Tax Competition in EU implies EMTR different: some effects on FDI and Economic Growth Rate[1]

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Abstract

Tax base mobility in a globalised economy implies that tax policy influences savings, domestic investments and inter-jurisdictional capital mobility. Assuming the existence of spatial and temporal interdependence, using: a data set of EU countries, after the capital market liberalisation, and a longitudinal data technique for pooling time series of cross section; we test how difference in national tax influence capital inflows and outflows. More, using a cointegration analysis on GDP procapita and FDI time series', we investigate the link between these two paths.

Empirical analysis

Foreign direct investment (FDI) has increased rapidly during the last decade in EU-countries in some case the FDI grew considerably faster than GDP. The increased internationalization of capital flows due to lower information costs, the completion of EMU, removing of barriers within EU-market for financial markets and more to the general progress in communication field.

Main purpose of this work will be consider some economics effects of inter-jurisdictional tax competition. After the analysis of the empirical literature that focus on the existence of interdependence between national policies, which influence saving, investment, foreign direct investment and indirectly the rate of national growth, we investigate empirically this phenomena using a longitudinal data technique with the main purpose to show how corporate tax rate, deposit rate withholding tax on resident and non-resident rate explain FDI flows after liberalisation within EU area. Finally we test by a cointegration analysis the causality between FDI net and GDP procapita, more in particular the effects produced by inflows of FDI in a host country which apply a low tax rate.

Literature testing the Degree of capital-market integration in OECD Countries

The results of Leibfritz, Thornton and Bibbee's (1997) and Feldstein and Horioka (1980) papers highlight "national rates of saving and investment were highly correlated in OECD countries and (they) interpreted this as

[1] This is part of a jointly paper presented with Joseph McCahery, to Warvick Summer Conference, held in July 2001. This work has been presented to the NEW Conference held in Salerno on September 2001 and it is published in the Conference

evidence that changes in domestic savings translate mostly into corresponding changes in domestic investment and not into capital flows".

Feldstein (1994) argued also that, although capital moves freely among major economies, the preferences of capital owners cause most of the incremental capital that results from increased national saving to remain in the home country, mainly because of aversion to political and currency risk.

"If financial markets remain substantially segmented, then for a typical OECD economy:

a) a tax on business capital will be borne mainly by the owners of capital;

b) a tax change that causes a sustained rise in domestic saving will also cause a rise in domestic investment;

c) domestic investment incentives draw little capital from abroad and only increase domestic investment to the extent that domestic saving is increased."

Feldstein-Horioka's work regressed investment and saving for 16 OECD countries in the period 1960-74. The average ratios were elaborated for each country in order to remove the business cycle influence and estimated a single cross-country regression. Feldstein and Horioka estimated the following equation:

"$I_i/GDP\ I = \alpha + \beta\, S_i/GDP_i + \varepsilon_i$

where I is domestic investment, GDP is gross domestic product, S is domestic saving, a and b parameters and e is a stochastic error term. They argue that a classical open economy view would imply β=0, and in a closed economy β=1. A typical estimate in their paper was that β=0.887. "[2]

The criticism made by Leibfritz, Thornton and Bibbee (1997) highlighted that in "an open economy faces an intertemporal budget constraint (such that the external current account must average zero over time) the use of time-average data will bias the results against capital mobility" so the international capital mobility may be incorrectly rejected.

To avoid this problem, the authors re-estimated the relationship between investment and savings using a panel set of annual observations of investment and saving ratios for 22 OECD countries[3]. The estimated equation is of the form:

$$I_{i,t}/GDP_{i,t} = \alpha_0 + \alpha C_{1(i)} + \alpha P_{2(t)} + \beta S_{i,t}/GDP_{i,t} + \varepsilon_{it}$$

Proceeding.

[2] Leibfritz, Thornton and Bibbee (1997, 24) point out that Feldstein-Horioka procedure has received several criticisms "in particular: the endogeneity of national savings in the regression equation which biases upwards the coefficient on national savings in the regression equation; and the coefficient on national savings is difficult to interpret because the Feldstein-Horioka functional form is unrelated to structural models of investment which tend to explain investment as determined by the cost of capital and the expected return on investment."

[3] Even if I asked to these authors some specification about the panel data they do not provide the detail table.

Where: I investment, S savings and GDP gross domestic product, i index country, t index time, and the dummy variable C(i) takes on a different value for each country[4], the dummy variable P(t) takes on a different value for each period.

They estimated the equation by OLS in the sample period 1960-94 and for the two sub-periods 1960-76 and 1977-94 and "The results[5] using measures of gross investment and saving are as follows:

	α	β	R^2
1960-94	0.0842	0.5301	0.76
	(7.600)	(15.60)	
1960-76	0.1531	0.4878	0.76
	(9.84)	(9.82)	
1977-96	0.0946	0.4459	0.76
	(6.40)	(4.69)	

These results indicate that capital mobility is substantially higher than suggested by Feldstein and Horioka and that capital mobility has increased over time".

The estimated slope coefficient β is 0.53 for the full period however, it declines to 0.45 for the second period. Similar regression results are obtained using net savings and investment. As the authors write "the results suggest that less than half of additional domestic saving remains in a country to fund domestic investment, with the rest being added to the pool of world savings seeking the highest return". Hence, if a country's tax policy is adjusted, to increase investment, the reduction on tax investment might be crucial.

Test on some EU Countries

Considering capital mobility across UE countries we investigate how sensitive is this phenomenon to the difference in effective tax rates across countries. We move from a simple data plot (figure A) which shows the differential in inflow and outflow of direct investment for each country with respect to the withholding tax rate applied by each country.

[4]Leibfritz, Thornton and Bibbee's (1997:24) say that "country dummy removes fixed differences between countries (size) and the time dummy removes time-related factors common to all countries (the international business cycle)".

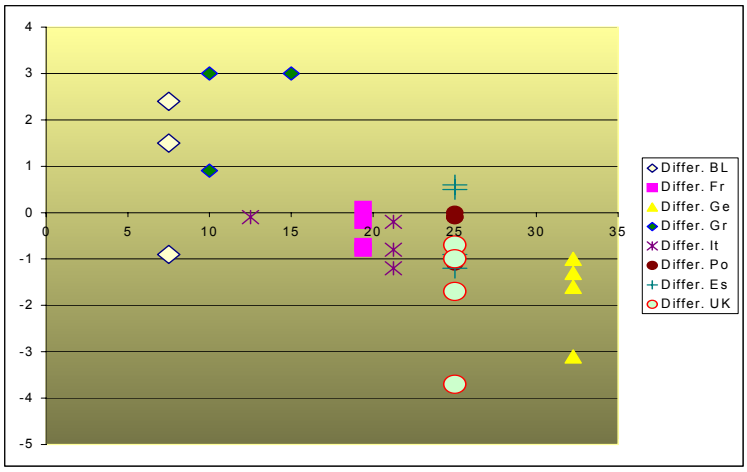

Fig A

Given the existence of spatial and temporal interdependence among the different tax rates applied by each country, we will elaborate a pooled time series of cross section techniques which are used with longitudinal data. Our time series usually refers to multiple observations over time of the single analysed country. Panel data refers to relatively few observations on a relatively larger number of countries. Pooled time series contain observations on n Countries over t years.

The phenomenon may be explained by a standard regression model of the form[6]:

(1) $y_{it} = \alpha_i + \beta_1 TAXC_{i't} + \beta_2 DR_{i,t} + \beta_3 RWT_{i,t} + \beta_4 D_{i,t} + \varepsilon_{it}$

where i = 1,...,n and t = 1,...,t,

α= intercept term[7]

β_1= the ratio of change between the corporate tax and the differential of flow of foreign direct investment

β_2= the ratio of change between deposit rate and the differential of foreign direct investment flow

β_3= = the ratio of change between resident withholding tax and the differential in foreign flow direct investment

β_4= the coefficient that allows a different intercept for each country and for each year.

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[5] These results cannot be check because there are no the relative detailed table, and also on request the authors have not provided it.

[6] $Y_{it} = \alpha + \mathbf{D}_{it}'\boldsymbol{\beta} + \varepsilon_{it}$ with i = 1,...,*N;* t = 1,...,T where α is the intercept; vector $\mathbf{D}_{it}'$ contains K regressors for country i at time t; vector $\boldsymbol{\beta}$ contains K regression coefficients to be estimated by assumption $E\{\varepsilon_{it}\} = 0$ and $Var\{\varepsilon_{it}\} = \sigma_\varepsilon^2$ Nielsen F., Gaddy G., (1999)

[7] The individual-specific intercepts α_i capture any combination of time-invariant variables that have been omitted, knowingly or not, from the regression model; Nielsen F., Gaddy G., (1999). To avoid perfect collinearity we must not include a general intercept α but a set of N indicators δ_{jit} ; therefore we obtain the so called Least Squares with Dummy Variables model.

ε = disturbance term.

Sometimes it seems that the use of longitudinal data introduces new "problems" into the analysis; instead, it provides the leverage needed to address methodological problems which are already present in a single cross section or a single time series. However, we can say that "it allows us to control the heterogeneity bias, or the confounding effect of time-invariant variables omitted from the regression model"[8]. Therefore, given that there are two approaches to estimation of model, the first considers the fixed effects model (FEM) and the other one considers the random effects model (REM); we use the first one. In FEM approach, the αi are considered as fixed constants, as the regression coefficients α_i in the equivalent model of Nielsen F., Gaddy G., (1999)[9]: "where each δ_{jit} is a ..dummy variable which is 1 when i = j and 0 otherwise". There are N δ_{jit} indicators, one for each unit is the analysis. In other words our model "is equivalent to an OLS regression using the deviations of all the variables from their unit-specific means".

However, we have a sample of 8 Countries observed over 4 years. The study does not consider all the European Countries because the sample of some small countries, which provide large tax advantages to the capital owner, are significantly affected by several qualitative variables (e.g. tax treaty provisions). Therefore, these small countries require a separate analysis. The best solution is to consider some of them, in a certain sense, as tax haven[10] which engage in a tax competition race in EU market.

The results obtained, using measures of differential inflow and outflow of foreign direct investment, corporate tax, deposit rate, withholding tax, weighted by GDP per capita are as follows[11]:

	α	β_1	β_2	β_3	R^2	Adjusted R^2
1994-98	3.752	1.259	-0.380	-0.434	0,905	0,825
	(2,279)	(1.910)	(0.217)	(0.147)		

The model shows the interaction between variables across 8 EU countries over 4 years shortly after the liberalisation of capital mobility in the EU. As the table shows the independent variables (corporate tax, deposit

[8] Nielsen F., Gaddy G., (1999)

[9] $Y_{it} = \alpha_1\delta_{1it} + \alpha_2\delta_{2it} + ... + \mathbf{D}_{it}'\beta + \varepsilon_{it}$

[10] Sometimes these countries are guilty of social and fiscal dumping. Marsden (1998).As example the "Luxembourg has been accused of pursuing beggar-thy-neighbour policies by combining strict bank secrecy with zero withholding taxes on interest payments to foreign savers." Also the case of Celtic tiger must be point out because they "well-designed tax policies have transformed it from a relatively .. agrarian economy into a dynamic" economy during the 90s.

[11] The value in brackets is the standard error. The used data are from: World bank database 1999 table expressed in PPP current international $, table 2.4 of Capital income taxation in Europe Trends and trade-offs by J. Gorter and R. A. de Mooij and from IBDF database. The t tests for all the coefficient are significant at level of 95%.

rate, withholding tax) explain part of international investment flow across countries; this implies that interjuridictional competition tax on the capital that moves freely within the EU geographic areas is significant[12].

The existence of a strong interrelation implies that competition between countries, interested in capturing the tax base of the whole market, becomes more significant because capital will follow the maximisation of profits in the global market. The most competitive countries will have an advantage in potential terms of total revenue and a greater rate of economic growth.

FDI Flow within EU

The EU capital market is becoming more and more integrated but capital tax systems remain quite different across the countries this might induce, as said in the first part of the paper, a large tax-base migration within different jurisdctions. In fact the impact of company tax on investment strongly influence the multinational flows and profits allocation.

Devereux and Freeman (1995) using data on bilateral FDI flows between 1984-89 for five EU countries: Germany, France, UK, Italy and the Netherlands jointly with data for the US and Japan, they estimate the tax elasticity of FDI. From this analysis they highlighted that the multinational firms when make investment have a double level of decision making; the first is not really affected by tax factor instead the second is fully influenced by effective tax pressure. Therefore, only when a multinational have decided to invest abroad it must allocate the outward flow in the country which offer the best tax conditions within the international markets.

This and others studies on the investment elasticity can be used to evaluate the overall impact of a reduction in the effective tax rate on inward FDI in the international capital market. The evidence of this phenomena within EU countries in the 1995 and 1996 may be showed in the following tables (A and B).

[12] We investigate on this phenomena also using the Granger Causality to see how much of the current FDI can be explained by past values of Effective tax rate with the purpose to investigate if the coefficients on the lagged FDI's are statistically significant.

Some tests, on data (1990/1998)World bank cdrom 2000 and worldscope database, highlighted that we cannot reject the null hp "Effective Tax rate_ITA does not Granger Cause D(FDIN_BEL), F-Statistic 19.0917 and a probability 0.04977" and also we cannot reject the null hp "Effective Tax Rate_PRT does not Granger Cause D(FDIN_BEL), F-Statistic 20.7039 and probability 0.04607".

TABLE A

FDI procapita positions abroad of 8 EU countries in the rest of EU countries, in euro

1995	**Austria**	**Denmark**	**Finland**	**France**	**Germany**	**Netherlands**	**Portugal**	**UK**	**Total inflow row Countries**
Austria	.	50,11	18,99	3,56	97,36	84,22	0,30	14,78	269,33
BLEU	49,83	9,95	102,00	288,10	283,71	1220,38	14,71	63,88	2032,56
Denmark	5,10	.	189,70	1,60	18,75	101,55	0,10	56,44	373,25
Finland	0,00	65,42	.	1,27	3,41	15,85	0,00	5,46	91,40
France	25,72	180,57	142,33	.	179,22	647,35	18,23	260,06	1453,48
Germany	216,23	313,12	160,92	132,85	.	709,12	0,00	185,58	1717,83
Greece	0,75	7,27	0,00	5,80	7,28	32,66	0,10	10,07	63,92
Ireland	2,73	123,57	15,27	16,67	117,54	141,98	9,27	92,36	519,38
Italy	21,87	30,80	7,24	107,07	86,27	141,53	1,41	54,33	450,51
Netherlands	92,58	147,28	318,13	362,30	223,94	.	23,98	602,29	**1770,51**
Portugal	24,36	52,60	6,26	25,51	18,74	35,64	.	24,37	187,48
Spain	5,96	44,38	33,28	138,20	75,65	304,46	81,19	68,46	751,59
Sweden	12,18	313,50	331,64	8,82	22,21	108,15	0,10	28,22	824,82
UK	56,29	712,89	182,46	229,50	231,28	757,24	17,93	.	2187,60
Total	513,61	2051,45	1508,22	1321,26	1365,35	**4300,13**	167,32	1466,30	
Average	39,51	157,80	116,02	101,64	105,03	330,78	12,87	112,79	
Stand deviation	134,28	521,66	375,39	334,90	337,33	1083,39	44,91	381,21	

TABLE B

FDI procapita positions abroad of 8 EU countries in the rest of EU countries, in euro

1996	**Austria**	**Denmark**	**Finland**	**France**	**Germany**	**Netherlands**	**Portugal**	**UK**	**Total inflow row Countries**
Austria	.	20,90	31,80	9,44	105,13	85,33	0,20	13,33	266,13
BLEU	43,43	32,31	53,07	301,65	297,86	1401,82	9,37	122,85	2262,36
Denmark	3,47	.	152,20	0,86	19,67	106,14	0,10	52,43	334,87
Finland	0,00	96,92	.	1,01	3,61	14,69	0,00	4,97	121,21
France	36,11	178,64	147,12	.	188,30	760,07	14,70	302,81	1627,75
Germany	247,55	228,05	235,12	142,18	.	700,91	0,40	206,29	1760,50
Greece	0,87	5,70	0,20	8,79	6,97	47,95	0,10	10,73	81,30
Ireland	4,22	95,02	38,83	25,70	113,63	185,02	15,81	144,91	623,14
Italy	30,03	28,51	22,83	116,81	107,33	179,67	1,41	73,72	560,32
Netherlands	98,90	326,87	484,68	342,37	205,28	.	23,97	869,05	**2351,12**
Portugal	23,82	98,82	7,22	26,52	21,33	50,01	.	27,45	255,17
Spain	9,18	53,21	33,76	135,57	80,84	349,94	78,95	80,20	821,66
Sweden	17,62	359,18	480,00	14,97	22,24	121,09	0,10	26,61	1041,82
UK	52,24	1018,62	213,27	247,55	263,43	948,12	15,01	.	2758,24
Total	567,44	2542,76	1900,10	1373,43	1435,63	**4950,76**	160,12	1935,36	
Average	43,65	195,60	146,16	105,65	110,43	380,83	12,32	148,87	
Stand deviation	148,85	656,57	478,94	346,26	354,53	1246,91	43,10	509,39	

these tables show that Netherlands has the largest FDI procapita flow within the EU considered countries; this is the most clear example that the multinational firms moves a big part of flow within the EU area and also confirm the rule of financial centres of Netherlands Belgium and Luxemburg. In fact, they have implemented an attractive tax regimes for the multinational and the result is that the number of financial holding companies in the Netherlands significantly increase in the last ten year from 6000 to more than 9000.

The evidence that in small countries there are larger inflow/outflow of capital because their implement an attractive tax regime seems confirmed also in the theoretical literature on tax competition (Kanbur and Keen); which explain why small countries set lower tax rates than large countries. Considering the evolution overtime, significant is the increase of in/outflows in the United Kingdom but this fact this seems confirmed by the role that this country play in the international capital market. In fact, this country is nowadays a centre of financial attraction in EU area because is part of EU but it is not into EURO, so the investor can take advantage by fluctuation in the exchange rate euro-pound.

Even if the differences in the statutory tax rate are not very large, more than 3% between larger countries and others small member; the differences into the two category are more significant. A better indicator concerning the difference between the two mean of the effective tax rate in the last ten year, it was surprisingly more than 10% (small countries 24.6% - large countries 35.8%).

From all the above evidence seems we may conclude that tax differentials have impact on the location of FDI. The attractive countries usually claim that financial investments are good opportunity for the economy only if these flows will be transformed in "real investments" [13] with a real impact on capital formation or employment (as in the case of Ireland). Unfortunately, the data doesn't highlight this claim but considering the difference between inflows and outflows might be a good indicator as in the case of Netherlands.

Economic growth and financial liberalization

Many theoretical and empirical work, in the macroeconomic literature again (Barro and Sala-i-Martin (1995), Jones (2000)), try to explain differences in economic growth across countries.

Even if there is no agreement on what the determinants are of economic growth, most of the literature has found evidence of conditional convergence.

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[13] "Indeed, (as observed by J. Gorter and R.A. de Mooij) the chart reveals that the large inflow of FDI in the Netherlands is accompanied by an even larger outflow. …. To illustrate, for every $100.000 assets invested by US multinationals in German and French affiliates, there were almost three people employed in 1998. For Belgium and the Netherlands, this is less than one employee (BEA, 2000)".

Bencivenga and Smith (1991) and others large part of literature[14] show that financial liberalization may promote financial development. More in particular, financial liberalization may impact on growth because foreign investment permanently producing a reduction of cost of capital; in addition if these investments are efficient the economic growth should increase[15] strongly. For these reasons seems that inward FDI may increase host country's productivity, may enlarge market, and indirectly affect GDP growth.

Considering liberalization of capital flow in 1992 within EU countries and the increased volume of FDI within the unique market we investigate how the relative procapita GDP increase across different countries over the period of 1990/1998.

Firstly, we move from a simple data plot (figure B) which shows the difference in percentage procapita GDP for each of the considered countries in the period 90-96.

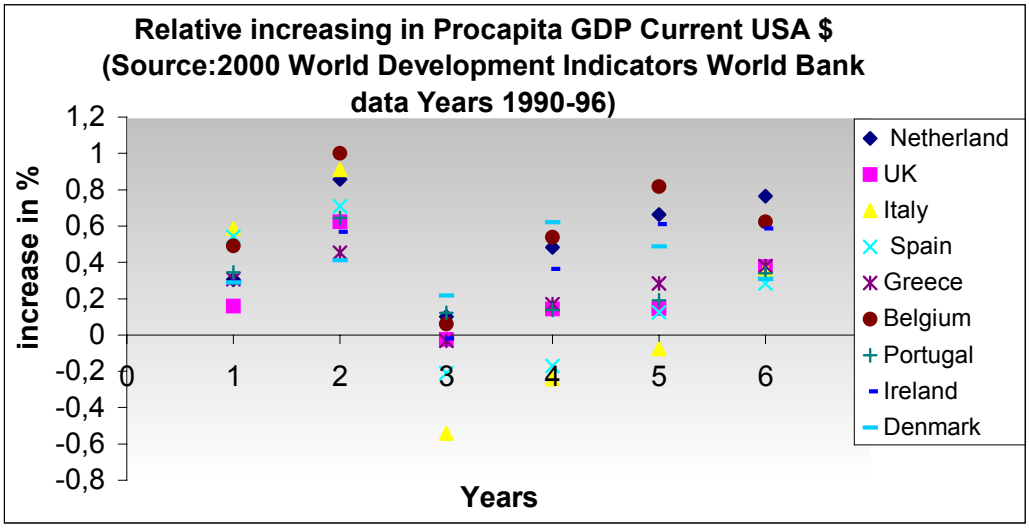

Fig. B

From this plot we immediately we can conclude that this phenomena is complex and must be investigate with advanced econometric tools.

[14] For an overview see, M.S. Khan, A.S. Senhadji (2000)

[15] Even if Bekaert G., Harvey C. R., (2001), specify that "in the aftermath of the recent crises, some economists felt foreign capital had been wasted on frivolous consumption and wasteful investment, undermining the benefits of financial liberalization" .

FDI and growth: causality

As we said above the allocation of capital might affects economic growth of each country; therefore financial flows assume a relevant rule in their economic development[16]. Unfortunately, the data do not allow the clear distinction on how many of this flow are financial and real investments; the most relevant economic theories suggests a causal link between FDI and economic growth of the host country.

As confirmed in the previous empirical investigation a large part of FDI is moved by differential in tax rate. Therefore, we can affirm countries that applies a low tax rate have inflow of FDI and should have larger opportunities of economic growth.

In this part of the work we will empirically test, by a cointegration analysis, the expected causality between Foreign Direct Investment Net (FDIN) and GDPC, on a time series 1975-1998 (World Bank 2000), particular attention is reserved at the last ten years.

Before to run the causality tests we must preliminarily ensure that our variable series have unit root[17] individually; then we apply a cointegration tests to investigate if they are "cointegrated" in the long run. In the case the hypothesis of non-stationarity is not rejected at variables level we test on the initial series on fist and second differences (Table c). In fact, the ADF tests was run under the following hypotheses: 1) the series are stationary at levels (no unit root); 2) the series are stationary at differencing once (one unit root); 3) the series are stationary at differencing twice (two unit roots).

From the result we can see that Belgium and Denmark FDIN is I(0) and GDPC is I(1); for Finland, France, Greece, Italy, Sweden and United Kingdom FDIN is I(1) and GDPC (1); and finally, for Ireland, Spain and Portugal FDIN is I(2) and GDPC is I(2). The results point out that the variables have an unit root and the result is not conclusive therefore we can not be in the case of regressions balanced by what the VAR could give a spurious results.

After the fundamental preliminary analysis we have run the cointegration test using Johansen`s methodology. In all the cases the variables seem to be cointegrated (long-run equilibrium) with the existence of at least one

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[16] Sachs (1997) points at the role of foreign direct investment as the motor of economic development J. Gorter and R.A. de Mooij. Important is the case of Ireland that has taken benefit from net immigration and has grown very fast their GDP, more than double than the rate of US, between 1987 and 1997

[17] To determine the stationarity of series , are applied unit-root tests by using the Augmented Dickey-Fuller procedure (ADF-1981) $\Delta y_t = \alpha + \beta_t + \gamma y_{t-1} + \Sigma \Delta y_{t-i} + \varepsilon_t \ (i=1, ..n)$ The null hypothesis is given by $\gamma = 0$. The results of running the ADF test is significantly different from zero then the null hypothesis of non-stationarity is rejected in favour of hypothesis of stationarity. "If the non-stationarity hypothesis is not rejected at the levels of variables then we try the test on the differences of the initial series. If the series are integrated of order d, that is if each one becomes stationary after differencing it d-times, then we can examine the cointegration among the series."

cointegration equation. For Denmark , Finland, Greece, Portugal Sweden we have 2 cointegrating equations, while for the each of the rest countries the test indicated 1 cointegrating equation.

Hence, we have estimated the Error Correction Model, to investigate the long-run causality between FDIN and GDPC, in term of t-statistics for correction terms as reported in table D. These results highlight a uni-directional long-run causality between FDIN and GDPC and specifically: for Belgium, Greece, France, Finland, Sweden and UK the FDIN influence GDPC, while for Denmark, Spain, Ireland Italy and Portugal the tests highlight the opposite relationship.

Conclusion

Some literature explain international growth differentials with spillover models, we have to look at another factor which could generate persistent economic growth. These empirical provisional results are inducing further investigation; in fact we have considered the effects of fiscal competition but we can ignore factors as: the efficiency of the EU liberalised capital markets; the socio-political factors and the dependence from initial conditions (path-dependent technological change) that can induce flow of FDI within the national economy.

We are following this path because few authors has examined the impact of financial market liberalisation on a large growth prospects. The evidence, exacerbates by market globalisation, show that an increasing number of relatively small countries engage the battle to attract foreign investment offering: lower effective tax rates, efficient and open capital market, efficient and flexible Public Institutions, ect...

Therefore our choice is driven by the circumstance, that cannot be ignored, that tax competition becomes more significant in the global market in which competitive economies might have advantage in term of: 1) total revenue in the short run (in particular small countries); 2) economic growth in the medium-long term (indifference between small and large countries), because foreign owned subsidiaries and affiliates trans-national companies behaviour will push government to shift tax burden from capital onto labour that seems less interjurisdictionally mobile.

At moment seems that EU Commission should use the economic effects of difference in effective tax rates as an automatic system to promote growth in the EU areas less developed, which have a slow and low growth rate, trying influence the capital allocation and investment within these jurisdictions. In this way Commission will automatically reduce the phenomena of capital flying outside EU borders that is growing exponentially in the globalised economy and will reduce the expense to finance the development in these areas.

TABLE C

ADF TEST FOR NON STATIONARITY						
	H_0=non stationarity for FDIN			H_0 = non stationarity of GDPC		
	Level	I difference	II difference	Level	I difference	II difference
Belgium	-3.087			0.7481	-3.2732	
(N=22)	(-3.003)			(-3.001)	(-3.019)	
Denmark	-5.4111			-0.6872	-3.7613	
(N=21)	(-3.040)			(-3.011)	(-3.019)	
Finland	0.1311	-3.724		-0.9934	-4.336	
(N=22)	(-3.011)	(-3.019)		(-3.011)	(-3.019)	
France	-1.509	-3.355		-1.336	-3.269	
(N=22)	(-3.003)	(-3.011)		(-3.003)	(-3.011)	
Greece	-1.364	-3.5618		-1.1163	-3.728	
(N=20)	(-3.019)	(-3.029)		(-3.018)	(-3.011)	
Ireland	-1.089	-4.4487		2.250	-1.388	-3.633
(N=21)	(-3.003)	(-3.011)		(-3.003)	(-3.011)	(-3.019)
Italy	0.3435	-3.360		-1.965	-3.123	
(N=22)	(-3.003)	(-3.011)		(-3.003)	(-3.011)	
Portugal	-1.3323	-3.275		-0.6194	-2.732	-3.2873
(N=22)	(-3.003)	(-3.011)		(-3.003)	(-3.011)	(-3.019)
Spain	-0.2778	0.0751	-4.146	-0.7021	-2.9904	-3.9942
(N=22)	(-3.003)	(-3.011)	(-3.019)	(-3.003)	(-3.011)	(-3.019)
Sweden	-2.061	-3.278		-1.471	-3.493	
(N=22)	(-3.003)	(-3.011)		(-3.003)	(-3.011)	
UK	-1.2812	-4.2028		-1.3708	-3.373	
(N=22)	(-3.003)	(-3.011)		(-3.008)	(-3.011)	
FDIN indicates the Fdi, net (BoP, current US$) /population and GDPC indicate GDP per capita,						
In the brackets is reported the MacKinnon (1991) critical values at 5% significance level						

TABLE D

COINTEGRATION RESULTS (JOHANSEN TEST)		
Country	*Optimum lag for VAR*	*n. of cointegration equations*
Belgium	2	1
Denmark	4	2
Finland	3	2
France	1	1
Greece	3	2
Ireland	4	1
Italy	2	1
Portugal	2	2
Spain	2	1
Sweden	1	2
United Kindgom	2	1
Before apply Johansen cointegration test when we there variable not valid we		
For Denmark , Finland, Greece, Portugal and Sweden we have 2 cointegrating equations, while for the each of the rest countries the test indicated 1 cointegrating equation.		

E.C.M. to estimate casality between FDIN and GDPC

Country	FDIN equation	GDP equation	Cointegration inference
Belgium	0.2395	0.07142	146.25* -132.029* FDIN implies GDPC
	(0.49513)	(0.79482)	(3.1637) (-2.2108)
Denmark	-1.7606 *	-0.0124 *	279.091 -118.272 GDPC implies FDIN
	(-3.25472)	(-2.7661)	(1.6122) (-1.2982)
Finland	-0.1052	0.0049	38.700 -37.800 FDIN implies GDPC
	(-0.9971)	(-0.6616)	(3.068) (-1.2993)
France	-0.6595	0.0012	368.626* -364.593 * FDIN implies GDPC
	(-1.4567)	(0.3648)	(2.2432) (-2.2484)
Greece	-0.1833	-4.12E-05	-506.1242* 413.9273* FDIN implies GDPC
	(-0.6207)	(-0.1042)	(-4.6589) (3.1070)
Ireland	-0.17301*	-0.0159	8.3236 -4.3939 GDPC implies FDIN
	(-2.9922)	(-1.06110)	(1.0663) (-0.16181)
Italy	-0.8477 *	0.0011	-567.190 469.751 GDPC implies FDIN
	(-2.6633)	(0.8737)	(0.8737) (1.1601)
Portugal	-2.5840*	-0.0014	261.899 -84.470 GDPC implies FDIN
	(-4.8335)	(-1,2485)	(0.9727) (-0.35872)
Spain	-1.7515 *	-0.00198	-156.0246 -153.0821 GDPC implies FDIN
	(-3.4830)	(-1.7580)	(-0.7343) (-1.47793)
Sweden	0.2934	-0.0143	-83.6076* 77.4591 * FDIN implies GDPC
	(0.3848)	(-0.5945)	(-2.0721) (2.9862)
United kingdom	0.0156	-0.0045	-2.0981* 23.8753 * FDIN implies GDPC
	(1.5360)	(1.2813)	(-3.8783) (2.2978)

TABLE E

References

Barro, R.J. (1991), Economic Growth in a Cross Section of Countries, Quarterly Journal of Economics, vol. 104, 407-443.

Bratton W., McCahery J., (2000), Fiscal Federalism, Tax Harmonization, and Wealth Redistribution: Translating Theory to Policy in the European Union, WP 006, January, Public Law and Legal Theory.

Brons, de Groot e Nijkamp, Growth Effects of Fiscal Policies A Comparative Analysis in a Multi-Country Context, draft.

Bucovetsky S., (July 2000), Efficient Migration and Income Tax Competition, Draft.

Cheshire, P.C., e I.R. Gordon (1998), Territorial Competition: Some Lessons for Policy, Annals of Regional Science, vol. 32, no. 3, pp. 321-346.

de la Fuente A., Gardner E.(1992), Capital Income Tax Harmonization and Capital Allocation in the European Community, in G. Kopits, editor, Tax Harmonization in the European Community. IMF Occasional Paper 94, July.

Dickey D.A., Fuller W.A., (1981), Likelihood ratio statistics for autoregressive time series with unit root, Econometrica 49 (4) 1057-1072

Easterly W., e S. Rebelo (1993), Fiscal Policy and Economic Growth; An Empirical Investigation, Journal of Monetary Economics, vol. 32, 417-458.

economics and statistics 48, 3

Engle R.E., Granger C.W.J., (1987), Cointegration and error correction-Representation, estimation and testing , Econometrica 55, 251-276

Gordon R H, (1983), An Optimal Taxation Approach to Fiscal Federalism in Quarterly Journal of Economics; 98(4), November, 567-86.

Gordon R.H., (1986), Taxation of investment and saving in a world economy in American Economic Review 76 (5), 1086-1102.

Gother J., R. A. de Mooij, (2000), Capital income Taxation in Europe, Trend and trade-offs, n.172, CPB Netherlands Bureau for Economic Policy Analysis.

Granger C.W.J, (1986), Developments in the study of cointegrated economic variables, Oxford bulletin

Grossman, G., e E. Helpman (1991), Innovation and Growth in the Global Economy, MIT Press, Cambridge MA.

Hansen, N., e A. Kessler (1997) The Political geography of Tax H(e)avens and Tax Hells, discussion paper A-541, University of Bonn.

Haufler A., (1999), Prospects for Co-ordiantion of Corporate Taxation and the Taxation of Interest Income in the EU, Fiscal Studies, vol. 20, n.2, pag.133-153.

Hendry F., (1986), Econometric modelling with cointegrated variables : An overview, Oxford bulletin economics and statistics 48, 3

Johansen S., (1988), Statistical analysis of cointegration vectors, Journal of economic dynamics and control 12, 231-254.

Kanbur R., e Keen M. (1993), Jeux Sans Frontièrs: Tax Competition and Tax Coordination When Countries Differ in Size, 83 American Economic Review, 877-892.

Khan M. S., Senhadji, A. S., (2000), Financial Development and Economic growth: An Overview, IMP WP, 209.

Levine, R., e D. Renelt (1992), A Sensitivity Analysis of Cross-Country Growth Regressions, American Economic Review, vol. 82, 942-963.

Nijkamp, P., e A. Reggiani (1998), The Economics of Complex Spatial Systems, Elsevier, Amsterdam.

Pain N., Wakelin K. (1997), Export performance and the role of foreign direct investment, WP NIESR.

Zhang K.H., (1999), FDI and economic growth: evidence from ten East Asian Economies, Economia Internationale, L11, 4, 517-535