

# **What does European Institutional Integration tell us about Trade Integration?**

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The presentation is based on the ECB Occasional Paper no. 40 of December 2005  
However, the whole project is still “work in progress”

# Introduction and aim of the paper

- The start of EMU has spurred a new interest in the debate on the effects of monetary integration: i.e., whether it would set free some forces bringing countries closer together.
- Much of the merit for having brought forward this debate on the “endogeneity of OCA” goes to Andrew Rose and Jeffrey Frankel.
- By studying the effects of several currency unions which have occurred in the past 25-30 years -- i.e., pre-EMU -- they show that currency unification leads to very significant deepening of trade.
- This paper adapts the debate on the “endogeneity of OCA” to the European pattern of economic and institutional integration: a process which started about 50 years ago with the 1957 Treaty of Rome.
- The paper is still “work-in-progress”: for the time being it illustrates some phenomenons and associations. More rigorous tests may follow.

## **Our objective (thus far) is to uncover some stylised facts:**

We look principally at two dimensions:

- a. institutional integration and an *index of institutional integration* captures the diverse institutional stages, and
- b. intra-European trade. Several *indicators of trade deepening* are presented:
  - trade openness,
  - the share of intra-regional trade in total trade and
  - discounted trade values similar to those used by Frankel and Rose (1997) and Rose (2000).

We pay special attention to the successive EU enlargements which took place in 1973, 1981, 1986, and 1995. *Explain.*

Unfortunately, the 2004 EU enlargement and the 10 NMS cannot yet be examined.

## (a) The *index of institutional integration*

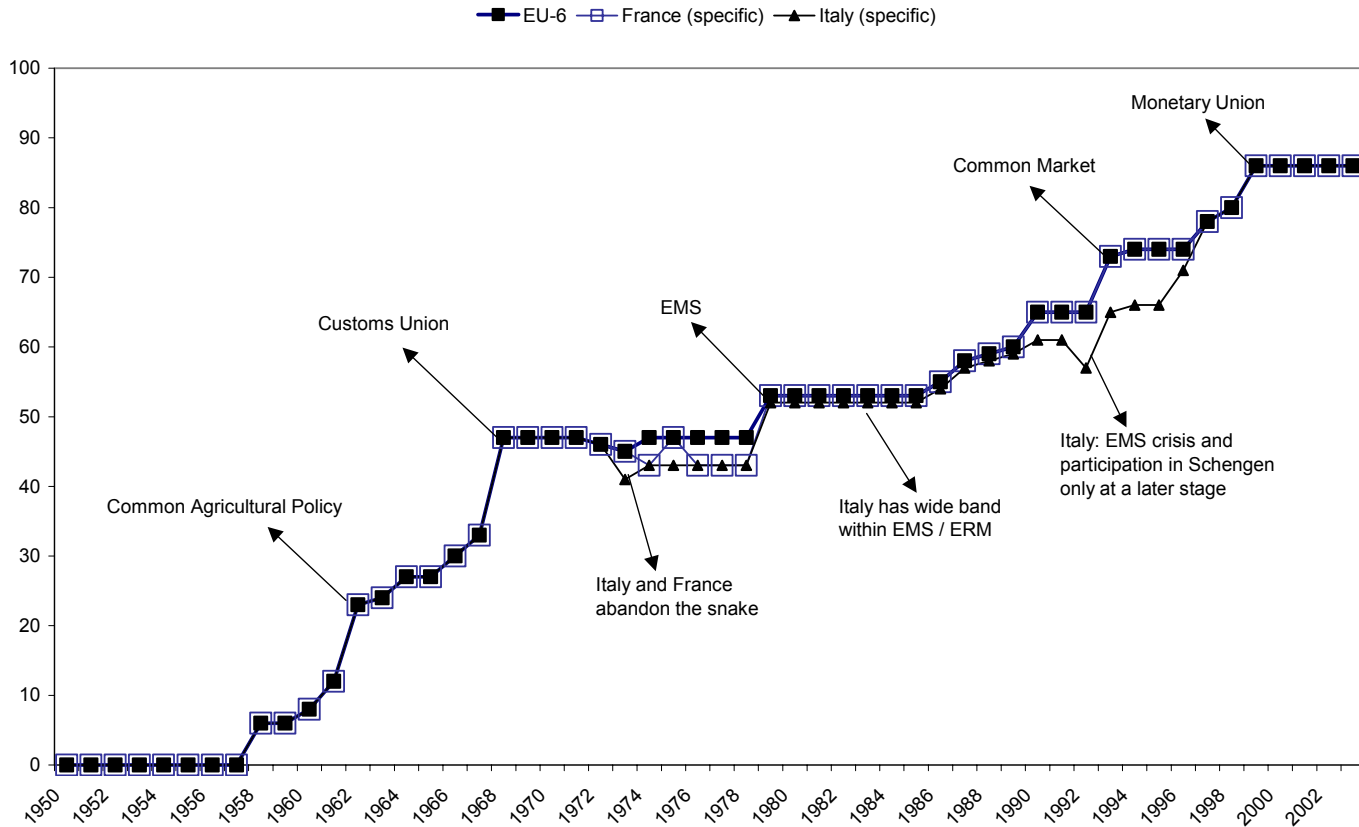
It tracks each European Union member country-specific path toward deeper economic, financial and monetary integration with the other Union's members. The index – that has a minimum of 0 and a maximum of 100 – is inspired by Balassa (1961) that identified five main stages of regional integration:

- ***Stage 1. Free Trade Area (FTA)*** - An area where tariffs and quotas are abolished for imports from area members, which, however, retain national tariffs and quotas against third countries. This is the European Economic Community since 1957; **0-15 points**
- ***Stage 2. Customs Union (CU)*** - A FTA setting up common tariffs and quotas (if any) for trade with non-members. European Economic Community since 1968; **0-10 points**

- **Stage 3. Common Market (CM)** - A CU abolishing non-tariff barriers to trade as well as restrictions on factor movement (i.e., promoting the integration of capital and labour markets). The European Community since 1993 (with the European Single Market). But the CM was already an objective of the Treaty of Rome (“four freedoms”); **0-25 points**
- **Stage 4. Economic Union (EUN)** - A CM with a significant degree of co-ordination of national economic policies and/or harmonisation of relevant domestic laws. The European Union nowadays; **0-25 points**
- **Stage 5. Total Economic Integration (TEI)** - An EUN with all relevant economic policies conducted at the supranational level. Both supranational authorities and laws need to be in place. **0-25 points**

The euro area (i.e., 12 out of 15 EU countries) can be currently classified somewhere between an EUN and a TEI.

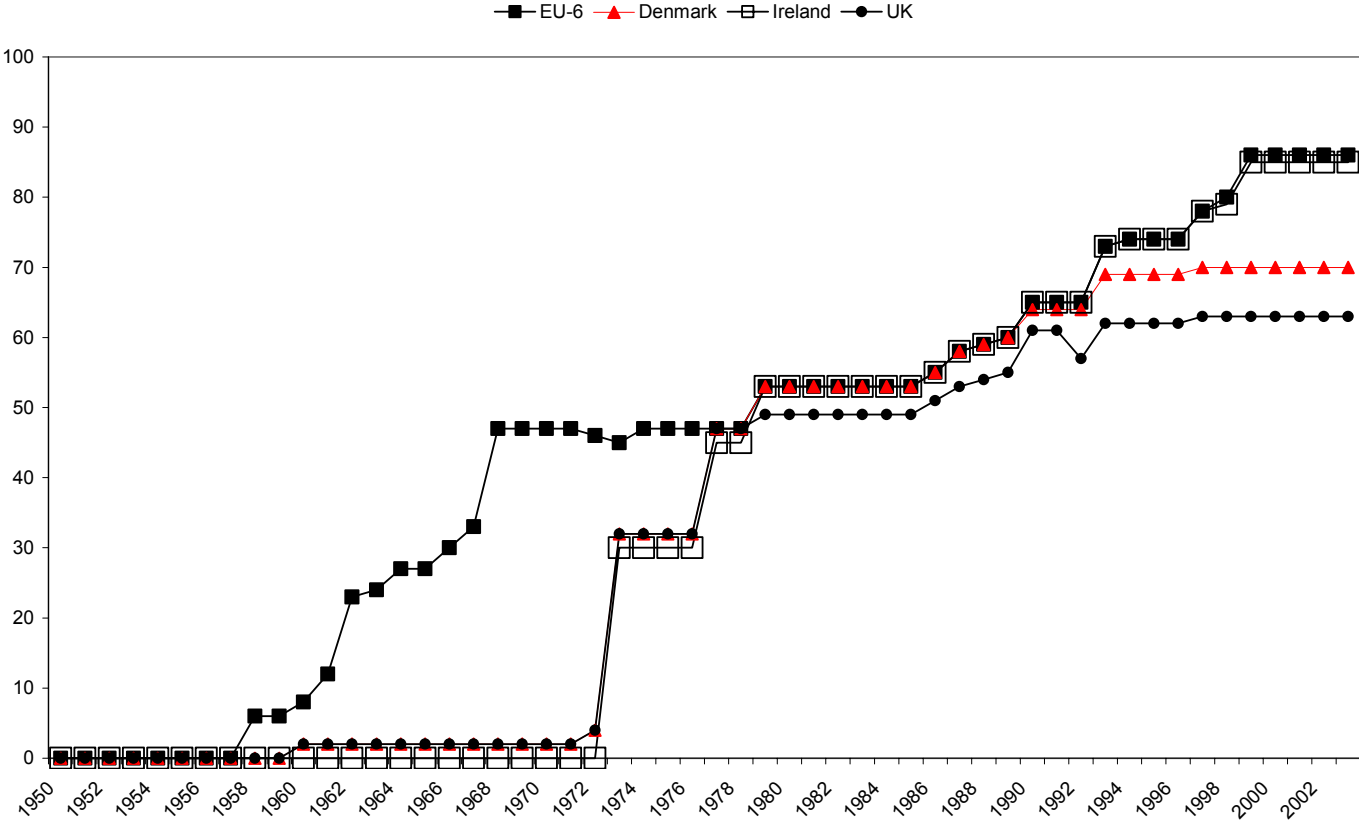
**Figure 1a Index of institutional integration of the EU-6 (i.e., Belgium, France, Germany, Italy, Luxembourg, and the Netherlands) that started integrating in 1957**



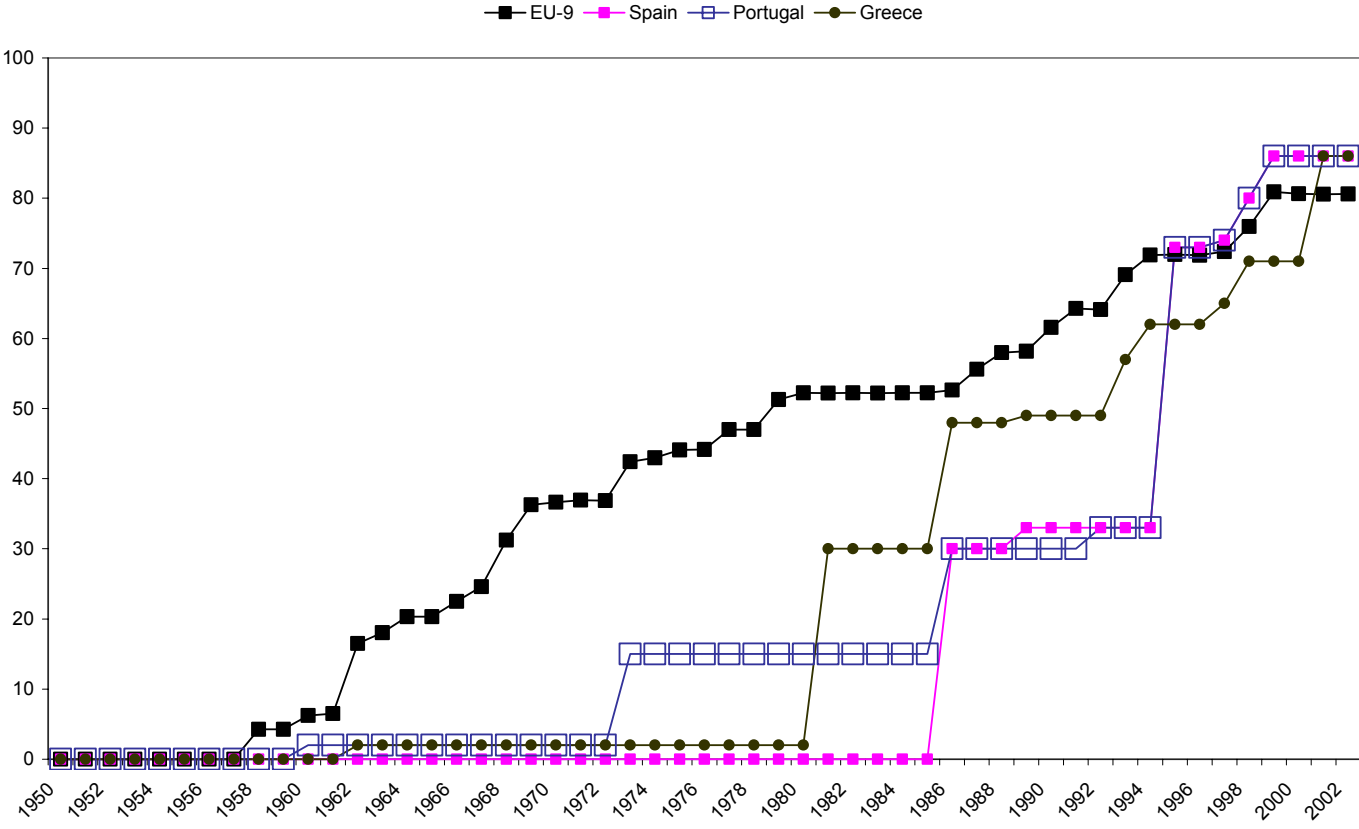
**We can distinguish three sub-periods in the process of institutional integration.**

- The *first period*, characterised by faster integration, proceeds from March 1957 (Treaty of Rome) to July 1968 (completion of the customs union).
- The *second* period can be identified between the start of the 1970s and the mid-1980s, and is characterised by sluggish integration, with the noteworthy exception of the EMS start in March 1979.
- The *third*, most recent period with a new, considerable, acceleration in regional institutional integration can be observed with the launch of several initiatives and the start of EMU.

**Figure 1b Index of institutional integration: EU-6 compared to Denmark, Ireland and the UK (that joined in 1973)**



**Figure 1c Index of institutional integration: EU-9 compared to Greece (that joined in 1981), and Portugal and Spain (that joined in 1985)**



## Observations:

- Some countries already scored points under institutional integration even prior to their EU accession owing to their trade agreements – such as the European Free Trade Agreement (EFTA) – with the EU. *E.g., look at Portugal.*
- In several cases EU accession required some time for a complete “institutional catching-up” by the new entrants. *E.g., look at Spain.*
- Hence, we “defuse” the impact of entry in the EEC/EU and assign some of the gains in trade deepening also to other arrangements (such as, EFTA).

**Implications and open questions:** e.g., did countries that joined at a later stage require less time for institutional catching-up with the rest? *Issue of speed.*

**Why?** The founders of the EU (EEC) have wrangled and wrestled for decades to reach the current institutional setting. However, those that joined later may have taken less time to achieve similar levels of institutional integration. *Example of a Club. However, there is no complete answer yet.*

## (b) The second dimension of the paper is trade

Three measures of trade deepening are obtained from the OECD-MFTS Database covering bilateral trade data in current US Dollars from 1960.

- The first measure is **Intra-regional trade openness (TO)**, the total trade of a country with the group to which it is acceding (i.e. EU-6 for UK which joins in 1973, but EU-12 for Austria, which joins in 1995) over the GDP of the acceding country. By keeping the group size constant any biases due to future group enlargement are avoided. TO is constructed as:

$$TO_{t,i}^{EUj} = \frac{\left( X_{t,i}^{EUj} + M_{t,i}^{EUj} \right)}{GDP_{t,i}}$$

- This measure captures the genuine increase in reciprocal trade of a region.

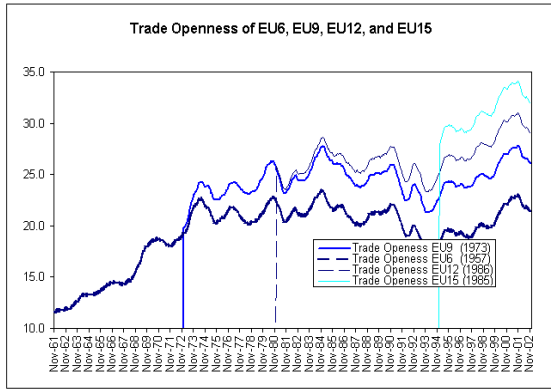
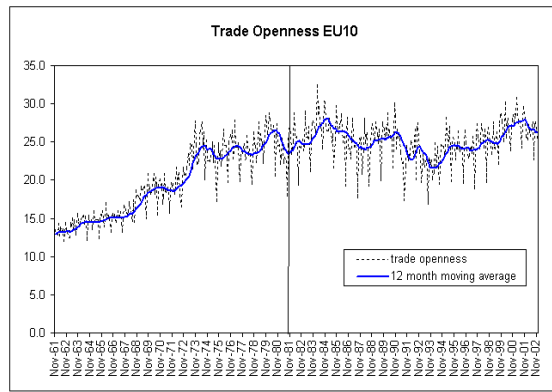
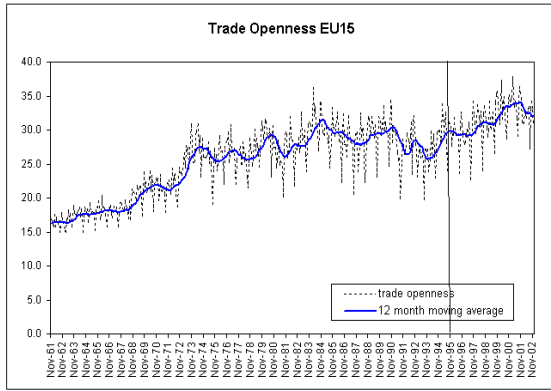
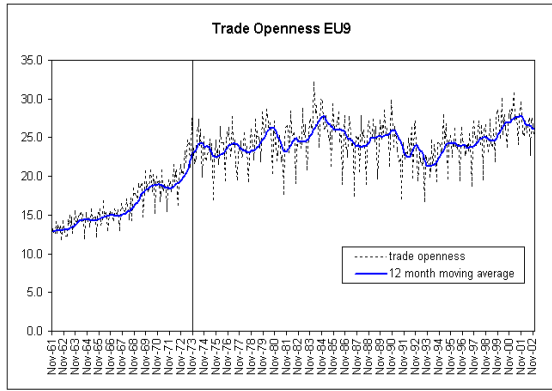
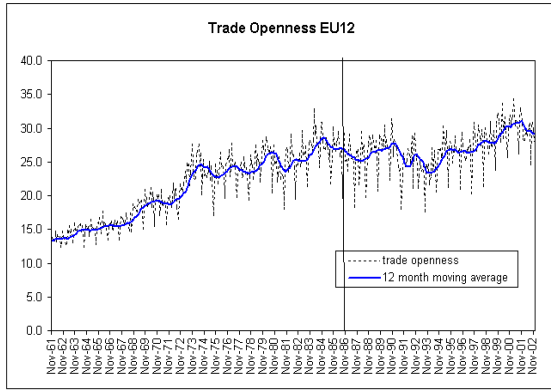
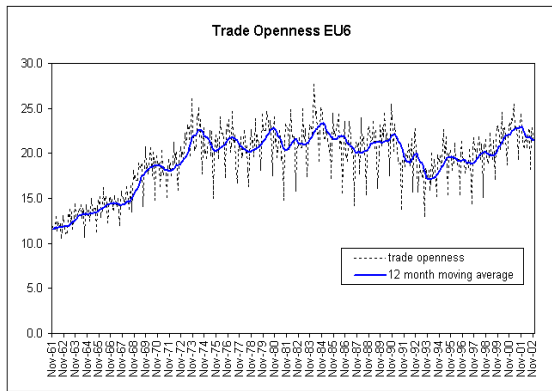
The second measure highlights the degree of regional trade integration as the ratio of intra-regional trade to total trade. This measure may reveal trade diversion. The potential drawback is instead that it may not increase even if intra-regional trade rises due to an even higher growth rate in extra-regional trade.

The **index of intra-regional trade integration (TI)** is constructed as the total trade of a country with the group to which it is acceding, divided by the total trade of that country with the world, or:

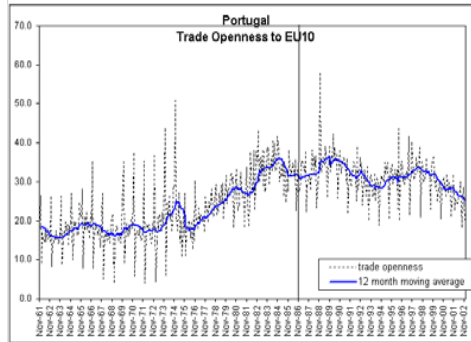
$$TI_{t,i}^{EUj} = \frac{\left( X_{t,i}^{EUj} + M_{t,i}^{EUj} \right)}{\left( X_{t,i}^{World} + M_{t,i}^{World} \right)}$$

- The third measure is akin to that presented in the paper by Frankel and Rose (1997) that uses US Dollar denominated bilateral trade data discounted by the USD Chain price index (with basis 1996 = 100 in our case).
- This measure of "real" trade is comparable to the measures used in the pre-EMU "endogeneity of OCA" literature.
- **"Discounted" trade (DT)**, which is a measure of "real" trade flows, is obtained by discounting nominal trade by the US GDP Chain Price Index as follows (*issue of bias*):

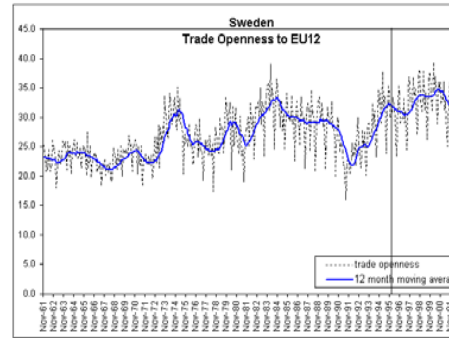
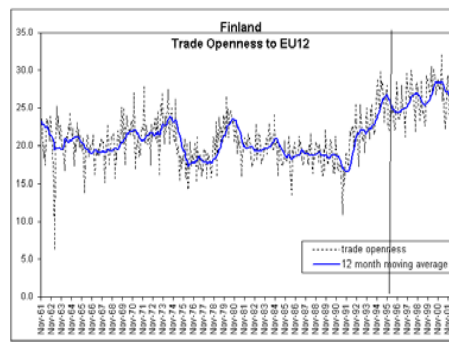
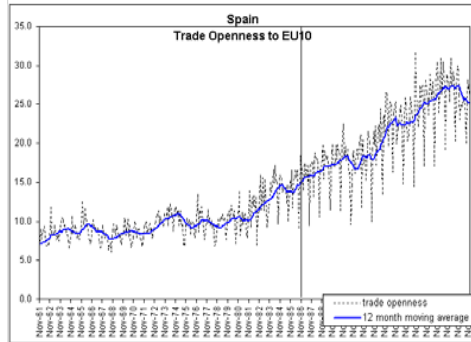
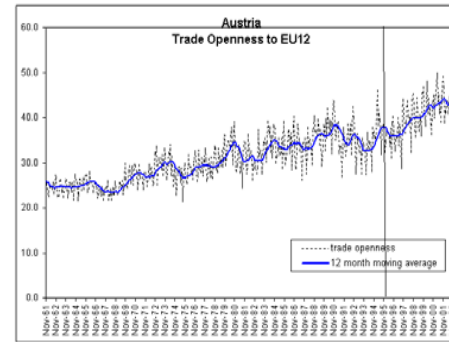
$$DT_{t,i}^{EUj} = \frac{\left( X_{t,i}^{EUj} + M_{t,i}^{EUj} \right)}{Index_t}$$



EU membership in 1986

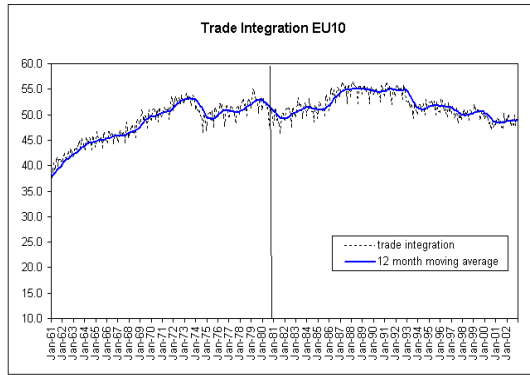
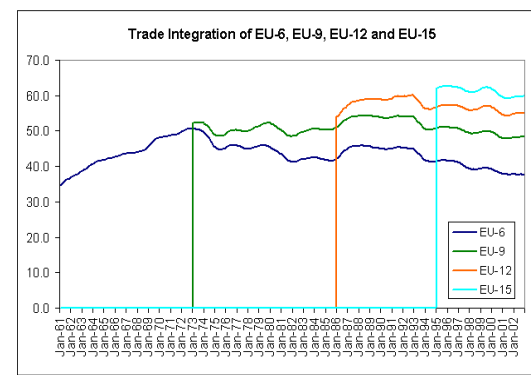
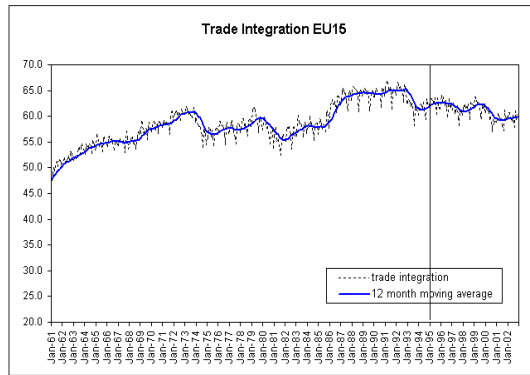
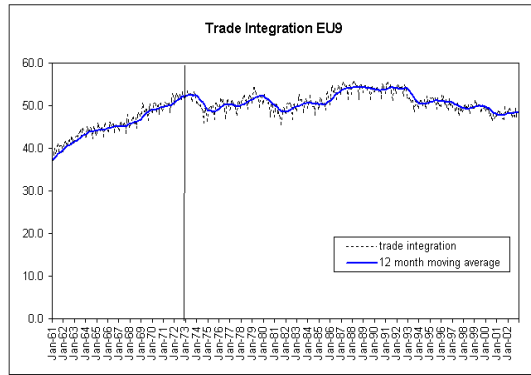
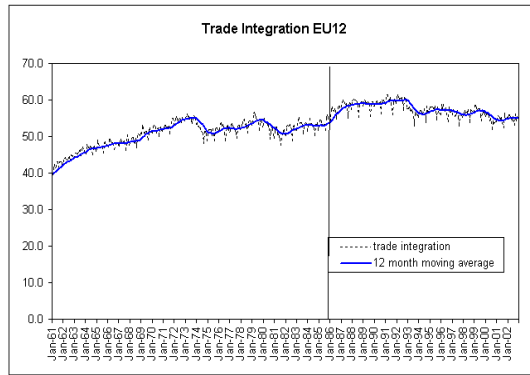
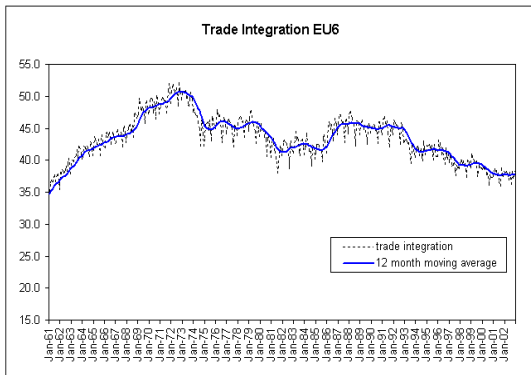


EU membership in 1995

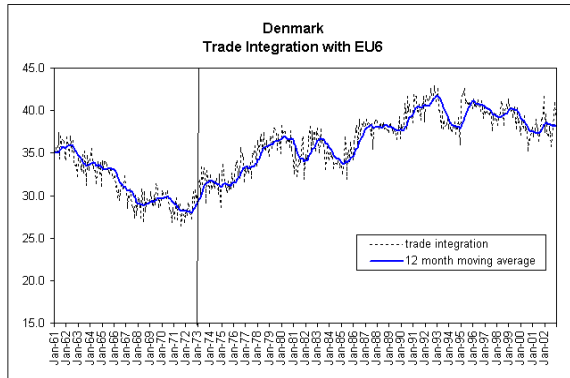


## Observations concerning trade openness TO:

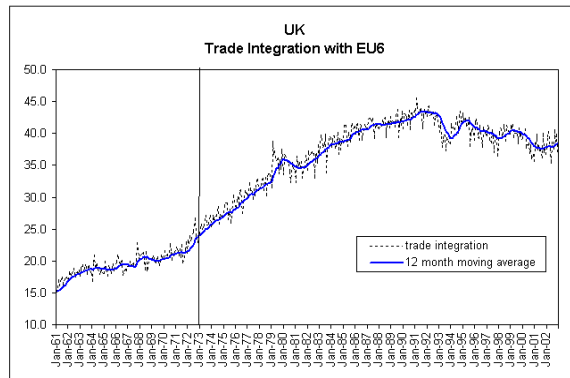
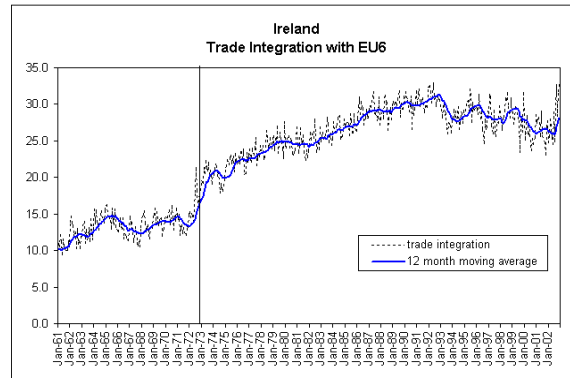
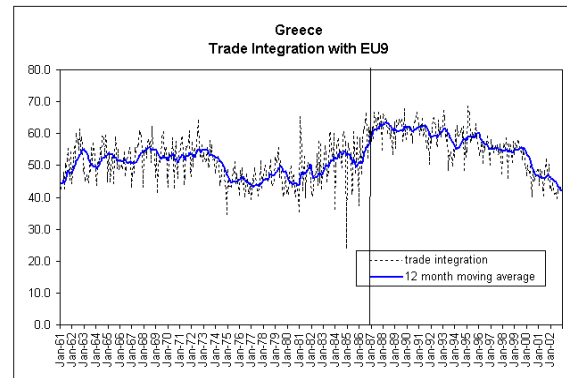
- TO raises with successive enlargements of the EU (as more intra-EU trade is factored in)
- It raises almost monotonically for every sub-period for every EU composition. Between 1960 and 2002 TO doubles on a twelve months moving average basis.
- The increase is more pronounced in the earlier sub-periods (i.e., until the mid-1970s) and then rises but with cyclical fluctuations.
- Intra-EU 15 trade openness rose from about 16 percent of GDP in 1960 to above 32 percent of GDP in 2002. For the current euro area countries the ratio raises from ~ 12 percent of GDP in 1960 to over 26 percent in 2002.
- EU accession processes are generally accompanied by higher trade openness.
- Furthermore, there are very significant increases in intra-regional trade openness 5-years prior to accession wrt 5-years after accession.

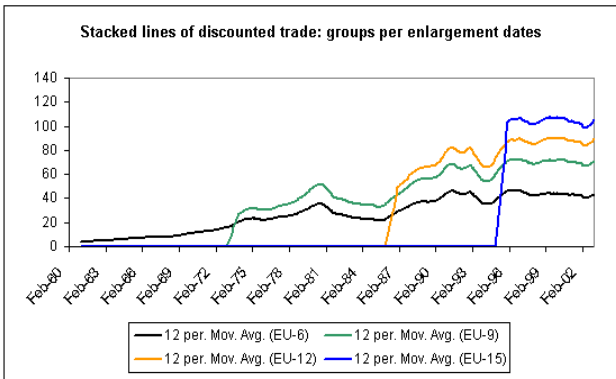
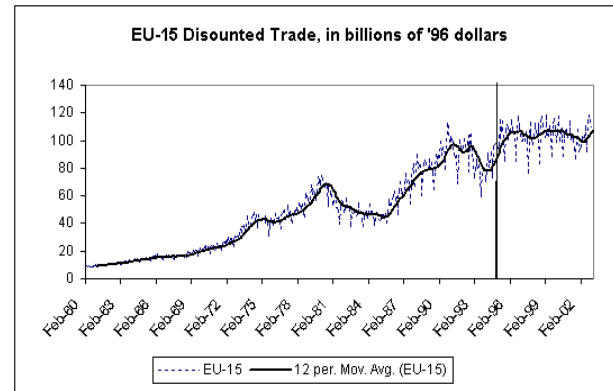
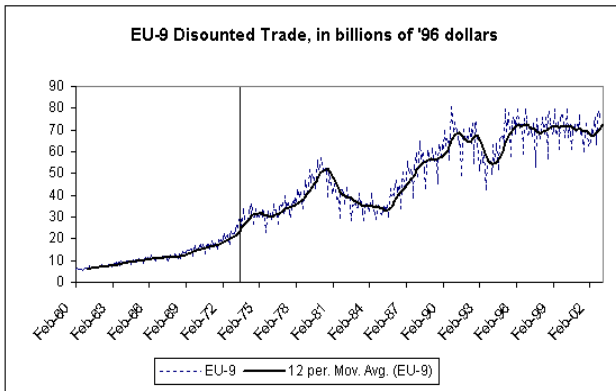
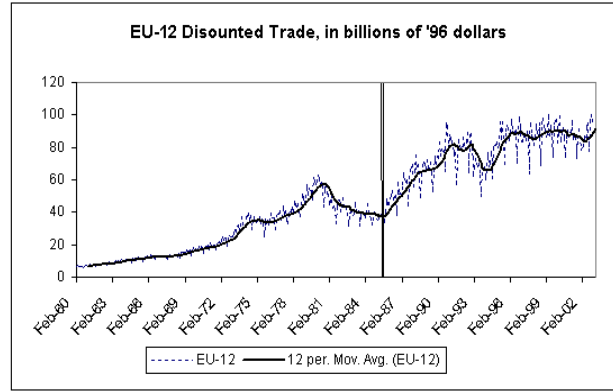
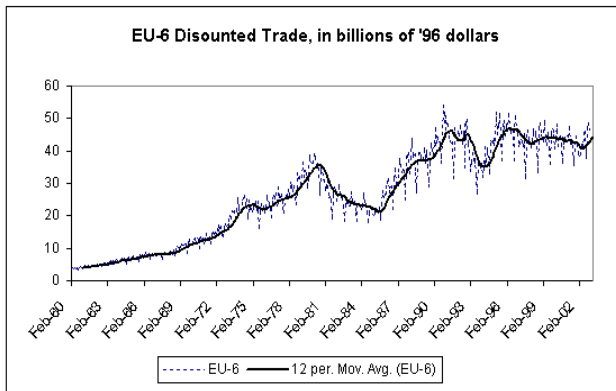


EU membership in 1973



EU membership in 1981





**Table 1. Selected measures of trade deepening, 1960-2003 (Part A)**

Average levels of intra-regional trade openness: intra-trade/GDP															
	Total						Denmark vs. EU-6	Ireland vs. EU-6	UK vs. EU-6	Greece vs. EU-9	Portugal vs. EU-10	Spain vs. EU-10	Austria vs. EU-12	Finland vs. EU-12	Sweden vs. EU-12
	EU-6	EU-9	EU-10	EU-12	EU-15	Euro Area									
1960 - 1972	15.1	15.8	16.0	16.3	18.9	14.8	15.8	9.1	6.5	13.1	17.6	8.5	25.3	20.6	22.9
1973 - 1984	21.3	24.1	24.3	24.4	27.0	21.9	18.0	23.4	14.8	18.1	25.0	10.6	30.3	20.4	27.7
1985 - 1994	20.4	24.4	24.7	25.9	28.5	23.3	19.5	29.0	17.5	22.6	32.5	16.9	34.7	19.5	27.8
1995 - 2003	20.4	25.3	25.4	28.2	31.2	25.5	21.9	35.5	17.1	17.4	30.4	24.8	39.7	26.2	32.4

Percentage change in intra-regional trade openness: intra-trade/GDP															
	Total						Denmark vs. EU-6	Ireland vs. EU-6	UK vs. EU-6	Greece vs. EU-9	Portugal vs. EU-10	Spain vs. EU-10	Austria vs. EU-12	Finland vs. EU-12	Sweden vs. EU-12
	EU-6	EU-9	EU-10	EU-12	EU-15	Euro Area									
1960 - 1972	64.9	53.1	52.7	49.5	37.5	50.4	-33.7	72.0	56.5	22.6	-2.7	25.9	9.4	-8.5	-2.8
1973 - 1984	21.3	39.7	40.1	41.5	38.9	35.4	59.6	144.3	121.7	57.9	100.9	61.4	22.3	-3.0	42.6
1985 - 1994	-22.2	-18.7	-18.9	-13.2	-12.7	-10.4	-3.1	3.9	-6.7	-20.7	-21.3	44.5	-2.9	15.6	-9.3
1995 - 2003	16.7	14.4	13.6	15.5	14.6	15.3	12.4	-0.1	-17.1	-31.8	-11.9	14.6	23.0	2.1	4.1
1960 - 2003	84.9	103.5	101.8	117.7	96.2	115.8	18.4	356.0	179.7	8.1	37.6	251.0	63.4	7.1	34.0

Average levels of trade integration: intra-trade/total trade															
	Total						Denmark vs. EU-6	Ireland vs. EU-6	UK vs. EU-6	Greece vs. EU-9	Portugal vs. EU-10	Spain vs. EU-10	Austria vs. EU-12	Finland vs. EU-12	Sweden vs. EU-12
	EU-6	EU-9	EU-10	EU-12	EU-15	Euro Area									
1960 - 1972	44.2	46.0	46.6	48.6	55.4	59.2	31.3	13.4	19.7	52.5	45.7	45.7	61.7	50.3	57.8
1973 - 1984	44.9	50.4	51.1	52.7	57.9	59.3	34.1	23.3	32.2	48.1	45.3	39.7	60.0	39.4	52.7
1985 - 1994	44.2	53.0	53.7	57.8	63.0	64.2	38.3	29.2	41.4	59.0	54.9	55.4	65.4	44.7	54.4
1995 - 2003	39.5	49.5	50.2	56.1	61.2	62.1	39.3	27.9	39.6	52.7	53.5	59.1	63.8	44.1	54.1

Percentage change in trade integration: intra-trade/total trade															
	Total						Denmark vs. EU-6	Ireland vs. EU-6	UK vs. EU-6	Greece vs. EU-9	Portugal vs. EU-10	Spain vs. EU-10	Austria vs. EU-12	Finland vs. EU-12	Sweden vs. EU-12
	EU-6	EU-9	EU-10	EU-12	EU-15	Euro Area									
1960 - 1972	46.8	40.1	39.9	38.1	26.8	22.3	-17.8	63.2	56.6	22.5	-7.4	-5.1	-1.1	-17.5	-4.4
1973 - 1984	-17.4	-3.8	-3.7	-3.3	-4.4	-8.2	16.6	57.5	60.5	-3.2	7.0	-7.7	-1.7	-15.7	-5.5
1985 - 1994	-0.8	1.0	1.0	7.2	6.9	7.5	11.6	6.0	7.5	9.1	22.7	44.8	7.6	17.8	2.0
1995 - 2003	-9.3	-5.0	-5.3	-3.0	-3.6	-3.9	0.1	-0.7	-7.9	-27.1	-8.5	-1.8	-6.0	-5.8	-5.8
1960 - 2003	9.1	29.6	29.2	39.3	25.4	16.3	7.3	164.4	132.4	-11.7	2.9	30.5	-3.8	-23.9	-13.9

Percentage change in Total Trade discounted by USD GDP Chain Price Index															
	Total						Denmark vs. EU-6	Ireland vs. EU-6	UK vs. EU-6	Greece vs. EU-9	Portugal vs. EU-10	Spain vs. EU-10	Austria vs. EU-12	Finland vs. EU-12	Sweden vs. EU-12
	EU-6	EU-9	EU-10	EU-12	EU-15	Euro Area									
1960 - 1972	411.3	346.5	347.3	353.7	325.6	401.4	72.0	352.5	120.9	307.9	979.6	533.3	281.4	154.0	109.8
1973 - 1984	20.9	31.1	31.5	33.7	34.0	26.5	35.2	187.0	112.3	52.7	639.8	72.1	48.3	29.4	7.9
1985 - 1994	118.6	116.6	116.3	128.5	130.8	136.7	132.4	191.9	98.9	97.9	314.7	372.1	189.3	156.7	98.0
1995 - 2003	11.0	9.5	9.4	10.3	9.5	12.5	10.9	101.9	-7.1	9.1	-16.8	27.0	4.2	5.0	0.2
1960 - 2003	1269.9	1227.0	1226.4	1345.4	1259.9	1424.7	637.8	8176.4	1005.2	976.3	2582.2	6458.5	1246.3	679.1	378.5

Institutional integration: average GDP-weighted score in institutional index															
	Total						Denmark vs. EU-6	Ireland vs. EU-6	UK vs. EU-6	Greece vs. EU-9	Portugal vs. EU-10	Spain vs. EU-10	Austria vs. EU-12	Finland vs. EU-12	Sweden vs. EU-12
	EU-6	EU-9	EU-10	EU-12	EU-15	Euro Area									
1960 - 1972	33.0	25.4	25.1	23.6	21.9	28.4	2.1	0.0	2.1	1.8	2.0	0.0	2.0	0.0	2.0
1973 - 1984	49.6	48.3	47.8	44.5	42.1	43.0	44.9	43.9	43.0	11.3	15.0	0.0	15.0	7.9	15.7
1985 - 1994	61.8	60.8	60.6	58.0	54.8	56.0	60.9	61.8	56.0	48.2	29.4	28.7	15.0	18.0	15.0
1995 - 2003	80.8	76.9	76.8	77.1	77.0	80.5	69.7	80.2	62.7	71.4	80.4	80.4	80.4	78.8	69.7

Source: Trade data from OECD-MFTS; GDP data from IMF-IFS; and Chain Price Index from BEA, NIPA Tables 7.1, 7.2, 7.14 and GDP Press Release. All data are till 2003, except Greek trade data. Until 1999 Belgium and Luxembourg reported all trade data together.

## Some of the findings **concerning trade integration TI:**

- Also TI raises with successive enlargements of the EU
- during 1960-2002 TI has increased for every EU composition albeit with some reversals for the countries that integrated earlier than others (i.e., from 9.1 percent for the EU6, to over 25 percent for the EU15). This suggests that EU counterparts have become preferential trading partners over the long time period.

## ....and **concerning real US Dollar denominated bilateral trade:**

- The increases in real trade is outstanding for every group of countries: four- or five-folds increases with respect to those measured by Rose and Frankel (1997). However, “our” increases unfold over ~50 years: R&F’s over shorter periods.
- It increases at uneven rates during the various sub-periods posting the most significant growth during 1960-1972 and 1986-1994.
- There may be diverse reasons for such uneven progresses over time (world business cycle, developments of world trade and inflation, and others). *Still to be explored in future extensions of this project.*
- Trade deepens also prior to official EU accession due to trade agreements between the EU and accession countries (e.g., EFTA).

**Table 1. Selected measures of trade deepening, 1960-2003 (Part B)**

	Percentage change in intra-regional trade openness: intra-trade/GDP															
	Total						Denmark	Ireland	UK	Greece	Portugal	Spain	Austria	Finland	Sweden	
	EU-6	EU-9	EU-10	EU-12	EU-15	Euro Area	vs. EU-6	vs. EU-6	vs. EU-6	vs. EU-9	vs. EU-10	vs. EU-10	vs. EU-12	vs. EU-12	vs. EU-12	
<b>total: '60- '03</b>	84.9	103.5	101.8	117.7	96.2	115.8	18.4	356.0	179.7	8.1	37.6	251.0	63.4	7.1	34.0	
post-EMS: '79-'03	4.4	10.9	10.2	22.7	22.9	23.8	34.9	27.8	-4.2	-25.1	5.0	171.9	43.0	32.0	26.3	
Pre-EMU('94-'98)- Post-EMU('99-'03)	13.6	11.5	11.1	12.7	12.3	12.7	5.6	5.8	-9.9	-15.9	-5.8	17.4	16.1	6.5	7.5	
5-y. before and 5-y. after joining							18.6	189.6	138.3	32.4	23.7	73.5	14.3	42.2	16.1	
<b>Special Periods</b>																
<b>Bretton Woods</b>																
1/1960 till 8/1971	56.7	44.3	43.9	40.8	30.8	41.3	-31.4	40.1	37.0	11.8	0.1	17.0	5.2	-10.3	-0.8	
<b>Floating rates -</b>																
9/1971 till 2/1979	12.8	26.6	26.8	25.5	21.7	22.9	27.5	151.7	111.9	29.3	33.2	9.3	8.1	-10.3	6.7	
<b>"Soft" ERM -</b>																
3/1979 till 8/1987	-0.5	3.1	3.6	7.9	8.7	8.4	10.5	6.9	12.3	51.4	30.6	69.9	13.5	2.0	17.2	
<b>"Hard" ERM -</b>																
9/1987 till 12/1992	-1.3	-0.1	-0.3	2.6	1.4	3.2	20.2	13.6	0.6	-14.6	4.2	15.5	9.1	13.3	-14.1	
<b>Pre-EMU -</b>																
1/1993 till 12/1998	1.7	4.8	4.3	8.4	9.9	8.3	-1.1	24.8	-3.5	-16.3	1.3	37.3	11.2	23.6	35.9	
<b>EMU -</b>																
1/1999 till 12/2003	7.6	5.1	4.7	4.2	3.3	4.3	4.8	-14.8	-12.1	-29.2	-22.4	-0.1	6.1	-6.2	-7.2	

	Percentage change in Total Trade discounted by USD GDP Chain Price Index															
	Total						Denmark	Ireland	UK	Greece	Portugal	Spain	Austria	Finland	Sweden	
	EU-6	EU-9	EU-10	EU-12	EU-15	Euro Area	vs. EU-6	vs. EU-6	vs. EU-6	vs. EU-9	vs. EU-10	vs. EU-10	vs. EU-12	vs. EU-12	vs. EU-12	
<b>total: '60- '03</b>	1269.9	1227.0	1226.4	1345.4	1259.9	1424.7	637.8	8176.4	1005.2	976.3	2582.2	6458.5	1246.3	679.1	378.5	
post-EMS: '79-'03	55.8	64.2	64.3	77.0	76.8	75.7	81.9	457.5	92.9	77.0	207.6	459.3	104.1	74.5	45.4	
Pre-EMU('94-'98)- Post-EMU('99-'03)	-0.8	0.0	-0.3	0.7	0.4	0.7	-3.8	34.1	0.6	-19.9	-5.7	14.8	0.0	1.5	-6.1	
5-y. before and 5-y. after joining							208.3	523.6	235.2	55.1	234.7	322.7	5.4	17.5	3.9	
<b>Special Periods</b>																
<b>Bretton Woods</b>																
1/1960 till 8/1971	240.7	199.9	200.1	201.8	184.3	229.5	28.7	130.1	59.5	209.5	190.5	298.1	116.1	66.8	40.3	
<b>Floating rates -</b>																
9/1971 till 2/1979	122.9	135.0	135.1	138.1	135.8	128.2	166.0	444.3	246.5	142.2	204.8	274.5	158.0	74.1	73.7	
<b>"Soft" ERM -</b>																
3/1979 till 8/1987	-32.0	-27.8	-27.5	-26.4	-24.6	-28.1	-14.5	13.4	-4.5	-5.6	39.4	1.8	-5.3	32.6	-6.4	
<b>"Hard" ERM -</b>																
9/1987 till 12/1992	12.8	13.3	14.5	17.9	16.5	18.3	19.6	41.6	12.8	120.0	112.0	65.9	17.4	0.3	-17.2	
<b>Pre-EMU -</b>																
1/1993 till 12/1998	31.6	33.6	33.9	36.4	38.2	38.2	31.4	125.5	35.7	60.6	44.1	69.0	52.4	98.5	59.9	
<b>EMU -</b>																
1/1999 till 12/2003	8.2	5.6	5.4	6.2	5.4	8.4	9.1	29.2	-11.1	-12.2	-25.3	23.4	-0.5	-5.2	-7.3	

Source: Trade data from OECD-MFTS; GDP data from IMF-IFS; and Chain Price Index from BEA, NIPA Tables 7.1, 7.2, 7.14 and GDP Press Release. All data are till 2003, except Greek trade data. Until 1999 Belgium and Luxembourg reported all trade data together.

## **Some descriptive links between institutional integration and trade integration and ....what happened around dates of EU enlargements (and EMU)**

Table 1 (Part B) shows that accession is associated with significant trade deepening. Taking accession years as a pivot, and computing the trade indicators 5-years prior to accession wrt. 5-years after accession we find the following:

- Concerning trade openness: plus 18.6 percent for Denmark, plus 189.9 percent for Ireland, and 138.3 percent for the UK. Plus 32.4 percent for Greece, 23.7 for Portugal, 73.5 for Spain, 14.3 percent for Austria, 42.2 percent for Finland and 16.1 percent for Sweden.
- Concerning the real US Dollar denominated bilateral trade: Plus 208.3 percent for Denmark, plus 523.6 percent for Ireland, and 235.2 percent for the UK. Plus 55.1 percent for Greece, 234.7 for Portugal, 322.7 for Spain, 5.4 percent for Austria, 17.5 percent for Finland and 3.9 percent for Sweden.

## **Trade effects of Stage 3 of EMU, i.e., with the euro**

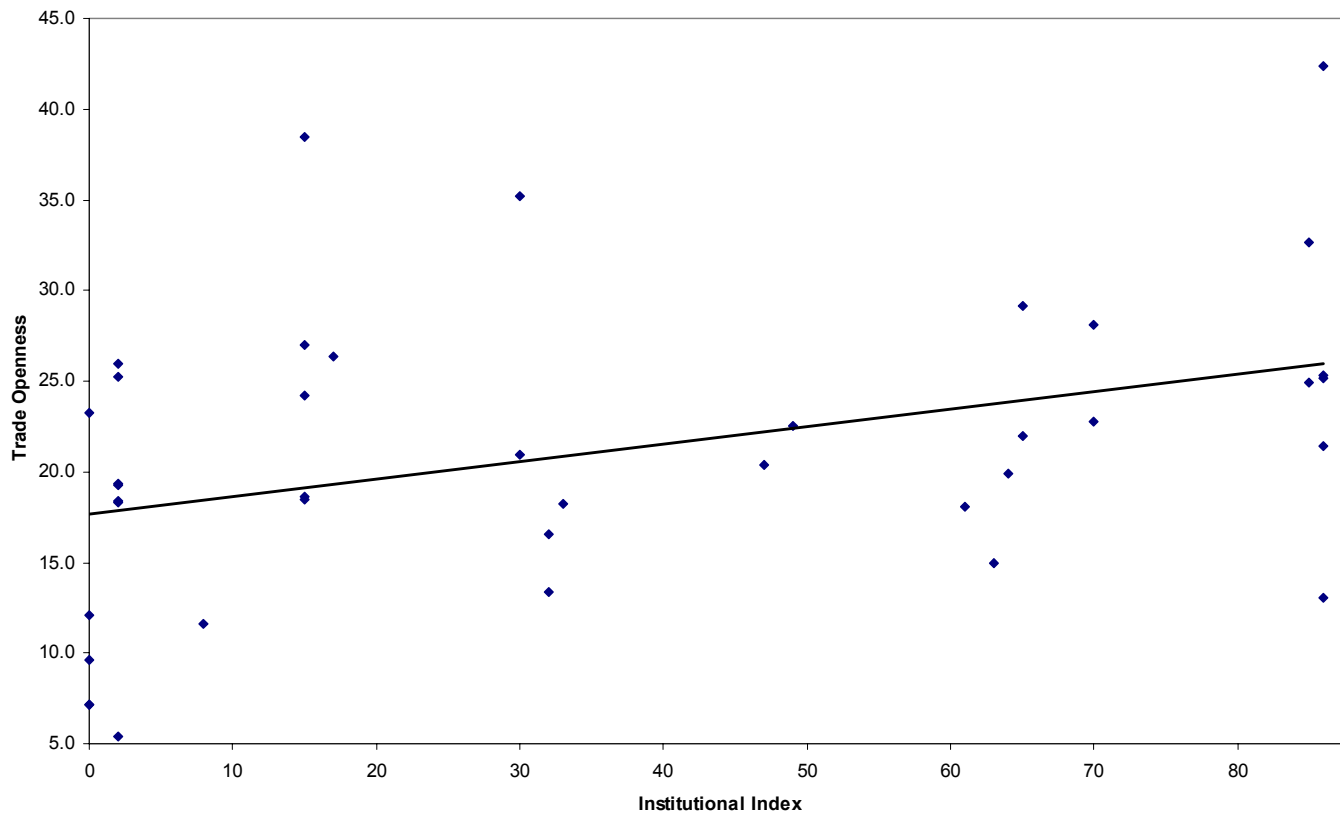
Table 1 (Part B) upon the launch of the euro in 1999, trade openness rose by 4.8 percent for euro area countries vis-à-vis a 3.3 percent increase for EU 15 countries. Discounted real trade rose by 8.4 percent vis-à-vis a 5.4 percent increase in the EU15.

- It may still be too early, using our specific framework, to say something about Stage 3 of EMU

### **Scatter diagrams**

- Here are some preliminary scatter diagrams looking at institutional integration vis-à-vis the 3 trade measures. They look ok but need further refinements.

Figure 2a Institutional integration and trade openness, 1960-2003, all EU countries



# Granger tests

- To see if our approach to treat both factors as endogenous makes sense, we run Granger causality tests for all variables.
- Result (see Table below): the link from institutional integration to trade deepening “dominates”, although the opposite link is also present in some cases.

	<i>For all Trade Variables: Trade deepening Granger causes Inst. Integration</i>	<i>Inst. Integration Granger causes Trade deepening (all variables)</i>
Total	26% Yes	56% Yes
Only early joiners DK, UK, IE	11% Yes	89% Yes

# Determining the optimal lag length

- Before implementing the VECMs, we first need to determine the optimal lag length:
  - We run unrestricted VARs on all pairs of variables and then apply the Schwarz criterion.
  - Notation:  $to_{t,i} = \begin{bmatrix} \ln(TO_{t,i}^{EUj}) \\ \ln(II_{t,i}) \end{bmatrix}$   $ti_{t,i} = \begin{bmatrix} \ln(TI_{t,i}^{EUj}) \\ \ln(II_{t,i}) \end{bmatrix}$   $dt_{t,i} = \begin{bmatrix} \ln(DT_{t,i}^{EUj}) \\ \ln(II_{t,i}) \end{bmatrix}$ 

$$to_{t,i} = \alpha + \beta_1 to_{t-1,i} + \dots + \beta_p to_{t-p,i} + \varepsilon_t$$

$$ti_{t,i} = \alpha + \beta_1 ti_{t-1,i} + \dots + \beta_p ti_{t-p,i} + \varepsilon_t$$

$$dt_{t,i} = \alpha + \beta_1 dt_{t-1,i} + \dots + \beta_p dt_{t-p,i} + \varepsilon_t$$
  - Caveat: residuals of II not normally distributed.

# VECM

- Specification is of the following type:

$$\Delta \ln(TO_{t,i}^{EUj}) = \alpha + \beta CE_i + \gamma_1 \Delta \ln(TO_{t-1,i}^{EUj}) + \dots + \gamma_p \Delta \ln(TO_{t-p,i}^{EUj}) + \lambda_1 \Delta \ln(II_{t-1,i}^{EUj}) + \dots + \lambda_p \Delta \ln(II_{t-p,i}^{EUj}) + \varepsilon_{t,i}$$

- Where CE stands for:  $CE_i = c + \ln(TO_{t-1,i}^{EUj}) - \theta \ln(II_{t-1,i})$ 
  - of course in vector form, so also  $\Delta II$  regression and for all variables TO, TI and DT, provided that cointegration was found.
  - Of particular interest is the parameter beta, which in effect measures the speed of adjustment to the long-run relationship.
  - Estimations of beta are reported below.

**Estimation of the parameter  $\beta$  in the cointegrating equation**

<i>Country or Region</i>	<i>Error-correction equation for <math>\Delta TO</math></i>	<i>Error-correction equation for <math>\Delta II</math></i>
1973 Enlargement		
Denmark	-0.041 (0.010)	-0.082 (0.037)
Ireland	-0.179 (0.041)	0.026 (0.014)
UK	-0.033 (0.010)	0.087 (0.040)
1981 / 86 Enlargement		
Greece	-	-
Portugal	-	-
Spain	-0.229 (0.061)	0.154 (0.047)
1995 Enlargement		
Austria	-0.058 (0.015)	0.177 (0.060)
Finland	-0.016 (0.033)	0.158 (0.055)
Sweden	-0.717 (0.016)	0.087 (0.059)
<b>Average</b>	<b>-0.182</b>	<b>0.087</b>

<i>Country or Region</i>	<i>Error-correction equation for <math>\Delta TI</math></i>	<i>Error-correction equation for <math>\Delta II</math></i>
1973 Enlargement		
Denmark	-	-
Ireland	-0.107 (0.032)	0.018 (0.017)
UK	-0.042 (0.011)	-0.025 (0.040)
1981 / 86 Enlargement		
Greece	-0.147 (0.037)	-0.096 (0.051)
Portugal	-	-
Spain	-0.211 (0.044)	0.098 (0.109)
1995 Enlargement		
Austria	-	-
Finland	-0.054 (0.025)	0.139 (0.074)
Sweden	-0.091 (0.028)	-0.052 (0.136)
<b>Average</b>	<b>-0.109</b>	<b>0.014</b>

# Beta results

- Sign and significance:
  - In all  $\Delta TO / \Delta TI / \Delta DT$  error-correction equations beta has the expected (negative) sign.
  - For the  $\Delta II$  equations, beta has the expected (positive) sign in 70% of cases. Less significant.
- Values:
  - Larger absolute value of adjustment parameter in prior equations.
  - Highest (absolute) parameter values for TO variables as compared to TI  $\longrightarrow$  faster adjustment speed.

### Results of the variance decomposition, in % after 5 years

<i>Country or Region</i>	<i>Percentage of Variance of Trade Openness explained by Inst. Integration</i>	<i>Percentage of Variance of Inst. Integration explained by Trade Openness</i>
1973 Enlargement		
Denmark	19.6%	13.7%
Ireland	33.0%	12.0%
UK	44.4%	14.9%
1981 / 86 Enlargement		
Greece	-	-
Portugal	-	-
Spain	50.0%	29.7%
1995 Enlargement		
Austria	27.6%	29.1%
Finland	28.3%	24.8%
Sweden	35.8%	6.8%
<b>Average</b>	<b>34.1%</b>	<b>18.8%</b>

<i>Country or Region</i>	<i>Percentage of Variance of Trade Integration explained by Inst. Integration</i>	<i>Percentage of Variance of Inst. Integration explained by Trade Integration</i>
1973 Enlargement		
Denmark	-	-
Ireland	14.8%	6.1%
UK	47.1%	0.7%
1981 / 86 Enlargement		
Greece	6.5%	14.0%
Portugal		-
Spain	1.1%	3.1%
1995 Enlargement		
Austria	-	-
Finland	7.4%	20.3%
Sweden	10.5%	0.8%
<b>Average</b>	<b>14.5%</b>	<b>8.7%</b>

# Interpretation

- Innovations in Institutional Integration explain a larger part of trade deepening than vice versa (but Cholesky ordering).
- Nevertheless: “reverse” link is non-negligible.
- Percentages higher for Trade Openness than Trade Integration.

## Some tentative conclusions and further work:

- Institutional integration: from EU6 to EU15 over a long period. Difficulties in testing due to the “Jump process”.
- Later joiners caught up relatively rapidly.
- Trade: very significant deepening over 45 years.
- Interaction between institutional and trade integration *before* currency union matters.
- Interaction runs in *both* directions, although the link from institutional to trade integration dominates.
- *Lot's of open questions remain: association is no causation, diverse other processes were at work during the period (e.g., not only European trade deepened), we need to control for “global integration” that will have affected Europe irrespective of (or over and above) European integration.*