

# **Corporate taxation and FDI: what has changed over time?**

*Maria Valentina Bresciani (Prometeia)*

*Michele Burattoni (Prometeia)*

*Silvia Giannini (University of Bologna and Prometeia)*

*Gianmarco Ottaviano (University of Bologna and Prometeia)*

2ND EUROFRAME CONFERENCE

ON ECONOMIC POLICY ISSUES IN THE EUROPEAN UNION

Trade, FDI and relocation: challenges for employment and growth

in the European Union?

**Friday 3 June 2005, Vienna, Austria**

---

# Objectives of the paper

---

- Provide a more accurate and theoretically founded measure of market potential as explanation of FDI
- Evaluate the effects of taxation on FDI
- Evaluate the effects of market potential on tax differentials (can market potential sustain positive tax differentials?)
- Assess what has eventually changed over time (is the above effect persistent over time?)

# Theoretical background

---

- “**New Trade Theory**” (Helpman and Krugman, MIT Press 1985 and 1989) +
- “**New Economic Geography**” (Fujita, Krugman and Venables, MIT Press 1999; Baldwin, Forslid, Martin, Ottaviano, Robert-Nicoud, Princeton University Press 2003)
- **Building blocks:**
  - trade costs
  - imperfect competition
  - increasing returns to scale

# Predictions of the theory

---

- **Trade flow prediction (“gravity”)**
  - bilateral trade flows are increasing in partners’ economic sizes and decreasing in their reciprocal distance
- **Location prediction (“market potential”)**

“home market effect”:

  - (i) firms are attracted by market size as it offers proximity to consumers and suppliers
  - (ii) firms are repelled by market size as it implies proximity to competitors
  - (iii) attraction is stronger in sectors with large returns to scale, small product differentiation, and for intermediate levels of trade costs (“inverted U-shaped relation” between agglomeration rents and trade barriers)

# Attraction and accessibility

---

---

## **Two-countries** (Krugman, AER 1980):

- Firms are attracted towards the larger country

## **Many-countries** (Behrens, Lamorgese, Ottaviano, Tabuchi, CEPR 2004):

- Abstracting from bilateral trade costs, firms are attracted towards larger countries (“attraction”)
- Abstracting from size difference, firms are attracted towards “central” countries i.e. countries that offer better access to all other countries in the trade network (“accessibility”)

# FDI and trade barriers

- Trade-related models of FDI (Barba Navaretti and Venables, Princeton University Press 2004)
- FDI is a way to reach distant customers (“market access”) and distant suppliers/factors (“cost saving”) as well as a way to avoid competitors
- **Two types of FDI:**
  - **horizontal FDI**
    - ✓ .. is driven by “market-access” considerations, so it substitutes for trade flows
    - ✓ .. given its nature, it is discouraged by lower trade barriers
  - **vertical FDI**
    - ✓ .. is driven by “cost-saving” considerations, so it complements trade flows
    - ✓ .. given its nature, it is encouraged by lower trade barriers

- Therefore:
  - effect of “**distance**” on aggregate FDI flows is **ambiguous**: negative if horizontal FDI dominates, positive if vertical FDI dominates
  - effect of “**market potential**” on aggregate FDI flows is **ambiguous**: negative if the disadvantage of proximity to competitors dominates, positive if the advantage of proximity to customers/suppliers dominates

# From theory to empirical evidence

---

- We disentangle “**Market potential**”:
  - “**Market access**” (MA): it measures the export demand each country faces given its geographical position and that of its trading partners:
  - “**Supplier/competitor access**” (SA): it is the analogous measure on the import side, so is an approximately distance weighted measure of the location of import supply to each country.



# Market access & supplier access

*(Redding and Venables, JIE 2003)*

- Calculations are based upon data on bilateral trade flows, in current dollars, among European Union countries.
- Data cover years from 1980 to 2003.

- Basic idea

The bilateral flow  $X_{ij}$  depends upon:

- Exporting countries characteristics  the capacity to supply
- Importing countries characteristics  the market capacity
- Transportation costs  related to distance

- We cannot observe variables corresponding exactly to theory for both, supplier and market capacity so:
  - We use dummies to catch these characteristics
  - One dummy for each country when the country is exporter
  - One dummy for each country when the country is importer
  - Sharing a common border and having a common language are also taken into account.

## Estimated equation

$$X_{ij} = C + \sum_i \mu_i cty_i + \sum_j \lambda_j ptn_j + \theta \ln(D_{ij}) + \delta_1 Contig + \delta_2 cmln$$

- $i, j$  run over the list of countries.
- $C$  is a constant,
- $X_{ij}$  is trade flow going from  $i$  to  $j$
- $cty_i$  is a dummy = 1 when the exporter is the country  $i$ : e.g.  $cty_{france}$  is 1 when France is the exporting country (i.e. France is the  $i$  country)
- $ptn_j$  is a dummy = 1 when the importer is the country  $j$ : e.g.  $ptn_{france}$  is 1 when France is the importing country (i.e. France is the  $j$  country)
- $D_{ij}$  is the distance between countries  $i$  and  $j$
- $Contig$  is a dummy = 1 when countries  $i$  and  $j$  share a common border
- $Cmln$  is a dummy = 1 when countries  $i$  and  $j$  have the same language

The estimation is run year by year over the sample.

Estimations are independent year by year.

# Basic results

---

1. **Distance** has a coefficient growing in absolute terms: the negative impact of distance on trade is stronger in recent years (frequent result, difficult to explain; see Disdier and Head, *Exaggerated Reports on the Death of Distance: Lessons from a Meta-Analysis*, mimeo 2003)
2. The coefficients of **country dummies** are quite stable with important exceptions, for instance Ireland and Spain whose “unobserved” characteristics explaining trade performances are growing in time.
3. The **value of the constant is growing over time**: the single countries, over time, become less important to explain the variability of trade flows. There are aspects of these flows related to characteristics spreading over countries (maybe European integration?).

# Market Access and Supplier Access calculations

- Both indicators are composed of two elements: one pertaining to the domestic market and one to the set of foreign countries.
- For **MA (market access)** of the country  $i$ 
  - the “**domestic**” part is:

$$e^{-p t n_i^{\lambda_i}} D_{ii}^{\theta}$$

where the distance of the  $i$  country from itself is related to the area of the country.

- the “**foreign**” part is:

$$\sum_{j \neq i} e^{-p t n_j^{\lambda_j}} D_{ij}^{\theta} contig_{ij}^{\delta_1} c m n l_{ij}^{\delta_2}$$

# Market access (MA)

---

- **Meaning:** market access is the dimension of a country (i) as a market, augmented by an average of the dimension of the markets of the countries other than (i) weighted by the distance of these countries (and other controls – common border and language); i.e. it is a measure of how large is the market that can be reached by locating the activity in country i (or how convenient it is to place an activity in a country to sell products)
- **Expected sign on FDI:** +

**Symmetrically Supplier access (SA) is calculated for a country  $j$  as follows:**

**“Domestic” part:**

$$e^{p t n_j^{\lambda_j}} D_{jj}^{\theta}$$

**“Foreign” part:**

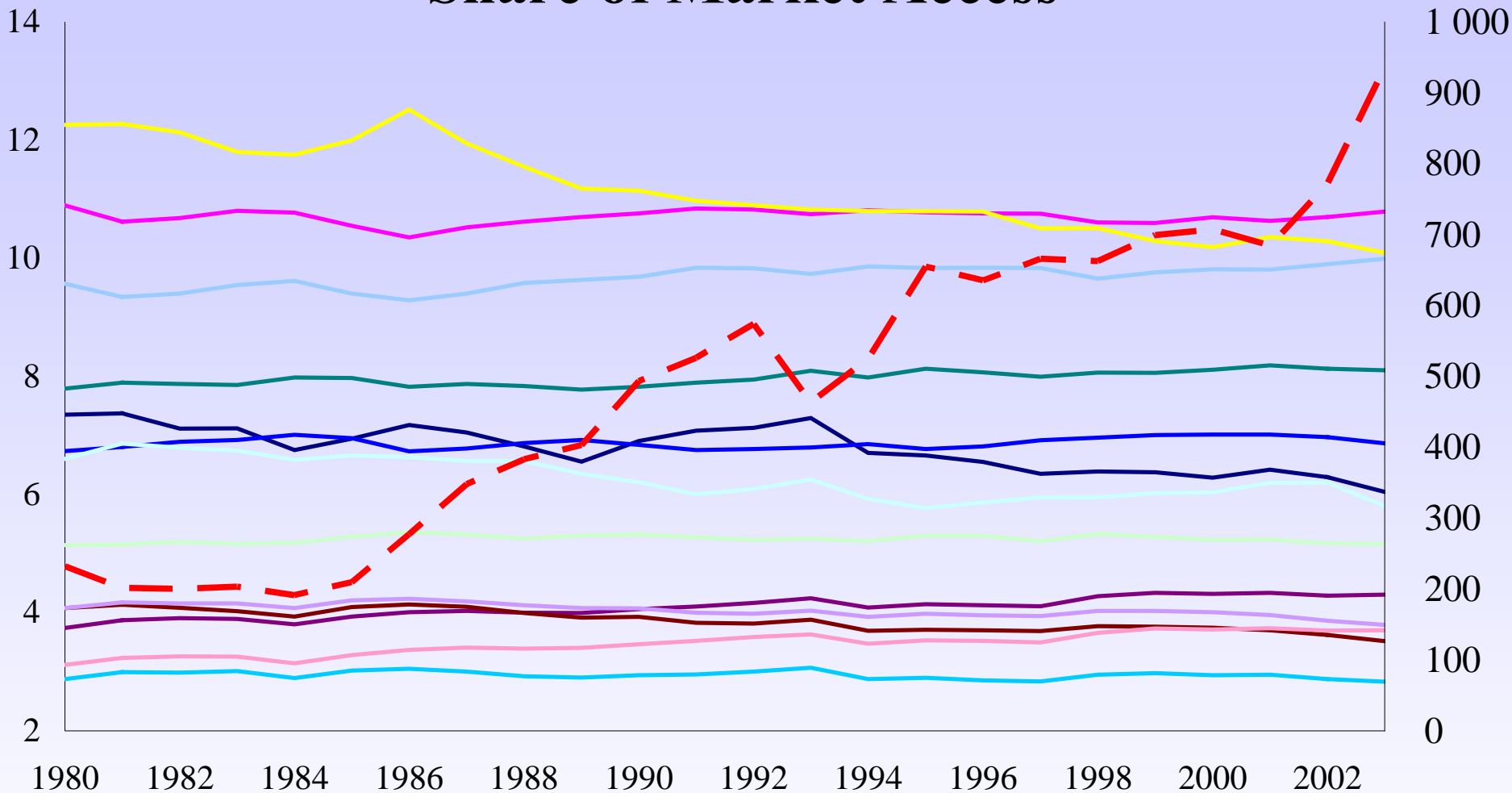
$$\sum_{i \neq j} e^{p t n_i^{\lambda_i}} D_{ij}^{\theta} contig_{ij}^{\delta_1} c m n l_{ij}^{\delta_2}$$

# Supplier access (SA)

- **Meaning:** market supply is the dimension of a country (j) as a supplier, augmented by an average of the dimension of the markets of the countries other than (j) weighted by the distance of these countries (and other controls – common border and language); i.e. it is a measure of how abundant is supply if the activity is located in country (j). SA is a measure of how easy it is to have goods to be used as inputs placing an activity in a country. It is an inverse measure of cost. But it can also be interpreted as a measure of competition in the sense that more suppliers can be competitors too.
- **Expected sign on FDI: ?**



# Share of Market Access



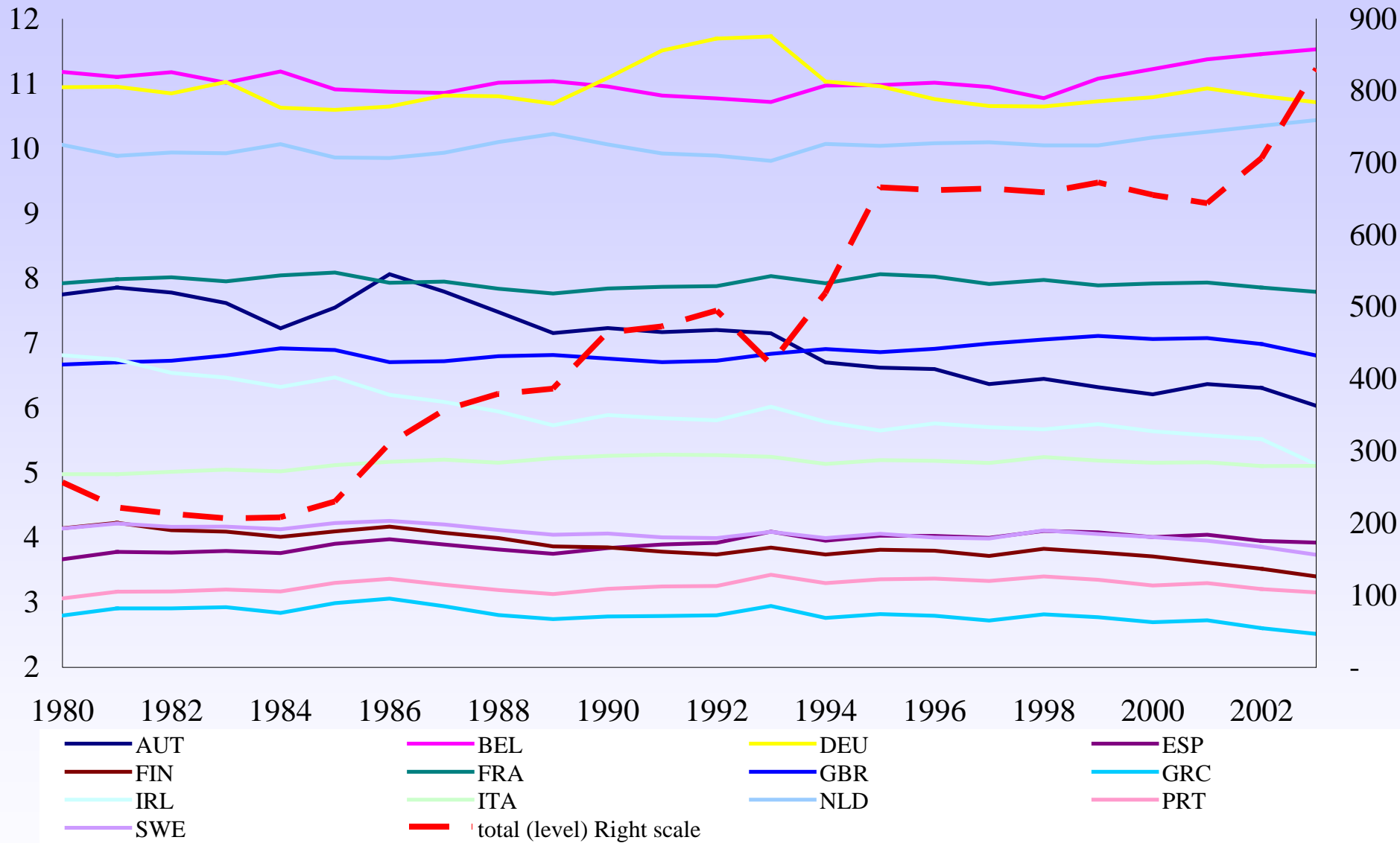
AUT  
FIN  
IRL  
SWE

BEL  
FRA  
ITA  
total (level) Right Scale

DEU  
GBR  
NLD

ESP  
GRC  
PRT

# Share of Supplier Access



# Comment

---

---

- MA and SA:
  - Increasing trend over time
  - Countries tend to maintain their MA and SA share (the variance across countries decreases slightly for MA only)

# Foreign Direct investments, $fdi_{hi}$

---

- Data:
  - bilateral FDI flows in the European Union recorded by Eurostat.
  - inward FDI flows from country  $i$  to country  $h$ , for 13 Ue countries, excluding Denmark, Luxemburg and Norway, over the period 1992-2003.
  - In theory the total number of observations for inward FDI should be 1583, but effectively the records extracted by the Eurostat data base the data are 836 ( 855 for outward FDI ). Null and negative observations are excluded because we are working with logarithm, leaving us with 635 observations.

# Tax variables

- **Forward looking effective tax rates (ETR)**  
(Devereux and Griffith, 1998; Klemm, 2003)
  
- **Effective Average Tax Rate (EATR):**
  - ✓ **differential** between host country and investor country for an hypothetical national investment project expected to generate an economic rent of 40%,  $dT_{40_{hi}}$ ;
  - ✓ **level**,  $T_{40_h}$
  
- **Alternative measures** (the results do not differ significantly):
  - Effective marginal tax rate (EMTR)
  - EATR with 20% economic rent
  - Statutory tax rates

# New economic geography variables

---

---

- **Distance**,  $di_h$ , is the great arc circle distance between  $i$  and  $h$  economic centre (source: CEPII)
- **Nominal GDP for the investor country**,  $Pil_i$ , is the nominal GDP for country  $i$  (source: AMECO)
- **Traditional Market potential for the hosting country**,  $Mpot_h$ , defined as the ratio do the nominal GDP of the country  $h$  to its internal distance
- **New measures of Market Access and Supplier Access** ( $Ma_h$ ,  $Sa_h$ )
- **Common language** ( $Comnlg_{ih}$ ) dummy controlling for common language
- **Contiguity** ( $Contig_{ih}$ ) dummy controlling for contiguity

# Other control variables

---

- **General Government final consumption as a share of nominal GDP, Cpil\_ap** (Source: AMECO)
- **General Government fixed capital formation as a share of nominal GDP, Ipil\_ap** (Source: AMECO)

# BASIC ESTIMATION for $FDI_{hi}$ :

## Standard gravity model

$$lfdi_{hit} = \alpha (T40_{ht} - T40_{it}) + \beta (ld_{hit}) + \gamma (lpil_{it}) + \delta (lmpot_{ht}) + \zeta (\text{comlng}_{hi}) + \theta (\text{contig}_{hi}) + a_i + a_h + e_{hit}$$

$l = \log$

- **Pooled and fixed effects on investor and host countries** (Benassy-Fontagnè, CEPII 2004; Buettner, ZEW 2002).
- **Heteroschedasticity-robust OLS method**



# Estimation results (standard model)

*Dependent variable: lfdi*

N. obs.: 635 Method: OLS <u>pooled</u> Tab.1			N. obs.: 635 Method: OLS dummies $a_h$ and $a_i$ Tab.2			N. obs.: 635 Method: OLS dummies, $a_h$ and $a_i$ Tab.3		
	Coef.	Std.Err		Coef.	Std.Err		Coef.	Std.Err
Td40hi	2.56**	0.60	Td40hi	0.93	1.44	T40h	-1.15	2.38
ld	-1.76**	0.13	ld	-0.73**	0.17	ld	-0.73**	0.17
lpil_i	0.83**	0.07	lpil_i	0.65	0.45	lpil_i	0.45	0.45
lmpot_h	0.31**	0.07	lmpot_h	2.43**	0.49	lmpot_h	2.55**	0.47
comlng	0.83*	0.29	comlng	0.84*	0.27	comlng	0.84**	0.282
contig	-0.74*	0.24	contig	0.18	0.21	contig	0.18	0.21
_cons	12.3**	1.21	cons	-0.73	0.17	_cons	8.27*	3.96
R <sup>2</sup> =0.54 Regression with robust standard errors F(6,628)= 148 p = 0			R <sup>2</sup> =0.731 F(27,607)= 75.7 p = 0 F test that all $u_i = 0$ : F(21,608)= 18.5, p = 0.			R <sup>2</sup> = 0.731 Regression with robust standard errors F(27,607)= 75.7 p = 0		

\*\* , \* significant at 1% and 5% respectively

# Baseline estimates (standard model) - Comments

---

- Gravity variables coefficients are in general significant;
  - The sign on distance variable is negative (as in Benassy-Fontagnè, CEPII 2004);
  - The tax differential has a positive coefficient in the pooled estimates (tab.1), but it is not significant in the fixed effects estimates (tab.2);
  - Looking at the level of EATR (more variable between countries and over time) the sign of the coefficient is positive, but still not significant
- ✓ *It seems that tax differentials did not play a significant role in the last 12 years in shaping FDI flows within the European Union*

# FDI Regression results (MA&SA model)

*Dependent variable: lfdi*

N. obs.: 635 Estimation OLS, dummy $a_h$ and $a_i$			N. obs.: 635 Estimation: OLS, dummy $a_h$ and $a_i$		
	Coef	Std.Err		Coef.	Std.Err
T40h	-1.10	2.458			
ld	-0.72**	0.173	ld	-0.72**	0.17
lpil_i	1.90**	0.37	lpil_i	1.97**	0.34
lma_h	1.75*	0.895	lma_h	1.74*	0.89
lsa_h	-1.79^	0.955	lsa_h	-1.77^	0.95
comlng	0.86*	0.288	comlng	0.86*	0.28
contig	0.19	0.217	contig	0.20	0.21
lipil_ap_h	-0.02	0.394	lipil_ap_h	-0.09	0.39
lcpil_ap_h	-4.45**	1.37	lcpil_ap_h	-4.29*	1.36
R <sup>2</sup> =0.725 Regression with robust standard errors F(30,604)=69.11 p = 0 ^Coefficient on lsa_h is significant at 6% **, * : significant at 1% and 5% respectively			R <sup>2</sup> =0.724 Regression with robust standard errors F(29,605)= 70.8 p = 0 ^Coefficient on lsa_h is significant at 6%		

# MA&SA model - Comments

---

---

- $MA^h$  coefficient positive as expected
- $SA_h$  coefficient negative: proximity of competitors seems to prevail
- **Tax differentials continue to be non significant**
- Other variables:
  - Public investment: negative but never significant
  - Public consumption: positive and significant

*It is difficult that these items are able to capture “quality” public expenditure*

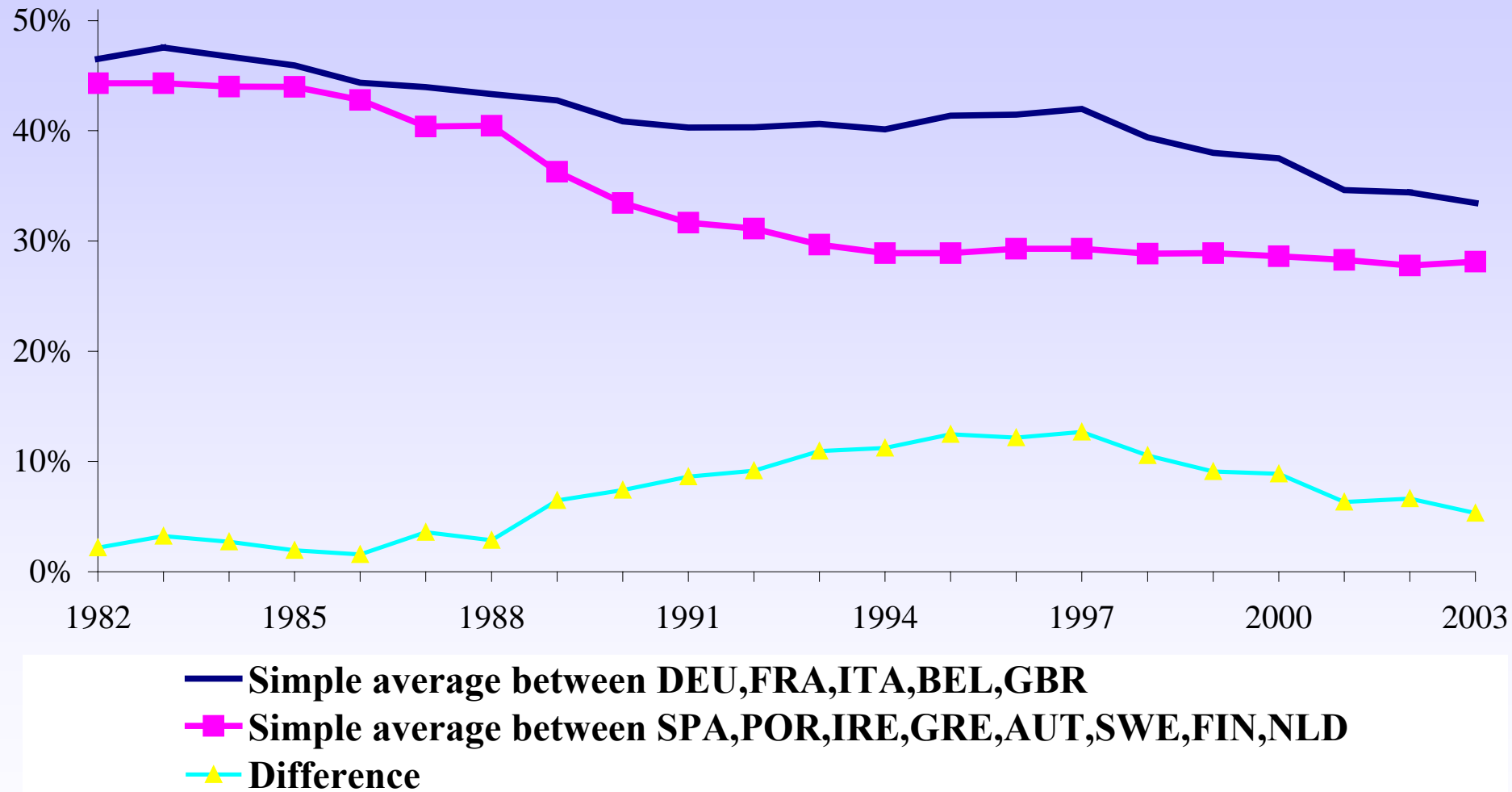
# Tax differentials and market access

---

- According to the new economic geography literature, agglomeration forces are strongest for intermediate trade costs (since when very high barriers divide markets, agglomeration is not feasible and at very low level of trade costs it is not necessary). This leads to the well known **bell-shaped** relation between trade openness and agglomeration
- Agglomeration forces allow to sustain positive tax differentials without affecting inward investments
- **Integration should lead to a bell-shaped core-periphery tax gap**

# Core-periphery tax gap

Effective Average Tax Rates on domestic investments with an economic rent of 40%



# Estimates of tax differentials

$$(T40_{ht} - T40_{it}) = \alpha (ld_{hit}) + \beta (lma_{ht}) + \gamma (lpil_{it}) + \delta (cml_{hi}) + \theta (cont_{hi}) + e_{hit}$$

- We only use  $lma_h$  as market potential variable. MA and SA are highly correlated. Here we are interested in the overall coefficient and there are no theoretical reasons to keep them both (differently from FDI's estimates).
- Estimation is run year by year and in the following tables we report results for 1992, 1996 and 2003
- Graph:  $ma_h$  coefficients over the whole period considered

*Dependent variable: dT40hi*

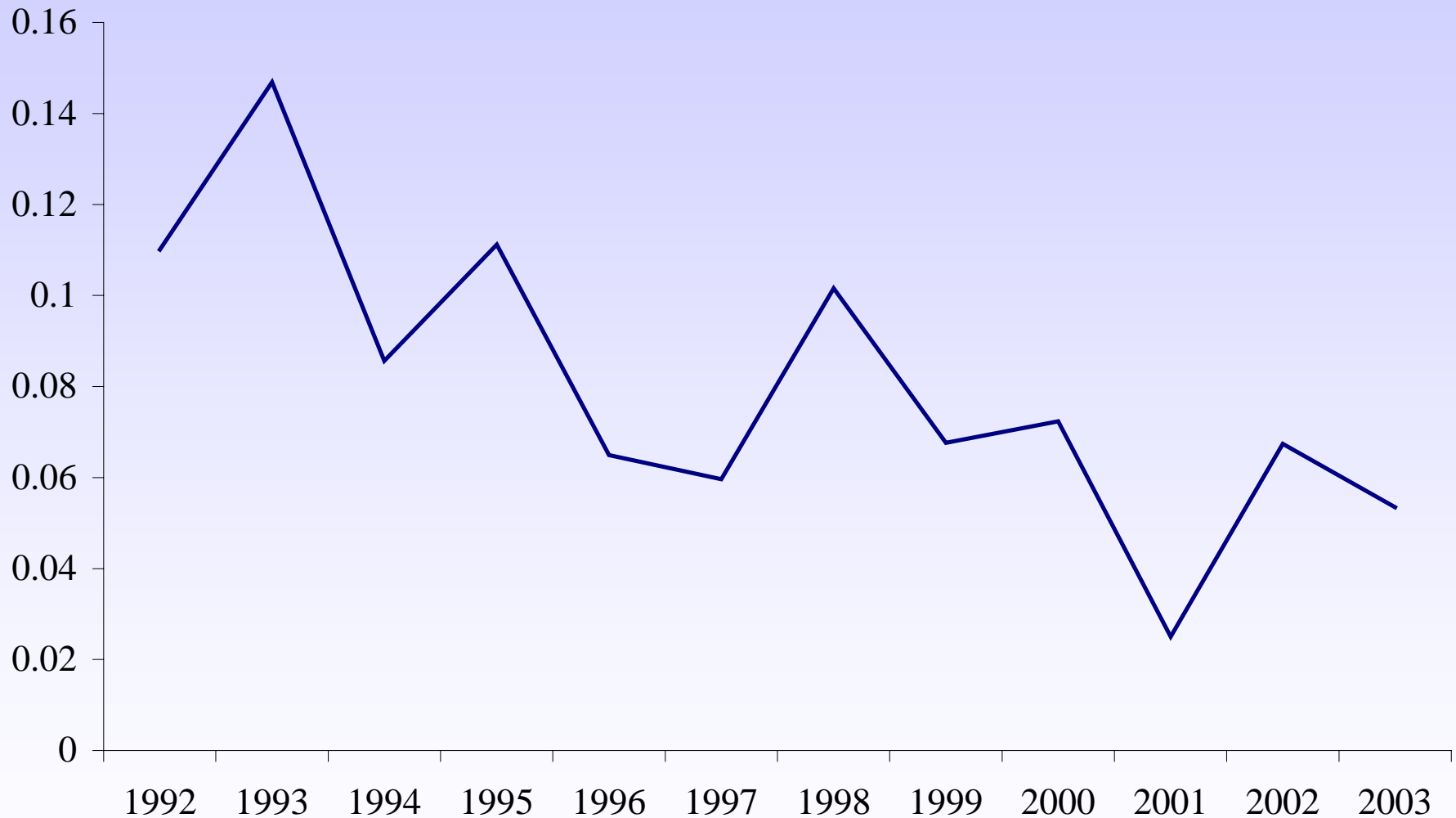
N. obs.: 41 Estimation OLS year 1992			N. obs.: 59 Estimation OLS year 1996			N. obs.: 96 Estimation OLS year 2003		
	Coef.	Std. Err.		Coef.	Std. Err.		Coef.	Std. Err.
ld	0.017	0.039	ld	-0.047	0.029	ld	-0.002	0.018
<b>lma_h</b>	<b>0.11**</b>	0.043	<b>lma_h</b>	<b>0.065</b>	0.044	<b>lma_h</b>	<b>0.05*</b>	0.023
lpil_i	-0.079**	0.018	lpil_h	-0.083**	0.015	lpil_i	-0.03**	0.01
contig	0.07	0.105	lcontig	-0.011	0.08	contig	0.026	0.025
comlng	-0.031	0.089	contig	-0.009	0.085	comlng	-0.022	0.031
R <sup>2</sup> =0.50 F = F(5,35)=12.19, p=0 Regression with robust standard errors			R <sup>2</sup> =0.44 F(5,53)=8.64, p = 0 Regression with robust standard errors			R <sup>2</sup> =0.21 F(5,90)=5.98, p = 0 Regression with robust standard errors		

\*\* , \* : significant at 1% and 5% respectively

(Coefficients on lma\_h results not significant at standard level of probability in 1996, 1997 and 2001)



# Tax gap reactivity to MA: increase in tax differential<sub>hi</sub> for 1% increase in ma<sub>h</sub>



# Main result and tentative interpretation

---

- **Main result:**
  - MA coefficient is decreasing over time: market access becomes less important over time to explain tax differentials
- **Tentative interpretation:**
  - As integration in the EU continue to raise, agglomeration forces become weaker implying that it is more difficult to sustain higher taxes in the core countries with respect to the periphery than in the past
  - Tax competition might have been cushioned by agglomeration forces but this countervailing effect seems to have lost its strength over time

# Limits of the analysis and further research

---

- Data limitation
- Use of different samples (countries and periods)
- Improvement of the econometric techniques.....
- Deeper investigation (on a longer time period) of the tax differentials
- .....
- .....