How Much Are the Poor Losing from Tax Competition?

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Overview

How much are European citizens losing from tax competition? Would they be better-off if European countries were able to have a common fiscal tool? This brief examines the welfare effects of tax competition in a free mobility union composed by perfectly symmetric countries where individuals can respond to taxation through migration. When countries of a free mobility union set their tax rates separately (tax competition), the optimal level of taxes and transfers is lowered because individuals can change their residence in response to taxes. By contrast, if countries are constrained to set a uniform tax rate at the union level (federal union), individuals' location decisions are no longer affected by taxes, leading to more redistribution at the optimum. The difference in the level of taxes and transfers between the competition and the federal union depends of how responsive migration responses are to taxes.

Using recent empirical estimates of migration responses to taxation, this work quantifies the welfare effects of tax competition, and how these welfare effects vary with individuals' earnings. Even when the elasticity of the number of taxpayers with respect to taxation is rather small and far below unity, as it has been estimated in the literature, the welfare costs of tax competition can be sizeable for poorest workers. The results show that the bottom fifty percent always loses from tax competition, and that being in a competition union rather than in a federal union could decrease poorer individuals welfare up to -20 percent. These welfare costs are bigger when the government has a moderate taste for redistribution, as when the level of redistribution is already low in the federal union, any additional decrease in redistribution has a large effect on poor individuals' welfare.

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Introduction

In 2018, the European Union celebrated the 50th anniversary of the implementation of freedom of movement for all European citizens. If the free movement principle laid the foundation of the European free mobility union, internal borders still exist in terms of taxes. Member states set their tax rates separately and the design of the tax and transfer systems thus remains completely outside the scope of union policy. At the same time, concerns have become increasingly prominent in policy debates that tax differentials across countries trigger large migration responses. As recently reviewed in Kleven et al. [2019], there is a growing evidence that taxes can affect the geographic location of people both within and across countries. In the absence of tax coordination between European countries, tax competition could therefore constrain redistribution in the European Union.

This article presents the efficiency-cost trade-offs related to the design of tax policy when countries are part of a free mobility union with no common fiscal tool. The first contribution of this paper is to document the mechanisms that may lead redistribution to be lower in a competition union compared to a union with a uniform tax rate, building on the seminal work of Mirrlees [1982] and related to the contribution of Lehmann et al. [2014]. The second contribution of this paper is to quantify how tax competition affects individuals' welfare through its effects on the optimal level of redistribution. In particular, it documents how individuals' welfare is affected differently regarding their position in the income distribution. It also emphasizes how the effects of tax competition on individuals' welfare vary with two central parameters: the elasticity of the number of taxpayers with respect to taxation and the social preferences of the competing government.

Labour Supply Responses to Taxes

The theoretical framework used for the analysis is based on a simple world where individuals are heterogeneous in terms of skills. The model builds on the seminal optimal taxation model of Mirrlees [1971] following the approach derived by Piketty [1997] and Saez [2001]. Each individual is characterized by a utility function, that is increasing in consumption, and decreasing in hours worked, as individuals dislike effort. I assume as an important simplification the absence of income effects, meaning that individuals always want to work more if the reward they can get from working is increased. Conditional on their exogenous skills, individuals choose the amount of work that maximizes their utility. The tax system consists in a linear tax rate and a universal transfer that is equal to the overall tax revenue raised split among all residents. Because the tax rate is linear, the universal transfer is simply the linear tax rate multiplied by the average income in the economy. It is worth pointing out that this model uses a conservative vision of redistribution, as government intervention only transfers consumption from some individuals to others. In the model, individuals' pre-tax earnings are endogenous to the tax rate, because individuals choose their effort as a function of after-tax reward. Therefore, any change in the net-of-tax rate (one minus the linear tax rate) will affect individuals' gross earnings by changing individuals' optimal amount of labor supply. This behavioral response is captured by the *elasticity of gross earnings with respect to the net-of-tax rate*, that measures by how much individuals' gross earnings are increased when the net-of-tax rate is increased. This parameter is always positive, because of the absence of income effects. When the after-tax reward of labor is increased because of a decrease in taxes, individuals always want to work more than before the tax decrease.

Location Decisions

Individuals' cannot only choose how much they work, they can also choose where they want to live. Their location decision is made conditional of their labor supply decision. They have an idiosyncratic taste for residing in each country and may suffer a migration cost if they move from one country to another. There-

fore, their utility in one country is a function of their pre-tax earnings, net-of-tax rate and transfers in this country, their taste for this country and the migration cost that is zero if individuals do not move. The optimality condition for residence establishes that individuals live in one country if and only if their utility in this country is higher than everywhere else. It follows from this optimality condition that the number of individuals who choose to locate in one country is a function of their overall tax liability in this country.

Individuals' location decisions are affected by differentials in taxation between countries.

This is because migration decisions are driven by average tax rates, rather than marginal tax rates. While an increase in the universal transfer will not change individuals' labor supply within each country, it will affect location decisions to and from this country by affecting the utility differentials between this country and all other alternative countries. As for labor supply responses, location responses to taxation can be summarized with elasticity concepts. I define the migration elasticity as the elasticity of the number of individuals in one country when the net-of-tax rate is increased in this country. For individuals with earnings below the average income, consumption is *decreasing* in the net-of-tax rate, while for individuals with earnings above the average income, consumption is *increasing* in the net-of-tax rate. It follows that the elasticity of the number of individuals in one country with respect to the net-of-tax rate in this country is negative for individuals with income below the average income, and positive above.

Federal vs Competition Union

The analysis focuses on free mobility union composed by perfectly symmetric countries. The symmetric assumption will have important implications for the analysis of the tax competition equilibrium. For simplicity, we can assume that there is no mobility outside the free mobility union meaning that individuals only move within the free mobility union. In this model, I call a federal union a union where all countries are constrained to set the same linear tax rate. As countries are perfectly symmetric in every aspect (size, distribution of skills, preferences, distribution of residence-specific tastes and distribution of migration costs), it does not matter for the analysis if the revenue collected with the federal rate is redistributed at the union or the country level. Because countries are perfectly symmetric, the federal rate set at the country or the union-level are similar. Of course, this definition of the federal union is a simplification and rules out any considerations linked to the fact that individuals may want to sort themselves in different countries because they have different tastes for public goods, which in turn may affect their welfare. By contrast to the rigid federal union, countries can enter in tax competition and set their tax and transfer policies separately without any coordination. I study the simultaneous non-cooperative equilibrium (Nash equilibrium), where each country sets unilaterally its tax rate without taking into account the other country strategy. As countries are perfectly symmetric, they will by definition set the same tax rate in the competition Nash equilibrium.

Optimal Taxes and Transfers

Governments choose their tax rates in order to maximize the total welfare in the economy. The aggregation of the total welfare in the economy depends on the preferences of the government, which are chosen as arbitrary parameters. The redistributive tastes of the government are captured by generalized social marginal weights in the model, following the approach of Saez and Stantcheva [2016]. With this formulation, the government attributes a weight to each individual's welfare, and these weights only need to be defined as multiplicative constant.

The theoretical framework allows to derive the optimal tax and transfers policy set in the competition and the federal union. Following my strict definition of the federal union, countries are constrained to set a uniform tax rate when they belong to the federal free mobility

union. As countries are perfectly symmetric, the optimal tax rate set at the country or the union level will be exactly similar. Because the federal tax rate is the same in all countries, location decisions become independent to the tax policy. In the rigid federal union, the only behavioral response to taxation occurs through labor supply choices. The optimal linear tax rate maximizing total welfare in the federal union is derived formally in Muñoz [2019b], but I discuss briefly the intuitions behind this result. The optimal tax rate set by the government is a decreasing function of the income-weighted average elasticity of earnings with respect to the net-of-tax rate. The idea is that the government cannot tax as much as he would want to because of the efficiency cost of taxation. The optimal tax policy of the government internalizes the fact that individuals will work less in the presence of higher taxes. The optimal tax is also affected by the income-weighted average welfare weight that captures government's preferences for redistribution. When this parameter is very low, meaning that the government only cares about individuals with low income, the optimal linear tax rate is increased. How is the optimal tax rate changed in the presence of tax competition? When countries set their tax rates unilaterally, location decisions are no longer independent from tax policy. Any increase in the level of taxes in one country will affect migration decisions between this country and its neighbours, taking all other parameters as given. Therefore, any competing country choosing its linear tax rate individually takes into account the fact that a change in its own tax rate will change location decisions of individuals with respect to this country. The optimal linear tax rate in the presence of tax competition is decreasing in both the elasticity of earnings with respect to net-of-tax rate and the elasticity of the number of taxpayers with respect to the net-of-tax rate. It follows that as soon as the mobility elasticity is different from zero, the competing rate is lower than the federal rate, and the gap between the two depends on how responsive individuals' location choices are to taxes. This result holds in a model assuming no other externalities - positive or negative - of tax-driven migration.

If the elasticity of the number of taxpayers with respect the net-of-tax rate is different from zero, and in the absence of externalities, the optimal linear tax rate is always lower in the competition union.

The competing government takes into account the additional efficiency cost of taxation in the presence of tax-driven migration, that is to say that higher taxes will change taxpayers' location decisions that will in turn affects government's tax revenue. As showed in Muñoz [2019b], the efficiency cost of taxation through tax-driven mobility is a combination of income-weighted and population-weighted mobility elasticities. The intuition is that in tax competition, in order to maximize individuals' welfare, the government maximizes the amount of transfer that can be redistributed to its residents. This is a function of the amount of taxes that can be collected on taxpayers (revenue channel) but also of the absolute number of transfer beneficiaries (transfer channel). As showed in Muñoz [2019b], the revenue-maximizing rate differs from the transfer-maximizing rate in tax competition.
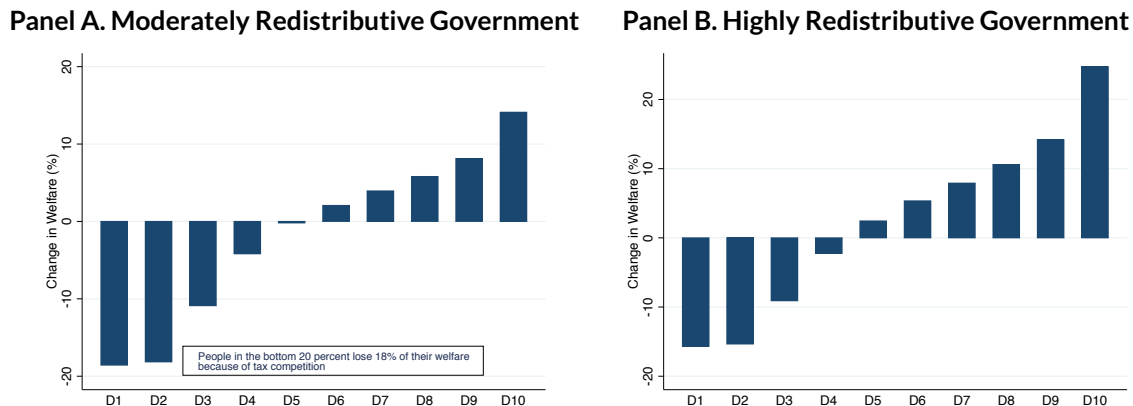
Welfare Analysis

The optimal tax analysis allows to obtain simple theoretical formulas in order to compute the optimal linear tax rates in the tax competition and the federal union. With these formulas at hand, it is possible to perform a welfare analysis. Individuals' welfare is the utility they can derive. The calibration exercise requires an empirical estimate for the labor supply and the mobility elasticities, an exogeneous distribution of individuals' skills, parameters capturing the preferences of the government and a functional form for individuals' utility. The methodology of the welfare analysis goes as follow. Using three parameters (preferences, earnings elasticity, mobility elasticity) we can compute the optimal linear tax rates in federal vs competition union. Under these linear tax rates, it is possible to compute the resulting

pre-tax earnings given the distribution of individuals' skills, and to obtain the implied level of transfers in the two systems. It is finally possible to compute individuals' welfare using a functional form for their utility,and the calibrated level of taxes, transfers, labor supply and pre-tax earnings. Importantly, the analysis is performed for the symmetric Nash equilibrium, where competing countries set the same linear tax rate. Therefore, in this equilibrium no one ultimately moves, but taxes are lower because countries set their tax rates unilaterally, emphasizing the effect of migration threat, a point that has also been made in Lehmann et al. [2014]. All of these parameters are chosen following the evidence available in the literature. Importantly all the empirical values chosen for these parameters will affect the results of the welfare quantification and thus need to be carefully looked at when interpreting the results of the quantification exercise. For the preferences of the government, I consider three different types of redistributive preferences: a Rawlsian government that only values the welfare of the bottom fifty percent, a highly redistributive government that values the welfare of the bottom fifty percent five times more than individuals with higher income levels, and a moderately redistributive government that values the welfare of the bottom fifty percent two times more than the welfare of individuals with higher income levels. Regarding the gross earnings elasticity, I follow the literature and use a constant value of 0.25 that corresponds to a moderate value regarding what has been estimated (see Saez et al. [2012] for a literature review). Regarding the utility function, I use a standard quasi-linear utility form where the parameter capturing the cost of effort is chosen to be compatible with the empirical values of the gross earnings elasticities described before. The first order condition of the individual problem gives the relationship between the optimal amount of labor supply, taxes, earnings and skills. This relationship will be used to compute pre-tax earnings under a given tax level, exogenous skills and the earnings elasticity. I follow the standard approach developed by Saez [2001] and I calibrate the exogenous skills distribution using

the empirical earnings distribution for France with a current linear tax rate of fifty percent and the chosen labor supply parameter of 0.25. The last parameter needed for the calibration is the elasticity of the number of residents with respect to the net-of-tax rate. As recently reviewed by Kleven et al. [2019], there is still little available estimates of this parameter, but there is a growing evidence that individuals' location choices are responsive to taxes. Empirical studies on the subject find that top earners' location choices are significantly affected by tax rates (Kleven et al. [2013], Kleven et al. [2014], Akcigit et al. [2016], Moretti and Wilson [2017], Agrawal and Foremny [2018], Muñoz [2019a]). The migration responses to taxation can be sizeable in some specific cases (Kleven et al. [2014], Kleven et al. [2013]). However, these studies also found large heterogeneities in migration responses to taxation, and showed that foreigners were much more responsive to taxes than domestics. Some occupations and segment of the labour market are also more likely to be responsive to taxes compared to others. The studies exploiting within-country variations in taxation also found larger elasticities compared to studies exploiting international migration responses to taxes. These heterogeneities are explained by the fact that estimated migration elasticities are not structural parameters but vary across countries, time, and institutional framework. They are thus affected by the characteristics of the population studied and the current state of tax competition. Overall, the elasticity of the number of top earners with respect to the net-of-tax rates has been found rather small, between 0.1 and 0.5 for international migration responses to taxation, and up to 0.8 for within-country migration responses to taxation. As there is for now no credible empirical work on mobility responses to taxes at the bottom of the income distribution, the calibration exercise will have to rely on assumptions regarding bottom earners migration elasticities. I start with the hypothesis that migration responses to a change in utility differentials through a change in the level of taxes are similar for all earnings levels.

Figure 1. Distribution of Welfare Gains and Losses from Tax Competition

Panel A. Moderately Redistributive Government **Panel B. Highly Redistributive Government**

Source: All details on calibration and assumptions are detailed in the notes below Table 1 and Muñoz [2019b]. This graph shows the distribution of the welfare effects of tax competition across labour earnings' deciles when the migration elasticity is 0.2 and the gross earnings elasticity is 0.25, corresponding to the scenario 2 of Table 1. The welfare effect of tax competition is the variation in percentage of individuals' welfare from a federal union to a competition union. A negative welfare variation means that individuals would be better off in a federal union.

How to read it: In the absence of uniform federal taxation, the bottom twenty percent loses up to 20 percent of its welfare. The top ten percent gains between 15 and 20 percent of welfare because of lower tax rates in tax competition.

The results show that individuals in the bottom fifty percent of the income distribution lose on average -10 to -20 percent of their welfare from tax competition.

The results of the welfare calibrations satisfying the assumptions described before are presented in Figure 1 and Table 1.

The results show that individuals in the bottom fifty percent of the income distribution always lose from tax competition, and would always be better off in a federal union. Their loss in welfare ranges on average from -10 to -20 percent, depending on the redistributive tastes of the government and the strength of mobility responses to taxation. By contrast, higher income earners benefit from tax competition, as taxes are lowered by mobility responses to taxation when countries engage in tax competition.

Therefore, the results of the numerical calibrations show that even with very small migration elasticities -far below unity-, the welfare effects of tax competition at the bottom of the income distribution are sizeable. Interestingly, the welfare losses of poorer workers are higher when the redistributive tastes of the government are lower. When

the level of redistribution is already low in the federal union because of the low redistributive tastes of the government, any additional decrease in redistribution has a large effect on poor individuals' welfare. By contrast, if the government has strong redistributive taste, the effect of tax competition through tax driven migration is mitigated by the high level of redistribution even in the presence of tax competition.

Overall, this paper sheds light on the welfare effects of the absence of tax cooperation in a free mobility union composed by perfectly symmetric countries. In this model, the absence of tax cooperation imposes an additional efficiency cost on taxation through migration responses to taxes, leading to lower level of taxes, and redistribution. The modified amount of taxes and transfers affects individuals' welfare differently regarding their level of earnings. The results show that individuals in the bottom fifty percent of the distribution would always be better off, under the assumption of the model, in a federal symmetric union.

The results of this work therefore emphasize the efficiency costs of taxation in the absence of tax coordination, and how it affects individuals' welfare especially

at the bottom of the income distribution. It indicates that poorer individuals would benefit from tax cooperation in Europe. Therefore, the recent proposals that have been made such as the Tdem (`http://tdem.eu/en/manifesto/`) to improve fiscal policy coordination in Europe and move towards a federal union would be welfare improving for the European bottom fifty percent.

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Table 1. Effects of Tax Competition on Optimal Taxes and Welfare With a Linear Tax Schedule

	Scenario 1 Elasticities e=0.25 $\bar{\varepsilon}$=0.07 $|\varepsilon_i|$=0.1		Scenario 2 Elasticities e=0.25 $\bar{\varepsilon}$=0.14 $|\varepsilon_i|$=0.2		Scenario 3 Elasticities e=0.25 $\bar{\varepsilon}$=0.20 $|\varepsilon_i|$=0.3		Scenario 4 Elasticities e=0.25 $\bar{\varepsilon}$=0.27 $|\varepsilon_i|$=0.4	
I- Optimal Linear Tax Rates								
	Federal	Competition	Federal	Competition	Federal	Competition	Federal	Competition
Rawlsian	0.73	0.68	0.73	0.64	0.73	0.60	0.73	0.57
Highly Redistributive	0.65	0.59	0.65	0.54	0.65	0.50	0.65	0.47
Mod. Redistributive	0.48	0.42	0.48	0.37	0.48	0.33	0.48	0.30
II- Welfare effect of Tax Competition (%)								
	Bottom 10	Bottom 50	Bottom 10	Bottom 50	Bottom 10	Bottom 50	Bottom 10	Bottom 50
Rawlsian	-2.7	-0.7	-6.0	-1.9	-10.3	-4.0	-12.8	-5.2
Highly Redistributive	-5.4	-2.5	-10.7	-5.3	-15.7	-7.9	-20.1	-10.5
Mod. Redistributive	-10.2	-5.7	-18.6	-10.5	-25.7	-14.5	-31.7	-18.0

Notes: This Table summarizes the effects of tax competition on optimal tax rates and welfare. All results are formally derived and discussed in Muñoz [2019b]. The optimal linear tax rates are computed following the formulas presented in Proposition 3 and Proposition x4 of the full-text article. The elasticity e_i is the elasticity of type-i individuals gross earnings y_i with respect to the net-of-tax rate $1 - \tau$. The elasticity ε_i is the elasticity of the number of type-i residents N_i with respect to the net-of-tax rate $1 - \tau$. As described with more details in the text, ε_i is negative for all individuals who have an income level that is lower than the average income in the economy (break-even point). For the calibrations presented in the Table above, the migration responses to taxation are assumed to be constant across all earnings levels, that is to say of similar absolute value, meaning that all individuals in the population have the same migration response to an increase of their consumption through a change in taxes. The parameter e is the income weighted average labour supply elasticity $\sum_i ((N_i y_i)/Y) \times e_i$ and the parameter $\bar{\varepsilon}$ is the combination of the income weighted and population weighted average mobility elasticity $\bar{\varepsilon} = \sum_i ((N_i y_i)/Y) \times \varepsilon_i - \sum_i (N_i/N) \times \varepsilon_i$. The average welfare weight $\bar{g}$ captures the redistributive preferences of the government. The moderately redistributive government values the welfare of individuals in the bottom fifty percent two times more than the welfare of individuals in the other deciles with a corresponding $\bar{g}$=0.77. The highly redistributive government values the welfare of individuals in the bottom fifty percent five times more than the welfare of other deciles with a corresponding $\bar{g}$=0.55. The Ralwsian government only values the welfare of individuals in the bottom fifty percent. The welfare of each individual is computed using the utility specification $u_i = (1 - \tau)y_i + T_0 - 1/(1 + 1/e_i) \times l_i^{1+1/e}$. Pre-tax earnings are endogeneously determined and follow the first order condition of the individual $y_i = w_i^{1+e}(1 - \tau)^e$ using an exogenous distribution of skills for w_i calibrated using the current distribution of French labour earnings combined with a current linear tax rate of 50 percent. The welfare effect of tax competition is the variation in percentage of individuals' welfare from a federal union to a competition union. A negative welfare variation means that individuals would be better off in a federal union.

The World Inequality Lab

The World Inequality Lab aims to promote research on global inequality dynamics. Its core mission is to maintain and expand the World Inequality Database. It also produces inequality reports and working papers addressing substantive and methodological issues. The Lab regroups about twenty research fellows, research assistants and project officers based at the Paris School of Economics. It is supervised by an executive committee composed of 5 co-directors. The World Inequality Lab works in close coordination with the large international network (over one hundred researchers covering nearly seventy countries) contributing to the database.