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How mobile is Capital within the European Union?

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Contents

1.   Introduction

During the last couple of decades the tax competition theory has been extended to a wide range of areas where diverse models coexist, each with its own distinct method and focus. A key result can nevertheless be derived: tax competition prompts governments to set inefficiently low tax rates on interjurisdictionally mobile capital (Zodrow and Mieszkowski, 1986). In fact, tax competition may drive tax rates down to zero (Razin and Sadka, 1991). This narrative of a *tax race to the bottom* underlies recent EU efforts to coordinate capital taxation (Radaelli, 1999). They include proposals for minimum corporate income tax rates in the Ruding report (Commission, 1992), and a code of conduct with respect to harmful tax practices tailored to attract foreign capital in the Primarolo report (Council, 1999).

The undertaxation result depends crucially on three assumptions: firstly, governments give sufficient weight to social welfare[1]; secondly, public expenditure is financed by distortionary source taxes on capital[2]; and thirdly, capital is internationally mobile. The latter assumption is the focus of this paper. We measure how the international allocation of capital depends on taxation by examining the relation between FDI positions and effective corporate income tax rates. In Section 2, we present the model, in Section 3 we discuss the data and their limitations, in Section 4 we present the results, and in Section 5 we conclude with some policy implications.

The focus on capital mobility within the EU is motivated by a relative scarcity of empirical evidence for the EU. As Bond et al.(1999) note, most studies concern the US. They generally reveal a significant impact of taxation[3]. The scant studies concerning the EU point in the same direction[4]. However, Gordon and Bovenberg (1996) review a

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[1] Edwards and Keen (1996) derive the minimum conditions under which, when governments are neither entirely benevolent nor wholly self serving, the undertaxation of capital continues to hold.

[2] Bucovetsky and Wilson (1991) show that in the face of taxation of income from relatively immobile labour, tax competition may still lead to undertaxation of income of relatively mobile capital. The undertaxation still depends, however, on exogenous restrictions on the tax system.

[3] Hines (1996) reports a negative impact of taxation on FDI; Hines and Rice (1994) on fiscal corporate income. Altshuler et al. (1999) identify, moreover, an increase of the impact of taxation.

[4] Devereux and Freeman (1995) and Bénassy-Quéré et al. (2000) report a significant impact of taxation on FDI; Yamada and Yamada (1996) on the location of Japanese multinationals. In addition, Sachs (1997) provides anecdotal evidence that Ireland has been successful in attracting FDI through tax concessions. On the other hand, Clegg, Scott, and Green (1999) do not find a significant impact of taxation on FDI.

strand of literature that suggests that capital is less mobile than is often believed[5]. In short, capital mobility is not an undisputed tenet, particularly within the EU.

2.   The model

The point of departure for our estimation of EU capital mobility is Hines's (1996) paper on the relation between FDI positions in property, plant, and equipment (PPE) of seven investing countries, and the corporate income tax rates of fifty US states. Capital mobility implies that, *ceteris paribus*, low tax states attract relatively much FDI, and high tax states relatively little. The linear approximation of his reduced form FDI model is:

1. $\sigma_{ij} = a_i - c_j s_i + b_j s_i (t_i - \bar{t}) + u_{ij} \qquad i = 1,..,50, \; j = 1,..,7$

where

2. $\sigma_{ij} = \dfrac{I_{ij}}{I_j}$

I_{ij} denotes the FDI position in PPE in state i of country j, I_j the corresponding total for the US, and σ_{ij} thus the FDI share in state i of country j. Furthermore, α_i is a state specific constant measuring the relative size of its business activity, c_j a country specific constant, s_i state i's population share, β_j the tax rate parameter of interest, t_i state i's statutory corporate income tax rate, $\bar{t}$ the US mean corporate income tax rate, and u_{ij} an error term.

Hines controls for the size of the investing country by using FDI shares, σ_{ij}, rather than total FDI, I_{ij}. Similarly, he controls for the size of the state that is being invested in by letting population shares, s_i, interact with the explanatory variables. Country and state specific effects are captured by country and state dummies, while the independent variable is the statutory state corporate income tax rate relative to the US mean.

We closely follow Hines in estimating the relation between the FDI position of eight investing EU countries and the effective corporate income tax rates of fifteen EU countries and the Belgium-Luxemburg economic union (BLEU). As will become clear

[5] Horioka and Feldstein (1980) find a high correlation between domestic savings and investment. Mishkin (1984) finds an inequality between interest rates across countries. Adler and Dumas (1983) find a home bias in international portfolios. This is inconsistent with perfect capital mobility.

shortly, our slightly divergent estimation procedure instigates a modification of Hines's model. We replace the destination dummies by two control variables: population and GDP per capita, that proxy respectively size and level of development. We expect, in line with the findings of for example Altshuler et al. (1998), that both variables have a positive impact upon FDI positions. Our regression equation is thus:

3. $\sigma_{ij} = \alpha_i + \beta_j s_i(t_i - \bar{t}) + \gamma_j \ln p_i + \delta_j \ln \dfrac{gdp_i}{p_i} + u_{ij},$ $i = 1,..,14, \ j = 1,..,8$

where all variables have a similar interpretation as above, except that FDI positions comprise all assets rather than just PPE, and that tax rates are effective corporate income tax rates calculated on the basis of published financial accounts of corporations rather than statutory corporate income tax rates. Furthermore, p_i denotes the population of country i in millions, and gdp_i the GDP of country i at purchasing power parity of 1990 (OECD, 1998).

The parameter of interest, β_j, can be interpreted as a semi-elasticity of FDI with respect to corporate taxation. This follows directly from the regression equation, as

4. $\beta_j = \dfrac{\partial \sigma_{ij}}{\partial s_i(t_i - \bar{t})} = \dfrac{\partial I_{ij}}{\partial(t_i - \bar{t})} \dfrac{1}{s_i I_j}$

under the assumption that s_i and I_j are constant[6]. Replacing them by their mean values $\bar{s}_i = 1/14$ and $\bar{I}_{ij} = I_j/14$ yields

5. $\beta_j = \dfrac{\partial I_{ij}}{\partial(t_i - \bar{t})} \dfrac{1}{\bar{I}_{ij}}$

In short, β_j is a semi-elasticity measuring the response of country j to a to change in the effective corporate income of an average country that is being invested in. In particular, it measures the percentage change in the FDI position of country j in an average country that is being invested if the latter changes its corporate income tax rate such that the difference between its rate and the EU mean changes by one percentage point.

[6]Devereux and Freeman (1995) find empirical support for a two step investment procedure, where investors first decide whether to invest abroad and secondly where to invest, a procedure that is consistent with a constant I_j. Furthermore, changes in population shares are negligible compared to changes in FDI, which justifies treating s_i as a constant.

3.   The data

The FDI data come from the EUROSTAT statistical office, which compiles bilateral FDI flows as well as positions on the basis of common EUROSTAT/OECD questionnaires sent to national banks and national statistical offices of all EU countries. These questionnaires are consistent with the operational definition and recommendations of the IMF. There is, however, a lack of coherence due to diverging national collection methods and classifications. For this reason EUROSTAT harmonises national data, making meaningful international comparison possible.

FDI is defined as *international investment by a direct investor to acquire a lasting interest in a direct investment enterprise in an economy other than its own*. It includes both greenfield and brownfield investment, that is, both initial and subsequent capital transactions between the two entities. International investment is, however, only counted as FDI if the direct investor owns at least ten percent of the direct investment enterprise. If this requirement is not met, international investment counts as portfolio investment.

FDI is, furthermore, decomposed into *equity*, *reinvested earnings*, and *other direct investment*. Equity comprises the flow of funds from the direct investor to the direct investment enterprise corresponding to the acquisition of shares and other capital contributions such as direct provision of machinery. Reinvested earnings comprise a direct investor's share of its direct investment enterprise's undistributed profits. Other direct investment is, finally, a catchall that mainly comprises the flow of funds from the direct investor to the direct investment enterprise corresponding to the acquisition of debt securities and trade credits.

Total FDI is then simply the sum of equity, reinvested earnings, and other direct investment. FDI is either a *flow* or a *position*. Flows correspond to the capital transactions referred to above, while positions correspond to the resulting capital stocks. EUROSTAT constructs the end of period position by adding the period's flow to a beginning of period position. It additionally adjusts this information by correcting for inflation, exchange rate changes, as well as for revaluations of the assets and liabilities. An end of period position should thus represent the market value of the capital stock at current prices and exchange rates.

EUROSTAT provides a panel of bilateral decomposed FDI flows and positions for the years 1992 until 1998. We choose to use the *total* FDI positions for the years 1995 and 1996. The reason is simply that total FDI is subject to least measurement error, that positions are less volatile than flows, and that the dataset for the years 1995 and 1996 is most complete. Nevertheless, the measurement error is still substantial due to diverging national collection methods and classifications. This is exemplified by the twenty percent average difference between FDI *abroad* and FDI *in the reporting economy*, where it should of course be zero. Even for the years 1995 and 1996 the data

of the FDI positions of BLEU, Greece, Ireland, Italy, Spain, and Sweden are incomplete and absent. This is why we remove these countries from the sample, and only consider Austria, Denmark, Finland, France, Germany, The Netherlands, Portugal, and the United Kingdom. Table 1 lists their FDI positions in the fifteen EU countries.

Table 1   *FDI positions abroad of eight EU countries in the fifteen EU countries in millions of euro*

	Austria	Denmark	Finland	France	Germany	Netherlands	Portugal	UK
1995								
Austria	-	262	97	207	7949	1302	3	866
BLEU[a]	401	52	521	16750	23163	18867	146	3744
Denmark	41	-	969	93	1531	1570	1	3308
Finland	0	342	-	74	278	245	0	320
France	207	944	727	-	14632	10008	181	15241
Germany	1740	1637	822	7724	-	10963	0	10876
Greece	6	38	0	337	594	505	1	590
Ireland	22	646	78	969	9596	2195	92	5413
Italy	176	161	37	6225	7043	2188	14	3184
Netherlands	745	770	1625	21064	18283	-	238	35298
Portugal	196	275	32	1483	1530	551	-	1428
Spain	48	232	170	8035	6176	4707	806	4012
Sweden	98	1639	1694	513	1831	1672	1	1654
UK	453	3727	932	13343	18882	11707	178	-
1996								
Austria	-	110	163	551	8611	1324	2	784
BLEU	350	170	272	17609	24398	21752	93	7224
Denmark	28	-	780	50	1611	1647	1	3083
Finland	0	510	-	59	296	228	0	292
France	291	940	754	-	15424	11794	146	17806
Germany	1995	1200	1205	8300	-	10876	4	12130
Greece	7	30	1	513	571	744	1	631
Ireland	34	500	199	1500	9308	2871	157	8521
Italy	242	150	117	6819	8792	2788	14	4335
Netherlands	797	1720	2484	19986	16815	-	238	51102
Portugal	192	520	37	1548	1747	776	-	1614
Spain	74	280	173	7914	6622	5430	784	4716
Sweden	142	1890	2460	874	1822	1879	1	1565
UK	421	5360	1093	14451	21578	14712	149	-

Source: EUROSTAT, 1999

[a] Belgium and Luxembourg are consolidated in the Belgium-Luxembourg economic union (BLEU).

The definition of FDI positions in EUROSTAT is broader than that used in Hines (1996): it comprises all assets rather than only PPE. However, at least part of EUROSTAT FDI should precipitate as PPE because of the lasting interest of the direct investor, operationalised by the ten percent ownership requirement. It is for this reason that FDI proxies the international allocation of real capital. Nevertheless, one should be aware of the ability of multinational corporations to shift profits from one country to another without actually relocating productive activity. They may for example engage in 'transfer pricing' whereby the distribution of costs and revenues over foreign subsidiaries is altered through the adjustment of intra-firm prices of intermediate goods. They may also use debt contracts, whereby the distribution of costs and revenues is altered through changes of interest payments by amortisation or issuing of loans.

Some of these shifted paper profits are likely to enter the FDI data through reinvested earnings. This may confound the observed relation between FDI and effective tax rates since profit shifting is driven by statutory rather than effective tax rate differentials. However, high statutory tax rates are often offset by narrow tax bases (Chennells and Griffith, 1997), which implies that a bias of the observed relation between FDI and effective tax rates is unlikely to be large.

We calculate the effective corporate income tax rates on the basis of the published financial accounts of the approximately six-thousand corporations in the Worldscope database. We divide, for each corporation, the corporate income tax paid by the pre-tax corporate income, list for each country the corporations according to the effective corporate income tax rate, and qualify the median effective corporate income tax rate as representative. Table 2 lists these rates for 1995 and 1996.

These effective corporate income tax rates incorporate, in addition to the statutory corporate income tax rate, important aspects of the tax code such as depreciation allowances and investment credits. They are, moreover, relatively easy to calculate and interpret. A possible disadvantage is a simultaneity bias in the estimators, since effective corporate income tax rates determine FDI and may themselves be determined by FDI as pre-tax corporate income directly depends upon investment behaviour[7]. The simultaneity bias is, however, unlikely to be large since FDI is only a relatively small part of total investment. This conjecture is indeed formally confirmed.

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[7] Alternatives are marginal effective tax rates calculated according to the King-Fullerton (1984) methodology. These tax rates do not introduce a simultaneity bias in the estimators as they are calculated ex ante on the basis of the tax code rather than ex post on the basis of tax data. They are, moreover, attractive from a theoretical perspective as they closely correspond to Jorgensons (1993) cost of capital concept. They tend, however, to be sensitive to assumptions underlying their calculation.

Table 2   *Effective corporate income tax rates*[a]

	1995	1996
Austria	17.0	24.1
BLEU	23.4	22.6
Denmark	31.7	31.5
Finland	26.8	28.3
France	36.2	34.9
Germany	40.8	41.1
Greece	31.0	33.2
Ireland	21.6	21.0
Italy	45.8	45.2
Netherlands	30.7	32.2
Portugal	22.6	21.6
Spain	24.0	26.5
Sweden	27.4	27.9
UK	30.4	30.0

Source: Worldscope, 1999

[a] Effective corporate income tax rates are the median ratios of the corporate income tax and pre-tax corporate income as published in the financial accounts of the six thousand largest EU corporations.

The final important set of data consists of the distinct ways countries provide international double taxation relief. Some countries allow crediting of taxes paid on foreign source profits against home tax liabilities, while others simply exempt foreign source profits from home taxation. Thus, governments of 'tax credit' countries effectively pick up the foreign tax bills of their home based investors, while the governments of 'tax exempt' countries reduce the tax base to which their corporate income tax rate applies. This implies that investors based in tax credit countries should be insensitive to tax rate differentials. Their behaviour can thus be used as a benchmark against which the behaviour of investors based in tax exempt countries can be measured. The ways in which countries provide international double taxation relief can in this manner be exploited to control for observable as well as unobservable variables that may confound the impact of taxation on FDI. After Hines (1996), the 'specialness' of the Northern Italy may attract investment *in spite of* high Italian tax rates. This does not, however, confound the impact of Italian taxation on FDI if one considers investment from tax exempt countries *relative to* investment from tax credit countries.

Until recently, EU countries implemented international double taxation relief at their discretion, usually by signing bilateral tax treaties. These treaties have recently been

amended according to the council directive 90/435/EEC on the common system of taxation applicable in the case of parent companies and subsidiaries of different member states, in short the 'parent-subsidiary directive':

Where a parent company, by virtue of its association with its subsidiary, receives distributed profits, the State of the parent company shall, except when the subsidiary is liquidated, either:

- *refrain from taxing such profits, or*
- *tax such profits while authorising the parent company to deduct from the amount of tax due to that fraction of the corporation tax paid by the subsidiary which relates to those profits and, if appropriate, the amount of withholding tax levied by the member state in which the subsidiary is resident, (..), up to the limit of the amount of the corresponding domestic tax.*

Our sample of eight investing EU countries comprises one tax credit country - the UK - and seven tax exempt countries - Austria, Denmark, Finland, France, Germany, The Netherlands, and Portugal (IBFD, 1999). Thus, since only the UK allows crediting of taxes paid on foreign source profits against home tax liabilities, behaviour of UK investors is used as a benchmark against which the behaviour of non-UK investors is measured. This allows us to estimate differential tax elasticities of FDI positions of tax exempt countries.

4.   The results

Table 3 lists the estimates of the tax elasticities, β_j, of the eight investing EU countries. The first four columns correspond to an unconstrained OLS estimation, β_{ols}, the last two to a constrained SURE estimation, β_{sure}, where in accordance with its tax credit status the UK tax elasticity is constrained to zero. The latter estimation procedure implies, however, that the dummies for investing countries must be dropped, hence the use of our modified regression equation (3) rather than Hines's original equation (1). It turns out that for both estimation procedures virtually all tax elasticities have the expected negative sign: the higher the effective corporate income tax rate, the lower the FDI position and vice versa. The only positive estimate - the β_{ols} of Austria - is not significantly different from zero, nor is the β_{ols} of the UK, which is consistent with its tax credit status.

Table 3   *OLS and Constrained SURE estimates: Regression coefficients, t-ratios,*
                   R^2, and standard errors of OLS estimates

	β_{ols}[a]	t-stat	R^{2}[b]	SEE	β_{sure}[a]	t-stat
Austria	4.28	1.57	0.44	9.19	-0.96	2.39
Denmark	-5.09	1.98	0.30	8.91	-1.47	1.40
Finland	-2.41	1.12	0.22	7.37	-4.30	3.35
France	-5.47	2.78	0.49	6.77	-4.64	3.70
Germany	-3.96	2.33	0.51	5.01	-2.34	2.22
Netherlands	-4.65	2.41	0.49	6.58	-6.58	3.86
Portugal	-11.00	4.01	0.56	9.34	-14.31	8.20
UK[c]	-5.51	1.22	0.19	10.93	zero	zero
Log-likelihood and restrictions test[de]					-107.72	$\chi^2 (1) = 0.51$

[a] In both OLS and SURE estimation, constant, log of per capita income and population variables are used.

[b] The R^2 refers to the goodness of fit of the OLS estimation.

[c] In the SURE estimation, the tax elasticity of the UK is constrained to zero due to its tax credit status.

[d] The restricted model is not rejected.

[e] Given the possible endogeneity of the effective corporate income tax rate, we use instrumental variable estimation, estimate the system of equations with constraints, and test the null hypothesis of exogeneity by using the Hausman test, which is not rejected. The instruments are last period's effective corporate income tax rate for seven countries, log of per capita income, log of population, and a constant.

The OLS estimates for the distinct investing countries range from not significantly different from zero for Austria, Finland, and the UK, to -11.00 for Portugal. The constrained SURE estimates range from not significantly different from zero for Denmark, to -14.31 for Portugal. The SURE estimates have a higher statistical significance than the OLS estimates. This suggests, given an a priori belief in behavioural responses to tax rates, that the distinction between tax credit and tax exempt countries is important. The case of Austria exemplifies the point: the sign of the OLS estimate suggests adverse behaviour of Austrian investors; the sign of the SURE estimate is, however, correct. Their arithmetic mean of the SURE estimates is -4.33. Thus, the rough and ready conclusion is that an EU country typically increases its outward FDI position in another EU country by approximately four percent if the latter decreases its effective corporate income tax rate by one percentage point relative to the EU mean.

How does this estimate compare to other estimates of this kind? Hines (1999) reports a consensus elasticity of -0.6 for the investment between the US and the rest of the world, which translates into a semi-elasticity of -2 for a typical tax rate of 30%. Thus,

our semi-elasticity of approximately -4 suggests that within the EU, FDI is relatively responsive to tax rates. This hints at a successful integration of the EU capital market, but also at a potentially harmful EU tax competition. Comparisons of this kind are, however, precarious due to differences in samples, definitions, and methods.

A back of the envelope calculation shows that a decrease of the effective corporate income tax rate of one percentage point relative to the EU mean would yield an increase of inward FDI that ranges from 31 million euro for Finland to 2,609 million euro for BLEU. To put this into perspective, this comes down to a less than one percent increase of total investment for Finland, and an almost seven percent increase for BLEU, where total investment is measured by gross fixed capital formation as published in the OECD national accounts. The Netherlands would have welcomed an increase of FDI of 1,528 million euro, which comes down to almost three percent of total investment.

In short, within the EU, FDI responds strongly to tax rate differentials relative to FDI between the US and the rest of the world. Moreover, the responses are substantial relative to total investment. Thus, our results *conditionally* support the EU efforts to coordinate EU capital taxation; conditionally, because the case for tax coordination hinges, in addition to international capital mobility, on the absence of non-distortionary taxes from governments' the strategy sets, as well as on the benevolence of governments. The absence of non-distortionary taxes is, although puzzling from a theoretical perspective, acceptable in the light of what we actually observe: governments do *in fact* tax internationally mobile capital. However, one's stance on the nature of governments must, given the difficulty of positively inducing it from existing data (Oates, 1985, Oates 1999), remain political.

5.   Conclusion

The results of this paper reveal that FDI is responsive to tax rate differentials within the EU: an EU country typically increases its FDI position in another EU country by approximately four percent if the latter decreases its effective corporate income tax rate by one percent. This hints at a successful integration of the EU capital market, but also at a potentially harmful EU tax competition. The results do therefore *conditionally* support the EU efforts to coordinate EU capital taxation; conditionally, because even if capital is infinitely mobile, tax coordination may fail to increase public welfare if governments behave as if they were a leviathan, maximising tax revenue rather than social welfare.

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Abstract

The key result of the tax competition literature is that governments set inefficiently low tax rates on income from internationally mobile production factors. Therefore, there is a case for coordination of EU capital income taxes, provided that capital is mobile within the EU. We measure how the international allocation of capital depends on taxation by examining the relation between FDI positions and effective corporate income tax rates. An EU country typically increases its FDI position in another EU country by approximately four percent if the latter decreases its effective corporate income tax rate by one percentage point relative to the EU mean. This conditionally support the recent efforts of the EU to coordinate capital income taxation. The benefits or costs of tax coordination ultimately depend, however, on whether one views the government as a social welfare maximising agent or tax revenue maximising leviathan.