The standard neo-classical view on tax competition
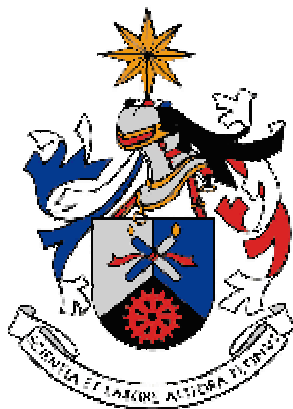# A diagrammatic survey and some deductions for small open economies

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The standard neo-classical view on tax competition
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Abstract:
This paper presents a diagrammatic survey of the standard neo-classical theory of tax competition for foreign direct investment and tax coordination between countries. It has four aims: to give a detailed view of the main theoretical and empirical results; to extract from it some general deductions for small and less developed open economies; to discuss different angles to improve the existing literature; and to put these in the context of fiscal policy in the European Union. It argues that eventual benefits brought by corporate tax harmonisation in the EU are not sufficient to compensate the risk of doing harm to small and relatively poor economies. Further research on equity issues is therefore needed before proceeding to harmonisation.

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1 -Introduction

For almost 20 years a huge amount of economic literature on tax competition has been published. These include both a neo-classical and a public choice approach. We will focus here on the standard neo-classical approach on capital tax competition, with an emphasis on the competition for foreign corporate investment. Two clarifications should be made in the first place. First, fiscal competition works through tax rates or other types of fiscal instruments. Overall, the literature is focused on two main fiscal policy tools: on the revenue side tax rates or tax burden (where subsidies and different types of tax related benefits are implicitly included) and, on the expenditure side, the level of provision of public goods[1]. The later can be divided in two (Oates, 1995): public inputs (roads, infrastructures, R&D or legal efficiency) and public outputs (schools, hospitals, gardens, housing infrastructures, etc.). The idea of this distinction is to differentiate the beneficiaries of public goods provision. Public inputs are used to further develop economic activity and can be used as a way of attracting corporations while public outputs are final goods to be consumed and are better suited to attract labour.

Thus, a second question is that any factor of production may be object of fiscal competition policies. Theoretically, the three fiscal tools presented above may be used to attract any factor of production. But only capital will be considered here because it is more mobile than labour or any other factor. Some qualifications should be made in the case of capital. Capital can be divided in two types, pure financial or short-term flows, and productive or long-term capital flows, i.e., direct investment between countries or regions. In many occasions economic literature does not differentiate these two types of capital and the results seem to be valid for both cases. In the first case, the net rate of return in any market - bond or currency markets for e.g. - is the main factor explaining capital flows. But this is not going to be the main concern here because it is beyond our purpose in studying corporate tax competition. So a focus on the second type of capital will be the aim. Corporate tax competition has some subtleties of its own. The determinants of foreign investment are not necessarily the same when a corporation chooses a new market and when it chooses the exact location of the investment inside that market (e.g., Devereux and Griffith, 1998, or Billington, 1999). Furthermore, multinational corporations use transfer pricing to "move" profits to jurisdictions with lower levels of taxation and thin capitalization to "transfer" costs (tax deductible interest payments) to high-tax countries. Empirical studies show that foreign investment is sensitive to both tax rates and public inputs (for e.g., Agarwal, 1980, Wheeler and Mody, 1992, or Hines, 1999). So, these two fiscal tools are the ones that governments

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[1] The question of which variable to use is adressed in Wildasin (1988), where it is shown that fiscal competition among a small number of jurisdictions obtains different Nash-equilibria depending on the chosen strategic variable: tax rates or public expenditure levels. However, Wildasin does not show results to be qualitatively different from the literature and for a sufficient large number of jurisdictions the two Nash-equilibria are the same.

are expected to use in order to attract foreign investment[2]. Diagram 1 below shows how the fiscal policy tools are related with factors of production to be attracted.

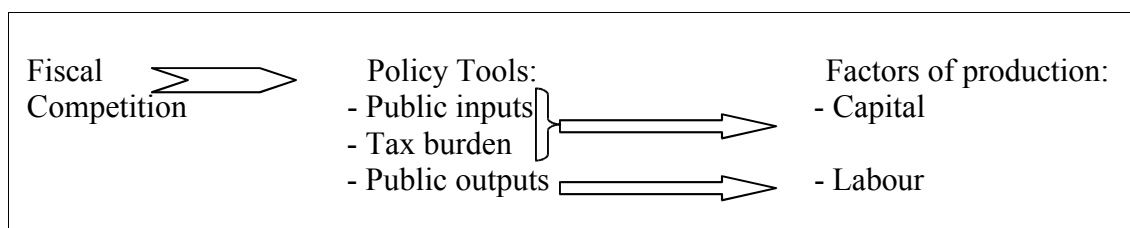|		
Fiscal ⟹ Competition	Policy Tools: - Public inputs - Tax burden ⟹ - Public outputs ⟹	Factors of production: - Capital - Labour

Diagram 1: Policy tools to compete for factors of production

In this survey we will look mainly at the use of tax rates (as a proxy for the tax burden) in competition for foreign corporate investment (capital). Economic literature uses more frequently tax rates than public inputs to explain movements of capital between countries or regions. The reason for this preference seems to be more of practical nature than because of any kind of theoretical argument. The tax rate is a single variable, easier to model and, to some extent, also allows for simpler empirical verifications. But public inputs are also used and with different results[3]. Anyway, the idea of this survey is two fold: To present the main theoretical and empirical findings of the literature and its possible applications to the specific case of the European Union (EU), and within the EU, of the smaller countries; and, simultaneously, to indicate possible ways of development of the literature. This is done with the help of a diagrammatic exposure so that the presentation can be as clear as possible. The application to a specific case and the diagrammatic approach, together with a more detailed presentation of the empirical literature, distinguishes this survey from previous ones, namely Wilson's (1999), Zodrow's (2003) and Wilson and Wildasin's (2004).

The survey will be developed as follows. Section 2 presents the standard neo-classical general argument on tax competition and its related effect of the under provision of public goods and discusses some tax policy related issues. Section 3 introduces the asymmetric aspects of tax competition and details the "small" country case. It proceeds with a look at the welfare effects of tax coordination in section 4 and with an assessment of some aspects of tax policy in "small" open economies, within the context of tax competition and tax coordination, in section 5. Section 6 concludes with an overview of the main conclusions of the literature to the EU and presents some directions of research to be developed.

2 – Corporate tax competition

There is one main argument against fiscal competition when efficiency is the perspective considered. The argument is based on a so-called horizontal "fiscal

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[2] Labour can also be divided in two types, high and low skilled labour. The reasoning here is different because labour, in both cases, is expected to have higher sensitivity to the provision of public outputs than to the other tools. Of course this does not mean that the other tools are not relevant but they are expected to be less so. Public inputs are only partially used in a direct way by labour. Roads may be used but R&D or other infrastrucutures may or may not. Low-skilled labour moves in search of better conditions of life like employment, housing and so on, and high-skilled for international careers, higher pay levels or better conditions of research. Tax rates are not supposed to be an important determinant when the chosen place to live is in another country. There may be some exceptions to this in the case of, for e.g., Monaco residents, but they are not quantitatively significant.

[3] For example, Keen and Marchand (1997) showed that competition for capital with public expenditure results in an underprovision of public goods but, within these, an overprovision of business related public inputs and an underprovision of non-business related public outputs.

externality" that arises from competition for capital[4]. The idea was developed, in the context of interjurisdictional competition among US states, in Oates (1972). It was later formalised by Zodrow and Mieszkowsky (1986) and Wilson (1986). The effect is caused by a change in tax rates in one jurisdiction. If a region increases its tax rate on capital and if capital is a mobile factor, then this change is expected to originate an outflow of capital to other regions with lower tax rates. This is seen by literature as a positive externality because the effects from the change in tax policy for third countries are not considered when policy-makers take their decisions. In the same way, if a country decreases its tax rate, it is expected to originate a negative effect by attracting capital from other regions. Therefore, fiscal competition exists when countries pursue active policies in order to attract capital from its neighbours. Given this competition for capital, countries or other jurisdictions tend to set their tax rates in a level that may be too low to assure an efficient provision of public goods. This is more so if the marginal public revenue from capital taxation is spent on this provision.

2.1 – The effect of tax changes on capital flows

A simple example of tax competition can be shown using the following assumptions: a Cournot-Nash competitive world economy with two "large" countries, where prices are endogenous, has a fixed stock of mobile capital and fixed immobile labour; residents in both countries are identical and in the same number, so they can be normalized to one, and own an equal share of capital; production occurs in a competitive market, is a function of capital and labour and has constant returns to scale; capital (labour "disappears" given the normalization) has a decreasing but positive marginal productivity, i.e., $F'(K) > 0$ and $F''(K) < 0$; a source-based unit tax on capital is the only source of revenue for the provision of a public good; benevolent governments try to maximise residents utility, that is, the consumption of private (X) and public goods (G). Two issues are determinant for this analysis: allocation of capital and the Samuelson rule for the provision of public goods.

Diagram 2 below shows this world economy of two countries, for e.g. Germany and the UK. Each vertical axis of the graph represents each country's marginal productivity of capital (F'(K), Germany left and UK right) and the horizontal axis the fixed stock of capital that is distributed between the two countries. The [rg,ruk] axis represents the net rate of return of capital (r), which is assumed to be the marginal productivity of capital less a unit tax rate (T). The allocation of capital between the two countries is determined by the free movement of capital looking for a higher net rate of return. In the initial equilibrium (point 9) the tax rate in both economies is the same (Tg0 and Tuk0) and capital is half split at K0.

Now consider that Germany tries to attract capital from the UK by lowering its tax rate to Tg1 (the difference between the 2 countries becomes Tuk0 – Tg1, the distance between points C and 9). The economy moves to point 5 because some capital moves from the UK to Germany (from K0 to K1) in searching for a higher net rate of return. The UK will be with a smaller stock of capital due to the decision taken by the German authorities and the world net rate of return rises due to the small tax rate and the ability of Germany to influence the world capital market (it is now represented by the horizontal axis [r'g,r'uk]). There is an inefficient allocation of capital because the

additional units of capital employed in Germany have a lower marginal product. Therefore, the world is worst-off in the inefficiency represented by the triangle [348].

At point 5, and if the nationality of capital's owners is ignored, two different effects can be observed. The production effect, where the German economy is now better off given that is producing more goods and services ([47K1Kg] comparing with [78K0Kg] before) and the UK economy less goods and services ([13K1Kuk] comparing with [18K0Kuk] before). And an income effect where tax revenue decreased and private income increased in both countries. In Germany, tax revenue changed from [89rgr'''g] to [r'g45r''g], and in the UK decreased from [89rukr'''uk] to [235r'uk]. On the other hand, the private income increased in Germany from [78r'''g] to [4r''g7] in the case of labour and from [rg9K0Kg] to [r'g5K1Kg] in the case of capital. But in the UK, labour's private income decreased from [18r'''k] to [123] while capital's increased from [K09rukKuk] to [r'uk5K1Kuk]. Because it is assumed that the production function has constant returns to scale there are no profits in both countries when the economy is in equilibrium. In the overall, the German economy is now better off by [K148K0], at the expense of the UK economy. This is true even if it is assumed that all capital moved to Germany is owned by British investors and that its returns will be repatriated to the UK. The total welfare of the German economy would, in this case, increase only by [4568].
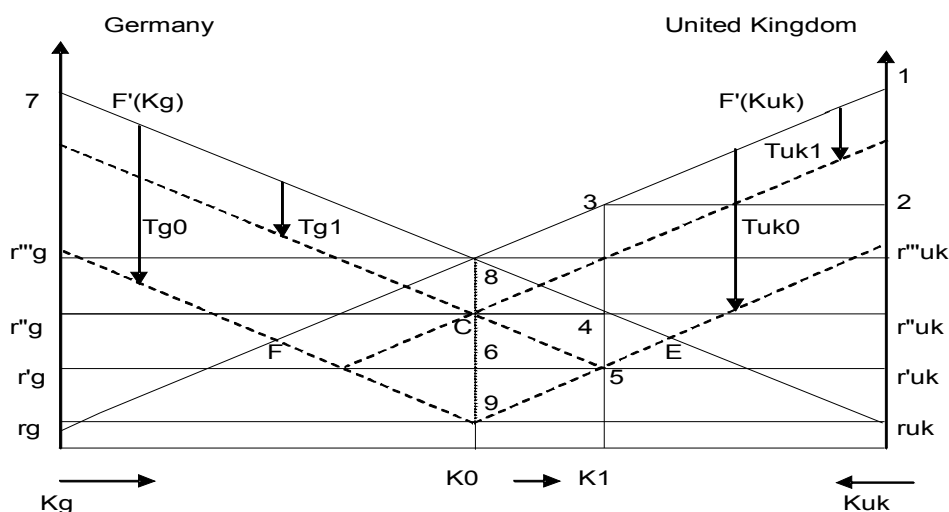

Diagram 2: Efficiency effects of tax competition – two large countries

The tax rate reduction in Germany benefited private producers and both labour and capital owners. The state has a loss of revenue that can limit its redistributive or supplier functions. Because this is a simple model, other effects of investment, such as know-how or transfer of technology, are not considered but they should be added to the gains obtained. In the UK, on the other hand, only capital owners benefited due to the increase in the international rate of return of this factor. A first conclusion from tax competition is that a country, such as Germany, can benefit from lower tax rates through the attraction of investment but these gains are made at the expense of other countries (the UK in this case). However, the gains may be only temporary if there is any type of retaliation from other countries. So, it is not certain that a country would compete through a tax instrument without considering the consequences of its policy.

In fact, and given that this is a Cournot-Nash world, the UK is expected to react to this change by choosing its best response as an utility maximizing tax rate given the rate chosen by Germany. Suppose first that the optimal tax choice for the UK is to lower its tax rate to Tuk1 and a symmetric equilibrium is reached in point C. In this case both

countries have the same stock of capital, tax rate and labour income but the rate of return of capital is now higher than in the initial situation, at [r"g,r"uk]. The only difference to the initial equilibrium is that some public revenue was "transformed" in return to capital. But now suppose that both countries engage in a limitless process of tax competition, where each country tries to attract capital from the other in order to expand its production possibility frontier. Then, the final equilibrium would be in point 8, in Diagram 2, and the net rate of return to capital would have increased to the horizontal axis [r'''g,r'''uk]. The quantity of goods and services produced in each economy would be equal and the same as in the initial equilibrium in point 9. But there would be a "race to the bottom" in tax rates and both the UK and Germany would end down with a zero capital tax rate.

This is the expected result of tax competition frequently referred by the literature and presented, for e.g., in Frenkel et al (1991, p. 206). The difference with the initial situation is that both countries would loose all its tax revenue in "exchange" for capital owners income (which would be now [8r'''gK0Kg] in Germany and [8r'''ukK0Kuk] in the UK). Labour income would be the same as in the initial equilibrium, at point 9 - [78r'''g] in Germany and [18r'''uk] in the UK. Therefore, only capital owners would benefit from tax competition due to the increase in the rate of return. And public revenue would be reduced (or eliminated if the tax on capital is the only source of revenue) limiting the ability of governments to implement their policies.

This is a theoretical result given that empirical data do not show this "race to the bottom" outcome, at least in terms of zero corporate tax revenue from foreign direct investment. But they show that foreign investors are attracted by lower taxes. The number of studies on FDI using US data is abundant (see Hines, 1999, for a survey) but this result is also confirmed for other countries. The Ruding Committee (1992), Devereux and Freeman (1995), using the cost of capital, and Bénassy-Quéré et al (2000), using tax rates, find a significant inverse relation with FDI inflows in some OECD countries. And Gropp and Kostial (2000) present empirical links between FDI in and outflows and corporate tax revenues in a group of 19 OECD countries. According to the literature they find that FDI inflows are sensitive to tax policies in the host countries. De Mooij and Ederveen (2003) present a survey of 25 studies on the impact of corporate taxes on FDI. Although the studies considered present a wide variation of results, they find a median value of -3.3 for the tax rate elasticity and are able to explain some of the different results with the type of capital data and tax rates used. Finally, this is also confirmed in the latest European Tax Survey (European Commission, 2004).

2.2 – The provision of public goods

Now consider that the provision of public goods exclusively depends on the level of corporation taxes. Assume also that the economy was at point 5, with capital in a fixed supply divided between the two countries at K1, and that the German authorities raised the tax rate from Tg1 to Tg0 (in the opposite direction of the example above). The initial excess burdens of taxation were [8F9], in UK's perspective, larger than [4E5], from the point of view of Germany. In "world" terms, however, these excess burdens are not real costs because the total capital supply is fixed and both correspond to tax revenue in the other country. After the tax raising the excess burden in Germany increased to [8E9], but because there was a change in the net rate of return this triangle also corresponds to UK tax revenue, so nothing changes in terms of the "world" social welfare (if, for the moment, the allocation of capital is ignored). But the question is that, from a German point of view, the increase in the tax rate is perceived to cost more (the sum of extra revenue raised with the additional excess burden) than it really costs in world terms

(where only the extra revenue to finance more public goods is a cost). In other words, the marginal cost of the increase in tax rates is perceived to be higher than the marginal benefit. It is this overstatement of the cost, in the presence of fiscal competition, that explains why countries end up with a sub-optimal level of public goods provision where the Samuelson rule is not respected, i.e., in equilibrium, the marginal cost of public funds is lower than the marginal benefit of public goods provision (Wildasin, 1989)[5].

The explanation assumes that capital is in a fixed supply, but this is not the case when the option to save is available. So, a better explanation of the under provision of public goods is the fact that decision makers in each country perceive an elastic reaction of capital to a change in tax rates and, in order to avoid the flow of capital, tend to set sub-optimal tax rates. The inefficiency can be shown from the optimal condition for the provision of public goods, obtained by maximizing the utility of residents of one country with respect to the tax rate subject to the public and private budget constraints and the international capital market condition ($F'(K_i) - T_i = r$, where i is the country considered – Zodrow and Mieszkowsky, 1986):

$$Ug \,/\, Ux = 1 \,/\, [1 + Ek] \qquad\qquad (1)$$

with $Ek = dK\,/\,dT * T\,/\,K$ and $dK\,/\,dT = [1\,/\,F''(K)]$

obtained by totally differentiating the international capital market condition with respect to the tax rate. From this comes:

$$Ek = T\,/\,K * [1\,/\,F''(K)] \to\!\!\!» < 0 \text{ given that } F''(K) < 0 \qquad\qquad (2)$$

$Ug\,/\,Ux$ is the ratio of marginal utilities of public and private goods provision and Ek is the elasticity of the supply of capital to a country with respect to its tax rate. Efficiency is achieved when government sets a tax rate level where the marginal utilities of public and private goods consumption are the same ($Ug\,/\,Ux = 1$) and equal to the marginal cost of public funds (MCPF). The MCPF is represented by the right hand side of equation (1) and depends both on the level of taxation and on the effect of a tax rate change in the stock of capital ($dK\,/\,dT$). As long as Ek is different from zero the utilities obtained from the consumption of an additional unit of public and private goods are also different. Given that Ek is negative, the cost of provision of an additional unit of public good in terms of lost consumption of private goods is higher than 1 and, therefore, equilibrium is obtained with sub-optimal provision of public goods.

This inefficient equilibrium is implicit in Diagram 2, at point C, where the "transformation" of tax revenue in return to capital prevents the utility maximization of consumers. That is, by assuming that the marginal revenue is used on the provision of public goods, the lower tax rate on capital reduces this provision. Then, a coordinated increase of the tax rate in the two countries would improve their welfare. Diagram 3, taken from Wilson (1991), shows more clearly this sub-optimal and the optimal equilibria.

In the diagram, X and G are private and public goods and curves ww' and cc' represent, respectively, the production and the consumption possibility frontier from a single country (UK or Germany) perspective. Per assumption, each unit of output from private

[5] It should be noted that this general result does not stand for all cases (for efficient enhancing tax competition results see Black and Hoyt, 1989, Oates and Schwab, 1991, Razin and Sadka, 1991, Janeba, 1998, and Garcia-Milá and McGuire, 2001). Furthermore, the public choice literature presents a strong argument against tax harmonization (the leviathan hypothesis of Brennan and Buchanan, 1980) based on the opposite result, that is, the overprovision of public goods.

firms can be transformed into one unit of the public good and given that in the Cournot-Nash equilibrium the capital stock does not change, the curve ww' has a slope of −1, which is the marginal rate of transformation. The curve cc' has a higher slope when it crosses ww', as it is shown in equation 1 above ($U_g / U_x > 1$), provoked by a consumption distortion in "favour" of private goods. This is due to the perceived effect of changes in taxation presented above. Therefore, when there is tax competition the equilibrium is inefficient and it is represented by [x*g*] (equivalent to point C in Diagram 2). Here, there is an underprovision of public goods in relation to the optimal point, O, where an indifference curve with higher utility is tangential to the production possibility frontier. Cleary, both countries would be better off if they move to O by raising its tax rates in a coordinated way and by eliminating the consumption distortion.
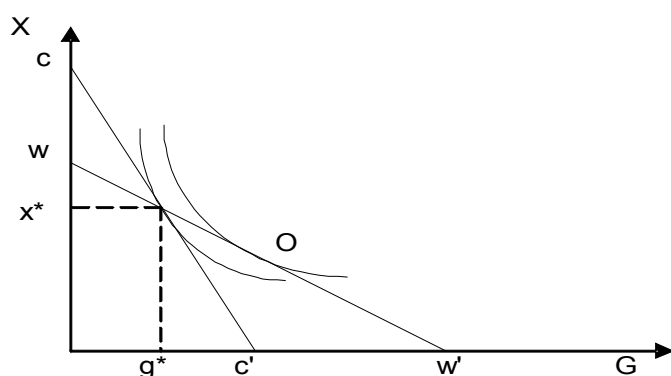

Diagram 3: Sub-optimal and optimal equilibria

So, if there is tax harmonisation capital flows are not induced, the misallocation of capital does not arise and there is no a wrong perception about the effect of tax changes. In Diagram 2 efficiency is achieved whenever the German and the UK tax rates are equal, from zero to the maximum possible capital tax rate, because the excess tax burdens are not relevant from a world perspective given that the total tax base is fixed and the common tax is levied in a non-distortionary way. However, in order to have an efficient provision of public goods it is needed a certain amount of tax revenue (dependant on population preferences), and as long as the tax rate increases there is also a reduction in the consumption of private goods (through the owners of capital given its lower after tax rate of return). So, the optimal tax rate will depend on the utility function of residents in each country and their desired quantity of public and private goods. Tax revenue should be sufficient to provide the optimal quantity of public goods and only on that level the equilibrium is efficient. In Diagram 3 this is in point O, where both the UK and Germany would be located in a superior indifference curve.

This is, from a neo-classical perspective, the main theoretical critic against tax competition and, simultaneously, the main argument for some type of tax coordination between countries (the issue of policy coordination among countries will be developed below). The above example of inefficient equilibrium with a finite (i.e., "large" countries) number of regions was presented in Wildasin (1988). Zodrow and Miezkowsky (1986) and Wilson (1986) had presented the same result for an infinite number of "small" regions or countries. Hoyt (1991) showed that the bigger is the number of countries in the world economy, the greater is the underprovision of public goods and the lower is the utility in equilibrium.

But on the empirical front the evidence is not conclusive on the relationship between tax competition and the under provision of public goods. This relation has been addressed

through the effect of capital mobility on fiscal policies in the context of the globalization of the economic activity. Quinn (1997) finds a positive relation between increased financial liberalization and government expenditure while Garrett (1995), Rodrik (1997) and Garrett and Mitchell (2001) find a negative one. The reason for this opposite outcome might be explained by methodological issues, namely that proxies are not accurate, or by the existence of other sources of taxation (see 2.3 below).

2.3 - Some tax policy issues

The theoretical results presented above are based on several assumptions. The standard tax competition model was first presented in the context of local tax competition in the USA, where jurisdictions usually rely mainly on property taxation to provide public goods. But this does not happen in a country where other sources of taxation are available. Countries can rely also on several types of labour and consumption taxes and may even disregard corporate taxation. Thus, the first policy issue is the possibility of governments to use several tax instruments.

Consider that a single-rate labour tax is added to the corporate tax and labour is assumed to be immobile and its supply fixed. The labour tax acts in a lump sum way and is, therefore, non-distortionary. When two jurisdictions engage in tax competition for mobile capital the outcome turns out to be quite different than the one presented above. Both countries are supposed to end up with a zero corporate tax rate, where the capital flows stop and an optimal provision of public goods is totally financed by the labour tax. Or, in a different way, when a lump sum tax on residents is available jurisdictions no longer need to tax corporations. This result, presented in Frenkel et al (1991), is optimal in terms of tax policy from a single country perspective.

However, it is based on a strong assumption in what concerns the supply of labour[6]. If residents of a country may choose between labour and leisure or if labour is mobile, its supply is no longer fixed. This means that when the labour tax bears all the burden of public goods provision, because the corporate tax rate is eliminated due to tax competition, the fiscal externality still exists and the fiscal policy is no longer optimal from a single country's perspective. The reason, exposed by Bucovetsky and Wilson (1991), is that when the labour tax is increased in a country to compensate a zero tax rate on capital and the distortion disappears from the capital market, there is still an outflow of capital and its respective fiscal effect because both the labour supply and, consequently, the demand for capital in that country are reduced. Labour supply is reduced due to the higher labour tax, meaning that some residents either choose to stay out of work or move abroad. And given this reduction in the use of labour, the economy demands less capital in order to maintain the initial relative levels in the use of factors of production (assuming no technological or production changes). This reduction in the demand of capital maintains the fiscal externality because it provokes a flow of capital to other countries and due to the government's perception of this outflow the labour tax will also be sub-optimal in equilibrium[7]. In other words, if marginal tax revenue is used for the provision of public goods, this provision will still be inefficient.

In conclusion, the "replacement" of a corporate tax by a labour tax does not avoid the existence of a fiscal externality. The difference, in this case, is that the fiscal effect does not arise from a change in the corporate tax rate but from a distortion in the labour market arising from the labour-leisure choice and/or labour mobility. But it should be

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[6] It also ignores the different size of countries. This issue will be adressed in the next section.

[7] Bucovetsky and Wilson (1991) also show that a coordinated increase of one of the tax rates (on labour or capital) by all countries would be Pareto-improving. This is because the international rate of return on capital would fall, raising wages and the labour supply and, consequently, welfare.

questioned if, in this case, there is a change in the size of the externality. First, given that labour cannot be assumed to be fixed even if its mobility is lower than capital, it is straightforward to conclude that the higher the mobility of labour (to move to a "leisure" status or abroad) the higher the distortionarity arisen from a labour tax and the higher the externality from tax competition. And second, because the government's perception of a capital outflow is not as evident as in the standard case, where other tax options are not available, and because changes in production technologies may increase the demand for capital (given the higher cost of labour), the fiscal effect originated by a distortion in the labour market seems to be of a lower size than that of the single-tax competition model. However, doubts about the absolute size and the real importance of the externality remain. Finally, this conclusion is also valid for consumption taxes[8] but cannot be applied to a lump sum tax on residents, where distortions are absent. But this type of tax is very difficult to implement due to the asymmetric information existing between individuals and tax authorities and, furthermore, it is regressive by nature.

A second issue concerning fiscal policy is that of the tax regime[9]. In theory, both source and residence based corporate taxation can be used by governments. In the first case only the income earned within a jurisdiction is taxed, while in the residence regime tax is levied on a resident independently of the place where the income is obtained. Tax competition literature usually assumes that the corporate tax regime is a source based one and this distorts investment location decisions because it provides an incentive for capital owners to invest abroad, where income is taxed with a different rate[10]. Thus, from an optimal tax theory perspective a residence-based tax on capital should be adopted. This is derived from Diamond and Mirrlees (1971), where is stated that it is desirable to have aggregate production efficiency in the presence of optimal taxation. This implies that the available resources should be used in a way that maximizes output. And this happens when the marginal rate of substitution between two factors of production is the same for all investors or firms. In the presence of costless freely mobile capital this means that corporate taxes should be the same independently of its location or, in other words, Diamond and Mirrlees "refused" a source based regime, because it is non-optimal, and advocated a residence-based tax on capital[11].

If residence-based taxation is used, then single-rate taxation does not provoke misallocation of capital because it would be taxed in the same way independently of its location. In other words, there would be no extra-market incentive for capital to move abroad and the outcome would be efficient given taxes available (Razin and Sadka, 1991).

When governments are allowed to use together a source based and a residence based capital tax on investment and savings (this one replacing a labour tax - Bucovetsky and Wilson, 1991), the equilibrium is efficient given the tax instruments available. This is because there is no distortion in the labour market and in the capital market. The residence-based tax "disincentives" capital to move abroad because there is no tax rate advantage. The same efficient result can be derived from Gordon (1986) when a residence-based capital tax and a wage tax are used. Therefore, the absence of a residence based tax, by allowing an "incentive" to the flow of capital, explains the

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[8] Gordon (1986) presents a two-period model where labour and savings are formalized as commodities and where it is based the work of Bucovetsky and Wilson (1991).

[9] See Giovannini (1990) and Keen (1993) for a detailed discussion.

[10] The source based tax regime may be, in some situations, a good way to tax capital. This seems to be the case of the taxation of foreign-owned rents, where the tax is not only non-distortive but the burden falls on non-residents. In the case of FDI, and if one believes that its returns have always a "rent" component due to the specific advantages of the investing company and ignores an eventual retaliation from other countries, a source based tax may be a good option (see below section 5.1).

[11] Mintz and Tulkens (1996) show that a pure residence-based system can achieve a world fiscal optimum.

existence of a fiscal externality to other countries. Or in other words, residence based taxation allows for efficiency because it "denies" the existence of fiscal competition.

But the problem lies with the ability to implement residence based taxation. A residence based corporate tax is difficult to implement because it demands a close and hard-working cooperation among countries in the exchange of information about the income obtained by non-residents. Furthermore, the country where a non-resident obtains income is not able to tax it and has an incentive to hide information or to cheat in order to keep investment within its boundaries. For these reasons it may be hard to achieve the level of cooperation needed and, in case of any effort of coordination among governments, it seems easier to harmonize tax rates instead of bureaucratic procedures.

However, these taxes are not implemented in the same way in all countries when the problem of double taxation of foreign profits arises. Suppose that a company wants to invest abroad. In this case, both the home country (where the head office is located) and the host country (where the new investment will be located) tax rates are relevant because profits are always taxed in the country where they are made (the source based system) and the parent company will want to repatriate retained profits somewhere in the future. Therefore, the system of taxation used by the home country of the investor may make a difference. There are two main systems: tax exemption and tax credit. Both systems aim to avoid double taxation of foreign profits.

The tax exemption system is a source based one and states that profits obtained abroad are not taxed in the home country. This is the system existing in most of the EU countries and is implemented through bilateral tax treaties. Tax credit countries (USA, UK and Ireland, among others), on the other hand, allow for the deduction of taxes paid abroad in the home tax bill, where foreign profits are included when repatriated[12]. There is a limit for these deductions and, usually, the amount deducted can never be higher than the home tax liability. In practice, if a company does not have profits at home it is less keen to repatriate profits from abroad because the correspondent tax payments cannot be deducted. This is permitted by the use of a tax deferral, where profits are only taxed in the home country when repatriated. So, companies tend to repatriate profits to their home country when they can eliminate totally or partially the home tax payments.

Table 1 - Tax competition and types of taxation
(Mobile capital and immobile labour)

Taxes ↓| Taxes →	Source-based capital tax	Residence-based capital tax	Labour tax
Source-based capital tax	Inefficient (Oates, 1972, Zodrow and Mieszkowsky, 1986, Wilson, 1986).	Efficient, given taxes available (Bucovetsky and Wilson, 1991)	Inefficient, if labour supply is not fixed (Bucovetsky and Wilson, 1991)
Residence-based capital tax		Efficient, given taxes available (Razin and Sadka, 1991)	Efficient, given taxes available (Gordon, 1986)
Labour tax			Inefficient, if labour supply is not fixed (Bucovetsky and Wilson, 1991)

In practical terms tax credit works as a mix of a residence based system, because companies pay the home country tax rate independently of the location of their investments, and a source based one, given that it also exempts (at least partially) companies from paying taxes on foreign profits because the amount paid to the host country tax authorities can be deducted in the home tax bill. But this is not a pure

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[12] The system does not work exactly in the same way in all countries but it allows for general conclusions.

system because there are two different situations: when the host country has a higher tax rate than the home country or the other way around. In the first case companies pay the entire tax amount there and deduct at home only the amount that corresponds to the home tax rate. In net terms they pay the host tax country and it works as a source based tax. But if the rate abroad is lower then all the taxes paid are deductible and the company has to pay at home the difference in the tax rates. Therefore it works as a residence based system[13].

Whether this difference in the system of taxation used by the home country of the investor is important or not as an explanation of tax competition or capital flows is not certain. The empirical studies on foreign direct investment that addressed this issue are not conclusive[14]. Table 1, above, presents a summary of the results obtained by the literature in terms of efficiency when different sources of taxation are available.

3 – "Large" and "small" countries

In the real world countries have different sizes and, in the EU, this can be easily seen by a comparison of Luxembourg with Germany, the smallest and the biggest country. Different country sizes means asymmetric fiscal competition, where decisions in each country have different economic impacts.

3.1 – Differences between "large" and "small" countries

Literature usually divides countries in "large" and "small". A "large" country and the impact of its decisions can be characterized in the following manner:
a) Higher number of residents
b) Able to change the international rate of return on capital
c) Able to engage in strategic competition
d) Faces a finite elastic supply of capital with respect to its capital tax rate

A "small" country, on the other hand, does not have these characteristics because it takes the international rate of return as given and faces a much more elastic supply of capital. Theoretically, the smaller the country in relation to the rest of the world the higher the elasticity it faces. In an extreme case, it faces an infinite elastic supply of capital. Literature refers to asymmetric fiscal competition when countries differ in the number of residents (Wilson, 1991, and Bucovetsky, 1991). So, a "large" country has more residents than a "small" one and, given this difference, the capital-labour ratio becomes a determinant variable in fiscal competition.

To see this consider a world economy of two countries where the UK is a "large" country with a share of total population Suk higher than the share Sp of Portugal, a "small" country. This economy works in the same way of section 1 above except that Kuk and Kp are the capital-labour ratios for both countries and F(Kuk) and F(Kp) represent the output produced per worker when the capital-labour ratio is Kuk and Kp, respectively for the UK and Portugal. Consider also that residents use private income

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[13] In this case the host country has an incentive to raise its tax rate on profits in order to "capture" fiscal revenue that, otherwise, goes to the home country (see section 4.1 below).

[14] Both Slemrod (1990) and Auerbach and Hassett (1993) do not find significant empirical differences between the two systems of taxation in the determination of FDI flows. However, Swenson (1994), looking at FDI inflows to the US in 18 industries, and Hines (1996), looking at the distribution of foreign investments across US states, find that corporations from countries with tax credit schemes are less likely to invest in places with lower levels of taxation.

only to buy private goods and that public income from the tax on capital is exclusively used to provide public goods.

The difference in size translates into the fact that decision makers in the UK have a perception of capital being less elastic in reaction to a change in tax rates in comparison with the Portuguese perception. This can be seen from the expression of the variation in the capital-labour ratio with respect to a tax rate change (Bucovetsky, 1991):

$$dKi / dTi = Sj / [Sp * F''(Kuk) + Suk * F''(Kp)] \tag{3}$$

Where i is one country and j the other country. Therefore, the elasticity of the supply of capital per capita with respect to the tax rate for both countries is (Ek(p) and Ek(uk) for Portugal and the UK, respectively[15]):

$$Ek\ (p) = dKp / dTp * Tp / Kp =$$
$$= Suk * Tp / \{Kp * [Sp * F''(Kuk) + Suk * F''(Kp)]\} \tag{4}$$

$$Ek\ (uk) = dKuk / dTuk * Tuk / Kuk =$$
$$= Sp * Tuk / \{Kuk * [Sp * F''(Kuk) + Suk * F''(Kp)]\} \tag{5}$$

If Kp = Kuk and Tp = Tuk then,   Ek (p) > Ek (uk) given that Suk > Sp

Therefore, due to the difference in size countries have a different elasticity of capital to its rate of return, and indirectly to tax rates, being the elasticity of the Portuguese economy higher than the UK 's. And due to this difference in the elasticity, countries are expected to have different tax rates in equilibrium in a tax competition scenario, or a different provision of public goods. This equilibrium is not efficient given the misallocation of capital and the under provision of public goods in both countries, if it is assumed that the marginal tax revenue is to be spent in this provision[16].

The difference between the two countries can also be seen from a different perspective. If the Portuguese authorities lower its tax rate, a smaller amount of incoming capital in absolute terms is needed in order to equalize the net rate of return with the rest of the world than if the same tax rate reduction happens in the UK. The reason is the small size of the Portuguese economy. In the same way, if the Portuguese authorities raise the tax rate a smaller amount of outgoing capital is needed in order to equalize the net rate of return in the Portuguese economy with the rest of the world. However, note that here the variable K is the capital-labour ratio. So, given the differences in the elasticity, in both cases the Portuguese economy would have a relatively higher entry or exit of capital per capita than the UK economy. In absolute terms, and with the same tax rate change, more capital is supposed to flow in the case of a tax change in the UK because it is a bigger economy. But in relation to the size of the economy, more capital per capita is supposed to flow in the case of Portugal (as Diagram 4 below shows). So, the fact that elasticity of capital is higher in the "small" country explains why the tax competition literature presents it with a lower tax rate in equilibrium.

Diagram 4 shows a comparison of the effects of an equal reduction in tax rates between a "large" and a "small" country. The same diagram represents two different and

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[15] The elasticity for the UK is obtained by totally diferentiating the international capital market condition F'(Kuk) – Tuk = F'([Kª - Suk*Kuk]/Sp) – Tp with respect to Tuk where Kª = Suk*Kuk + Sp*Kp is the world capital-labour ratio. The same applies to Portugal.

[16] The UK has an additional incentive, besides the elasticity, to underprovide public goods. The reason is that it is a capital exporter (given its higher tax rate) and this can be seen by the fact that an increase in the UK's tax rate lowers the world rate of return on capital and diminishes the income of UK capital holders.

independent situations, that of Portugal and the UK. It is assumed that Portugal is sufficiently "small" in order to maintain unchanged both the world net rate of return and the marginal productivity of capital per unit of labour in the UK. In other words, Portugal faces a perfectly elastic supply of capital. This is a strict assumption because in a two-country world a small country is expected to have some influence on international prices. However, it simplifies the explanation and the conclusions may be extended to an n-countries world. The UK, on the other hand, is able to change the world net rate of return and, due to the differences in elasticity presented above, faces a less than perfectly elastic supply of capital. So, the main difference between the two countries is the supply of capital that they face (Sprt and Sukg, in the diagram). The demand curves, represented by the marginal productivity of capital per unit of labour, are assumed to be the same for both countries - F'(K).
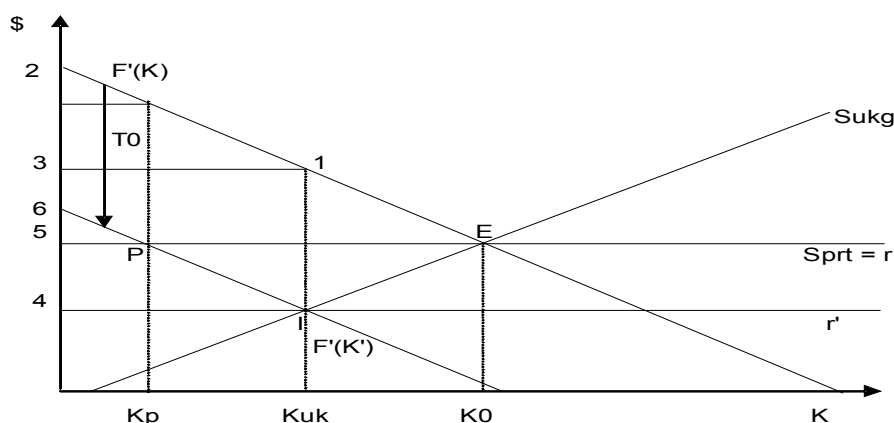

Diagram 4: A comparison between a "large" and a "small" country

Suppose that the initial equilibrium is in point P, in the case of Portugal, and in point I, for the UK, where both countries levy a tax rate of T0 and the demand for capital per capita is represented by F'(K'). Given the differences in the supply the equilibrium must also be differently located. In this case, the stock of capital per unit of labour is Kp and Kuk for Portugal and the UK, respectively. If both countries reduce simultaneously the tax rate to zero the demand curve shifts upward to {F'(K)} and the new equilibrium would be in a common point, E. Here, two differences appear as expected: the capital-labour ratio of UK moved less than in the case of Portugal (Kuk to K0 and Kp to Ko, respectively) and, in the case of the change in UK's tax rate, the world net rate of return moved upwards from r' to r. These are the differences presented above and are explained by the different elasticity of supply. The "small" country has more to gain if it lowers the tax rate than the "large" country because a proportionally higher share of capital per capita would be attracted.

2.2 – The "small" country case

A first difference between the asymmetric and symmetric cases is that given the lower tax rate in Portugal (due to the elasticity of the supply of capital), its capital-labour ratio becomes higher than it would be in the symmetric case presented above due to the more than proportional attraction of capital. In a neo-classical economy this may be translated into a higher productivity of labour or, in other words, a better remuneration of this factor of production than in the symmetric case. The problem with this is that the reduction in the tax rate also means a reduction in the tax revenue and, therefore, in the

provision of public goods. So, as in the symmetric case presented above, the provision of public goods in the "small" country is inefficient in equilibrium. The consequences of this asymmetric equilibrium seems not be qualitatively different of the symmetric example given above. The gains and losses of the "small" country case are similar: capital owners are benefited and the state looses revenue. And as Bucovetsky (1991) and Wilson (1991) show, optimality would be achieved only with a coordinated increase in tax rates or with the merger of the two countries (equivalent to point O in Diagram 3).
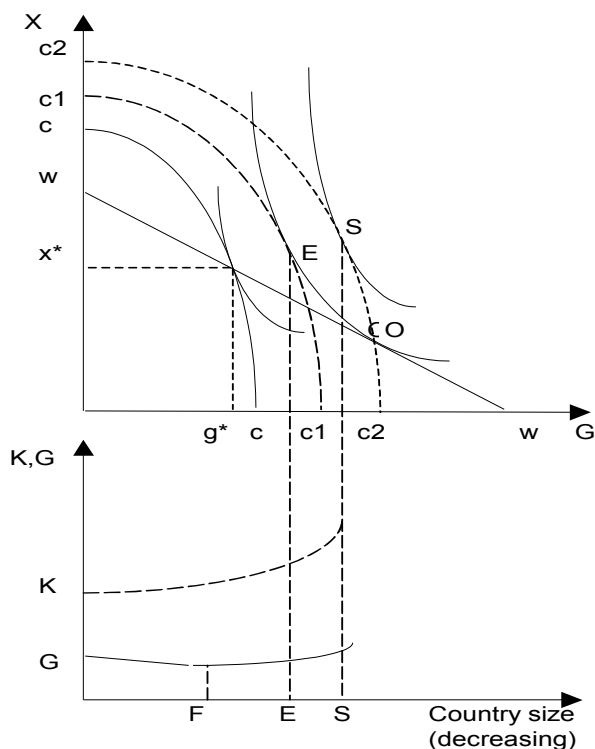

Diagram 5: "Small" country and tax competition versus tax coordination

However, there is a second difference: the advantage of being "small" is further extended by the literature to the fact that residents in the "small" country may be better off even when in comparison with the situation of efficient tax coordination[17]. This happens if the difference in size or in the elasticity between the "small" and the "large" country is big enough. Diagram 5, above, details the "small" country perspective when asymmetric equilibrium is reached both in a tax competition and a coordinated setting. The upper side of the diagram is similar to Diagram 3 but here both the production possibility frontier of the "world" economy [w,w] and the consumption possibility frontier of the "small" country [c,c] are presented on a per capita basis. The upper side of Diagram 5 shows the asymmetric tax competition equilibrium (point [x*,g*]), where public goods are underprovided, together with Point O, that represents the optimum from the world's point of view, that is, when countries coordinate their fiscal policies. It is combined with the lower side where are represented the level of capital per unit of labour (K) and the equilibrium level of public goods provision (G), in the vertical axis, together with a variable size of the "small" country (the horizontal axis represents the dimension of the "small" country decreasing from the origin, i.e., the difference in size with the "large" country is increasing).
The logic behind the lower part of the diagram is that the smaller is the country in relation with the "large" one the "smaller" is the total capital per capita (K) attracted and

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[17] Contrasting the traditional advantage of being "large" presented by the international trade literature.

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the smaller is the equilibrium tax rate that finances public goods (G) provision. But also the larger is, proportionally to the size of the country, the stock of capital per capita attracted. For a better understanding of the influence of these two variables, the private (Xp) and public (Gp) budget constraints for the "small" country are presented below (Bucovetsky, 1991). As it was assumed for simplification, a "small" country does not have influence in the rate of return of capital (r), so this variable should be treated here as a constant. K^a is the world capital-labour ratio.

$$Gp = Tp * Kp \qquad\qquad\qquad (6)$$

$$Xp = [F(Kp) – F'(Kp) * Kp] + r * K^a \qquad\qquad\qquad (7)$$

Equation (6) shows that the level of public goods provision depends both on the tax rate and on the stock of capital. Therefore, Gp in Diagram 5 is initially decreasing due to the decrease in the size of the country and because the proportional increase in the capital per capita stock (Kp) is not sufficient to compensate the lower tax rate (Tp). But this happens only up to a certain point (assumed to be F in the diagram). After this, the K attracted compensates the reduction in T. This can be easily understand by considering that, as it was shown in Diagram 4, a reduction in the tax rate in a very small country attracts a very small amount of K in absolute terms but a proportionally higher amount is needed in order to equalize its rate of return with the world's. Therefore, the smaller the country the higher is, proportionally, the K attracted. In other words, the stock of K in Diagram 4 increases (on a proportional basis) at an accelerating tax rate. And, as it can be seen from equation (7), an increase in the stock of K increases the provision of private goods as long as its marginal productivity is positive. Therefore, to the right of point F both private and public goods provision increases. But the level of provision of public goods in tax competition equilibrium is always inefficient given the higher elasticity of supply that Portugal faces, and the associated perception of the Portuguese authorities. Point E, in Diagram 5, represents the size of the "small" country where its residents are indifferent between tax competition and tax coordination, given that the country will be located in the same indifference curve. A bigger "small" economy (to the left of point E) will be better off after merging or coordinating a tax increase with other countries. But to the right of point E, any smaller economy is better off by having an autonomous fiscal policy (at point S, for example). This is because, at point S, the consumption possibility frontier is higher in Portugal than it would be in a "merged" or "coordinated" world. This can be seen if the curve cc in, in the upper side of the diagram, moves upward to c2c2, up to the point when it crosses the optimal point O.

Therefore, if a country is "small" enough tax competition may be advantageous from its perspective. The questions are how "small" should a country be and how much can it benefit from tax competition. Eggert and Haufler (1998) try to answer these questions by extending the standard model of tax competition. They first conclude that in a simple world of two countries, like the one presented above, the "small" one has a potential large gain. This, depending on the size of the country and on the elasticity of substitution between public and private goods[18], varies between 1.3% and 8.1% of utility increase (which stems from an higher capital-labour ratio and is equivalent to per capita income changes – p.347) when the tax competition scenario is compared with the "coordinated" setting. The sizes of the "small" country considered by the authors are in the range of 25% to 5% of the world population. But these are quite large "small"

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[18] The higher the elasticity the larger is the potential gain for a "small" country. Here, the value of 0.5 assumed for the elasticity is taken from empirical estimations of 0.25-2.0 presented by Whalley and Trela (1986) and Rubinfeld (1987).

countries if it is considered that the United States, for e.g., has about 4.2% of the world population.[19]

They also considered three extensions of the model where the potential large gains for the "small" country are reduced: transaction costs or imperfect capital mobility, multiple countries and multiple tax instruments (Eggert and Haufler, 1998, p.346). In the first case, and with capital flows reduced by 90% in comparison with the situation of perfect capital mobility, the "small" country gains in terms of utility are less than 1%. The reason is that a lower mobility limits the attraction of capital towards the "small" country, diminishing its gain. If the capital flows were only reduced by 60%, the gain in utility would be in the range of 0.6% to 2.6. The question, then, is how immobile is capital and it can be argued that it is not that immobile as the simulations assume (see discussion in section 4 below).

In the same way as above, if more countries are considered the gains are also reduced given that competition to attract capital from the "large" country would be fiercer. The authors show that with two "small" countries and a "large" one competing for capital the benefits may vary between -1.3% (when each "small" country has 25% of the total population) and 5% of increase in utility (when each has 5% of the population) for each "small" country. Again, "small" countries are too large if we look to the real world (for e.g., the UK has 1% of the world population while Portugal has 0.17%).

The third issue is related with the availability of more than one tax instrument. The above analysis was made with the assumption that "small" countries rely on capital taxation to provide public goods. But with a different tax instrument available would the result be different in comparison with the symmetric case? The answer is no given that, as exposed above, in a tax competition setting, even with asymmetric countries, the fiscal externality is still present. Therefore, the "replacement" of a capital tax by a labour or other distortionary tax does not avoid the existence of a fiscal externality and the advantage of being "small" still holds[20]. However, Eggert and Haufler (1998) show that the advantage of being "small" may be substantially reduced or may even disappear if a labor tax is available and the labor-leisure decision is distorted. For an elasticity of substitution between leisure and private good consumption of 0.5 (representing the elasticity of labour supply[21]), the benefit in terms of change of the utility of individuals varies between -0.24% and 0.24%[22]. This is due to the fact that both the "small" and the "large" country are less dependent on capital tax revenue to provide public goods and the effects of tax competition are less important (in other words, the labour tax bears the burden). This reduces the potential gains but it also reduces the inefficiency in the provision of public goods for the "small" country".

Overall, the authors conclude that the simple model presented above overestimates the potential advantage of tax competition for a "small" country and that if the three extensions of the model are considered together the advantage of being "small" becomes unimportant. However, they do not simulate it and, as mentioned above, they considered quite large "small" countries. Simulations for countries of 1%, or even of less size, of the world population seem more appropriate given the real size of the small countries. This may be important even in the case of multiple tax instruments, as Eggert and Haufler (1998) implicitly recognize: «...*with an additional labour tax instrument, the small country's indifference* (between tax competition or coordination) *locus ... only*

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[19] For an higher elasticity, 1.5, the values vary between an utility loss (-0.1%), when the "small" country has 25% of the size of the world, and an utility benefit of almost 9% when its size is 5%.

[20] Wilson (1991) shows that the advantage of being "small" still holds with two tax instruments.

[21] Values from Ballard et al (1985) and Hausman (1985). The higher the elasticity of substitution between leisure and private good consumption the higher the elasticiy of labour supply.

[22] For an elasticity of 1 the benefit varies between -0.4% and 0.8% (Eggert and Haufler, 1998).

depends on the relative size ...». Empirical evidence supports that small countries do benefit from tax competition (Hines, 2004).

Finally, and to conclude this section, there is a further difference between the "large" and the "small" country. For a "large" country, tax competition is never advantageous in efficiency terms (Wilson, 1991). It is always better off with a merger or a coordination of tax policies. The bigger is the country the closer it is to the world optimal equilibrium, at point O in Diagram 5. This is because it looses proportionally less capital in a tax competition setting and it is able to have an optimal provision of public goods in a coordination scenario.

4 – Tax coordination in the world economy

The optimal results obtained by the neo-classical literature on fiscal competition consider the disadvantages of the real world versus the "ideal world", where all countries, independently of their size, would have the same tax rates and corporations would bear the same tax burden. From a neo-classical perspective tax harmonization in the entire world would avoid efficiency losses in the allocation of capital or other factors of production and in the provision of public goods and all countries participating, including "small" ones, would benefit from it. That is, from a "world" or "global" perspective. This result can be shown considering again a world of two countries, Portugal and the UK.

Diagram 6, below, shows Portugal and the United Kingdom represented in a Hamada diagram. In the axis, Tp and Tu represent the tax policy of both countries in what regards their corporate tax rate. It is assumed that the objective of each country is to maximize the welfare of its residents and that this depends on the level of the tax rates in both countries. Rp and Ru represent the reaction functions of each country, that is, the level of each country's tax rate that will give it the maximum welfare given the other country's policy. This a typical Nash-Cournot setting, where U and P are, respectively, the indifference curves for the UK and Portugal and U4 represents a higher welfare to the UK than U1 (a similar logic applies to the P of Portugal).

If countries are competing for corporations is expected a non-cooperative Nash outcome. In the diagram this outcome is represented as **C**, from competition. Suppose that the initial policies of both countries are represented by point **Su** (a point in the dashed UK indifference curve). This point represents a determined level of tax rates for Portugal (T'p, the horizontal line from **Su** to the vertical axis) and for the UK (T'u, the dashed vertical line) and is located on the reaction function of Portugal. That is, given the UK's tax rate Portugal cannot improve its welfare. But the same does not happen with the UK. If the UK policy makers decide to lower the tax rate from T'u to T''u, then its welfare is maximized given Portugal's tax policy and the new outcome will be located in an UK's indifference curve with slightly higher utility (not represented). Portugal, on the other hand, will be in a lower curve and its residents will be worst-off. But now Portugal can improve its situation given UK's tax policy and further changes in the tax policies of the two countries would end in a Nash equilibrium represented by **C**.

It can be easily seen that a cooperative solution would improve the welfare of both countries, in comparison with the non-cooperative outcome. This is represented by the contract curve **Op-Ou**, where all solutions between points **H1** and **H4** are simultaneously preferable for both countries because they would be located in a higher indifference curve. This is the solution presented by the neo-classical literature in what concerns tax competition. If all countries in the world cooperate by harmonizing and increasing their corporate tax rates all would benefit. In this two-countries world, if the outcome were near **H1**, the UK would benefit more than Portugal. But if it were near **H4**, Portugal

would benefit more. The outcome on the contract curve would depend mainly on the bargaining power of each part but the result is valid both for "large" and "small" countries. Therefore, this result can be generalized for a world of many countries (for e.g., Sorensen 2000, 2004).
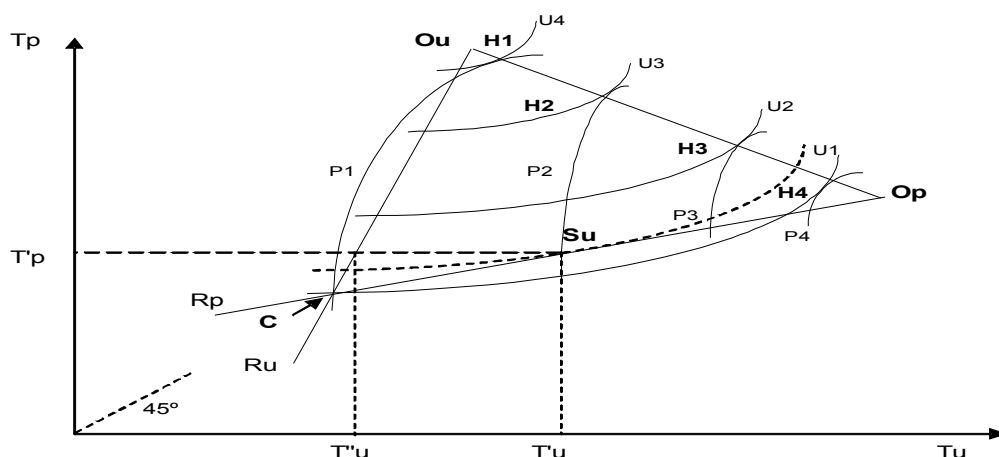

Diagram 6: Tax coordination versus tax competition in the world economy

However, two questions should be raised. First, in spite of the advantages of coordinating taxes all over the world it is very difficult to reach an agreement on tax policy among almost two hundred different countries. Therefore, tax coordination is more feasible for a smaller and closer group of countries, and the EU is the best hypothesis given the level of economic integration already achieved by its members. A question, then, is how important are the gains from tax coordination, that is, what is the size of the inefficiency provoked by tax competition. And how would these gains or losses change with a reduced number of countries participating in the process of tax coordination. Second, although it seems advantageous from a global perspective to have coordinated taxes, the consequences may differ among countries participating in such a process. In other words, and from a single country perspective, some countries would gain and some would loose depending on the initial situation of each one and on the final arrangements. Therefore, it is important to know which countries would probably loose and which would probably benefit from tax coordination.

4.1 – The gains from tax coordination

The size of the gains from coordination was considered in some studies. Wildasin (1989) worked on the Zodrow-Miezkowsky tax competition model for symmetric jurisdictions in the United States and presented a welfare loss from the under provision of public goods with a wide variation - from 0,07% to almost 1.45% of the US GNP (Table 1, DWL column). However, these values depended mainly on the demand elasticity for capital with respect to its gross return and on the demand elasticity for public goods. In both cases the higher the elasticity the larger the size of the inefficiency provoked by capital tax competition. The 1.45% size was obtained with a value of 1.5 in the demand elasticity for capital. But with an elasticity of 1.3 the size of the inefficiency was only 0.45% of the US GNP[23]. Using values more in line with empirical estimations

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[23] Furthermore, these estimates considered the case when local jurisdictions in the USA did not receive any transfers from high level governments and were based on effective property tax rates of 30%. But given that real property tax rates are significantly lower, those values are overestimations of the size of the

of 1 and 0.5[24], respectively for the demand elasticity for capital and public goods, the size of the welfare loss is reduced to 0.2% of GNP.

Parry (2003) further developed Wildasin's estimates by looking at the inefficiency effects in a bloc of regions where the supply of capital is no longer fixed. He found that only under certain circumstances - a sizeable local elasticity of demand for capital with respect to the tax rate (>0.3), a very inelastic bloc supply of capital with respect to its net rate of return and a unitary demand elasticity for public goods - the size of the fiscal externality may reach 11% of capital tax revenue, which, by the author's reference, is never higher than 1% of the regional GDP[25]. But with more reasonable values for the parameters, namely higher capital supply elasticity from the bloc's perspective (1)[26] and a lower demand elasticity of public goods (0.4), the size is reduced to nearly half of that value[27].

Table 2 – Simulation studies: size of the inefficiency or gains from coordination

Study	Key parameters	Size of the inefficiency or gains from global coordination
Wildasin (1989 - Table 1)	Demand elasticity for capital = 1	0.2% GNP
Wildasin (1989 - Table 1)	Demand elasticity for capital = 1.5	1.45% GNP
Parry (2003 - Fig. 4)	Capital supply elasticity = 0	0.5% GDP (EU)
Sorensen (2004 - Table 5)	Revenue to redistribution	0.94% GDP
Sorensen (2004 - Table 5)	Revenue to public goods provision	1.42% GDP

Using a different and much more complex general equilibrium model, Sorensen (2000, 2004) uses an egalitarian welfare function to estimate the gains from tax coordination when marginal public revenue is spent on changes in the distribution of income. If there is a global (world) coordination of the tax policy among symmetric countries the benefit is a maximum of almost 1% of GDP[28]. When allowing for the marginal revenue to be used for the provision of public goods instead of redistribution, he finds that the efficiency gains from an optimal provision of public goods in a global coordination scenario may rise to almost 1.5% of the initial GDP. Table 2 above summarizes some of the results and it shows that, under the most favourable conditions, the best result of a tax coordination in the world would be a gain of 1,5% of GDP.

But these values arise in an idealistic harmonized world (or autarkic bloc, in the case of Wildasin and Parry). What would be the difference if a group of countries act as first movers and coordinate their tax rates? From a theoretical perspective it is expected that the gains would still be positive but smaller than in the "global" case. This can be seen when looking again at diagram 6 above. Consider now that diagram 6 represents a representative country from two different groups, U for the EU members that will harmonize their tax rates and P for the part of the world that will keep their fiscal autonomy. It is assumed that the P countries have the same tax policy, just for the simplification of the presentation. The U members will act as a Stackelberg leader by moving first and coordinate its tax policy while the rest of the world, the "followers",

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externality in this specific case.

[24] Rubinfeld (1987).

[25] Given that the corporate tax is less than 4% of GDP in the EU, on average, the externality would be around 0.5% of GDP.

[26] An higher capital supply elasticity increases tax competition between blocs but lowers it between regions within a bloc. Parry (2003) studies the effects of tax harmonization within the bloc.

[27] And if a Leviathan behaviour or a strategic government behaviour (as a "large" region, able to influence the net return on capital) are included in the model, the size of the externality significantly diminishes and becomes unimportant (i.e., less than 5% of capital tax revenue in the author's definition).

[28] Sorensen (2004). But this increase in terms of welfare from an higher level of redistribution is obtained with a loss of the aggregate income (GDP) of 5%.

can only react to this move. Given the reaction of the other countries, Rp, the best that the "coordinated" countries can achieve by moving first is to define a determined level of corporate tax T'u, as represented by the vertical dotted line, and to be located at the higher indifference curve (the dashed one) tangent to Rp, in point **Su**. The P members cannot react without lowering its welfare and, as may be seen in the diagram, this is an equilibrium solution that stands between the optimal global coordination and the non-cooperative Nash equilibrium. It is superior to the competitive outcome but inferior to the all-countries coordinated outcome. The P countries would benefit more than the coordinated countries, given that this coordination would be made at a higher tax rate than the competitive equilibrium.

Konrad and Schjelderup (1999) use a different approach and show that regional coordination among a sub-set of countries may benefit all countries in the world if capital income taxes are strategic complements. That is, in a Bertrand-type equilibrium, when the remaining countries react to an increase of the coordinated countries tax rate by rising their own tax rates. This happens if the remaining countries benefit from a higher than the Nash-equilibrium tax rate in the coordinated countries through a lower net cost of capital (the pecuniary externality of DePater and Myers, 1994). An increase in the capital tax rate by the coordinated countries reduces demand for capital and lowers its cost in the international market. Furthermore, it induces the remaining countries to do exactly the same and raise capital tax rates, further lowering the cost of capital. Then, both the coordinated and the remaining countries benefit from an increase in domestic activity and, consequently, a welfare raise.

The Sorensen (2000, 2004) model also compares the results of a global coordination of capital taxation (interest and profits) with those obtained if a coordination is made only by a few countries representing slightly more than half of the world's population and where a minimum source based capital tax rate is imposed. In this later case, when the marginal public revenue is spent on transfers and there is perfect capital mobility, the benefit in welfare for the coordinated countries is less than one-tenth of the one obtained in the global coordination hypothesis, that is, less than 0.1% of GDP. If we accept this reference of one-tenth, then the efficiency gains from regional coordination would be lower than 0.2% of GDP in the case of an optimal provision of public goods (as mentioned above, the estimated gains of global coordination are less than 1.5% of GDP – Table 2). And this value may be an overestimation of the potential gains for a "coordinated" EU given that the model weights the population of the potential "union" well above the real weight of the EU's population in the world's total (53% against 6,3% of the EU 15 countries). As Sorensen (2000) states «...*the welfare gains from regional co-ordination within a subgroup of countries like the EU are likely to be less than 1% of GDP. Indeed, a gain of 0.5% may seem an optimistic estimate.*». Finally, the existence of imperfect capital mobility seems not to alter the conclusions in a substantial way. And the same applies to the existence of asymmetric countries or other changes in the parameters of the model (Tables 5 and 6, Sorensen, 2000). In conclusion, the answer for the first question is that the efficiency gains from global tax coordination may be slightly superior to 1% of GDP, but they tend to become unimportant if the coordination is made only at a regional level.

4.2 – Who benefits and who looses

An answer to the second question was also attempted in different types of simulation studies by measuring welfare or capital flows. When harmonization is made with a level of taxes near the average of the countries involved, the general conclusion in all studies is that countries with higher initial tax rates would benefit (in terms of a rise in its

income) from coordination while countries with lower ones would loose. Small open economies, with a higher supply elasticity of capital, are expected to benefit or loose more than the remaining countries. But there is no evidence of that, or of the opposite, in the studies presented. Fuente and Gardner (1990) estimated the effects of corporate income tax harmonization within the EU, where low-tax countries would raise their effective tax rates while high-tax ones would lower them, and found that general result. They also concluded that, in the overall, the process would be beneficial for the EU if the average value of the effective tax rate of its members decreased after the coordination. This means that the EU would benefit from the attraction of capital from the rest of the world, but at its (rest of the world) expense. However, when capital income taxes are strategic complements both the EU and the rest of the world may benefit of a higher welfare from regional coordination (Konrad and Schjelderup, 1999, simulated in Sorensen, 2000 and 2004) An overview of some simulation results is presented below, at table 3, where countries with lower tax rates loose and those with higher tax rates benefit from coordination.

Table 3 – Simulation studies on tax coordination in the EU

Study	Measuring	Main beneficiaries		Main loosers or gaining less	
		Country	Value	Country	Value
Bénassy-Quéré et al (2000 - Table 10)*	Change in FDI inflows	Spain	29% FDI inflow	Ireland	-45% FDI inflow
Bénassy-Quéré et al (2000 - Table 12)*	Change in FDI inflows	Denmark	63% FDI inflow	Spain	-88% FDI inflow
Sorensen (2000 - Table 5)**	Change in welfare	Nordic countries	0.53% GDP	Continental Europe	0.07% GDP
Gropp and Kostial (2001 - Table 5)***	Net change in FDI flows	Italy	0.87% GDP	Ireland	-1.33% GDP
Sorensen (2004 - Table 4) **	Change in welfare	Nordic countries	0.95% GDP	Continental Europe	0.03% GDP

* Harmonization equal to the average of tax rates. Nominal rates in the 1st row and effective rates in the 2nd, both in 1995.
** Coordination as a minimum capital tax rate endogenously determined by the model.
*** Harmonization equal to the average of statutory tax rates.

The fact that tax harmonisation or some sort of tax coordination scheme implies gainers and losers makes it only conceivable if there is some type of compensation or transfer from the first group to the second. Of course, and as it was shown above, if there is an overall gain for all countries those that are benefited may transfer part of the benefit to those countries who loose by the harmonization. But the snag is that it is very difficult to get an agreement among the parties on the amounts to be transferred. And this may be an insurmountable barrier during the bargaining process. If there is no agreement on the amounts to be transferred between gainers and losers of tax harmonization, those countries within the EU who are expected to benefit can harmonize the corporate tax rates. From an economical point of view, and forgetting for the moment the political implications, there is no obstacle although the benefits are not expected to be large.

5 – Some issues of corporate tax policy in small open economies

From the results presented by the literature it is possible to address some of the issues concerning the corporate tax policy of small countries. First, the effects of capital mobility and corporate tax incidence. Second, the determinants of capital taxes, both the external, where the literature is usually focused, and the internal, which may be at least as important as the former ones. And third, preferences and equity issues in what concerns capital and labour taxation and countries with different levels of development.

5.1 – Capital mobility and the incidence of corporate taxation

It was presented above that there is an external constraint to corporate taxation in "small" open economies when a non-distortionary tax source is available and a source-

based capital tax regime is in place. Under these conditions tax competition is efficient, given taxes available, if capital tax rates are zero (Frenkel et al, 1991, p. 206). The logic is that, in a tax competition setting, if the corporate tax is increased in a "small" country, capital is expected to move to the lower-tax rest of the world. A "small" open economy takes the international rate of return on capital as given. This implies that in order to avoid a distortion in investment location decisions, domestic investment should earn exactly the same rate of return as that of the international capital market. If a tax is levied on capital by a "small" country, its net rate of return is not lowered in the international market in order to avoid that it moves abroad. It is concluded, then, that under tax competition capital should not be taxed in a "small" country that faces an infinite elasticity of supply of capital with respect to its tax rate when there is free mobility and residence-based taxation cannot be implemented.

But the zero tax rate policy may also depend on the incidence of capital taxation and on how do firms adjust if a corporate tax is levied. In the short-run capital is fixed and, therefore, corporations are expected to absorb the cost of taxation. But in the long run it can vary depending on the situation. In the case of a "small" open economy, with perfect capital mobility and perfect product substitutability, capital is expected to support only a small part of the tax burden given the higher elasticity that it faces. That is, part of it would move away due to the positive change in its tax rate. Furthermore, if the remaining corporations do not absorb the total cost of the tax and cannot lower the international rate of return on capital, the probable long-term outcome would be the tax burden to fall on the immobile factors (labour and land through a reduction in wages and land prices) because international prices of both capital and products cannot adjust (Mutti and Grubert, 1985, and Kotlikoff and Summers, 1987). If the assumption of perfect substitution of domestic and foreign products is relaxed then it is also expected a raise in output prices. Finally, if the assumption of perfect capital mobility is relaxed then capital absorbs some of the burden of taxation in the long run. But it is not clear how much will it be absorbed.

If capital only absorbs a small part of the tax burden, then, it seems preferable to tax directly commodities, labour or landowners and avoid the distortion from a source-based capital tax and discouraging inward investment. Thus, from the point of view of optimal taxation it is better to tax the immobile factors of production and avoid a corporate tax, as Frenkel et al (1991) concluded. This is so even accepting that a small country has some, but limited, influence on the international rate of return of capital and that the fiscal externality of tax competition still exists with a zero tax rate (Bucovetsky and Wilson, 1991). Even in this situation, it seems preferable to have a zero corporate tax rate given that the size of the externality is not that important (section 4 above) and the burden is expected to fall on the immobile factors[29].

There is a wide, but not complete, consensus among economists that capital bears less than half of the corporate tax burden (Slemrod, 1995, Fuchs et al, 1997, and Auerbach and Slemrod, 1997). But Gravelled and Smetters (2001), using a general equilibrium model to simulate the incidence of the corporate tax in a "large" open economy, conclude that, for empirically acceptable values in the parameters, domestic capital

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[29] In the case of a "large" country, and given the lower elasticity of capital that it faces, a tax can be levied with a smaller loss of capital. It should also be noticed that in the case of foreign ownership of domestic firms it may be optimal, from a single country perspective, to have a positive source-based capital tax. This happens when economic profits or rents are not fully taxable and there is a minimum revenue requirement by the government (Huizinga and Nielsen, 1997, p.156). In this case, it is advantageous for a "small" country to use the capital tax to transfer income from the foreign owners to domestic consumers. But given the pressure from international tax competition, "small" countries cannot raise tax rates without the risk of provoking a capital flight., at least in the long run.

bears most of the burden of taxation (more than 70% - Tables 2 and 4). And when domestic capital is not heavily burdened, it is foreign capital that "pays" most of the tax and not the immobile factors of production. The authors present three different reasons for a "change" on the burden of taxation from the immobile factors towards capital: a large open economy instead of a small one, imperfect capital mobility and, the main reason, imperfect product substitutability[30]. These three reasons are all barriers to a perfect mobility of capital where the rate of return is supposed to determine its location. A "large" economy has a lower elasticity of supply of capital, as it was seen above, but this is not a question that concerns "small" countries. However, both the imperfect product substitution, which in itself limits capital flows, and capital mobility, should also apply, to some extent, to "small" economies.

So, a key question to corporate tax policy is how mobile is capital in reality? If it is very mobile, as the studies on globalisation and the growth in the international movement of funds seems to indicate, then there is a low incidence of the corporate tax on capital and "immobile" factors bear the burden of taxation. If this is it, then corporate taxes in small countries should be reduced or eliminated in order to avoid their distortions (Table 5, below, shows a higher tendency to reduce corporate tax rates in smaller European countries). If it is not that mobile given the real interest rate differentials across countries, the high correlation between domestic savings and investment and that domestic capital ownership still prevails due to legal and cultural differences between countries (for e.g., see among others Feldstein and Horioka, 1980, and Mishkin, 1984) or due to the fact that investors face asymmetric information across countries (Gordon and Bovenberg, 1996), then corporations should also be taxed in order to avoid an "overcharging" of immobile factors (see section 5.3 below).

It should also be noted that there is an important difference between pure financial flows and corporate investment. The optimality of the zero tax rate under a source-based system assumes that capital is perfectly mobile, but that might be less likely in the case of corporate investment. First, the determinants of foreign direct investment are several (market size, purchasing power, etc.) and not only its net rate of return. For example, Haufler and Wooton (1999) showed that competition for FDI from outside an economic area favour larger countries when internal (within the economic area) transaction costs are lower than external trade barriers. Second, imperfect product substitution may be an important obstacle for perfect capital mobility. For these reasons corporate investment might be much less mobile than pure financial flows and the optimality of the zero tax policy under a source-based system may not be valid.

In conclusion, corporate tax policy should be settled depending on the levels of direct mobility of capital and, indirectly, of international product substitution. Further research on the degree of capital mobility is needed to better understand the effects of tax policy and tax competition. Table 4 shows how capital mobility is related with tax incidence and the size of inefficiency from tax competition[31]. In the case of the EU, where capital mobility has increased in a significant way (no legal restrictions, monetary union, etc.), and is higher that in the rest of the world, simulation studies concluded that the welfare gains from regional coordination would be much lower than 1% of GDP. Therefore, it

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[30] These results are partially confirmed in simulations of tax coordination (Sorensen, 2004, see section 3 above), although it is stated that the size of the inefficiency does not change significantly due to imperfect capital mobility.

[31] Lee (1997) discusses the influence of imperfect capital mobility on tax competition and shows, in a two period model, that with large transaction costs tax competition between symmetric countries may result in under provision of public goods or, under restrictive assumptions, in over provision of public goods.

should be expected that in "small" EU countries tax policy changes in order to lower the burden of capital instead of engaging in a coordination process.

Table 4 – Capital mobility, tax incidence and inefficiency from tax competition

Capital mobility	Tax incidence mainly on:	Size of inefficiency
Higher	Immobile factors	Bigger
Lower	Capital	Smaller

5.2 – Determinants of corporation taxes

The zero corporate tax rate argument has other problems beyond imperfect capital mobility. The first, and an obvious one, is the fact that countries, including "small" open economies, do tax corporate income, although these usually have lower tax rates (e.g., Hines and Rice, 1994, on US foreign direct investment on tax havens). A first set of explanations is the ones provided above: capital mobility is not totally costless due to legal, accounting and cultural barriers and asymmetric information. And all countries in the world have influence in the international capital market, even if in some cases an almost imperceptible one, and would probably retain a fraction of its stock with high capital tax rates.

A second explanation was provided in Gordon (1992), where the existence of capital income tax is possible due to the use of double-taxation conventions. If a capital exporter country is a Stackelberg leader when defines its tax policy and adopts a double-taxation convention, giving a tax credit to its residents' foreign income, capital-importing countries become able to tax capital because non-resident firms and individuals can reduce the equivalent amount of this tax in their tax bill. And because capital imports are now taxed, capital-exporting countries can also levy a tax on capital. Huizinga and Nielsen (1997), on the other hand, explain capital taxation due to the impossibility of completely taxing economic rents and as a way of transfer revenue from foreign owned domestic firms to domestic consumers.

Although all are possible explanations, none of them seems to explain both the high level of statutory corporation tax rates in the EU small countries, as shown in Table 5 below, and, for some countries, the lack of a clear relationship between their size and their statutory tax rates, in accordance with literature predictions (although, on average, small countries present an higher reduction between 1985 and 2001 than large countries). But a few remarks need to be made about this. First, the statutory tax rates presented are, in many cases, top marginal rates. Second, these tax rates hide a wide variety of exemption rules. Therefore, the implicit tax rate, that is the corporate tax revenue as a % of GDP, may be of more help. And here it can be seen that some "small" countries do indeed appear to benefit of some advantage. The clearest example is tiny Luxembourg, where corporate tax revenue in % of GDP is bigger than in any other country. This means that Luxembourg (a well known tax haven in the EU) is able to attract capital even though has a high statutory tax rate. The same can probably be applied to Ireland where the higher growth rate of GDP in the last few years seems to "hide" the equivalent growth in corporate tax revenue.

But other countries like Denmark, Austria, Sweden or Portugal seem not to be getting any advantage of being "small" and they are also not gaining from fiscal coordination. One reason can be that they are not small enough. Table 5 considers "small" a country that has less than 5% of the EU15 population. However, it is not clear from the literature how "small" should a country be in order to benefit from fiscal competition. Eggert and Haufler (1998) simulate for "small" countries with 5% of the world population, where the benefit is unimportant. But this is hardly a "small" country in reality. Germany, the

biggest country in the EU, has around 1.5% of the world population. From Table 5 it may be seen that Luxembourg has 0.1% of the EU population and larger countries such as Sweden or Portugal have around 2.5% of the EU population and 0.2% of the world population. Another reason might be that tax policy is determined by different factors than those predicted by the literature.

Table 5: Population and Tax Rates in the EU 15 countries

Country	Population millions - 2001	Statutory Tax Rates - 1985*	Statutory Tax Rates - 2001*	Variation 1985-2001	Implicit Tax Rates - 2001 **
Germany	82,2	61,7	38,9	-22,8	0,61
UK	59,8	40	30	-10	3,53
France	59,5	50	40	-10	3,44
Italy	57,8	47,8	37	-10,8	3,62
Spain	39,5	33	35	2	2,83
Average of large countries		**46,5**	**36,18**	**-10,32**	**2,81**
The Netherlands	16	42	35	-7	4,09
Greece	10,6	49	n/a	n/a	3,39
Belgium	10,3	45	40,2	-4,8	3,61
Portugal	10	50	35,2	-14,8	3,63
Sweden	8,9	52	28	-24	2,92
Austria	8,1	61,5	34	-27,5	3,13
Denmark	5,3	50	30	-20	3,13
Finland	5,2	57	29	-28	4,9
Ireland ***	3,8	50 / 10	20 / 10	- 30 / 0	3,62
Luxembourg	0,4	45,5	37,5	-8	7,47
Average of small countries		**50,2 / 46,2**	**32,1 / 30,9**	**-18,1 / -15,2**	**3,99**
EU Average	-	**48,9 / 46,3**	**33.5 / 32.8**	**-15,4 / -13,5**	**3,59**
Stand.-deviation	-	**7,3 / 12,1**	**5,4 / 7,4**	**-1,9 / - 4,7**	**1,3**

 * The combined central (flat or top marginal rate) and sub-central rates (except France, 1999, and Italy, 2000)

 Sources: Ruding Report (1992), tables 8.5 and 8.6, and OECD Tax Database (2000-2002).

 ** Corporate tax revenue as a percentage of GDP (OECD Revenue Statistics)

 *** Ireland applied, at the time, a 10% corporate tax rate for manufacturing corporations

So, a different explanation might be that tax competition literature implicitly and wrongly assumes that tax rates are determined only because of external determinants. Corporate tax rates may be established due to internal determinants and the external bit can be far less relevant. So what determines tax rates? The immediate reason is that of the tax base. The tax competition literature assumes that capital tax rates are determined mainly with the concern of attracting factors of production in order to enlarge the production possibility frontier or, at least, to maintain a capital base. However, corporate tax revenues in developed countries were stable in the last 20 years because the effect of a decrease in tax rates was cancelled out by the broadening of the tax base, mostly through a less favorable depreciation regime (Devereux et al, 2002)[32]. This was a way of keeping stable or even to increase the level of revenue obtained from corporate taxation and shows a concern, from governments, to use corporate taxes in order to assure the financing of public expenditure.

However, Slemrod (2004) does not find empirical evidence of a direct relation between the corporate tax rate and the revenue needs of governments. He goes beyond the above-described logic of tax burdens as a determinant of capital flows and looks at domestic influences over the determination of corporate taxation. The idea is to understand if corporate tax changes over the years are also explained by the convergence of domestic determinants. Other type of explanations of the determination of corporate tax rates are considered:

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[32] This means that the tax base is an alternative way of countries to compete over the attraction of investment and it would be expected to become more important if countries harmonize their tax rates. But that is why the EU is currently trying to harmonise tax bases before any attempt of corporate tax rates integration (European Commission, 2001, p. 11).

- Avoids the reclassification of labour income as corporate income in search for a lower tax rate. If the corporate tax were lower, capital income would be transferred to shareholders as dividends or in other way in order to avoid labor income taxation. So, higher corporate tax rates are usually associated with higher top individual tax rates in order to prevent income shifting (Gordon and Slemrod, 2000).
- It is a way of taxing economic profits or rents (Mintz, 1996, Huizinga and Nielsen, 1997).
- For administrative efficiency it is thought to be better to collect tax at the corporate level than at the shareholders'. Therefore, it is expected that corporate income taxes are higher in countries where there are more administrative difficulties in collecting taxes from individuals.
- When government activities result in cost-reduction benefits for corporations, these should pay them through user charges. When these charges cannot be collected directly, the corporation tax may be a good substitute. So, variations in corporate taxation should be associated with cost-reduction benefits from public activities.
- Corporate tax should be higher in countries where the egalitarian sentiment of the population is higher because, in voters' eyes, it is usually associated with tax progressivity. Equity in taxation between labour and capital may be an internal determinant due to pressure from voters (see 5.3 below).
Other reasons such as the corporation tax being a "price" to pay for the limited liability that the shareholders enjoy in the event of bankruptcy, contrary to the non-incorporated businesses, may also be considered. Thus, a better understanding of the internal determinants of corporate tax policy is needed and should be a different direction for the literature. These may be of more importance than the external ones and may help to explain some of the incongruence in the findings of the empirical tax competition literature.

5.3 – Equity and preferences

So far corporate tax policy has been considered mainly from an efficiency point of view. But there is other dimension, that of the equity, that also has an impact on the determination of tax policy. And both the incidence and determinant questions raised above are deeply related with the equity issues of tax competition. Tax competition theory predicts that lower corporate tax rates attract investment but, indirectly, may also hamper the task of redistribution within a country by diminishing the level of revenue (Sinn, 1990). To compensate an eventual loss of corporate tax revenue, and because of the difficulty that governments face in lowering expenses (due to some rigidity or to electoral constraints), there is a need to raise extra revenue from other, less mobile, sources of taxation, such as labour or consumption. In the first case, the redistribution purpose is not affected given the progressivity associated with labour taxation in developed countries. But the same does not apply to consumption taxes. In their usual format, they are regressive in nature.
But there is a problem if the tax burden falls on labour. If labour taxes are chosen to replace corporate taxation there is a danger of provoking unemployment. Section 2 above presented the effects of tax competition in terms of the distribution of income. It was shown that tax competition benefits capital owners and diminishes tax revenue that may be used for redistribution but labour income is not supposed to change. However, this conclusion does not consider that the loss in tax revenue from tax competition has to be replaced by another source. If labour tax rates were raised, corporations would possibly choose to adjust and increase the capital-labour ratio in production, provoking unemployment. This concern was stated by the European Commission (1996) and is

now one of the main arguments for corporate tax harmonization in the EU. There is empirical evidence to support it. Rodrik (1997, Table 4.5), in the context of globalisation, concludes that an increase in economic openness shifts the tax burden from capital to labour. And Davori and Tabellini (2000) provide empirical evidence that an excessively rapid growth in the cost of labour in Europe, due to higher taxes, reduced labour demand and created unemployment.

Empirical evidence also shows that corporate tax revenue have been stable or increasing in the last 35 years, even with the lowering of statutory tax rates. But things may change in the near future. And if that happens due to tax competition, the tax burden should be expected to move from capital to labour income. Table 6 shows that in the last 30 years the increase in tax revenue in % of GDP has been mostly explained by a higher effective labour tax rate.

Table 6: EU tax rates – Evolution per type of tax*
Weighted averages

%	1970	1980	1990	2000
Consumption	24.9	22.6	23.8	25.5
Labour	25.3	32.5	35.4	37.3
Capital	18.5	19.3	21.0	23.3
Corporation	7.4	8.5	9.5	9.7

* Tax revenue as a % of the potential tax base computed from national accounts

Source: Cnossen (2003)

A different, but related, consequence from tax competition would be that if capital is more intensely used in production, due to the higher labour costs, it would also be less productive. This has two effects. First, existent labour becomes better remunerated in relation with capital. Therefore, an increase in fiscal competition may be associated not only with higher unemployment but also with a better remuneration of the employed workforce. If this is true, it seems that both capital and employed labor would gain from tax competition and unemployed labor would loose, strengthening the need for redistributive policies. If the threat of unemployment increases it could also be expected an increase in the number of unionized workers, at least in those sectors more affected by tax competition (Daveri and Tabellini, 2000)[33]. Secondly, in the long term the fall in the marginal productivity of capital diminishes the incentive to invest and to grow. Daveri and Tabellini (2000) also show that higher labour tax rates in the EU, for the period between 1965 and 1995, are related with a reduction of the investment share of output and a growth slowdown.

Thus, it seems that tax competition may, after all, be a subject of equity and not of efficiency (given the small size of the inefficiency provoked) if it limits the amount of money for redistribution that governments have at their disposal, namely to those more needed of support, the unemployed. This applies both to large and small open countries, but especially to the later due to their relatively higher vulnerability to capital mobility. But there are two problems with this argument. First, unemployment may be increasing due to labour market rigidities in the broader context of globalisation, where firms move abroad due to lower production costs, and not because of tax competition[34]. Second,

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[33] In fact, Checchi and Lucifora (2002) show that union density has been decreasing since the 1980's in the European countries. The Nordic countries are the exception.

[34] Fuest and Huber (1999) discuss the effects of unemployment on tax coordination with non-competitive labour markets (where wages are determined via bargaining between unions and firms). In opposition to the standard result of higher welfare arising from a coordinated tax increase in a full employment and competitive labour market setting, they show that, in the presence of unemployment and given the non-competitiveness of the labour market, a coordinated capital or labour tax increase may result in a fall of

lower corporate tax rates are supposed to attract foreign investment, so says the theory, and to create new jobs. Therefore, jobs and not unemployment are supposed to increase. This balance between a higher tax burden on labour and employment creation due to the attraction of FDI is a question that has to be further considered by the literature.

A second equity question concerns the differences in development and preferences between countries. Most of the standard neo-classical literature focus the discussion on the advantages of tax coordination but usually does not address its costs. It states that in order to avoid inefficient redistributive policies due to sub-optimal tax rates and expenditure levels arising from tax competition, benefiting countries or regions may (when some type of tax coordination is not possible) compensate those who loose with a transfer of income or, in the case of a federation, through a subsidy from a higher (federal) level of government that can correct the fiscal externality (Wildasin, 1989).

But the fiscal federalism literature (see Oates, 1999, in a survey) also discusses the benefits of fiscal decentralization and points out to the advantages of an improved alignment between regional preferences and actual public good provision. Corporate tax harmonization may partially prevent different preferences and different needs in terms of budget/fiscal policy. This is important because some countries may be in better shape than others in terms of budget deficit and public debt. And fiscal decentralization allows for an improvement in voter participation and the related accountability of governments[35]. Other potential cost from tax coordination arise from the fact that monetary policy is no longer available as an adjustment tool for asymmetric shocks. Therefore, it seems desirable to minimize any limits to countries' autonomy in terms of fiscal policy (as Cnossen, 1990, strongly supports). However, it can be argued that a full harmonization is not a good solution for the EU but that does not prevent some type of coordination of corporate tax policy, like a minimum rate. Or those countries would adjust after tax coordination so that its preferences and fiscal needs would become similar[36].

A further approach is made by the new economic geography literature when explaining the spatial distribution of economic activity. There are two fundamental differences with the standard neo-classical literature: transaction costs are positive and production has increasing returns to scale. When economic integration, the decrease of transaction costs, "promotes" the agglomeration of economic activity, it also limits the effects of fiscal competition because it allows, through the increasing returns to scale assumption, for the existence of different tax rates in equilibrium. Developed countries, with an higher capital stock per capita and gross rate of return to capital, can have an higher tax rate in equilibrium than the less developed ones because they can tax an industry with increasing returns to scale without provoking a flow of capital and an external effect (Ludema and Wooton, 2000)[37]. Then, welfare consequences of a corporate tax rate harmonization between two countries with different levels of development would be negative to, at least, the less developed nations (Baldwin and Krugman, 2004). The

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labour demand, due to higher wages, where unemployment rises and welfare is reduced. That is, the labour market system prevents an adjustment and provokes unemployment.

[35] A potential further problem in a federal context is that of vertical tax competition, when different levels of government are competing for the same tax base. For e.g., when a hypothetical European government increases the corporate tax rate is, simultaneously, decreasing the fiscal base of the national governments. This means that the ignored effect of an European tax on national revenues provides an incentive to overtaxation because there is a tendency to underestimate the true marginal cost of public funds (see, for example, Keen, 1997).

[36] In line with an argument for the European Monetary Union presented by Frankel and Rose (1997). But is this a good consequence?

[37] Empirical studies confirm that the agglomeration of economic activity is one of the main determinants of FDI (Wheeler and Mody, 1992, or Devereux and Griffith, 1998).

reason is that less developed countries (with weaker agglomeration effects) would lose the tax advantage for attracting companies and industry would tend to concentrate even more in the developed countries[38]. Thus, the existence of transaction costs and increasing returns to scale justifies different tax rates between countries with unequal levels of economic agglomeration[39]. This is the case of the EU, after the enlargement to 25 countries, where the core-periphery pattern seems to be deepened and a reinforcement of the cohesion funds seems to be necessary. But this does not mean that any type of coordination is not desirable and it should not be forgotten that the increasing returns to scale assumption only could be applied to some industries.

Therefore, there seems to be a set of arguments to be considered before any type of tax coordination among countries is arranged. Section 3 above shows that a small open economy may benefit from tax competition although it does not conclude how small should a country be. Then, it can be argued that a small open economy, with a level of development below the average and different preferences over the provision of public goods, may prefer to have a lower corporate tax rate than a large and richer country. This is important both for countries like Portugal and Greece and the new members of the EU. These are, mostly, small and poorer countries in comparison with the average of the EU. And maybe that is why the new EU members have lower corporate tax rates[40].

In what concerns equity issues, tax competition may diminish funds for redistribution within countries or may increase unemployment by overcharging labour with taxes. On the other hand, tax harmonization, or even some type of tax coordination, may hamper any efforts from poorer countries to catch up with those more developed and may create some type of dependency from income transfers if fiscal policies are not tailored to their economies. Both these issues should be more carefully addressed in order to foresee the consequences of tax coordination.

6 – Conclusions

There is a wide theoretical and empirical literature on tax competition that often mixes financial and corporate capital flows and whose findings are not definitive for the design of a fiscal policy in an economic area like the EU. The objective of this survey was to present the literature and to put questions for a better understanding of the effects of tax competition for capital. A few of them were raised and ask for further research, namely on the extension of international capital mobility and product substitution, capital tax incidence, internal and external tax determinants, the effects of fiscal competition on unemployment and a better understanding of the disadvantages of tax coordination within a monetary union.

The findings of the literature are not evident in what concerns a corporate tax policy in the EU. The efficiency arguments for some type of coordination are not that strong given the small size of the inefficiency and the different needs in terms of tax policy between small and large countries. The equity arguments, on the other hand, need to be further researched. Both in the case of the possible negative effects on unemployment of an increasing labour taxation and the different preferences and levels of development of the Member States. Countries are different in size or population, level of development or capital endowments, which means that different policies may be required for each country and this may prevent a closer coordination. For small and relatively poor

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[38] Fumagalli (2000) discusses the welfare effects of subsidy competition for FDI between two countries with different levels of development.

[39] Not only on equity terms but also on efficiency grounds (Ottaviano and van Ypersele, 2002).

[40] All the new EU members, except Malta and the Czech Republic, had, in 2002, a statutory corporation tax rate equal or lower than 25% (Martinez-Serrano and Patterson, 2003).

countries tax harmonization seems to be a bad solution and the EU has now a significant number of them.

In spite of this, the EU political agenda is dominated by huge efforts to limit tax competition and to guarantee some sort of coordination among the Member States (European Commission, 2001). The discussion at the EU level stems now on the practical tools to address fiscal policy, mainly towards multinational companies[41]: strict guidelines for state support for investment; a minimum and maximum level for statutory corporation tax rates (the Ruding Committee, 1992, proposed 30% and 40%, respectively) and common rules for a minimum tax base in the form of Home State Taxation or Common Base Taxation; business Code of Conduct; Formula apportionment where corporation profits is allocated across countries according to the geographical distribution of its activities; European Company Statute that provides the legal base for a European corporation; qualified majority voting in the tax domain; European corporation tax.

The long pursued objective of corporate tax harmonization was not abandoned by the European Commission[42]. As the Ruding Committee advised, «...*the adoption by all Member States of a common system of corporation tax is a desirable long-term objective.*». Given the political sensitivity of the issue and the reluctance of the Member States in sharing decisions on corporate tax policy, the EC tried to get support from the business community by stressing double taxation problems in transfer pricing and exposing the tax compliance costs for cross border activities (European Commission, 2004). Although it is not clear how relevant are these costs in comparison with the domestic ones. Furthermore, an important question, not addressed in this survey, is the need to have a better understanding of the role of taxation in the firms' decision process to invest abroad. Although the tax competition literature presumes that taxes play a decisive role, this is not a consensual finding of the FDI literature and it is not always in accordance with the way businesses seem to operate (see, for e.g., Buch et al, 2005). However, there is a real problem of income shifting when corporations move their profits to low tax places. But this also includes jurisdictions outside the EU and requires a wider coordinated effort. From this survey it is not clear that the best way to avoid these practices in the EU is to harmonise corporation taxes because it can harm small and less developed countries. Therefore, those countries who want to coordinate or harmonise tax rates should be able to do it while the others may remain outside the agreement (a possibility considered by the European Commission, 2001, p.15). And the coordination or harmonisation can be limited to some industries, where scale economies are weak and/or the distortions in competition are relevant (for e.g., the financial sector, where higher distortions in competition were found by the Ruding Committee, 1992).

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[41] A lot of them were already considered by economic literature (see, for e.g, the special edition of International Tax and Public Finance, 10, issue 6, 2003, on tax coordination in the EU)

[42] For a listing of previous attempts see Devereux and Pearson (1989).

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