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Foreign Direct Investment and the Prospects for Tax Co-Ordination in Europe

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SUMMARY

The growing globalisation of OECD economies, associated to the progresses in European integration, tends to increase the mobility of capital and to deepen the pressure on tax policies. On the one hand, tax policies are tied by the Stability pact criteria: the limit imposed on budget deficits leaves little scope for tax rates to decrease. On the other hand, the growing mobility of capital tends to increase the elasticity of tax bases to tax rates, hence reducing the autonomy of governments in increasing taxes.

In this particular context, tax interdependencies are rising between countries and regions. Two issues are of particular concern, and could have different outcomes depending on the way they are tackled. First, countries could engage in an action on tax levels; depending on whether this action is co-operative or not leads to tax harmonisation or tax competition. Second, countries could have to reconsider fiscal schemes, since the growing interdependence of countries tends to dissociate the notions of residence and source of revenue, and rises an incentive for tax evasion (namely, when exemption schemes are applied, profits taxes are paid in the country where the investment is located; investors are therefore incited to locate their affiliates in low tax countries. Conversely, when credit schemes are applied, foreign investors pay their home country taxes, and there is no particular incentive to evade the national tax system).

The issue of fiscal harmonisation is all the more stringent that the scope for tax competition is enhanced with EMU (intra-European exchange rate risk disappears with the euro, which considerably reduces impediments to trade, FDI and labour mobility, and increases the mobility of the tax bases). In the area of corporate taxes however, the scope for competition will depend on the sensitiveness of firms to tax discrepancies across possible locations (for instance, if agglomerations economies are dominant, tax competition would have a negligible impact).

Hence there is a need to assess the importance of taxes in the decision of firms to allocate their activities abroad. This paper provides an econometric analysis of the sensitivity of inward foreign direct investment (FDI), in some OECD countries, to tax rates and to tax regimes. It is shown that inward FDI is negatively affected by a rise in effective as well as nominal corporate tax rates. This result holds, be the fiscal regime (exemption/credit) controlled or not.

These results are used to perform some simulations which allow to quantify the impact on inward FDI of a tax competition and of a change in tax schemes in Europe. It is shown that the generalisation of credit schemes in Europe would reduce inward FDI in our sample of countries, because it would remove the opportunity to evade high tax rates at home, whereas the generalisation of exemption schemes in the EU would increase inward investment. We also highlight some externalities produced by tax changes in Europe on extra-European countries. Turning to a comparison of tax harmonisation versus tax competition and dumping, the simulations highlight the potentially negative externality of tax competition in Europe for the foreign partners of the EU, namely the United States and Japan, who would lose from a non co-operative tax game in Europe.

Keywords : Tax competition, Tax harmonisation, Foreign direct investment, EMU.

JEL Classification : F21, H25, H87

RÉSUMÉ

Avec les progrès de l'intégration européenne et l'internationalisation croissante des économies de l'OCDE, les politiques fiscales sont soumises à une pression croissante : d'une part, les pays de l'Union européenne sont contraints par les critères du pacte de Stabilité, ce qui limite leur capacité à réduire les taux de fiscalité ; d'autre part, la sensibilité des bases fiscales aux taux d'imposition s'accroît, ce qui réduit la marge de manœuvre des pays qui souhaiteraient augmenter leur pression fiscale.

Du fait de cet environnement, les économies et les régions sont de plus en plus interdépendantes en matière de fiscalité, puisque la politique fiscale d'un pays produit des externalités sur ses voisins. Dans ce cadre, deux questions sont particulièrement importantes, et peuvent produire des résultats tout à fait différents selon la manière dont elles seront réglées. Dans le domaine des taux d'imposition, la coopération conduit à l'harmonisation fiscale, l'absence de coopération à la concurrence fiscale. Mais, parallèlement à la question du niveau des taux d'imposition, se pose celle des régimes fiscaux : dans un pays appliquant un système de crédit, les multinationales sont soumises à l'impôt de leur pays d'origine, ce qui limite les incitations à l'évasion fiscale ; au contraire, un système d'exemption permet aux filiales de payer l'impôt dans le pays où elles sont implantées, ce qui peut offrir la possibilité d'exploiter des écarts de fiscalité.

Le problème de la concurrence fiscale est d'autant plus aigu que l'UEM accroît encore les possibilités de concurrence fiscale : avec l'euro, le risque de change intra-européen disparaît, et avec lui certains obstacles au commerce, à l'investissement direct ou à la mobilité du travail, ce qui augmente encore la mobilité des bases fiscales. Le résultat d'une concurrence ou d'une harmonisation fiscale pour la localisation des activités en Europe devrait dépendre de la sensibilité des firmes aux écarts de fiscalité entre les localisations possibles (ainsi, si les économies d'agglomération dominent, la concurrence fiscale pourrait avoir un impact négligeable).

Il est donc essentiel de mesurer l'influence de la fiscalité dans les décisions de localisation des firmes. Nous proposons ici une analyse économétrique de la sensibilité de l'investissement direct étranger (IDE) entrant dans certains pays de l'OCDE, aux taux d'imposition et aux régimes fiscaux. Les résultats montrent que l'IDE entrant est négativement relié au niveau du taux de fiscalité sur les sociétés, que ce dernier soit exprimé en termes effectifs ou en termes nominaux. Ce résultat reste valable lorsque l'on tient compte du régime fiscal en vigueur (crédit ou exemption).

Par ailleurs, la généralisation en Europe du système de crédit réduirait l'IDE entrant dans les pays de l'échantillon (car elle supprimerait la possibilité d'échapper à une fiscalité nationale élevée), tandis que la généralisation du système d'exemption augmenterait l'investissement. On met également en évidence les externalités associées à ces modifications de régime fiscal pour les pays extra-européens. La comparaison des conséquences de l'harmonisation, de la concurrence et du dumping fiscal met en lumière l'externalité négative de la concurrence fiscale en Europe pour les partenaires étrangers de l'Union (ici, les États-Unis et le Japon), qui perdraient à la mise en place d'un jeu fiscal non coopératif en Europe.

Mots-clés : Concurrence fiscale, harmonisation fiscale, investissement direct étranger, UEM.

Classification : JEL: F21, H25, H87

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1. INTRODUCTION

Recent changes in the rhythm of European integration and of globalisation have dramatically reduced the scope for independent fiscal policies. On the one hand, the efforts to meet the Maastricht criteria and the subsequent stability pact have limited the possibility of reducing tax pressure. On the other hand, the liberalisation of capital movements, inside and outside Europe, has increased the elasticity of location choices to tax rates. This is also the case for a limited part of the labour force, e.g. qualified labour. Hence, a larger share of the tax base is being increasingly elastic to tax rates, while there is a need to maintain or increase the tax burden. In such a context, tax policies become more interdependent: increasing or decreasing the tax rate on the mobile part of the tax base is the source of externalities between countries or regions, and the source of an externality on the less mobile tax bases (non qualified labour, sticky activities, final consumption).

Rising interdependencies across national tax policies could have various outcomes. Firstly, some countries could individually and unilaterally undercut their tax rates on the mobile base, forcing their partners to do the same if they want to keep their share of the European mobile base; this would lead to a *tax competition*, i.e. a "race to the bottom". Secondly, EU countries may consider a policy aiming at limiting the scope for tax competition through the imposition of minimum tax rates and the standardisation of tax bases; this would be *tax harmonisation*. Finally, EU countries may reconsider the way they *collect taxes*, as the growing interdependence of countries completely dissociates the two notions of residence and source of revenue. The objective would be to eliminate both risks of double taxation and of zero taxation and to reduce the scope for tax evasion. Hence, *tax co-ordination* concerns both the harmonisation of tax rates and the measures aiming at making national taxation schemes consistent.

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- *Tax competition* can be defined as a reduction in domestic tax rates, or the implementation of partial exemption schemes, in order to enlarge the tax base or at least to attract activities. This policy is similar to a strategic trade policy (Janeba, 1998). According to models of strategic trade policies, in which firms are immobile in a framework of imperfect competition, there is a welfare gain for the domestic country entering in a subsidy race in order to shift rents. In contrast, the tax competition literature assumes perfect competition and mobile firms, concluding that governments will engage in wasteful tax undercutting. Having lost the tool of competitive depreciation, inflationary countries could manage to compensate inflated unit costs by implementing tax reduction schemes. Accordingly, tax competition aims at attracting the more mobile factors (namely capital and qualified labour), at the expense of the less mobile factors: non qualified labour, natural resources. Negative externalities on other countries in the integrated economy are generally referred to. In addition, the burden of adjustment of the budget relies more heavily on the least mobile factors (unqualified labour, small business), and social care could be destabilised.

Tax competition does not necessarily lead to inefficiency since it imposes a rationalisation of public expenditure: firms accept higher taxes if the latter are associated with better infrastructures or public services. Hence, firms have access to public services at the lowest price thanks to tax competition (Boss, 1999). In sum, differences in tax rates could not matter for location decisions, if they simply balance differences in public infrastructures or services. However this reasoning assumes that firms are the only tax payers. In practice, mobility gives the firm a kind of market power: the threat to move makes the government reduce their contribution to public goods and social transfers, and transfer the cost to less mobile tax bases which lack market power.²

- The justification for *tax harmonisation* is twofold. First, tax discrepancies may distort the allocation of resources within an integrated area, particularly the allocation of capital. However, long-lived differences in corporate taxes across European countries may be justified on various grounds. In particular, lower taxes could compensate for location disadvantages, whereas higher corporate tax rates could be justified on the grounds of a location rent (proximity of a large market, qualified labour etc). The second argument for tax harmonisation relies on the fact that tax competition could lead the governments to reduce taxes on mobile bases at the expense of immobile bases. The financing of public goods and the compensation for location disadvantages would then fall on immobile bases.

The scope for tax competition or harmonisation has been enhanced by EMU. The Single market had already promoted integration, but it did not remove all impediments to trade: border effects remain large in Europe (Head and Mayer, 2000). Remaining cultural obstacles, inertia of consumer preferences, firm discrimination strategies can partly explain such outcome. The absence of a common currency so far is also a potential explanation. Launching the euro undoubtedly means a reduction in transaction costs and in uncertainty. Recent estimates show that trade patterns and trade volumes could be largely modified

² The analogy between tax competition and market equilibrium was introduced by Tiebout (1956).

accordingly (Fontagné and Freudenberg, 1999-a; Rose, 1999). The single currency should also modify the pattern of Foreign Direct Investment (FDI), since uncertainty associated with exchange rate variations previously distorted the allocation of FDI within the integrated area and between this area and third countries. The euro drops such distortion and consequently is modifying the allocation of FDI. EMU also removes exchange rate risk on foreign European financial assets; it allows firms to flock their activities in attractive locations (large markets, small unit costs, low taxation) without bearing any exchange rate risk on their sales; it allows workers to move within the integrated area during their life cycle without bearing any exchange rate risk on their accumulated assets and social benefits.

The crucial point is the sensitiveness of tax bases (and more specifically of firms) to tax discrepancies across possible locations. Indeed, the determinants of location are complex. Wheeler and Mody (1992) argue that agglomeration economies constitute the leading factor of location, overcoming the desire of investors to spread risk over a large number of locations. They conclude that location tournaments based on tax competition are costly and cannot counteract these agglomeration forces. Providing specialised inputs or expanding the market potential are more relevant policies. In sum, firms should neglect taxation levels. Head, Ries and Swenson (1999) evidence this point on the case of 760 Japanese establishments choosing their locations inside the United States over 1980-92. They show that tax discrepancies are dominated by agglomeration economies.

This paper tries to measure the importance of taxes in the decision of firms to re-locate their activities abroad. More specifically, we test the impact of corporate tax discrepancies on FDI among OECD countries. Section 2 reviews the literature on this issue. Section 3 provides a picture of tax discrepancies across the European Union. The econometric methodology and the results are presented in Section 4, and some simulations are performed in Section 5 in order to quantify the impact of tax competition or tax harmonisation. Section 6 concludes.

2. LOCATION AND TAX COMPETITION: THE EXISTING LITERATURE

According to the Tiebout's law, fiscal competition allows individuals to be located in areas offering the combination between taxes and public goods which best satisfy their preferences (Tiebout, 1956). However Tiebout also highlights that communities try to attract tax payers until they reach an optimum size which allows them to minimise the cost of their public goods. Tax competition, aiming at enlarging the tax base until it reaches its optimum size, also exists in this framework. Wilson (1999) summarises the main results of the literature on tax competition.

First, rising the tax rate in one region is the source of a positive externality to neighbouring regions. Since such externality is not taken into account by each government, taxes appear to be lower than their socially optimal level.

Second, when regions differ in size, there is an advantage for a region being of a small size. Such asymmetric tax competition is based on the fact that the large region faces weaker response of the capital cost to tax rates: increasing tax rates depresses the demand for capital and hence its price, compensating for the increase in tax rates. Hence, a large region is less inclined to tax competition. By contrast, tax competition benefits the smaller region.

This shows that small countries within the EU are the origin of negative externalities to large countries in the absence of regulations at the EU level.

Third, all determinants of trade being neutralised, differences in capital taxation are the very source of international trade and specialisation. Combining this argument with the previous one, small countries are able to attract capital intensive activities, at the expense of large countries.

Lastly, the conventions for double taxation have different implications for the location of activity. A *full credit scheme*, corresponding to a government providing full tax credit for taxes paid abroad, would lead to non intuitive results. The host country would have an incentive to raise tax rates since foreign investors would not be worse off. But in order to limit the reimbursement of excess taxes, the investor's home country would have an incentive to raise taxes too. The Nash equilibrium would then result in high taxes in both countries and no capital flows.

Conversely, firms originating from countries applying an *exemption scheme* should be more sensitive to changes in tax rates abroad; however using the United States as a host country over 1962-87, Slemrod (1990) finds no evidence of such an impact, a result confirmed by Auerbach and Hassett (1993). This suggests either that the variance in tax rates is too low, or that taxation schemes have weak influence on decisions to invest abroad. Considering the 1979-91 period and using data at the industry level, Swenson (1994) finds that the capital cost is positively related to inward FDI in the US. Although British and Japanese investors in the US are applied a partial credit scheme, this is not sufficient to explain this counter-intuitive result. Hines (1999) surveys the results obtained in the empirical literature: elasticities of FDI to taxation vary in tremendous proportions. In sum, if a simple analysis leads to the conclusion that tax policies are an important feature of attractiveness (Schlitzer and Zaghini, 1998), such conclusion does not resist a careful econometric examination.

However, we can expect that the larger the area of fiscal competition under consideration, the weaker the impact of tax rate differentials. Hence, using data at a more detailed level should be more promising. At the micro-economic level, the impact of taxation on location ought to be very large. To put it in simple words, if only one side of the street in a given town offers tax rebates, all firms will consider locating on this side (if their output is differentiated). It does not mean however that all of them will do it, since moving from an existing location is not necessarily worthwhile. In fact, the cost of moving will be compared to the present value of future tax rebates. If taxation is volatile, firms will likely adopt a wait and see attitude.

Even at the micro level, the empirical evidence is mixed. Most existing studies use conditional logit estimates and try to mobilise sector data or even individual firm data. The relevant scale of location is the country in Europe, the State in the U.S., the region within European countries, or at the most detailed level alternative cities or industrial areas in a given region of a given European country. For example, one can consider investment in various states in the US, conditional to a foreign investment in the United States, or the choice between European countries, conditional to a location in Europe.

Hines (1996), compares the inter-state distribution of investments from foreign countries according to their fiscal schemes (credit vs exemption). He shows that firms originating from countries offering credit schemes are less likely to invest in states imposing low taxation.

Devereux and Griffith (1998) use individual firm *activity* data of US multinationals investing in Europe (restricted to the UK, France and Germany). In line with Markusen and Brainard, they show that the choice between producing abroad or exporting is determined by the proximity-concentration trade off; then, the choice of the location, conditional to the decision to produce abroad rather than to export, is driven by taxation and other cost-related factors.

Friedman, Gerlowski and Silberman (1992) consider the establishment of new manufacturing plants of European and Japanese firms at the state level in the United States. They find that per capita state and local taxes are strong deterrents of location. Such outcome is particularly pronounced for Japanese firms, which suggests a high sensitivity of executives to their individual tax burden and to the one of their employees. Coughlin, Terza and Arromdee (1991) also obtained a negative, although not significant, impact of such taxes. Analysing the location of Japanese affiliates in the automobile sector leads to mixed conclusions. Smith and Florida (1994) obtain a negative impact of taxes as far as the location of new establishments is concerned, but acquisitions, as opposed to greenfields, are hardly sensitive to such determinant. In contrast, agglomeration effects play a key role.

Mayer and Mucchielli (1999) consider 700 Japanese firms decisions of investment in Europe. Both the region of location and the industry to which the subsidiary belongs to are identified. The effective tax rate has no impact. Agglomeration economies and labour costs dominate all other explanations.

Relying on a survey of firms located in the Northern part of France, Jayet *et al.* (1999) show that distance to suppliers and demand, and the quality of infrastructures, largely dominate fiscal determinants or subsidies. The proximity of sub contractors, the availability of qualified labour and the specialisation of the labour force are also important determinants. In contrast, differences in costs do not clearly discriminate between locations, noticeably local taxation, a result interpreted in terms of compensating advantages by the authors.

In sum, there is no consensus on the impact of taxation on the location of firms. But existing studies generally concern investments in only one country or even region, with limited variance in the tax rates. Taking a multi-country view could help to conclude on the impact of taxes on location.

3. EVIDENCE OF TAX DISCREPANCIES IN EUROPE

3.1. Corporate tax rates in Europe

Improved integration in European goods and capital markets has resulted in a convergence in nominal tax rates to levels around 35% in 1997 (Table 1). The average tax rate decreased from 38.8% to 35.6% in the EU15 over 1990-1997, with a standard deviation falling from 3.4 to 2.0%. Only in Ireland does the corporate tax rates differ substantially from the EU average, with a 10% rate being applied to many activities (until January 1st, 2000 for new investors).

Taking this non-converging tax rate into account, the standard deviation across countries still fell from 9.4% in 1990 to 8.2% in 1997. In contrast, taxation on personal income remains quite different in EU countries, and large differences in social taxes on workers are recorded (Hugounenq, Le Cacheux and Madiès, 1999).

Table 1
Nominal corporate tax rates (in %)

	1990	1991	1993	1994	1997
Germany	43.0	43.0	43.0	37.5	37.5
Belgium	43.0	39.0	39.0	39.0	39.0
Denmark	40.0	38.0	38.0	34.0	34.0
Spain	35.0	35.0	35.0	35.0	35.0
France	39.5	38.0	34.0	33.3	33.3
Ireland*	43.0/10.0	43.0/10.0	40.0/10.0	40.0/10.0	38.0/10.0
Italy	36.0	36.0	36.0	36.0	36.0
Netherlands	35.0	35.0	35.0	35.0	35.0
United-Kingdom	35.0	34.0	33.0	33.0	33.0
United States	34	34	34	34	34
Japan	37.5	37.5	37.5	37.5	37.5
Average EU	38.8/35.2	37.9/34.2	37.0/33.7	35.9/32.5	35.6/32.5
Standard deviation	3.4/9.4	3.1/8.9	3.1/8.8	2.3/8.2	2.0/8.2

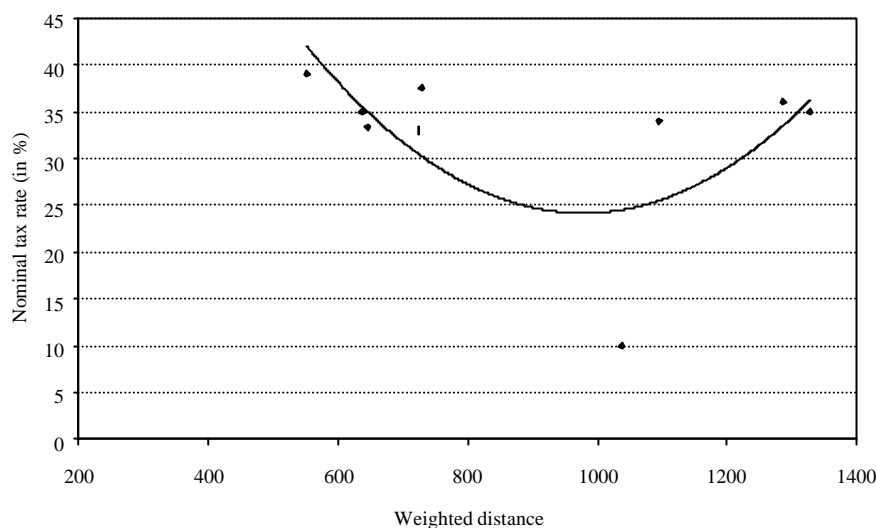
Source: European Commission. Assumption: 50% of the dividends are re-invested in the subsidiary.

* Ireland: the rate to be applied to manufacturing industry and some services is reduced to 10% until December 31 2010 (OECD, *Taxing Profits in a Global Economy: Domestic and International Issues*, OECD, Paris, 1991).

Do tax differentials compensate for location disadvantages? In Figure 1, nominal tax rates are compared to the GDP-weighted average distance of each country to its European partners. There seems to be a traditional U-shape relationship between distance and tax rates: for relatively small distances, the larger the distance, the lower taxes in order to compensate for the location disadvantage³. But for large distances, competing by lowering taxes is not worth because firms will not move anyhow. Hence, tax rates increase with the distance. Ireland appears in a particular position, with a tax rate (10%) much lower than what would be consistent with its location disadvantage.

³ The estimation result (for year 1995) is: $NTAX = 117.9 - 0.19DIST + 10^{-4}DIST^2$, $\bar{R}^2 = 0.20$,
[0.034] [0.101] [0.109]
where *NTAX* denotes the nominal tax rate and *DIST* is the weighted average distance to other EU countries. P-values are indicated between brackets.

Figure 1
Nominal tax rate and weighted distance, EU, in 1995



This U-shape relationship appears relatively fragile for nominal taxation, since removing Ireland or adding non EU countries makes the distance non significant⁴. However, considering effective tax rates instead of nominal ones makes the relationship more robust, as evidenced in the next section.

3.2. Average tax burden by country

Looking at nominal tax rates is not enough to assess the degree of tax convergence in Europe, since the definition of the tax base varies to a large extent across countries. In order to tackle such phenomenon, ex ante (nominal) tax rates can be replaced by ex post (effective) rates. Available OECD data allow to compute effective corporate tax rates (in percentage of the operating surplus) for 1985, 1990, and 1992 to 1995 (Table 2).

⁴ Not reported here to save space.

Table 2
Effective tax rates (in % of operating surplus)

Country	1985	1990	1992	1993	1994	1995
Belgium-Luxembourg	11.1	8.3	7.3	7.9	8.8	9.6
Germany	-	-	7.0	6.3	4.6	4.2
Denmark	17.6	10.0	9.3	12.2	11.2	11.0
Spain	6.4	9.2	6.4	5.2	4.1	4.1
France	12.0	10.4	6.4	6.4	6.5	6.5
United Kingdom	32.0	21.1	12.4	10.1	10.6	12.8
Ireland	4.9	5.2	7.5	8.2	9.0	7.6
Italy	12.7	11.5	11.8	10.4	8.7	7.8
Netherlands	11.4	12.3	11.3	12.3	11.2	11.1
Japan	24.4	27.5	21.2	18.9	19.0	20.8
United States	10.9	9.8	9.5	10.0	10.6	10.9
Average EU	13.5	11.0	8.8	8.8	8.3	8.3
Standard deviation	7.9	4.3	2.3	2.5	2.5	2.9

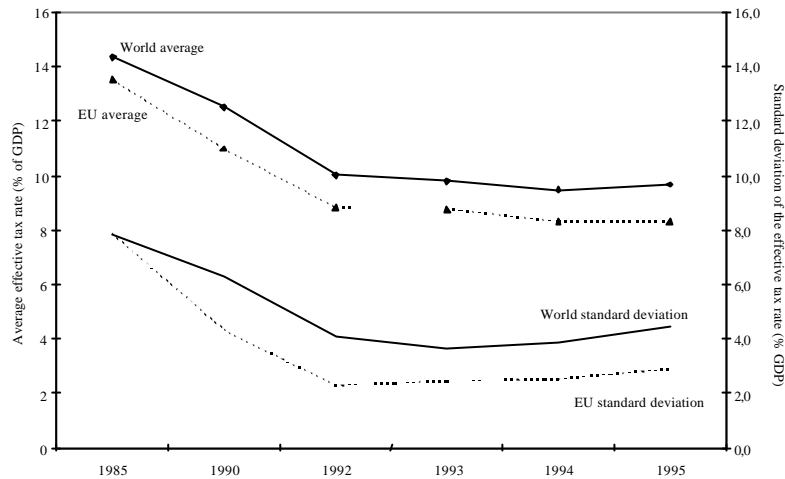
Source: own calculation based on OECD data.

There are large discrepancies between Table 1 (nominal rates) and Table 2 (effective rates). Firstly, effective rates are much smaller than nominal rates, which results from the fact that the tax base differs from the operating surplus due to various accounting rules. Secondly, countries with low nominal rates do not necessarily display low effective rates. This is especially the case in the UK which has one of the smallest nominal rates in the EU and nevertheless the highest effective rate. Attractive places such as the UK charge higher taxes in absolute terms through attracting more activity. Germany seems to have been in the opposite case over the past.⁵

In the mid-eighties, effective tax rates in the EU ranged from 4.9% in Ireland, to 32.0% in the UK; the effective rate was 24.4% in Japan and 10.9% in the United States. Ten years later, the effective tax rate is unchanged in the United States, while it has been lowered to 20.9% in Japan. In Europe, Spain and Germany are the most attractive places in 1995 with only 4.1% and the UK remains the country where the largest effective tax rates are imposed in the EU. In Figure 2, the decreasing average and the converging standard deviation in tax rates are striking: to us, this can not be explained by business cycles determinants only. Fiscal competition may have contributed.

⁵ However, the German government announced in January 2000 its intention to cut corporate tax rates from 45% to 25%.

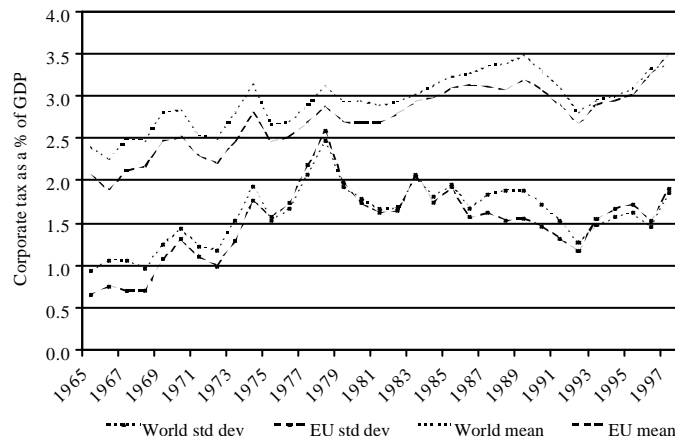
Figure 2
Average and dispersion of effective tax rates in the sample
and in the European sub-sample



Source: Effective tax rates in Table 2.

Looking back to the 1960s, two periods can clearly be distinguished, as evidenced in Figure 3, which shows the evolution of the mean and of the standard deviation of corporate taxes as a percentage of GDP. Until the end of the 1970s, corporate effective taxation diverged substantially in the EU as well as in the OECD as a whole, in a context of rising rates. In contrast, since the early 1980s, corporate rates have been converging, in a context of stabilised average rates. Hence, the stabilisation and convergence of corporate taxes seem to have coincided with the liberalisation of capital flows.

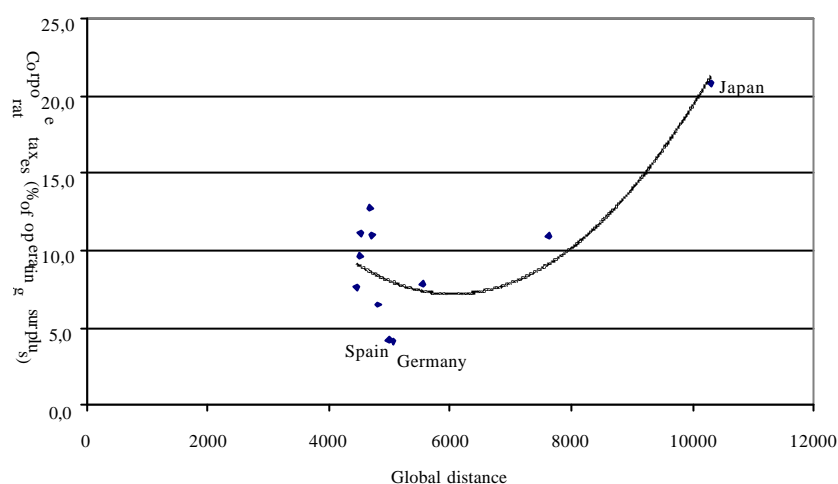
Figure 3
Long-run evolution of effective corporate tax rates



Source: own calculations based on OECD data.

Do remaining differences in corporate tax rates compensate for location disadvantages? Like for nominal tax rates, a U-shape relationship can be drawn between distance and effective corporate tax rates (Figure 4). In this framework, Ireland can no longer be considered as a dumping country. Only Spain and Germany can be pointed out as imposing low corporate taxes compared to what would be justified by distance. Japan plays a crucial role in this relationship since its large distance allows it to impose high corporate taxes.⁶ However, distance is no longer significant when the sample is restricted to EU countries.

Figure 4
Effective tax rate and weighted distance, OECD in 1995



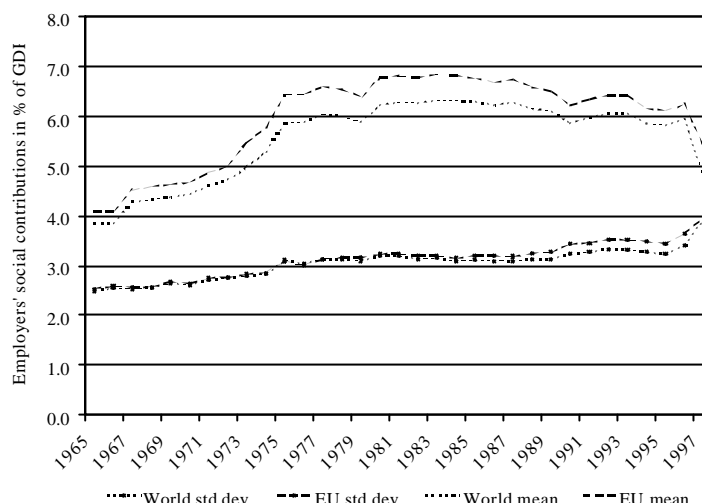
Source: own calculations based on OECD data.

The fiscal burden on firms is not limited to taxes on corporate income: social taxes on wages are to be taken into account. And given the large discrepancy in the structure of fiscal revenues in EU countries, this must deeply alter the picture. Noticeably, employers social security contributions vary in large proportions across EU countries. The lowest level is recorded in Denmark where social benefits are financed through personal income taxation, France being at the opposite of the spectrum. Like corporate taxes, employers' contributions increased until the late seventies, before stabilising in the eighties and slightly declining in the nineties. In contrast, the dispersion of effective contributions has *increased* especially the nineties (Figure 5). These contributions must be taken into account as far as one is interested in location choices.

⁶ The estimation results (for year 1995) is:

$$ETAX = 35.6 - 0.009 DIST + 10^{-5} DIST^2, \bar{R}^2 = 0.620, \text{ where } ETAX \text{ denotes the effective tax rate and } DIST \text{ is the average distance to other OECD countries. P-values are indicated in parentheses.}$$

Figure 5
Long-run evolution of effective employers' social contributions



Source: OECD.

3.3. Criteria of tax neutrality

When looking at the impact of taxes on FDI, a crucial distinction must be made between "capital export neutrality" (CEN) and "capital import neutrality" (CIN). CEN implies an indifference of the investor to alternative locations, with respect to effective tax rates (Horst, 1980; Dutton, 1982), while according to CIN, tax rates are identical for all investors in a given location.

In order to guarantee CEN, international investors must be taxed in the home country, e.g. according to the country of origin principle. In this case however, foreign firms located in a given country face various tax rates and CIN does no longer hold. Conversely, CIN would be obtained with the principle of residence country, at the expense of CEN. Only a total harmonisation of tax rates would allow to conciliate both criteria. In contrast, neither CEN nor CIN are fulfilled in observed systems which mix the two principles of origin and of residence.

- First, foreign companies generally benefit from a more accommodating regime. In the European Union, the fight against such practices took place in two stages, first with the Ruding committee in 1992, and then the ECOFIN council of 1997.

In 1992, the Ruding committee highlighted the importance of transparency for tax incentives, and concluded that, in order to minimise tax discriminations and costly tax competition, minimal rules on tax rates and tax bases should be adopted. The Ruding committee also put a special emphasis on the harmonisation of transfer prices rules (in order to contain tax optimisation by multinational firms). However, tax harmonisation associated to the operation of EMU leaves few economic policy instruments to EU members, who are progressively losing their monetary, fiscal and eventually tax policy. For this reason, the Ruding

committee admitted that tax incentives could be authorised for some countries, but restricted to particular regions or activities. One recommendation of the Ruding committee was to adopt regulations in this field.

In December 1997, the ECOFIN council adopted a code of conduct for business taxation, which plans the removal of “measures which provide for a significantly lower effective level of taxation, including zero taxation, than those levels which generally apply in the Member State in question”⁷. A Code of Conduct Group was established within the Council to assess the tax measures that may fall within the Code. The group submitted a comprehensive report to the Council meeting on 29 November 1999. The report identified 66 tax measures as harmful. Although a broad consensus (but not unanimity) was achieved on this diagnosis, the political commitment has remained weak due to the inclusion of the Code in a controversial package together with the taxation of savings income and the issue of withholding taxes on cross-border interest and royalty payments between associated companies.

In April 1998, the OECD had also published a report on harmful tax competition. 19 recommendations were approved by OECD countries. Most of them focused on the exchange of information and on the extension of regular taxation to all companies. A Forum was created to undertake an ongoing evaluation of existing and proposed preferential tax regimes. But again, there has been no strong commitment from member countries to fight “harmful tax competition”.

- Second, effective tax rates differ according to the origin country of FDI: in most EU countries, repatriated profits are exempted from any charge in the residence country. In other countries (the UK, Ireland the U.S. and Japan), a partial credit scheme charges repatriated profits inflated by foreign taxes, and rebates domestic taxes by the amount of foreign taxes (Table 3).
- Lastly, charges vary according to the type of FDI: retained earnings, new equity or debt. In sum, it is not only the tax rate that has to be considered, but more generally the complex system of taxation built by each country as an origin or as a host country: there is a different tax rate for each pair of countries, according to the origin and to the host country. For instance, low corporate taxes in the U.S. should enhance German FDI to the U.S., since German investors cannot be rebated at home for taxes paid abroad (exemption scheme). Conversely, Japanese or British firms ought not to have such incentive since they are submitted to a credit scheme. In addition, since firms are ultimately owned by their shareholders, the personal income taxation should be taken into account in order to assess an indirect capital export or import neutrality. The latter analysis is generally not done however, for obvious reasons of complexity.

⁷ “Conclusions of the Ecofin Council meeting on December 1997 concerning taxation policy”, *Official Journal of the European Communities*, 6.1.98, C 2/3.

Table 3
Principle of taxation of foreign income in our sample of countries

Origin country of investor	Principle of taxation at home	Remark
Belgium	Exemption at 95%	Considered as full exemption
Luxembourg	Full exemption	
France	Full exemption	Assumption: application of the parent-subsidiary directive in all cases
Germany	Full exemption	
Ireland	Partial Credit scheme	
Italy	Exemption at 95%	Considered as full exemption
Netherlands	Full exemption	
Spain	Full exemption	
United-Kingdom	Partial Credit scheme	
United States	Partial Credit scheme	
Japan	Partial Credit scheme	

Source: Literature survey.

Having such distinctions in mind, Devereux and Pearson (1995) compute the cost of capital in European countries for "a given post-corporate tax, pre-personal tax rate of return" of 5%. According to the discussion above, the cost of capital should ideally be calculated on a strictly bilateral basis, and by type of financing. This is precisely what Devereux and Pearson do). They obtain 12x12x3 rates, ranging from 2% (German investment in Greece financed by new equity) to 19.9% (Irish investment in Portugal financed in the same way) showing that both CEN and CIN are invalidated (Table 4). On this basis, Devereux and Pearson conclude that a harmonisation of all corporate tax rates to 37.5% would have a rather low the impact, especially if subsidiaries are financed by equity or by retained earnings. In turn, generalising partial credit schemes would deepen discrepancies in capital cost since it would inflate this cost for German multinationals investing abroad (through equity or debt financing). However, turning to the generalisation of exemption schemes would reduce only slightly the dispersion of average costs of capital.

Table 4
Bilateral cost of capital (subsidiary financed by new equity) for selected EU countries (1991)

		Country of the subsidiary							
		Belgium	France	Germany	Ireland	Italy	Netherlands	Spain	United Kingdom
Origin country of the parent	Belgium	5.4	8.5	6.5	4.6	7.0	6.4	8.1	5.4
	France	6.7	5.4	4.1	4.1	6.5	6.1	8.1	6.0
	Germany	7.2	6.6	5.5	3.3	9.8	6.1	6.5	4.8
	Ireland	6.9	7.8	5.8	5.1	5.8	6.6	19.7	7.2
	Italy	7.4	11.1	3.9	10.2	6	8.9	9.1	9.8
	Netherlands	6.1	7.6	6.2	4.4	5.1	5.7	7.2	5.2
	Spain	7.2	8.1	6.2	7.4	6.7	6.1	6.1	6.3
	United Kingdom	5.9	7.8	5.8	7.7	5.1	6.0	7.2	5.9

Source: Devereux and Pearson (1995).

Hugounenq, Le Cacheux and Madiès (1999) compute the cost of capital according to similar principles; they introduce a distinction between three types of investments: machinery, buildings, stocks (Table 5). According to their calculations, pre tax rates range from 4.4% (Belgian investment in Germany) to 6.7% (Dutch investment in Belgium) in our sample of EU countries. Such discrepancies are much smaller than those observed in 1991, reflecting the convergence in the effective tax rates associated with the combination of various systems of taxation within the EU.

Table 5
Pre tax rate of return required to provide a net return of 5%: foreign investment (1998)

		Country of the subsidiary							
		Belgium	France	Germany	Ireland	Italy	Nether-lands	Spain	United-Kingdom
Origin country of the parent	Belgium	5.0	4.8	4.4	4.8	4.7	4.9	4.6	4.7
	France	6.1	5.9	5.5	6.0	5.9	6.0	5.7	5.9
	Germany	5.8	5.5	4.5	5.7	5.4	5.7	5.4	5.5
	Ireland	6.1	6.0	5.6	6.0	5.9	6.0	6.0	5.9
	Italy	6.5	6.4	5.9	6.4	5.2	6.4	6.2	6.3
	Netherlands	6.7	6.6	6.2	6.6	6.5	6.6	6.4	6.5
	Spain	6.4	6.3	5.9	6.3	6.3	6.4	6.3	6.3
	United-Kingdom	6.1	6.1	5.7	6.1	6.0	6.1	6.2	6.0

Source: adapted from Hugounenq, Le Cacheux and Madiès (1999). Assumption: 55% reinvested earnings, 10% new equity, 35% debt.

However, such calculations must be handled cautiously. Various (favourable) specific regimes for headquarters of foreign firms are applied in numerous countries: Belgium, France, Great Britain, Netherlands. Lastly, multinational firms can partially evade taxes by manipulating internal transfer prices. It is expected that locations offering attractive taxation regimes will be chosen as a beachhead for subsidiaries charging inflated internal prices. The very high average unit value of Irish exports (Fontagné, Freudenberg, 1999-b) validates such story.

In sum, criteria of tax neutrality are not fulfilled in Europe, even if a convergence in tax rates has been observed during the nineties. The outcome is a potential misallocation of capital between EU countries.

4. MEASURING THE IMPACT OF TAXES ON INTERNATIONAL LOCATION

The outcome of tax competition is highly dependent on the relationships of member countries (regions) with the outside of the integrated zone under consideration. Surprisingly however, this dimension is generally not taken into account in existing studies, as highlighted in Section 2. Capital is assumed to be mobile within the integrated area, but not between this area and third countries. This is a particularly inadequate design for studies aiming at examining the European experience, given the large flows of capital between third countries and member states. Interregional externalities have to be considered in addition to the intra-regional externalities referred to above. The underlying mechanisms are the following (Janeba and Wilson, 1999).

First, both movements of goods and capital have to be taken into account. The EU tariff policy is exclusively determined at the EU level, whereas capital taxation within the Community is decentralised in absence of tax harmonisation. Accordingly, tax competition between member states can lead either to inefficiently high or inefficiently low taxation levels, depending on the design of the trade policy. Two types of externalities generate such outcome: negative externalities inside the EU associated with tax undercutting by individual member states (e.g. "intra-regional externalities") and terms of trade effects.

The mechanism is quite simple: tax competition lowers the average level of capital taxation in the integrated economy. Hence, the incentive for foreign firms to invest in the integrated economy rises: tariff jumping becomes more valuable. Such tariff jumping raises the output of the import sector in the host country (previously imported goods are now produced domestically). This raises the terms of trade of the host country, where the optimal tariff shrinks. As a result, the trade authority reduces the external tariff. Hence, the tax competition problem should be alleviated either by centralising tax decisions or by enforcing higher external protection in order to attract foreign firms.

4.1. *Econometric methodology*

We consider marginal location decisions and hence tackle the determinants of FDI *flows*. Accordingly, the dependent variable is the annual inward bilateral FDI flows at constant prices (the deflator is the price index of the gross capital formation in the investing country). The flows account for FDI in all sectors. The corresponding data comes from OECD data bases. We use a panel of 9 European countries (UE12 less Portugal and Greece due to the lack of data), plus third countries (Japan and the United States). We consider the years 1985, 1990, and 1992 to 1995. The estimations are successively performed with effective tax rates and on nominal tax rates as determinants of FDI. In addition, we compare the results when accounting or not for the taxation schemes (credit *vs.* exemption). Finally, estimations using the cost of capital (calculated by Devereux and Pearson (1995) and by Hugounenq et al. (1999)) were carried out, but the results are not reported here because the capital cost did not show up significant.

Two types of determinant can be distinguished; "macroeconomic" determinants such as market access, transportation costs etc, and policy-related determinants such as taxes, social contributions and the exchange rate regime. We control for the first set of determinants, but we are basically interested in the second set.

4.1.1. *Control variables*

As far as market access is relevant, the investor is interested in the market potential associated with the various locations. Obviously, this market potential is not limited to the domestic market of the host country: exports towards neighbouring countries have to be taken into account. And even in the host country, the domestic market potential is limited by the transportation costs between the subsidiary and the various regional markets within the borders. In order to tackle this issue, we define a market potential inspired from Harris (1954) and Alsard (1954). The market potential is an average of GDPs of EU regions weighed

by the inverse distance to these regions (see the description of the variables in Appendix). Market potential is expected to have a positive impact on inward FDI.

The market potential variable is supplemented with the (lagged) real exchange rate level which is supposed to account for the purchasing power of the consumers in the host country. Hence, an exchange rate appreciation is expected to increase FDI. This is consistent with the motivation of foreign investors among OECD countries, who basically want to serve domestic markets. Alternatively, if foreign investors intend to re-export their production, then the real exchange rate would have the opposite effect since an appreciation translates into higher output costs.

The size of the origin country is introduced as a supply variable. Large countries have a greater potential than small countries for investing abroad. In turn, differences in market sizes limit the potential for foreign production if external economies of scale matter. It is generally expected that external economies of scale lead to the concentration of the production in the larger country (Helpman and Krugman, 1985); we interpret this result as an hindrance to FDI when countries are of a too different size.

Another important determinant of investing abroad rather than exporting is the transportation cost between the two markets. According to the "proximity-concentration trade-off", large transportation costs between the origin and destination country favour FDI at the expense of trade, for a given level of returns to scale. Hence, a positive impact of distance on FDI should be observed. However this view is generally not supported by empirical evidence, which highlights the fact that FDI flows and trade are complements (Fontagné, 1999). In the latter view, the distance has a negative impact on both trade and FDI which are co-determined by geographic, but also non geographic factors (language, culture, size of the border effect). In order to account for this co-determination, we add the bilateral openness ratio as an explanatory variable: pairs of countries trading a lot must also invest a lot on their respective markets. Alternatively, if tariff jumping is the prominent motive for investing abroad, trade openness would be negatively related to FDI.

4.1.2. Policy related variables

Turning to "policy related" determinants, standardised ex post taxes (effective tax rates) are computed at the macroeconomic level for each of the destination and origin countries. Then we simply calculate the difference between the effective tax rates in the host and in the investing country. This calculation is done for both corporate taxes (as a percentage of the operating surplus) and employers' social contributions (as a percentage of employees' compensations). It is expected that tax friendly countries attract more FDI if differences in taxes are not fully balanced by differences in public infrastructures, public services or access to market. In a first step, we do not account for the difference between the regimes of exemption and credit. Along the same line, we compare social contributions as a percentage of workers compensation in the host and the destination country.

In a second step, we control for the differences in taxation regimes in the sample. Remind that the United States, the United Kingdom, Japan and Ireland apply partial credit schemes to their firms: they are concerned by differences in tax rates if and only if the tax rate abroad is higher than the one at home. Conversely, investors from other countries are applied an exemption scheme, which makes them sensitive to any tax discrepancy.

Taking effective tax rates rather than nominal rates sticks more to the reality but is potentially noised by the fact that multinational firms will locate profits in tax-friendly countries; hence, effective taxation could appear heavier ex post than it is ex ante. This problem, which is empirically confirmed by Hines and Rice (1994), is accounted for in a third step by using nominal rates as an alternative measure to effective rates.

In all estimations, the exchange rate regime is accounted for through a nominal exchange rate variability variable. More volatility in the exchange rate should induce less FDI due to the larger uncertainty on profits. This variable will allow us to compare the impact of tax scenarios to the effect of EMU on FDI flows.

All the variables and data sources are detailed in the Appendix.

4.2. Estimation results (1985-95)

The results are provided in Table 6. We start in column (1) by estimating the full model, incorporating both tax rates and social contributions, and taking the taxing scheme into account. The first striking result is that the difference in social contributions between the investing and the host country fails to be a significant determinant of inward FDI. Accordingly, social contributions are dropped from other equations. Other coefficients are significant and rather stable across the specifications, as evidenced by columns (2) to (6).

The market potential has a positive impact on inward FDI. Remind that this effect is obtained through considering not only the domestic market, as far as European countries are concerned, but also the market in other European countries in the sample. In addition, these market potentials take into account transportation costs supported when delivering the output of the affiliate within the host market and to foreign markets. The real exchange rate also impacts FDI inflows in the sense of more inflows when the exchange rate appreciates, which is consistent with the purchasing power interpretation.

As expected, the size of the investing country has a positive impact on its investment abroad, which reflects a supply effect, large countries having a greater potential for investing abroad, and the difference in sizes between the investing and the host country reduces the bilateral investment *ceteris paribus*.

A larger bilateral openness is associated with more bilateral FDI, departing from the argument of tariff jumping. Such outcome is consistent with the negative influence of distance on FDI: according to the proximity-concentration trade off, a positive influence would be expected of transportation costs on FDI, production in foreign subsidiaries substituting to exports.

The bilateral exchange rate volatility reduces inward investment, evidencing an impact of monetary uncertainty on FDI flows. Note that this effect is symmetrical: more volatility reduces FDI flows in both directions between two countries.

Table 6
Estimation results (1985-95)

	Effective tax rates					Nominal
	1	2	3	4	5	tax rates
						6
TEOS _{ijt} Corporate tax/operating surplus differential, tax regime not controlled	-	-0.314 [0.012]	-	-	-	
TEVA _{ijt} Corporate tax/value added differential, tax regime not controlled	-	-	-0.679 [0.091]	-	-	
TEOS _{ijt} Corporate tax/operating surplus differential, tax regime controlled	-0.304 [0.074]	-	-	-0.297 [0.072]	-	-0.108 [0.124]
TEVA _{ijt} Corporate tax/value added differential, tax regime controlled	-	-	-	-	0.043 [0.921]	-
DSOC _{ijt} Employers' social contribution/employees' compensation differential	-0.010 [0.885]	-	-	-	-	-
SGDP _{ijt} Market potential	0.486 [0.001]	0.499 [0.000]	0.517 [0.000]	0.492 [0.000]	0.538 [0.000]	0.646 [0.000]
GDP _{jt} Size of the investing country	0.005 [0.000]	0.005 [0.000]	0.005 [0.000]	0.005 [0.000]	0.005 [0.000]	0.005 [0.000]
VOL _{ijt} Exchange-rate volatility	-0.759 [0.104]	-0.848 [0.070]	-0.854 [0.076]	-0.758 [0.104]	-0.781 [0.103]	-
QR _{ijt-1} Lagged real exchange rate	-0.121 [0.059]	-0.122 [0.048]	-0.112 [0.071]	-0.123 [0.052]	-0.124 [0.047]	-0.188 [0.010]
CINGDP _{ij} Bilateral openness	0.078 [0.019]	0.066 [0.047]	0.072 [0.030]	0.079 [0.016]	0.076 [0.021]	0.112 [0.010]
DPIB _{ijt} GDP differential	-13.644 [0.000]	-12.986 [0.000]	-12.782 [0.000]	-13.723 [0.000]	-13.334 [0.000]	-16.110 [0.000]
DIST _{ij} Distance	-0.001 [0.005]	-0.001 [0.001]	-0.001 [0.003]	-0.001 [0.005]	-0.001 [0.011]	-0.001 [0.010]
DU6 Dummy UK/USA 1995	121.52 1 [0.000]	121.39 7 [0.000]	122.09 9 [0.000]	121.52 6 [0.000]	123.04 9 [0.000]	119.727 [0.000]
DU11 Dummy USA/Japan 1990	270.38 0 [0.000]	267.61 9 [0.000]	269.40 0 [0.000]	270.38 2 [0.000]	271.46 6 [0.000]	269.006 [0.000]
Number of observations	530	530	530	530	530	432

Adjusted R ²	0.596	0.593	0.589	0.591	0.588	0.600
Hausman test	20.567	24.178	20.865	20.813	19.570	17.897
	[0.024]	[0.007]	[0.013]	[0.022]	[0.034]	[0.057]
F test	8.463	8.939	8.412	8.527	8.267	7.823
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]

Heteroskedastic consistent estimates. Variables defined in Appendix. P-values in brackets.

Having controlled for all these determinants we can now focus on the role of taxation. The coefficient on tax discrepancies is systematically negative, highlighting the adverse effect of tax levels on FDI inflows. This impact varies only slightly across the various measures of tax rates. In column (3), corporate taxes are standardised by the value added. The parameter is raised since the value added is by definition larger than the operating surplus. However, the significance level is reduced. In columns (4) and (5), the taxation schemes are accounted for. The coefficient is almost unchanged when taxes are standardised by the operating surplus, but it becomes insignificant when they are standardised by the value added. Lastly, in column (6), we consider the nominal (*ex ante*) tax rate and take into account the taxation scheme. In this equation, the volatility has to be dropped. Once again we obtain a negative sign. The coefficient is smaller due to the larger values of the tax variable. It is less significant, but confirms the adverse effect of taxation on inward FDI.

5. TAXATION SCENARIOS FOR THE EUROPEAN UNION

Here we use the estimations presented in Section 0 to analyse the impact of various taxation scenarios in the European Union. The scenarios are based on the equations corresponding to columns (4) and (6) of. This choice is motivated, by the quality of the estimates, by the needs to account for taxation schemes on the top of tax rates and by the necessity to work on both effective and nominal rates in order to get more robust results.

Two distinct problems have to be tackled. First, there is a potential impact associated to a harmonisation of the taxation schemes in the various European countries. Second, notwithstanding such harmonisation in schemes, the tax rates themselves can vary as a result of a harmonisation within the EU, or a competition between EU members, or a non co-operative solution driving tax rates on the mobile capital to zero.

Operating the simulation implies to take the Irish case into particular account. As a matter of fact, the nominal Irish tax rate applied to foreign activities in Ireland is very low (10%) and was sometimes suspected to be some form of tax dumping. Put under pressure by their European partners, the Irish are likely to give up the special treatment their allowed to foreign investors, which could considerably alter the pattern of FDI received by Ireland. For this reason, we run alternative simulations as far as nominal tax are concerned, where we consider the Irish observed nominal tax rate, and some *ad hoc* form of “normal” tax rate that could be applied in this country. Namely, we suppose that it would be politically acceptable for Ireland to impose a nominal tax rate set to the (non weighted) average of its European partners. This seems to us the maximum tax level this country could accept. Were the nominal tax rate actually to be revised in this country, it would then range somewhere between 10% and the limit we set.

Lastly, two problems can be derived from the assessment of tax co-ordination in European countries. The first problem is linked to the fiscal cost of such a policy, and to the potential

trade-off that would have to be made between tax revenues raised on the mobile base (capital), and compensating tax revenues to be raised on the immobile base (roughly labour). The second one is more general, and is related to the catalyst of tax competition in Europe. Indeed, tax competition is becoming a question of concern because of the establishment of a single currency in Europe, which increases capital mobility. The cost of this competition has to be compared to the gain that the euro provides in terms of increased FDI, because the Single currency cancels the exchange rate risk in the euro zone.

5.1. Harmonisation of taxation schemes in Europe

Both credit schemes and exemption schemes are currently applied in the European union. Hence, harmonising taxation schemes could lead to a generalisation either of the credit scheme or of the exemption scheme. Both scenarios are studied successively, using nominal, and then effective tax rates.

In a generalised turn to credit schemes, all EU countries would adopt the scheme currently used in Ireland and in the United Kingdom (as well as in the United States and in Japan). According to the simulations implemented with nominal tax rates, the total amount of FDI in the sample would be reduced by USD 3 billion or 3% of total inward investment per year (Table 7). Such outcome can easily be explained: with all countries applying credit schemes, there is no longer an opportunity for investors to escape high tax rates at home through investing in tax friendly countries, such as Ireland. The latter country would lose USD 2 billion, that is 2% of total inward investment per year. Such reduction corresponds to a 45% cut in inward investment in Ireland. This country accounts for 70% of the losses within the sample.

Table 7
Impact on inward FDI of the adoption of a common tax scheme in the EU
(nominal tax rates, 1995)

Country	Inward FDI (millions USD)	Gains in millions USD		Gains in % of total inward FDI in the countries of the sample	
		Generalised credit scheme	Generalised exemption scheme in the EU	Generalised credit scheme	Generalised exemption scheme in the EU
Belgium-Luxembourg	5507	0	0	0.00	0.00
Germany	21815	-19	0	-0.02	0.00
Denmark	1387	-153	0	-0.14	0.00
Spain	1051	-99	0	-0.09	0.00
France	6917	-188	0	-0.18	0.00
United Kingdom	28554	-216	0	-0.20	0.00
Ireland	4968	-2251	288	-2.12	0.27
Italy	2106	-60	0	-0.06	0.00
Japan	5516	-16	0	-0.02	0.00

Netherlands	4378	-87	0	-0.08	0.00
United States	24154	-144	0	-0.14	0.00
Total	106354	-3234	288	-3.04	0.27
Sub total UE15	76683	-3074	288	-2.89	0.27

Source: own calculations based on Equation (6).

In contrast, a generalised turn to the exemption scheme within the EU (Japan and the United States remaining in a credit scheme) would allow firms to partially evade taxation by locating their affiliates in low taxation countries. Only two investing countries are potentially concerned by the change in the taxation scheme: Ireland and the United Kingdom. However, these two countries had the two lowest nominal tax rates within the sample. In the credit scheme, Irish and British investors had already to take the tax differentials into account. The situation is not reversed by the shift to the exemption scheme. The only bilateral relationship affected by such move would be the one between the UK and Ireland, British investors taking the opportunity to invest in the low-tax neighbour country after the move; the corresponding amount is however quite small: less than USD 300 million.

With an Irish nominal tax rate set to more “normal” levels, the convergence of EU tax schemes would have much less impact (Table 8). Turning to a generalised credit scheme would lead European countries to loose less than 1% of the world total inward FDI, while the rest of the world would only loose 0.2%. This is due to the fact that credit schemes would be applied in an environment of very close nominal tax rates (the Irish nominal tax rate here is equal to the European average); hence the EU, as well as its partners in the sample, would be very close to both CEN and CIN (credit schemes tend to generate CEN, while very comparable nominal tax rates would allow to approach CIN). The same conclusion holds for the generalisation of exemption schemes in the EU, because tax rates are very close.

Table 8
Impact on inward FDI of the adoption of a common tax scheme in the EU, Irish case set to the average of EU members of the sample (nominal tax rates only)

Country	Inward FDI (millions USD)	Generalised credit scheme	Generalised exemption scheme in the EU	Generalised credit scheme	Generalised exemption scheme in the EU
		Gains in millions USD		Gains in % of total inward FDI in the countries of the sample	
Bel-Lux	5507	0.0	0.0	0.00	0.00
Germany	21815	-18.7	0.0	-0.02	0.00
Denmark	1387	-152.9	16.6	-0.14	0.02
Spain	1051	-99.1	4.7	-0.09	0.00
France	6917	-188.4	23.1	-0.18	0.02
UK	28554	-215.9	27.0	-0.20	0.03
Ireland	4968	-80.6	0.0	-0.08	0.00
Italy	2106	-60.2	0.0	-0.06	0.00

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Japan	5516	-16.2	0.0	0.02	0.00
Netherlands	4378	-87.0	4.1	-0.08	0.00
United States	24154	-144.2	15.6	-0.14	0.01
Total	106354	-1063.2	91.0	-1.00	0.09
Sub total EU 15	76683	-902.8	75.4	-0.85	0.07

Source: own calculations, based on equation (6).

Turning to effective rates, (Table 9) shows that a harmonisation on credit schemes has the same negative impact on total FDI, roughly USD - 3 billions. However, the distribution of the impact on the various countries is very different. Germany and Spain are the most affected ones; this result is not surprising since these two countries display the lowest effective taxes rates in 1995 among developed countries. The impact is very large for Spain since inward FDI would be roughly driven back to zero.

Table 9
Impact on inward FDI of the adoption of a common tax scheme in the EU
(effective tax rates, 1995)

Country	Inward FDI (millions USD)	Gains in millions USD		Gains in % of total inward FDI in the countries of the sample	
		Generalised credit scheme	Generalised exemption scheme in the EU	Generalised credit scheme	Generalised exemption scheme in the EU
Belgium-Luxembourg	5507	-93	103	-0.09	0.10
Germany	21815	-866	415	-0.81	0.39
Denmark	1387	-6	61	-0.01	0.06
Spain	1051	-925	442	-0.87	0.42
France	6917	-427	234	-0.40	0.22
United Kingdom	28554	0	0	0.00	0.00
Ireland	4968	-312	178	-0.29	0.17
Italy	2106	-302	183	-0.28	0.17
Japan	5516	0	0	0.00	0.00
Netherlands	4378	0	53	0.00	0.05
United States	24154	-10	60	-0.01	0.06
Total	106354	-2941	1729	-2.77	1.63
Sub total UE15	76683	-2931	1669	-2.76	1.57

Source: own calculations based on Equation (4).

Conversely, a move of Ireland and of the United Kingdom to the exemption scheme applied elsewhere in Europe would benefit raise FDI to a much greater extent than in the simulation

based on nominal rates: USD 1.7 billion against USD 0.3 billion. Again, Germany and Spain are the most affected, but this time positively. Because they offer the lowest effective rate in the EU, they become attractive for foreign investors (especially the British ones) who previously operated in credit schemes. Accordingly, ¾ of the additional inward investment in these two countries from European partners comes from the UK, the rest coming from Ireland. Since other EU countries were already using exemption schemes, their investors were already taking into account tax differentials with the UK. After the move, the UK remains with a higher effective rate and unchanged differentials; hence, no country will modify its investments to the UK. There is potentially one exception however, namely Ireland, but the latter country was operating in a credit scheme with a lower tax rate than Great Britain.

5.2. Harmonisation vs. competition on tax rates

Now we turn to a different exercise, which considers various outcomes associated with the non sustainability of tax differentials between EU countries, in a context of mobile capital.

Three scenarios can be simulated: harmonisation, competition and dumping on tax rates. Harmonisation means a convergence towards a simple average of tax rates within the EU, under the assumption "one country one vote"; this can be done either for nominal or effective tax rates. Competition means that tax rates converge towards the lowest one, observed in 1995 in Europe. Lastly, dumping, which is the solution of a non co-operative game between European governments, leads to a zero corporate taxation. The simulations are run without harmonising tax schemes, in order to disentangle the two types of effects. Let us firstly consider nominal rates in Table 10. Not surprisingly, the country with the lowest nominal tax rate before the harmonisation will be the loser, namely Ireland. Ireland loses USD 2.2 billions, out of USD 5 billions. The benefits are spread over the majority of other countries within the sample, the United Kingdom being the least concerned European country due to a very small tax difference to the average. As far as third countries are concerned, inward FDI in Japan and in the USA is not affected due to unchanged European tax average. However, there is a slight positive effect for the EU15 (0.5% increase in inward FDI) due to the special tax schemes in the UK and in Ireland: this two countries operate with credit schemes, with low nominal tax rates. This is an incentive for their own firms not to export capital, since they would pay the difference between the foreign tax and the national tax rate. The disincentive is not negligible for Ireland, since the tax rate spread is always superior to 20 points, whatever the European partner. Shifting to tax harmonisation cancels the discrepancy between domestic and foreign tax rates, and provides incentive for Irish and British firms to locate abroad; the impact is large enough to generate a global gain for the EU.

Table 10
Impact of harmonisation/competition/dumping on inward FDI (nominal tax rates, 95)

Country	Inward FDI (millions USD)	Gains in millions USD			Gains in % of total inward FDI in the countries of the sample		
		Harmonisation	Competition	Dumping	Harmonisation	Competition	Dumping
Belgium-Lux.	5507	762	762	762	0.72	0.72	0.72
Germany	21815	601	601	601	0.57	0.57	0.57
Denmark	1387	161	161	161	0.15	0.15	0.15

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Spain	1051	306	306	306	0.29	0.29	0.29
France	6917	81	81	81	0.08	0.08	0.08
United Kingdom	28554	48	48	48	0.04	0.04	0.04
Ireland	4968	-2251	-2251	-2251	-2.12	-2.12	-2.12
Italy	2106	444	444	444	0.42	0.42	0.42
Japan	5516	0	-2191	-3163	0.00	-2.06	-2.97
Netherlands	4378	269	269	269	0.25	0.25	0.25
United States	24154	0	-2063	-3378	0.00	-1.94	-3.18
Total	106354	420	-3833	-6120	0.40	-3.60	-5.75
UE15	76683	420	420	420	0.40	0.40	0.40

Source: own calculations based on Equation (6).

With the Irish tax rate set at a more “normal” level, the impact of harmonisation and competition is smaller (see Table 11). This is due to the fact that harmonisation is done on a higher EU average (35.4%, to be compared to 32.5% when the 10% Irish rate is used), and competition leads to a much higher rate (33% instead of 10%). The tax differential with the US and Japan narrows, and the gains and losses shrink⁸, except in the dumping case, because the United States and Japan loose now more in terms of tax rate differentials (see below).

Table 11
Impact of harmonisation/competition/dumping on inward FDI, Irish case set to the average of EU members of the sample (nominal tax rates only, 1995)

Country	Inward FDI (millions USD)	Gains in millions USD			Gains in % of total inward FDI in the countries of the sample		
		Harmonisation	Competition	Dumping	Harmonisation	Competition	Dumping
Bel-Lux	5507	447.1	463.0	463.0	0.42	0.44	0.44
Germany	21815	267.8	284.7	284.7	0.25	0.27	0.27
Denmark	1387	-149.0	-132.5	-132.5	-0.14	-0.12	-0.12
Spain	1051	-42.1	-24.2	-24.2	-0.04	-0.02	-0.02
France	6917	-200.1	-184.6	-184.6	-0.19	-0.17	-0.17
UK	28554	-231.4	-215.9	-215.9	-0.22	-0.20	-0.20
Ireland	4968	0.0	16.9	16.9	0.00	.02	0.02
Italy	2106	86.5	104.6	104.6	0.08	0.10	0.10

⁸ In this case, the US are not indifferent to tax harmonisation, because the credit scheme operated in the UK, with a British tax rate now above the American one, discourages British investments in the US. In Japan, the net impact of harmonisation in the EU remains zero, since the Japanese corporate tax rate is still above the European one.

Japan	5516	0.0	-228.8	-3436.5	0.00	-0.22	-3.23
Netherlands	4378	-36.9	-21.2	-21.2	-0.03	-0.02	-0.02
USA	24154	-15.6	-217.2	-3654.8	-0.01	-0.20	-3.44
Total	106354	126.3	-155.1	-6800.3	0.12	-0.15	-6.39
EU 15	76683	141.9	290.9	290.9	0.13	0.27	0.27

Source: own calculations, based on Equation (6).

Turning back to Table 10, the two scenarios of competition and dumping do not change anything to the harmonisation story as far as FDI across European countries is concerned, since tax differentials within the EU move in the same way (only the average level of taxes varies across the three scenarios). In addition, third countries, which are operating under credit scheme, are not affected by a reduction in tax rates in Europe (excepted in the case where the European tax rates move from above to under their own rates). As hosts, however, these countries are affected by the growing competition of European locations as EU countries race to the bottom. In absolute terms, the United States and Japan display similar evolutions. In proportion of observed FDI inflows, the evolutions are quite different however: Japan would lose up to two thirds of its inward investment in case of a dumping. This is typically the negative outcome for a third country of a non-co-operative game within the EU.

The same mechanisms apply in the simulation with effective rates (Table 12): the three scenarios lead to similar changes in inward FDI for EU countries, whereas the United States and Japan become less attractive when EU countries race to the bottom. However the latter losses are smaller than in the simulation with nominal rates, and the distribution of gains and losses among European countries differs (Germany and Spain are the main losers instead of Ireland).

Table 12
Impact of harmonisation/competition/dumping on inward FDI
(effective tax rates, 1995)

Country	Inward FDI (millions USD)	Gains in millions USD			Gains in % of total inward FDI in the countries of the sample		
		Harmonisatio n	Competitio n	Dumping	Harmonisatio n	Competitio n	Dumping
Belgium-Lux.	5507	485	485	485	0.46	0.46	0.46
Germany	21815	-865	-865	-865	-0.81	-0.81	-0.81
Denmark	1387	871	871	871	0.82	0.82	0.82
Spain	1051	-925	-925	-925	-0.87	-0.87	-0.87
France	6917	-280	-280	-280	-0.26	-0.26	-0.26
United Kingdom	28554	1334	1334	1334	1.25	1.25	1.25
Ireland	4968	-33	-33	-33	-0.03	-0.03	-0.03
Italy	2106	27	27	27	0.03	0.03	0.03

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Japan	5516	0	-1117	-2228	0.00	-1.05	-2.09
Netherlands	4378	872	872	872	0.82	0.82	0.82
United States	24154	60	-1133	-2319	0.06	-1.07	-2.18
Total	106354	1546	-765	-3061	1.45	-0.72	-2.88
UE15	76683	1486	1486	1486	1.40	1.40	1.40

Source: own calculations based on Equation (4).

5.3. *Impact of tax harmonisation and competition on tax revenues in EU countries*

The likelihood of the various scenarios presented in the previous sections will crucially depend on their impact on public revenues. The impact of tax competition and of tax harmonisation on fiscal balance is calculated in Table 13. Note that these results rest on two crucial assumptions: first, a variation in tax rates leads to a proportional variation in tax revenues, i.e. that the elasticity of revenues to tax rates is constant; second, the endogenous reaction of output to a tax reform is not accounted for.

The impact of nominal tax competition is highly uneven across countries, mostly due to the Irish very low tax rate, which makes competition especially costly for the fiscal balance of EU countries, whose revenues would fall by up to 2.6% of GDP (in Italy). Conversely, the impact of a harmonisation would be moderate, except in Ireland where tax revenues would rise by 6.5% of GDP. If harmonisation occurs after Ireland has come back to a “normal” level of corporate taxation, then the impact on fiscal balance in the European partners becomes almost negligible.⁹

Effective tax competition leads to similar orders of magnitude for public revenues as nominal tax competition, although the distribution of gains and losses across European countries is different (the main losers are the UK, Italy, Ireland and Denmark). Conversely, given the considerable dispersion of effective tax rates, harmonising them leads to very unevenly spread gains and losses across EU countries, revenues rising by more than 1% of GDP in Spain and Germany and falling by over 1% in the UK.

Table 13
Impact of harmonisation or competition on tax revenues (in % of GDP)

Country	Corporate tax revenues in 1995 (% of GDP)	Impact on tax revenues of				Rise in the immobile base taxes ^(a) which compensates competition (in %)	
		Harmonisation		Competition		Nominal rates	Effective rates
		Nominal rates	Effective rates	Nominal rates	Effective rates		
Bel-Lux	0.46	-0.08	-0.06	-0.34	-0.26	.9	2.2
Germany	1.08	-0.16	1.07	-0.79	-0.01	.6	0.1

⁹ Not reported here to save space.

Denmark	1.96	-0.11	-0.48	-1.39	-1.22	.0	4.4
Spain	1.86	-0.15	1.87	-1.33	0.00	13.1	0.0
France	1.61	-0.06	0.45	-1.13	-0.58	9.5	4.9
UK	3.27	-0.09	-1.14	-2.28	-2.21	19.0	18.5
Ireland ^(b)	2.92	6.45	0.26	0.00	-1.34	0.0	11.1
Italy	3.60	-0.39	0.21	-2.60	-1.70	9.4	12.6
Netherlands	3.26	-0.27	-0.83	-2.33	2.05	11.7	10.2
Total EU	2.05	-0.11	0.39	-1.51	0.88	10.0	2.8

Source : OECD and own calculations.

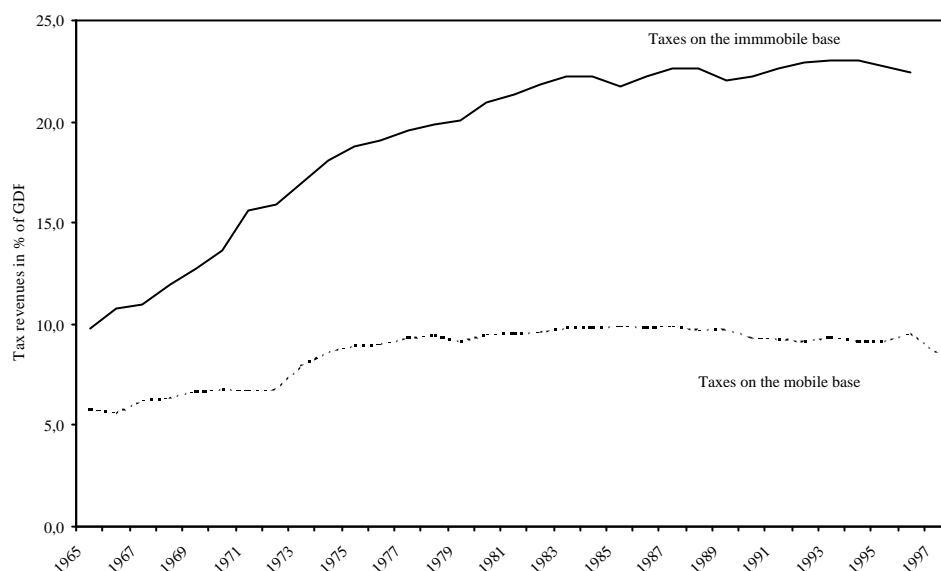
By definition, the impact of dumping on tax revenues equals the ratio of corporate tax revenues over GDP.

^(a) Personal income taxes plus employees social security contributions. ^(b) The nominal tax rate for Ireland is the observed 10% one.

But should tax competition occur, given the restrictions imposed by the Stability Pact for EU countries, taxes on less mobile bases would have to be raised. As an illustration, the compensating rise in these “non mobile base”¹⁰ taxes is calculated in Table 13. The tax burden would be very unevenly, and in most cases dramatically increased, whatever the scope of tax competition (nominal or effective rates). Personal tax rates would be increased up to 19% in the UK or Italy in the case of nominal tax competition, and up to 18.5% in the UK in the case of effective tax competition. In the longer run, this result raises the problem (largely out of the scope of this paper) of a possible “social” competition in European countries, and of the financing of public goods. Such an outcome may have already begun in Europe, as evidenced by growing gap between tax revenues levered on the mobile and on the immobile base (Figure 6).

¹⁰ Here the sum of personal income taxes and employees social contributions, and for simplicity summed-up in “personal taxes”.

Figure 6
Taxes on the mobile and on the immobile base in the EU (EU mean)



Source: OECD, IMF and own calculations. Taxes on the immobile base are measured by personal income revenues, social contributions of employees and VAT revenues. Taxes on the mobile base are measured by social contributions of employers and corporate taxes revenues.

In sum, tax competition would be harmful for those bases which are little mobile. Tax harmonisation appears less painful if implemented on nominal rates than on effective rates. Yet, harmonising the sole nominal rates would probably miss the aim of tax co-ordination which is “to rule out harmful competition”, whether it takes the form of low tax rates or of exemptions.

5.4. The impact of EMU

The necessity of tax co-ordination is partially due to the progresses of the European integration, namely the establishment of the euro. Hence, the losses entailed through tax harmonisation or competition must be compared to the gains provided by the launching of the euro. These gains are mainly linked to the fact that, since it cancels exchange rate risks into the euro-zone, the single European currency should induce an increase in FDI flows within the euro zone.

The impact of the euro is simulated by setting the bilateral volatility of currencies to zero. The bilateral volatility between other currencies and the euro is set to the bilateral volatility between these currencies and the DEM (considered as a prefiguration of the euro), while the bilateral volatility between other currencies (here, the USD and the JPY) remains unchanged. Two cases are examined. Firstly, we simulate the euro-11 present situation, where all European countries of the sample, excepted Denmark and the UK, adopt the euro. However, one of the outsiders of EMU (the UK) has been at the centre of EU discussions concerning

tax harmonisation. Hence, it is interesting to perform a second simulation where Denmark and the UK enter EMU.

Table 14
Impact on inward FDI of UK and Denmark entering the EMU, 1995

Country	Inward FDI (millions USD)	Impact of EU11		Marginal impact of UK and Denmark entering the EMU	
		Millions USD	% of total inward FDI	Millions USD	% of total inward FDI
Bel-Lux	5507	1171	1.1	277	0.3
Germany	21815	843	0.8	293	0.3
Denmark	1387	397	0.4	829	0.8
Spain	1051	1394	1.3	311	0.3
France	6917	801	0.7	268	0.3
UK	28554	91	0.1	1588	1.5
Ireland	4968	954	0.1	294	0.3
Italy	2106	2877	2.7	315	0.3
Japan	5516	438	0.4	76	0.1
Netherlands	4378	788	0.7	273	0.3
USA	24154	-193	-0.2	-110	-0.1
Total	106354	9561	9.0	4414	4.1
EU15	76683	9316	8.8	4448	4.2

Source: own calculations, using Equation (4).

The results are given in Table 14. The Single currency clearly increases inward FDI in the EU, by 8.8% of total inward FDI. This significantly compensates for the global losses that would be endured in the EU with any form of tax co-ordination (on fiscal schemes as well as on tax rates). Of course, the Single currency has the same impact on inward and outward FDI, since the bilateral volatility of i against j is the same as the bilateral volatility of j against i . However, the global impact of the Single currency cannot be considered as negligible, since it allows for an efficient allocation of capital, and for an increase of intra-euro zone trade.¹¹ For the UK, entering EMU leads FDI inflows (and outflows) to increase by 1.5% of OECD FDI flows, which is roughly equivalent to the impact of a harmonisation of effective corporate tax rates (Table 12) and much higher than the impact of nominal tax rate scenarios.

¹¹ FDI flows are complements for trade in the OECD. See Fontagné & Pajot (1999).

6. CONCLUSION

In this paper, various measures of corporate tax differentials are compared, and their impact on FDI is shown to be significantly negative. The consequences of various tax scenarios (harmonisation, competition, dumping) on FDI are derived. Contrasting with previous studies on this issue, FDI flows between EU countries and Japan or the US are closely accounted for. The simulations lead to the following conclusions.

Firstly, FDI from Japan and the United States to EU countries is indifferent to the level of corporate taxes in Europe, because investors from both countries are subject to a credit scheme on the benefits of their foreign subsidiaries (hence, they are refunded for taxes paid abroad).¹² As host countries, however, Japan and the US are sensitive to corporate taxes in Europe: in lowering the average EU tax rate compared to Japanese and US tax rates, a tax competition on nominal rates in Europe would reduce inward investments by USD 2 billion in Japan and in the US. Hence, the US and Japan would suffer from a race to bottom rates in Europe. Conversely, tax harmonisation would have no impact on them, both as investors and as host countries.

Secondly, EU countries as a whole would benefit from tax competition in terms of FDI inflows, although they would suffer from a substantial loss in tax revenues. The distribution of gains and losses among EU countries depends on whether nominal rates or effective rates are harmonised. Ireland would suffer from competition or harmonisation of nominal rates, whereas Spain and Germany would suffer from competition or harmonisation in effective rates.

Finally, for FDI among EU countries, harmonising taxation schemes would have more impact than harmonising tax rates. The adoption of a common credit scheme would reduce inward FDI in the EU by USD 3 billion due the fact that all tax incentives would disappear (investors would be applied their own domestic tax rates). Conversely, the adoption of a common exemption scheme would raise FDI within the EU because UK investors would get an incentive to invest abroad.

¹² Except when EU rates are above Japanese or American ones (which is rarely the case),

APPENDIX

Variables and data sources

The following notation are used: i is the host country, j the investing country, t the period under consideration.

1 Control variables

2 Market potential

We tabulate $SGDP$ as an indicator of market potential taking into account internal transportation costs in the host country and transportation costs between the host country and the regional market, including internal transportation costs on these foreign markets. The first step is to compute distances weighted by the regional GDPs within Europe. One considers regions belonging to European countries i and j and computes weighted distances between these regions. This gives us average distances between countries i and j . The formula is the following:

$$d_{ij} = \sum_{k \in i} \left(\sum_{k' \in j} z_k d_{kk'} \right) z_k$$

$$z_k \equiv \frac{GDP_k}{GDP_i}$$

$$z_{k'} \equiv \frac{GDP_{k'}}{GDP_j}$$

In a second step, one introduces these transportation costs in the calculation of market potentials, using national GDPs in purchasing power parity (source: IMF and CEPII-CHELEM). This gives us the variable $SGDP$ that will be used in the estimations.

$$SGDP_{ijt} = \frac{GDP_{it}}{d_{iit}} + \sum_i \frac{GDP_{jt}}{d_{ijt}} \text{ if } i, j \in \text{Europe}$$

$$SGDP_{ijt} = \frac{GDP_{it}}{d_{iit}} \text{ if } j = \text{Japan, USA}$$

3 Lagged real exchange rate

$Q_{ij}(t-1)$ is the lagged real exchange rate using producer prices and 1990 as a base year (IMF, lines rf and 63).

4 *Size of the investing country*

We consider the PPP GDP of the investing country. This aims at controlling for the fact that larger countries invest more, other things being equal.

5 *Bilateral openness*

CINGDP is the sum of bilateral exports and imports over the GDP of the reporting country (not in percentage). We do not expect to capture hindrances to trade with such variable, but the general common determinants of trade and investment not controlled elsewhere. Direction of Trade Statistics (IMF) is the data source.

$$\text{CINGDP}_{ij} = \frac{X_{ijt} + M_{ijt}}{\text{PIB}_{it}}$$

6 *Difference in market sizes*

The difference in market sizes is simply defined as the difference in PPP GDPs between countries i and j , using the Balassa normalisation procedure. This variable is identical whether i is larger or lower than j .

$$\text{DGDP}_{ijt} = 1 + \frac{w \ln w + (1-w) \ln(1-w)}{\ln 2}, \text{ with } w = \frac{\text{GDP}_{it}}{\text{GDP}_{it} + \text{GDP}_{jt}}$$

7 *Transportation costs*

We consider the great arc cycle distances between i and j economic centres.

8 *Dummies*

DU6 : UK/USA 1995

DU11 : USA/Japan 1990.

9 *Policy variables*

10 *Corporate taxes*

$TEOSijt$ is the absolute difference between i and j taxes on corporate income standardised by the corresponding operating surplus, in percentage:

- taxes on corporate income as a % of GDP (Line 18 OECD, Financial and Fiscal Affairs, Compendium), available for 1985, 1990, 1992 to 1995;

- GDP in local currency (OECD, national accounts);
- Operating surplus in local currency (OECD, national accounts);
- Value added in local currency (OECD, national accounts).

Then, the calculated value is corrected for the fiscal regime:

- if the investing country has adopted an exemption scheme, the above calculation applies;
- if the investing country has adopted a (partial) credit scheme and the effective tax rate in j is larger than the effective rate in i , then $TEOSijt=0$;
- if the investing country has adopted a (partial) credit scheme and the effective tax rate in i is larger than the effective rate in j , then the above calculation applies.

Since taxes on imports and VAT enter in the calculation of the operating surplus, we check that results are not affected by such outcome and calculate a new variable $TEVAijt$ using the value added to standardise taxes.

Lastly, we consider the nominal tax rates ($TNOSijt$), using the same principles of calculation. For example, since Ireland imposes a 10% tax rate on inward investments, this rate (which is the lowest in the sample) applies to all foreign investors from countries with exemption schemes; in contrast, the nominal US tax rate (34%) applies to US investments in Ireland since US investors are subject to a credit scheme.

11 Social contributions

$SOCR_{ij}$ is defined as the difference in the share of employers' social contributions in the total employees' compensation in countries i and j .

$$SOCR_{ijt} = soc_{it} - soc_{jt}$$

The contributions are given in % of GDP in line 22 of Financial and Fiscal Affairs. The compensation of employees paid by resident producers is taken from OECD national accounts, as are the GDPs.

12 Exchange rate volatility

The exchange rate volatility is defined as the coefficient of variation of monthly nominal bilateral exchange rate (monthly standard deviation of the nominal bilateral exchange rate divided by its average) over the current year, here multiplied by 100 (IMF, International Financial Statistics, line rf).

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APPENDIX: VARIABLES AND DATA SOURCES

The following notation are used: i is the host country, j the investing country, t the period under consideration.

13 Control variables

1.1 potential

We tabulate $SGDP$ as an indicator of market potential taking into account internal transportation costs in the host country and transportation costs between the host country and the regional market, including internal transportation costs on these foreign markets. The first step is to compute distances weighted by the regional GDPs within Europe. One considers regions belonging to European countries i and j and computes weighted distances between these regions. This gives us average distances between countries i and j . The formula is the following:

$$d_{ij} = \sum_{k \in i} \left(\sum_{k' \in j} z_{k'} d_{kk'} \right) z_k$$

$$z_k \equiv \frac{GDP_k}{GDP_i}$$

$$z_{k'} \equiv \frac{GDP_{k'}}{GDP_j}$$

In a second step, one introduces these transportation costs in the calculation of market potentials, using national GDPs in purchasing power parity (source: IMF and CEPII-CHELEM). This gives us the variable $SGDP$ that will be used in the estimations.

$$SGDP_{ijt} = \frac{GDP_{it}}{d_{iit}} + \sum_i \frac{GDP_{jt}}{d_{ijt}} \text{ if } i, j \in \text{Europe}$$

$$SGDP_{ijt} = \frac{GDP_{it}}{d_{iit}} \text{ if } j = \text{Japan, USA}$$

14 Lagged real exchange rate

$Q_{ij}(t-1)$ is the lagged real exchange rate using producer prices and 1990 as a base year (IMF, lines rf and 63).

15 Size of the investing country

We consider the PPP GDP of the investing country. This aims at controlling for the fact that larger countries invest more, other things being equal.

16 Bilateral openness

CINGDP is the sum of bilateral exports and imports over the GDP of the reporting country (not in percentage). We do not expect to capture hindrances to trade with such variable, but the general common determinants of trade and investment not controlled elsewhere. Direction of Trade Statistics (IMF) is the data source.

$$\text{CINGDP}_{ij} = \frac{X_{ijt} + M_{ijt}}{\text{GDP}_{it}}$$

17 Difference in market sizes

The difference in market sizes is simply defined as the difference in PPP GDPs between countries i and j , using the Balassa normalisation procedure. This variable is identical whether i is larger or lower than j .

$$\text{DGDP}_{ijt} = 1 + \frac{w \ln w + (1-w) \ln(1-w)}{\ln 2}, \text{ with } w = \frac{\text{GDP}_{it}}{\text{GDP}_{it} + \text{GDP}_{jt}}$$

18 Transportation costs

We consider the great arc cycle distances between i and j economic centres.

19 Dummies

DU6 : UK/USA 1995

DU11 : USA/Japan 1990.

20 Policy variables

21 Corporate taxes

TEOSijt is the absolute difference between i and j taxes on corporate income standardised by the corresponding operating surplus, in percentage:

- taxes on corporate income as a % of GDP (Line 18 OECD, Financial and Fiscal Affairs, Compendium), available for 1985, 1990, 1992 to 1995;

- GDP in local currency (OECD, national accounts);
- Operating surplus in local currency (OECD, national accounts);
- Value added in local currency (OECD, national accounts).

Then, the calculated value is corrected for the fiscal regime:

- if the investing country has adopted an exemption scheme, the above calculation applies;
- if the investing country has adopted a (partial) credit scheme and the effective tax rate in j is larger than the effective rate in i , then $TEOSijt=0$;
- if the investing country has adopted a (partial) credit scheme and the effective tax rate in i is larger than the effective rate in j , then the above calculation applies.

Since taxes on imports and VAT enter in the calculation of the operating surplus, we check that results are not affected by such outcome and calculate a new variable $TEVAijt$ using the value added to standardise taxes.

Lastly, we consider the nominal tax rates ($TNOSijt$), using the same principles of calculation. For example, since Ireland imposes a 10% tax rate on inward investments, this rate (which is the lowest in the sample) applies to all foreign investors from countries with exemption schemes; in contrast, the nominal US tax rate (34%) applies to US investments in Ireland since US investors are subject to a credit scheme.

22 Social contributions

$SOCR_{ij}$ is defined as the difference in the share of employers' social contributions in the total employees' compensation in countries i and j .

$$SOCR_{ijt} = soc_{it} - soc_{jt}$$

The contributions are given in % of GDP in line 22 of Financial and Fiscal Affairs. The compensation of employees paid by resident producers is taken from OECD national accounts, as are the GDPs.

23 Exchange rate volatility

The exchange rate volatility is defined as the coefficient of variation of monthly nominal bilateral exchange rate (monthly standard deviation of the nominal bilateral exchange rate divided by its average) over the current year, here multiplied by 100 (IMF, International Financial Statistics, line rf).

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