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ABSTRACT

The start of the European Economic and Monetary Union (EMU) has spurred a new interest in the debate on the effects of monetary unions on regional economic integration. This literature either investigates past episodes of monetary unions or attempts to gauge any effect with a few years of EMU data. This paper takes instead a more general perspective: it investigates the link between economic integration and the overall institutional process of regional integration in Europe – of which monetary integration was only one step – over the last 50 years. We look mainly at two dimensions: European institutional integration – whose main steps were the customs union in 1968, the single market in 1993 and the single currency in 1999 – and intra-European trade. We pay special attention to the successive EU enlargements which took place in 1973, 1981, 1986, and 1995. Different facets of openness and trade linkages are presented. After looking at some descriptive links between institutional and trade integration, the paper uses some causality tests to assess the direction of causality and magnitude of impact. The evidence provided is consistent with the idea that the interaction between regional institutional and trade integration *before* monetary union matters. Such interaction runs in *both* directions, although the link from institutional to trade integration dominates. Many open questions remain, however.

JEL classification: *E42, F15, F33 and F41*.

Key words: Optimum Currency Area, Economic and Monetary Integration and EMU.

NON-TECHNICAL SUMMARY

The start of the European Economic and Monetary Union (EMU) has spurred a new interest in the debate on the effects of monetary integration. One much debated question has become whether sharing a single currency sets free some forces bringing about greater economic and financial integration among the participating countries. Much of the merit for having brought forward this debate on the endogeneity of Optimum Currency Areas (OCAs) goes to Andrew Rose and Jeffrey Frankel. By studying the effects of several currency unions that have occurred in the past 25-30 years they show that monetary integration can lead to very significant trade deepening. Given its recent beginning, EMU is not included in their analysis.

This paper takes instead a more general perspective: it investigates the link between economic integration and the overall institutional process of regional integration in Europe – of which monetary integration was only one step – over the last 50 years. It looks mainly at two dimensions: European institutional integration (in particular the creation of a free trade area in 1958, a customs union in 1968, the single market in 1993 and the single currency in 1999) and intra-European trade.

It also pays special attention to the various waves of EU enlargements. While European institutional integration was advancing, nine other countries joined the European Union (EU) during four successive rounds of enlargement in 1973, 1981, 1986 and 1995. We include these rounds in our analysis, whereas we do not consider the most recent accession by ten new members.

A systematic investigation of the link between European institutional integration and regional trade is provided by using the index of institutional integration first developed in Dorrucci, Firpo, Fratzscher and Mongelli (2002 and 2004). This index allows us to uncover several stylised facts relating to the link between effective progress in joint institution building and regional trade. The degree of trade deepening is measured by using several indicators, including trade openness (i.e., bilateral trade data normalised by GDP), the share of intraregional trade in total trade, and deflated trade values similar to those used by Frankel and Rose (1997) and Rose (2000).

Several descriptive links are presented, together with a few preliminary formal tests. It turns out that the EU witnessed a very significant deepening of intra-regional trade among its member countries over a long period – i.e., about 50 years for the six founding countries. These increases exceed the estimates put forward by the literature on the endogeneity of OCA launched by Rose and Frankel. Hence, in the European case the relevant time horizon seems to extend beyond the establishment of a monetary union – as EMU occurred relatively recently – and cover the whole process of institutional integration (involving steps such as the removal of tariff and non-tariff barriers, integration of factor markets, monetary cooperation and monetary integration). Moreover, preliminary tests (Granger-causality and variance decompositions based on a vector error correction model) suggest that the causal link between institutional integration and trade deepening runs *both* ways, although the link from institutional integration to trade deepening is far more pronounced.

In conclusion, while the evidence presented is far from conclusive, this paper suggests that the interaction between institutional and trade integration *before* currency union may matter. Such an interaction would seem to run in *both* directions, although in the European case the link from institutional to trade integration appeared to dominate. Many open issues, however, remain for future research, such as: the inclusion of more conditioning variables and some ad hoc econometric techniques to deal with our institutional variable, which has uncommon properties, and to account for the successive waves of EU enlargements. One

could also check the validity of our preliminary findings when a similar analysis is applied to the institutional arrangements in other regions of the world (e.g. Latin America, East Asia and Sub-Saharian Africa). One open question is whether the hypothesis of endogeneity of OCA may be extended and generalised: however, much further work would be needed in this direction.

I INTRODUCTION

The start of the European Economic and Monetary Union (EMU) has spurred a new interest in the debate on the effects of monetary integration. One much debated question has become whether sharing a single currency sets free some forces bringing about greater economic and financial integration among the countries sharing the single currency. Much of the merit for having brought forward this debate on the "endogeneity of OCA" goes to Andrew Rose and Jeffrey Frankel.[1] By studying the effects of several currency unions that have occurred in the past 25-30 years (excluding EMU) they show that monetary integration can lead to very significant deepening of trade, even in excess of 300 percent.

Rose (2004) conducts a meta-analysis of a large number of other studies on the effects of currency union on trade. He shows that the combined estimates imply that a bilateral currency union increases trade by between 30 percent and 90 percent. The implication for EMU, according to Frankel and Rose, is that the euro area may turn into an OCA after the launch of monetary integration even if it was not an OCA before, or *"countries which join EMU, no matter what their motivation may be, may satisfy OCA properties ex-post even if they do not ex-ante!"* (Frankel and Rose 1997). Hence, the expectation for the European countries that have adopted the euro in 1999 is that their reciprocal trade may also rise quite significantly in the future.

It is too early to assess the effects of the euro on euro area trade (though it is interesting to note that extra-euro area trade has increased more that intra-regional trade since 1999). Rather, this paper deems it useful to investigate to what extent European trade integration may have been affected by the progress made in European institutional integration *before* the advent of EMU. To this aim, we define:

(i) *Actual economic integration* as the degree of interpenetration of economic activity among two or more countries belonging to the same geographic area as measured at a given point in time. While the expression "economic activity" includes both real aspects of an economy (such as trade and labour mobility) and financial/monetary aspects (such as financial flows and exchange rate developments), we here focus on trade integration only;

(ii) *Institutional integration* as the policy decisions taken by two or more governments of countries belonging to the same geographic area in order to promote economic co-operation in terms of deepening and/or widening the spheres of co-ordination under the terms of an agreed pact. Pacts may vary widely in form, ranging from inter-governmental agreements on sectoral co-operation to economic and monetary unions with transfer of sovereignty to supranational institutions.

In the case of Europe, the institutional integration process started already 48 years ago with the 1957 Treaty of Rome, when six countries founded what was then called the European Economic Community (EEC).[2] The process of integration initially aimed to the establishment of a free trade area and customs union, an objective that by 1968 had been

1 See Rose (2001 and 2004), Frankel and Rose (2002) and several references therein.

2 Of course, one may argue that the process of integration started even earlier. It seems, however, reasonable to start the analysis from the Treaty of Rome.

already reached. It then took 25 years to achieve a (still imperfect) common market where non-tariff barriers and restrictions on factor movement are abolished. In the meanwhile, progress was being made in the building up of an economic union where national macro and microeconomic policies are co-ordinated and/or gradually harmonised in line with supranational laws. Finally, in January 1999 EMU commenced and the euro was established as the single currency of eleven European countries. Greece later joined on 1 January 2002. It is noteworthy that, while European institutional integration was advancing, nineteen other countries joined the six founders at different points in time. The EU thus now includes 25 members.

Over this long period economic integration has deepened among all EU countries. We observe in this paper that the reciprocal trade among EU members has risen, over time, by a large multiple of the increases found by Rose (1997) as well as several other studies that he reviews (see Rose (2004)). From our preliminary analysis it turns out that such increases could have far exceed the maximum gains previously estimated. However, such gains have been stretched over a very longer period, i.e. almost 50 years. Another remarkable feature is that non-intra EU trade also increased dramatically over the sample period: i.e., there is an increase of both internal and external openness.

The paper focuses on the following sub-periods that are linked to the main enlargement dates in the past:[3]

– 1960-1972, which is only relevant for the EU-6 founding countries (i.e., Belgium, France, Germany, Italy, Luxembourg and the Netherlands, which started integrating in 1957);[4]

– 1973-1985, with Denmark, Ireland and the United Kingdom becoming members of the EU-9 since 1973 and Greece joining in 1981, thus forming the EU-10;

– 1986-1994, with Portugal and Spain forming the EU-12 together with the other ten members; and

– 1995-2003, with Austria, Finland and Sweden joining the EU-12, thus leading to the EU-15.

Ten new member countries have joined the EU in May 2004, but they are not discussed in this paper as comparable data are not available for them (see Angeloni, Flad and Mongelli (2005)).

The paper is organised as follows. Section 2 presents the index of institutional integration describing how European regional co-operation proceeded over time in terms of depth (i.e., by removing trade barriers, setting increasingly ambitious institutional objectives, etc.) and geographical scope (i.e., new members). Section 3 presents several indicators of trade deepening, including trade openness (i.e., bilateral trade data normalised by GDP), the share of intra-regional trade in total trade and deflated trade values similar to those used by Frankel and Rose (1997) and Rose (2000)). Some other measures of economic and financial integration are also presented, including business cycle synchronisation, financial market integration and nominal convergence. Such measures are used as "controls" in subsequent sections. Section 4 presents several descriptive links between institutional integration and trade

3 Some alternative sub-periods may also be considered: March 1957-August 1971: Bretton Woods system of fixed exchange rates; September 1971-February 1979: very volatile exchange rates and failed attempt to establish an exchange rate mechanism (the "Snake"), plus a major recession in 1973-75; March 1979 – August 1987: "Soft ERM" with frequent realignments, especially until 1983; September 1987-December 1992: "Hard ERM": no realignments (apart from a realignment associated to the lira entering the narrow ERM band in January 1990) until the EMS crisis in September 1992; integration of factor markets, culminating in the establishment of the European Single Market in January 1993; January 1993-December 1998: "Pre-EMU", with enhanced nominal convergence and run-up to monetary union; and January 1999 onwards with EMU.

4 We will also illustrate some selected results for the EU-6 countries using data for 1958-1960 intra-trade.

integration. Section 5 and the related appendix present some more formal tests of the links between institutional integration and trade integration. Finally, Section 6 presents some conclusions and qualifications. Appendices A, B and C contain an "explorative" vector error correction model (VECM) and a variance decomposition exercise.

There are several limitations and caveats to our analysis. First, the focus of this paper is exclusively on Europe until 2003. Second, we concentrate on the two aforementioned dimensions of European integration, i.e., institutional integration and the degree of trade deepening. Third, and more importantly, European integration did not occur in a vacuum, and a host of other variables and developments affected, directly or indirectly, both institutions and trade, thus playing a role in shaping European integration. Examples are given by financial integration, global geopolitical developments and, foremost, the sustained global growth in trade and outputs. Furthermore, the paper excludes trade in services, which has also grown at sustained rates and now accounts for a significant share of GDP (about 6-7 percent for EU countries). However, long time series for trade in services on a comparable basis are not available. Some other technical and methodological caveats are mentioned in the next sections.

2 THE INDICATOR OF INSTITUTIONAL INTEGRATION AND THE ENLARGEMENT OF THE EEC/EU

This section presents the index of institutional integration, which tracks the country-specific path of each member of the European Union (defined here as EU-15, i.e. prior to the enlargement completed in 2004) toward ever-deeper economic, financial and monetary integration with the other Union's members. This index was first presented in Dorrucci, Firpo, Fratzscher, and Mongelli (2002 and 2004). The index follows the seminal contribution of Balassa (1961), which identified the following five main stages of regional integration[5]:

– *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. An example, is the European Economic Community since 1957;

– *Stage 2.* Customs Union (CU) – A FTA setting up common tariffs and quotas (if any) for trade with non-members. An example is the European Economic Community since 1968;

– *Stage 3.* Common Market (CM) – A CU abolishing non-tariff barriers to trade (i.e., promoting the integration of product and service markets) as well as restrictions on factor movement (i.e., promoting the integration of capital and labour markets). An example is the European Community since 1993 (with the establishment of the European Single Market). The CM was already set up as an objective under the Treaty of Rome (so-called "four freedoms");

– *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. An example is the European Union nowadays; and

– *Stage 5.* Total Economic Integration (TEI) – An EUN with all relevant economic policies conducted at the supranational level, possibly in compliance with the principle of subsidiarity. To this aim, both supranational authorities and supranational laws need to be in place. An example is the euro area (i.e., 12 out of 25 EU members), which can be currently classified somewhere between an EUN and a TEI. However, some supranational authorities and joint rule

5 It is important to observe that political union may be seen as an ultimate step going beyond the five stages identified by Balassa. However, that step is not discussed in this paper.

making were established already with the Treaty of Rome in 1957, and subsequently enhanced.

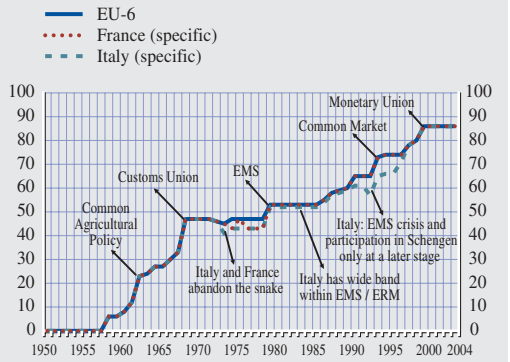
The overall degree of institutional integration at a given point in time during 1957-2003 can be quantified by assigning "scores" to the level of integration recorded for each of these five stages (see Dorrucci, Firpo, Fratzscher, and Mongelli (2002 and 2005)). In particular, scores from 0 to 25 are assigned to the degree of regional integration achieved over time in the development of, respectively, a Free Trade Area/Customs Union (FTA/CU, considered jointly), a Common Market (CM), an Economic Union (EUN), and an area with Total Economic Integration (TEI). By summing up the scores achieved in each moment in time, a monthly index of institutional regional integration is obtained which can range between 0 (no economic integration at all) and 100 (full economic integration, including monetary and financial integration).[6]

At the same time it should be emphasised that this index cannot capture all elements, particularly some unilateral informal initiatives impinging on institutional integration. An example is the de facto monetary union between Austria and Germany that started much before 1999.

Figure 1a illustrates the paths of institutional integration of the six aforementioned founders of the EU (then called EEC) from 1957 until 2003. The development of the EU-6 as a whole sets the benchmark for this study as, with the exception of a few temporary relapses in institutional integration by France and Italy, this group has both pioneered and marked the pace of European institutional integration.

The figure also shows that we can distinguish three sub-periods in the process of regional integration. The *first period*, characterised by faster integration, proceeds from March 1957 (Treaty of Rome) to July 1968 (completion of the customs union). By that time more than half of the overall institutional integration process

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



had been already completed. However, that was also due to the fact that in July 1968 the EU was indeed much more than just a customs union, since it already had some genuine characteristics of subsequent Balassa stages, for instance supranational institutions and Community laws enforced by the courts. 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. Finally, in the *third*, most recent period a new, considerable acceleration in regional integration can be observed with the launch of several initiatives and the start of EMU: as a result, the EU/euro area can currently be classified somewhere between an EUN and a TEI.

Figure 1b illustrates the path of institutional integration of Denmark, Ireland, and the United Kingdom with the EU-6 core group.

6 In Dorrucci, Firpo, Fratzscher, and Mongelli (2002) scores are assigned on the basis of a set of specific indicators and criteria (see Appendix 1, pp. 33-42). To the extent possible scores are not assigned on the basis of the year when a certain decision was *taken* (e.g. Treaty of Rome in 1957), but rather the year and month when a decision started being actually *implemented*. Moreover, some Balassa stages tend to develop *in parallel*, which implies that some stages evolve at the same time. For instance, when it became a customs union (1968), EU-6 had already one fundamental characteristic of total economic integration, i.e. a number of supranational institutions and the structuring of integration through Community law. This entails that numbers can be assigned *in parallel* for each of the five stages.

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

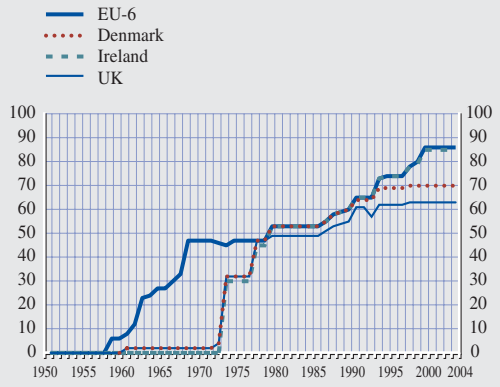
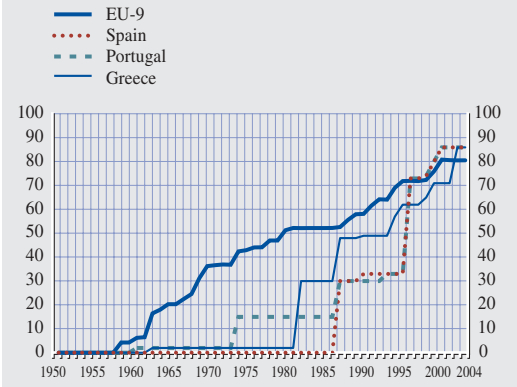


Figure 1c Index of institutional integration: EU-9 compared to Greece (that joined in 1981), Portugal and Spain(that joined in 1985)



These three countries joined the EU in 1973. The chart illustrates that nowadays Ireland is fully integrated with the EU-6 members, whereas Denmark and, to a larger extent, the UK, present a lower degree of integration.

Figure 1c illustrates the path of institutional integration of Greece, Portugal and Spain with the EU-9 countries. The chart illustrates that Greece (which joined the EU in 1981) required quite a long time to catch up with the rest of the EU, while at the same time the EU as a whole was leaping forward. The same phenomenon holds, but to a lesaser extent, for Portugal and Spain: they joined the EU in 1985, leapt to a medium level of institutional integration and then made the final leap a few years later. It should be noted that in the graph these three members actually "overtake" the EU-9 taken as a whole in recent years. The reason for this is that the EU-9 also includes Denmark and the UK, which are at a lower level of institutional integration.

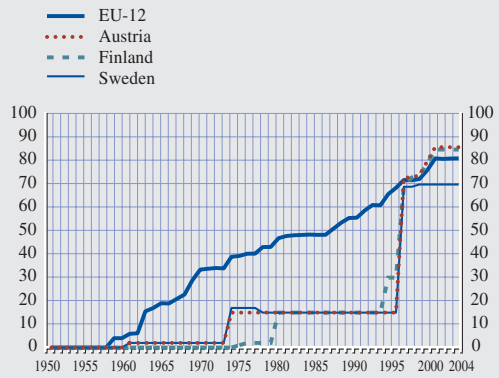
Finally, Figure 1d illustrates the path of institutional integration with the EU-12 countries of Austria, Finland and Sweden, all of which joined the EU in 1995.[7]

All in all, the figures above illustrate a number of overarching features of the European process of institutional integration. *First*, certain countries already scored points in their process of institutional integration even prior to their EU accession, owing to their trade agreements – such as the European Free Trade Agreement (EFTA) – with the EU. *Second*, in specific cases EU accession required some time for a complete institutional catch-up by the new entrants. Both observations will allow us to "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). As a general rule, however, the countries that joined at a later stage required less time to catch-up (institutionally speaking) with the rest. The reason for this looks straightforward: while the founders of the EU have wrangled and wrestled for decades to reach the current institutional setting, those joining later were "only" required to incorporate the *acquis communutaire* into their system of rules and laws.

Third, and most importantly, the figures also point to the relatively higher impact of certain events on the process of institutional

7 In Figure 1d the institutional integration measure only shows Austria as becoming significantly integrated from 1995 onwards (i.e., when it joined the EU). In this regard, it may be argued that Austria's close link with the German D-Mark has increased its integration with Germany and the other EMS members substantially before that. However, our index does not focus on *unilateral* initiatives by individual countries, but only on *multilateral* regional decisions.

Figure 1d Index of institutional integration: EU-12 compared to Austria, Finland and Sweden (that joined in 1995)



integration. The custom union of 1968, the common Market of 1993, and the monetary Union of 1999 look as the most influential steps.

In the following, we will seek to verify whether some of these institutional features – and first of all the degree of institutional deepening – had any significant impact on trade-deepening.

3 DIVERSE MEASURES OF TRADE DEEPENING

The second variable investigated in this paper is trade. We make use of the OECD-MFTS Database covering bilateral trade data in current US dollars from 1960 onward.[8] Three complementary measures of trade deepening are obtained from these data. The first measure is based on the *ratio of intra-regional trade to GDP as an indicator of trade openness*.[9] This measure captures the genuine increase in reciprocal trade among the countries investigated.

Intra-regional trade openness (TO) is defined here as the total trade of a country with the group to which it is acceding (e.g. 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. We define the variable TO as:

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

where i are the "acceding countries" (i.e. DK – Denmark, UK – United Kingdom, etc.) and j denote the successive enlarged EUs (i.e, EU-6, EU-9, EU-10, EU-12). By normalising trade flows by GDP the effects of business cycle fluctuations are also reduced somewhat.

The second measure highlights the *degree of regional trade integration as the ratio of intra-regional trade to total trade*. The merit of this measure is that it may reveal evidence of trade diversion. The potential drawback of this measure is instead that this ratio may not increase even if intra-regional trade rises strongly because of an even higher growth rate in extra-regional trade. For the analysis below intra-regional trade integration (TI) is defined 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 rest of the world, or:

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

This index has been constructed for the EU-6 as a whole and for each individual "acceding" country. We refer to this variable as II.

The third measure, or real trade, is akin to that presented in the paper by Frankel and Rose (1997), which looks at *real trade deepening using US dollar-denominated bilateral trade data* deflated by the USD Chain price index (with basis 1996 = 100 in our case). This permits to obtain a measure of "real" trade data. For the analysis below, "deflated" trade (DT) is

8 I.e., the rest of this analysis is based upon bilateral trade data of every EU country vis-à-vis each other. Trade with the non-EU is also considered to compute some of the indicators below. Unfortunately, these data do not include trade in services which has increasingly acquired greater importance in total trade. Only for the EU-6 countries we possess trade data also for the 1958-1960 period.

9 The adjective intra-regional is important so as to distinguish it from the common meaning of trade openness: i.e., total trade – including extra-regional trade – over GDP.

a measure of "real" trade flows obtained by discounting nominal trade by the US GDP Chain Price Index. This measure is included to allow for a comparison with the findings of Frankel and Rose (1997). Mathematically we can define it as:

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

where Index stands for the Chain Price Index (base year is 1996). The merit of this measure is that it permits to gauge a dimension of trade deepening comparable to the diverse comparisons of the literature on the "endogeneity of OCA" that followed Frankel and Rose (1997) paper. At the same time this measure has several drawbacks and must be interpreted with caution. Using a USD-based deflator may underestimate the effective deepening of European trade as average US inflation exceeded average EU inflation. Still this indicator produces several seeming outliers, with very considerable increases in trade volumes that would deserve to be taken as indicative (and require further analysis).

The following preliminary findings emerge from Table 1 and Figure 2, concerning the *indicator of trade openness* TO (i.e., intra-regional trade to GDP): [10]

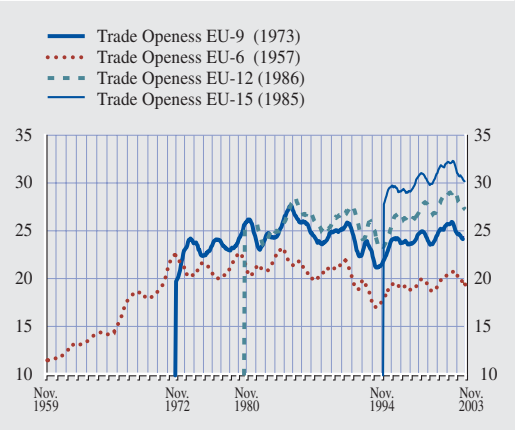
– TO rises with successive enlargements of the EU (as more intra-EU trade is factored in);

– The overall index rises – albeit with some cyclical variations – for every sub-period, i.e. 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 than continues raising, though subject to cyclical fluctuations.

– Trade openness for the EU-15 as a whole rose from about 16 percent of GDP in 1960 to above 32 percent of GDP in 2002. For the current euro area countries as a whole the ratio rises from about 12 percent of GDP in 1960 to over 26 percent in 2002.

Figure 2 Trade Openness of EU6, EU9, EU12, and EU15



– Each EU composition (i.e., group of countries such as EU-6, EU-9, and so on) shows a "dome-like" shape: it displays a tendency to increase and then decline somewhat (probably as more trade takes place vis-à-vis the new member countries). A more recent example of this is the fast deepening of trade between Germany and the new EU Member States;

– EU accession processes are generally accompanied by clear advancements in trade openness (see Figure 3).

– Furthermore, Table 1 (Part B) shows very significant increases in intra-regional trade openness 5-years *prior to* accession compared with 5-years after accession.

Concerning *trade integration (TI), defined as a ratio of intra-regional trade to total trade,* Table 1 and Figure 3 show that also TI raises with successive enlargements of the EU (as more intra-EU trade is factored in). During 1960-2002 TI has increased for every EU composition, albeit with some reversals for the

10 Please note that Table 1 refers to period averages while the Figures show yearly averages of monthly data.

Figure 3 Trade Integration of EU-6, EU-9, EU-12 and EU-15

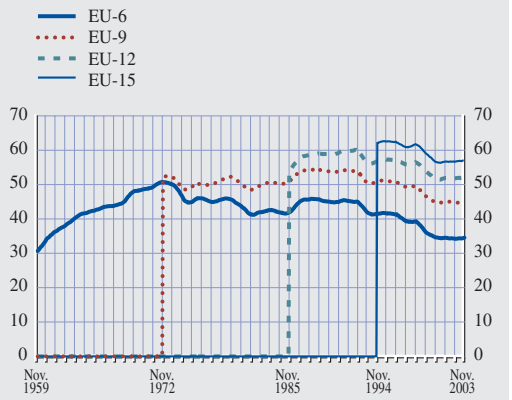
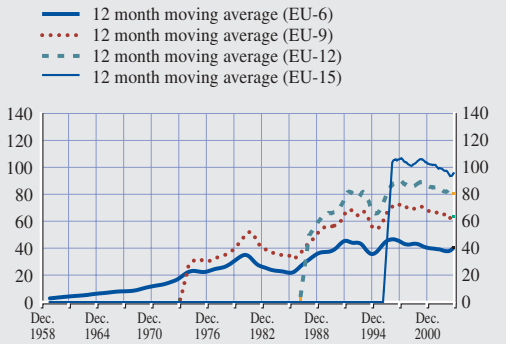


Figure 4 Stacked lines of discounted trade: groups per enlargement dates



countries that integrated earlier than others (i.e., from 9.1 percent for the EU-6, to over 25 percent for the EU-15). This suggests that EU counterparts have become preferential trading partners over the long time period.

Concerning *real US-dollar-denominated bilateral trade* (subject to the aforementioned caveats):

– The increases in real trade values is very large for every group of countries: we are in the range of four- or five-folds increases with respect to those measured by Rose (2000) and Frankel and Rose (1997): i.e., 1,200-1,400 percent vis-à-vis 300 percent. However, the increases we measure unfold over about 50 years: those by Rose (2000) and Frankel and Rose (1997) require less time;

– It increases at uneven rates during the various sub-periods posting the most significant growth during 1960-1972 and 1986-1994 for all EU compositions;

– One important reason why trade deepening developed also prior to official EU accession is the existence of trade agreements between the EU and future accession countries prior to accession (e.g., EFTA). Furthermore, all countries in the sample were subject to the General Agreement on Tariffs and Trade (GATT);

– As explained, our measure of real bilateral trade is only indicative; and

– The reasons for the uneven and cyclical progresses over time should also explored in future extensions of this project.

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[1]	EU-9	EU-10	EU-12	EU-15	Euro Area									
1960-1972	14.3	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[1]	EU-9	EU-10	EU-12	EU-15	Euro Area									
1960-1972	117.0	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	*101.1*	*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[1]	EU-9	EU-10	EU-12	EU-15	Euro Area									
1960-1972	42.4	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[1]	EU-9	EU-10	EU-12	EU-15	Euro Area									
1960-1972	74.8	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	*12.4*	*20.4*	*20.2*	*31.1*	*18.9*	*8.9*	*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[1]	EU-9	EU-10	EU-12	EU-15	Euro Area									
1960-1972	425.1	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	*1,652.0*	*1,227.0*	*1,226.4*	*1,345.4*	*1,259.9*	*1,424.7*	*637.8*	*8,176.4*	*1,005.2*	*976.3*	*2,582.2*	*6,458.5*	*1,246.3*	*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[1]	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.
1) For the EU-6 the data start from 1958. The data for 1958-1959 were obtained from the European Commission, supplemented with IFS data.

Table I Selected measures of trade deepening, 1960-2003 (Part B)

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 [1]	EU-9	EU-10	EU-12	EU-15	Euro Area									
total: 1960-2003	121.6	89.1	87.8	104.9	85.9	102.1	18.4	356.0	179.6	8.1	37.6	251.0	63.4	7.0	33.8
post-EMS: 1979-2003	-5.1	3.0	2.5	15.5	16.4	16.0	34.9	27.8	-4.3	-25.0	5.0	171.9	43.0	31.9	26.1
Pre-EMU (1994-1998)- Post-EMU (1999-2003)	5.0	5.2	4.9	7.3	7.6	6.9	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
Special Periods															
Bretton Woods 1/1960 till 8/1971	105.7	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
Floating rates – 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
"Soft" ERM – 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
"Hard" ERM – 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
Pre-EMU – 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
EMU – 1/1999 till 12/2003	-1.5	-1.9	-2.2	-1.5	-1.7	-1.9	4.8	-14.8	-12.1	-29.2	-22.4	-0.1	6.1	-6.3	-7.3

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 [1]	EU-9	EU-10	EU-12	EU-15	Euro Area									
total: 1960-2003	1,781.0	1,103.6	1,100.3	1,308.2	1,159.7	1,424.7	637.8	8,176.4	1,005.2	976.3	2,582.2	6,458.5	1,246.3	679.1	378.5
post-EMS: 1979-2003	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 (1994-1998)- Post-EMU (1999-2003)	-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
Special Periods															
Bretton Woods 1/1960 till 8/1971	425.1	172.2	171.5	173.6	153.3	229.5	28.7	130.1	59.5	209.5	190.5	298.1	116.1	66.8	40.3
Floating rates – 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
"Soft" ERM – 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
"Hard" ERM – 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
Pre-EMU – 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
EMU – 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.
1) For the EU-6 the data start from 1958. The data for 1958-1959 were obtained from the European Commission, supplemented with IFS data.

Table 2 Institutional Integration and Trade Deepening during Successive EU Enlargements, 1958/60-2003 [1]

European Union (EU) Enlargements [2]		Institutional Integration (II) (Score 100=max)	Trade Openness (TO) (Share of GDP in %)	Trade Integration (TI) (Share of total trade)	Discounted Trade (DT) (1996 US$ billion)
EU-6	1958	5.0	8.8	29.0	2.2
	1960	8.0	11.6	34.5	3.8
	1972	46.0	19.1	50.7	15.9
1973 Enlargement					
Ireland	1973	30.0	17.3	20.7	0.2
	1985	53.0	28.3	27.1	0.6
Denmark	1973	32.0	16.6	31.7	1.1
	1985	53.0	19.5	34.5	1.4
United Kingdom	1973	32.0	11.0	25.7	4.4
	1985	49.0	18.8	40.0	9.5
EU-9	1973	42.4	23.2	52.3	27.4
	1985	52.2	26.0	51.0	35.3
1981/85 Enlargement					
Greece [3]	1986	48.0	27.9	59.0	1.1
	1994	62.0	19.2	58.4	1.6
Portugal	1986	30.0	30.9	53.7	1.0
	1994	33.0	28.4	55.0	2.1
Spain	1986	30.0	15.1	52.4	3.6
	1994	33.0	21.2	59.1	8.5
EU-12	1986	52.5	26.4	57.2	49.6
	1994	68.6	24.8	56.7	72.8
1995 Enlargement					
Austria	1995	73.0	37.7	67.1	3.5
	2003	86.0	42.4	61.0	5.6
Finland	1995	69.0	26.4	45.6	1.4
	2003	85.0	24.9	42.9	2.1
Sweden	1995	69.0	32.0	56.4	4.2
	2003	70.0	31.3	51.2	5.3
EU-15	1995	71.9	29.7	62.5	103.6
	2003	81.1	30.3	56.7	105.2

Sources: IFS, OECD MTFS Database, European Commission and authors calculations.
1) Data is 12 months averages of the year. 1960 data is 12 months average December 1960-November 1961. 1958-60 OECD annual trade data, supplemented with IFS data.
2) Trade deepening of acceeding countries vis-à-vis the EU at the time of the enlargement. E.g., in the case of UK it is trade deepening with EU-9.
3) Greece joined the EU-9 in 1981.

4 SOME DESCRIPTIVE LINKS BETWEEN INSTITUTIONAL INTEGRATION AND TRADE INTEGRATION

This section presents some illustrations of the link between institutional and trade integration. We also look at what happened around the date of EU accession and since the start of Stage 3 of EMU.

4.1 SPECIFIC EFFECTS OF ACCESSION

The above Table 1 (Part B) illustrates that accession is characterised by significant trade deepening. Taking the respective accession years as a pivot, and computing the indicators of trade deepening 5-years prior to accession with respect to 5-years after accession, we find the following effects.

The indicator of trade openness (i.e., intra-regional trade to GDP) exhibits increases by 18.6 percent for Denmark, 189.9 percent for

Figure 5a Institutional integration and trade openness, 1960-2003, all EU countries

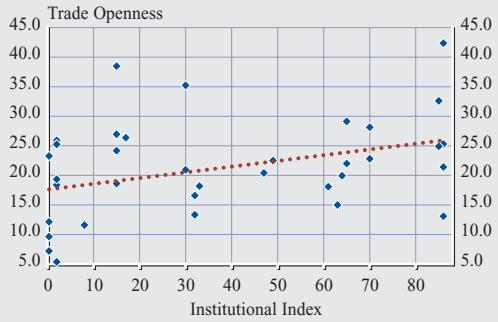


Figure 5b Institutional integration and trade openness, 1960-2003, EU-6 vs. Denmark, Ireland and the UK

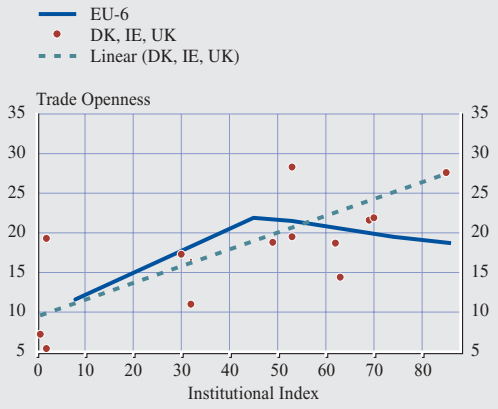


Figure 5c Institutional integration and trade openness, 1960-2003, EU-9 vs. Spain, Portugal and Greece

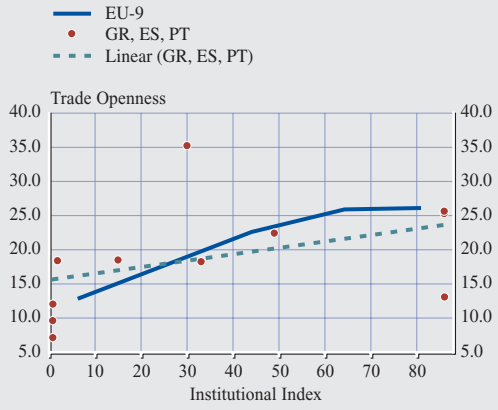
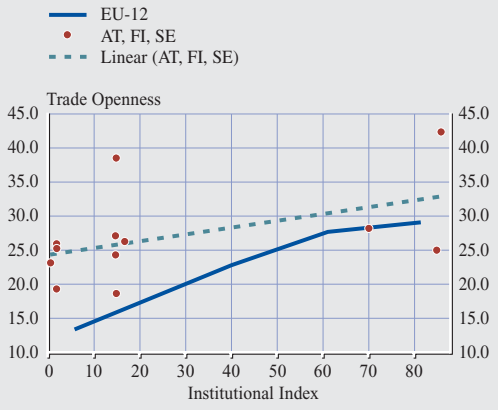


Figure 5d Institutional integration and trade openness, 1960-2003, EU-12 vs. Austria, Finland and Sweden



Ireland, 138.3 percent for the UK, 32.4 percent for Greece, 23.7 percent for Portugal, 73.5 percent 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, we observe increases by 208.3 percent for Denmark, 523.6 percent for Ireland, 235.2 percent for the UK, 55.1 percent for Greece, 234.7 percent for Portugal, 322.7 percent for Spain, 5.4 percent for Austria, 17.5 percent for Finland, and 3.9 percent for Sweden.

4.2 SPECIFIC EFFECTS OF STAGE 3 OF EMU (I.E., THE INTRODUCTION OF THE EURO)

Table 1 (Part B) illustrates that 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. Deflated real trade rose by 8.4 percent vis-à-vis a 5.4 percent increase in the EU-15.

The following scatter diagrams describe the possible *link between institutional integration and the three trade measures*. The relationship is clearly positive. However, a few may even be downward biased by the fact that intra-regional

Figure 6a Institutional integration and trade integration, 1960-2003, all EU countries

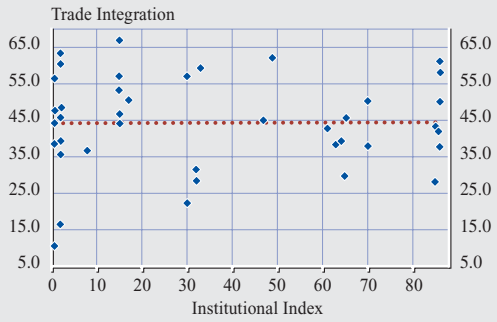


Figure 6b Institutional integration and trade integration, 1960-2003, EU-6 vs. Denmark, Ireland and the UK

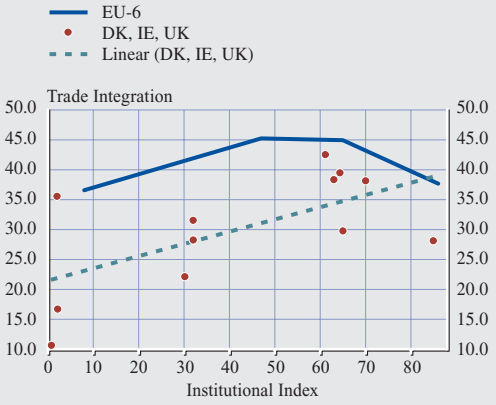


Figure 6c Institutional integration and trade integration, 1960-2003, EU-9 vs. Spain, Portugal and Greece

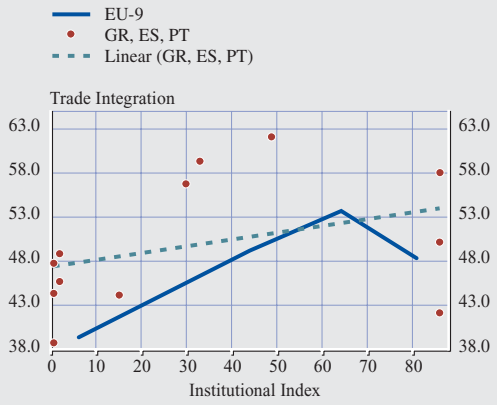
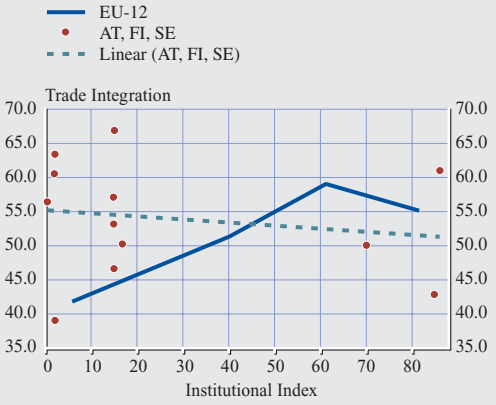


Figure 6d Institutional integration and trade integration, 1960-2003, EU-12 vs. Austria, Finland and Sweden



trade increases with successive accession waves but trade deepening of any group may retrench somewhat over time: for instance, trade deepening among the EU-6 declined as the EU grew larger. In future extensions of this work, a correction will be required for this effect.

5 TESTING THE LINKS BETWEEN INSTITUTIONAL INTEGRATION AND TRADE DEEPENING

In this final section we use some simple tools to gauge some direction of causality between institutional and economic integration. For institutional integration we use the index of institutional integration as defined in Section 2. Before commencing our formal test, however, we need to perform a few data transformations. As a standard procedure, we take the natural logarithms of all four variables (II, TO, TI and DT). Moreover, as monthly trade data contain strong seasonal components, it is necessary to seasonally adjust the variables TO, TI and DT. Visual inspection of seasonal stacked lines of the variables confirms that the means are different in different months, indicating the presence of seasonality. The procedure we use to perform seasonal adjustment is the standard TRAMO/ SEATS.

Box

LIST OF VARIABLES AND ABBREVIATIONS USED

TO – Trade Openness
TI – Trade Integration
DT – Deflated Trade

II – Institutional Integration

AU – Austria
DK – Denmark
ES – Spain
FI – Finland
GR – Greece
IE – Ireland
PT – Portugal
SE – Sweden
UK – United Kingdom

ln – natural logarithm

5.1 OPTIMAL LAG LENGTHS AND COINTEGRATION RANKS

The level of integration of all variables is checked with the Adjusted Dickey-Fuller tests. All variables for all countries are, in fact, I(1). The variable II does not require seasonal adjustment as institutional integration, which is a political process, does not contain a seasonal component. Visual inspection of seasonal stacked lines confirms this.[11] That is, they are all non-stationary in levels and stationary in first differences. In nearly all cases, moreover, these results are not sensitive to the inclusion of a deterministic trend in the test specification: the variables are not trend stationary either. In order to avoid spurious regressions, therefore, the cointegration approach is the correct way to proceed.

We then look at the optimal lag length and determine the rank of cointegration of each set of endogenous variables. The sets of endogenous variables are as follows: DT and II; TI and II; and TO and II. That is, we want to run a VECM for each combination of institutional integration and the three proxies of trade deepening. Algebraically we can use the vector formulations:

$$dt_{t,i} = \begin{bmatrix} \ln\left(DT_{t,i}^{EUj}\right) \\ \ln\left(II_{t,i}\right) \end{bmatrix}, \; ti_{t,i} = \begin{bmatrix} \ln\left(TI_{t,i}^{EUj}\right) \\ \ln\left(II_{t,i}\right) \end{bmatrix} \text{ and}$$

$$to_{t,i} = \begin{bmatrix} \ln\left(TO_{t,i}^{EUj}\right) \\ \ln\left(II_{t,i}\right) \end{bmatrix}$$

The optimal lag length can be estimated by running *unrestricted* VARs and then applying a standard criterion for lag length selection. The VARs can be defined as follows:

$$(1) \qquad dt_{t,i} = \alpha + \beta_1 dt_{t-1,i} + \ldots + \beta_p dt_{t-p,i} + \varepsilon_t$$

$$(2) \qquad ti_{t,i} = \alpha + \beta_1 ti_{t-1,i} + \ldots + \beta_p ti_{t-p,i} + \varepsilon_t$$

$$(3) \qquad to_{t,i} = \alpha + \beta_1 to_{t-1,i} + \ldots + \beta_p to_{t-p,i} + \varepsilon_t$$

11 It is interesting to note, however, that it is not a *necessary* condition for all variables to be integrated of the same order when running a VECM. One can also include variables that are I(0) (Hayashi, 2000).

Here α is a vector of constants; β_1,..., β_p are matrices of coefficients to be estimated; and ε_t is a vector of innovations that may be contemporaneously correlated, but are uncorrelated with their own lagged values and uncorrelated with the right-hand side lagged variables.

There are several criteria that can be used for the selection of the optimal lag length, which we call p^*. All are similar in that they improve as R^2 increases, but, ceteris paribus, degrade as the model size increases and degrees of freedom are lost. We apply the Schwarz (Bayesian) criterion consistently to all unrestricted VARs.[12] The results can be found in Table A.1 in Appendix A. Optimal lag lengths range from 1 to 4 lags.

Having determined the optimal lag length, we can proceed to the cointegration tests. We use the standard Johansen test (Johansen, 1995). We allow for a deterministic trend in the levels data. Subsequently, we use the Trace statistic to test whether the rank of cointegration is 1 (i.e. there is one cointegrating vector). Since we have only two variables, the cointegration rank cannot exceed 1. The results at 5% significance are reported in Table A.3. In just over half the cases the cointegration rank is 1. The cases where no cointegrating vectors were found are most concentrated in the variables of deflated trade (DT). For trade openness and trade integration, on the other hand, the vast majority of variable pairs do possess cointegrating vectors. For those variables which have a rank of zero, no VECM can be run.

5.2 GRANGER CAUSALITY TESTS TO GAUGE ENDOGENEITY

We use Granger Causality tests to check whether institutional integration and trade deepening may be qualified as endogenous to each other. Again, we make use of the optimal lag length, p^*, as determined by our unrestricted VARs. The full results (at 5% significance) are reported in Table A.2. Table 3 below provides a summary. As we can see, in 56% of the cases institutional integration Granger causes trade deepening, whereas in 26% of the cases trade deepening Granger causes institutional integration. These preliminary results would appear to indicate that the link from institutional integration to trade deepening is stronger than the reverse link. Nevertheless, the reverse link cannot be entirely discarded. Interestingly, however, the results become far more "pronounced" when we only take the first group of acceding countries that joined the EU in 1973: the UK, Ireland and Denmark. When we look only at these three countries institutional integration Granger causes trade deepening in 89% of the cases, whereas the reverse only holds for 11% of the cases.

A preliminary Vector Error Correction Model (VECM), which captures both the short-run dynamics and the long-run trends in the equations, is given in Appendix B, while a variance decomposition analysis is presented in Appendix C.

12 For a comprehensive description of the Schwarz criterion and other criteria of lag length selection, see Greene (2003).

Table 3 Summary of results from Granger-causality tests

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

Of particular interest for our discussion in the VECM is the parameter (β) indicating the speed of adjustment to the long-run co-integrating equation (see Appendix B). It is found that the adjustment speed is greater for shocks running from economic integration (i.e. trade openness TO, trade integration TI, and discounted trade DT) to institutional integration (II), than for those running from institutional integration. Also, in terms of adjustment speed trade openness TO ranks first, followed by trade integration TI, and discounted trade DT.

A variance decomposition sheds some further light on the degree to which the variation of one endogenous variable is explained by the variation in the other (see Appendix C). It is found that generally shocks to institutional integration explain a larger part of trade deepening than vice versa. This is in line with the observations on the "dominance" of this direction of the link between the two. Nevertheless, the effect of trade deepening on institutional integration – the "reverse" link – is non-negligible according to these results.

6 CONCLUSION

This paper concentrates on two dimensions of European integration: institutional integration and trade deepening. An index of institutional integration captures the diverse stages of integration as resulting from regional multilateral policy decisions. It shows that the process of regional co-operation occurred in successive waves, and that later joiners caught up relatively quickly with the initial founding members of the EU.

Trade deepening is captured by several complementary indicators, including an indicator of trade openness (i.e., bilateral trade data normalised by GDP), an indicator of trade share integration, and an indicator of deflated trade values similar to the one used by Frankel and Rose (1997)). These measures show that the EU did witness a very significant deepening of reciprocal trade among its member countries over the considered 50 years: by a large multiple of the increase found by Frankel and Rose for the cases of currency unification they examine. However, in Europe this took a long period of time, requiring substantial institution building and removal of tariff and non-tariff barriers in between.

The paper's findings are consistent with the view that the causal link between institutional integration and trade deepening runs *both* ways. Such an interaction makes sense as it may be most beneficial for policymakers to take an institutional step once economies are more intertwined. Yet the link running from institutional integration to trade deepening is empirically far more pronounced. This is witnessed by the larger percentage of significant cases of Granger causation. There are also higher values for the long-run adjustment parameter in a preliminary VECM-exercise and the larger values in the variance decomposition for this direction of the link. By the same measures, the results are more pronounced for the trade openness variable than for the trade integration and deflated trade variables.

An important limitation of our analysis is that a host of other variables and developments have directly and indirectly affected institutions and trade, and played a role in shaping European integration: e.g., financial integration, global geopolitical developments, and foremost sustained global growth in trade and outputs. We would need to "condition" our findings on them in future extensions of this project.

The paper suggests that, over time, the EU might have experienced a dynamic interaction between the process of institutional integration and economic and financial integration. This leads us to postulate a generalisation of the "endogeneity of OCA", whereby what matters is not just the monetary union as such, but the whole process of regional institutional integration and its characteristics. Such a generalisation, however, should be more

seen as a subject for future research than as a fully-fledged finding of this paper. In any case, the paper hints that European countries may have benefited from a virtuous circle between institutional and economic integration (bringing about, for instance, higher intra-regional trade) at the regional level. However, the causality between the above dimensions needs to be examined further.

Policy makers interested in greater regional integration should not disregard the interaction between the institutional process and actual economic integration over time. Over time there can indeed be a dynamic interaction between a process of institutional integration and actual economic integration. This does not mean that the latter is entirely endogenous to the policy decisions affecting institutional integration: there is no "automatic pilot" ensuring that a strengthening in regional institutional integration will bring about, for instance, higher intra-regional trade, more synchronised business cycles, financial market integration and nominal convergence.

There are several directions for further extensions of this project. One crucial aspect is that the institutional index, based on annual data according to the methodology presented in Dorrucci, Firpo, Fratzscher and Mongelli (2002 and 2005), is unusual in the sense that it retains the same value for some years but then jumps at discrete intervals and then remains flat again. This calls into question whether there is sufficient variation in the index to get meaningful results (i.e., only a very small proportion of the observations actually contain any movement in the explanatory variable). One therefore needs to devise an econometric approach to better analyse the impact of the movements in the institutional index on trade integration.

It is important also to consider the inclusion of more conditioning variables and some ad hoc techniques to deal with the successive waves of EU enlargements. Furthermore, one could also check the validity of our preliminary findings when a similar analysis is applied to the institutional arrangements in other regions of the world (e.g. Latin America, East Asia and Sub-Saharian Africa). One open question is whether one could postulate that the hypothesis of endogeneity of OCA may be extended and generalised which would require much further conceptual work in this direction.

APPENDIX A

Tables A.1, A.2 and A.3 report the results of the preliminary tests for the Vector Error Correction Model.

Table A.1 Unrestricted VARs to determine optimal lag length[1)]

Country or Region	Trade Openness: Optimal Lag Length using Schwarz criterion
1973 Enlargement	
Denmark	1
Ireland	2
UK	1
1981/86 Enlargement	
Greece	3
Portugal	3
Spain	1
1995 Enlargement	
Austria	1
Finland	3
Sweden	1

Country or Region	Trade Integration: Optimal Lag Length using Schwarz criterion
1973 Enlargement	
Denmark	3
Ireland	3
UK	3
1981/86 Enlargement	
Greece	3
Portugal	4
Spain	2
1995 Enlargement	
Austria	2
Finland	2
Sweden	3

Country or Region	Deflated Trade: Optimal Lag Length using Schwarz criterion
1973 Enlargement	
Denmark	1
Ireland	2
UK	1
1981/86 Enlargement	
Greece	4
Portugal	3
Spain	3
1995 Enlargement	
Austria	1
Finland	3
Sweden	1

1) The VAR includes as endogenous variables institutional integration and one of the variables of trade deepening below.

Table A.2 Granger Causality Tests[1)]

Country or Region	Trade Openness Granger causes Inst. Integration	Inst. Integration Granger causes Trade Openness
1973 Enlargement		
Denmark	N	Y
Ireland	N	Y
UK	N	Y
1981/86 Enlargement		
Greece	N	N
Portugal	N	Y
Spain	Y	N
1995 Enlargement		
Austria	N	N
Finland	N	N
Sweden	N	Y

Country or Region	Trade Integration Granger causes Inst. Integration	Inst. Integration Granger causes Trade Integration
1973 Enlargement		
Denmark	N	Y
Ireland	N	Y
UK	N	Y
1981/86 Enlargement		
Greece	N	N
Portugal	N	Y
Spain	N	N
1995 Enlargement		
Austria	N	N
Finland	N	N
Sweden	N	Y

Country or Region	Deflated Trade Granger causes Inst. Integration	Inst. Integration Granger causes Deflated Trade
1973 Enlargement		
Denmark	N	Y
Ireland	Y	N
UK	N	Y
1981/86 Enlargement		
Greece	N	Y
Portugal	Y	Y
Spain	Y	Y
1995 Enlargement		
Austria	Y	N
Finland	N	N
Sweden	Y	N

1) Using lag length determined by unrestricted VARs. Results at 5% significance. Y = Yes; N = No.

Table A.3 Rank of cointegration from Johansen test [1)]

Country or Region	Trade Openness: Rank of cointegration
1973 Enlargement	
Denmark	1
Ireland	1
UK	1
1981/86 Enlargement	
Greece	0
Portugal	0
Spain	1
1995 Enlargement	
Austria	1
Finland	1
Sweden	1

Country or Region	Trade Integration: Rank of cointegration
1973 Enlargement	
Denmark	0
Ireland	1
UK	1
1981/86 Enlargement	
Greece	1
Portugal	0
Spain	1
1995 Enlargement	
Austria	0
Finland	1
Sweden	1

Country or Region	Deflated Trade: Rank of cointegration
1973 Enlargement	
Denmark	0
Ireland	0
UK	0
1981/86 Enlargement	
Greece	0
Portugal	0
Spain	1
1995 Enlargement	
Austria	0
Finland	0
Sweden	0

1) Determined using optimal lag length based on unrestricted VARs. Maximum rank of cointegration is one, since there are only two variables. The test includes as endogenous variables institutional integration and one of the variables of trade deepening below.

APPENDIX B

AN "EXPLORATIVE" VECTOR ERROR CORRECTION MODEL (VECM)

We present here a simple, and preliminary, Vector Error Correction Model (VECM) is used to cast an additional look upon the link between institutional integration and actual economic integration measured by trade deepening. The benefit of this approach is that both institutional integration and trade deepening can be specified as endogenous. In a standard linear regression, we would specify institutional integration as exogenous and only look at its effects on trade. But, at least from a theoretical point of view, there is a good case to argue that both variables are endogenous. After all, when a deepening of trade takes place and economies become more intertwined, it may make more sense for politicians to follow suit by deepening institutional integration as well. As famously argued by Mundell (1961), for example, it is only beneficial to take the *institutional* step towards the formation of a currency union if the involved countries are sufficiently *economically* integrated (according to the OCA criteria). The VECM approach also has another important advantage: it is ideally suited to deal with non-stationary, but cointegrated variables.

The specification of the VECM is as follows, starting with the cointegrating equation:

$$CE_i = c + \ln(TO^{EUj}_{t-1,i}) - \theta \ln(II_{t-1})$$

Here CE stands for the cointegrating equation; c is a constant; and θ is the parameter for Institutional Integration. The above specification for Trade Openness extends also to the two other trade measures, TI and DT.

Then the error-correction specification becomes:

$$\Delta \ln(TO^{EUj}_{t,i}) = \alpha + \beta CE_i + \gamma_1 \Delta \ln(TO^{EUj}_{t-1,i}) + \ldots + \gamma_{p^*} \Delta \ln(TO^{EUj}_{t-p^*,i}) + \lambda_1 \Delta \ln(II^{EUj}_{t-1,i}) + \ldots + \lambda_{p^*} \Delta \ln(II^{EUj}_{t-p^*,i}) + \varepsilon_{t,i}$$

and, equivalently

$$\Delta \ln(II_{t,i}) = \alpha + \beta CE_i + \gamma_1 \Delta \ln(TO^{EUj}_{t-1,i}) + \ldots + \gamma_{p^*} \Delta \ln(TO^{EUj}_{t-p^*,i}) + \lambda_1 \Delta \ln(II^{EUj}_{t-1,i}) + \ldots + \lambda_{p^*} \Delta \ln(II^{EUj}_{t-p^*,i}) + \varepsilon_{t,i}$$

Here α is the constant term; β is the parameter of adjustment to the long run relationship; γ and λ are the parameters for the lagged terms (up to the optimal lag length p^*) of Trade Openness and Institutional Integration, respectively; and ε is a white noise error term. Again, the same specification extends also to TI and DT. Of particular interest is the parameter β, as it indicates the speed of adjustment to the long-run cointegrating equation. Our estimations of β are reported in Table 4 (below).

Table B.1 Estimation of the parameter β in the cointegrating equation [1)]

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

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

Country or Region	Error-correction equation for ΔDT	Error-correction equation for ΔII
1973 Enlargement		
Denmark	-	-
Ireland	-	-
UK	-	-
1981/86 Enlargement		
Greece	-	-
Portugal	-	-
Spain	-0.061	0.033
	(0.024)	(0.020)
1995 Enlargement		
Austria	-	-
Finland	-	-
Sweden	-	-
Average	**-0.061**	**0.033**

1) The VECM is only estimated in those cases where the rank of cointegration found is greater than zero. The table reports the value of the adjustment paramater β, according to the estimated equation: the error-correction equation that starts with the trade measure, i.e. ΔTO/ΔTI/ΔDT, and the one that starts with the institutional measure ΔII. Standard errors are in brackets below.

The values we would expect for β are as follows: for the ΔTO error-correction equation we expect a negative value for β, because as the CE-term $\left(TO_{t-1,i}^{EUj} - \theta II_{t-1}\right)$ increases (i.e. a "positive" deviation), the growth rate of TO should be negative to return to the long-run equilibrium path; for the ΔII error-correction equation we expect the exact opposite, namely a *positive* value of β, because if the CE-term increases, II should *increase* over time in order to undo the deviation.

Table A.1 shows that in most cases the parameters have the expected signs, although there are a few exceptions. For the ΔTO/ ΔTI/ΔDT error-correction equations, all estimated β's have the expected negative sign. However, for the ΔII error-correction equations only about 70% of the estimated β's have the expected positive sign. The calculated averages for the three trade variables all have the expected signs for the parameter β.

Now, let us turn to the interpretation of the β parameter. Since all variables are in logs, all parameters are comparable as elasticities. In those cases where β has the expected sign, we can state that a larger value of the coefficient implies a more rapid adjustment to the long-run equation. For example, in the case of trade openness a deviation from the long-run path lasts less long than in the case of trade integration, as the average absolute values of the β's are higher for the trade openness variable. Therefore, we see that the adjustment speed is greater for shocks running from TO, TI or DT than for those running from II, which seems to corroborate earlier evidence. Also, in terms of adjustment speed TO ranks first, followed by TI and DT.

APPENDIX C

A VARIANCE DECOMPOSITION

Variance decomposition allows one to gauge the degree to which the variation of one endogenous variable is explained by the variation in the other. Since it is expressed in percentages, it allows for relatively easy interpretation. We use the standard method of the Cholesky decomposition, where the shocks coming from institutional integration are

Table C.1 Results of the variance decomposition [1)]

Country or Region	Percentage of Variance of Trade Openness explained by Inst. Integration	Percentage of Variance of Inst. Integration explained by Trade Openness
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%
Average	**34.1%**	**18.8%**

Country or Region	Percentage of Variance of Trade Integration explained by Inst. Integration	Percentage of Variance of Inst. Integration explained by Trade Integration
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%
Average	**14.5%**	**8.7%**

Country or Region	Percentage of Variance of Deflated Trade explained by Inst. Integration	Percentage of Variance of Inst. Integration explained by Deflated Trade
1973 Enlargement		
Denmark	-	-
Ireland	-	-
UK	-	-
1981/86 Enlargement		
Greece	-	-
Portugal	-	-
Spain	39.8%	13.7%
1995 Enlargement		
Austria	-	-
Finland	-	-
Sweden	-	-
Average	**39.8%**	**13.7%**

1) Only for variables with nonzero cointegration rank. Expressed in percentage terms: 5 years after the innovation.

placed first in the ordering. Table 4 reports the results for the variance decomposition for 5 years after the innovation.

The averages reported in the table show that generally shocks to institutional integration explain a larger part of trade deepening than vice versa. This seems in line with our earlier observations on the "dominance" of this direction of the link between the two. Nevertheless, the effect of trade deepening on institutional integration – the "reverse" link – is certainly non-negligible according to these results. Moreover, one should keep in mind that the ordering of the Cholesky decomposition can significantly affect the results.

Another interesting point is that, as in the case of the β parameter values, the reported percentages in the variance decompositions are higher for the trade openness variable than for the trade integration variable.

STATISTICAL ANNEX

TRADE DATA

Trade data on both intra and extra-regional trade for the years 1960-2003 were obtained from the OECD-MFTS database. Points to note:

– Until December 1998 Belgium and Luxembourg were reporting their imports together. We thus take these two countries as one bloc and disregard the internal trade between them.

– Greek trade data are only available until December 2002.

Annual, intra-regional trade data for the EU-6 for the years 1958-1959 were obtained from the European Commission. For the calculation of the trade indicators, these data were supplemented with GDP data for 1958-1959 from IMF-IFS. Moreover, as the OECD only reports since 1960, extra-regional trade data were also taken from IMF-IFS for these years. To ensure that the discrepancy between IFS data and the subsequent OECD data is not too large, we compared the two datasets for the early 60s. Discrepancies are usually relatively small, in the 2-3% range.

GDP DATA

GDP data were obtained in local currency from IMF-IFS. They were subsequently converted into US Dollar terms using data on exchange rates from IMF-IFS.

CHAIN PRICE INDEX

The data on the US GDP Chain Price Index were obtained from BEA, NIPA Tables 7.1, 7.2, 7.14 and the GDP Press Release. The base year is 1996, so that the computations represent deflated trade in 1996 dollars.

TABLES ON OPTIMUM CURRENCY AREA CRITERIA

The data used to compute the tables on the OCA criteria have a broader set of sources, namely: IMF-IFS; IMF-DTS; IMF-WEO; BIS; World Bank-WDI; Datastream; OECD-MEI; OECD-MFTS; CEIC database; Heston, Summers and Aten's Penn World Table Version 6.1, CICUP, Oct. 2002.

A more precise explanation of the measures represented in these tables can be found in chapter 2.2 of Dorrucci, Agur, McKay and Ramon-Ballester (2004, forthcoming).

INSTITUTIONAL INDICES

The database for the institutional indices is an expanded version of the one set up by Dorrucci, Firpo, Fratzscher and Mongelli (2002).

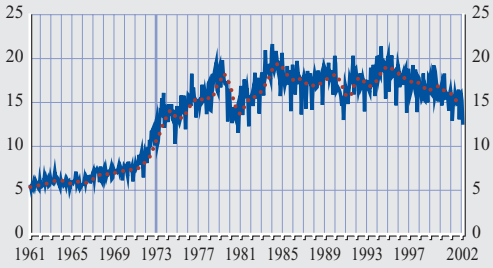
Annex with figures (see below)

Charts Trade openness EU

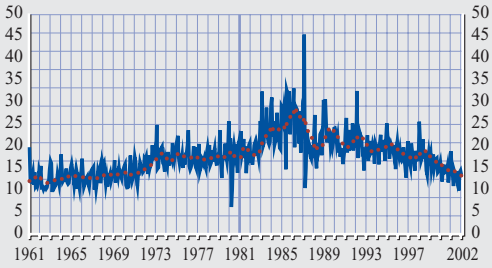
(as at November of each year)

trade openness
12 month moving average

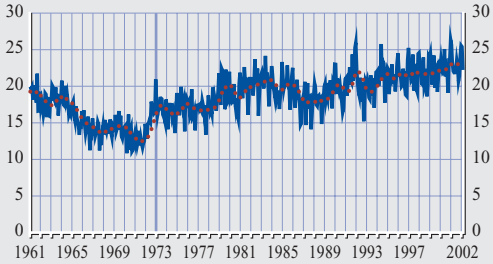
United Kingdom - EU6



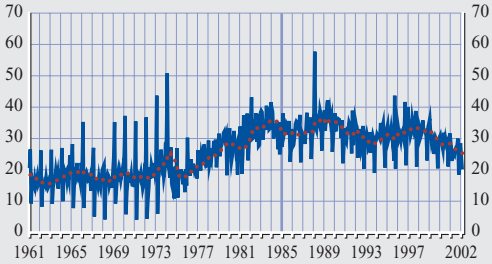
Greece - EU9



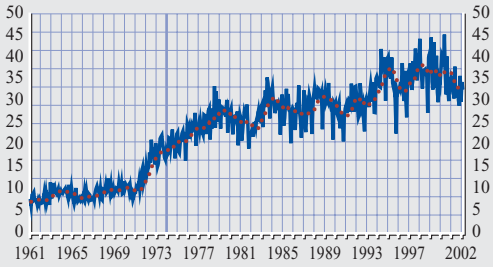
Denmark - EU6



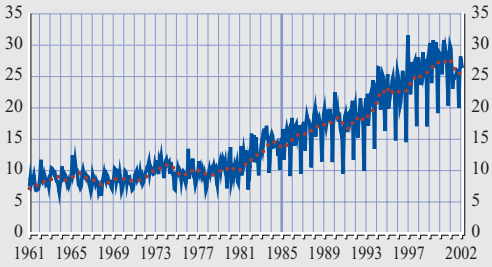
Portugal - EU10



Ireland - EU6



Spain - EU10

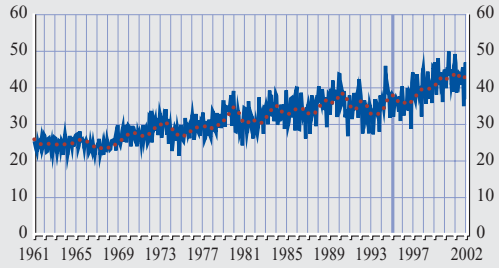


Charts Trade openness EU (cont'd)

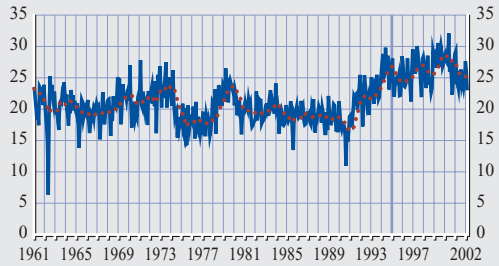
(as at November of each year)

trade openness
12 month moving average

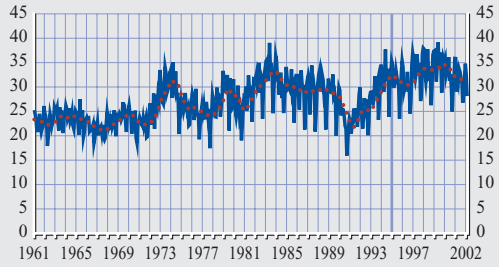
Austria EU12



Finland EU12



Sweden EU12

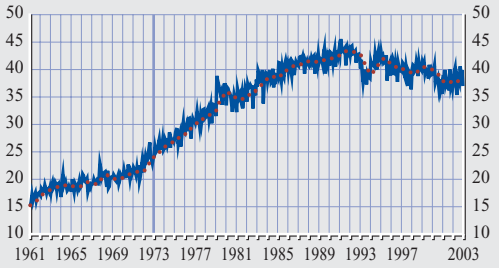


Charts Trade integration

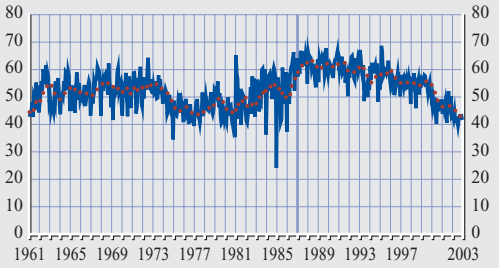
(as at January of each year)

trade integration
12 month moving average

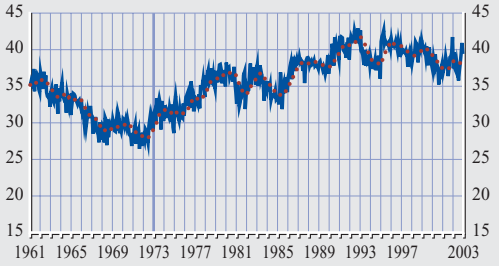
United Kingdom - EU6



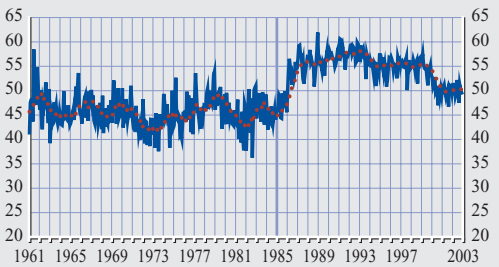
Greece - EU9



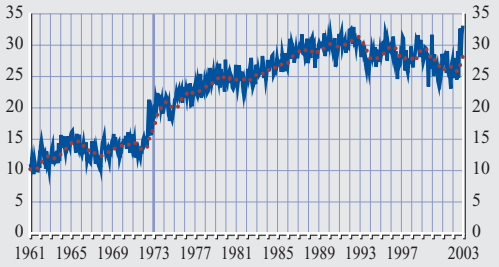
Denmark - EU6



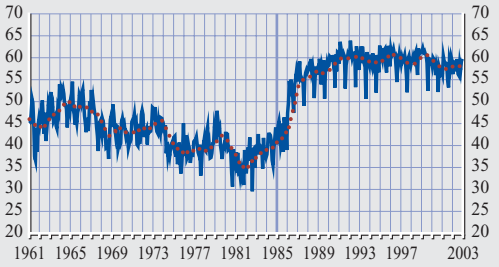
Portugal - EU10



Ireland - EU6



Spain - EU10

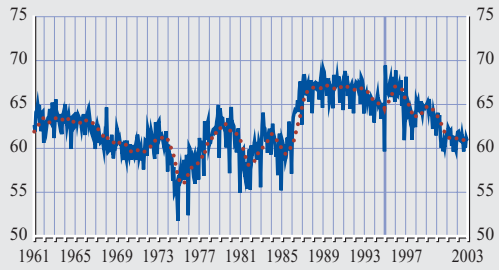


Charts Trade integration (cont'd)

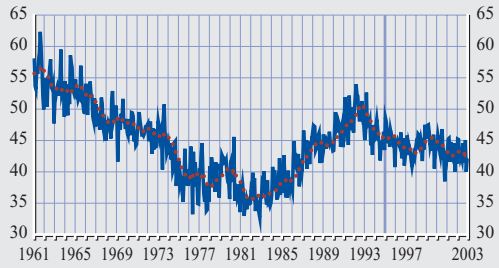
(as at January of each year)

trade integration
12 month moving average

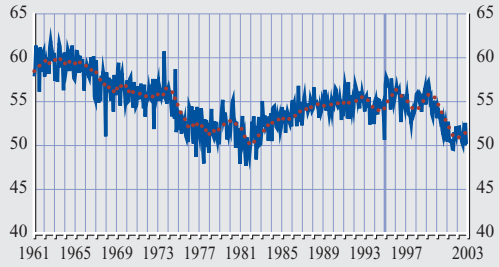
Austria - EU12



Finland - EU12



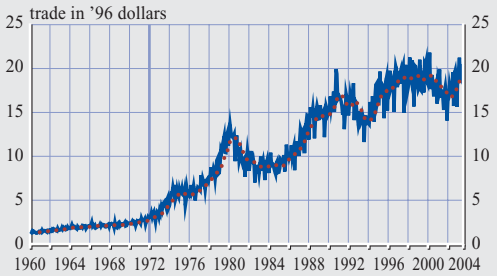
Sweden - EU12



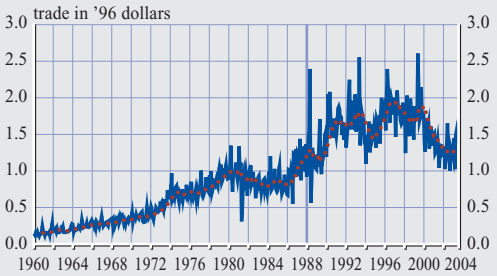
Charts Discounted Trade in billions of '96 dollars

(as at January of each year)

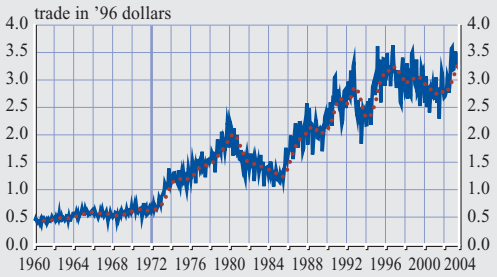
United Kingdom - EU6



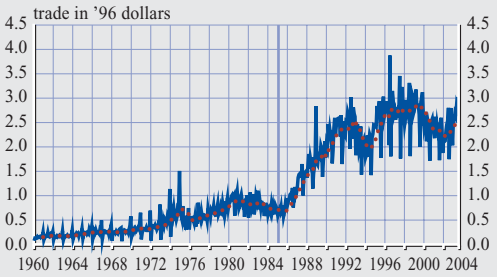
Greece - EU9



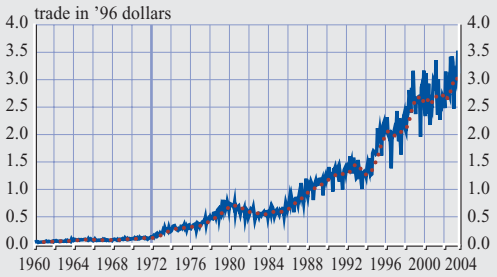
Denmark - EU6



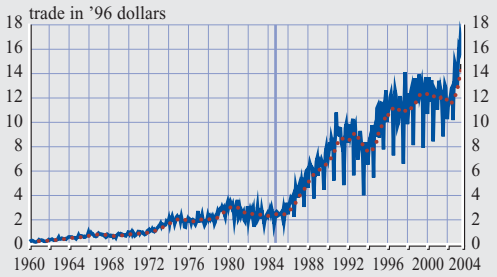
Portugal - EU10



Ireland - EU6

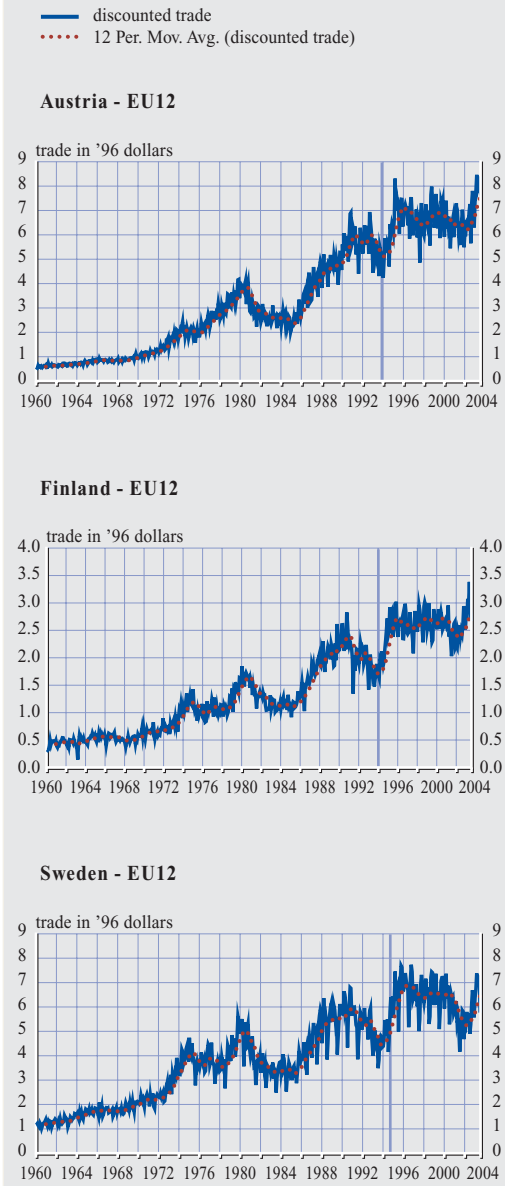


Spain - EU10



Charts Discounted Trade in billions of '96 dollars (cont'd)

(as at January of each year)



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