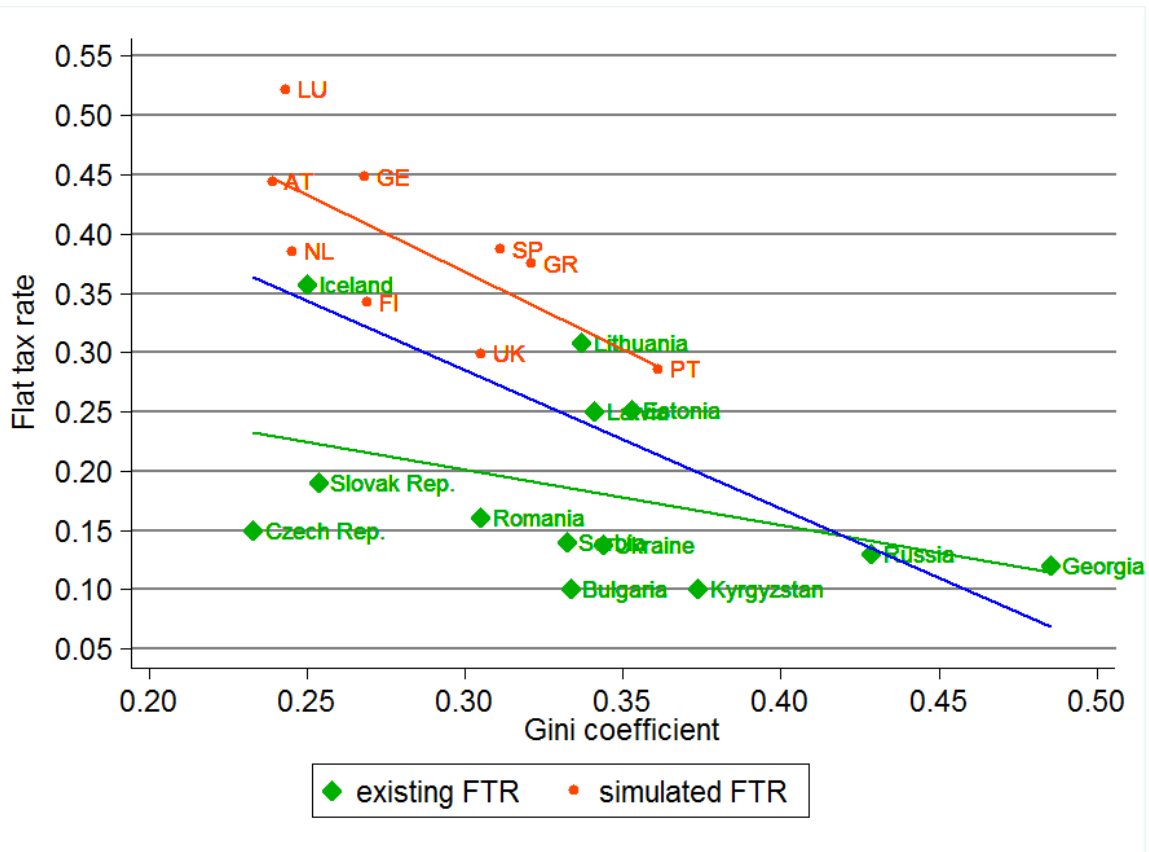Source: own calculations using EUROMOD version D5.

Figure 4: Existing and simulated flat tax rates vs inequality level
Source: own calculations using EUROMOD version D5.

Western European countries (orange) and Eastern European countries with existing flat tax systems (green). The inequality levels in Eastern Europe are higher than those in Continental Europe, except for the Czech and Slovak Republics. In general, a negative relationship between income inequality and flat tax rate can be found, i.e. the lower the marginal flat tax rate the higher inequality and vice versa, however, this correlation seems stronger for Western European countries.

4.2 Distributional effects

In this section, we analyse the distributional effects of introducing a revenue and inequality neutral flat tax. For the sake of clarity, we focus on the flat tax rates which are inequality neutral in terms of the Gini coefficient, $t_F^*(Gini)$ as there is not much variations in the flat tax rates based on different inequality measures as seen in previous section (see Figure 3).

When analysing this kind of flat tax, one has to be aware of the fact that revenue neutrality in terms of (overall) tax payments does not necessarily imply a constant mean disposable
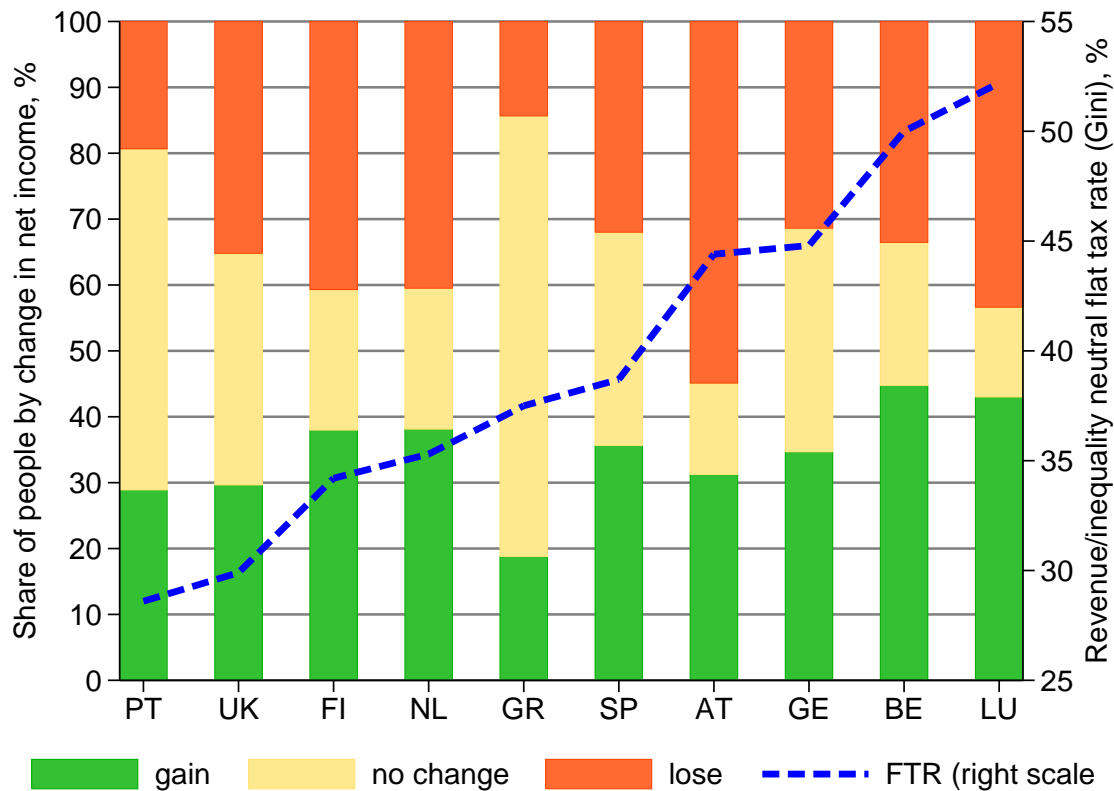
Figure 5: Gainers and losers in terms of equivalised disposable income (no change = difference less than €10 per month)
Source: own calculations using EUROMOD version D5.

income. This mainly depends on mean-tested benefits which are calculated on the basis of after-tax net income. Further on, inequality neutrality does not imply that the distribution of incomes does not change. Therefore, we compute a number of distributional measures to cover several aspects of distribution: poverty, affluence and polarisation. These are based on equivalised household disposable incomes.[30]

The introduction of any revenue (and inequality) neutral tax reform always yields gainers and losers. Different groups of taxpayers are affected differently by tax schedule flattening and tax base broadening. Figure 5 summarises gainers and losers[31] by presenting population shares for each.

No strong relationship between the flat tax rate and any share can be observed. In general

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[30]We use the modified OECD equivalence scale which weights the household head with a factor of 1, household members aged 14 and older with 0.5, and under 14 with 0.3. The household net income is divided by the sum of the individual weights of each member (=equivalence factor) to compute the equivalent household income.

[31]Households whose disposable income does not change more than 10 euros per month in either direction are regarded as „unchanged".
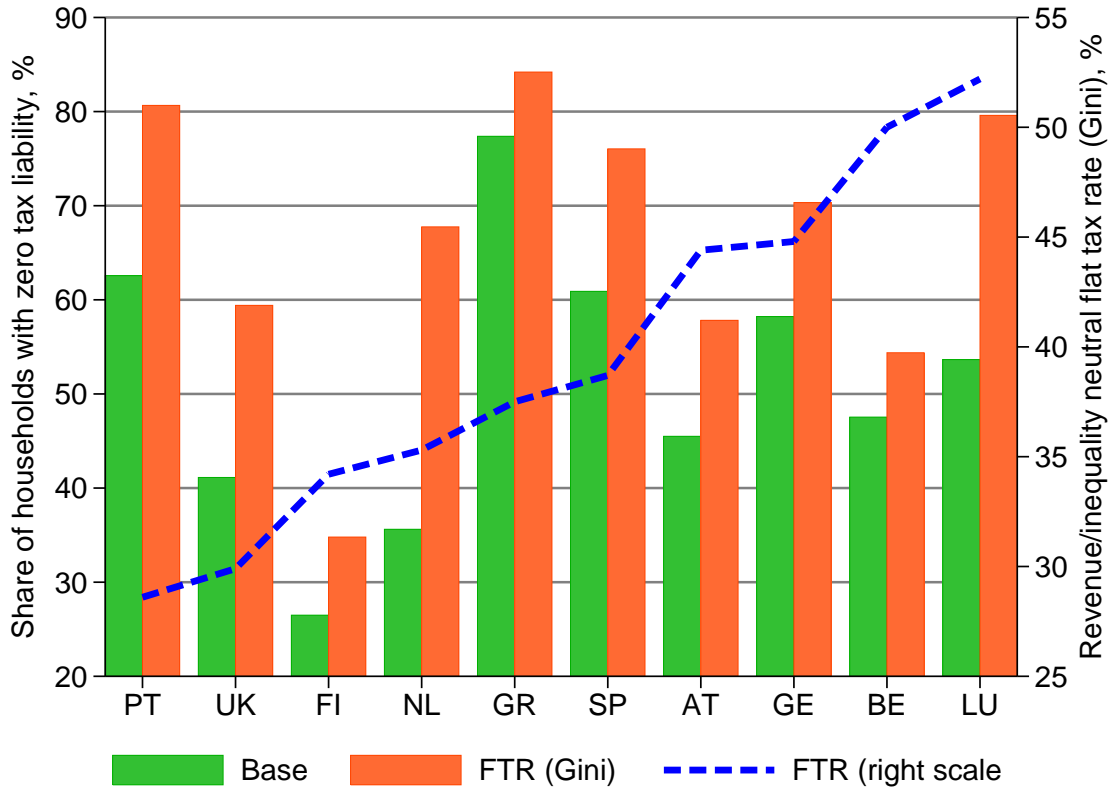
Figure 6: Share of people with zero tax liability
Source: own calculations using EUROMOD version D5.

the share of gainers/losers seems somewhat symmetric. Overall, there are (slightly) more gainers than losers in Germany, Greece, Netherlands, Portugal and Spain, whereas the opposite is true for Austria, Finland, Luxembourg and the UK. However, in none of the countries does a flat tax lead to a majority of people gaining. However, if 'gain' and 'no change' considered together then majority is worse off only in Austria.

The rather larger number of people with unchanged disposable income in Greece (and Portugal) can be explained by the large share of people with zero tax liability in these countries (77.4% and 62.6%, respectively). These fractions increase further to 84.2% and 80.7% under the flat tax scenario. In fact, Figure 6 shows that this share increases for all countries. Therefore, the tax burden is distributed among fewer people to attain the same revenue as before. Especially the increase for the Netherlands is remarkable, where the share of people not paying taxes more than doubles. Finland is the only country with a share below 30% which is only slightly increased.

Figure 7 shows the net share of gainers and losers by quintiles. In the Southern countries,
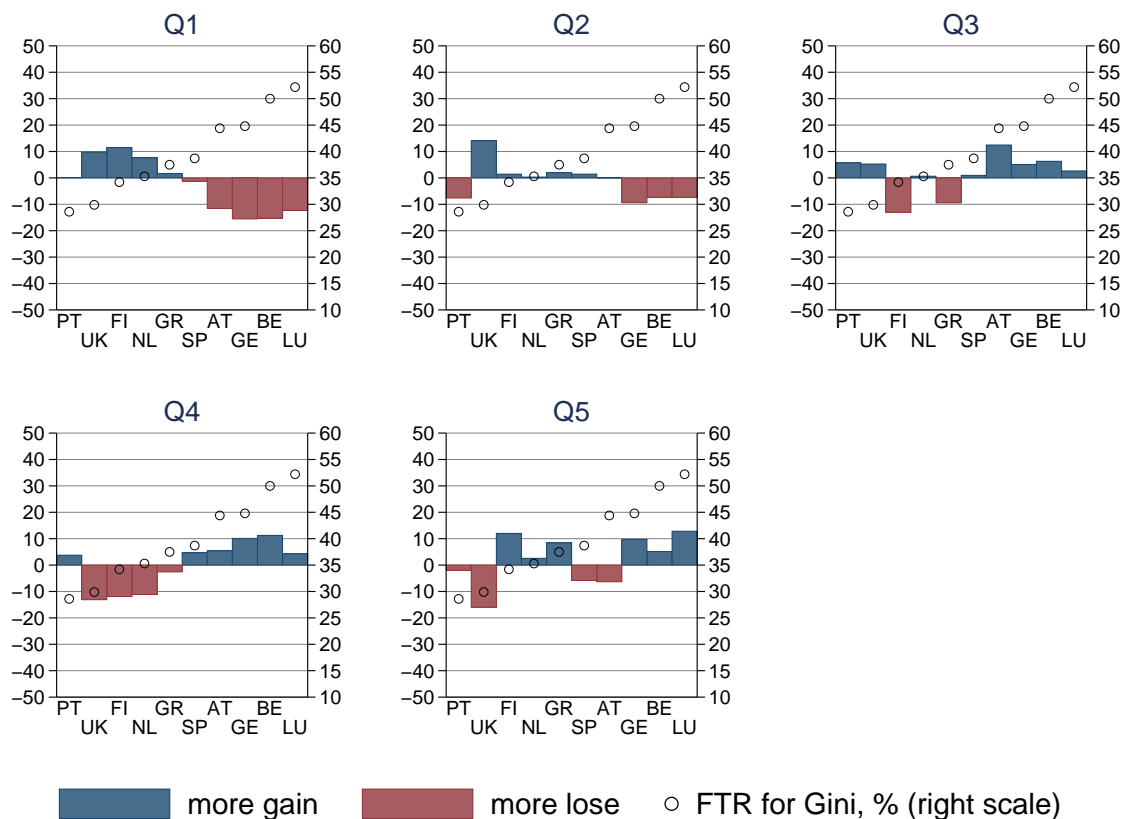
Figure 7: Difference in share of gainers and losers ('net-gainers') by quintiles, pp
Source: own calculations using EUROMOD version D5.

there are more gainers than losers at least in four quintiles (including the lowest). In the UK, the Netherlands, Spain and Austria, the top quintile loses, which is somewhat opposite to the previous country studies. However, when taking a closer look at the top of the distribution (e.g. the top 1%), the very top still gains when an inequality and revenue neutral flat tax is introduced.

To analyse the effects of flat taxes on poverty we compute the headcount index and the measures of Foster et al. (1984) based on the poverty line taken from the baseline scenario.[32] We compute the poverty lines as 60% of median equivalent income for each country. The results for the headcount ratio (FGT0) are plotted in Figure 11. Measuring affluence is a much less considered field in the literature than poverty. We compute the headcount index and the measures of Peichl et al. (2006) which are analogously defined to the FGT indices of

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[32]We fix the poverty and richness lines at the baseline level to account for (possible) changes in median income. Otherwise, if we would allow for changing poverty (richness) lines an increasing measure of poverty (or a decreasing index of richness) would not necessarily indicate a worse situation for people with low (high) incomes as a result of the changing poverty (richness) line.
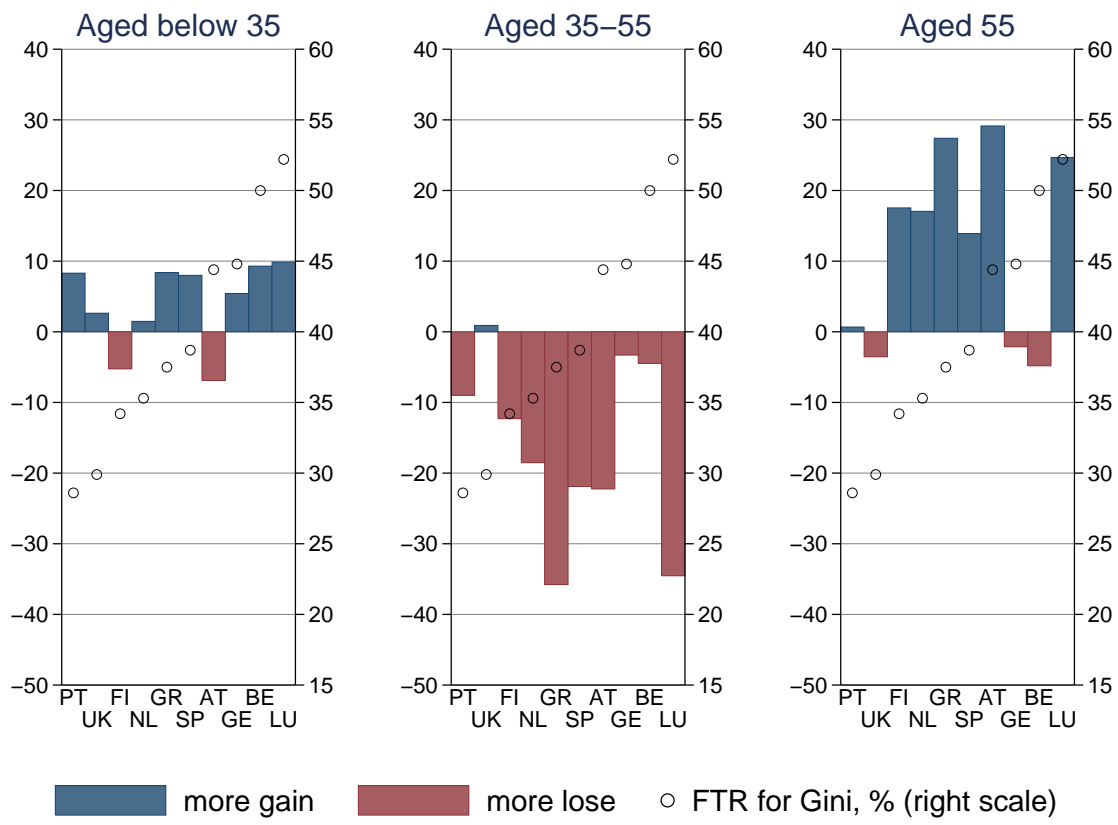
Figure 8: Difference in share of gainers and losers ('net-gainers') by age classes, pp
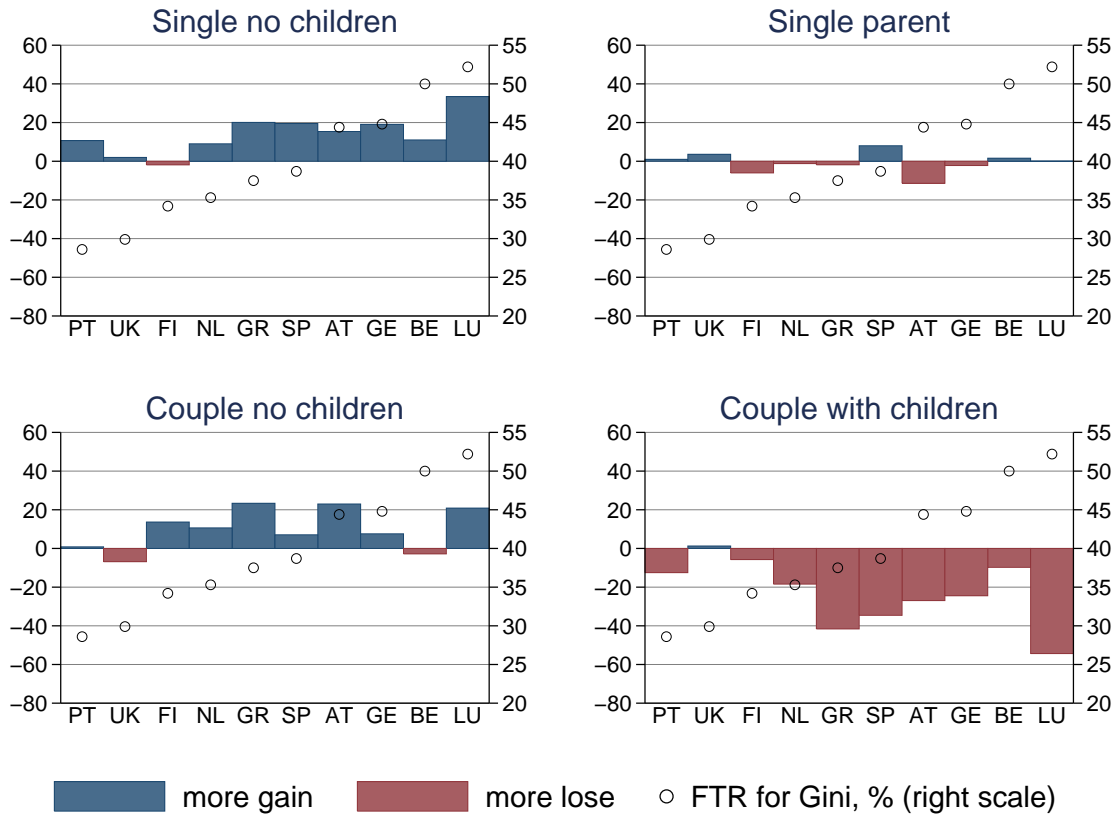Source: own calculations using EUROMOD version D5.

Figure 9: Difference in share of gainers and losers ('net-gainers') by family status, pp
Source: own calculations using EUROMOD version D5.

Figure 10: Difference in share of gainers and losers ('net-gainers') by main source of income, pp
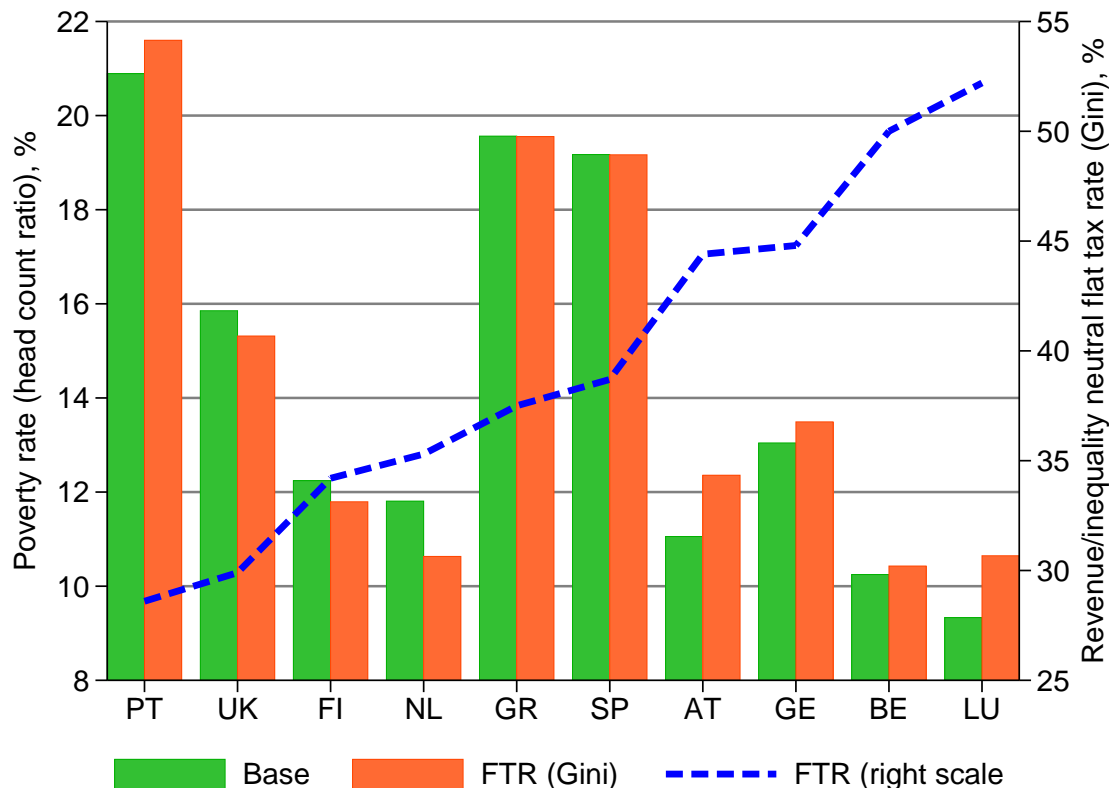Source: own calculations using EUROMOD version D5.

Figure 11: Poverty rates 60% of median equiv. disposable incomes
Source: own calculations using EUROMOD version D5.

poverty. The affluence line is computed as 200% of median equivalent income. The results for the headcount ratio are presented in Figure 12.[33]

Again, there are distinct differences between countries in the baseline levels of poverty and affluence. Two groups of countries can be distinguished: poverty and affluence are rather high in Southern European countries and the UK, and low in Continental Europe and Finland. When analysing poverty, one has to take into account the fact that the lowest deciles of the income distribution seldom pay income taxes. There is, therefore, limited scope for a reduction in income poverty through reduced marginal tax rates. The revenue and inequality neutral flat tax rates lead to increasing poverty in Portugal, Austria, Germany and Luxembourg; decreasing poverty in the UK, Finland and the Netherlands, while it remains the same for Greece and Spain.

To assess the importance of the middle class we calculate the polarisation index of Schmidt

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[33]One should note, though, that measuring affluence depends on the quality of micro data as the upper tail of the income distribution in surveys is especially prone to non-response and measurement error bias.
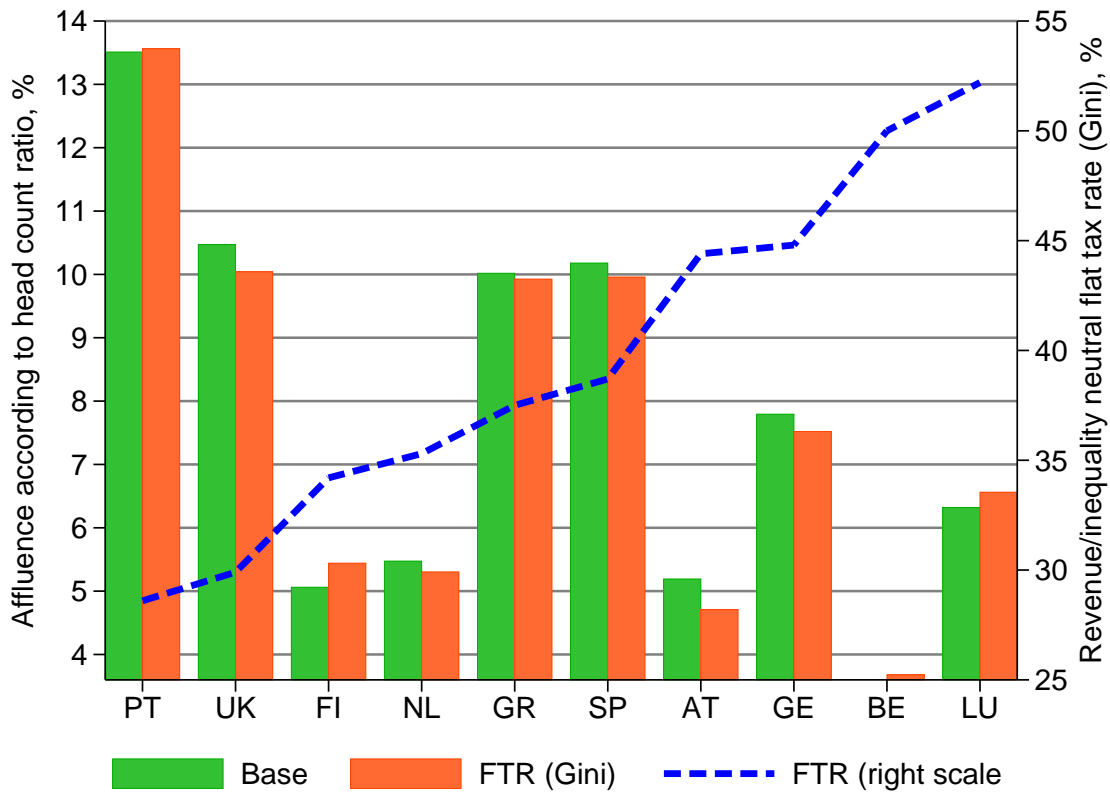
Figure 12: Affluence rates 200% of median equiv. disposable incomes
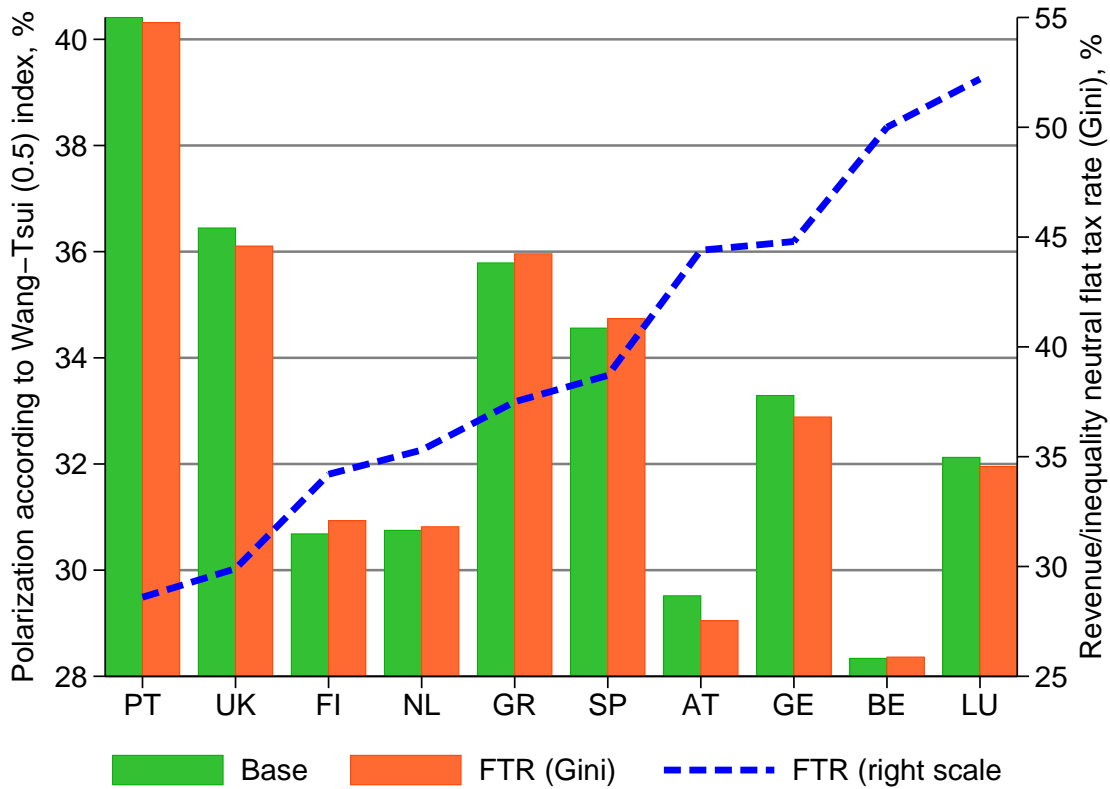Source: own calculations using EUROMOD version D5.

Figure 13: Polarization, Wang-Tsui-Index
Source: own calculations using EUROMOD version D5.

(2004)[34]. The results are presented in Figure **??**.

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[34]Schmidt (2004) creates a polarisation index which in analogy to the Gini index (Lorenz curve) is based on a polarisation curve for better comparability of the results and their interpretations. Generally speaking, polarisation is the occurrence of two antipodes. A rising income polarisation describes the phenomenon of a declining middle class resulting in an increasing gap between rich and poor. The proportion of middle income households is declining while the shares of the poor and the rich are both rising.
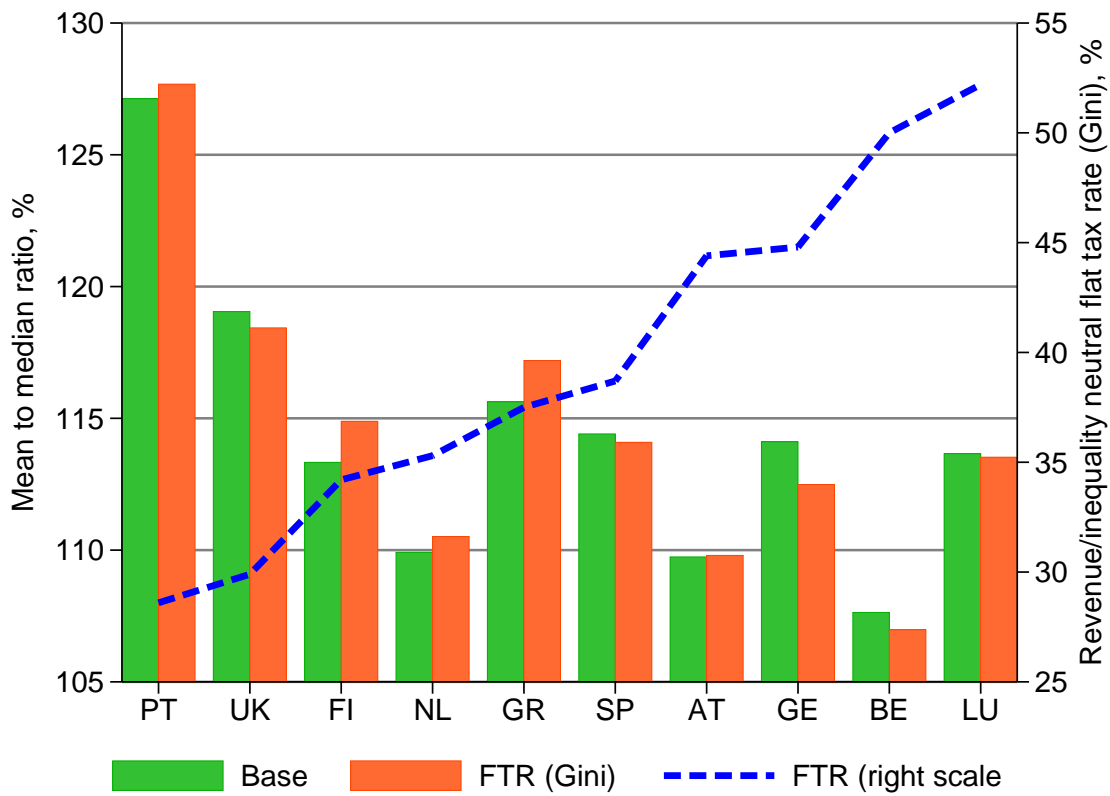
Figure 14: Mean-Median-Ratio

Source: own calculations using EUROMOD version D5.

4.3 Work incentives: effective average and marginal tax rates

In this section, we analyse the effects of flat tax reforms on the effective marginal (EMTR) and average (EATR) income tax rates faced by different groups of taxpayers as a measure for efficiency effects. The underlying idea is that average and marginal income tax rates affect labour supply and savings incentives. Therefore, changes in effective income tax rates may be considered as rough indicators for distortions caused by the tax system.[35] Effective marginal tax rate shows at which rate an additional unit of income is taxed, whereas effective average tax rate shows the proportion of total taxes (including SICs) to market income.[36] Changes in effective average tax rates are of special interest for the extensive labour supply margin which seems to be more important for particular subgroups at the bottom of the income distribution than the intensive margin which is affected by the effective marginal tax rate (see Heckman (1993) and Immervoll et al. (2007)).

Figure 15 summarises effective marginal tax rates[37] by presenting overall population shares for people with decreasing and increasing EMTRs. If 'decrease' and 'no changes' are together considered as positive developments then incentives improve for majority in all countries (especially in Portugal, Finland, Greece and the Netherlands) but the UK, Austria and Germany.

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[35]One should note, though, that average EMTRs and EATRs, in general, do not allow deriving conclusions for the expected labour supply reactions of individuals. These depend on the individual effective tax rates and their respective labour supply elasticities.

[36]We calculate EMTRs for the working age population (those aged 18-64) with positive employment or self-employment income, increasing earnings of each individual in the household in turn by 3% while the change in all benefits and taxes (including social insurance contributions) is observed at the household level. We use the following formula: $EMTR_i = 1 - \frac{\Delta Y_j}{d_i}$, where d_i is the income increment for individual i and Y_j disposable income of household j to which this individual belongs. The effective average tax rate is also calculated for the working age population as: $EATR_i = \frac{T_i}{X_i}$, where T_i is total tax payments and X_i the market income of individual i.

[37]People whose EMTR does not change more than 1 pp in either direction are regarded as „unchanged".
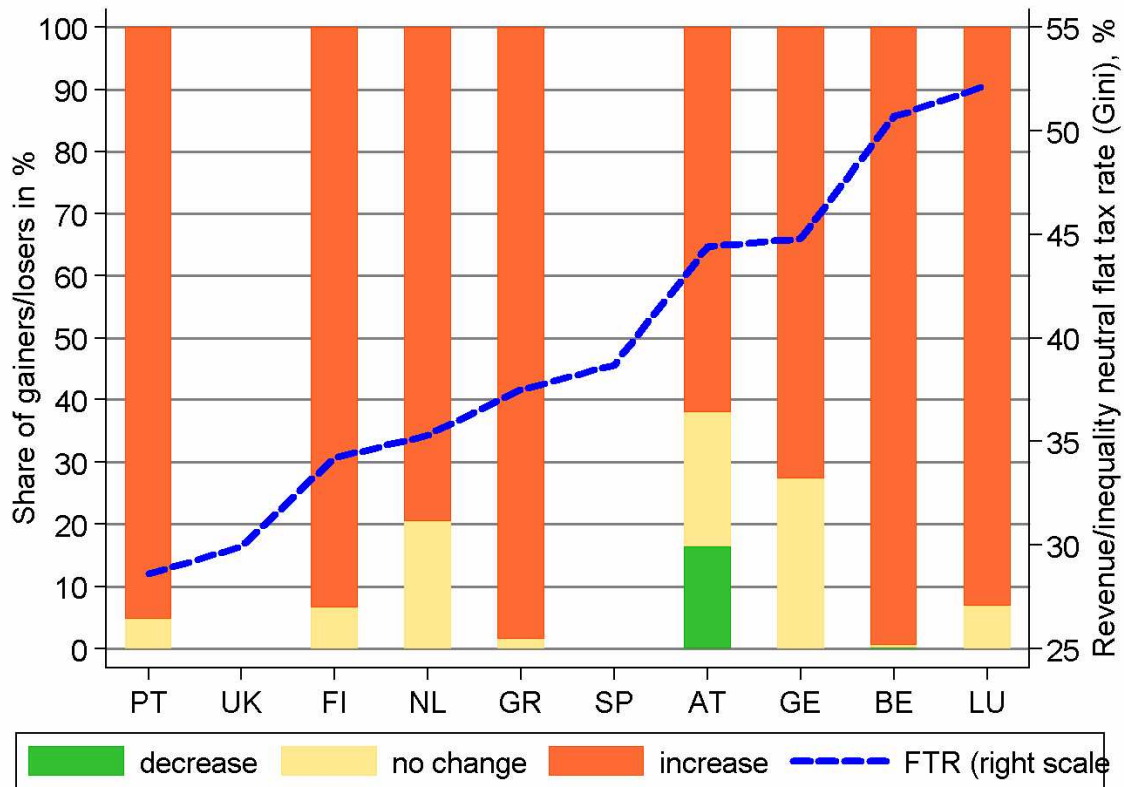
Figure 15: Impact on effective marginal tax rates (no change = difference less than 1pp)
Source: own calculations using EUROMOD version D5.

5 Conclusion

Flat income taxes have become increasingly popular in Eastern Europe. However, this popularity has not yet reached Western European countries with well-established middle classes. Using EUROMOD we provide a microsimulation analysis of revenue and inequality neutral flat tax reforms for selected Western European countries in a common framework.

Our analysis shows that the revenue and inequality neutral flat tax rates tend to be higher in continental than in Southern European countries, while being less affected by different measures of income inequality. The high marginal rates imply that revenue and inequality neutral flat reforms are not feasible in most countries, however, there might be scope for non-revenue or non-inequality neutral reforms depending on political preferences. Inequality neutrality also shows that high income groups might be 'net-losers' as the share of people not paying income taxes is increasing in all countries. Overall, flat tax implementation seems more favourable in the Southern European countries (Portugal, Greece and Spain).

When interpreting these results, one has to be aware of the fact that we limit our analysis to static models. However, flat taxes are also supposed to have positive dynamic efficiency and growth effects.[38] These long-term effects might make increasing inequality acceptable. Nevertheless, the question arises whether a personal income tax reform is the best instrument to increase growth and employment. The user costs of labour and capital play an important role in determining the labour and investment demand. These user costs, however, are determined more by social security contributions and corporate taxes than by personal income tax.

Nevertheless, the immediate and short-term distributional effects analysed in this paper are most likely to be decisive for the political feasibility of a flat tax reform. The main problem of implementing a flat rate tax could be to convince a majority of the population that redistribution in favour of the highest income decile is acceptable. These distributional effects at the expense of the middle class help to explain why flat rate taxes have not been successful in the political process in Western Europe. However, our analysis shows that for some Mediterranean countries a flat tax can increase both equity and efficiency. This also suggests that these and other countries with similar income distributions and welfare state structures are more prone to follow such reforms.

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[38]Cf. Stokey and Rebelo (1995) or Cassou and Lansing (2004).

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Appendices

A EUROMOD

	Input dataset for EUROMOD	No of households	Date of collection	Reference time period for incomes
AT	Austrian version of EU-SILC	4,521	2004	annual 2003
BE	Panel Survey on Belgian Households	2,975	2002	annual 2001
FI	Income distribution survey	10,736	2001	annual 2001
GE	German Socio-Economic Panel	11,303	2002	annual 2001
GR	Household Budget Survey	6,555	2004/5	annual 2003/4
LU	PSELL-2	2,431	2001	annual 2000
NL	Sociaal-economisch panelonderzoek	4,329	2000	annual 1999
PT	European Community Household Panel	4,588	2001	annual 2000
SP	European Community Household Panel	5,048	2000	annual 1999
UK	Family Expenditure Survey	6,634	2000/1	month in 2000/1

Table 3: EUROMOD input datasets (version C13)

	No of brackets	Lowest (pos) rate	Highest rate	Form of the main tax relief	Capital taxation	Tax unit
AT	4	21%	50%	0% tax bracket, tax credit	flat tax (25%)	individual
BE	5	25%	50%	tax allowance	optional flat tax (15%)	some sharing
FI	5	state 12%, local 15%	state 35%, local 19.75%	0% tax bracket (state), tax allowance (local)	flat tax (29%)	individual
GE	4	19.9%	48.5%	0% tax bracket	integrated	optional joint
GR	3	15%	40%	0% tax bracket	integrated	individual
LU	16	8%	38%	0% tax bracket	integrated	joint
NL	4	1.7%	52%	tax credit	flat tax (30%)	individual
PT	6	12%	40%	tax credit	flat tax (20%)	joint
SP	5	15%	45%	tax allowance	integrated	optional joint
UK	3	10%	40%	tax allowance	one bracket slightly reduced	individual

Table 4: Income tax systems, 2003