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# Trade Patterns Inside the Single Market

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**RESUME**

En dépit de la mise en place du Marché commun, l'intégration économique européenne était restée inachevée, de sorte que l'on évoquait, au milieu des années quatre-vingt, les "coûts de la non-Europe". Aussi le Livre Blanc sur le Marché unique de 1985 prévoyait-il quelque 300 mesures visant à libéraliser le commerce de biens et services et les mouvements de facteurs : suppression des barrières non tarifaires ayant résisté au Marché commun, suppression des formalités aux frontières, libéralisation des marchés publics, reconnaissance mutuelle des normes, déréglementation et intégration financières, libre circulation des personnes.

Une batterie d'études *ex ante*, synthétisées dans le rapport Cecchini, justifiait cet objectif d'intégration accrue : l'achèvement du marché intérieur, parce qu'il renforçait la concurrence, devait favoriser la réallocation des ressources vers les emplois efficaces, et permettre la réalisation d'économies d'échelle. La suppression des dernières entraves au commerce devait déboucher sur une forte croissance des échanges intra-communautaires, augmenter le bien-être de la Communauté et renforcer sa compétitivité vis-à-vis des pays tiers.

Même si le commerce international *per se* n'était pas au coeur des études *ex ante*, l'hypothèse implicite était que la libéralisation commerciale devait augmenter les échanges en Europe, et qu'une grande partie de cette progression serait un commerce *intra*-branche, c'est-à-dire un accroissement simultané des exportations et importations au sein des mêmes branches. Les coûts d'ajustement liés à un tel commerce sont généralement considérés comme beaucoup plus faibles que ceux liés à une spécialisation inter-branche, entraînant la concentration des activités économiques sur un nombre limité de secteurs et l'abandon des autres. Ce scénario optimiste était basé sur l'expérience acquise lors de la mise en place du Marché commun: contrairement aux théories traditionnelles qui associaient intégration et commerce inter-branche, les premières études des années soixante ont mis en évidence de forts échanges intra-branche entre pays européens.

Quarante ans après la mise en place du Marché commun, on se propose -à la lumière des développements récents des théories du commerce international- de dresser un bilan du commerce intra-européen et d'évaluer, *ex post*, l'impact du Marché unique.

L'analyse proposée ici repose sur deux innovations importantes : le niveau de détail auquel les flux de commerce sont examinés et une nouvelle typologie du commerce. Ce réexamen est entrepris sur la base des statistiques de commerce pour 10 000 produits. Le commerce est décomposé en trois types : commerce inter-branche, commerce intra-branche de produits différenciés horizontalement (produits de même niveau de prix), enfin commerce intra-branche de produits différenciés verticalement (produits de qualité, et donc de prix différents). Comme attendu, ce sont bien les échanges intra-branche qui ont pris leur essor pendant cette période. Le scénario d'une concentration de certaines branches dans un petit nombre de pays ne s'est donc pas globalement concrétisé. Mais, contrairement aux conclusions suggérées par les études *ex ante*, la part du commerce intra-branche de produits différenciés horizontalement est restée relativement stable, tandis que celle du commerce intra-branche de produits différenciés verticalement s'est

développée rapidement, jusqu'à représenter le principal type de commerce en 1994. De ce fait, l'intégration profonde des économies au sein du Marché unique n'a pas, jusqu'ici, induit de fortes spécialisations. Ainsi, l'Espagne et le Portugal ont réussi leur intégration dans l'échange intra-communautaire en s'éloignant d'un schéma de spécialisation résiduelle sur les activités (intensives en travail) abandonnées par les pays membres plus avancés.

Toutefois, la prépondérance d'un commerce intra-branche de produits différenciés verticalement, plutôt qu'horizontalement, suggère une division qualitative du travail à l'intérieur de la Communauté. Les ajustements se font au sein des branches sur les gammes de qualité, plutôt qu'entre les branches.

Cette progression du commerce intra-branche tient à de multiples déterminants, repérés ici au moyen d'un modèle économétrique à quatre dimensions (pays, partenaires, branche, temps) combinant des variables explicatives relatives aux pays (avantage comparatif, taille etc.), aux structures de marché (économies d'échelle, différenciation) et à l'intégration européenne (barrières non tarifaires par exemple). On met en particulier en évidence que la part des échanges intra-branche en différenciation verticale est en relation positive avec la distance économique entre partenaires, un résultat jusqu'ici plutôt associé à l'échange inter-branche. En ce sens les coûts d'ajustement associés à l'intra-branche en différenciation verticale ne sont certainement pas négligeables.

Les mesures prises en vue de mettre en place le Marché unique n'ont toutefois eu qu'une influence limitée dans cette évolution de la nature des échanges intra-communautaires.

Cinq résultats principaux peuvent être tirés de l'analyse. Tout d'abord, les effets directs sur le commerce intra-branche des mesures prises lors de la création du Marché unique sont restés limités. La suppression des formalités aux frontières représente un choc clairement identifiable qui s'est inscrit dans une tendance plus générale de recul des coûts de transaction favorisant le commerce intra-branche. En revanche, la suppression des barrières non tarifaires semble avoir favorisé le développement des échanges inter-branche, peut-être parce qu'elle a réactivé le processus de spécialisation des pays membres. Enfin, le phénomène d'agglomération spatiale des industries -source potentielle de divergence en Europe- n'apparaît pas globalement, mais s'est manifesté dans certaines branches, comme la chimie ou l'automobile, par ailleurs fortement marquées par les barrières non tarifaires.

Ce sont donc des déterminants plus généraux qui ont joué. Ainsi la taille des marchés autorise-t-elle à la fois une plus grande variété de produits et un spectre de qualité plus étendu, et ceci d'autant plus qu'il s'agit de pays à niveau de vie élevé. Les économies d'échelle justifient la spécialisation des unités de production ce qui tend à accroître les échanges intra-branche ; ce type de spécialisation est favorisé par les fusions-acquisitions intra-européennes. Tous ces mécanismes, qui peuvent avoir été indirectement facilités par

le Marché unique, se sont donc conjugués pour renforcer le caractère intra-branche du commerce communautaire.

Au total, les premières années de fonctionnement du Marché Unique n'ont validé ni les attentes les plus optimistes des travaux *ex ante*, où le développement des échanges de variétés permettait d'éviter les coûts d'ajustements, ni le scénario de spécialisation accroissant les asymétries entre pays européens. C'est bien à l'intérieur des branches que les ajustements se sont faits de façon prioritaire, sur les niveaux de qualité. Ceci suggère qu'une division qualitative du travail s'est renforcée en Europe, dans laquelle des pays aussi différents que l'Irlande -au bénéfice d'implantations étrangères- ou l'Allemagne sont spécialisées dans le haut de gamme, tandis que les pays du Sud de l'Europe sont spécialisés dans les produits de bas et de moyenne gamme.

**SUMMARY**

Despite the implementation of the Common Market, European economic integration still remained unachieved in the mid-1980s. The "costs of Non-Europe" were addressed in the White Paper of 1985, proposing some 300 measures to promote the liberalisation of trade in goods and services and of factor movements, such as the cancellation of border formalities and non tariff barriers having survived the Common market, the liberalisation of public procurement practices, the mutual recognition of technical standards, and financial integration and deregulation, the free movement of citizens.

*Ex ante* studies -synthesised in the Cecchini report- suggested that the Single Market would tend to lower prices through increased competition, induce market structure transformations, and foster a concentration of resources in more efficient uses. These effects would translate into sizeable welfare gains, increases in GDP, and increased competitiveness*vis-à-vis* non-member countries.

Even if trade *per se* was not the core of *ex ante* studies, the implicit assumption was that trade liberalisation would translate into an increase in trade flows within the Community, and that most of this increase would be intra-industry trade (IIT), i.e. simultaneous exports and imports within the same industries. Adjustment costs in that case are generaly considered to be much smaller than those associated with an inter-industry specialisation driving towards a concentration of economic activity on a limited number of industries and the abandon of others. This optimistic reasoning was built upon the experience of the implementation of the Common Market: contrasting with the conclusions of a traditional theory of international trade linking integration and inter-industry trade, the European integration was accompanied by a sharp increase in intra-industry trade.

New developments in international trade theory, such as agglomeration economies or the vertical differentiation of products need to be taken into account when assessing the Single market and giving an overview of intra-European trade patterns

Bilateral intra-European trade flow statistics for some 10,000 products are used in order to break down trade into three categories: inter industry trade, intra-industry trade in horizontally differentiated products and, finally, intra-industry trade in vertically differentiated products (products of different quality). As expected, intra-industry trade has increased since the mid-1980s: thus, on the whole, this evidence does not support a possible scenario of concentration of industries in a limited number of countries. Contrasting with the conclusions of *ex ante* studies, the share of intra-industry trade of varieties has remained remarkably stable over time, whereas the share of intra-industry trade of qualities has increased rapidly, and is now the most important trade type in intra-European trade. As a result, the deep integration of European economies has not so far implied deep specialisation. Spain and Portugal have successfully managed their openness to European competition withdrawing from a scheme of residual specialisation in those (labour intensive) activities abandoned by the core countries.

Nevertheless the importance of intra-industry trade in qualities, and not in varieties, suggests a qualitative division of labour within the Community. Adjustments are taking place within industries along the quality spectrum, rather than between industries.

The increase in intra-industry trade is the result of numerous determinants, here identified using an econometric model having four dimensions (country, partner, industry, time) and combining explanatory variables on country characteristics (comparative advantage, size etc.), market structure (returns to scale, product differentiation), and European integration (non tariff barriers for example). One of the main conclusion is that the share of IIT in vertically differentiated products increases with the economic distance between countries, a result so far rather associated to inter-industry trade. This suggests that the adjustment costs associated with intra-industry trade in vertically differentiated products are all but negligible.

The Single market in itself has only had a limited direct impact on this evolution of intra-EC trade patterns.

The cancellation of boarder formalities represents a visible shock, reinforcing the more general trend of decreasing transaction costs pushing towards IIT. In contrast, the cancellation of non tariff barriers seems to favour inter-industry trade, possibly revigorating the specialisation process among member countries. Finally -despite evidence for industries like chemicals and automobiles- there is no evidence of generalised agglomeration economies potentially fuelling asymmetries among member states.

In total, more general determinants are at work. For example, the market size favours more variety as well as a larger quality spectrum, especially for rich countries. Returns to scale also lead to a higher share of IIT, a phenomenon reinforced by the wave of intra-European mergers and acquisitions. These factors, which may be indirectly associated to the Single market, have thus contributed to reinforce the intra-industry nature of intra-EC trade.

Thus, so far, the first years of the Single market have neither validated the optimistic scenario entailed in *ex ante* studies, nor led to a more pronounced specialisation of European members potentially associated with cohesion costs. Adjustments have taken place within industries, on the quality spectrum. This suggests that a qualitative division of labour has emerged in Europe, in which countries as different as Ireland (due to inward foreign direct investment) and Germany are specialised on up-market products, whereas Southern member states are specialised on the low and medium quality segments.

# *TRADE PATTERNS INSIDE THE SINGLE MARKET*[1]

*Lionel Fontagné, Michael Freudenberg, Nicolas Péridy*[2]

## INTRODUCTION

The programme to complete the **Single European Market** (SEM), implemented in the mid-1980s, has introduced major changes to the European economies.

The **measures** taken consist mainly of a liberalisation of trade in products and services, through a cut of Non Tariff Barriers (NTBs), cancellation of border formalities, liberalisation of public procurement practices, and the mutual recognition of technical standards. Also included are the liberalisation of factor movements, notably through financial deregulation and integration; as well as deregulation of sectors formerly subject to tight national regulation.

The **reasoning** behind these measures was that liberalisation would tend to lower prices through increased competition, induce market structure transformations, and foster a concentration of resources in more efficient uses. These effects would translate into sizeable welfare gains, increases in GDP, and increased competitiveness *vis-à-vis* non-member countries.

To overcome the potential problem of cohesion in the Community, Structural Funds were boosted in order to foster a **convergence** in real income levels and to facilitate industrial conversions in sensitive sectors. Lastly, this entire process was implemented within the clear perspective of a monetary union.

Most *ex ante* studies to assess the gains from integration were to a large extent based on **economies of scale.**[3] Trade was not the focus of these studies and, so far, no fully-fledged quantitative evaluation of the effects of 1992 on both the volume and composition of trade has been undertaken. Nevertheless, the implicit assumption of most studies was that the removal of the remaining barriers to the mobility of goods would translate into an increase in trade flows within the Community, and that most of this increase would be of the **intra-industry** type, i.e. simultaneous exports and imports *within* industries.[4] *Intra*-industry trade, based upon the similarity of nations, may lead to cost

[1] This is a revised and shortened version of a study prepared for the European Commission within the framework of the *ex post* evaluation of the Single European Market. The initial study what is going to be published by the EC under the same title included a chapter on a case study on Spain, by E. Gordo (Universidad Complutense de Madrid) and C. Martin (Universidad Complutense de Madrid and FIES), which is not reproduced here.
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[2] Nicolas Péridy est maître de conférence à l'Université de Nantes.
[3] See the Cecchini report.
[4] Emerson et al. (1990, Chap 6).

free adjustments, increased efficiency and welfare gains associated with variety. In contrast, *inter*-industry trade, traditionally associated with comparative advantages of nations, may lead to more costly adjustments, as trade and specialisation move factors from contested export-oriented industries.

At the same time, *ex ante* studies expected that not all sectors and member states would be affected in the same way[5].

(a) For **sensitive sectors** with important NTBs in the "pre-completion" situation, conversion costs, implying factor mobility, possibly sunk costs, and cohesion costs, were therefore predicted.

(b) The sectoral adjustment occurring in the **less developed member states** were far from clear. One possible adjustment is an increased specialisation along comparative advantages giving rise in *inter*-industry trade, whereas a convergence in production structures should increase *intra*-industry trade. Trade would thereby contribute to reducing the asymmetries in production and trade structures among the member states.

**Recent development in international trade theory** complicate the traditional relationship between trade structure and the correlative adjustments in production structures. As a result the debate on trade patterns in Europe might be less clear than suggested by the traditional association referred to above, of painful adjustments with inter-industry trade, and cost free adjustments with intra-industry trade.

(a) Determinants and consequences of intra-industry trade in horizontally differentiated products are different from those in vertical differentiation. In the former case, products sold at the same price are perfect substitutes, while in the second a common ranking of consumer preferences can be associated with differences in quality. In the latter case, the adjustment costs associated with an increase in intra-industry trade might be sizeable, since it might not be equivalent to specialise in high or low quality products in the same industry. This suggests that our investigation must not only capture changes in the intra versus inter-industry nature of trade flows, but also **distinguish intra-industry trade in horizontal product differentiation (exchange of varieties) and intra-industry trade in vertical differentiation (exchange of qualities)**

(b) *Inter*-industry trade is no longer exclusively based upon comparative advantages: economies of mono-location or agglomeration, spillover effects, or more generally the country size (and differences in size) do matter. **Agglomeration economies** might increase inter-industry trade, in the same manner as in the United States, where states and regions exhibit a high degree of industrial specialisation[6].

(c) Concerning **factor mobility**, the *convergence hypothesis*[7] leads to a complex relationship between FDI, trade values and trade structure: as countries converge,

[5] European Commission (1990b).
[6] Krugman (1993).
[7] Markusen and Venables (1995).

multinational firms might *displace* trade. As pointed out by Markusen (1995), an international mobility of capital -associated with multinational companies- might lead to a trade displacement: in that case decreasing values of inter-industry trade would translate in an increasing share of IIT, as affiliates increase their sales. Therefore, an important issue is whether factor mobility has been, or not, a substitute to trade flows (due to increasing affiliates' sales) as a result of the single market completion.

As a result, this study first addresses the following questions:

(a) What evolution of intra-EC trade patterns can be observed over 1980-1994? Has the completion of the SEM been associated with increased trade flows among member states on an inter-industry or intra-industry basis?

(b) In case of an increase in intra-industry trade, does it concern mostly horizontally or vertically differentiated goods?

(c) On which quality segments are the member states positioned?

In order to isolate the effects of the SEM, we estimate the impact of determinants associated or not with the SEM:

(a) What are the "natural" determinants of these intra-EC trade patterns?

(b) Controlling for these factors, what have been the effects of (i) the cancellation of border formalities, (ii) the reduction of transaction costs, (iii) the phasing-out of NTBs, and (iv) the correlative factor mobility on the nature of intra-EC trade flows?

(c) And, finally, what would be the impact of a real convergence between member states?

These questions are important as variations in trade patterns among member states can be expected to provide important information about the nature and the size of the effects of the Single Market on production structures, and thereby give indirect indications about the magnitude of efficiency gains achieved so far. Turning to the catching-up issue, observing trade patterns inside the Single Market should help clarify whether the degree of structural asymmetry among member states can be expected to increase or to decrease as a consequence of the SEM. This is an important issue for determining whether there is a complementarity between the Single Market and monetary union.

**The paper is organised as follows**. Section 1 presents the motivations for an ex ante study. Section 2 gives an overview of useful recent theoretical and empirical developments related to this enquiry. It will introduce a joint representation of intra- and inter-industry trade, taking into consideration returns to scale and the type of product differentiation. Particular attention will be paid to factor mobility. Section 3 indicates the main results of the method which disentangles trade, with particular attention paid to the differences between horizontal and vertical differentiation (developed in Fontagné and Freudenberg 1997) from 1980 to the end of the period. This Section will provide indicators which will fuel the econometric modelling developed in Section 4, and

implemented in Section 5 in order to test for the different hypotheses using a country-partner-industry-time model. The latter Section turns to the very question of the impact of the single market. It starts by listing the potential effects and the questions addressed to the data base. A first round of estimates is then given, explaining the trade patterns observed in Section 3, before capturing the effects of the single market, controlling for other determinants of trade patterns.

## 1. WHY AND HOW AN *EX POST* STUDY ON TRADE PATTERNS WITHIN THE EU?

### 1.1. Why a study on trade effects of the Single European Market?

There are four main reasons why the trade effects of the Single Market deserve a study of their own. First, trade *per se* is an important variable, if only in the context of the regionalisation versus globalisation debate.

Second, variations in the intensity and composition of trade among member states can be expected to provide important information about the nature and the size of the effects of the Single Market upon production structures, and thereby give indirect indications about the magnitude of efficiency gains achieved so far.

Third, differences in the evolution of trade patterns between developed and less developed member states should provide indications of the effects of the Single Market *cum* Structural Fund programme upon economic and social cohesion. More generally, trade patterns are an indicator of the distribution of efficiency gains among and within member states.

Lastly, observing trade developments since the Single Market began to be implemented should help clarify whether the degree of structural asymmetry among member states can be expected to increase or to decrease as a consequence of economic integration. This is an important issue for determining whether there is a complementarity between the Single Market and monetary union.

The theoretical considerations examined in Section 3 lead to the hypothesis that the SEM has had a magnification effect, reinforcing the "natural tendencies" towards more IIT -and primarily on a vertical differentiation basis- among member countries. In order to undertake an *ex-post* appraisal of the effectiveness of the measures mentioned above, it is therefore necessary to address key questions related to the patterns of trade, especially between member countries.

(a) Has the completion led to a deeper involvement in intra-European trade flows by the more developed Member Countries or of the less advanced ones, or both?

(b) Are the related trade flows of an inter-industry or intra-industry nature?

(c) Are the observed intra-industry flows linked to a horizontal or vertical differentiation of goods?

(d) Have returns to scale, where they have been achieved, boosted systematically intra-industry trade or, in contrast, have they led to agglomeration economies potentially detrimental to the internal cohesion of Europe?

(e) Have microeconomic strategies, coupled with macroeconomic comparative advantages led to changes in the location of countries along the vertical range of differentiated products?

(f) Will a division of labour take place, in the sense that more advanced countries are specialised in up-market goods, and lesser ones in down-market products? Even if this were the case, a long run study would reveal any price/quality convergence, e.g. that some lesser developed countries will "upgrade" in their specialisation.

The answers suggest the completion effects on efficiency and welfare, and shed light on potential distribution conflicts inside member countries[8] or between the latter, in the case of sizeable agglomeration effects which cannot be excluded *a priori*.

Taking into consideration the current theoretical analysis of the gains from international integration, the basic idea is that an appraisal of the impact of the Single European Market (SEM) on intra-EC trade patterns must:

(a) *identify the nature of intra-EC trade flows* over a given time period (1980 to 1994); and then

(b) estimate the *impact of the SEM* on this nature[9], using econometric analysis.

Concerning the former objective, it was mentioned above that the horizontal and vertical dimensions of the differentiation have to be distinguished: from this perspective, methodological choices have to be made in order to identify types of trade for each year/country/partner/industry, before turning to the measurement of transformations in trade relationships between European partners over a period covering the microeconomic expectations of the completion of the Internal Market, and the completion itself. The difficulty, is to choose between complementary methodologies measuring the respective weight of the different trade types. To explain it non-technically, it might be pointed out that traditional measures of IIT have been renewed following two directions:

(a) traditional indices, based on the trade overlap in the line of the seminal Grubel and Lloyd study, can be adjusted to the necessary distinction between types of product differentiation: using unit values in order to characterise the (non-) similarity of products, traditional indices can be calculated for the two types of differentiation. This methodology has been adopted by Greenaway, Hine and Milner (1994, 1995); the case study on Spain occasionally used such a measurement, due to technical reasons of data availability;

[8] Under the classical scarce/abundant factor scheme, even if human capital is understood as a factor in a wider acceptation.
[9] And incidentally on its value.

(b) a complementary methodology, initially introduced by Abd-El-Rahman, and successively refined by Freudenberg and Müller[10] and the CEPII[11], will be used centrally in this paper, as referred to in the tender.

Having done this, the latter objective will be to address -on an econometric basis- the responsibility of the SEM in the evolution of trade patterns. It might be found that the SEM *per se* has had no role in the evolution observed, the changes in the nature of trade being explained on a time/country/partner/industry basis. In contrast, it might be found that the SEM has had a significant impact on trade flows, controlling for all other determinants, over the period considered.

### 1.2. How to measure intra-EC trade patterns?

It is important to start by underlining that "industries" do not intervene in the calculations referred to below. However, the main results obtained in this first part of the study will be presented as such, as they are of interest in themselves. For this, elementary observations will be aggregated to the industry level. In addition, these results at an industry level will serve as inputs (as dependent variables) for the multi-country, multi-industry, multi-year econometric model of bilateral, intra-EC trade to estimate the impact of the Single Market.

#### *1.2.1. Nature of intra-EC trade flows*

To identify the nature of intra-EC trade flows, the CEPII proposes rejecting the traditional dividing line between "intra- versus inter-industry trade". This does not mean that the distinction between these two types of trade should be rejected. In contrast, the CEPII -bearing in mind the theoretical approach of trade types- aims to provide a measurement directly linked with theoretical explanations, while disentangling horizontal and vertical differentiation.

Indeed contemporary developments in the new international economics suggest that trade must be quantified with tools implementing a distinction between vertical and horizontal differentiation. In this perspective, a clear definition of what a product is, based on price considerations, must be borne in mind.

In contrast to most other empirical studies on "intra- versus inter-industry trade", this new methodology not only takes into account unit value differentials (a proxy for price differentials) at the most detailed level of classification (some 10,000 products), but breaks down trade into different components. At the same time, it distinguishes between bilateral and multilateral relationships, in order to cancel the geographical bias and to introduce the notion " bilateral, two-way trade in similar products".

[10] Abd-El-Rahman (1984, 1986a and 1986b) and Freudenberg and Müller (1992).
[11] See Freudenberg and Fontagné (1997).

This approach permits the decomposition of *total* trade into different types, thus providing additional information, as compared to traditional indicators (Balassa, Grubel and Lloyd).

As the initial intention was to apprehend better the notion of intra-industry trade at product level, by breaking with traditional measures , it is necessary to define what a "product" is, what a "similar" product is, and lastly what "two-way trade" is. If trade flows of a particular product with a partner country fulfil the two criteria of similarity and overlap, we qualify *both exports and imports* as "two-way trade in similar products."[12]

The scope of this methodology, however, is far larger, in the sense that trade flows which do not fulfil the two criteria of "similarity" and "trade overlap" can also be defined. Each elementary, bilateral trade flow can finally be classified in one of the following three **trade types**:

(a) two-way trade in similar (or horizontally differentiated) products;

(b) two-way trade in vertically differentiated products; and

(c) one-way trade.

### *1.2.2. Specialisation along quality ranges*

Concerning **quality ranges** on which member countries specialise, the CEPII proposes comparing unit values to a European norm for each trade flow. As exports and imports are analysed separately, flows for the same product, with a given trade partner, can exist in different European price/quality ranges:

(a) up-market products (with unit values exceeding the Community average by at least 15 %);

(b) down-market products (more than 15% below the norm); and

(c) middle-market products.

Carrying out the analysis at the most detailed level of the classification means that sectoral and geographical bias has been reduced to a strict minimum. The two dimensions proposed here (trade types and price/quality ranges) can subsequently be aggregated to any desired level.

## 1.3. How to capture the impact of the SEM on intra-EC trade patterns?

Having based intra-industry trade appraisal in a clear theoretical framework, in which the definition of the product will be a key point, the original empirical methodology referred to above will be used, which attributes a key role to prices, in addition to the conventional nomenclature disaggregation. This first step sheds light on general features (the rise of trade in vertically differentiated products), on country specificity (the

[12] As a result, in contrast to the Grubel and Lloyd indicator, a surplus or a deficit can appear for this kind of intra-industry trade.

convergence of Southern countries trade types towards Northern ones), and finally on differences among industries. In a second step, in order to estimate the impact of the Single Market programme on trade patterns (both in terms of volume and composition) among member states, the general influences on intra- and inter-industry trade will have to be separated from those related to the Single Market related ones.

### *1.3.1. Determinants*

Inter-industry trade has a set of traditional determinants (comparative advantage related to factor endowments, notably qualifications), but can also be related, as underlined above, to new explanations like agglomeration effects.

Turning to intra-industry trade, similarity between countries and *per capita* GDP has to be related to the volume in intra-industry flows. At the same time, differentiation of the products, economies of scale, and more generally market structure are related to horizontal differentiation. Lastly, income distribution differences between countries will lead to cross-hauling.

In addition, the Internal Market programme has introduced a major change in the intra-European relations, whether they are of a financial nature or of a real one. As a consequence there has been a jump in FDI between European countries; market structures have been reorganised leading to huge Mergers and Acquisitions; price convergence is expected as a result of reduced opportunities for discrimination in markets; etc..

### *1.3.2. Anti-monde*

How are the effects of the Single Market on trade patterns to be estimated?

During the considered time period (1980 to 1994) which correspond to a *pre-* and a *post* announcement (implementation) period, GDPs, differences in GDPs, differences in *per capita* income, exchange rates etc. have changed. It is therefore necessary to control for these effects in order to identify the Single Market effect *per se*: growth translates "naturally" in IIT, what can not been, for example, interpreted has a direct result of the Single Market.

The approach used here to build an Anti-Monde is a **panel** analysis of the regressions for the determinants of intra-industry trade. A dummy for the pre- and post-period could have been used, but is rather an empirical expedient than a satisfactory solution. The introduction of variables of bilateral FDI or cuts in NTBs associated with the completion is more accurate. For each year-country-partner-product, the importance (value or share) of intra-industry trade may be taken as the explained variable, in the distinctive features shown by this phenomenon: horizontal versus vertical differentiation. It will also be necessary to measure the impact of cuts in transaction costs associated with the cancellation of border formalities.

It is useful to divide the questions addressed by the models in two: (1) to explain the nature of intra-EC trade, and (2) to estimate the impact of the SEM.

### *1.3.3. Main features of the econometric model*

As we propose tackling the impact of the SEM on the nature of intra-EC trade flows by using econometric analysis, the core model is the following:

(a) the dependent variable is the *share of bilateral two-way trade in bilateral trade, both horizontally and vertically differentiated*. The latter can be tested separately or jointly. As the methodology to identify the nature of intra-EC trade is free of any bias of aggregation, the elementary observations of the first part of the study (country/partner/product/year) can be aggregated to any desired level. As data on explanatory variables are limited to 14 industries, trade data is aggregated to the country/partner/industry/year level.

(b) they are three types of explanatory variables: *country variables* (in order to control for size, differences in sizes, income, transaction costs, etc.), *industry variables* (controlling for market structures at the industry level), and *integration variables*, (Non-Tariff Barriers, FDI).

(c) the model controls for bilateral exchange rate movements.

In addition to this core specification of the model, the latter has also been estimated in value for the global panel, and in value and share for each industry and each country separately.

Turning to the impact of the SEM, three types of questions are raised:

(a) has the presence of NTBs changed the nature of intra-EU trade over the period considered: to say it differently, are industries characterised by high pre-completion NTBs subject to less or more specialisation? Has the boost in M&A over the completion period led to a change in trade structure; has it been trade displacing along the Markusen's convergence hypothesis?

(b) what is the profile of parameter estimates for variables associated with the completion: not only tariff barriers but also transaction costs smoothed by the removal of border formalities?

(c) are these results sensitive to the accession of Portugal and Spain, and did these countries follow the general scheme of trade transformations observed for other member states?

## 2. THE NEW INTERNATIONAL ECONOMICS AND THE GAINS FROM INTERNATIONAL INTEGRATION

Since the 1960s, the theoretical link between international trade and resource re-allocation has been questioned, opening the way towards a "rethinking of international trade" (Krugman). The conventional view of international trade, based on differences

between countries, established a positive relationship between these differences and the volume of trade: such a view misses the bulk of contemporary international trade, especially when one looks at regional integration experiences, like the European one. Imperfect competition, and more generally market structures, consumers' preferences and returns to scale, were as a result substituted to comparative advantage in the search for a new explanation of trade patterns.

Gains from trade therefore change, efficiency under constant returns to scale brought on by inter-industry factor mobility being replaced by efficiency under increasing returns, and by welfare gains associated with consumer preferences. Trade theorists have substituted comparative advantages with imperfect competition, leading to a change in the gains from trade: efficiency under constant returns to scale brought on by inter-industry factor mobility has been replaced by efficiency under increasing returns, and by welfare gains associated with consumer preferences or the possibility for producers to find inputs adapted to their specific needs. As a result, potential gains are enhanced, as a result of imperfect competition, increasing returns and externalities. But at the same time, these have failed to be systematic.

Two main results of the burgeoning literature since the sixties can be pointed out:

(a) first of all, after a period of search for a new theory *alternative* to the HO-scheme, a synthesis has been reached: intra and inter-industry trade can be understood in a synthetic manner;

(b) potential gains from trade are enhanced, as a result of imperfect competition, increasing returns and externalities; but at the same time, they fail to be systematic, contrary to those related to the classical view of international trade.

In the line of the World Integrated Equilibrium popularised by Helpman and Krugman, two concepts are fruitful when looking at these contemporary developments in the perspective of an *ex-post appraisal of the internal market's completion*,: the *economic distance* between countries on the one hand, the *factor content of net trade flows* on the other hand.

Intra-industry trade between differentiated varieties of a same product, implying no specialisation process, and no displacement of resources from industry to industry, is *a priori* the only pattern of trade that will be observed between two perfectly identical countries: international trade is of an intra-industry nature. As a result, conversion costs, factor mobility, distribution of income are irrelevant topics for trade between countries separated by a very small economic distance: in this case the factor content of trade would be nil. In contrast, trade between countries separated by a high economic distance would be of the classical, inter-industry type.

From this perspective, the Internal Market programme should lead to an increase of intra-industry trade between the more developed member states, and possibly between the less developed ones. Conversely, adjustment processes at a sectoral level are concerned if, and only if, the transformations in the nature of trade associated with the Single Market

lead to a deeper specialisation between the less developed member states and the more advanced ones.

Such a presentation is nevertheless strongly associated with the horizontal differentiation of products. Turning to the vertical differentiation, a peculiar feature of trade has to be identified: differentiated products belonging to the same "group" do not share the same production function. Therefore, whatever the basis for this difference, it would imply a net factor content of trade not necessarily nil even if trade is balanced and perfectly intra-industry. This means that potential effects associated with IIT in vertically differentiated products are not those referred to in the literature on horizontal differentiation. Adjustments costs might replicate, inside industries, effects observed between industries in the inter-industry/specialisation framework, whereas advantages or disadvantages for different type of qualities might be cumulative.

In addition**,** sector specific, country specific and international economies of scale alter the picture: if agglomeration economies exist, leading to a concentration of firms in the 'country' being initially advantaged, two complementary bases for specialisation are operating:

(a) the availability of resources largely used in the industry leads to a comparative advantage;

(b) the size of the country leads to cuts in average costs associated with externalities: larger industries are more competitive, which may counter-balance comparative (dis)advantages considered at a given level of output.

Finally, it must be kept in mind that regionalisation has a factor mobility dimension. FDI flows, and/or M&A strategies have a double face: efficiency *and* market power. But what is more striking is the *convergence hypothesis* established by Markusen and Venables (1995): as countries converge, multinational firms might *displace* trade: the share of IIT might increase, whereas the *value* of inter-industry trade might decrease. As a result, an important issue is whether factor mobility has been, or not, a substitute to trade flows as a result of the single market completion.

In this new perspective it is useful to understand how things would have been, if the European economy had been perfectly integrated rather than divided among countries with different factor endowments. A key feature of the world integrated equilibrium popularised by Helpman and Krugman, is that in a perfectly integrated economy factor prices and product prices would be identical between countries. Such a benchmark is relevant in the perspective of European integration, as far as the lack of convergence in prices has been understood as an indirect proof of the "non-Europe". In contrast, the SEM will precisely push in the direction of a perfectly integrated (European) economy. In implementing this tool, it is nowadays usual to consider that an appraisal of international trade effects has to be based on factor services embodied in goods, rather than on goods.

A first question to address in order to give an overview of contemporary theoretical insights in intra-industry trade is therefore the definition of the product. A second

question is related to the possibility of externalities, which alter traditional results in unexpected ways. A third question is related to increasing returns, which are a central feature of the integration process, especially in the perspective of the Completion of the Internal Market, which is related to the market structure question. Lastly, a distinction has to be made between the horizontal and vertical differentiation of products.

### 2.1. A unified definition of what a product is

It has become usual to assume that the consumer choice can be represented by a *two-stage budgeting*. In a first stage, the consumer chooses between different products (note that products are defined by their production functions, *not by positions in the custom's nomenclature),* and on a second stage, between differentiated varieties of the same product.

Following this general principle, intra-industry trade between differentiated varieties of a same product has the following consequence: as exports and imports concern outputs of the same industry, i.e. products associated with the same production function, the factor content of net trade flows is nil if trade is balanced. Each country exports and imports the same amounts of services of each factor embodied in products. In the same way, efficiency would be nil under *constant* returns to scale: there would be no process of specialisation, no displacement of resources from industry to industry, the only gain being a benefit over the diminishing marginal utility associated with the consumption of a given variety by a given consumer in increasing quantities. But indeed, efficiency gains are positive, since varieties are produced under increasing returns.

This is *a priori* the only pattern of trade that will be observed between two perfectly identical countries: international trade is an intra-industry one. Using the traditional Grubel and Lloyd index that will be discussed below, an empirical investigation will give 1 as a result, 100% of trade being of an intra-industry type. There is therefore no specialisation at a macroeconomic level, trade having consequences only at the microeconomic level. As a result, conversion costs, factor mobility, distribution of income are irrelevant topics.

While this ideal situation cannot be observed in practice, this definition of a product has to be borne in mind when one tries to establish empirically results related to intra-industry trade: the bulk of the literature misses this when using custom-items (even at a very disaggregated level) as a basis for empirical investigation. In contrast, the methodology used below, keeps this principle in mind as will be demonstrated. This methodological concern is, from our point of view, of major significance if one tries to base empirical investigation on theoretical foundations rather than on empirical expedients.

At this initial level, the relationship associating inter-industry trade to differences in factor endowments and intra-industry trade to product differentiation is perfectly established and the analysis of gains from integration is straightforward:

(a) inter-industry trade between different countries carries efficiency gains (resources re-allocation) and a gain for the consumer, as the latter is confronted with a new set of relative prices[13];

(b) intra-industry trade between similar countries carries a gain for the consumer, as the latter values variety *per se*, or finds a product closer to his/her most preferred one; an efficiency gain is added under increasing returns, as international trade has pro-competitive effects.

From this perspective, the Internal Market programme should lead:

(a) to an increase of intra-industry trade between the more developed member states, and possibly between the less developed ones;

(b) and to an increase of inter-industry trade between the former and the latter.

Following this approach, adjustment processes at a sectoral level are concerned if the transformations in the nature of trade associated with to the Single Market lead to a deeper specialisation between the less developed member states and the more advanced ones.

In contrast, the development of intra-industry trade between the former and the latter on the one hand, and between the only latter on the other one, would not entail these types of costs. Adjustments would be of a microeconomic nature, among firms inside industries, rather than among industries. As will be pointed out below, this presentation is nevertheless heavily associated with the horizontal differentiation of products. A further distinction between similar and vertically differentiated products inside each industry will lead to conclusions which are more complex.

### 2.2. The integrated equilibrium

The notations are the following in the text: *j* for the industries, *i* for the differentiated products, *k* for countries. As a result $Q_{ijk}$ will for example represent the output of country *k* for the variety *i* of product *j*. We have m products, *n* varieties of each, and *l* countries.

Consider an input/output structure involving f primary factors (subscripts f) under a "perfect competition on all markets" assumption: a set $\overline{V}$ of *m* input vectors $u_j$ corresponding to the general producer equilibrium exist for each vector ω of factor prices. Each product being defined by a $u_j$, if technology is free, for example inside multinationals, it is not useful to add a subscript k to $u_j$.

One can establish the conditions under which the international economy replicates the result of a theoretical "world integrated equilibrium" (Helpman-Krugman, 1985).

[13] If the comparative advantage is of a vertical rather than a horizontal nature, trade in intermediates boosts this gain (Fontagné 1991).

Consider *N* countries (subscripts *k*), with factor endowments represented by a $\upsilon_k$ vector of primary inputs.

The question to address is the following: is $\overline{V}$ compatible with the set $\overline{\overline{V}}$ of endowments in the perspective of uniqueness of ω? If one can answer 'yes', the integrated equilibrium can be replicated by free trade between countries.

At the elementary level of dimensionality entailed in the traditional textbooks, i.e. *j* = (1, 2), the two vectors define a diversification cone (McKenzie, 1955, Chipman, 1966) ; if the endowment vector belongs to it for all countries one can find a solution associating positive outputs for all goods to a unique $\omega_k$. Assuming a higher dimensionality (*l* countries, *m* final goods et 3 primary factors), this result (Simonnard, 1966, Leamer, 1987) is robust only in the same triangle of diversification. The "natural friend principle" (Ethier, 1974) does therefore no longer establish a one to one relationship between inputs and outputs. And the same price movements will have different results for different triangles of diversification (Rybczynski derivatives...).

With a nil economic distance ($D_{kk'}$ =0),and at the elementary level of dimensionality,

$$GL_{kk'} = 1$$

$$\left|\Delta_{kk'}\right| = 0$$

**2.3. Externalities**

Sector specific, country specific and international economies of scale, that are magnified in the new international economics literature, alter the picture. These effects can be synthesised in a very simple way. If the development of aeronautics in Europe leads to better European competitiveness for this industry, without altering competition between European firms[14], it may be said that this externality is sector and country[15] specific. From this perspective, agglomeration[16] effects exist, leading to a concentration of firms in the 'country' being initially advantaged. In contrast, externalities may be of an international nature, costs being cut as world output is boosted, as in electronics.

As far as the former case of externalities is taken into account, two complementary bases for specialisation are operating: the availability of resources largely used in the industry leads to a comparative advantage, *ceteris paribus*, while the size of the domestic production (due either to *per capita* income, population and/or domestic preferences) leads to cuts in average costs associated with externalities: the size of countries matters.

14 Each of these facing constant returns to scale.
15 Under the assumption that Europe is a single country.
16 The monolocation of activities refers to the agglomeration of producers, not a displacement of resources between countries, which is not taken into account at this stage of analysis.

Lastly larger industries are more competitive, which may counter-balance comparative advantages considered at a given level of output. And small countries - or more generally countries initially characterised by a small domestic market - will be pushed out of such industries, notwithstanding their comparative advantages, whereas similar countries - as far as factor endowments are concerned - will compete on the basis of industry size.

In order to take into account externalities, one defines a vector $\gamma$, representative of all externalities to production being identified for the sets *N* and *J* i.e. for *l* countries and *m* industries

$$g = (Q_{11},...,Q_{1m},...,Q_{l1},...,Q_{lm})$$

Therefore, with *g* referring to production functions of *m* homogeneous products:

$$\frac{dg_{kj}}{\P g_t} \rangle 0$$

$$\left| g_t = \mathrm{Q_{kj}} \right.$$

$$\frac{\delta g_{kj}}{\partial \gamma_t} \rangle 0$$

$$\left| \gamma_t = Q_j \right.$$

An external sector and country specific economy of scale drives to the following production function:

$$g_{kj} = h_{kj}(n_j, Q_{kj})$$

In contrast, an international economy of scale will lower the costs in the industry *j* when the world output increases, but without any efficiency gain for each firm or each country on his own.

Taking this kind of effect into account in the international equilibrium determination, the previous results are modified in the following way:

(a) the mono-location of industries subject to external economies of scale will lead to a sectoral specialisation;

(b) inter-industry trade is possible without any comparative advantage;

(c) and more generally, comparative advantages no longer determine inter-industry trade patterns, as economies of scale modify their relation to prices.

**2.4. Internal economies of scale**

Internal economies of scale rather than externalities can be introduced in our theoretical scheme without modifying fundamentally the principle of factor content of net trade flows. With homogeneous products in industries without barriers to competition, average costs of firms (subscripts ζ) belonging to the set $Z_{jk}$ are determined by ω and $q_{jz}$. Under the contestability assumption, the related industries will be monopolised without altering the average cost pricing principle. If one assumes a positive relationship between the capitalistic nature of industries and the intensity of scale economies, one can therefore divide the set *G* of *m* homogeneous products in two sub-sets entailing respectively all contestable markets and all perfectly competitive markets:

$$\begin{cases} j \in (1.\ldots.b, b+1.\ldots\ldots\ldots m) \\ \dfrac{K_{j+1}}{L_{j+1}} \langle \dfrac{K_j}{L_j} \; ; \; \forall j \\ \displaystyle\sum_z \sum_k q_{zkj} = q_{zj} \; ; \; \forall j \leq b \end{cases}$$

As referred to above, returns to scale are a key point when one tries to appraise the potential effects of an economic integration. As far as Europe is concerned, is not necessary to underline the role taken by economies of scale in the *ex-ante* evaluation of the 1992 programme.

In order to give a better understanding of the problem, one has to remember that new developments in microeconomics relax the tight link between concentration and anti-competitive practices that is the base for traditional competition policies. As a result, two extreme cases can be presented.

(a) In the first case, returns to scale lead to oligopolistic market structures, but potential entries guarantee that firms will not adopt strategies boosting market prices. Mono-location of firms will lead to inter-industry trade and the tight link between comparative advantage and trade patterns will be relaxed once more.

(b) In contrast, in the latter case, firms will adopt pricing strategies based on the imperfect substitutability of *varieties* of the same product. Economies of scale and mark-up will lead to intra-industry trade of differentiated products. In this case, gains from trade are *increased*, as microeconomic efficiency gains are brought about by more competitive market structures, while completion of markets opens the way towards more diversity/variety for the representative consumer. At the same time, the first best pricing associated with perfect competition is no longer a relevant principle: therefore, *effects associated with the economic integration are*

*less systematic*, subject to the different sets of assumptions, and possibly counter-intuitive.

### 2.5. Vertical versus horizontal differentiation

Turning to a theoretical explanation of the imperfect substitutability between varieties, three key assumptions can be made:

(a) under the "love for variety" approach[17], consumers value variety *per se*, more variety of the same product leading to a higher utility;

(b) under the "diversity of tastes" approach[18], each consumer has a "most preferred" variety in mind, and tries to find a variety closely related to his ideal; as consumers are regularly distributed on the "preference spectrum", each firm will choose a location on the latter, i.e. will produce a variety combining the characteristics of the products in a specific way;

(c) finally, contrary to the two previous assumptions related to a *horizontal* differentiation, one can assume a *vertical* differentiation: a continuum of qualities of the same product, having *different prices* is proposed to the consumer.

A central feature of the models related to horizontal differentiation is the "less differentiation-more diversity" approach to economic integration. While tightly linked to a hypothesis about demand elasticity under the first assumption, this central result is clearly established under the second one: from an empirical point of view, it will mean that the integration effects on industry structures have a great significance, which have to be taken into account.

Turning to vertical differentiation strategies, a peculiar feature of trade has to be identified: differentiated products belonging to the same "group" do not share the same production function. As far as they are not sold at the same price (otherwise only one product -the highest quality- would be sold), even if produced in the same country, they do not entail the same content of factor services.

The difference might be based on fixed costs of development increasing with the level of quality; conversely they might be based on variable costs associated with a content of capital[19] or qualified labour increasing with quality. For example Falvey (1981) uses a model of IIT with vertically differentiated products, in which the unit cost[20] of a given quality *v* is simply the price of one unit of labour plus *v* units of capital. In contrast, the price to pay for quality can be a fixed cost, associated with R&D expenditures, and increasing with the quality differential between domestic and export markets, as in Motta, Thisse and Cabrales (1995).

[17] Referred to as the Spence-Dixit-Stiglitz-Krugman approach in the literature.
[18] Referred to as the Helpman-Lancaster approach.
[19] See Falvey and Kierzkowski
[20] And therefore the price, under perfect competition.

Fontagné and Freudenberg (1997) identify a complex relationship between the economic distance and the nature of trade, which raises into doubt the traditional negative relationship between the economic distance and the intensity of IIT. The distinction between the horizontal and vertical differentiation of products, referred to here, modifies the theoretical framework: using the "integrated equilibrium" approach: the economic distance between countries is no longer the basis for specialisation *between* industries along a comparative advantage scheme only, but also the basis for a specialisation along ranges of quality, *within* industries. Combining these two kinds of product differentiation into a single model of imperfect competition -in which consumers choose first among qualities and then among varieties of each quality- yields the following central result*: different countries will engage in IIT in vertically differentiated products whereas similar ones will engage in IIT of varieties within similar qualities*. The economic distance - here the difference among countries in the allocation of specific resources along the quality spectrum - leads to IIT in vertically differentiated products. Thus a *negative* relationship between the difference in GDP per capita and the share of IIT in horizontally differentiated products in bilateral trade is expected in the empirical study below, and conversely for the share of IIT in vertically differentiated products.

Whatever this basis would be, it would imply a net factor content of trade which is not necessary nil even if trade is balanced and perfectly intra-industry. This means that potential effects associated with IIT in vertically differentiated products are not those referred to in the literature on horizontal differentiation. Adjustments costs might replicate, inside industries, effects observed between industries in the inter-industry/specialisation framework, whereas advantages or disadvantages for different type of qualities might be cumulative.

It should be thus borne in mind that *a country involved in IIT based on the vertical differentiation of products is specialised*, with all potential effects associated with this event.

In addition, the IO literature points out the role of advertising expenses as a basis for vertical differentiation, an issue raising the question of increasing barriers to entry potentially associated with an increase in the share of IIT in vertically differentiated products. If this last interpretation was right, it might mean that newcomers are discriminated on the related markets, as they face barriers to entry erected by older competitors who have previously invested in goodwill.

In this perspective, it is necessary to adopt an empirical point of view reflecting the existence of these alternative sets of assumptions by combining the most detailed level of trade statistics with information available on qualities of products.

### 2.6. Factor mobility and trade types

The theoretical arguments referred to above highlighted the relationship between (1) the economic distance, returns to scale and the type of product differentiation, and

(2) the types of trade. It must be nevertheless be kept in mind that the globalisation of the world economy, and in addition the regionalisation, have a factor mobility dimension.

As far as the completion of the single market is concerned, it has been often underlined that firms have taken this opportunity to increase intra-European FDI flows, and/or taken into account this new competitive challenge by developing M&A strategies. In the same way, it could be advocated that the potential reduction in market power has led firms to impulse M&A potentially increasing barriers to entry against new competitors. As always, industrial restructuring has a double face: efficiency and market power.

What do we know about these questions?

Brainard (1993) and Horstmann and Markusen (1992) have derived an interesting result of models where multinational firms rise endogeneously as an international equilibrium: *ceteris paribus* for returns to scale and transportation costs[21], large countries (defined as the average GDP of declaring country k and partner k')[22] or countries with similar factor endowments (the difference in *per capita* incomes between declaring country k and partner k')[23] are the very conditions for such an outcome[24].

But what is more striking is the result established by simulations done by Markusen and Venables (1995): as $GDP_{kk'}$ increases and $PCID_{kk'}$ *decreases* (convergence hypothesis) inter-industry trade decreases whereas IIT increases, resulting in an increase of the *share* of IIT in total trade. This result is only partially consistent with the Helpman-Krugman line of "mono-national" firms, models concluding at a rising IIT in the same context. Here multinational firms *displace* trade: the share of IIT increases along the diminishing value of inter-industry trade. But since it is the result of a trade displacement, the steady state is no trade between similar countries. Markusen (1995) notices that this potential impact of FDI on the nature of trade as not paid much attention in the empirical literature. The econometric developed below will authorise to evaluate this hypothesis for the completion period. An important issue is whether factor mobility has been or not a substitute to trade flows as a result of the completion of the single market.

### 2.7. The Internal Market and the gains from integration

As a result of deeper economic integration in Europe, efficiency and welfare should be enhanced through the mobility of goods and factors. In this process, three intermediate objectives should be reached: achievement of returns to scale, competition-reinforcement, re-allocation of resources towards the most efficient uses.

[21] Unfortunately, a further qualification of the model is that, given sizes and incomes, multinationals emerge as the result of high transportation costs or tariff barriers, a scheme which does not fit well with the completion period characterised by decreases in transportation costs (along the cancellation of border formalities and the deregulation of the sector) and the phasing out of NTBs.
[22] See the variable *GDPkk'*, referred to in the econometric model below
[23] Resp. PCIDkk'
[24] See Markusen (1995) for a simplified presentation.

As a result, inter-industry and inter-firm re-allocation of resources might lead to re-conversion costs, as well as efficiency gains. At the same time, external effects might induce agglomeration effects. And finally, from the consumer's point of view, one has to assess if variety has been preserved, on average. Even if there is no theoretical foundation that could guarantee that welfare has finally increased[25], given all these effects, the probability of a positive answer to this question is fairly high. As a result, *each* European country might recover, at least, its pre-Single Market level of consumption , in the post-completion situation.

Macroeconomic efficiency gains: with $p_e$ the free trade price m-vector, $C$ unit cost functions and $Q$ the world output vector, this condition can be written (subscript $A$ for Autarky):

$$p_e \Theta_A \leq p_e \Theta_e = \sum_{j=1}^{m} C_j(w) Q_{je} = w\bar{V}$$
$$\left|\Delta_{kk'} \neq 0\right.$$

Gain for consumers being confronted to a new set of relative prices (with $\tilde{\tilde{U}}$ , the indirect utility function):

$$\tilde{\tilde{U}}(p_e, r) \leq \tilde{\tilde{U}}(p_A, r)$$
$$\left|\sum_j p_j D_j \leq r\right.$$

Specific gain to trade in middle products (vertical comparative advantage). With the subscript $i$ for the successive stages of the process, the necessary condition is:

$$\sum_{j=1}^{m} C_j(w) Q_{jA} > \sum_{j=1}^{m} C_j(w) Q_{je} > \sum_{i=1}^{n} C_i(w) Q_{ie}$$

Taking into account external economies of scale or contestable markets, a gain exist if:

$$\sum_{j=1}^{m}\sum_{z=1}^{z} C_{jz}(w, q_{jez}) q_{jAz} \leq \sum_{j=1}^{m}\sum_{z=1}^{z} C_{jz}(w, q_{jAz}) q_{jAz}$$

[25] Helpman-Krugman (1985) have nevertheless established a sufficient condition in order to attain a gain on the whole: large increases of output in industries with high economies of scale and large increases in a variety for industries where differentiated products are weak substitutes.

In the case of internal economies of scale: a gain exist if, with $\tilde{\tilde{D}}_j$ the index of consumption services of the $j$ product and $\tilde{\tilde{p}}_j$ the price to pay for these services:

$$\tilde{\tilde{U}}\left(\tilde{\tilde{p}}_e, r\right) \geq \tilde{\tilde{U}}\left(\tilde{\tilde{p}}_A, r\right)$$

$$\left| \sum_j \tilde{\tilde{p}}_j \tilde{\tilde{D}}_j \leq r \right.$$

Under the variety assumption, one has to add the following condition for consumers (see Helpman-Krugman, 1985).

$$\tilde{\tilde{U}}\left(\tilde{\tilde{p}}_e, r\right) \geq \tilde{\tilde{U}}\left(\tilde{\tilde{p}}_A, r\right)$$

$$\left| \sum_j \tilde{\tilde{p}}_j \tilde{\tilde{D}}_j \leq r \right.$$

$$\left| \begin{cases} \tilde{\tilde{D}}_j = D_j n_j^{a_j^{-1}} \\ p_j = p_j n_j^{1-a^{-1}} \end{cases} \right.$$

Thus, mechanisms leading to these gains are tightly connected with the type of trade adjustment associated with the completion of the internal market. This connection has a sectoral and country dimension as far as more and less advanced member countries do not share the same type of adjustment, whereas different industries are not identically concerned by the internal market.

Concerning the latter point, Buigues, Ilzkowitz and Lebrun (European Commission, 1990b) have established a typology of industries subject to high market completion effects: as far as NTBs, share of intra-European imports in internal demand, price dispersion and economies of scale are concerned, 40 industries in 4 groups are sensitive[26]:

(a) high tech industries protected by public procurement practices;

(b) regulated or traditional public procurement industries (2 groups);

(c) industries with smooth NTBs, of which consumer goods, capital goods and intermediates.

[26] In a second stage, the previous list has been modified to take into account national patterns: for example 13 industries have been appended in the Portuguese case.

From this perspective, the distinction between intra and inter-industry trade is a key question: will the adjustment to the cancellation of non-tariff barriers lead to a specialisation along comparative advantages of member countries, or will economies of scale lead to a greater concentration of industries? In contrast, will smoother adjustments be observed, with exits of industries at the microeconomic level, whereas countries maintain their industrial structure?

In the former case, an increase in inter-industry trade would be observed, associated with a displacement of resources between industries, and with a redistribution of income inside countries between production factors. In the latter case, in contrast, consumers and producers would face a greater variety of products whereas competitive pressures would drive prices down, reduce price discrimination, and last but not least, lead to an achievement of scale economies.

Another possible dimension of the trade adjustment must be borne in mind: even if the trade adjustment might probably lead to an increase in intra-industry trade, it does not mean that consequences might be those generally referred to in models of intra-industry trade, based on hypothesis of horizontal differentiation *à la Chamberlin*. In contrast, the specialisation might occur at a very fine level, inside industries, on *quality ranges*.

What would such a vertical differentiation assumption mean from a practical point of view? Countries would specialise inside industries on products with different levels of price ranges; cross hauling would mean importing low qualities and exporting high ones or conversely; and differences in quality would mean differentials in the factor contents of trade associated with differing inputs in qualified labour, capital or R&D.

As in Krugman (1980), size of countries matters if higher qualities of products require larger fixed costs : will countries with lower GDP, engaged in an economic integration with richer ones, catch-up or not? They initially bear a disadvantage associated with the lower qualities produced for the domestic market, facing an integrated market that asks for higher ones. The adjustment cost, a fixed cost in R&D, is increasing with the difference in sizes. Persistence of leadership is always an equilibrium in such a context, to the benefit of the richer country, as demonstrated by Motta, Thisse and Cabrales: but another equilibrium, leapfrogging, is possible in as far as the asymmetry between countries is not too large.

From a policy oriented point of view, such outcomes address the question of catching-up for Southern Member countries of the Community, in a context of increasing IIT in vertically differentiated products. Has the completion of the SEM led to persistence of leadership, « Southern » member countries being marginalised in bottom quality products, or in contrast have the latter increase the quality of their output? Trade patterns will provide useful information as far as IIT disentangle horizontally and vertically differentiation.

Lastly, the simple (traditional) way to manage the trade effects of an economic integration (i.e. an association of economic distance[27] with inter-industry trade and conversely), is dramatically affected by the many qualification of models. As a result, the relevance of a unique theoretical scheme is no longer certain (see Table 1), and an analysis of intra-industry trade at the most disaggregated level has to be implemented in order to give an empirical echo to the horizontal-vertical differentiation scheme.

**Table 1. Determinants of trade types and potential effects on integration**

<table>
<tr><th colspan="3">Determinants</th><th>Trade Types</th><th>Potential Effects of Integration on<br>Specialisation</th><th>Income Distribution</th></tr>
<tr><td rowspan="2">Comparative Advantage</td><td colspan="2">Factor endowments</td><td rowspan="2">Inter-industry</td><td rowspan="2">Along comparative advantages</td><td rowspan="2">Changes in factor prices within countries</td></tr>
<tr><td colspan="2">Productivity differential</td></tr>
<tr><td rowspan="3">New International Economics</td><td rowspan="3">Economies of scale</td><td>External</td><td>Intra-industry</td><td>Through agglomeration</td><td rowspan="2">Potential income divergence among countries</td></tr>
<tr><td rowspan="2">Internal (under monopolistic competition)</td><td>Vertical differentiation</td></tr>
<tr><td>Horizontal differentiation</td><td>Few</td></tr>
</table>

To give an example, stating that there is a strong link associating Germany to France in intra-industry trade relations compared with inter-industry trade relationships between France and Spain, is clearly an over-simplification. Intra-industry trade between France and Germany can be based on a quality differential (i.e. price differential) between varieties of products, reflecting a "specialisation". At the same time, the less developed countries of the Union can benefit from an up-grading of their line of products channelled by FDI: as a result, the share of intra-industry trade in their bilateral commercial relationships can increase rather than decrease.

To summarise, contemporary developments in the new international economics lead to the following empirical suggestions:

(a) Intra-industry-trade must be quantified with tools implementing a distinction between vertical and horizontal differentiation. From this perspective, a clear definition of what a product is, based on price considerations in addition to nomenclatures, must be borne in mind.

(b) Inter-industry trade must be disconnected from its traditional comparative advantage basis, in order to integrate new considerations like externalities, agglomeration effects etc.

[27] Understood as differences in factor endowments or income *per capita.*

(c) A large diversity of trade patterns is expected as determinants, nature, and effects of trade are highly dependent of market structures. This must discourage the researcher from seeking a monolithic representation of what the trade effects of the European integration are.

## 3. INTRA-EC TRADE PATTERNS 1980-1994

Intra-EC trade has been affected by numerous events over the past fifteen years. The enlargement of the European Community, with the accession of new members (Greece, Portugal and Spain) in the 1980s and the German unification in the beginning of the 1990s, had an impact on trade flows and macroeconomic adjustments in Europe. The Southern countries were characterised by lower *per capita* income, with a distinctive specialisation along industries and high potential of trade-creating and trade-diverting effects.

The programme to complete the Internal Market, implemented in the mid-1980s, has also introduced major changes for the European economies. The anticipation by economic actors of the completion of the Single European market (SEM) drove to strong industrial restructuring at the microeconomic level, notably through mergers and acquisitions both by European and non-European companies. Last but not least, the macroeconomic context changed and affect adversely the European market during the very phase of SEM completion. Overall, dramatic changes in intra-EC trade were expected.

The methodology applied here allows to examine the nature of intra-EC trade flows. The definition of trade types is based on the traditional distinction between inter-industry trade -associated with the specialisation of countries in industries along lines of comparative advantages or due to scale economies- and intra-industry trade based on imperfect competition. This traditional distinction is augmented there by another one between horizontally and vertically differentiated products. Concerning this distinction, unit values are taken as proxies for prices, prices themselves reflecting differences in quality of products exchanged. Total trade can be decomposed in *three trade types* according to their similarity in unit values and to overlap in trade: two-way trade in similar products (significant overlap and low unit value differences); two-way trade in vertically differentiated products (significant overlap and high unit value differences); as well as one-way trade (no or no significant overlap). In addition, three *European price/quality ranges* are defined to examine on which market segment products are exchanged: *up-market* products (with unit values exceeding the EC-average by at least 15 %); *down-market* products (more than 15 % below the norm), as well as *middle-market* products (between +/- 15% around the average).

All calculations for trade types and price/quality ranges are done at the elementary level (11 countries-10 partners-10,000 products-15 years). Only then the figures are aggregated: on the one hand for the presentation of the main results in this Section, and on the other hand to introduce them as dependent variables in the econometric model in Section 7 (country-partner-industry-year).

### 3.1. Methodology and data

The methodology -based on Abd-El-Rahman (1986a) and further refined in Fontagné and Freudenberg (1997)- is summarised below.

#### *3.1.1. Methodology*

*The definition of "two-way trade in similar products"...*

The basic idea is to give a definition of intra-industry trade which is closer both to reality and economic theory. On a conceptual level, we prefer to apprehend the phenomenon of "intra-industry trade" better at the product level, and at the same time to distinguish between horizontal and vertical product differentiation. To operationalise the notion of "two-way trade in similar products", it is necessary to define what a "product" is empirically, what a "similar" product is, and lastly what "two-way trade" is. The following definitions are used here:

(a) a *product*: the detailed composition of the classification is the best guarantee for avoiding the empirical problems of sectoral aggregation. The data published by Eurostat in the classification of the 8-digit "Combined Nomenclature (CN)" (and, until 1987, the 6-digit Nimexe) provide some 10,000 items, which are sufficiently detailed for products to be distinguished by their principle, technical characteristics. For each elementary flow (exports or imports of the declaring country to/from the partner country for a given product item) two criteria are applied.

(b) product *similarity*: even inside an item of the "combined nomenclature", products may differ clearly by their quality. Here, it is assumed that differences in prices (unit values) reflect quality differences. Therefore, products whose unit values are close (in a given year) are considered as similar. Traded products are considered to be similar (or *horizontally* differentiated) if the export and import unit values differ by less than 15%[28], i.e. if they fulfil the following condition:

$$\frac{1}{1.15} \leq \frac{UV^{X}_{kk'pt}}{UV^{M}_{kk'pt}} \leq 1.15,$$

where UV stands for unit value, superscripts X and M refer to exports and imports and indices k representing the declaring country, k' the partner country and p the product in year t. When this is not the case, products are considered to be *vertically* differentiated.

(c) trade *overlap*: trade in an item is considered to be "two-way" when the value of the minority flow (for example imports) represents at least 10% of the majority flow (exports in this case), i.e. if they fulfil the following condition, where X and M stand for the value of exports and imports:

[28] Following Abd-El-Rahman (1991), Greenaway, Hine and Milner (1994) also used a 15% threshold to distinguish between similar products and vertically differentiated products, despite a more limited degree of classification disaggregation. Nevertheless, their study takes the "traditional" line in the sense that they split up the overall Grubel and Lloyd indicator to apprehend the relative importance of these two categories.

$$\frac{Min\left(X_{kk'pt}, M_{kk'pt}\right)}{Max\left(X_{kk'pt}, M_{kk'pt}\right)} > 10\% ,$$

Below this level, the minority flow cannot be considered significant as it does not represent a structural feature of trade.

If trade flows of a particular product with a partner country fulfil the two criteria of similarity and overlap, we qualify *exports as well as imports as "two-way trade in similar products"*[29]. For a discussion on the two (arbitrary) thresholds see Fontagné and Freudenberg (1997).

*A typology of international trade*

But the second novelty of this approach is to identify also trade flows which do not fulfil these two conditions. This method allows for each year total trade to be broken down into different categories according to the similarity in unit values and to the overlap in trade:

(a) two-way trade in similar products (significant overlap and low unit value differences);

(b) two-way trade in vertically differentiated products (significant overlap and high unit value differences);

(c) one-way trade (no or no significant overlap).

This approach permits the *totality* of trade to be broken down according to these criteria, both imports and exports being part of one and the same of these types. A surplus or a deficit may thus appear for each of the three types. Table 2 syntheses this typology. As the calculations are done for each year, bilateral trade flows for a given product can be defined as two-way trade in similar products in one year, and part of two-way trade in vertically differentiated products in another year.

[29] In contrast to the Grubel and Lloyd indicator, a surplus or a deficit can appear for this kind of intra-industry trade. This has important implications both for theoretical and empirical considerations, as we can identify situations where "intra-industry" trade goes along with "revealed" comparative advantages (see below).

**Table 2. How to define the three trade types**

| **Degree of Overlap between Exports and Import Values:** Does the minority flow represent at least 10% of the majority flow? | **Similarity of Export and Import Unit Values:** Do export and import unit values differ less than 15%? | |
|---|---|---|
| | Yes (horizontal differentiation) | No (vertical differentiation) |
| Yes | *Two-way trade in similar products* | *Two-way trade in vertically differentiated products* |
| No | *One-way trade* | |

*How to aggregate the results?*

As already mentioned, the elementary trade flows have 4 dimensions: country-partner-product-year. The aggregation procedure is straightforward. For example, the average Grubel and Lloyd indicator of intra-EC trade flows for industry j in year t is obtained by summing up over declaring countries k, partner countries k' and the products p being part of industry j :

$$GL_{EC,EC,j,t} = 1 - \frac{\sum_{k\in EC}\sum_{k'\in EC}\sum_{p\in j}\left|X_{kk'pt} - M_{kk'pt}\right|}{\sum_{k\in EC}\sum_{k'\in EC}\sum_{p\in j}(X_{kk'pt} + M_{kk'pt})}$$

Likewise, the *value* of two-way, intra-EC trade in similar products in industry j in year t is

$$TWHDval_{EC,EC,j,t} = \sum_{k\in EC}\sum_{k'\in EC}\sum_{p\in j}\sum_{z\in TW-HD}\left(X^{z}_{kk'pt} + M^{z}_{kk'pt}\right)$$

where z is one of three categories depending on the corresponding trade type (TWHD, TWVD, OW).

The *share* of two-way, intra-EC trade in similar products in industry j in year t is

$$TWHDsh_{EC,EC,j,t} = \frac{\sum_{k\in EC}\sum_{k'\in EC}\sum_{p\in j}\sum_{z\in TW-HD}\left(X^{z}_{kk'pt} + M^{z}_{kk'pt}\right)}{\sum_{k\in EC}\sum_{k'\in EC}\sum_{p\in j}\sum_{z}(X^{z}_{kk'pt} + M^{z}_{kk'pt})}$$

*European price ranges: a quantitative measure of quality ranges*

The question on which market segments (in terms of price/quality) different member states are positioned in is less developed theoretically, but not less important for political economy issues, as this might have important consequences in terms of income distributions: will we find a (vertically differentiated) division of labour, in the sense that more advanced countries are specialised in up-market goods, and lesser ones in down-market products?

As we did for trade types, we assume that differences in prices (unit values) reflect quality differences. As exports and imports are analysed separately, flows for the same product with a given trade partner can exist in different European price/quality ranges (Freudenberg and Müller, 1992):

(a) *up-market* products (with unit values exceeding the Community average by at least 15 %),

(b) *down-market* products (more than 15% below the norm), as well as

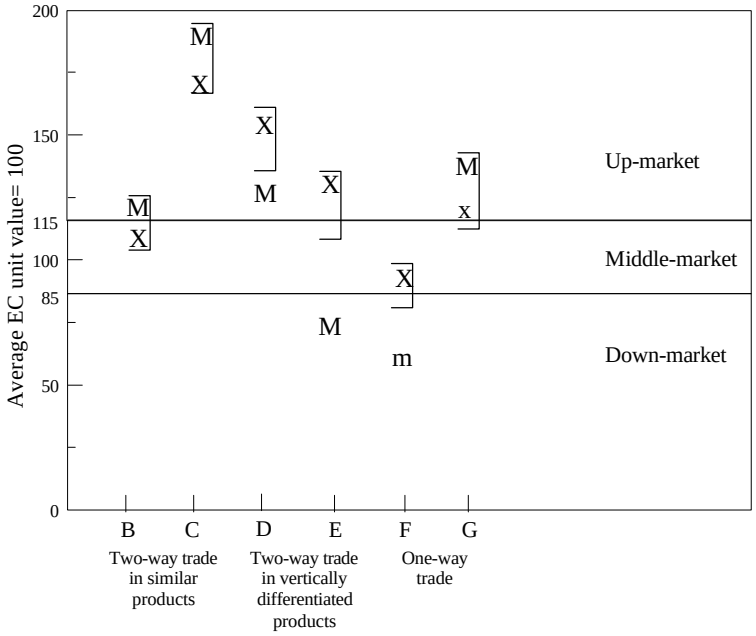
(c) *middle-market* products (between +/- 15% around the average).

Being carried out at the most detailed level of the classification, this work allows headings to be aggregated to any desired level, so that a break down all trade into three trade types and three price/quality ranges may be obtained.

It is important to mention that *trade types and price/quality ranges are two distinct and strictly independent notions*. For example, two-way trade in *similar* products can be done in *different* European price segments. Likewise, two-way trade in *vertically differentiated* products can be done in the *same* market segment.

Let us consider country A's trade relations with partners B to G for a given product (Figure 1). *Price/quality ranges* are defined using the 15% thresholds around the average European unit value. In this illustration, A's trade with partners B and C is two way-trade in similar products, and two-way trade in vertical differentiation with D and E (since the trade flows are outside the brackets). There are one-way exports to F (with only little imports) and one-way imports from G (with little exports). The two notions are thus strictly independent. For example, two-way trade in *similar* products can be done in *different* European price segments (with partner B). Likewise, two-way trade in *vertically differentiated* products can be done in the *same* market segment (with country D).

**Figure 1. Different configurations of trade types and price/quality ranges**




Note: Exports and imports indicated in uppercase (XM) means that there is significant overlap, and thus two-way trade. In case of one-way trade, only the majority flow is in uppercase, and the corresponding minority flow in lowercase (Xm, xM).
The brackets indicate the maximum gap between unit values for exports and imports for be considered similar. If two flows are within such a bracket, we consider them as horizontally differentiated, otherwise as vertically differentiated.

### *3.1.2. Harmonisation of trade data*

The different indicators mentioned above are calculated using Eurostat data. In order to minimise the following two problems, we decided to "harmonise" the trade data used in our study:

(a) double-declaration of the same trade flow in fob-cif;

(b) no declarations for Greece, Portugal and Spain before their entry into the EC.

Each individual trade flow within the EC is declared twice, by the exporting country (fob) and by the importing one (cif). This, however, can cause a strong non-symmetry of the overall results. Tests have shown that the difference between two declarations cannot be attributed solely to differences in fob and cif, since the transactions do not only differ in terms of value, but also in terms of quantities. In addition to these problems, there are no declarations for Greece before 1981 and for Spain and Portugal before 1986.

The solution we adopted is harmonising all bilateral trade flows at the most detailed level of the classifications (so that harmonised exports from declaring country k to partner

k' for the product j will equal the harmonised imports of country k' from country k) by weighting the declarations of the importing country twice as much as those by the exporting country:

$$X^{H}_{kk'j} = M^{H}_{k'kj} = \frac{X_{kk'j} + 2M_{k'kj}}{3}$$

Concerning data for Greece, Portugal and Spain before their entry into the EC, we derived them indirectly by using the declarations of the other member states: for example, French exports to Spain for a given product are used as a proxy for Spanish imports from France. In that case, of course, bilateral trade flows between Greece, Portugal and Spain cannot be calculated before their respective entry into the EC.

### 3.2. Overall picture of the patterns of trade in all intra-EC trade

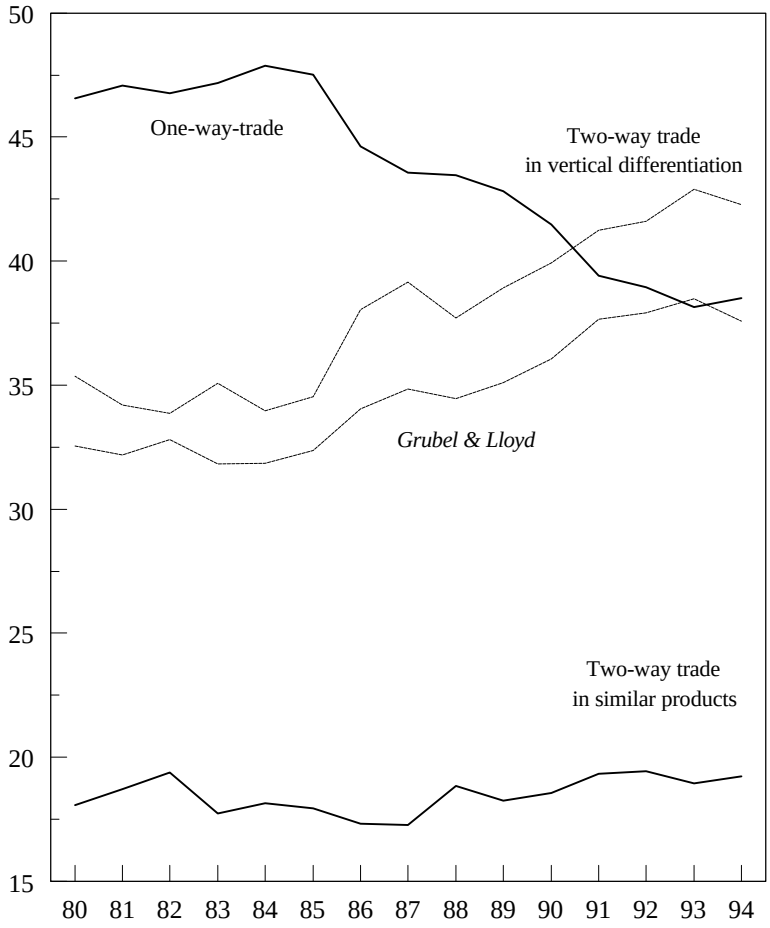
A well-known phenomenon in the economic literature is the rise of intra-industry trade within the European Community. Let us examine the patterns of intra-EC trade over the last 15 years at the most aggregated level, all countries and products taken together.

Figure 2 indicates both the traditional Grubel and Lloyd (GL) indicator as well as the share of the three trade types in intra-EC trade from 1980 to 1994. The considered time period was characterised by an increase in intra-industry trade: the GL was around 33% in the beginning of the 1980s, and gained rather regularly about five points until 1994. While this observation comes as no surprise, as it is well documented in the literature, the *level* of the GL might seem low when compared to other studies, but this is, of course, due to the level of disaggregation (calculated on a bilateral basis for some 10,000 products).

The most important trade type in the beginning of the 1980s was one-way trade (with a share of some 45%). However, from the mid-1980s onwards, it started to decline. In that sense, the evolution of one-way trade is symmetric to the GL indicator and shows that the preparation phase of the SEM was accompanied by a decrease in the share of inter-industry trade in Europe. This, however, does not mean that SEM *per se* has caused this event; it could be associated with other determinants which may have played simultaneously.

One of the value added of the method used here is to disentangle the correlative increase in intra-industry trade. *At this level of presentation, in contrast to what is often implicitly assumed, the rise in intra-industry trade in intra-EC trade does not concern horizontally differentiated products, but products which are vertically differentiated.* In fact, two-way trade in similar products remains rather stable and represents less than 20% of all intra-EC trade, whereas two-way trade in vertically differentiated products -associated with a qualitatively division of labour- increased from less than 35% in 1980 to 1985 to more than 42% in 1994.

**Figure 2. Evolution of trade types and the GL indicator in intra-EC trade, 1980-1994**




Source: Eurostat-Comext, calculations by the CEPII.

### 3.3. Analysis of industries

The 14 industries used in this study were determined in interaction of available statistics for the econometric model, thereby operating a trade-off between different constraints (see **Table A-23** in the appendix).[30]

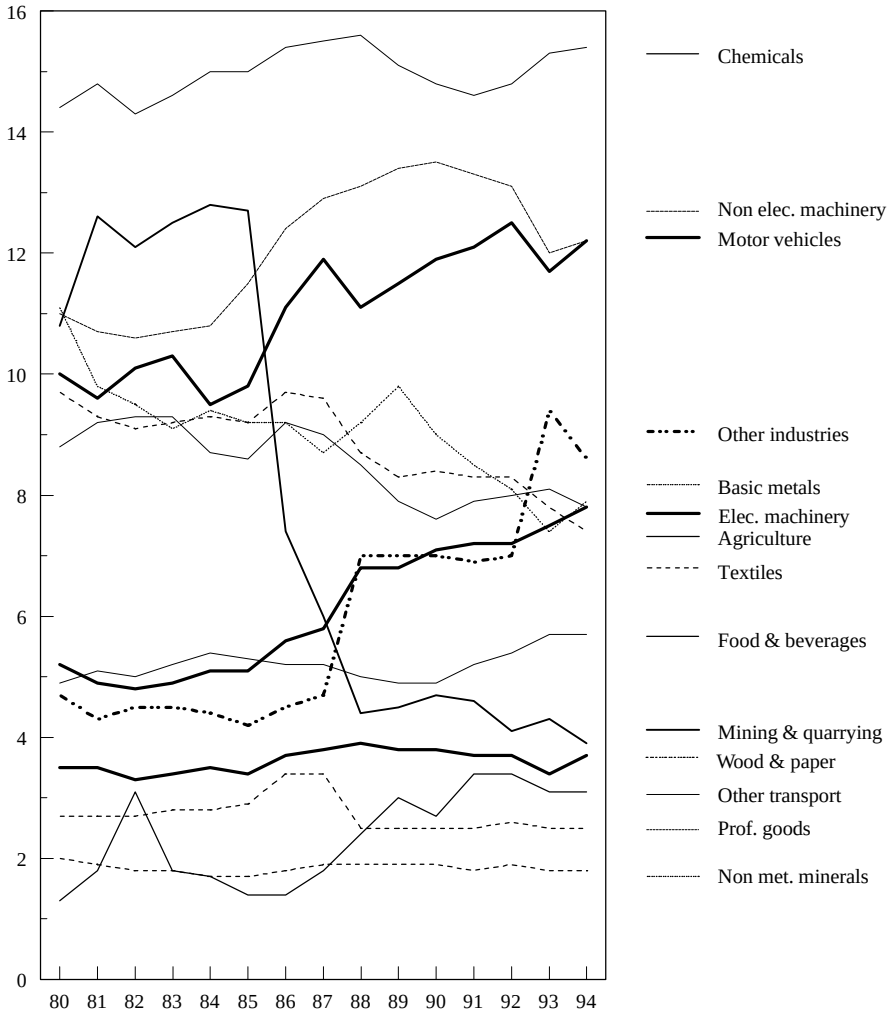
#### *3.3.1. Share of industries in total intra-EC trade*

Figure 3 shows that chemicals remained -with a share of some 15%- the most important industry in intra-EC trade over the considered time period, followed by

[30] Shortly, different sources of data have been used, including trade figures in different nomenclatures, and figures for production or industrial structures emanating from Eurostat and OECD.

non-electrical machinery[31] and motor vehicles (some 12% in 1994). However, the relative importance of some of the industries changed substantially between 1980 and 1994. Among the industries which increased their share are chemicals, electrical machinery, and the heterogeneous "other industries." In contrast, mining, quarrying and petroleum experienced a sharp decline over the same time period (from some 12% to 4%).

**Figure 3. Share of industries in intra-EC trade, 1980-1994**




Source: Eurostat-Comext, calculations by the CEPII.

[31] Non-electrical machinery, unfortunately, includes some automatic data processing equipment from section 84 HS

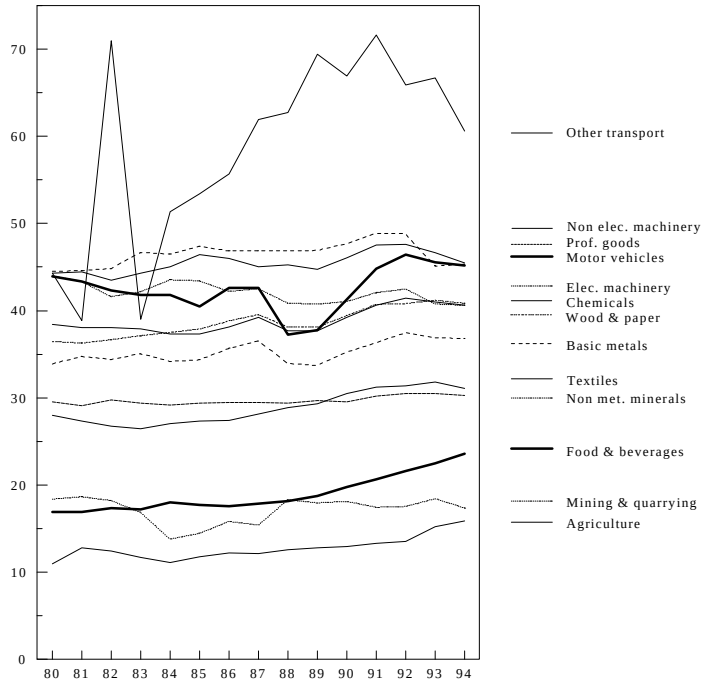
### *3.3.2. Evolution of the GL indicator by industry*

Using the traditional Grubel & Lloyd index (Figure 4), and considering total intra-EC trade, the nature of trade flows for the 14 industries is in general not surprising. Two groups of industries can be distinguished:

(a) industries in the first group are characterised by an important share of intra-industry trade. "Other transport equipment" shows up a large increase of the GL (to about 60% in 1994), and has an unexplainable value for 1982.[32] Other industries with a higher than average degree of overlap are non electrical machinery, professional goods and motor vehicles (GL of 45%); chemicals, wood and paper and electrical machinery as well as basic metals;

(b) For food & beverages, mining, quarrying & petroleum, as well as for agriculture, more than three quarter of trade is of an inter-industry nature and more than two thirds for textiles and non metallic minerals.

**Figure 4. Evolution of the GL indicator in intra-EC trade by industry, 1980-1994**




Source: Eurostat-Comext, calculations by the CEPII.

[32] Concerning this industry, we cannot exclude a possible overestimation of intra-industry trade due to statistical regimes.

### *3.3.3. Evolution of trade types by industry*

Let us now examine the three trade types in order to disentangle the components of IIT. Three groups of industries can be distinguished on the basis of their intra-European trade types in 1994 (Table 3 and Figure 5):

(a) industries characterised by a high share of one-way trade (50% or more), suggesting a specialisation of member states along lines of comparative advantages: agriculture, mining, food and beverages, textiles as well as non metallic minerals;

(b) industries characterised by a high share of two-way trade in similar products, i.e. the "traditional" intra-industry trade based on varieties and excluding macroeconomic adjustments are other transport equipment and motor vehicles, and, to a lesser extent, basic metals, chemicals and wood and paper products;

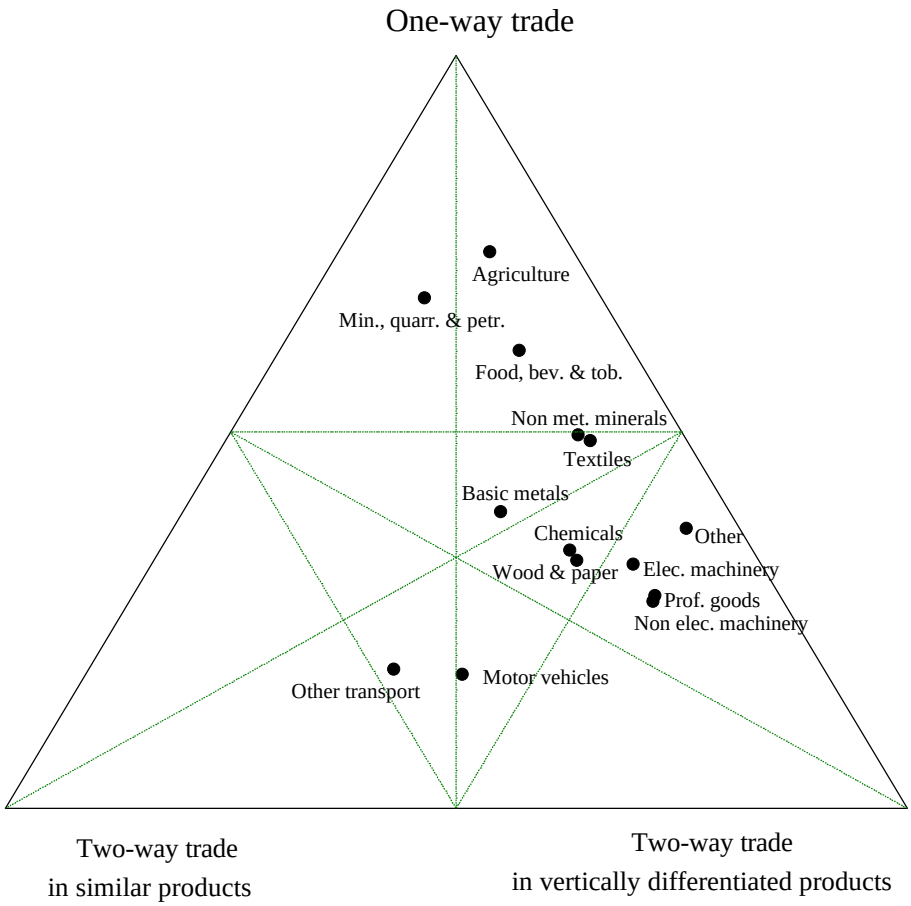
(c) industries characterised by an important share of two-way trade in vertically differentiated products, based on a specialisation along ranges of qualities are electrical as well as non-electrical machinery, professional goods, and the heterogeneous "other industries."

**Table 3. Share of trade types in intra-EC trade by industry**

| **Industries** | **Share in 1994** (%) | | | **Variation 1985 to 1994** (% points) | | |
|---|---|---|---|---|---|---|
| | Two-way trade in similar products | Two-way trade in vertically diff. products | One-way trade | Two-way trade in similar products | Two-way trade in vertically diff. products | One-way trade |
| Motor vehicles | **40.4** | 41.8 | 17.8 | **19.1** | 1.9 | **-21.0** |
| Other transport | **47.6** | 33.8 | 18.5 | 1.2 | 6.8 | -8.0 |
| Non electr. machinery | 14.4 | **58.1** | 27.5 | -3.9 | 3.4 | 0.5 |
| Prof. goods | 13.9 | **57.9** | 28.3 | -3.9 | 0.4 | 3.5 |
| Electr. machinery | 14.2 | **53.4** | 32.4 | -0.4 | -3.1 | 3.6 |
| Wood & paper | **20.2** | **46.9** | 32.9 | -3.3 | **10.1** | -6.8 |
| Chemicals | **20.3** | **45.5** | 34.3 | -2.6 | 5.8 | -3.3 |
| Other industries. | 5.9 | **57.0** | 37.2 | -6.0 | 2.0 | 3.9 |
| Basic metals | **25.5** | 35.2 | **39.3** | -2.0 | 6.1 | -4.2 |
| Textiles | 10.7 | 40.4 | **48.9** | -3.2 | **9.2** | -6.0 |
| Non met. minerals | 11.6 | 38.7 | **49.7** | 1.3 | 0.0 | -1.4 |
| Food & beverages | 12.5 | 26.6 | **60.9** | 0.8 | **8.7** | **-9.5** |
| Mining & quarrying | **19.6** | 12.6 | **67.8** | **4.4** | -1.0 | -3.4 |
| Agriculture | 9.3 | 16.8 | **73.9** | **2.6** | 5.2 | -7.8 |
| All industries | 19.2 | 42.3 | 38.5 | 2.0 | 3.1 | -5.1 |

Source: Eurostat-Comext, calculations by the CEPII.
The industries are ranked according to the importance of two-way trade in all trade. Figures in bold indicate higher-than-EC-average shares (or variations).

**Figure 5. Share of trade types in intra-EC trade by industry, 1994**




Source: Eurostat-Comext, calculations by the CEPII.

Let us now examine the evolution over the 1980-94 period (Figure 6):

(a) A relative stability can be found both in industries characterised by a high share of one-way trade (agriculture, mining, food and beverages, textiles and non metallic mineral products) and in those which already had high levels of two-way trade in vertically differentiated products in the early 1980s (electrical and non electrical machinery, and professional goods). In these industries, the predominant trade type remains the same over the whole period. Despite the relative stability, IIT in vertical differentiation increases slightly in most of these industries, especially in textiles and food and beverages.

(b) The global trend towards more IIT in vertically differentiated products can be observed especially in chemicals, basic metals and wood and paper.

(c) Finally -besides other transport material which shows up erratic movements in the beginning of the 1980s and the highest share of two-way trade in similar products of all industries in the 1990s- the most impressive change is observed for motor vehicles: after a period of decreasing one-way trade associated with increasing two-way trade in vertically differentiated products over 1985-1992, a huge increase in IIT with horizontal differentiation pushes the latter IIT and inter-industry trade down in the recent period. This phenomenon is certainly anything else than a flash increase in the demand for vertical differentiation in Europe: one might interpret it in terms of a sharp cut in price discrimination practices of firms along member states' markets often referred to in the pre-completion period. This evolution was expected; but the extent of it, and its speed, suggest huge gains for European consumers of these products. If the SEM has had strong effects somewhere, it might be in this industry.

**Figure 6. Evolution of the GL indicator and the share of trade types in intra-EC trade, 1980-1994**

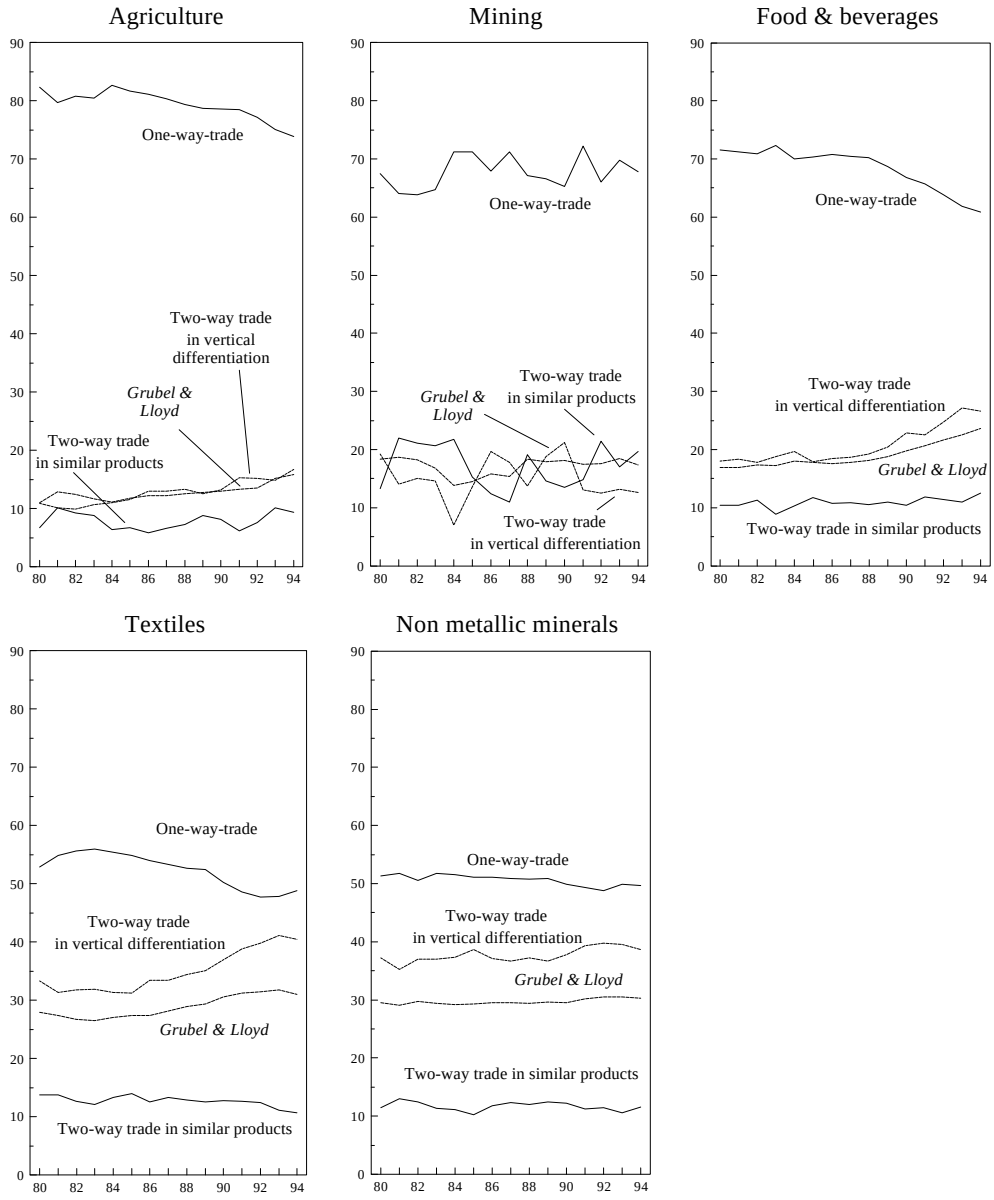


**Figure 6 continued**

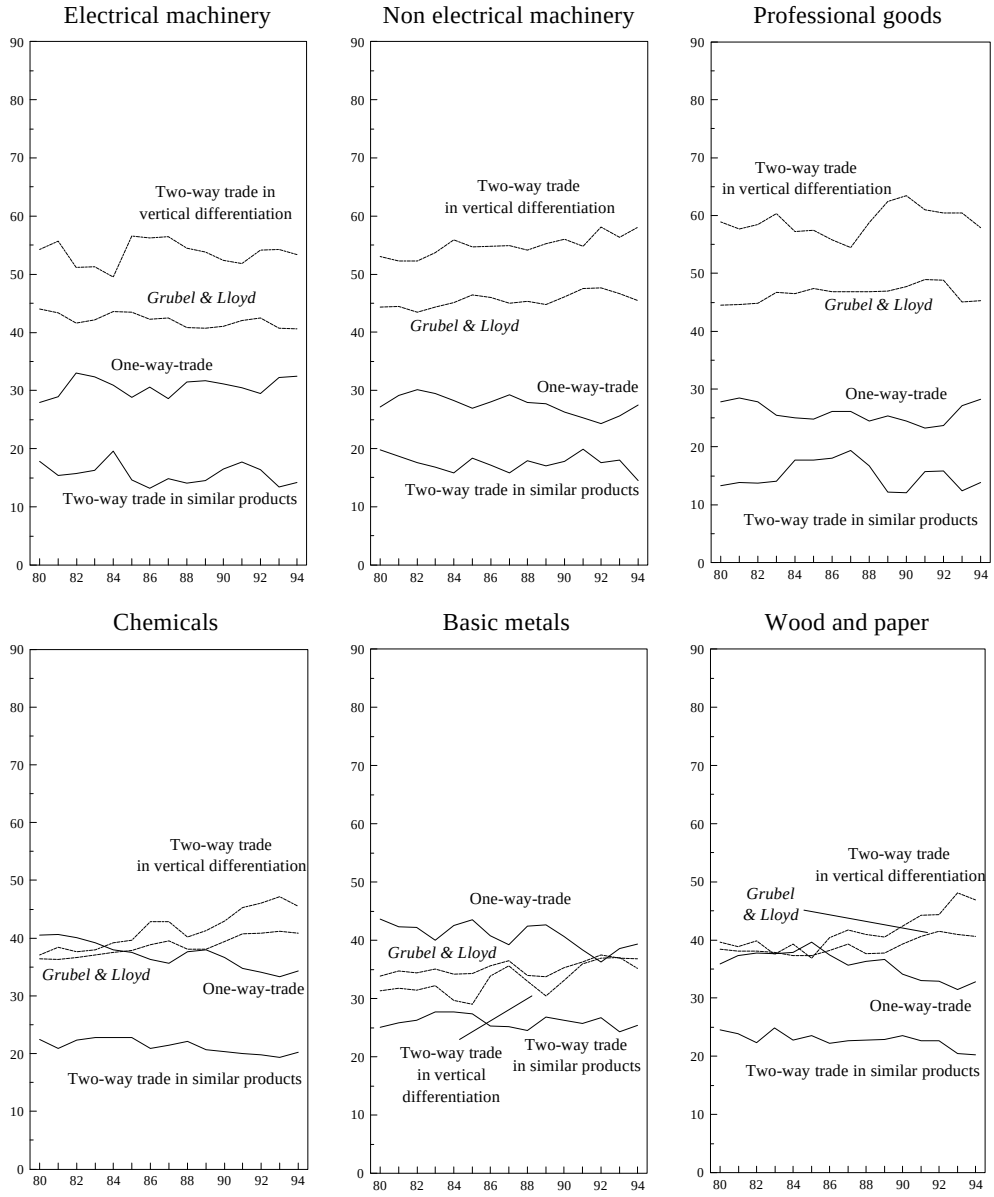
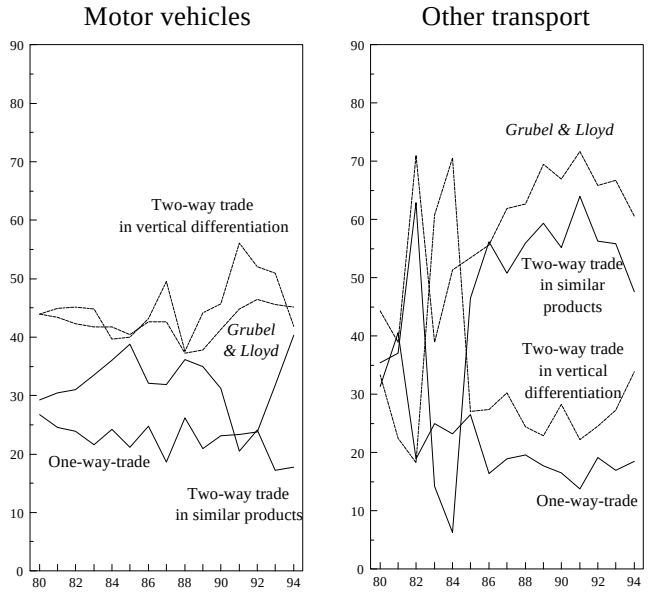


**Figure 6. continued**




Source: Eurostat-Comext, calculations by the CEPII.

### 3.4. Analysis of member states

This section examines the nature of trade of member states in intra-EC trade. The enlargement of the European Community, with the accession of new members (Greece, Portugal and Spain) in the 1980s and the German unification in the beginning of the 1990s, had an impact on the weight of the member states in total intra-EC-trade.

#### *3.4.1. Share of member states in total intra-EC-trade*

Figure 7 indicates the share of member states in total intra-EC-trade. This permits to identify three groups of countries according to their relative importance:

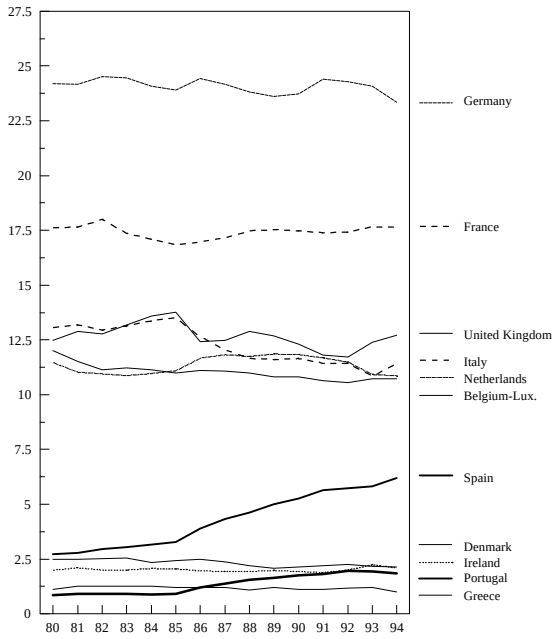
(a) the two major European economies, Germany and France, account together for around 40% of all intra-EC trade;

(b) four countries have a similar, relative share in intra-EC trade (between 10% and 12%): the United Kingdom and Italy, as well as two smaller, highly open ones, largely turned towards the European market: the Netherlands and Belgium-Luxembourg;

(c) the last group includes smaller countries (Denmark and Ireland) as well as newcomers (Greece, Portugal and Spain). Except for Spain in the last period, these countries have each a weight of between 1% and 2% of total intra-EC-trade.

The main changes over the considered time period occurred in this latter group of countries, which justifies the interest for "Southern" European countries. Note that there are no declarations for Greece, Portugal and Spain before their entry into the EC. Their trade flows are derived indirectly by using the declarations of the other member states. In that case, of course, bilateral trade flows between Greece, Portugal and Spain could not be calculated before their entry into the EC. While for Greece, the "statistical" accession effect (which should have happened in 1982) is negligible, the inclusion of bilateral Spanish-Portuguese trade data after 1986 explains the sudden rise of the relative trade shares of these two countries between 1985 and 1986. However, and in contrast to Greece, Spain and Portugal continued to increase their share in overall EC-trade after their adhesion the European Community. This increase for Spain and Portugal is largely predictable on the basis of the traditional theoretical arguments as far as these countries were fundamentally separated by a high economic distance[33] from other member states. In contrast, this argument does not hold for Greece. In addition, it is very difficult to disentangle between the effects due to their accession and those due to the Single market.

**Figure 7. Share of member states in intra-EC trade, 1980-1994**




Bilateral trade flows between Greece, Portugal and Spain are not taken into account before their entry into the EC.
Source: Eurostat-Comext, calculations by the CEPII.

[33] One refers here to differences in income *per capita*, factor endowments, technological level, which are the traditional determinants of inter-industry trade.

### *3.4.2. Evolution of the GL indicator by country*

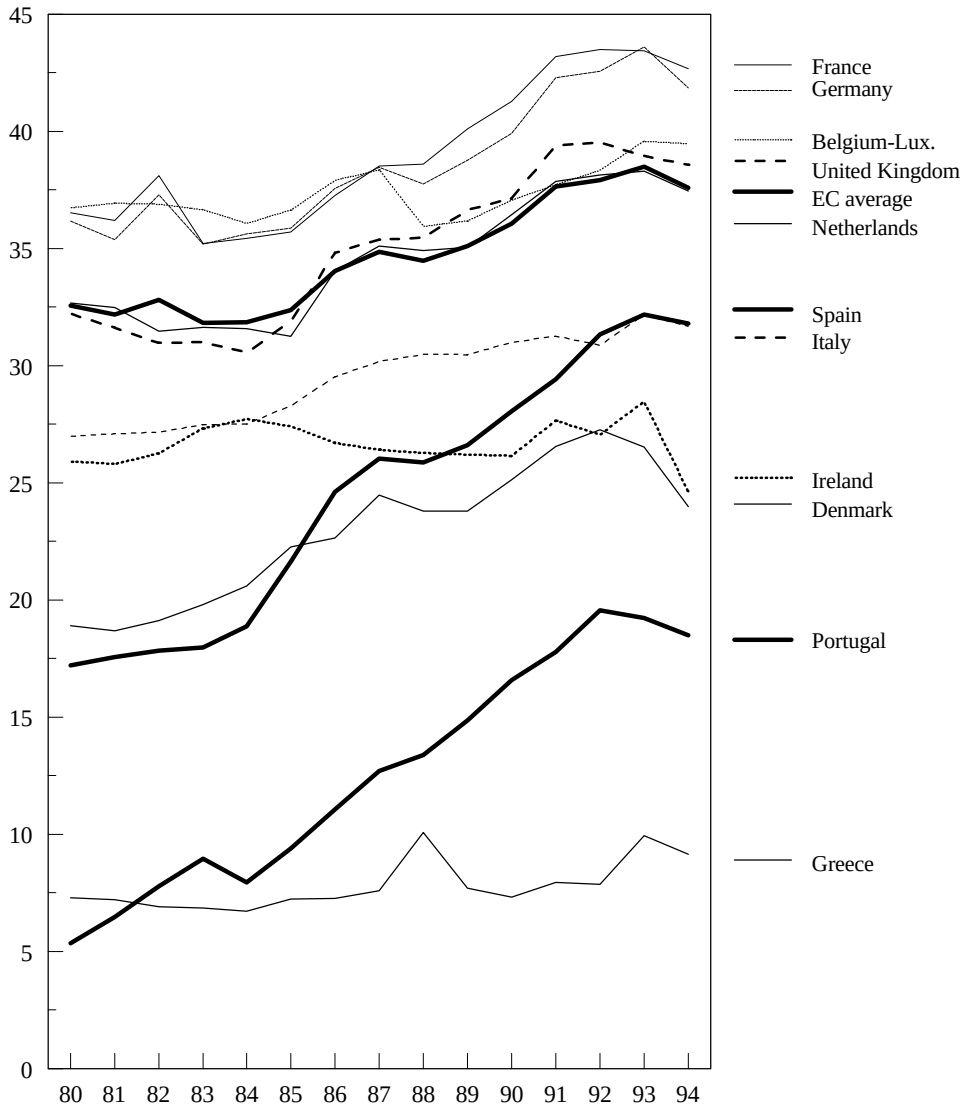
Figure 8 shows the evolution of intra-industry trade (as measured by the Grubel and Lloyd indicator) between 1980 and 1994 for each member country, as well as the EC average.

France and Germany show up the highest values of the GL (about 42% in 1994), followed by Belgium-Luxembourg, the United Kingdom and the Netherlands. In contrast, Greece's, and, to a lesser extent, Portugal's trade with other EC-members is largely dominated by inter-industry trade flows.

While intra-industry trade increased for most countries, the rise is most important for Portugal and Spain: between 1980 and 1994, the GL almost quadrupled for Portugal (from the very low level of 5% to more than 18%) and doubled for Spain (from 17% to 32%, at par with Italy). Note that the rise of intra-industry trade for Spain and Portugal began well before their entry into the EC.

As a result of diverging transformations in trade structures, the ranking of European countries in terms of intra-industry trade has been largely modified over the period (Figure 8). Spain is the most outstanding country: at the ninth place in terms of the GL in 1980, it overtook Ireland and Denmark, and is at par with Italy in 1994, gaining 3 ranks.

**Figure 8. Evolution of the GL indicator in intra-EC trade by country, 1980-1994**




Source: Eurostat-Comext, calculations by the CEPII.

**Table 4. Ranking of European countries by the importance of intra-industry trade (GL indicator, all industries)**

| Rank | 1980 | 1987 | 1994 |
|---|---|---|---|
| 1 | France | France, Germany, Belgium-Lux. | France |
| 2 | Belgium-Lux. | | Germany |
| 3 | Germany | | Belgium-Lux. |
| 4 | Netherlands | United-Kingdom | United-Kingdom |
| 5 | United-Kingdom | Netherlands | Netherlands |
| 6 | Italy | Italy | **Spain**, Italy |
| 7 | Ireland | Ireland | |
| 8 | Denmark | **Spain** | Ireland |
| 9 | **Spain** | Denmark | Denmark |
| 10 | Greece | Portugal | Portugal |
| 11 | Portugal | Greece | Greece |

Source: Eurostat-Comext, calculations by the CEPII.

### *3.4.3. Evolution of trade types by country*

After a presentation of the results based on the traditional Grubel and Lloyd indicator, we present the relative importance of the three trade types (Table 5). Two groups of countries can roughly be distinguished,

(a) The first group is composed of countries characterised by a high share of *intra*-industry trade. Two-way trade in similar products is particularly important for France, Belgium-Luxembourg and Germany, and two-way trade in vertically differentiated products for the United Kingdom, Germany and France. Due to its rapid convergence towards the trade structure of the more developed European countries, Spain is now part of this group and shows up a situation close to Italy's.

(b) Countries in the second group are characterised by an *inter*-industry specialisation. This phenomenon is particularly true for Greece, whose trade is almost completely of an inter-industry nature; a situation which, in contrast to Portugal, has hardly changed since 1987. As far as the countries in this group engage in intra-industry trade, two-way trade is predominantly done in goods differing by quality. At the exception of Denmark, the countries (Greece, Portugal, Ireland) have rather low levels of economic development.

Even if the rise in two-way trade (be it in horizontal or vertical product differentiation) is most pronounced for Spain (+12 percentage points) and for Portugal (+9), the overall rise in intra-industry trade within the EC (as also seen in Figure 2) cannot be attributed to these two countries, as the EC-average hardly changes once Spain and Portugal are excluded. In fact, two-way trade is increasingly important for most

countries, the exceptions being Ireland and Denmark who show up a slight decrease over the 1987-1994 period.

**Table 5. Share of trade types in intra-EC trade by country**

| Country | Share in 1994 (%) | | | Variation 1987 to 1994 (% points) | | |
|---|---|---|---|---|---|---|
| | Two-way trade in similar products | Two-way trade in vertically diff. products | One-way trade | Two-way trade in similar products | Two-way trade in vertically diff. products | One-way trade |
| France | **24.1** | **44.3** | 31.6 | **2.8** | **3.6** | **-6.4** |
| Germany | **20.5** | **46.9** | 32.6 | 1.9 | **3.4** | **-5.4** |
| Belgium-Lux. | **23.2** | 42.0 | 34.8 | 1.6 | 2.2 | -3.8 |
| United Kingdom | 16.5 | **47.9** | 35.6 | -1.9 | **8.9** | **-7.0** |
| Netherlands | 18.9 | 41.9 | **39.3** | -0.3 | **5.1** | -4.8 |
| Spain | 18.9 | 35.2 | **45.9** | **8.7** | **3.3** | **-12.0** |
| Italy | 16.2 | 36.9 | **46.9** | **5.8** | -3.1 | -2.8 |
| Ireland | 7.9 | 34.4 | **57.7** | -0.9 | -1.3 | 2.2 |
| Denmark | 8.1 | 31.9 | **60.0** | -1.1 | -0.0 | 1.1 |
| Portugal | 7.5 | 23.9 | **68.6** | **3.9** | **4.8** | **-8.6** |
| Greece | 3.7 | 10.3 | **86.0** | 0.8 | -0.6 | -0.2 |
| EC-12 | 19.2 | 42.3 | 38.5 | 2.0 | 3.1 | -5.1 |
| EC without Spain and Portugal | 19.5 | 43.1 | 37.4 | 1.7 | 3.3 | -5.0 |

Source: Eurostat-Comext, calculations by the CEPII.
The countries are ranked according to the importance of two-way trade in all trade. Figures in bold indicate higher-than-EC-average shares (or variations).

Figure 9 shows the evolution of the shares of trade types by countries for the years 1980, 1987 and 1994 and Figure 10 for 1994 only. As already mentioned, the advantage compared to traditional presentations showing the GL over time is that an increase of that latter indicator (increase in intra-industry trade) translates into a downward movement in the triangle (away from one-way trade towards two-way trade), but it also indicates whether the change is towards two-way trade in horizontal differentiation (movement to the left) or in vertical differentiation (to the right).

Notice that *all* countries are on the right side in the triangle: independent of the share of two-way trade in all intra-EC trade, *for each country, two-way trade is more important for vertically differentiated products than for similar products*. However, this phenomenon, the pre-eminent feature of intra-European trade, received little attention in the theoretical literature when compared to intra-industry trade in horizontal differentiation. It nevertheless underlines the particular interest of the question on which

market segment different member states are positioned, question which will be addressed in the following section.

Concerning the question addressed in Section 2 on the fears for potential divergence among European countries associated with a possible increase of specialisation along lines of comparative advantage through agglomeration effects in Europe. *For all countries, to the exception of Greece and Ireland, two-way trade (be it in horizontal or vertical differentiation) became increasingly important, the movement being most pronounced for Portugal and Spain. At least at this level of aggregation, it appears that theoretically possible agglomeration effects, detrimental to European cohesion, are not empirically observed.*

Two provisional explanations for this overall result might be suggested here:

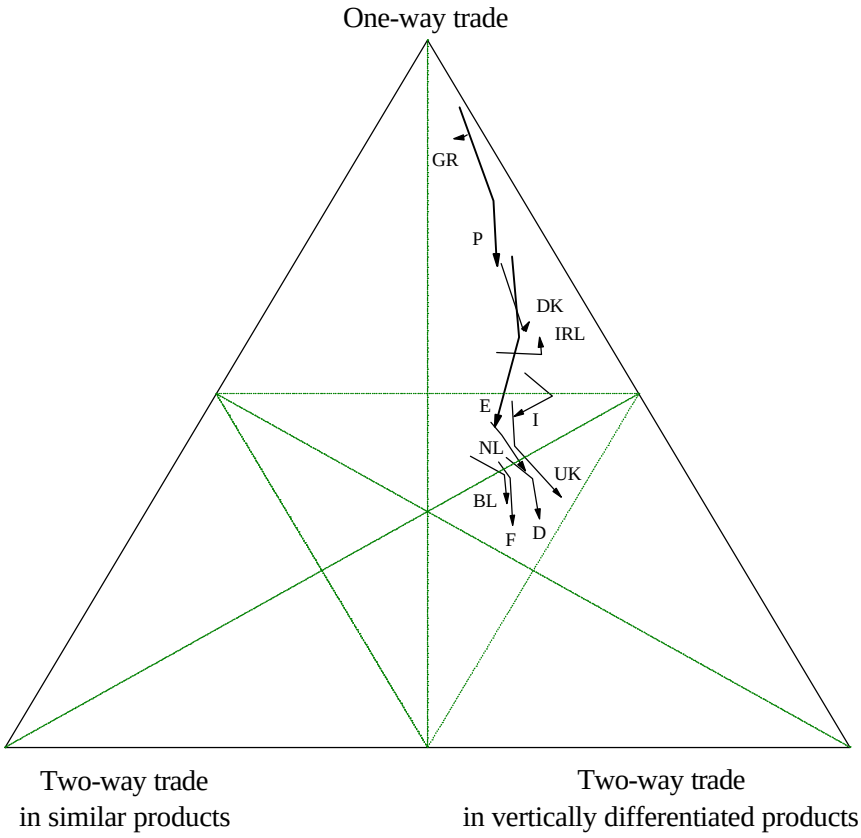
(a) first of all, factor mobility, which has been favoured by the SEM, implies foreign direct investment flows towards low *per capita* income countries. In accordance to the traditional theory of factor endowments, returns on capital are expected to be high in countries with lower endowment in capital per unit of labour. Possibly, FDI might have engaged Southern European countries in a rapid convergence of trade structures to those observed in Northern ones.

(b) on the same time, structural funds engaged by the Community are expected to smooth the transition period for these countries.

Lastly, it has to be borne in mind that other factors may have played an important role: the real convergence between countries pushes towards more intra-industry trade, as the general increase in income in Europe, and, possibly, the development of industries characterised by high level of economies of scale etc. As a result, we do have to wait until Section 7 before interpreting the present results in terms of effects associated with the Single Market: the econometric model will shed light on an anti-monde which will give a slightly different interpretation

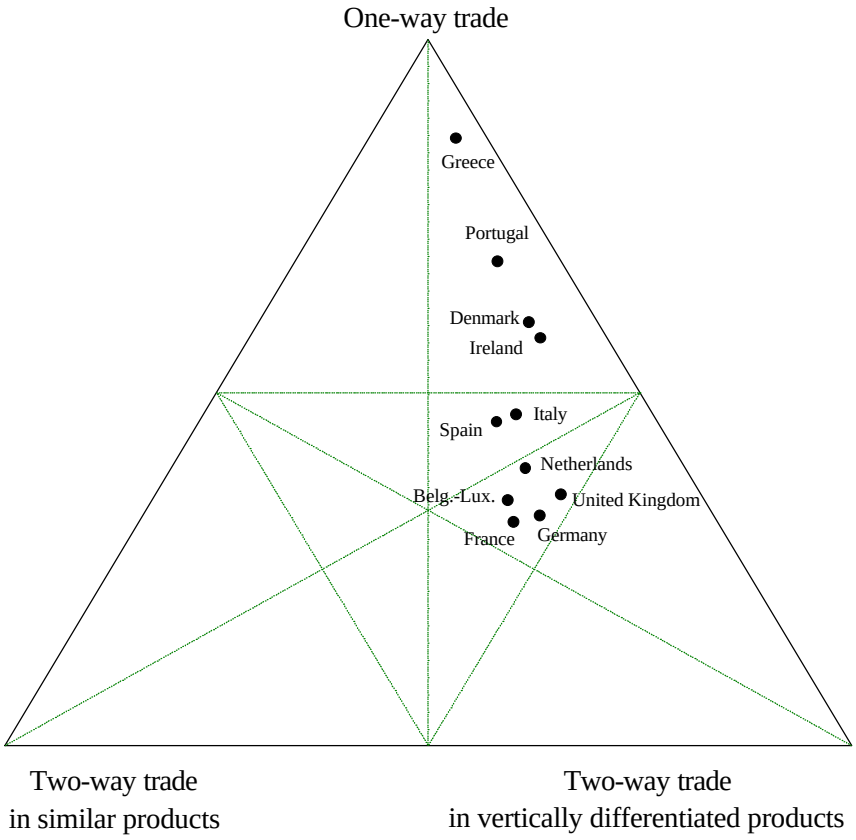
At this stage, it is difficult to assess the impact of the completion of the SEM on these events; the econometric modelling developed below will identify the impact of Non Tariff Barriers cancellation combined with a surge of intra-European Foreign direct Investment associated with the Single Market. Complex relationships will be identified, which exclude any interpretation of figures at this stage. It will be simply kept in mind that intra-industry trade on a bilateral basis has grown very fast in the past decade, an event which appeared simultaneously to the completion of the SEM and to the integration of new -Southern- partners in the Community.

**Figure 9. Share of trade types in intra-EC trade by country, 1980, 1987 and 1994**




Source: Eurostat-Comext, calculations by the CEPII.

**Figure 10. Share of trade types in intra-EC trade by country, 1994**




Source: Eurostat-Comext, calculations by the CEPII.

Let us examine in more detail the trade adjustments which occurred for the European countries. If, in 1980, one-way trade was the predominant trade type for *all* countries, Table 5 nevertheless helped distinguishing two groups of countries: countries where two-way trade is now predominant and those for which one-way trade remains the main trade type. Notice the difference of the scale between Figure 11 (55%) and Figure 12 (100%).

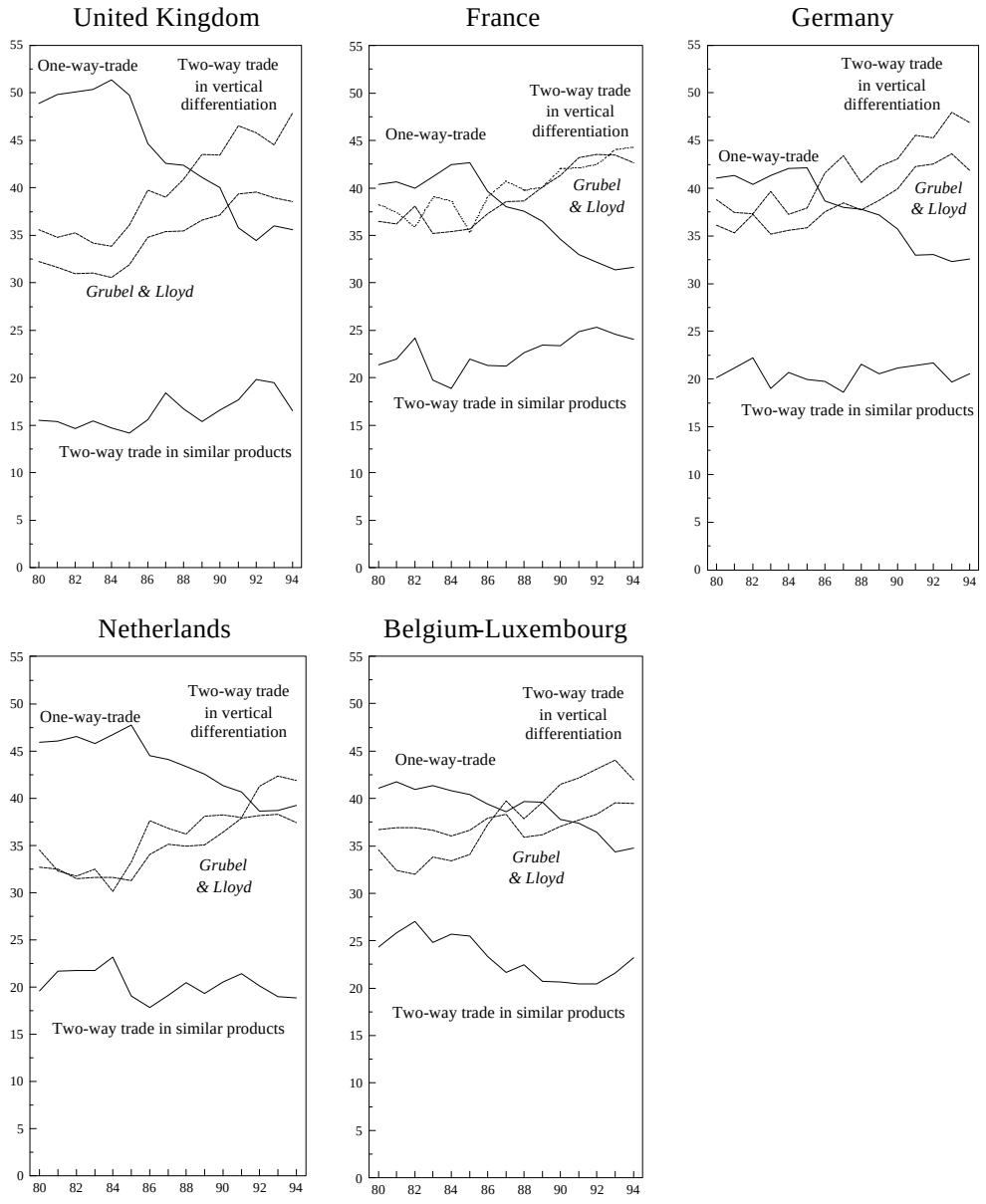
(a) The countries of the first group (Figure 11) show up a high share of two-way trade. For each of these countries, one-way trade represented the most important trade type in 1980, but has fallen since the mid-1980s by some 10 to 15 points, the drop being most pronounced for the United Kingdom. The correlative increase in two-way trade is mostly due to a rise in two-way trade in vertically differentiated products, representing now the most important trade type for all countries: for

France and Germany since 1986, for Belgium-Luxembourg and the United Kingdom[34] since 1989 and Netherlands since 1992.

(b) The six countries in the second group (Figure 12) are still characterised by a high share of one-way trade. Four of them show up a relative stability: Italy, Ireland, Denmark and especially Greece. In fact, Greece's trade relations with its EC-partners hardly changed during the considered time period. In 1980 as in 1994, some 85% of its intra-EC trade remain of an inter-industry nature, two-way trade in similar products being negligible. In contrast, Portugal, and even more so Spain, experienced remarkable changes in trade patterns. Trade structures moved towards those observed in more developed countries. Unlike countries like Germany or France, whose increase in two-way trade is mostly due to trade in vertically differentiated products, Spain and Portugal experienced an increase of two-way trade in horizontally *and* vertically differentiated products. While one-way trade still remains at a rather high level for Portugal, the nature of Spanish trade is now comparable to the one observed in Italy.

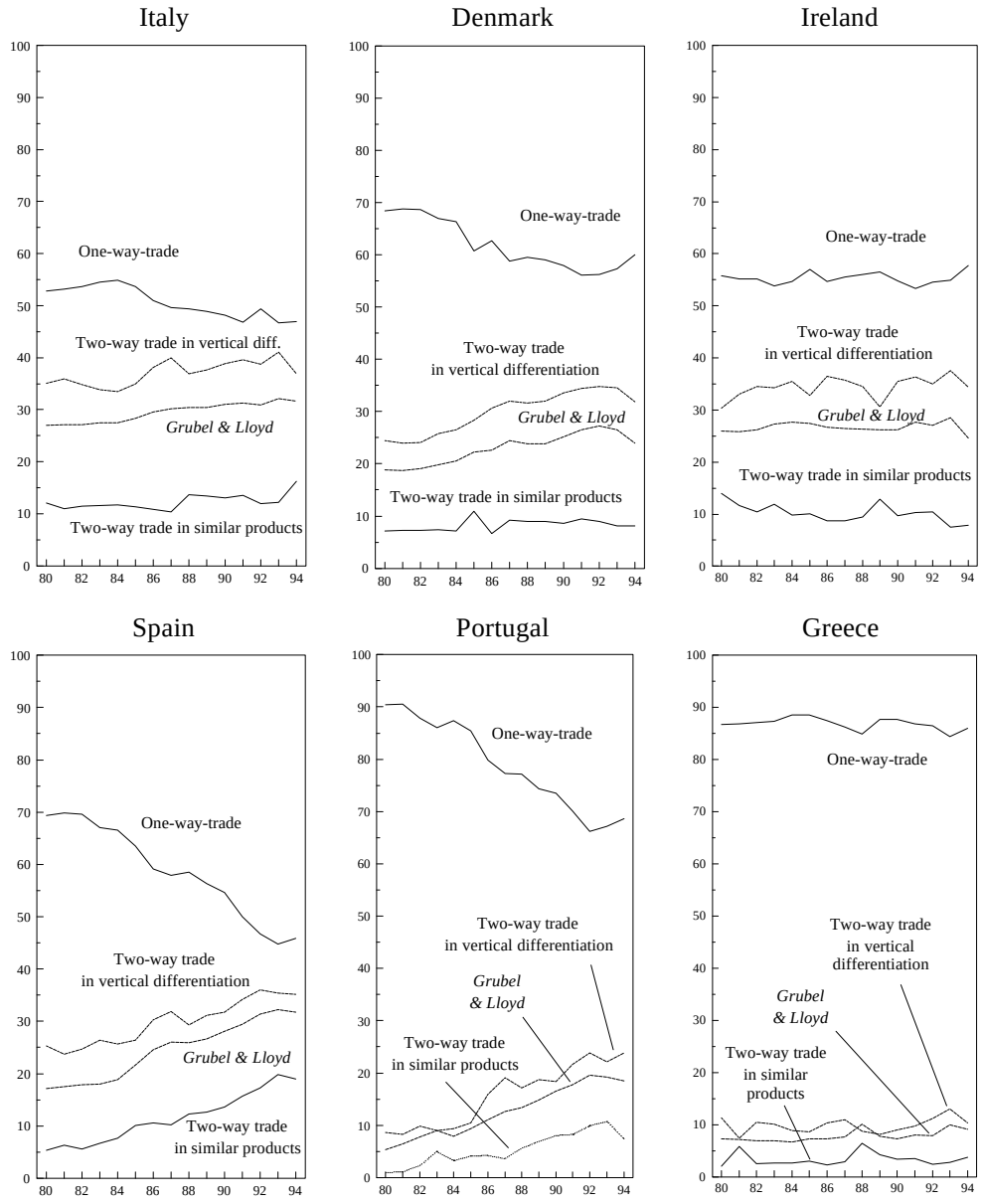
[34] While being based on a different methodology, the results for the United Kingdom are compatible with the ones put forward by Greenaway, Hine and Milner (1994 and 1995).

**Figure 11. Evolution of the GL indicator and the share of trade types in intra-EC trade, 1980-1994**




Source: Eurostat-Comext, calculations by the CEPII.
Notice the difference of the scale between Figure 11 (55%) and Figure 12 (100%).

**Figure 12. Evolution of the GL indicator and the share of trade types in intra-EC trade, 1980-1994**




Source: Eurostat-Comext, calculations by the CEPII.
Notice the difference of the scale between Figure 11 (55%) and Figure 12 (100%).

Finally, Table 6 shows the relative importance of the three trade types in *bilateral* trade in 1994 (complete figures can be found in Figure A-32).

(a) Bilateral two-way trade in similar products represents almost a third of all bilateral trade between Belgium-Luxembourg and the Netherlands, and more than a quarter for the couples France-Belgium-Luxembourg, France-Germany as well as for Italy-Spain. The presence of the latter country may seem somewhat surprising, but as examined above, due to its rapid convergence towards the trade structure of the more developed European countries, Spain shows up a situation close to... Italy's. By the way, Spain also shows up above-EC-average shares in its trade with France and the United Kingdom. In contrast, less than 1 percent of Greece's trade with Portugal, Denmark, the Netherlands and Belgium-Luxembourg concerns two-way trade in similar products. Bilateral two-way trade in similar products seems most important for countries which are economically and geographically close.

(b) More than half of British trade with Germany, Belgium-Luxembourg and the Netherlands concerns two-way in vertically differentiated products. Note also the predominance of this trade category for French-German trade. In contrast, this trade type is again negligible for Portugal-Greece and Portugal-Ireland.

(c) The share of one-way trade -by construction the complement of the two former trade types to 100% - is particularly high for bilateral trade among Southern countries or between Southern and Northern countries: bilateral trade between Greece and Portugal is almost exclusively one-way trade, whereas this trade represents only 17% of French-German trade. This suggests that the level of economic development and the market size might also play a major role.

In general, South-South trade is characterised by one-way trade, and North-North trade by two-way trade (predominantly in vertical, but also in horizontal differentiation). If Southern countries engage in two-way trade, it is predominantly in vertical differentiation with Northern countries. At this level of analysis -and notwithstanding sectoral effects- it seems that economic and geographic proximity, as well as the level of economic development and the market size favour two-way trade.

**Table 6. Share of trade types in bilateral trade, 1994**

| Most important | | | Least important | | |
|---|---|---|---|---|---|
| **Two-way trade in similar products** | | | | | |
| 31.4 | Belgium-Lux. | Netherlands | 0.2 | Greece | Portugal |
| 29.0 | France | Belgium-Lux. | 0.4 | Denmark | Greece |
| 28.2 | France | Germany | 0.6 | Netherlands | Greece |
| 25.7 | Italy | Spain | 0.6 | Belgium-Lux. | Greece |
| 24.6 | Belgium-Lux. | Germany | 1.2 | Italy | Ireland |
| 24.5 | France | Spain | 1.3 | France | Greece |
| 24.3 | France | UK | 1.4 | Denmark | Portugal |
| 22.9 | France | Italy | 1.5 | Ireland | Portugal |
| 20.7 | Netherlands | Germany | 1.6 | Greece | Spain |
| 19.8 | UK | Spain | 1.6 | France | Ireland |
| **19.2** | **EC-average** | | 1.9 | Germany | Ireland |
| **Two-way trade in vertically differentiated products** | | | | | |
| 56.8 | Germany | UK | 1.5 | Greece | Portugal |
| 55.4 | Belgium-Lux. | UK | 3.9 | Ireland | Portugal |
| 54.8 | France | Germany | 4.9 | Netherlands | Greece |
| 51.1 | Netherlands | UK | 4.9 | Denmark | Greece |
| 46.4 | UK | Ireland | 5.5 | Greece | Spain |
| 44.4 | France | UK | 7.7 | Italy | Greece |
| 44.3 | Netherlands | Germany | 7.9 | Belgium-Lux. | Greece |
| 43.6 | Belgium-Lux. | Netherlands | 8.6 | Ireland | Spain |
| 43.3 | Germany | Italy | 9.4 | Denmark | Portugal |
| 42.7 | Italy | UK | | | |
| 42.4 | France | Netherlands | | | |
| 42.3 | Belgium-Lux. | Germany | | | |
| **42.3** | **EC-average** | | | | |
| **One-way trade** | | | | | |
| 98.4 | Greece | Portugal | 17.0 | France | Germany |
| 94.8 | Denmark | Greece | 24.9 | Belgium-Lux. | Netherlands |
| 94.6 | Ireland | Portugal | 25.1 | Germany | UK |
| 94.4 | Netherlands | Greece | 29.7 | France | Belgium-Lux. |
| 92.9 | Greece | Spain | 31.3 | France | UK |
| 91.6 | Belgium-Lux. | Greece | 32.5 | Netherlands | UK |
| 89.2 | Denmark | Portugal | 33.1 | Belgium-Lux. | Germany |
| 87.7 | Ireland | Spain | 35.0 | Netherlands | Germany |
| 87.1 | Italy | Greece | 35.9 | Belgium-Lux. | UK |
| 85.3 | UK | Greece | 36.5 | France | Spain |
| 83.7 | Netherlands | Portugal | **38.5** | **EC-average** | |
| 83.6 | Denmark | Spain | | | |
| 82.7 | Italy | Ireland | | | |
| 81.7 | France | Greece | | | |
| 81.3 | Germany | Greece | | | |
| 80.9 | UK | Portugal | | | |

### *3.4.4. Analysis of price/quality ranges by country*

The results obtained by disentangling intra-EC by trade types suggest that the 1980-1994 period is characterised by an increase in two-way trade in vertically differentiated products, i.e. simultaneous exports and imports of products with the same, principle technical characteristics, but under different prices (unit values).

*Intra- EC trade as a whole*

In order to better understand this "qualitatively division of labour" within Europe, we defined three European price/quality ranges (up-market, middle-market and down-market products). For each of the 10,000 products, the same 15% threshold for differences in unit values around the EC-average was applied for every year.

If unit values differences were essentially determined by discrimination in prices associated with counter-competitive practices, the share of middle-market products should have increased, since the second half of the considered time period saw the announcement and completion of the SEM, intending to cutting down anti-competitive practices.

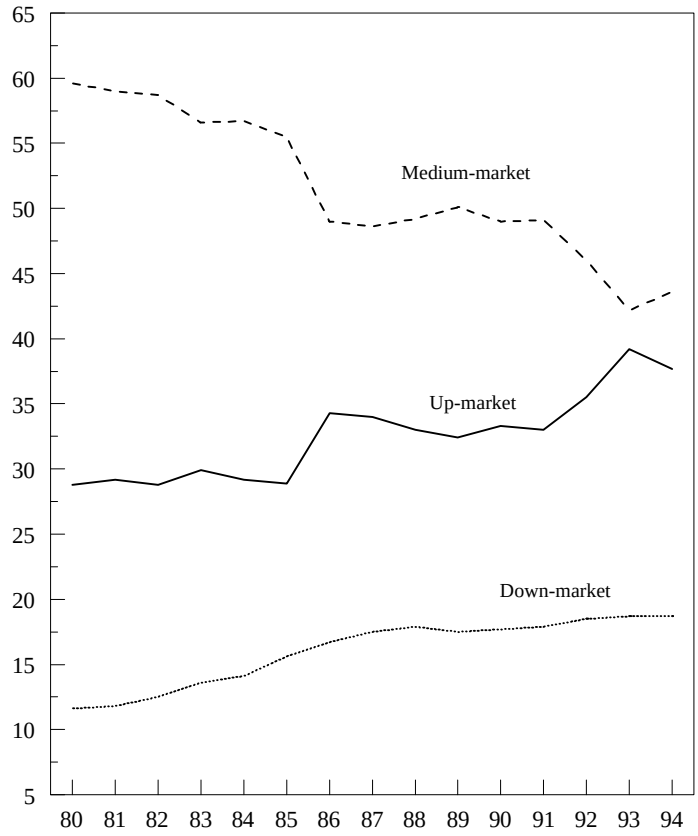
However, Figure 13 shows that while remaining the most important market segment, middle-market products saw their share actually *decline* (by some 15 points). This means that the *dispersion of unit values has grown* throughout the last 15 years: the decrease in the share of trade in medium range products suggests that differences in unit values reflect essentially differences in quality.

From a policy point of view, a theoretical argument referred to above must be borne in mind when interpreting the results below: products sold at significantly different prices on the same market are outputs of distinctive production functions. High quality means more R&D, a higher qualification of labour, specific organisation of internal procedures of firms etc. Therefore, the range on which countries specialise is not "neutral" from a policy point of view.

Keeping this interpretation in mind, the correlative increase of trade in top and low quality products means a specialisation of countries over the quality spectrum, a same criteria (the 15% difference in unit values) pushing a growing part of trade outside the boundaries.

The choice of using the same criteria over the whole period was made since the alternative -calibrating the criteria in order to keep the medium range constant- would not have picked up this phenomenon of specialisation. A consequence of this choice is to imply the introduction of a trend of quality differences by industry in the econometric model. As referred to below, an indictor of product differentiation will be used in the econometric model in order to control this effect.

**Figure 13. Evolution of intra-EC trade by price/quality range, 1980-1994**




Source: Eurostat-Comext, calculations by the CEPII.

*Intra-EC trade structure for member countries*

In 1994, the structure of *imports*, according to the price/quality criteria used here, is so close among the EC member states that virtually no "outlier" country can be identified (Table 7): concerning the "demand" side, patterns of consumption at this aggregated level seem to be very "harmonised".

The situation is rather different when we look at *exports*, these exports reflecting the specialisation of countries along the quality spectrum in each industry. Thus, after aggregation over all industries, some EC countries are specialised on down market segments, whereas other countries are specialised on top quality products. Here, we can clearly distinguish the Southern countries which joined the EC in the 1980s (Greece, Portugal and Spain), plus Italy, whose exports are primarily made of down- or middle-market products. On the other extreme, more than 50% of Irish exports are in the

up-market segment, followed by Germany, Denmark, the United Kingdom, and, to a lesser extent, by France.

These contrasted results suggest that the dispersion among member states of consumption structures along the quality spectrum are smaller than the dispersion of production structures: German and Italian consumers buy different qualities in approximately the same proportions (due to "identical" preferences as revealed by imports from other EC countries), but German producers are on the whole specialised on high unit values products, contrary to Italian ones.

If these preliminary results for Germany seem to be compatible with the image of the label "made in Germany", expensive but supposedly high-quality products, it is more difficult to identify the reasons associated with the performance of Ireland. In this latter case, the role of foreign affiliates using this country as a location of assembly lines devoted to the furniture of the European market is certainly leading. The import content of high quality exports is relatively high is this case[35]. Of course, these results at a macroeconomic level have to be interpreted with care, but analyses developed below at a more detailed level confirm these first results.

**Table 7. The countries' price/quality structure of exports and imports in intra-EC trade, 1993/94**

| Country | Exports (%) | | | Imports (%) | | |
|---|---|---|---|---|---|---|
| | Down | Medium | High | Down | Medium | High |
| Ireland | 21.3 | 24.9 | 53.8 | 28.3 | 30.3 | 41.4 |
| Germany | 14.0 | 38.6 | 47.4 | 14.2 | 46.4 | 39.4 |
| Denmark | 19.8 | 38.4 | 41.7 | 20.8 | 32.9 | 46.3 |
| United Kingdom | 20.5 | 39.1 | 40.5 | 21.8 | 36.7 | 41.6 |
| France | 14.9 | 45.2 | 39.9 | 19.2 | 44.1 | 36.7 |
| Netherlands | 15.4 | 50.9 | 33.7 | 19.6 | 45.2 | 35.2 |
| Italy | 28.5 | 39.4 | 32.2 | 15.1 | 43.7 | 41.2 |
| Belgium-Lux. | 18.1 | 50.0 | 31.9 | 19.9 | 45.2 | 34.9 |
| Greece | 31.0 | 42.3 | 26.7 | 21.5 | 37.0 | 41.6 |
| Portugal | 34.1 | 39.6 | 26.3 | 22.8 | 41.0 | 36.2 |
| Spain | 28.9 | 48.0 | 23.1 | 23.8 | 40.4 | 35.8 |
| EC-12 | 18.7 | 42.9 | 38.4 | 18.7 | 42.9 | 38.4 |

Source: Eurostat-Comext, calculations by the CEPII.

Figure 14 shows the evolution of intra-EC exports by price/quality range over 1980 to 1994. Concerning Ireland, Germany, Denmark and the United-Kingdom, the main feature of export patterns is certainly the fact that up-market products are leading in the final period, after having increased their share throughout the period considered here. Up-market products now account for more than 50% for Ireland, nearly half of German exports, and 40% of Danish and British exports. But this increase in quality of products

[35] See Fontagné, Freudenberg, Ünal-Kesenci (1995).

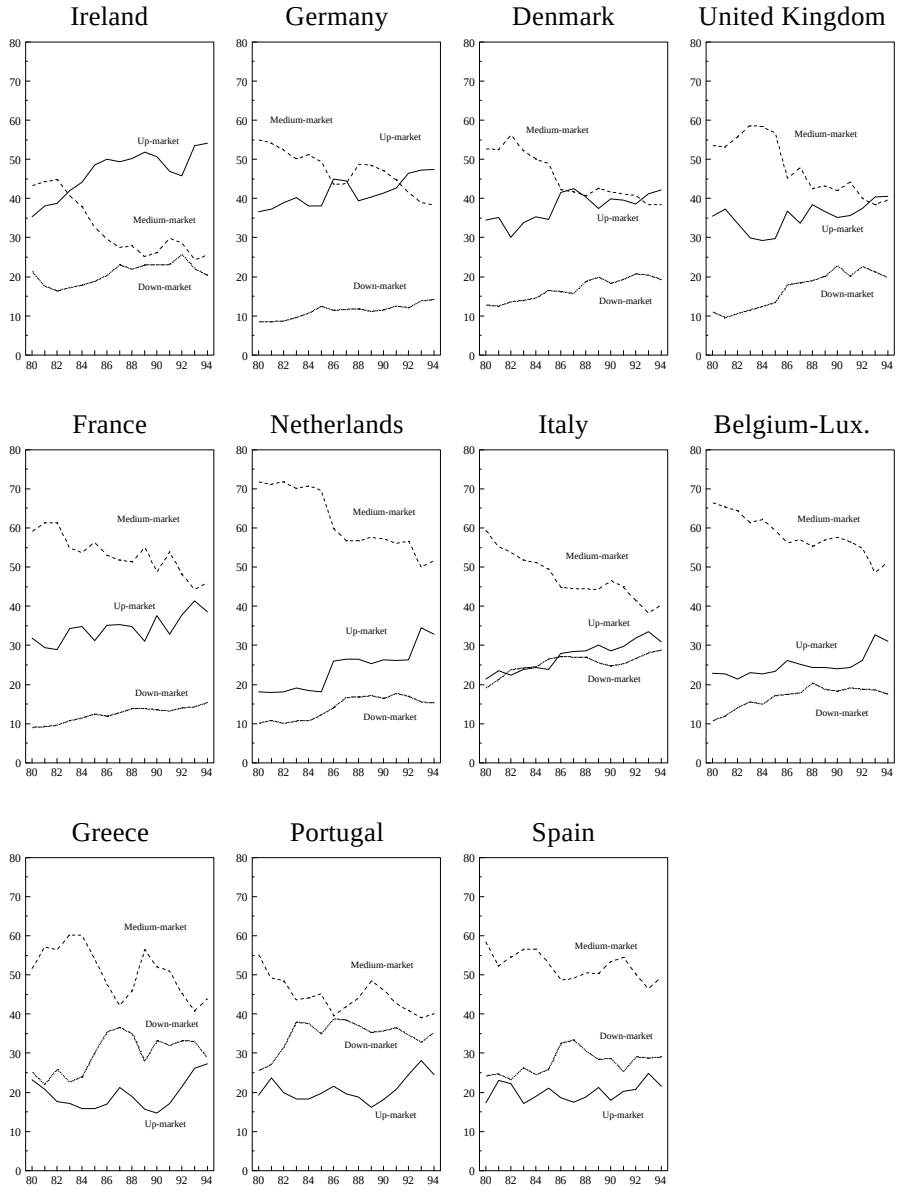
over time has been obtained through a sharp decrease of medium market products, not lower ones. In contrast, simultaneously, the share of down-market products has increased in all these countries' exports.

Quality ranges are sometimes interpreted in terms of a response to exchange rates pressure on exporters, countries with appreciating currencies being pushed to up-grade in their specialisation in order to balance declining market shares in volume. In contrast, producers from countries with depreciating currencies may be able to compete on the basis of lower prices, feeling less obliged to up-grade and may therefore persist in producing a given (lower) quality. The similar evolution for Germany and United-Kingdom, two countries which recently had opposite strategies concerning their respective exchange rates, raised this interpretation into doubt: British exporters have not been driven downward the quality spectrum.

Concerning Southern countries, exporters are located mainly on the medium range of the price/quality spectrum. But as in most countries, exports in the medium-market range are decreasing. Down-market and up-market exports have an increasing share, which highlights the process of an in-depth specialisation of producers which is not oriented *a priori* against top quality products, contrary to the intuition, even if finally down-market products account systematically for a larger share of exports than up-market ones.

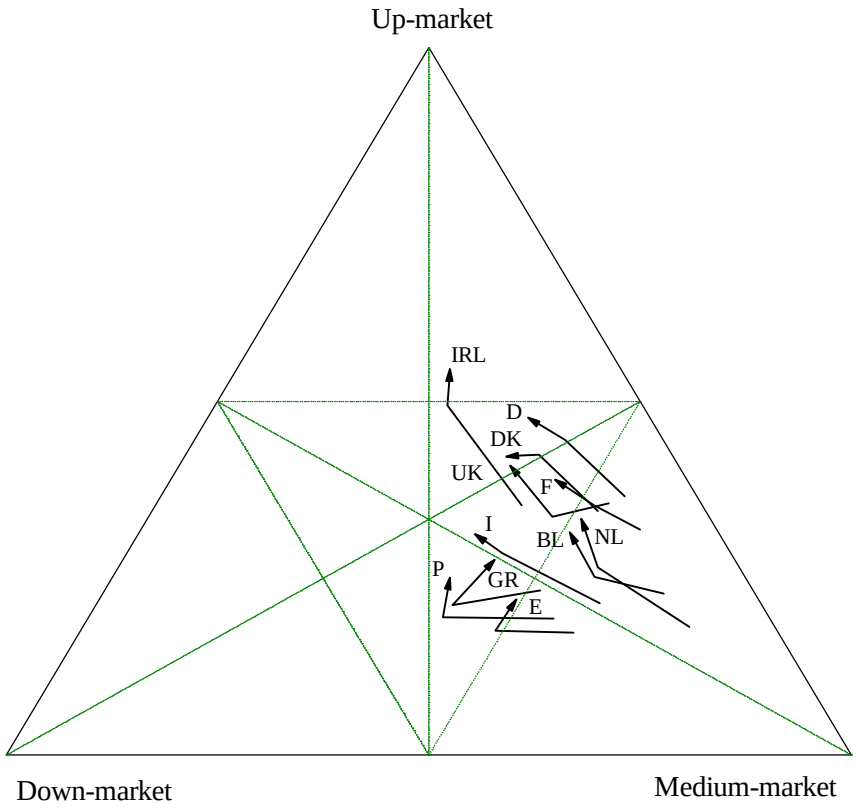
Figure 15 shows the evolution of the price/quality structure of exports by country between 1980, 1987 and 1994. All countries exported more up-market products in 1994 than in 1980. However, the two sub-periods clearly show that for Southern countries, the trend until 1987 was towards down-market products and towards up-market goods thereafter. While they have not yet caught-up with the more advanced countries, this a huge up-grading effect nevertheless suggests a certain convergence since 1987.

**Figure 14. The countries' export structure by price/quality range in intra-EC trade**




Source: Eurostat-Comext, calculations by the CEPII.

**Figure 15. The price/quality structure of exports by country, 1980, 1987 and 1994 (all products intra-EC trade)**




Source: Eurostat-Comext, calculations by the CEPII.

*Revealed comparative advantages by price/quality ranges*

The difference between Northern and Southern countries is striking once overall strengths in price/quality ranges are analysed. Table 8 synthesises the results based on the indicator of "revealed comparative advantages"[36] in 1994. While Northern countries show

[36] The "contribution to the trade balance", developed by G. Lafay (1987 and 1990), is a *structural* indicator which tries to eliminate business cycle variations by comparing an industry's performance to the overall one and, unlike many other indicators, a *symmetrical* indicator in the sense that it focuses not only on exports, but also on imports. If there were no comparative advantage or disadvantage for any industry (in a given country), then total trade surplus or deficit should be distributed across all industries according to their share in total trade. The 'contribution to the trade balance' is the difference between the actual and the theoretical balance. Expressed in thousandths of GDP, that is:

$$\left(\frac{1000}{Y}\right)\left(\left(X_j - M_j\right) - \left(X - M\right)\left(\frac{X_j + M_j}{X + M}\right)\right)$$

A positive contribution is interpreted as a 'revealed comparative advantage' for that industry. By definition, the sum over all industries is zero. Another important feature is that the values for products or industries can be aggregated to any given level without biasing the results.

up comparative advantages in up-market products (Ireland and Germany), in the medium- and up-market range (France) or in medium-market goods (United Kingdom, Netherlands, Belgium-Luxembourg and Denmark), Southern countries are specialised in the lower quality range: down-or medium-market goods for Spain and Greece, and down-market products for Italy and Portugal.

**Table 8.**
**The countries' strengths in intra-EC trade by price/quality range, 1994**

| Country | Price/quality range | | |
|---|---|---|---|
| | Down | Medium | High |
| Ireland | | | + |
| Germany | | | + |
| France | | + | + |
| United Kingdom | | + | |
| Netherlands | | + | |
| Belgium-Lux. | | + | |
| Denmark | | + | |
| Spain | + | + | |
| Greece | + | + | |
| Italy | + | | |
| Portugal | + | | |

Source: Eurostat-Comext and CEPII-CHELEM, calculations by the CEPII.
An "+" represents a positive "contribution to the trade balance" of the price/quality ranges.

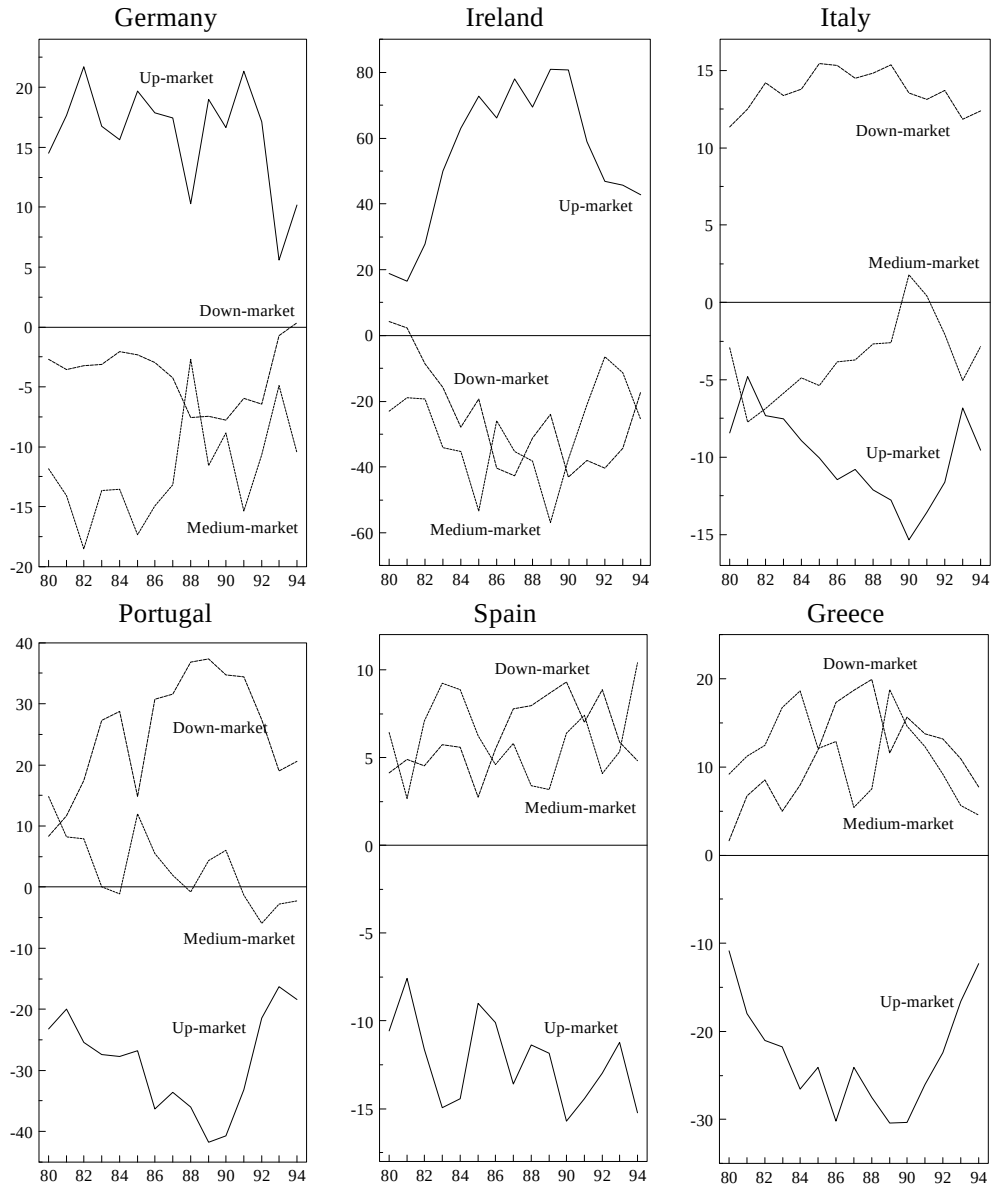
Figure 16 shows the evolution of the "contribution to the trade balance" by price/quality range for selected countries. A positive value of that indicator can be interpreted as a "revealed comparative advantage", a negative one as a comparative disadvantage. By definition, the sum over the three categories is zero.

Germany's comparative advantages are in up-market products, as is the case for Ireland. But for the two former countries, it must be pointed out that this traditional pattern of specialisation sharply decreases in the early 1990s, a feature of trade patterns which is difficult to interpret at this stage in the perspective of the completion of the Single Market.

Italy highlights a symmetric location of comparative advantages along the quality spectrum: this country has clearly made the choice of a cheaper currency and a lower quality for products, a choice which is diametrically opposite to the one made by other "core countries" of the EC. It does not mean that this choice is a "bad" specialisation: the market exhibits a demand for high and low quality products, and being the only large country strongly specialised in down-market products sold at a cheaper price might be an interesting strategy.

Turning to the three "Southern" countries, patterns of comparative (dis)advantages are those expected: these countries are disadvantaged for top quality products. But over time, and this is more interesting, things have changed: in the early 1990s, their comparative advantage for down-market products falls, whereas specialisation turned either towards top or middle quality products. The scenario of an integration to the EC based on "residual" specialisation on down-market products, with its correlative adverse consequences for the catching-up, is noborne out by the evidence at this stage

**Figure 16. Evolution of revealed comparative advantages in intra-EC trade by price/quality ranges for selected countries, 1980-1994**




Source: Eurostat-Comext and CEPII-CHELEM, calculations by the CEPII.

*Comparative advantages by industry and price/quality ranges*

These overall results need nevertheless be examined at an industry level. Figure 17 shows revealed comparative advantages by industry and price/quality range for all member

states in 1994. Table 9 synthesises the results by taking the five most important positive (strengths) and negative (weaknesses) values from Figure 17.

The patterns are quite contrasting across countries.

(a) Some countries are specialised in certain industries over the whole price/quality spectrum: Denmark (agriculture) and Greece (textiles).

(b) Most countries also show up a rather strong industrial specialisation with two of the first five strengths in the same industry. Here we find the Netherlands (medium- followed by up-market agriculture), Italy (up- and medium market textiles and down- and medium-market non electrical machinery), the United Kingdom (up-and medium-market electrical machinery), Ireland (up- and medium-market non electrical machinery[37]), Portugal (medium- and down-market textiles and wood and paper products) as well as Spain (medium- and down-market motor vehicles and agriculture).

(c) In this typology, Germany is a clear outlier. Its specialisation is not oriented towards specific industries, but clearly towards a price/quality specialisation. Germany's five major strengths are all in up-market goods (motor vehicles, non electrical machinery, electrical machinery, chemicals and other transport).

For France and Ireland, the analysis by price/quality ranges yields an interesting finding, as strengths and weaknesses can be found within the *same* industry. Ireland's major advantage is chemicals in the up-market segment, and its main disadvantage concerns chemicals in the medium-market range! A symmetric observation can be made for France for motor vehicles. These results are compatible with the predominance of two-way trade in vertically differentiated products in Europe, indicating a qualitatively division of labour. Another example concerns Germany and Italy, Europe's two major producers of non-electrical machinery: while Italy is specialised in down- and medium-market goods, Germany is specialised in the up-market segment in that industry. However, between 1987 and 1994, Germany lost ground in almost all its high-priced key industries.

As mentioned before, one possible argument against our indicator based on relative unit values concerns the impact of bilateral exchange rates variations on relative prices. Substantial deprecations can lead domestic producers to a higher competitiveness due to lower export prices, a phenomenon which in our methodology might be falsely interpreted as "lower quality", thus invalidating the (theoretical) link between relative prices and product quality. For example the overall specialisation in down-market products which we found for Italy can be raised into doubt since it may be the result of the exchange rate depreciation. However, an analysis at the industry level shows that currency depreciation has not led Italy to down-market specialisation in its key industries: its first comparative advantage still concerns *up*-market textiles. The same remark can be made for the United Kingdom, showing up an *up*-market specialisation for chemicals. The findings concerning Italy and the United Kingdom may thus serve as an *ex-post* justification of our

[37] As already mentioned in footnote 31, non-electrical machinery includes some automatic data processing equipment.

indicator of price/quality ranges, since these two countries are still able to sell at high prices in their key industries.

**Table 9. The countries' five major strengths and weaknesses in intra-EC trade by price/quality range, 1994**

| Country | Major strengths | | | | Major weaknesses | | | |
|---|---|---|---|---|---|---|---|---|
| | Industry | Price/quality range | | | Industry | Price/quality range | | |
| | | Down | Medium | High | | Down | Medium | High |
| France | Motor vehicles | | M | | Non elec. machinery | | M | |
| | Agriculture | | M | | Min.-extraction | | M | |
| | Other manufacturing | | | H | Other transport | | | H |
| | Other transport | | M | | Motor vehicles | | | H |
| | Min.-extraction | | | H | Textiles | D | | |
| Belgium-Lux. | Motor vehicles | | M | | Other manufacturing | | M | |
| | Basic metals | | M | | Other manufacturing | D | | |
| | Chemicals | | M | | Min.-extraction | | M | |
| | Textiles | | M | | Other manufacturing | | | H |
| | Motor vehicles | | | H | Non elec. machinery | | | H |
| Netherlands | Min.-extraction | | M | | Motor vehicles | | M | |
| | Agriculture | | M | | Non elec. machinery | | | H |
| | Agriculture | | | H | Non elec. machinery | D | | |
| | Other manufacturing | | | H | Chemicals | | | H |
| | Food and beverages | | M | | Textiles | | M | |
| Germany | Motor vehicles | | | H | Other manufacturing | | | H |
| | Non elec. machinery | | | H | Min.-extraction | | M | |
| | Elec. machinery | | | H | Agriculture | | M | |
| | Chemicals | | | H | Agriculture | | | H |
| | Other transport | | | H | Other transport | | M | |
| Italy | Textiles | | | H | Agriculture | | M | |
| | Non elec. machinery | D | | | Elec. machinery | | | H |
| | Textiles | | M | | Chemicals | | M | |
| | Non elec. machinery | | M | | Chemicals | | | H |
| | Other manufacturing | | | H | Motor vehicles | | M | |
| United Kingdom | Other manufacturing | | | H | Motor vehicles | | | H |
| | Chemicals | | | H | Motor vehicles | D | | |
| | Elec. machinery | | | H | Motor vehicles | | M | |
| | Elec. machinery | | M | | Food and beverages | | M | |
| | Other transport | | M | | Agriculture | | M | |
| Ireland | Chemicals | | | H | Chemicals | | M | |
| | Agriculture | | M | | Motor vehicles | | M | |
| | Food and beverages | | | H | Basic metals | | M | |
| | Non elec. machinery | | | H | Motor vehicles | D | | |
| | Non elec. machinery | | M | | Textiles | | | H |
| Denmark | Agriculture | | M | | Motor vehicles | | M | |
| | Agriculture | | | H | Chemicals | | M | |
| | Agriculture | D | | | Motor vehicles | D | | |
| | Other manufacturing | | | H | Elec. machinery | | | H |
| | Other manufacturing | D | | | Chemicals | | | H |
| Greece | Food and beverages | | M | | Chemicals | | | H |
| | Textiles | | M | | Motor vehicles | | M | |
| | Textiles | D | | | Chemicals | | M | |
| | Textiles | | | H | Non elec. machinery | | | H |
| | Min.-extraction | D | | | Elec. machinery | | | H |
| Portugal | Textiles | | M | | Motor vehicles | | M | |
| | Textiles | D | | | Agriculture | | M | |
| | Wood and paper | | M | | Chemicals | | | H |
| | Wood and paper | D | | | Motor vehicles | | | H |
| | Elec. machinery | | | H | Basic metals | | M | |
| Spain | Motor vehicles | | M | | Chemicals | | | H |
| | Motor vehicles | D | | | Non elec. machinery | | | H |
| | Agriculture | | M | | Chemicals | | M | |
| | Other manufacturing | | M | | Non elec. machinery | D | | |
| | Agriculture | D | | | Elec. machinery | | | H |

Source: Eurostat-Comext and CEPII-CHELEM, calculations by the CEPII.
For each country, industries are ranked according to the "contribution to the trade balance" of the respective price/quality ranges.

**Figure 17. Revealed comparative advantages by industry and price/quality range, 1994 (intra-EC trade)**

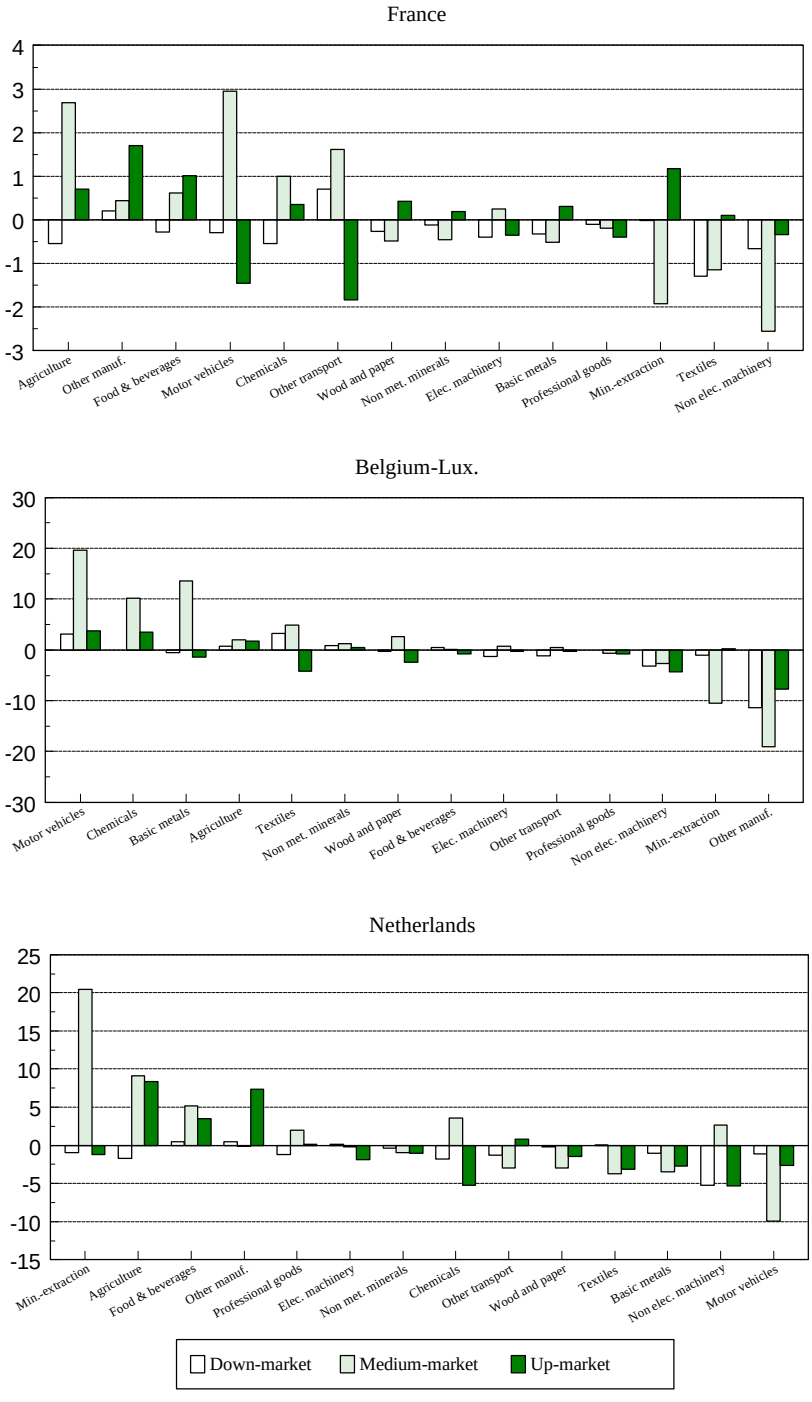
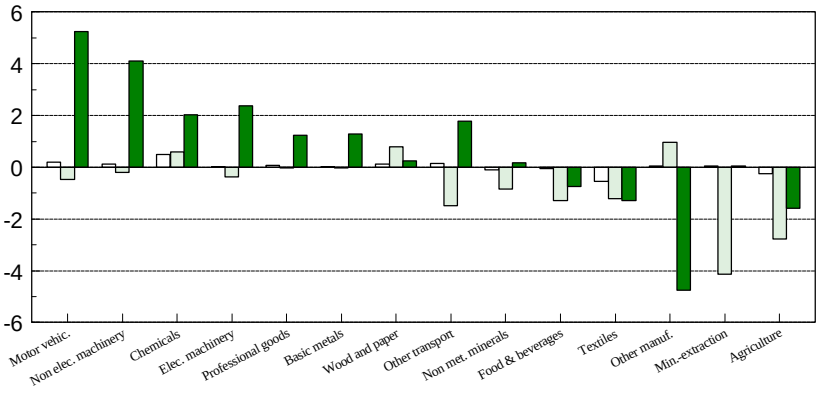
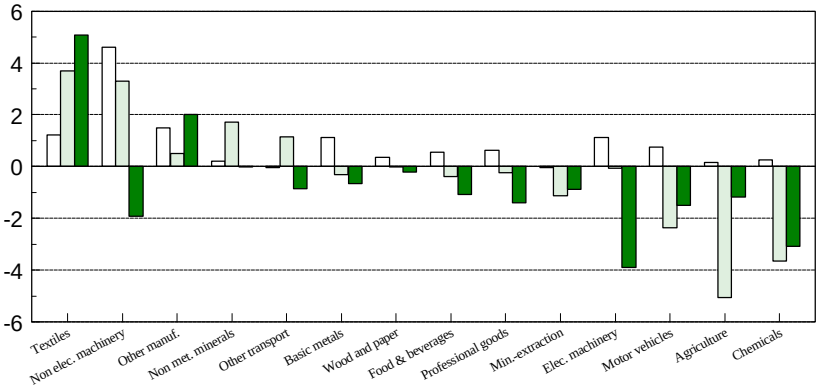


**Figure 17 continued**

Germany




Italy




United Kingdom

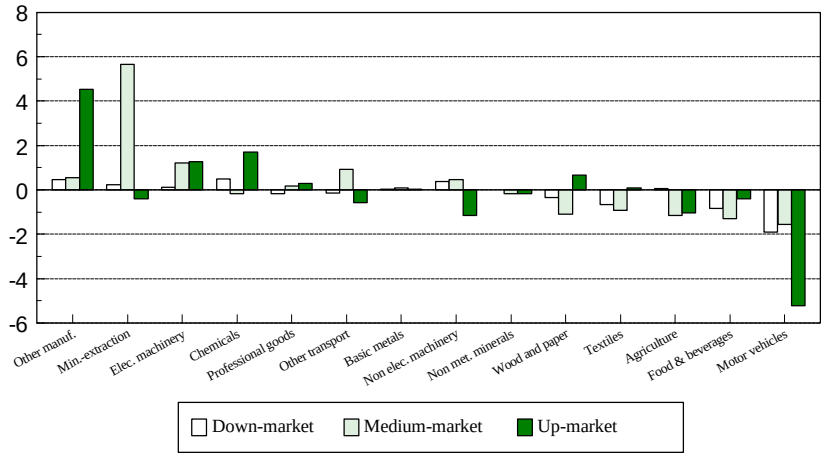
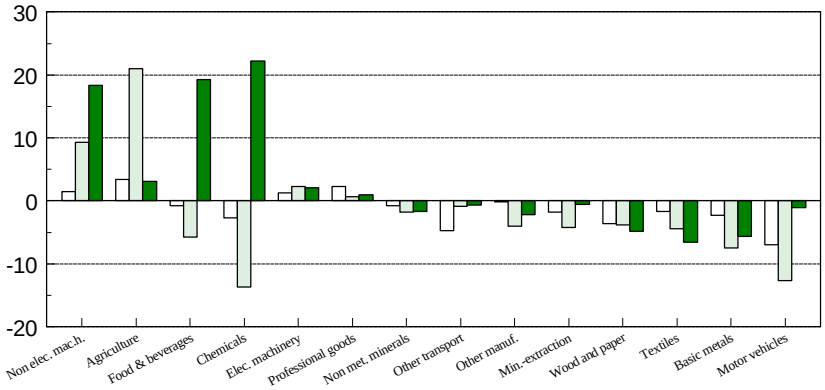
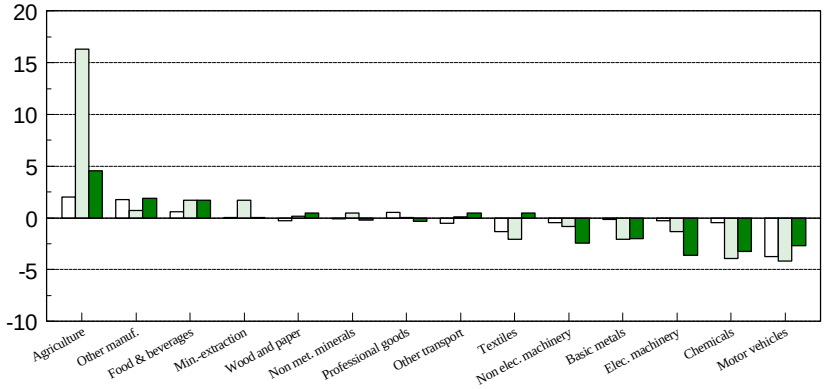


**Figure 17 continued**

Ireland




Denmark




Greece

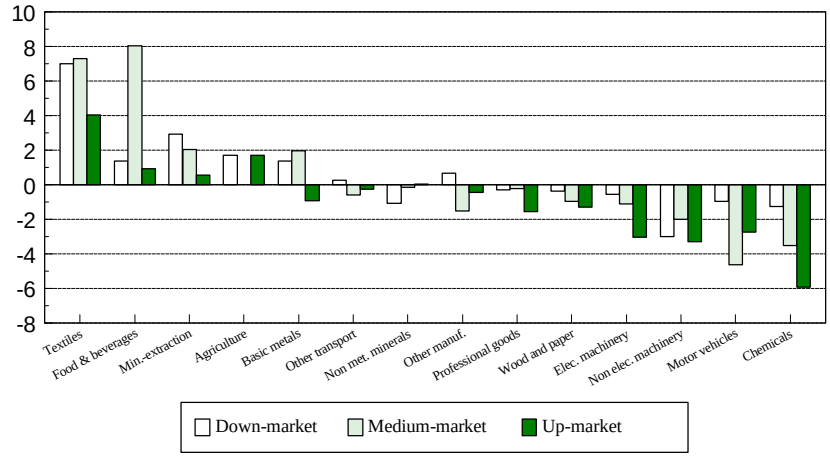
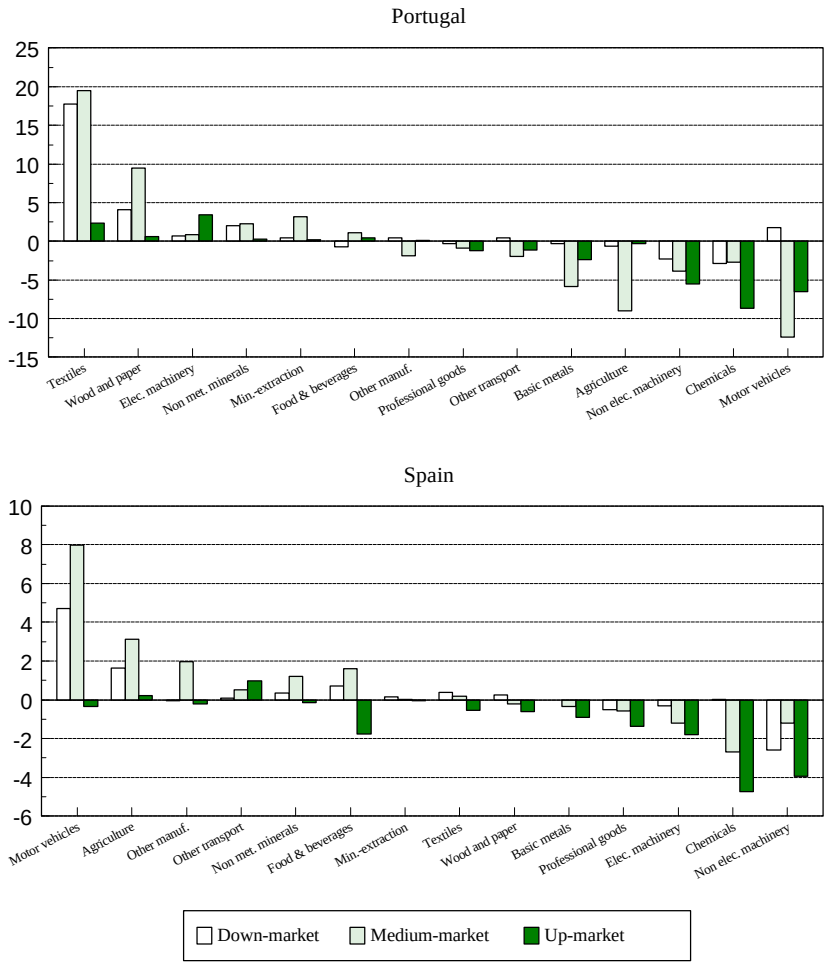


**Figure 17 continued**




Source: Eurostat-Comext and CEPII-CHELEM, calculations by the CEPII.
The revealed comparative advantage is calculated on the basis of intra-EC trade. For each country, industries are ranked by their total comparative advantage in 1994 (i.e. when the three price ranges are summed up for each industry.

## 4. ECONOMETRIC METHODOLOGY

### 4.1 How to explain intra-EC trade patterns?

Theoretical developments have pointed out that trade-effects of the SEM are not only associated with the distinction between inter-industry and intra-industry trade, but also (and may be mainly) with the distinction between the vertical and horizontal differentiation of products subject to intra-industry trade. Therefore, a new methodology

was developed, which disentangles two-way trade in horizontal differentiation and two-way trade in vertical differentiation.

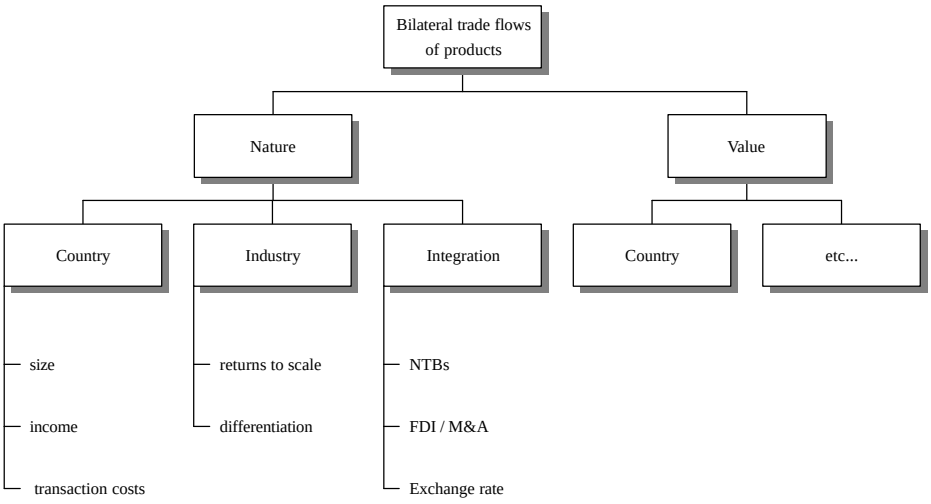
### *4.1.1. The determinants of intra-EC trade patterns*

It must be borne in mind that the consequence of this empirical evidence is of considerable relevance, since the trade effects differ from IIT in horizontal differentiation and IIT in vertical differentiation: in the latter case, adjustment costs are potentially high, and specialisation along the quality spectrum inside each industry might have cumulative effects over time. These are potentially detrimental for countries specialising in lower qualities.

But, at this stage, these findings must not be interpreted as the results of the SEM *per se*: potentially, catching-up, structural funds or exogenous explanations have played a major role. And turning to the SEM, the relative impact of NTBs, transaction costs and FDI must be disentangled. The econometric modelling developed below will address these questions.

In order to isolate the impact of integration in Europe from other factors, we decided to use econometric estimates combining country, market structure and integration as independent variables explaining the nature of bilateral trade flows within the Community (Figure 18).

**Figure 18. The determinants of bilateral trade flows**




As referred to above, a careful measurement of the nature of trade flows -intra-industry or inter-industry trade has to be based on the following principles:

(a) trade flows have to be taken into account at the bilateral level, therefore excluding trilateral relationships for a same product, which are often identified, ambiguously, as IIT: a given flow has to be classified in the same category of trade, whatever the declaring country is. In short, we must cancel the traditional "geographic" bias of aggregation.

(b) trade flows have to be measured at the most detailed level of industrial disaggregation, in order to minimise the traditional "sectoral" bias of aggregation.

(c) IIT, when observed, must be disentangled in the trade of horizontally differentiated products (in line with a SDS or Hotelling differentiation of products) and in trade of vertically differentiated products.

(d) the share of each trade type in total trade (referred to as the "nature" of trade below), and the value of each trade flow, must be distinguished. For example, IIT with horizontal differentiation is both a value (for country *k* facing partner *k'* in industry *j* for year *t*), and a share (in total trade for country *k* facing partner *k'* in industry *j* for year *t*).

In accordance with these general rules, the results referred to in the previous section, defining three types of trade, will be the basis of our econometric study: they will feed our database of explained variables.

Two additional qualifications have to be pointed out:

(a) a time dimension has to be taken into account, covering the pre- and post-completion period;

(b) strong evidence is generally available for the market structures determinants of trade, a feature which is extensively justified by models developed by the "New International Economics". These effects have to be strictly controlled, since our study covers all industries.

The next section develops the model estimated below, addressing its theoretical justifications. In a second section, the variables used are presented, and the choices justified. Another section is devoted to a panel analysis, which will identify the role of the SEM completion. The last section will go back to the industry dimension, estimating equations industry by industry.

### *4.1.2. The model*

Models integrating gravity variables *à la* Linnemann were initially developed without a satisfactory theoretical foundation, on a rather *ad hoc* basis. But they have been extended in order to provide them with greater legitimacy.

Bergstrand (1990), in particular, was able to construct a general equilibrium model, tested in a partial equilibrium form, which permits the sign of parameters to be constrained, and hence avoids specification errors.[38]

These models are often used to analyse the effects to trade preferences.[39] They may also be used as an interesting tool in explaining the nature of trade, rather than its volume, the latter being their original object.

The advantage of this method is also to integrate explicitly a bilateral dimension into the analysis, as well as determining factors that are of a sectoral nature. More specifically, gravity principles may be applied to explain the (intra/inter-industry) nature of bilateral, intra-Community trade, i.e. shares of the different trade types, in accordance with our methodology. Despite the progress in analysis that has been recalled here, an explanation of the nature of trade with this type of methodology cannot be based on a complete model constraining the parameters. This is simply because there are not one, but several explanations for two-way trade in similar or vertically differentiated products.

In the method used here, it is necessary to include both sectoral and country variables, as the combination of these explanatory categories providing generally better econometric results.

More fundamentally, theoretical arguments makes it impossible to ignore one or the other of these two major categories of determining factors. Indeed, when the sample includes countries of a different nature, as is the case here, these can participate in international trade on the basis of very different determinants: entry barriers or monopolistic competition, versus comparative advantages. As a result, it is possible to put the emphasis on sectoral variables in research based on the Helpman-Krugman-Lancaster approach, which looks for the determinants of international trade in market structures. But it is also possible to use mainly national variables in an approach *à la Bergstrand*. Table 10 provides an overview of the approaches currently used in the literature in this field. This table points out the fact that, contrasting from other studies, the present study combines 4 dimensions (i.e. country-partner-industry-time).

Considering these three categories of explanatory variables, namely countries, market structures and integration, the former are clearly imported from gravitational models, and refer to the control of "distance" and "income" effects. These are combined here with variables stemming from industrial economics. Lastly, variables related to commercial policy and foreign direct investment identify the impact of the SEM's completion.

The calculation of the variables presented above was constrained by the availability of data (e.g. concentration, product differentiation, economies of scale, FDI, NTBs) and the potential multicolinearity between variables. Both problems have carefully been examined.

[38] For a more detailed discussion see Péridy (1991).
[39] Péridy (1997), Fontagné and Péridy (1995).

Consequently, our estimation procedure is more complex than that traditionally found in the literature. Careful econometric testing has been performed concerning: heterogeneity, heteroscedasticity, multicolinearity and influential observations.

Broadly speaking, the estimation of the models was first made with OLS (Ordinary Last Square). Since potential heterogeneity of parameters may introduce strong biases in this estimator, fixed effect and random effect models have also been estimated (respectively with Least Square Dummy Variables and Feasible Generalised Least Square. These last models have been both rejected by appropriate econometric tests. This indicates that, despite a slight heterogeneity of parameters, OLS models may be used.

**Table 10. Different dimensions introduced by econometric studies on IIT**

| | "intra-industry trade" | |
|---|---|---|
| | global | bilateral |
| characteristics | | |
| industry | Caves (1981)<br>Greenaway, Hine, Milner (1995) | . |
| country | | Greenaway, Hine, Milner (1994)<br>Bergstrand (1990) |
| country-industry | Somma (1994)<br>Clark (1993)<br>Balassa (1986) | Balassa, Bauwens (1987)<br>Loertscher, Wolter (1980) |
| industry-time | Hughes (1993)<br>Neven, Roller (1990)<br>Globerman, Dean (1990) | . |
| country-time | Stone, Lee (1995) | |
| country- industry-time | | ***this paper*** |

Concerning the choice of the dependent variable, ideally the *nature* (i.e. the share of trade types), rather than the *value* of intra-EC trade is to be explained by a combination of country/industry/integration variables: it is the *nature* of trade, which we are seeking to explain here, and which constitutes the original part of our research.

Indeed, the success of models of this kind in explaining the *value* of trade is more or less guaranteed, precisely because of the presence of variables relating to size, distance and revenue among all the explanatory variables. But disentangling trade types, the success of such models is less guaranteed *a priori*, even for values. Therefore we will estimate both specifications.

The dependent variables are thus both the *share* and the *value* of the three trade types in bilateral, intra-EC trade by industry from 1980 to 1994, thus having 4 dimensions (country-partner-industry-time). Equations for the two categories of horizontal and vertical differentiation have been estimated separately.

We estimated the model for the values (subscript *val*) and the shares (respectively *sh*) of trade types. Our main interest is for Two-way trade in Vertically Differentiated

products (*TWVD*) and for Two-way trade in Horizontally Differentiated products (*TWHD*), since:

(a) the trade adjustment observed is fundamentally based on IIT;

(b) One Way trade (*OW)* is simply a residual: parameters will "mechanically" have an opposite sign, as compared to the two previous types of trade.[40] Concerning variables having an inverse effect on the two types of IIT, their parameters will simply not be significant for the residual *OW*. Ideally, it would have been useful to estimate a simultaneous equation system explaining the three shares adding up to one, but given the high dimensionality of the econometric model, it has been impossible to do it. Even without this additional complexity of the model, it is difficult to manage the problems associated with the four subscripts in the panel (declaring country / partner / product / year).

(c) *OW* is simply a trade flow based on the specialisation of countries if we explain its value: the equation estimated is therefore simply gravitational, even if estimated at the industry level, on panel and on bilateral basis. Such a result has strictly no interest in the perspective of this research.

As from January 1993, in the framework of the single market completion, the intra-EC commodity flows are collected using new procedures (Intrastat System). This is one of the reasons[41] why recorded intra-EC trade actually fell between 1992 and 1993. This change may have implications for trade analysis in *value*. Nevertheless, it is not clear whether there is a systematic bias towards one of the trade types. In contrast, the effect on the analysis of the*shares* of the trade types should be negligible.

### 4.2. The database of explanatory variables

#### *4.2.1. Country variables*

*Market size*

$GDP_{kk'}$ is an indicator of the size of the economies under study. Since the dependent variable is measured on a bilateral basis, it is necessary to use the average GDP as the GDP value (in current US$) of the declaring country *k* and its partner *k'*, following the methodology put forward by Bergstrand (1990). It is to be expected that size will have a positive impact on the intensity of the division of labour, leading to a reinforcement of the "intra-industry" nature of intra-European trade. A greater variety of goods exists in the "large" countries.

*Difference in market size*

The variable $GDPD_{kk'}$ is the difference in size between the countries. In accordance with Balassa (1986), Balassa and Bauwens (1987) and Somma (1994) the following ratio is used:

[40] With the exception of parameters having opposite signs for the two types of IIT.
[41] Other factors which are listed include the recession in Europe as well as exchange rate movements.

$$GDPD_{kk'} = 1 + \frac{\left[w \ln w + (1-w)\ln(1-w)\right]}{\ln 2}$$

$$\text{where } w \equiv \frac{GDP_k}{GDP_k + GDP_{k'}}$$

This indicator is of a better quality than the absolute difference in GDP, in as far as the latter is sensitive to the absolute size of the partners. Here $GDPD_{kk'}$ has a value ranging from 0 to 1, which is independent of the absolute size of the trade partners. The difference in size is traditionally an obstacle to Two-way trade in similar products.

*Standard of living*

Income *per capita* $PCI_{kk'}$ is also expressed as the bilateral average in current US$. As widely established in the theoretical literature, "rich countries" should have higher levels of two-way trade. Therefore, we expect $PCI_{kk'}$ would have a positive impact.

*Economic distance*

To obtain a proxy variable for the economic distance between two countries, $PCID_{kk'}$ was originally defined in the same way as $GDPD_{kk'}$. Since results obtained with this solution at an intermediate stage where rather difficult to interpret it was finally decided to use a very simple measure: the difference between $PCI_k$ and $PCI_{k'}$. An eclectic vision of world trade *à la Helpman-Krugman* traditionally suggests that the economic distance between two countries reinforces the nature of inter-industry trade in bilateral trade: trade follows from specialisation between two countries separated by a large economic distance. The variable $PCID_{kk'}$ should thus have a *negative* impact on Two-way trade if IIT were only based on the horizontal differentiation of products. In contrast, in a context of vertical differentiation (Falvey-1981, Fontagné and Freudenberg-1997), exporting a quality and importing another quality of the same product is the result of specialisation over the price/quality spectrum if not along lines of comparative advantages. Therefore, a positive relationship is to be expected in this case.

Factor endowments and technology endowments pose different problems. Apart from natural resources, factor endowments and income *per capita* are two parts of the same problem, namely the level of development. The inclusion of these variables in the same specification generates important multicolinearity problems, as shown by Bergstrand (1990). In any case, as far as differences in *per capita* income are a proxy of economic distance, all effects related to comparative advantage are already captured by our specification.

*Transportation costs*

The geographic distance $Gdist_{kk'}$ is expressed in nautical miles between the centre of gravity of the declaring country and its partner. Given that we are dealing with intra-European trade, this indicator was corrected using data from PCGlobe. The distance

between producers should lead to a reduction in two-way trade. It is to be expected that this variable will have a negative impact.

### *4.2.2. Market structure variables*

These variables are introduced in order to (1) control the sectoral dimension of the problem considered here; and (2) assess the traditional relationships between economies of scale, barriers to entry, product differentiation and IIT.

*Differentiation of products*

Traditionally, differentiation is introduced in an indirect way, a wide spectrum of solutions being used, from the dummy (1 for the consumer industry, 0 otherwise) to an inverse proxy which is the ratio of concentration of industries (the homogeneity of products drives to concentration). We tested the latter hypothesis, but the results were not satisfactory, this being partly due to problems of data for concentration which are compatible with our sectoral disaggregation, and being partly due to multicolinearity with other variables. Therefore, contrary to previous work, we decided not to use the traditional C5 index (which gives the share -at the community level and per industry- of the top five companies in the Community's value added).

Lastly, the best results were obtained with an original ratio of differentiation, which gives, industry by industry and for each year a weighted average of dispersion in unit values in intra-EC trade. Another advantage, from the point of view of the coherence of this study, lies in the fact that this proxy is an indirect output of the calculation made on trade types.

Remember that the criteria being used to distinguish horizontal from vertical differentiation and to define the three European price/quality ranges are based on differences in unit values.

Do the thresholds of 15% have any real sense? Furthermore, the question of the degree of dispersion of unit values needs special examination. Would it be possible to calculate a "synthetic indicator" for such differentiation? The idea is to find an indicator of the dispersion of unit values. The more homogeneous a product is, the smaller should be the variation of unit values around the European average, and vice versa, leaving aside statistical discrepancies (as well as transport and related cost) which we tried to minimise by "harmonising" the declarations.

The indicator we used to measure the degree of product differentiation is the (value-) weighted, average relative distance of the unit value ratio:

$$Diff_{jkk'} = \frac{\sum V_{kk'j} \dfrac{MAX\left(UV_{kk'j}, UV_{..j}\right)}{MIN\left(UV_{kk'j}, UV_{..j}\right)}}{\sum V_{kk'j}}$$

where V stands for value and UV for unit value, and indices k representing the declaring country, k' the partner country and j the product. This indicator is equal or larger than 1.

To us, compared to dispersion measures like the standard deviation, this indicator is easier to interpret, and it can be aggregated to any desired level. For example, calculating it at the product level (by summing up over declaring countries k and partners k'), give an average unit value dispersion for a given product j, therefore yielding a *proxy for the vertical differentiation of a product.* Of course, the indicator can also be aggregated over all products, in a given industry, to obtain the average dispersion in that industry.

Table 11 shows this proxy by industry, and Table 12 by product groups. Note that the aggregation levels here do not correspond to the ones used in the econometric model. They are only used as illustrations: here, CN-8 items were aggregated according to the nomenclature CHELEM of the CEPII. Leaving aside "other products", the values are highest for chemicals and machinery, and lowest for energy. Note also the low values for vehicles (on average, the average relative distance of unit values for this industry is 26%).

If we look at product groups, we find -not surprisingly- very high values for specialised machines, pharmaceuticals, precision instruments and telecommunication equipment, but also for basic organic and basic inorganic chemicals, as well as for coke. At the other extreme, our indicator shows up low values for cereals, refined petroleum products, natural gas and crude oil, but also for cars and motorcycles (17%).

Over time, the degree of the differentiation of products changes for the industry taken as a whole (Figure 19), but it might be due to a change in the trade structure by industry, industries having differing levels of vertical differentiation of their products.

Our variable $Diff_j$ is integrated in the econometric model for intra-EC trade as a whole, after aggregation using our specific nomenclature. As we consider unit value dispersion to be industry-specific, the specification finally used here has only one (industry) dimension, therefore indicating the *average weighted dispersion for all countries and partners over the whole time period.*

We expect a positive relationship between this variable and the share of IIT in vertical differentiation for bilateral trade flows between member states over the period; consequently a negative relationship might be observed on IIT in horizontally differentiated products. "Other industries" is a wide basket in which differing products are placed. As a result, it will be necessary to run the calculation without this industry.

**Table 11. Proxy for product differentiation in intra-EC trade by "filières", 1994**

| Industry | Proxy |
|---|---|
| Chemicals | 4.29 |
| Machinery | 3.37 |
| Electronic products | 2.46 |
| Electrical products | 2.13 |
| Wood and paper | 1.65 |
| Textiles | 1.61 |
| Food & agriculture | 1.45 |
| Non-ferrous metals | 1.41 |
| Iron and steel | 1.28 |
| Vehicles | 1.26 |
| Energy | 1.13 |

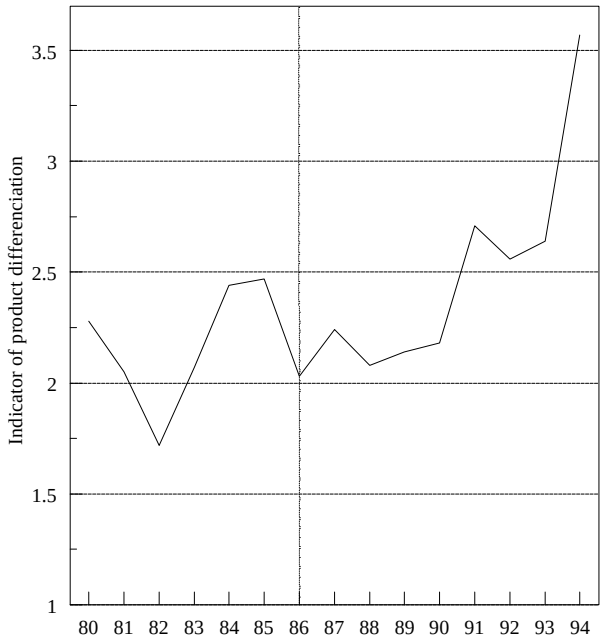
Source: Eurostat.

**Table 12. Proxy for product differentiation in intra-EC trade by groups of products, 1994**

| Proxy | Product group | Proxy | Product group |
|---|---|---|---|
| 13.89 | Specialised machines | 1.51 | Carpets and textile furnishings |
| 12.74 | Basic organic chemicals | 1.49 | Coal (incl. lignite and other primary energy products) |
| 8.07 | Pharmaceuticals | 1.49 | Construction and public work equipment |
| 3.38 | Basic inorganic chemicals | 1.48 | Furniture |
| 3.37 | Coke | 1.47 | Aeronautics |
| 3.27 | Animal foodstuff | 1.46 | Large metallic structures |
| 3.27 | Precision instruments | 1.45 | Tubes and first-stage processing products |
| 3.27 | Telecommunications equipment | 1.45 | Leather furskins and footware |
| 3.22 | Optics and photographics and cinematographi equipment | 1.45 | Vehicle components |
| 3.07 | Watch and clockmaking | 1.44 | Paper and pulp |
| 2.94 | Unprocessed minerals | 1.44 | Articles in wood |
| 2.78 | Electronic components | 1.43 | Rubber articles (incl. tyres) |
| 2.44 | Machine tools | 1.42 | Iron ores and scrap |
| 2.39 | Electrical apparatus (incl. passive devices) | 1.41 | Yarns and fabrics |
| 2.35 | Ships (incl. oil rigs) | 1.39 | Cements |
| 2.25 | Engines, turbines and pumps | 1.38 | Plastic articles |
| 2.15 | Non-ferrous ores and scrap | 1.38 | Agricultural equipment |
| 2.13 | Heavy electrical equipment | 1.37 | Domestic electrical appliances |
| 2.09 | Clothing | 1.35 | Commercial vehicles and transport equipment |
| 2.03 | Toilet products, soaps and perfumes | 1.33 | Consumer electronics |
| 1.94 | Printing and publications | 1.28 | Preserved meat and fish products |
| 1.93 | Computer equipment | 1.28 | Non-ferrous metals |
| 1.89 | Toys, sports equipment and misc. manuf. art. | 1.27 | Other edible agricultural products |
| 1.89 | Misc. hardware | 1.25 | Plastics, fibers and synthetic resins |
| 1.79 | Paints, colourings and intermediate chemical products | 1.23 | Iron and steel-making |
| 1.78 | Knitwear | 1.23 | Cereal products |
| 1.76 | Arms and weaponry | 1.22 | Fats (of vegetable or animal origin) |
| 1.74 | Preserved fruit and vegetable products | 1.22 | Meat and fish |
| 1.70 | Non-edible agricultural products | 1.19 | Sugar products (incl. chocolate) |
| 1.64 | Beverages | 1.19 | Cereals |
| 1.64 | Glass | 1.17 | Cars (incl. motorcycles) |
| 1.57 | Manufactured tobaccos | 1.13 | Refined petroleum products |
| 1.57 | Ceramics | 1.09 | Natural gas |
| 1.57 | Fertilisers | 1.03 | Crude oil |

Source: Eurostat.

**Figure 19. Indicator of product differentiation in intra-EC trade, 1980-1994**




*Economies of scale and concentration*

As for the variables relating to industrial organisation, whose dimension here is not "national", the concentration (*conc*) is measured by the C5 index, which gives the share, per industry, of the top five companies (at the Community level) in the Community's value-added.[42] According to the Structure-Conduct-Performance tradition, concentration is considered to reveal entry barriers. It may thus be expected that the *conc* variable will have a negative impact on the intensity of two-way trade in similar products. It has been tested successfully at a preliminary stage of the study, in cross section, on trade in intermediate goods only. Lastly, it has been difficult to ensure the compatibility of the nomenclature used for this market structure variable, and that devoted to the dependent variables, based on trade. We finally decided not to maintain *conc* in the final step, in order to work on all points, without missing any activity.

Economies of scale have been initially measured by the average size of the largest companies in each industry, *à la* Neven and Röller (1990) and Hughes (1993). This size is standardised by the average size of all companies in the industry in question. The literature on intra-industry trade generally considers that increasing returns to scale should reinforce the intra-industry nature of trade, economies of scale being best exploited in a large-scale market. Such results were obtained. Other variables have been introduced in preliminary estimates, such as the capital ratio of industries (K/VA) *cap*, which is a proxy of "natural" barriers to entry, and the capital intensity of industries, *intcap*. Lastly, we

[42] Ideally, this indicator is out-dated by indices relating to entropy, but requires a mass of information that is difficult to collect on such a scale.

decided to build new variables in a rather different way: using Eurostat Industrial Data by Size[43] of Enterprises, the below indicators were calculated for the "core countries" (Germany, France, Italy and the United Kingdom) as a whole, in 1987:

(a) the relative productivity of large firms by industry;

(b) the share of large companies in the employment by industry;

(c) the share of large companies in the value added by industry.

We chose the first indicator (*scale*), relative to productivity differentials, on the basis of the minimisation of multicolinearity problems in the specification tested.

### *4.2.3. Variables associated with European integration*

Six categories of variables have been used:

(a) dummies for "Southern" member states;

(b) dummies trying to catch an effect on microeconomic expectations;

(c) variables relative to trade barriers hindering trade between member states;

(d) variables relative to Foreign Direct Investment (FDI), associated with the completion of the Single Market;

(e) transaction costs: cancellation of border formalities will reduce transaction costs; as a result, the assumption is made that *Gdist* will have a decreasing impact on trade types and values;

(f) monetary integration (the lack of), since bilateral exchange rate fluctuations possibly hinder trade flows on the one hand, and are potentially influential on unit values and thus the measurement of vertical differentiation on the other hand.

*Dummies*

*SI* (Southern countries integration): this dummy variable is expected to provide insights on the impact of Spain's and Portugal's integration in the EC as of 1986. This variable is highly significant and has a positive impact on intra-European trade, but we do not present these results, since they do not separate effects associated with the integration of Southern countries into the EC from those we are interested in here.

Turning to microeconomic expectations, it is possible to take a dummy as a measure of the impact of the SEM. This dummy would take value 0 before 1986, and 1 afterwards. Alternative dates would indicate the expectation effect on private sector of the SEM. Control tests have been performed in order to ensure that this variable only reflected the impact of the SEM; on the whole, results are poor as expected in workshops carried out during this research, and this strategy has been dropped out: trade barriers and FDI are intellectually more satisfactory and work well.

[43] Size: "large enterprises": >500 employees; "small and medium size": < 500 employees.

*Non-tariff barriers*

We have constructed two variables reflecting Non-Tariff Barriers hindering intra-EC trade:

(a) the first is derived from the seminal work of Buigues, Ilzkowitz and Lebrun (1988)[44]: in a first step, following Neven and Röller (1991), we use an ordinal variable according to the level of NTBs in intra-European trade at the NACE 3 digits level.[45] At this level, for example, we identify pharmaceuticals (NACE 257) or wine (NACE 425) as industries with high barriers to intra-European trade before the completion of the internal market. Thereafter, the values obtained are weighted by EC value added in 1987, in order to return to the nomenclature in 14 industries.

(b) a second proxy for NTBs is derived from the same study of the Commission, but taking into account the price discrepancies in Europe, excluding taxes[46]. These differentials are weighted by the 1987 EC value added.

Figure 20 plots the two variables for each industry.

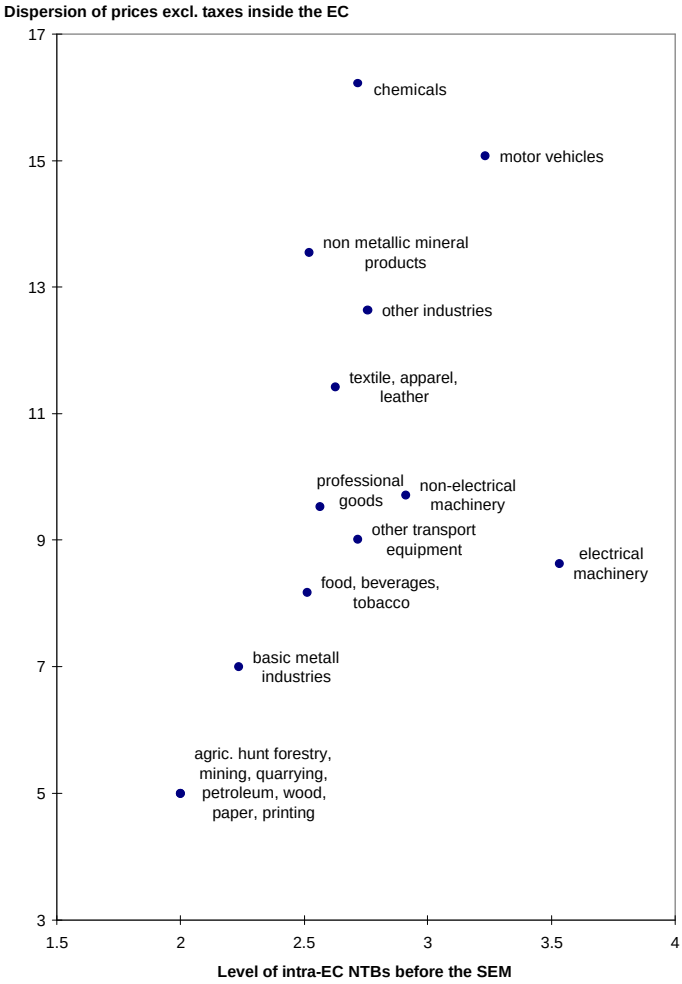
As far as we are interested in the impact of the SEM completion, NTBs might affect negatively specialisation of countries along comparative advantage lines, in the pre-completion period: our hypothesis is that the first wave of integration in Europe was associated with IIT in horizontally differentiated products, precisely because these barriers hinder specialisation between industries or inside industries along the quality spectrum. Therefore, a negative impact of NTBs on inter-industry trade before the completion, combined with a positive impact as a result of the completion, is to be expected. The same reasoning applies to IIT, in vertically differentiated products. Conversely, NTBs might boost IIT in horizontally differentiated products before the completion. During the completion, the latter influence is expected to decline sharply over time. In any case, when interpreting the results associated with these types of explanatory variables, it must be kept in mind that our NTBs have no time dimension, due to lack of information. Therefore, of the sign must be cautiously interpreted, when comparing the pre- and post completion stages, while the key information is certainly the evolution of parameters during the period considered here.

[44] The authors establish their classification using Nerb (1988), Commission (1988) and MAC (1988). These three sources give information derived respectively from a questionnaire (11,000 European firms), sectoral studies and a study on technical barriers, which are used as a basis for classification of industries into 3 groups at the NACE-3 digit level. The second one is related to industries where "(..) the principal obstacles are differences in standards or administrative and technical controls. (..) However, these barriers do not prevent intra-Community trade." In contrast, the third one groups industries "(..) in which the public sector is the main purchaser and those in which differences in standards present a considerable obstacle to intra-Community trade" (Buigues and Ilzkowitz, 1988, p. 21).

[45] Ranging from 2 to 4; 1 was not taken as lower value as far as we use logarithms in the econometric model

[46] The data base of prices gathered by Eurostat is traditionally used to calculate PPP. Buigues, Ilzkowitz and Lebrun [1988] base their calculus on an original exploitation of this data base: they highlight the fact that domestic discrepancies, which might be considered as "natural" are far less than inter-country intra-European ones. Moreover, these discrepancies have grown over the 1975-85 period in sectors heavily affected by NTBs.

**Figure 20. Non Tariff Barriers on intra-EC trade associated with the pre-completion period**




It must be pointed out that the two variables are relatively co-linear: we do not aim at introducing them simultaneously into our equations, but rather to use each one in different specifications, explaining different trade types. For example, the second one might pose problems for vertically differentiated products.

*Foreign direct investment*

Foreign Direct Investment (FDI), which is on the frontier of international trade theory and industrial economics, is another bilateral variable that has to be considered. It is difficult to obtain reliable data for FDI on a bilateral basis for all member states, and on a sectoral basis.

Using data issued from balance of payments statistics, one faces not only differences of methodology between declaring countries, but also problems associated with the registration of flows itself. Concerning the first problem, all countries do not use the same definitions of the link between the investor and the enterprise (10% or other levels..); in addition, some countries do integrate indirect links between firms, whereas other countries do not. Reinvested earnings are not taken into account in the same way everywhere. Credits are not accounted for along unified principles. In case of multinational firms, or for holdings the question of allocation of flows is to be considered: if a firm in country A invest in country C while financing this investment through a subsidiary belonging to country B, one will face asymmetries in registrations between A and B on the one hand, and B and C on the other hand. This problem is generally referred to be important between Netherlands, the United Kingdom and United States[47].

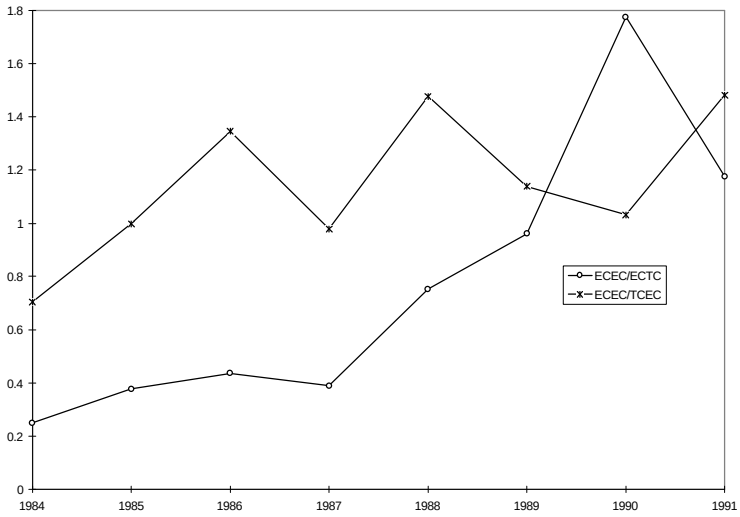
Data published by Eurostat in 1994 are a useful basis, since flows and registration methodologies are unified as far as possible. Despite these efforts, flows are steadily highly asymmetric between countries, as a result of the way these flows are collected initially. Nevertheless, these are useful statistics as long as one tries to disentangle the impact of the single market on FDI and the general trend in FDI for European countries: these statistics do not cover only intra-EC FDI but also FDI flows with third country. In any case, these statistics have been published on a bilateral basis over 1984-1991 (with the exception of countries like Ireland or Greece), but not adding the two dimensions - sectoral and geographic- of the problem. Information is available by industry but at a rather aggregated level (energy plus seven industries) but on a multilateral basis.

Flows over 1984-1991 were deflated with gross prices indexes (IMF financial statistics, various issues) and cumulated, in order to cancel the very high inter-annual variability of data. Two matrix have then been constructed, giving outflows and inflows on a bilateral basis.

The first question to address is to know whether the big push in intra-European FDI before the completion has been the result of private expectations, firms "preparing" the single market, or more generally has been impulse by an increasing trend in FDI in Europe. The figure below highlights -until 1991- a large increase in the ratio (EC to EC divided by EC to Third Countries): the single market has induced -relatively- larger FDI flows between European countries. But private actors belonging to third countries have also had motives to invest in Europe as a result of the Single Market: the figure below indicates that this phenomenon has been clearly overwhelmed by intra-EC investment over the period.

[47] See for example "Les investissements directs de la Communauté Européenne 1984-91", Eurostat, 1994, p.25.

**Figure 21. Ratio of intra-EC to extra-EC FDI: outflows (ECEC/ECTC) and inflows (ECEC/TCEC)**




Source: data in current ECU, Eurostat (1994)

In addition, the following indicator has been calculated:

$$BPFDI_{kk'} = \frac{\max\left(\sum_{t=84}^{91} FDI_{kk't}{}^{k}; \sum_{t=84}^{91} FDI_{kk't}{}^{k'}\right) + \max\left(\sum_{t=84}^{91} FDI_{k'kt}{}^{k}; \sum_{t=84}^{91} FDI_{k'kt}{}^{k'}\right)}{2} \equiv BPFDI_{k'k}$$

with superscript $k$ for the declaring country

It gives the bilateral intensity in FDI flows, for each pair of member states, as registered in Balance of Payments, over the Single Market completion period (Table 13). Since this variable will be introduced in the econometric model, it has to be strictly "bilateralised" (intensity for k facing k' identical to the reciprocal), leading to the formula given above. The figure below illustrates the results: France, United Kingdom, Germany, and the Netherlands are the leading countries in terms of capital mobility; in contrast, Greece, Portugal, Denmark and Ireland are - at least in absolute terms - less concerned, an observation which will be surprising for the latter country, but the indicator is not weighted by the GDP. The leading partner for France is the United Kingdom, followed by the Netherlands, Belgium, Germany and Italy. Reciprocally, France is the first partner of United Kingdom, followed by the Netherlands, Germany and Spain. Germany's first partner is Belgium, followed by France, the United Kingdom, the Netherlands, and Ireland. Finally, the United Kingdom is the first partner of the Netherlands, followed by France, Belgium Germany and Italy.

**Table 13. Intra-EU *bilateral* FDI (1984-1991, ECU million, 1985 prices)**

| | Belgium | Nether-lands | Germany | Italy | United Kingdom | Ireland | Denmark | Greece | Portugal | Spain |
|---|---|---|---|---|---|---|---|---|---|---|
| France | 5790 | 6957 | 5237 | 4146 | 8780 | 304 | 631 | 186 | 325 | 3722 |
| Belgium | | 5577 | 9274 | 2010 | 2770 | 314 | 141 | 42 | 135 | 787 |
| Netherlands | | | 3332 | 2787 | 7914 | 302 | 499 | 98 | 124 | 2247 |
| Germany | | | | 2411 | 5025 | 2929 | 387 | 161 | 220 | 2420 |
| Italy | | | | | 2442 | 27 | 83 | 39 | 37 | 803 |
| United Kingdom | | | | | | 758 | 637 | 73 | 682 | 4618 |
| Ireland | | | | | | | 142 | 0 | 15 | 47 |
| Denmark | | | | | | | | 0 | 36 | 122 |
| Greece | | | | | | | | | 1 | 7 |
| Portugal | | | | | | | | | | 653 |

Source: authors' calculation, Eurostat data.

As referred to above, FDI in BoP might been subject to registration bias. In order to integrate the factor mobility dimension of European integration, controlling for the bias of registration in BoPs, another indicator has been calculated, based on a completely different set of data: Mergers and Acquisitions (M&As). For this data, we are deeply indebted to Eric Vanhaelewyn[48] who kindly computed year-by-year information, on a bilateral country basis over 1986-94. The data base was then used in order to define 2 variables. In accordance with Eric Vanhaelewyn we decided to use the number of M&A, since the information on value seems to be of poor quality. The good results obtained with the variables referred to below is encouraging.

First of all, four variables have been defined:

(a) *NFDIkk'*: the share of country k' in the outward M&A of country k;

(b) *NFDIk'k*: the share of country k' in the inward M&A in country k;

(c) *ZFDIkk'*: the share of country k' in the total M&A engaged by firms of country k;

(d) *ZFDIk'k*: the share of country k' in the total M&A concerning firms of country k.

The equations were also controlled, showing that each variable is significant individually.

In a second step, and in as far as we ran our econometric model on a bilateral basis, we defined two variables which were used to obtain the final results presented below, in the same way as for FDI in balance of payments statistics:

$$NFDI = 0.5\left(NFDI_{kk'} + NFDI_{k'k}\right) \text{ and } ZFDI = 0.5\left(ZFDI_{kk'} + ZFDI_{k'k}\right)$$

It should be noticed that even if each of these variables has been computed on a yearly basis, the results presented below use values of *NFDI* and *ZFDI* for the 1986-94 period taken as a whole. A decomposition by year is of no interest, since we do not have

[48] Commission of the European Communities, DG for Economic and Financial Affairs

the information for years before 1986, and our dependent variables are computed over 1980-94.

Figure 22 gives an example of the results obtained, which feed the econometric model: for France, the following explanation may be made, for 1986-94: as far as France accounts for one quarter of M&A in Greece involving foreign firms, while at the same time France accounts for one quarter of the involvement of Greek firms in M&A abroad, a 25% coordinate was used on the horizontal axis. At the same time, Greece accounts for only 0.1% of M&A in France involving foreign firms, while at the same time Greece accounts for only 0.6% of the involvement of French firms in M&A abroad, gives a near 0% coordinate near 0% on the horizontal axis. As a result, France is an important partner for Greece, but this relation is highly asymmetric, so that Greece is a marginal partner from the French point of view.

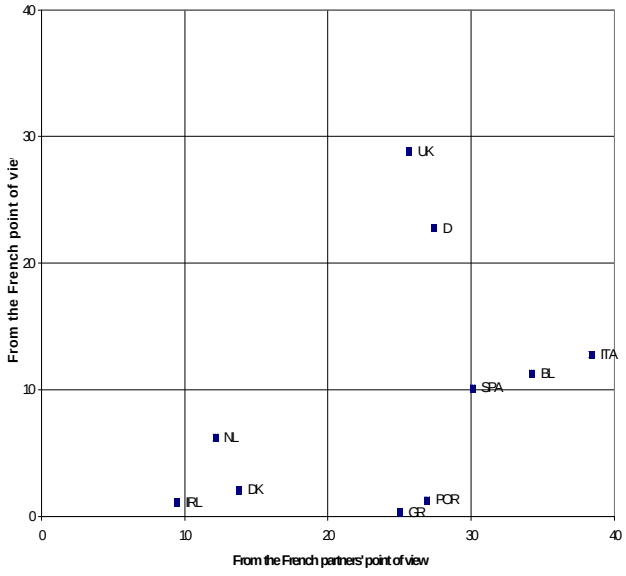
As a result, Figure 22 points out that:

(a) the small countries engaged in highly asymmetric relationships with France are Portugal, Greece, Denmark, and Ireland;

(b) in contrast, relationships are highly symmetric between France and its large German and British partners;

(c) the Netherlands, Spain, Belgium-Luxembourg and Italy are in an intermediate position.

**Figure 22. Intensity of bilateral M&A relationships, France 1986-1994 (%)**




Source: compilation of AMDATA

Finally, a variable *CBPFDI* was also tabulated, correcting BPFDI by FDI flows with Third Countries (Table 14):

$$CBPFDI_{kk'} = 50\left(\frac{BPFDI_{kk'}}{TC_k} + \frac{BPFDI_{k'k}}{TC_{k'}}\right) \equiv CBPFDI_{k'k}$$

$$TC_k \equiv \frac{1}{2}\left(\sum_{t=84}^{91} FDI_{zkt}{}^{k} + \sum_{t=84}^{91} FDI_{kzt}{}^{k}\right)$$

with subscript *z* for Third Countries.

$$TC_{k'} \equiv \frac{1}{2}\left(\sum_{t=84}^{91} FDI_{zk't}{}^{k'} + \sum_{t=84}^{91} FDI_{k'zt}{}^{k'}\right)$$

**Table 14. Matrix of bilateral FDI intensities among EC members over the completion period, corrected by flows of FDI registered with Third Countries (variable CBPFDI)**

| | UK | Germany | Nether-lands | Belgium | Spain | Italy | Ireland | Denmark | Portugal | Greece |
|---|---|---|---|---|---|---|---|---|---|---|
| France | 50.9 | 32.9 | 22.2 | 30.9 | 24.4 | 5.9 | 14.1 | 21.8 | 22.0 | 36.8 |
| UK | | 54.1 | 85.5 | 25.0 | 21.5 | 7.6 | 3.9 | 5.1 | 9.8 | 11.7 |
| Germany | | | 17.2 | 23.3 | 29.2 | 6.1 | 11.6 | 11.6 | 8.5 | 24.3 |
| Nether-lands | | | | 19.0 | 16.1 | 57.8 | 8.8 | 19.0 | 15.0 | 25.0 |
| Belgium | | | | | 15.7 | 0.6 | 2.2 | 4.7 | 2.6 | 10.9 |
| Spain | | | | | | 13.8 | 13.5 | 8.5 | 45.4 | 40.9 |
| Italy | | | | | | | 5.4 | 0.0 | 1.2 | 1.2 |
| Ireland | | | | | | | | 0.1 | 3.1 | 3.5 |
| Denmark | | | | | | | | | 0.2 | 0.9 |
| Portugal | | | | | | | | | | 48.2 |

Source: Eurostat Data, authors calculation.

*Exchange rates*

Following Bergstrand (1989, 1990) the exchange rate, *EXRkk'* might have an impact on the volume of trade, but should not influence its nature, the latter being the core subject of this study. But since we do use a panel over 1980-94, it might not be excluded that exchange rate variations could affect the estimates. In addition, a traditional concern opposed to measures based upon unit values is related to the potential influence of parity fluctuations over the results. Different approaches of the problem have been adopted throughout this study, referred to in the following section.

### 4.3 The estimates

The period covered by our estimates is 1980-1994. A comprehensive econometric work has been done, embodying successive rounds of estimates, of which only the "final product" is presented here.

#### *4.3.1. Feasibility study*

A first round of estimates was carried out in order to check the feasibility and the coherence of a model embodying country, market structure and integration variables in a

specification explaining the volume and the nature of bilateral trade flows, while disentangling total trade by trade types:

(a) IIT associated with horizontal differentiation: more precisely Two-way trade in Horizontally Differentiated products (*TWHD*);

(b) IIT associated with vertical differentiation: more precisely Two-way trade in Vertically Differentiated products (*TWVD*)

(c) inter-industry trade, respectively One Way trade (*OW*).

Since a specification combining the variables referred to above was quite powerful in explaining not only the value of trade, which is quite easy, but also the nature of trade, i.e. the respective shares of *TWHD*, *TWVD* and *OW* in bilateral trade flows by industry, at the same time, it was necessary to address the questions of heteroscedasticity, multicolinearity and heterogeneity of parameters.

The latter problem of heterogeneity of the parameters occurs whenever a sample of observations has more than one dimension. The most common case is when the sample is made of two dimensions (individual and time). In this case, the OLS model may be biased since the value of the estimated parameters may vary among individuals and/or over time.

The model presented here is a panel data model with four dimensions: time, industry, reference countries and partner countries. Complete tests of heterogeneity are unfortunately impossible in our case for several reasons: first, the theoretical econometric literature is limited to 2 (and most recently 3) dimensions. Second, and consequently, econometric software is limited to 2 dimensions. Lastly the size our dataset (at the minimum 463,200 values) is such that the stratification variables frequently contain too many individuals for the software used (LIMDEP).

Despite these problems, we have been able to test for heterogeneity across countries . It appears that despite the conclusion of heterogeneity of the parameter, the re-estimation of the model through Least Square Dummy Variable (LSDV) or Generalised Least Square (GLS) in fixed or random effects, gives results extremely close to the OLS pooled estimates. Thus, on the basis of this test, the heterogeneity bias due to countries is negligible.

These results have led us to a second round of estimates, in which a change of the variable associated with economic distance was decided: we finally turned to a simple difference which is not standardised, contrary to the one chosen for differences in the size of countries. In addition, we decided neither to use proxies associated with the production function, nor the proxy for barriers to entry. More generally, despite these choices, and as the results referred to below will point out, market structure variables are a source of multicolinearity: economies of scale have something to do with product differentiation, fixed assets have something to do with barriers to entry and economies of scale, etc. The model was ran without exchange rates, given the poor theoretical evidence of its impact on

trade type *shares*, whereas parameters estimates were controlled in a further step for exchange rate variations.

### *4.3.2. The final model*

A third round of estimates has finally been ran, in order to look more carefully at two questions: FDI, exchange rates.

Concerning FDI, *NFDI* (Mergers & Acquisitions) has been tentatively changed for *BPFDI* (bilateral flows of FDI as reported in Balance of Payments, after harmonisation), the latter offering the possibility to control for European FDI with Third Countries during the completion period. Results obtained with *NFDI* are slightly statistically better than those obtained with *BPFDI*, a result that might reflect the problems associated with the registration of FDI flows in BoPs. It has been checked that parameter estimates are robust to this change. Given this result, the supplementary *BPFDI* corrected by FDI flows (variable *CBPFDI*) with Third Countries has therefore not been tested. Finally, equations have been estimated using M&A, i.e*NFDI.*

The bilateral exchange rate was introduced systematically, *in absolute term* (variable *EXR*), in the model. Since there was in principle no theoretical foundation for a relationship between IIT and variations in the type of model we use, exchange rate had been initially dropped out of the model. This choice raised concerns from the Commission and the academic panel, as a story based upon unit values might be sensitive to exchange rate variations and pricing to market strategies. As a result, the second round of estimate had been done with and without exchange rates, whereas results were given extensively only for the "without" option, facing similar parameter estimates. It appeared that large variations in exchange rates, i.e. the lack of monetary integration in Europe, had adverse implications: losses in trade, increased specialisation, etc. These findings were supplemented by a paper recently issued (Ricci, 1996) leading to a similar diagnosis on the basis of a theoretical model. Finally, it is the matter of a trade-off between adding new variables in the model, which leads to increased multicolinearity, or having a thinner model, that fits better statistical tests. Again, it has been checked that all parameter estimates are robust to this change; in addition, the condition numbers (which give us an indication of the degree of multicolinearity [49]), are only slightly increased. Considering these encouraging results, the exchange rates were finally systematically introduced in the third round of estimates feeding results below.

Finally, the equations of the final model are the following, using a log-log specification[50]:

[49] Square root of the ratio of the maximum to the minimum eigenvalues of the X'X matrix. See Belsley, Kuh and Welsh (1980), section 3.

[50] The six equations for the three types of trade in value or share, have been finally estimated using variables of Table 15 in logarithmic form:
(a) for the 1980-94 panel, all countries, all industries;
(b) for the 1980-94 panel, all countries less Portugal and Spain, all industries;
(c) for each country, all industries;

$$y_{jkk'_t} = a_1 GDP_{kk'_t} + a_2 GDPD_{kk'_t} + a_3 PCI_{kk'_t} + a_4 PCID_{kk'_t} + a_5 Gdist_{kk'} + a_6 Scale2_j + a_7 Diff_j + a_8 NTB_j + a_9 NFDI_{kk'} + a_{10} EXR_{kk'_t} + e$$

*with*:

$$y = TWHD_{val}, TWVD_{val}, OW_{val}, TWHD_{sh}, TWVD_{sh}, OW_{sh}$$

**Table 15. Explanatory variables for the final model**

| Characteristics | Variable | | Indicator |
|---|---|---|---|
| Country | Size | *GDPkk'* | Average of Gross Domestic Products of the two countries |
| | Differences in size | *GDPDkk'* | Normalised difference in GDPs |
| | Income *per capita* | *PCIkk'* | Average income *per capita* of the two countries |
| | Economic Distance (comparative advantage) | *PCIDkk'* | Differences in income *per capita* |
| | Geographic distance | *GDistkk'* | Distance between capital cities |
| Market structures | Economies of scale | *Scalej* | Relative productivity of larger firms, by industry (France-Germany-Italy-United kingdom) |
| | Differentiation | *Diffj* | Average relative distance of unit value ratios |
| Integration | Non tariff barriers | *NTB1* | Along Buigues *et alii* (1988) |
| | | *NTB2* | Differences in prices excl. taxes among member states |
| | Exchange rates | *EXRkk't* | Bilateral (absolute value of) exchange rate |
| | Foreign investment | *NFDIkk'* | Average of (share of country k' in outward M&A of country k) and of (share of country k' in the inward M&A of country k), over the completion period |

## 5. TRADE PATTERNS AND THE SINGLE MARKET

The reasoning behind the measures associated with the completion of the single market was that liberalisation would tend to lower prices through increased competition, induce market structure transformations and foster a concentration of resources in more efficient uses. These effects would translate into sizeable welfare gains, increases in GDP, and an increased competitiveness vis-à-vis non-member countries.

At the same time, it was expected -as was put forward in a series of *ex-ante* studies trying to estimate the effects of these measures- that not all sectors and member states would be affected in the same way. For sensitive sectors with important NTBs in the "pre-completion" situation, conversion costs, implying factor mobility and possibly sunk costs, were therefore predicted. To overcome the potential problem of cohesion in the Community, Structural Funds were boosted in order to foster a convergence in real income and to facilitate industrial conversions in sensitive sectors.

As the conventional view of trade based on differences between countries has been challenged by the new international economics, it is necessary to carefully integrate these new developments in our empirical estimates.

(d) for each industry, all countries.
On the whole, it gives (2x6) + (13x6) + (11x6) equations; these 150 equations have been ran in a systematic manner, using exactly the same specification, in order to authorise comparisons of their results

### 5.1. The potential effects of the Single Market

On the ground that the bulk of contemporary trade is based on similarities, imperfect competition, or consumer preferences, these new theoretical developments emphasise increased gains of integration, including efficiency through increasing returns along with greater welfare based on increased product variety on the one hand and increased competition on the other hand.

Turning to assessments of the Single Market, even if the structure of trade was not the core of *ex-ante* studies (focused on its volume), the implicit assumption was that the removal of (non-tariff) barriers to internal trade would translate into an increase in intra-industry trade flows inside the Union. Nevertheless, recent theoretical developments point out that economic integration will have different consequences between partners in a region characterised by a large differences in *per capita* income, and more generally by varying economic structures. These developments not only take into account "traditional" increasing returns to scale, but emphasises the difference between horizontal and vertical differentiation of products and shed light on potential agglomeration effects and transaction costs. As a result a theoretical scheme associating intra-industry trade with gains of variety and inter-industry trade with specialisation is no longer valid. Thus, three important points have to be underlined:

(a) to the extent that the presence of less developed states inside the Union leads to large differences in economic structures, an in-depth study would suggest a refined scenario associating intra-industry trade with "North-North" or "South-South" scenario, and inter-industry trade to a "North-South" one.

(b) increasing returns may translate into inter-industry trade, and not intra-industry trade, as far as industries exhibit external economies of scale or agglomeration effects;

(c) intra-industry trade is anything but a monolithic phenomenon: an important dimension which must be carefully taken into account is the distinction between horizontal and vertical differentiation.

Lastly, inter-industry trade (implying a displacement of resources between industries), intra-industry trade of vertically differentiated products (associated with a specialisation along quality ranges), and intra-industry trade of similar products (respectively along brands or characteristics sets, excluding quality) have different implications.

The single market might have at least implications on trade which are twofold:

(a) since it is a step forward in the regional integration, the single market might lead to trade creation effects but also to trade diversion effects, detrimental to Third countries. Reasons for such an ambiguous mechanism are well known (see for example Viner, 1950) and do not deserve more developments; what is more striking is the possibility of capturing such types of mechanisms using the methodology chosen here.

(b) since it is a step forward toward free trade among European countries, the single market will led to alterations of intra-EC trade, *per se*, i.e. independently from trade creation of diversion issues. Obviously, this throw some shadow on welfare conclusions for Member States, as underlined by Bhagwati (1971).

The first implication is clearly out of purpose here, for at least two reasons:

(a) Since this study is strictly bilateral -a methodological choice which has been justified above- it has to focus on intra-EC flows. Even if it is possible to capture EC trade vis-à-vis Third country using EC members as declaring countries, it is impossible to integrate bilateral flows among third countries themselves (at least at the level of disaggregation implemented here). What this study aims at presenting, is an exhaustive database on bilateral trade flows, what disqualifies the possibility of integrating Third countries. In addition, even if the Single market might have implications on trade types in trade relationships between EC-12 and Third countries, it might be far or less insignificant compared to the implications for intra-EC trade. Once again, the implications *vis-à-vis* Third countries are certainly more a trade diverting issue than a trade type one.

(b) The type of econometrics used here, even useful for trade types, is clearly disqualified by the recent literature in as far as trade creation or trade diversion is concerned. Obviously, it would be possible to integrate an "in/out" set of dummies when explaining the value of the different types of trade, if our database was extended to relationships between EC members and third countries. Unfortunately, it would disqualify other explanatory variables in order to maintain multicolinearity in acceptable bounds, and firstly market structures ones. Turning as a result towards traditional gravity models (even if adjacency, common language etc. are not in the model) we would face the difficulty of assessing trade diversion effects with such a type of specification., a point that deserves larger developments.

It is well known that results obtained with such models vary greatly over authors and specifications: Haveman and Hummels (1996) list the results for the EC: Bikker (1987) find an extra-EC bias for the early years and nothing later whereas Aitken (1973), Brada and Mendez (1983) or Bayoumi and Eichengreen (1995) raised a symmetric conclusion. Finally, Frankel and Wei (1993) did not reach clear conclusions. In addition, the short run implications have to be distinguished from the medium run ones since trade diversions generally lead to negotiations resulting in liberalisation compensations for Third countries.[51]

A first explanation for these disappointing results lies in the omission of explanatory variables, a problem partially solved by Bayoumi and Eichengreen who use an equation estimated in first differences: it allows to omit fixed effects, but is useless for time-varying omitted variables.

[51] See Fontagné (1995).

A second explanation is associated with the very basis of the model, as demonstrated by Haveman and Hummels: having defined, randomly, trade blocs of ten countries, they replicate the traditional in/out methodology and highlight fooling results. Even if blocs are defined randomly, there is an intra-bloc trade diversion effect. This might be due to the fact that the size of multilateral trade is not controlled in the equations estimated.

Using bilateral trade shares, therefore controlling for omitted variables, they highlight, contrary to previous econometric results, that the EC has a strong extra-EC bias, i.e. might not be trade diverting. In addition, this might be due to trade distorting issues, as the Common Agricultural Policy, leading countries like France to trade more with the rest of the world than suggested by «natural » determinants of trade.

This debate suggest that neither our database, nor our econometric specification are well designed to address the trade creation/diversion issue.

As a result, our empirical estimates aim at giving a clear assessment of:

(a) the determinants of the nature (i.e. the structure by trade types) of bilateral trade in Europe: what are the respective influences of comparative advantages of member countries, of returns to scale, of (Non-tariff) barriers to trade, of exchange rate fluctuations?

(b) the impact of the SEM, not only in its trade liberalisation dimensions (NTBs and border formalities phasing out), but also looking at the impact of capital flows.

Thus, the econometric modelling aims at answering the following questions:

(a) has the SEM led to an in depth specialisation of member countries along comparative advantages (a positive relationship between the completion of the SEM and inter-industry trade, respectively a negative relationship with IIT)?

(b) has the SEM led to an in depth specialisation of member countries along agglomeration economies, potentially detrimental to small (in GDP terms) countries (positive relationship between differences in size and inter-industry trade)?

(c) what kind of effects might have had corrective instruments have, such as structural funds?

(d) has convergence led to more IIT or more specialisation?

But, in addition to these question, one has to address the issue associated with the twofold nature of IIT: driven by a horizontal differentiation of products, IIT leads to gains of variety and potential economies of scale, without implying high reconversion costs for member countries. At the opposite of this smooth path towards integration, inter-industry trade, and the associated specialisation of countries has a cost in terms of resources displacement, along comparative advantages, or more accurately to the benefit of large countries in case of agglomeration economies. Between these two polar cases, IIT associated with a vertical differentiation of products leads to specialisation along the

quality spectrum, as a result of R&D expenses, endowments in human capital, or simply advertising. In this case, IIT might be associated with a costly displacement of resources, as inter-industry trade under specialisation.

Finally, capital mobility potentially leads to intra-firm trade, which can be of either types, but might also give the opportunity to discriminate among markets, to realise high mark-ups as a result of M&A leading to higher concentration of market structures, implications which might raise into doubt the gains associated with more IIT. If M&A were associated with a strong positive impact on IIT in horizontally differentiated products, it would raise the question of the opportunity of a tighter control of microeconomic practices, through a strict internal competition policy. But this issue goes far further the assessment of this study.

Looking at all this questions, an important problem emerges: since many problems are potentially associated with the difference in income *per capita* between member states, it must be pointed out that two "Southern" European countries combine an evolution associated with the accession, and an evolution associated with the SEM, and this only for simple agenda purposes. It will be necessary to disentangle what relies upon each of these two events.

## 5.2. The general determinants of intra-EC trade patterns

### *5.2.1. Overview of the results*

Table 16 summarises the principle results, for IIT. All signs are conventional, except for NTBs, a question which will be clarified below. Levels of significance are high. Detailed results and interpretation by type of trade are given in the following sections.

**Table 16. Main results for IIT: intra-EC bilateral trade flows; panel data 1980-94**

| | | Country variables | | | | | Market structure | | Integration | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **All industries and countries** | | **GDP** | **GDPD** | **PCI** | **PCID** | **GDist** | **SCALE** | **Diff** | **NTB** | **NFDI** | **EXR** |
| value | TWHD | ++ | -- | ++ | --# | -- | ++ | -- | ++ | ++ | -- |
| | TWVD | ++ | -- | ++ | ++ | -- | ++ | ns# | ++ | ++ | -- |
| share | TWHD | ++ | -- | ++ | --# | -- | ++ | -- | ++ | ++ | -- |
| | TWVD | ++ | ns | ++ | ++ | -- | ++ | ++# | ++ | ++ | -- |

++ positive parameter, significant at the 1% level
-- negative parameter, significant at the 1% level
resp. + or - at the 5% level
ns: parameter not significant at the 5% level
# after solving for problems of multicolinearity with other variables

### *5.2.2. Intra-industry trade in horizontal differentiation*

Concerning IIT based upon horizontal differentiation of products, the following results are obtained:

(a) Concerning the value of trade flows (Table 17), IIT increases with the size of countries, size leading to a greater variety, as systematically referred to in the literature based on SDS preferences.

(b) In contrast, differences in sizes between trade partners hinder IIT in similar products, since the potential for gains in variety is reduced. Consequently, the expected convergence of Southern European countries should lead to a strong rise in this type of trade.

(c) IIT increases with the standard of living, as predicted by traditional models, richer countries offering more variety to consumers.

(d) The economic distance, *i.e.* the difference in factor endowments between countries, proxied here by the difference in *per capita* income, creates more opportunities for specialisation along comparative advantage lines and therefore reduces IIT.

(e) Transaction costs have also a negative influence, which is trivial here, since values of flows are considered: its simply a gravitational impact, independent of the nature of trade flows.

(f) The vertical differentiation of products *reduces* IIT for horizontally differentiated products, coincidentally with its (expected) positive impact on the IIT of products located differently on the quality spectrum*i*(*e.* vertically differentiated products).

(g) Lastly, FDI, a proxy of an in-depth integration of economies, leads to greater trade in horizontally differentiated products. Reciprocal M&A have led to more trade: factor and products flows have been complements rather than substitutes during the integration. This increase in trade flows cannot be interpreted in terms of trade creation, as one does neither control for trade flows with Third countries, nor for M&A with Third Countries. In addition, this increase in Intra-EC trade flows might be associated for a large part to an increase in intra-firm trade flows, as a result of M&A.

(h) Currency depreciation leads to specialisation, the share of inter-industry trade increasing, and conversely for the IIT share, whereas reducing values of trade of all types.

(i) The latter effect is particularly acute for IIT stemming from horizontal differentiation.

On the whole, keeping in mind that we have around 20,000 observations, the adjusted R2 is 76%, there is no heteroscedasticity (see $c^2$), and there are few problems of multicolinearity, following the Belsley, Kuh and Welsh test: we have treated the main problem of multicolinearity, namely between the economic distance (*PCID*) and economies of scale (*scale*), a problem which led to the non-significance of *PCID*, while the sign was contradictory to theoretical reasoning. We have re-estimated this equation

without *scale*, considering that it did not disqualify *PCID*, but was due to multicolinearity, as expected the former variable has the correct sign and is significant at the 1% level.

**Table 17. Panel data: results for *values* of bilateral intra-EC trade flows; 1980-94**

| | *Intra*-Industry Trade | | | | | | *Inter*-Industry Trade | | |
|---|---|---|---|---|---|---|---|---|---|
| | Horizontal Differentiation | | | Vertical Differentiation | | | | | |
| | parameter | stand err | sign. level | parameter | stand err | sign. level | parameter | stand err | sign. level |
| *GDP* | 2.7259 | 0.0576 | 0.0001 | 1.6928 | 0.0352 | 0.0001 | 1.2898 | 0.0150 | 0.0001 |
| *GDPD* | -2.7361 | 0.1427 | 0.0001 | -1.1309 | 0.0870 | 0.0001 | -0.8353 | 0.0372 | 0.0001 |
| *PCI* | 0.4809 | 0.0961 | 0.0001 | 0.7556 | 0.0590 | 0.0001 | 0.0652 | 0.0251 | 0.0093 |
| *PCID* | - # | # | 0.0001# | 0.1580 | 0.0212 | 0.0001 | -0.11634 | 0.0090 | 0.0001 |
| *GDist* | -2.7167 | 0.0436 | 0.0001 | -1.7466 | 0.0291 | 0.0001 | -0.0675 | 0.0114 | 0.0001 |
| *SCALE* | 23.9673 | 0.9383 | 0.0001 | 23.8527 | 0.6710 | 0.0001 | 15.2037 | 0.2448 | 0.0001 |
| *Diff* | -0.9309 | 0.0576 | 0.0001 | ns# | # | ns | -0.0999 | 0.0150 | 0.0001 |
| *NTB* | 3.3528 | 0.0987 | 0.0001 | 7.8213 | 0.1586 | 0.0001 | 1.4544 | 0.0257 | 0.0001 |
| *NFDI* | 0.5055 | 0.0173 | 0.0001 | 0.5017 | 0.0106 | 0.0001 | 0.1340 | 0.0045 | 0.0001 |
| *EXR* | -0.0039 | 0.0007 | 0.0001 | -0.0016 | 0.0004 | 0.0003 | -0.0005 | 0.0002 | 0.0140 |
| n | 19034 | | | 19034 | | | 19034 | | |
| adj R2 | 0.7569 | | | 0.9257 | | | 0.9886 | | |
| F value | 5926.6 | | | 1631.1 | | | 165434.0 | | |
| Prob>F | 0.1% | | | 0.1% | | | 0.1% | | |
| X2 | 3850.2 | | | 1589.6 | | | 1010.2 | | |
| Prob >X2 | 0.1% | | | 0.1% | | | 0.1% | | |
| cond. numb. | 32 / 29 # | | | 33 / 29 # | | | 32 / 29 # | | |

#: after solving for multicolinearity problems
ns: statistically not significant

Turning to shares (Table 17), the results are quite similar and therefore those expected looking at the theory; the case for NTBs will be addressed below. The adjusted R2 is fairly high (46%), considering we are explaining the variance in the shares of trade types, not the values of trade flows, and there is no heteroscedasticity, nor are there few problems of multicolinearity: the latter are restricted to multicolinearity between PCID and GDist or Scale. Testing these two problems separately, PCID gets a correct sign significant at the 1% level.

**Table 18. Panel data: results for *shares* of trade types in bilateral intra-EC trade flows; 1980-94**

| | *Intra*-Industry Trade | | | | | | *Inter*-Industry Trade | | |
|---|---|---|---|---|---|---|---|---|---|
| | Horizontal Differentiation | | | Vertical Differentiation | | | | | |
| | parameter | stand err | sign. level | parameter | stand err | sign. level | parameter | stand err | sign. level |
| GDP | 0.9874 | 0.0362 | 0.0001 | 0.2572 | 0.0250 | 0.0001 | -0.1758 | 0.0053 | 0.0001 |
| GDPD | -1.0527 | 0.0896 | 0.0001 | ns | ns | ns | 0.5078 | 0.0132 | 0.0001 |
| PCI | 0.3669 | 0.0608 | 0.0001 | 0.8604 | 0.0420 | 0.0001 | # | # | # |
| PCID | - # | - # | 0.0001 | 0.1316 | 0.0151 | 0.0001 | -0.0465 | 0.0032 | 0.0001 |
| GDist | -1.7942 | 0.0300 | 0.0001 | -0.7871 | 0.0207 | 0.0001 | 0.6108 | 0.0044 | 0.0001 |
| SCALE | 16.2240 | 0.6912 | 0.0001 | 5.2562 | 0.4771 | 0.0001 | # | # | # |
| Diff | -0.4903 | 0.0364 | 0.0001 | + # | # | 0.0001 # | 0.0227 | 0.0054 | 0.0001 |
| NTB | 4.7200 | 0.1633 | 0.0001 | 3.1109 | 0.1127 | 0.0001 | ns | ns | ns |
| NFDI | 0.3218 | 0.0109 | 0.0001 | 0.3421 | 0.0075 | 0.0001 | # | # | # |
| EXR | -0.0024 | 0.0005 | 0.0001 | -0.0008 | 0.0003 | 0.0104 | 0.0002 | 0.0001 | 0.0020 |
| n | 19034 | | | 19034 | | | 19034 | | |
| adj R2 | 0.4614 | | | 0.6636 | | | 0.9890 | | |
| F value | 1631.1 | | | 3755.8 | | | 170730.0 | | |
| Prob>F | 0.1% | | | 0.1% | | | 0.1% | | |
| X2 | 4096.8 | | | 1549.2 | | | 1987.0 | | |
| Prob >X2 | 0,1% | | | 0.1% | | | 0.1% | | |
| cond. numb. | 33 / 29 # | | | 33 / 29 # | | | 33 / 29 # | | |

# : after solving for multicolinearity problems
ns : statistically non significant

### *5.2.3. Intra-industry trade in vertical differentiation*

Turning to IIT in products differentiated by quality, and explaining the *value* of trade flows over 1980-94, the model leads to the following conclusions.:

(a) The size of countries, a variable which is often associated with the potential for economies of scale, *ceteris paribus*, and for greater variety of differing qualities for the same product, has a positive effect on IIT in vertically differentiated products.

(b) The difference in GDPs, as under IIT in horizontal differentiation, has an opposite effect, due to the fact that we consider values of trade, largely affected by gravity-related explanations.

(c) As the demand for differentiation is expected to increase with income, the relationship between *PCI* and *TWVDval* is positive.

(d) Conversely, the economic distance proxying differences in factor endowments (*PCID*) has a positive effect: this relationship is symmetric with the one observed for horizontally differentiated products, as expected on the basis of an interpretation of IIT with vertical differentiation in terms of specialisation.

(e) Transaction costs exhibit the expected negative sign, and conversely for scale. NTBs have the same impact for horizontal differentiation, as does FDI.

(f) As for IIT with horizontal differentiation, currency depreciation leads to specialisation, and the IIT share decreases, a phenomenon which is less accurate than for horizontal differentiation.

The adjusted R2 is very high, which is not so surprising since values of trade flows are explained; there is no heteroscedasticity and few problems of multicolinearity. The latter are in fact concentrated on the Diff variable, accounting for the vertical differentiation of products. We have estimated the model without *Scale* and *NTB* in order to cancel this problem, *Diff* becoming non-significant and having a negligible parameter. In contrast, the latter result proves that IIT with vertical differentiation and price dispersion inside industries are not one and the same thing, despite our measurement methodology for IIT based on unit values.

The explanation of the share of IIT with vertical differentiation in bilateral trade flows of member countries gives quite interesting results. The adjusted R2 is high (66%), since we explain shares of trade types, there is no heteroscedasticity and little multicolinearity. First of all, and contrary of what was observed for the share of IIT with horizontal differentiation, the difference of country sizes has a positive effect on *TWVDsh*: large countries are largely engaged in IIT with vertical differentiation, but are more involved in the latter type of trade with respect to small countries than large ones. However, this relation is significant only at the 10% level, which casts doubts on the above explanation. The second interesting point is related to the differentiation of products: taking into account multicolinearity between *Diff* and *NTB*, *Scale* and *NFDI*, when re-estimating the model without these three variables, *Diff* is significant at the 1% level and exhibits a positive relationship with the explained variable.

### *5.2.4. Inter-industry trade*

It is necessary to control that inter-industry trade leads to a set of parameter estimates compatible with the one referred to above for IIT, bearing in mind that the sum of the three shares necessarily equal 100%: this third round of parameters is not independent of the two previous ones. All parameters have the correct signs and are significant at the 1% level, except for NTBs which are not significant for explaining this residual share. For example, parameters associated with GDP or NTBs were previously positive in both cases, and the corresponding ones for inter-industry trade are necessarily negative; those associated with transport costs were negative; the corresponding one is now positive etc. Nevertheless, these principles are complicated by multicolinearity between PCI, Scale and FDI.

Lastly, turning to inter-industry trade in value, the model is simply an (largely improved !) gravitational explanation of bilateral trade flows associated with the specialisation of member countries: therefore there is no reason for parameters to be constrained by previous estimations. One can check that transport costs hinder trade, that

large countries trade more with large countries, that trade flows increase with income, that FDI is complementary to trade etc.

The reader will also notice that the sign associated with *PCID* is rather surprising: since this explaining variable is supposed to be a proxy for the economic distance, *i.e.* for the comparative advantage, it should be associated with a positive parameter; the result obtained here might indicate that comparative advantage is not a basis for trade as long as intra-European trade is concerned, the specialisation playing more among quality ranges of products, inside industries, than inside industries. However, this might not be the case, as the origin for this result is twofold:

(a) Concerning values, trade between rich and poor countries is low for reasons which, obviously, are not simply limited to comparative advantage.

(b) Turning to shares, we detected a colinearity with the geographical distance. Even for inter-industry trade, countries trade more with their neighbours: France more with Germany than with Greece, for example. As a result a high *economic* distance has similar effects as transportation costs.

In contrast, GDPD -the difference in sizes of countries- has a negative impact on the value of inter-industry trade - as expected, and a positive one for the share of this type of trade. Since differences in sizes are a proxy of differences in the potential for external economies of scale -along arguments issuing from the new international economics- this negative sign should be interpreted as capturing the agglomeration effects referred to above in the theoretical section: larger country can specialise -even against their comparative advantage- for industries subject to high economies of scale, potentially detrimental to smaller countries, a phenomenon potentially distorting the structure of trade towards inter-industry trade.

### 5.3. The impact of the Single Market

#### *5.3.1. What do we know about the story?*

At this stage, results provided by the methodology developed here are twofold:

(a) Section 4 has pointed out the large increase in IIT during the completion period;

(b) Disentangling trade types, the first phenomenon is clearly associated with an increasing share IIT based upon a vertical differentiation of products;

Nevertheless, it is impossible to assess the impact of SEM completion *per se* in this evolution of trade patterns: catching-up, growth in Europe or long term trends might have played an important role. To say it simply, it is impossible to establish a link between the completion and the rise in IIT in vertically differentiated products, on the basis of the analysis developed in Section 4.

In addition, the current Section, while controlling for market structures, growth, real convergence, and integration variables, has led to the identification of the following results:

(a) Larger countries trade more among them than with smaller ones, a phenomenon that has to be controlled if one wants to assess the impact of the single market.

(b) There is no evidence that traditional determinants based upon comparative advantage of nations, have been at work for inter-industry trade and specialisation of member countries among industries; in contrast, comparative advantages have clearly had a *positive* impact on IIT[52] through a specialisation of countries along « fine » comparative advantages inside industries, for certain range of products. An increase in the economic distance (here *PCID*) among member states leads to *less* IIT of *similar* products, and *more* IIT for *vertically differentiated* products and more inter-industry trade.

(c) Agglomeration economies, based upon economies of scale beneficial to larger countries have had a positive impact on the share of trade associated with a specialisation of countries; looking at the previous result, we can conclude that inter-industry trade has been more driven by economies of scale than by the comparative advantage.

(d) Economies of scale, directly measured at the firm level, confirm this interpretation: they have led to more inter-industry trade (in value). In addition, they have had a high impact on IIT of the both types, even if trade of horizontally differentiated products is more sensitive to economies of scale than trade of vertically differentiated ones.

(e) FDI highlights a positive influence on both types of IIT, and a very smooth one upon inter-industry trade. This prevalence of intra-firm trade in trade flows associated with the surge in FDI during the completion period leads to the following question: is this IIT of an intra-firm nature or not? if yes, will this intra-firm trade lead to a reduction in welfare gains traditionally associated with variety gains, as a result of higher mar-ups potentially being the result of a higher concentration of the market? it will be impossible to answer such questions here, given the type of data used.

(f) Industries with high Non-Tariff barriers have, over the period considered, been ceteris paribus subject to more IIT of both types. The latter result is of high concern in the perspective of an appraisal of the single market; it has now to be refined and explained.

This effects being controlled, the following section will highlight effects of the SEM *per se.*

[52] Through TWVD, which does not exclude, obviously, the expected negative impact on IIT based upon a horizontal differentiation of products.

### *5.3.2. Synthesis*

Let us start by briefly giving the results which will be developed below (Table 19).

(a) *the cancellation of NTBs might not be the main vector of integration associated with the internal market programme*. Since these barriers did hinder specialisation[53] among European countries, intra-industry trade has been boosted to artificially high levels before the completion of the SEM. In contrast, *cancelling NTBs* has largely reduced this effect and has led to *more inter-industry trade*. This effect is clearly dated (around 1986); IIT in horizontally differentiated products has been more concerned than IIT in vertically differentiated ones. But at this stage, all the benefits of this measures seem not have been obtained.

(b) by comparison, *the cancellation of border formalities, by reducing transaction costs*, has had an impressive influence on trade: this measure *has largely increased trade among member states*. But it has led to intra-industry trade, of the both types (horizontal and vertical differentiation). Therefore, *border formalities were not a hindrance to specialisation along comparative advantage lines in Europe*. Where comparative advantages were the basis for trade, differences in costs were large enough to overcome additional transaction costs[54] in the pre-completion period.

(c) lastly, *mechanisms associated with FDI have been complementary to trade*: the large increase of M&A activity associated with the expectation of the completion has led to large increases in intra-industry trade, potentially intra-firm (but this last qualification cannot be checked here).

Notwithstanding these direct effects associated with NTBs and border formalities, or FDI, the SEM has had indirect effects which might be counteracting:

(a) a general impact of the SEM, largely underlined in the *ex-ante* studies, was an expected increase in GDPs: here, growth translates in more IIT;

(b) at the same time, in order to foster convergence, structural funds were implemented in Europe: since they might have led to a decrease in differences of *per capita* income in the Community, their impact on trade flows might have been pro-IIT in horizontal differentiation and reciprocally for IIT in vertical differentiation;

(c) last but not least, necessary adjustments of bilateral exchange rates in Europe have led to less IIT and more specialisation along comparative advantage lines, i.e. more inter-industry trade.

The empirical evidence of Section 5 is therefore the result of these complex relationships.

[53] Along comparative advantages.
[54] Symmetrically, IIT based on a horizontal differentiation of products is very sensitive to price differentials (1.5 more than IIT based on vertical differentiation).

**Table 19. The impact of the SEM: synthesis of econometric results**

| | | intra-industry trade | | inter-industry trade |
|---|---|---|---|---|
| | | vertical differentiation | horizontal differentiation | |
| NTBs cancellation | Increased competition | | - | + |
| Border formalities cancellation | Reduced transaction costs | + | + | |
| Microeconomic adjustment | FDI | + | + | |
| SEM completion | Growth | + | + | |
| Structural funds | Convergence of GDP | - | + | |
| (EMU) | Currency depreciation | - | - | + |

### *5.3.3. Where NTBs boosted IIT*

First of all, taking into account panel data referred to above, a powerful result of our econometric modelling is the fact that, before the completion of the Single Market, NTBs did hinder specialisation along comparative advantage lines: as a result they had a mechanical, positive impact on IIT, a parameter that is clearly ascertained by our estimates.

How can one interpret this unexpected result? To the benefit of NTBs, European firms were maintained artificially on the market, and might have differentiated their products in order to reinforce the non contestability of markets.

Therefore, the cancellation of NTBs associated with the completion of the SEM has raised inter-industry trade: markets becoming more contestable, countries have specialised along the lines of their comparative advantages, notwithstanding the traditional increase in IIT associated with trade liberalisation among rich countries[55].

In order to date this phenomenon, we have re-estimated the model following, over time, the evolution of parameters associated with NTBs. The panel has been cut into sub-periods, designed to smooth their inter-annual high variations. Due to multicolinearity, these estimates have been done without *scale, diff and Exr.*

[55] Variables related to NTBs, which are considered here as characteristics of industries, might have captured effects associated with general features of these industries (as economies of scope etc.) rather than to commercial policies. In this case, the perturbing causes might be strong enough to overcome effects associated to barriers *per se*. A first argument suggesting that this point must not be excluded lies in the multicolinearity problems encountered between *FDI*, *Scale* and *NTB*. These multicolinearity problems are particularly accurate for the vertical differentiation, in value as in share. But estimating the model with or without any combination of the related variables leads to similar results. This proves that we do not face an artefact.

Figure 23 highlights the fact that the role of NTBs in explaining IIT with vertical differentiation is continuously *declining*. No effect of the SEM *per se* is captured: it might be the result of external factors, which are not controlled for here.

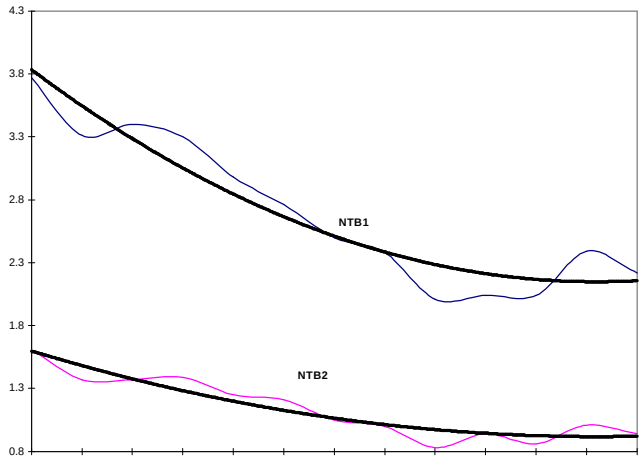
In contrast, turning to horizontal differentiation (Figure 24), we clearly capture the impact of the SEM: whatever the initial level of the parameter is -considering that other factors might bias it upwards at a given moment of time- it is absolutely clear that the positive impact of NTBs on TWHD is declining with the completion of the single market. NTB1 highlights two sub-periods of sharp decline just after 1986 and during the years 1988-1993.

Since the share of inter-industry trade is not affected, *values* of inter-industry trade highlight a large impact of SEM completion: Figure 25 points out the negative impact of NTBs before the mid-eighties. After this turning point (whatever the proxy for NTBs is) this impact is positive, and increasingly positive.

This result means that the cancellation of NTBs has been associated with *more intra-European trade*, and has led to *more specialisation* of member countries along the lines of comparative advantage. It is impossible, however, to infer any trade creation, since it might be simply the result of a trade diversion detrimental to third countries, what cannot be controlled for here.

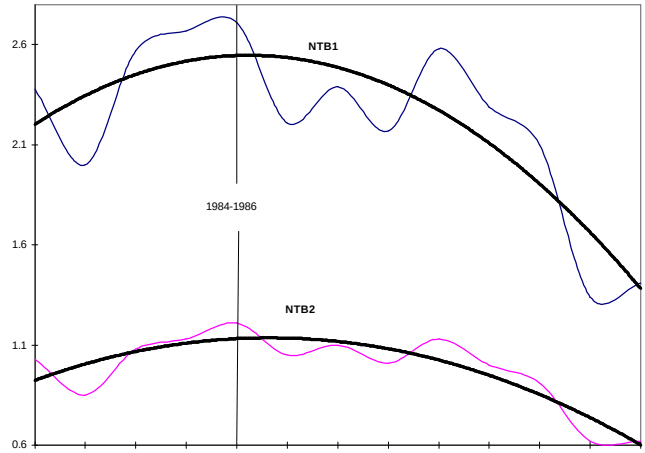
Turning to an alternative solution, which cuts the panel into two pre- and post-completion sub-periods, similar results were obtained.

**Figure 23. Impact of NTBs with vertical differentiation, all countries, all industries (1980-94, share)**



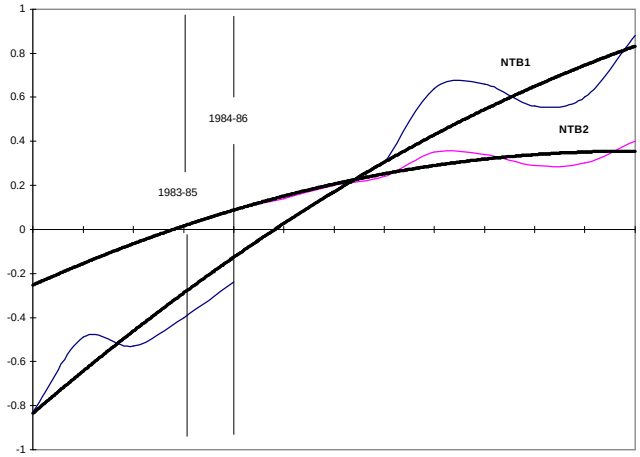

Note: value of parameter estimates on the vertical axis; time on the horizontal axis (1980-82, then 1981-83 etc.). All parameters are significant at the 1% level.

**Figure 24. Impact of NTBs with horizontal differentiation, all countries, all industries (1980-94, share)**




Note: value of parameter estimates on the vertical axis; time on the horizontal axis (1980-82, then 1981-83 etc.). All parameters are significant at the 1% level.

**Figure 25. Impact of NTBs on inter-industry trade, all countries, all industries (1986-94, value)**




Note: value of parameter estimates on the vertical axis; time on the horizontal axis (1980-82, then 1981-83 etc.). All parameters are significant at the 1% level, obviously with the exception of the turning point.

### *5.3.4. The impact of reduced transaction costs*

Cancellation of border formalities are another way of addressing the question of the impact of the SEM: since transaction costs decrease, a decline in parameters associated with *Gdist* is to be expected: distance to market is less costly after in the Single Market. It

might have induced more trade among member states and/or may have changed the nature of trade.

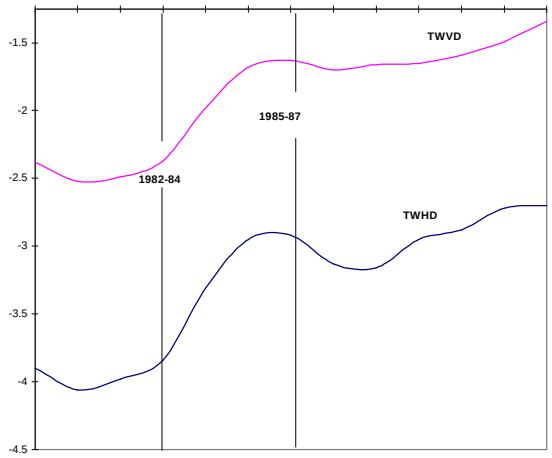
Figure 26 points out the lower influence of transaction costs on trade in vertically differentiated products, compared with horizontally differentiated ones. The demand for the latter is more price elastic, as qualities are similar.

Clearly, the cancellation of border formalities has resulted in more Intra Industry Trade in Europe, by lowering transaction costs (here, the value of the negative parameter is reduced in absolute terms). In any case, this enhanced trade cannot be interpreted in terms of trade creation: since this study focuses on intra-EC trade, any increase in intra-EC trade might be due either to a trade creation or to a trade diversion.

Conversely, the influence on inter-industry trade is nil: the negative impact of transaction costs does not change over time. Where differences in production costs were large enough, transaction costs were not a hindrance to specialisation among member countries, in contrast to NTBs: a foreign firm can bear transaction cost, but public procurement practices may not be circumvented.

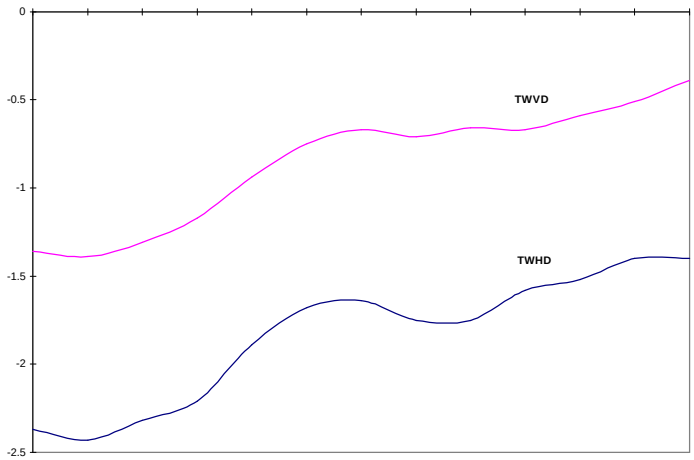
The results for shares of trade types are similar: it means that the Single Market has not only increased trade among member states: it has also changed the nature of their bilateral trade flows, by increasing the share of IIT in total trade.

**Figure 26. The influence of transaction costs on values of IIT inside the EC (1980-94)**




Note: value of parameter estimates on the vertical axis; time on the horizontal axis (1980-82, then 1981-83 etc.). All parameters are significant at the 1% level.

**Figure 27. Influence of transaction costs on shares of IIT inside the EC (1980-94)**




Note: value of parameter estimates on the vertical axis; time on the horizontal axis (1980-82, then 1981-83 etc.). All parameters are significant at the 1% level.

### *5.3.5. Where size matters*

Turning to industries, it is possible to estimate the model on a panel basis, industry by industry, over the period considered here. Therefore equations for values and shares of trade types have been estimated with around 1,600 observations each. Statistical test have been implemented for each equation. The estimates were ran without *scale*, due to multicolinearity problems.

Obviously, all these results can not be presented in detail here, and only three dimensions will be presented below: the relationship associating respectively country size and differences in size, transaction costs and FDI with IIT in horizontal or vertical differentiation.

First of all, *country size* allows for the completion of economies of scale inside industries. As a result, it may promote IIT, country specialising in different varieties or qualities of products.

On the contrary, differences in size may lead to mono-location of industries, if external economies of scale/agglomeration economies play an important role. In contrast inter-industry trade would be promoted in this case.

First of all, let us consider what industries are sensitive to the market size: Figure 28 points out that, for all industries, the potential for economies of scale has led to IIT in horizontal differentiation rather than in vertical one. The reasoning behind this empirical evidence is straightforward: competition in price is more accurate when goods are differentiated by characteristics but belong to the same quality range. Therefore, international trade, since it increases outputs, authorises the achievement of economies of

scale. In contrast, differences in quality, associated with differences in prices, lead to a demand less elastic to price: the potential for economies of scale is no more an important determinant of IIT. The aeronautics and rail transportation industries (here "other transport equipment") highlight the larger sensitivity to the size of the market: the larger the market, the higher the share of IIT between EC members. At the opposite of the spectrum, one find not surprisingly the textile industry.

Then, let us turn to the question of agglomeration economies. It has been referred to such an effect above, when using the panel (all industries all countries): on the whole *GDPD, i.e.* the differences in sizes between economies, or the potential for agglomeration economies, reduce the share of IIT in horizontal differentiation and increase conversely the share of inter-industry trade. This result is significant at the 1% level. Are such economies of location only country-related, or on the contrary also industry related?

**Table 20. Econometric evidence for potential agglomeration economies at the industry level**

| | sign and significance of parameter estimates for GDPD | | Agglomeration economies |
|---|---|---|---|
| | TWHDsh | TWVDsh | |
| **Chemicals** | **-** | **-** | **yes** |
| **Non-electrical machinery** | **-** | **-** | **yes** |
| **Motor vehicles** | **-** | **-** | **yes** |
| **Mining and quarrying** | **-** | **-** | **yes** |
| Wood and paper | - | ns | ? |
| Non metallic min. pr. | - | + | ? |
| Other manufacturing | - | + | ? |
| Textile and leather | + | ns | ? |
| Remaining industries | ns | + | ? |

statistical level of significance: 10%

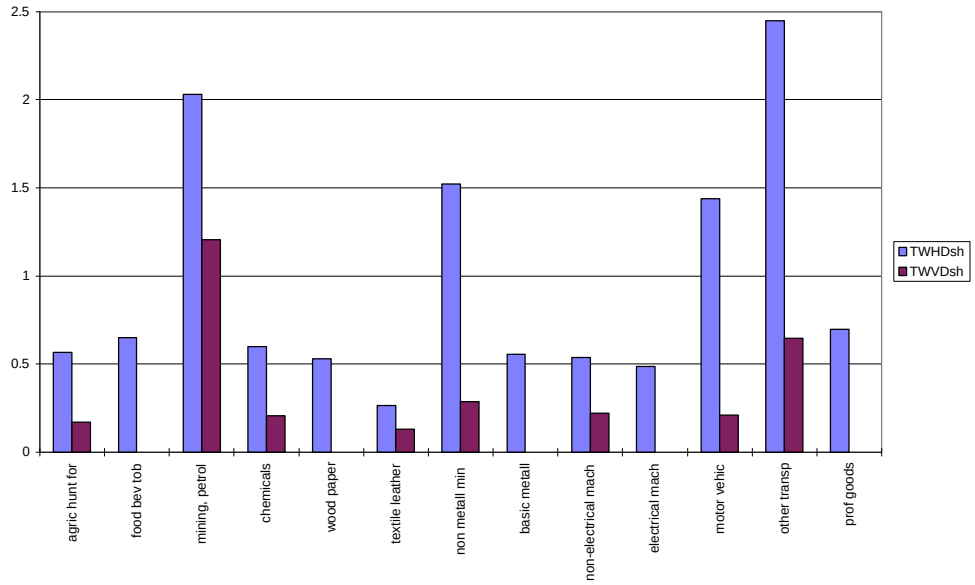
Looking at detailed results by industry given in Table 20, this effect can in fact be observed for some industries. In addition to country related fixed effects in the panel referred to above, agglomeration economies might be industry related for mining, chemicals, non-electrical machinery and motor vehicles. For the remaining industries, it is impossible to conclude as effects on both types of IIT are opposite, or not significant. To say it differently, agglomeration economies have pushed towards more specialisation and more inter-industry trade in Europe over the completion period, but these economies are only partly sector specific: the mechanism might on the contrary be based on spillovers across industries. This result is important, since it demonstrates that a potential divergence across countries associated with external economies has implications for the whole economy, leading to potential cohesion costs for the Community

Sensitivity to transaction costs (Figure 29) is another important question in the perspective of the SEM: once again, IIT in horizontal differentiation is more affected The

reasons are those already referred to above, associated with sensitivity to price differentials. Leaving aside the unexplained estimate obtained for "non-electrical machinery", the automobile industry and "other transport equipment" are the two industries mostly concerned by transaction costs and the size of the market. In contrast, trade in professional goods, concerning more specific products and a demand less elastic to prices, is not really concerned by both determinants.

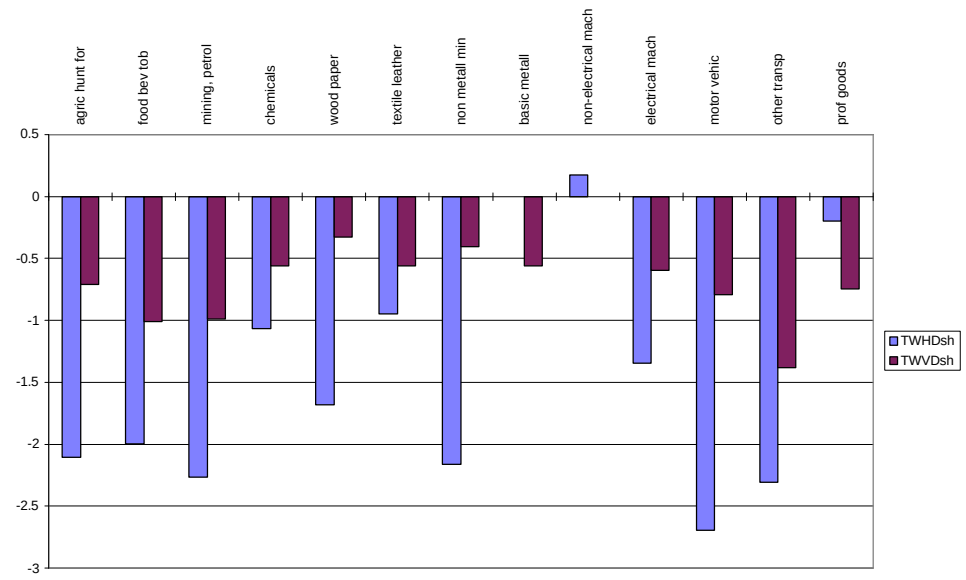
Lastly, it should be noticed that FDI (Figure 30), in contrast to previous determinants, has had a higher impact on IIT in vertically differentiated products: professional goods, other transport equipment, non metallic mineral products, wood-paper-printing, food-beverages-tobacco, and agriculture-hunting-forestry are concerned.

**Figure 28. Impact of market size on the share of IIT in intra-EC trade (1980-1994)**



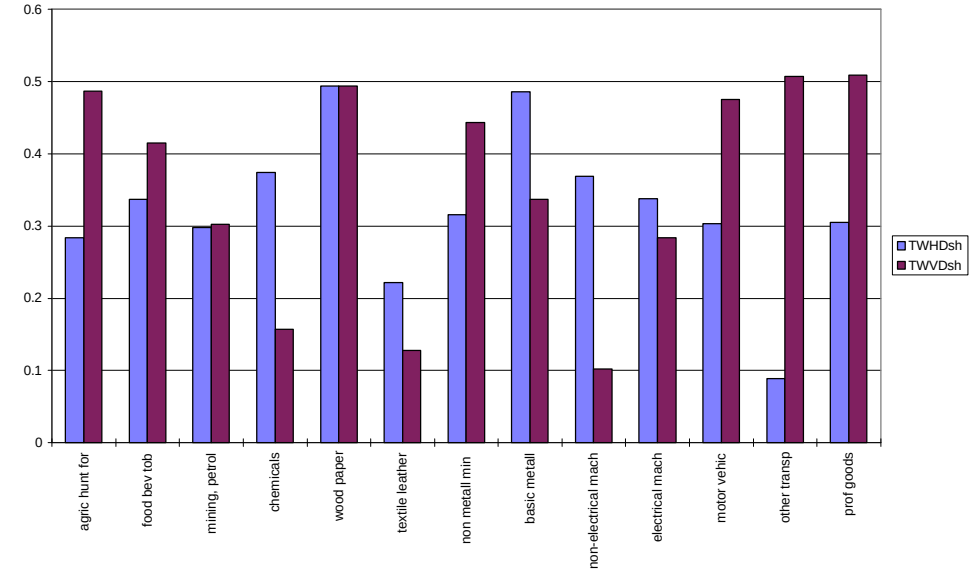

Note: parameter estimates (1980-94) on the vertical axis. Missing values: parameter estimates not significant at the 10% level.

**Figure 29. Impact of transaction costs on IIT between EC members (1980-1994)**




Note: parameter estimates (1980-94) on the vertical axis. Missing values: parameter estimates not significant at the 10% level

**Figure 30. Impact of M&A on IIT between EC members (1980-1994)**




Note: parameter estimates (1980-94) on the vertical axis. Missing values: parameter estimates not significant at the 10% level

### *5.3.6. Where FDI did not displace trade*

A question recently raised by the theory is the relationship not only between trade and factor mobility, but also factor mobility and the nature of trade. As pointed out by Markusen (1995), an international mobility of capital -associated with multinational companies- might lead to a trade displacement: in that case decreasing values of inter-industry trade would translate in an increasing share of IIT, as affiliates increase their sales.

It has been referred to above that the completion period has been *accompanied* by a surge in intra-European M&A and FDI, even if when controlled for FDI relationships between the EC and Third countries. Markusen (1995) noticed that this issue had not paid much attention until its 1995-survey. What does our 1980-94 of intra-EC trade panel say about it?

It is true that the surge in M&A has been associated with an increasing share of IIT in total intra-EC bilateral trade, along the Markusen's hypothesis. In addition it is a very strong conclusion, since parameters are statistically significant at the 1% level. But, in contrast, the trade displacement effect referred to in Markusen (1995) and Markusen and Venables (1995) cannot been observed: there is (at the 1% significance level) a positive relationship between FDI and the *value* of inter-industry trade, as well as with IIT. The only element fitting Markusen's intuition is the fact that this positive impact is 4 times more important for IIT than for inter-industry trade. It might be the case that Markusen is basically true, but other economic elements of the multinational strategy are not captured by his model.

This complex relationship has been checked using another specification of our econometric equations using, as a proxy, FDI flows in bilateral Balance of Payments, in replacement for M&A: all parameters being positive, we can conclude that FDI has not displaced intra-EC trade, even if its positive impact on IIT has been much more accurate than for inter-industry trade.

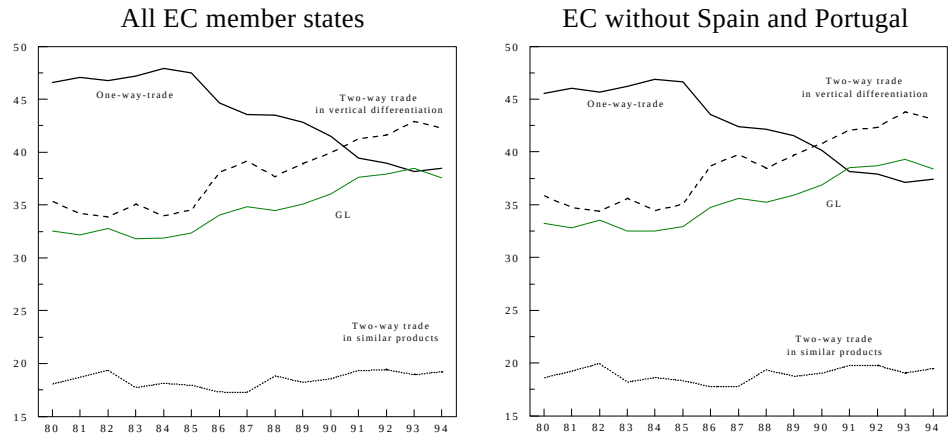
### *5.3.7. Accession or completion?*

The agenda of European integration has been crowded in the mid-1980s for Spain and Portugal: accession on the one hand, completion of the single market on the other hand. Looking at results obtained in section 5, EC trade patterns over the completion period might be largely sensitive to the accession of the former countries.

More precisely, it has been highlighted that Portugal and especially Spain have trade structures that have become more similar to the ones in the "core countries": the share of IIT is increasing. Since the present report aims at giving an *ex post* appraisal of the Single Market, it is necessary to check that our results are not sensitive to this event.

One might suppose that the increasing share of these countries in European trade flows, added to the transformation of their trade structures, would result in an increase in the share of IIT in Intra-European trade. Therefore, what is understood here as the result of the single market completion might be the result of the Spanish and Portuguese accessions. Figure 31 clearly reject this hypothesis.

**Figure 31. Trade types and the GL indicator in intra-EC trade, with and without Spain and Portugal, 1980-1994**




Source: Eurostat-Comext, calculations by the CEPII.

Nevertheless, it must be kept in mind that the model implemented here does explain bilateral trade flows of member countries, of which a large part is only slightly affected by these new accessions, given the weight of these two countries.

It is possible to investigate these question by running the econometric model once with these two countries, and then again but without them. The rule of thumb is therefore to assess if parameter estimates for the panel are largely affected by this transformation or not, and in addition to compare statistical levels of significance.

Another solution might be to introduce dummies for these countries. As referred to above, this kind of methodology can capture anything but the effect they are supposed to control for. Therefore, such a strategy of research has been eluded.

Results given in Table 21 highlight that parameter estimates are *not* affected by the presence of these two countries. Often, the quality of regressions is slightly improved, but nothing does fundamentally changed, with the exception of GDPD, an explanatory variable not significant with and significant without Spain and Portugal, when one explains the share of IIT in vertically differentiated products in total bilateral trade flows. The parameter then becomes positive, as for inter-industry trade. In addition, multicolinearity is slightly reduced.

**Table 21.**
**Comparison of parameter estimates with and without Spain and Portugal in the 1980-94 panel**

value

| | *Intra*-Industry Trade | | | | | | *Inter*-Industry Trade | | |
|---|---|---|---|---|---|---|---|---|---|
| | Horizontal Differentiation | | | Vertical Differentiation | | | | | |
| | parameter ***with*** | parameter ***without*** | sign. level | parameter ***with*** | parameter ***without*** | sign. level | parameter ***with*** | parameter ***without*** | sign. level |
| *GDP* | 2.7259 | 2.6236 | 0.0001 | 1.6928 | 1.6735 | 0.0001 | 1.2898 | 1.2855 | 0.0001 |
| *GDPD* | -2.7361 | -2.1928 | 0.0001 | -1.1309 | -0.8773 | 0.0001 | -0.8353 | -0.8482 | 0.0001 |
| *PCI* | 0.4809 | 0.5848 | 0.0001 | 0.7556 | 0.6308 | 0.0001 | 0.0652 | 0.0589 | 0.0093/ 0.0359 |
| *PCID* | - # | - # | 0.0001 | 0.1580 | 0.0464 | 0.0001 | -0.1164 | -0.1486 | 0.0001 |
| *GDist* | -2.7167 | -2.6185 | 0.0001 | -1.7466 | -1.6370 | 0.0001 | -0.0675 | -0.0479 | 0.0001 |
| *SCALE* | 23.9673 | 23.3503 | 0.0001 | 23.8527 | 23.3601 | 0.0001 | 15.2037 | 14.9957 | 0.0001 |
| *Diff* | -0.9310 | -0.9006 | 0.0001 | -0.3235 | -0.2361 | 0.0001 | -0.0999 | -0.0532 | 0.0001/ 0.0013 |
| *NTB* | 3.3529 | 3.2116 | 0.0001 | 7.8213 | 7.6219 | 0.0001 | 1.4544 | 1.4354 | 0.0001 |
| *NFDI* | 0.5055 | 0.5051 | 0.0001 | 0.5017 | 0.4956 | 0.0001 | 0.1340 | 0.1354 | 0.0001 |
| *EXR* | -0.0039 | -0.0066 | 0.0000 | -0.0016 | -0.0048 | 0.0003 | -0.0005 | -0.0006 | 0.0140/ 0.0298 |
| n | 19034 | 15672 | | 19034 | 15672 | | 19034 | 15672 | |
| adj R2 | 0.7569 | 0.7794 | | 0.9257 | 0.9372 | | 0.9886 | 0.9889 | |
| F value | 5926.6 | 5536716.0 | | 1631.1 | 23407 | | 165434.0 | 139375 | |
| Prob>F | 0.1% | 0.1% | | 0.1% | 0.1% | | 0.1% | 0.1% | |
| X2 | 3850.2 | 3013.2 | | 1589.6 | 1111 | | 1010.2 | 819 | |
| Prob >X2 | 0.1% | 0.1% | | 0.1% | 0.1% | | 0.1% | 0.1% | |
| cond. numb. | 32 / 29# | 31 / 28# | | 33 / 29# | 32 / 28# | | 32 / 29# | 31 / 28# | |

share

| | *Intra*-Industry Trade | | | | | | *Inter*-Industry Trade | | |
|---|---|---|---|---|---|---|---|---|---|
| | Horizontal Differentiation | | | Vertical Differentiation | | | | | |
| | parameter *with* | parameter *without* | sign. level | parameter *with* | parameter *without* | sign. level | parameter *with* | parameter *without* | sign. level |
| GDP | 0.9874 | 0.9132 | 0.0001 | 0.2572 | 0.2338 | 0.0001 | -0.1758 | -0.1834 | 0.0001 |
| GDPD | -1.0527 | -0.6382 | 0.0001 | ns | 0.3098 | ns / 0.0001 | 0.5078 | 0.5243 | 0.0001 |
| PCI | 0.3669 | 0.4335 | 0.0001 | 0.8604 | 0.7923 | 0.0001 | # | # | # |
| PCID | - # | - # | 0.0001 | 0.1316 | 0.0653 | 0.0001 | -0.0465 | -0.0478 | 0.0001 |
| GDist | -1.7942 | -1.7222 | 0.0001 | -0.7871 | -0.7137 | 0.0001 | 0.6108 | 0.6124 | 0.0001 |
| SCALE | 16.2240 | 15.7165 | 0.0001 | 5.2562 | 5.0752 | 0.0001 | # | # | # |
| Diff | -0.4903 | -0.4943 | 0.0001 | + # | + # | 0.0001 # | 0.0227 | 0.0255 | 0.0001 |
| NTB | 4.7200 | 4.4745 | 0.0001 | 3.1109 | 2.9556 | 0.0001 | ns | ns | 0.0001 |
| NFDI | 0.3218 | 0.3214 | 0.0001 | 0.3421 | 0.3371 | 0.0001 | # | # | # |
| EXR | -0.0024 | -0.0045 | 0.0001 | -0.0008 | -0.0035 | 0.0104 / 0.0001 | 0.0002 | ns | ns |
| n | 19034 | 15672 | | 19034 | 15672 | | 19034 | 15672 | |
| adj R2 | 0.4614 | 0.4635 | | 0.6636 | 0.7013 | | 0.9890 | 0,9876 | |
| F value | 1631.1 | 1355.0 | | 3755.8 | 3680 | | 170730.0 | 124990 | |
| Prob>F | 0.1% | 0.1% | | 0.1% | 0.1% | | 0.1% | 0.1% | |
| X2 | 4096.8 | 3229.2 | | 1549.2 | 1080 | | 1987.0 | 1801 | |
| Prob >X2 | 0,1% | 0.1% | | 0.1% | 0.1% | | 0.1% | 0.1% | |
| cond. numb. | 33 / 29# | 32 / 28# | | 33 / 29# | 32 / 28# | | 3 3/ 29# | 32 / 28# | |

*Source:* Eurostat, calculations by the CEPII.

Turning to results by country, it is possible to run two sub panels for Spain and Portugal facing their European partners. This exercise is, from a strict econometric point of view, of poor quality if one uses the standard specification developed here for the global panel: sharply reducing the number of observations necessary leads to multicolinearity problems as the number of explaining variables remains high. In comparison with the global panel, we have around 2.5 times multicolinearity for Spain, whereas for Portugal it raises until 4 times more multicolinearity.

Concerning Portugal, multicolinearity problems for *TWVDval* are associated with *Diff, Scale, NTB,* and *EXR*, i.e. to market structure and integration variables. The same problem arises for Spain since *Owval* is considered. On the whole, the *Diff* variable works poorly here, for all equations.

These problems of multicolinearity being handled, the picture for the two Southern countries is slightly different from the one arising from the global panel (Table 22).

First, contrary to the general pattern of intra-EU trade, the share of IIT under vertical differentiation is negatively related to the average size (GDP) of Spain/Portugal and partner countries. The two Southern members are less engaged with large (core) countries than with other member states in this type of trade. This is confirmed by the *positive* relationship between the Spanish share of IIT under horizontal differentiation and the difference between Spanish and partner country *incomes per capita*. On the whole, it means that the expected catching up of Spain would lead to a smaller share of both types of IIT in total Spanish trade: this result was expected for vertically differentiated products but not for horizontally differentiated ones. In contrast a Portuguese catching up would lead to an increase (not expected) in two-way trade in vertically differentiated products.

Turning to trade in value, GDP recovers the "correct" for Spain but not for Portugal. The relationship between TWHD and PCID is steadily positive for Spain. Inter-industry trade of both Southern countries looks negatively related to the average income *per capita* of partner countries, contrary to IIT; unfortunately there is a multicolinearity problem between PCI and GDP. Turning to PCID, a proxy for the comparative advantage of nations, a scheme of specialisation, between industries, is ascertained by the positive sign for Spain. This variable is unfortunately not significant for Portugal.

But what it is more striking, is the result for FDI: once again, FDI has not been trade displacing; in addition, it must be pointed out that the impact of FDI is around 2 to 3 times larger for the Spanish trade than for the Portuguese one, for all types of trade, what confirms the intuition of the leading role of factor mobility in the Spanish integration to EU-trade. Finally, it is ascertained by our estimates that FDI has led, first of all, to (intra-firm ?) IIT of horizontally differentiated products.

**Table 22.**
**Comparison of parameter estimates for Spain and Portugal (panel 1980-94, all industries)**

| | value | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | *Intra*-Industry Trade | | | | | | *Inter*-Industry Trade | | |
| | Horizontal Differentiation | | | Vertical Differentiation | | | | | |
| | Spain | Portugal | sign. level % | Spain | Portugal | sign. level % | Spain | Portugal | sign. level % |
| GDP | 1.8246 | 2.4508 | 0.0001/ 0.0108 | 0.6782 | -2.247882 | 0.0215/ 0.0008 | 0.7441 | 1.6305 | 0.0001 |
| GDPD | -4.6065 | ns | 0.0001/ ns | -2.4380 | 10.809358 | 0.0001 | - # | -2.1992 | 0.0001 # / 0.0404 |
| PCI | 2.4153 | ns | 0.0001/ ns | 2.1661 | 7.002669 | 0.0001 | - # | -0.4588 | 0.0001 # / 0.0034 |
| PCID | 0.3312 | ns | 0.0291/ ns | 0.6793 | ns # | 0.0001/ ns # | 0.0464 | ns | 0.0120/ ns |
| GDist | -2.9230 | -3.2336 | 0.0001 | -1.6677 | -1.923771 | 0.0001 | 0.2486 | -0.1333 | 0.0080/ 0.0001 |
| SCALE | 26.2990 | 26.0926 | 0.0001 | 21.9310 | 34.623585 | 0.0001 | 9.7994 | 18.6592 | 0.0001 |
| Diff | -0.9574 | -1.2433 | 0.0001 | -0.6188 | -0.817830 | 0.0001 | -0.2793 | -0.4635 | 0.0001 |
| NTB | 3.2407 | 4.5877 | 0.0001 | 7.7213 | 10.891481 | 0.0001 | 1.0731 | 1.4417 | 0.0001 |
| NFDI | 1.4303 | 0.4474 | 0.0001 | 1.1488 | 0.512157 | 0.0001 | 0.5927 | 0.1250 | 0.0001 |
| EXR | ns | ns | ns | 0.0046 | 0.002892 | 0.0003/ 0.0508 | ns | ns # | ns/ ns # |
| n | n=1670 | n=1670 | | n=1670 | n=1670 | | n=1670 | n=1670 | |
| adj R2 | 0.50 | 0.50 | | 0.80 | 0.80 | | 0.99 | 0.99 | |

| | share | | | | | |
|---|---|---|---|---|---|---|
| | *Intra*-Industry Trade | | | | | |
| | Horizontal Differentiation | | | Vertical Differentiation | | |
| | Spain | Portugal | sign. level % | Spain | Portugal | sign. level % |
| GDP | 0.7551 | ns | 0.0101/ ns | -0.3563 | -2.4234 | 0.0863/ 0.0001 |
| GDPD | -3.3596 | ns | 0.0001/ ns | -1.4355 | 8.3188 | 0.0001 |
| PCI | 1.4806 | 1.8381 | 0.0001/ 0.0242 | 1.6938 | 5.3043 | 0.0001 |
| PCID | 0.2073 | ns | 0.0312/ ns | 0.4646 | -0.7652 | 0.0001 |
| GDist | -2.2114 | -2.3371 | 0.0001 | -0.8273 | -1.0012 | 0.0001 |
| SCALE | 22.6686 | 19.7929 | 0.0001 | 7.8959 | 10.8591 | 0.0001 |
| Diff | -0.4020 | -0.4596 | 0.0009/ 0.0025 | -0.2750 | -0.3945 | 0.0011 |
| NTB | 5.6129 | 7.5837 | 0.0001 | 3.8005 | 5.6584 | 0.0001 |
| NFDI | 0.6237 | 0.2755 | 0.0001 | 0.6501 | 0.3495 | 0.0001 |
| EXR | -0.0025 | ns | 0.0468/ ns | 0.0032 | 0.0025 | 0.0003/ 0.0217 |
| n | 1670 | 1670 | | 1670 | 1670 | |
| adj R2 | 0.52 | 0.52 | | 0.46 | 0.46 | |

### *5.3.8. Single market without a single currency*

The potential impact of exchange rates on the types of trade defined here has often been questioned:

(a) as far as unit values are used in order to disentangle the two types of IIT, do variations in the value of national currencies modify the results? More specifically, would the introduction of bilateral exchange rates in an explanation of IIT based on panel data affect the value of parameters?

(b) do exchange rate variations transform the specialisation of countries, and/or change the respective share of IIT and inter-industry trade?

(c) do the same variations change the respective weight of the horizontal and vertical differentiation determinants of this IIT?

In response to these questions, three type of arguments have to be considered:

(a) first of all, an econometric model using panel data over 14 years, covering the set of all member countries, and being designed on a bilateral basis, seems to be the ideal tool in order to investigate this type of question;

(b) but at the same time, theoretical explanations addressing these questions are poor: following Bergstrand (1989, 1990), we were expecting no influence of the bilateral exchange rate on intra-industry and inter-industry *shares*; turning to the values of trade, the potential impact is ambiguous, depending of the CES.

(c) finally, since our methodology of IIT measurement has something to do with unit values, the results might be suspected to be biased if the model did not control for exchange rates, even for shares.

Adding to these controversial issues, it must be remembered that there is no satisfactory proxy of bilateral exchange rates: ideally, the variable related to the exchange rate would reflect absolute bilateral values of national currencies, emphasising for example the fact that the FF against the DM has more value than the FF against the FB. In contrast, existing measures of exchange rates do not reach this ideal, giving information on the evolution, not on the level, of these values. What is taken into account is the fact that FF depreciates more against DM than against FB.

Despite these difficult questions, exchange rates have been introduced in the econometric estimates in order to assess the different types of arguments. It must be kept in mind that our model uses the value of bilateral exchange rates, year by year. Therefore, one does not include explicitly exchange rate fluctuations in the model; but since a panel is used, these variations are associated with the sign of the related parameter.

The following results are obtained.

(a) Introducing bilateral exchange rates in the panel, parameters associated with this new independent variable are highly statistically significant for all equations.

(b) This new specification does not change either signs nor the values of parameters associated with other variables; there is only slight colinearity between exchange rates and *PCI.* Our model is therefore not biased by exchange rate fluctuations.

(c) There is a negative relationship with this new variable and all types of trade in value, whereas this relationship is positive with inter-industry trade in share.

The interpretation of these results is the following: as a country depreciates its currency, the *number* associated with its bilateral exchange rate *increases* whereas the value of its bilateral trade registered in ECU might not change. On the contrary this value, in ECU, *decreases* (negative relationship) for all types of trade, *i.e.* for trade as a whole. As for other types of commercial policies, a currency depreciation leads to less trade. It might nevertheless be the result of macroeconomic policies accompanying the devaluation, and not of the variation in the exchange rate *per se*. Or it might be associated with pricing to market strategies: if exporters of the depreciating declaring country do not increase their mark-up, their prices will be held constant in local currency and depreciated in ECU. If sales are not elastic enough, their exports will decrease in ECU, whereas their reduced imports will also push bilateral trade down.

## CONCLUSION

While trade *per se* was not the focus of *ex ante* studies on the gains from European integration, the implicit assumption was that the removal of the remaining barriers to the mobility of goods would translate into an increase in trade flows within the Community, and that most of this increase would be of the **intra-industry** type, i.e. simultaneous exports and imports *within* industries.[56] *Intra*-industry trade, based upon the similarity of nations, may lead to cost free adjustments, increased efficiency and welfare gains associated with variety. In contrast, *inter*-industry trade, traditionally associated with comparative advantages of nations, may lead to more costly adjustments, as trade and specialisation move factors from contested export-oriented industries. At the same time, *ex ante* studies expected that not all sectors and member states would be affected in the same way.[57]

Any *ex post* evaluation on the impact of the Single European Market has to take into account recent developments in international trade theory which weaken the traditional relationship between trade structure and the correlative adjustments in production structures. As a result, the debate on changes in trade patterns in Europe associated with the Single Market is less clear than suggested by the traditional association referred to above, i.e. painful adjustments in case of inter-industry trade, and cost free adjustments for intra-industry trade.

(a) Determinants and consequences of intra-industry trade in horizontally differentiated products are different from those in vertical differentiation. In the former case (exchange of varieties), products sold at the same price are perfect

[56] Emerson et al. (1990, Chapϭ).
[57] European Commission (1990b).

substitutes, while in the second (exchange of qualities) a common ranking of consumer preferences can be associated with differences in quality. In the latter case, the adjustment costs associated with an increase in intra-industry trade might be sizeable, since it might not be equivalent to specialise in high or low quality products in the same industry.

(b) *Inter*-industry trade is no longer exclusively based upon comparative advantages: economies of mono-location or agglomeration, spillover effects, or more generally the country differences in size do matter. Agglomeration economies might increase inter-industry trade, in the same manner as in the United States, where states and regions exhibit a high degree of industrial specialisation.[58]

(c) Concerning factor mobility, the *convergence hypothesis*[59] leads to a complex relationship between FDI, trade values and trade structure: as countries converge, multinational firms might *displace* trade. As pointed out by Markusen (1995), an international mobility of capital -associated with multinational companies- might lead to a trade displacement: in that case decreasing values of inter-industry trade would translate in an increasing share of IIT, as affiliates increase their sales. Therefore, an important issue is whether factor mobility has been, or not, a substitute to trade flows (due to increasing affiliates' sales) as a result of the single market completion.

As a result, this study has first addressed the following questions:

(a) What evolution of intra-EC trade patterns can be observed over 1980-1994? Has the completion of the SEM been associated with increased trade flows among member states on an inter-industry or intra-industry basis?

(b) In case of an increase in intra-industry trade, does it concern mostly horizontally or vertically differentiated goods?

(c) On which price/quality segments are the member states positioned?

These questions are important as variations in trade patterns among member states are expected to provide important information about the nature and the size of the effects of the Single Market on production structures, and thereby give indirect indications about the magnitude of efficiency gains achieved so far.

Trade patterns were measured using information on values and unit values for bilateral trade flows for some 10,000 products over 1980 to 1994. In total, some 12 million bilateral trade flows were taken into account. This analysis of intra-EC trade from 1980 to 1994 has confirmed what is generally found in the empirical literature: *intra-EC trade is characterised by an increase in intra-industry trade, especially from the mid-1980s onwards*.

The most important trade type in the beginning of the 1980s was one-way trade (with a share of some 45% in intra-EC trade). It started to decline from the mid-1980s

[58] Krugman (1993).
[59] Markusen and Venables (1995).

onwards: the preparation phase of the SEM was accompanied by a decrease in the share of inter-industry trade in Europe. This, however, does not mean that SEM *per se* has caused this event; it could be associated with other determinants which may have played simultaneously.

But in contrast to what is often implicitly assumed, *the rise in intra-industry trade in intra-EC trade does not concern horizontally differentiated products, but products which are vertically differentiated*. In fact, two-way trade in similar products remains rather stable, whereas two-way trade in vertically differentiated products -associated with a qualitatively division of labour- increased significantly and represented the most important trade type in 1994.

Even if the rise in two-way trade (be it in horizontal or vertical product differentiation) is most pronounced for Spain and Portugal, the overall rise in intra-industry trade within the EC cannot be attributed to these two countries, as the EC-average hardly changes once Spain and Portugal are excluded.

*For each member country, two-way trade in vertically differentiated products is more important than two-way trade in similar products*. However, this pre-eminent feature of intra-European trade has received little attention in the theoretical literature. It underlines the particular interest of the question on which market segment different member states are positioned, as this might have important consequences in terms of income distributions. From a policy point of view, it must be borne in mind, when interpreting such a pattern of trade, that high "quality" (as revealed by prices) can be attributed to more R&D, higher qualified labour, the specific organisation of firms' internal procedures, or large investments in advertising. Therefore, the range on which countries specialise is not "neutral", especially as far as catching-up is concerned.

The difference between Northern and Southern countries is striking once overall strengths in price/quality ranges are analysed. While Northern countries show up comparative advantages in up-market products (Ireland and Germany), in the medium- and up-market range (France) or in medium-market goods (United Kingdom, Netherlands, Belgium-Luxembourg and Denmark), Southern countries are specialised in the lower quality range: down-or medium-market goods for Spain and Greece, and down-market products for Italy and Portugal.

But over time things have changed for Southern countries: in the early nineties, their comparative advantage for down-market products fell, whereas specialisation turned either towards top or medium quality products. Evidence does not support the scenario of an integration based on "residual" specialisation on down-market products with its correlative adverse consequences for catching-up.

One possible argument against an indicator based on relative unit values used in this study concerns the impact of bilateral exchange rates variations on relative prices. Substantial depreciations can lead domestic producers to a higher competitiveness due to lower export prices, a phenomenon which in our methodology might be incorrectly

interpreted as "lower quality". For example the overall specialisation in down-market products which can be found for Italy in 1994 can be raised into doubt since it may be the result of the depreciation of the lira. However, an analysis at the industry level shows that currency depreciation has not led Italy to down-market specialisation in its key industries: its first comparative advantage still concerns *up*-market textiles. The same remark can be made for the United Kingdom, showing up an *up*-market specialisation for chemicals in 1994.

The large increase in IIT, and the importance of intra-European trade in vertically differentiated products are two phenomenon which might be associated with SEM completion, but also with other features of the European economy, such as growth, convergence of countries etc. As a result, SEM completion and the rise in IIT might only be simultaneous events; moreover, the Single Market might have had own effects counteracting with natural trends in European trade patterns.

Most determinants act in the same way on IIT in both types of product differentiation, *i.e.* they either increase or reduce their respective share in total bilateral trade.

Among the factors which *increase* the share of IIT both for horizontally and vertically differentiated products are:

(a) Market size, which leads both to a greater product variety (horizontal differentiation) and a larger quality spectrum (vertical differentiation): intra-EC IIT thus may rise the consumers' welfare and producers' efficiency.

(b) Average per capita income of declaring and partner countries has a similar effect, since richer countries offer more variety as well as a larger quality spectrum to consumers.

(c) Returns to scale, as suggested by *ex ante* studies, boost IIT of both types.

(d) Foreign direct investment, an integration variable, leads to a greater share of IIT of both types.

(e) Intensity of Non Tariff Barriers in intra-EC trade before the SEM completion leads to a greater share of IIT in bilateral trade, a relationship statistically highly significant; possibly, these barriers hindered the exhaustion of returns to scale, leading to a greater variety of products.

In contrast, factors which *reduce* the share of both types of intra-industry trade are:

(a) Transportation costs have a negative influence on both types of IIT, independently from the traditional gravitational impact, since shares of trade are considered: therefore, any change in transportation, and more generally transaction costs, may change not only the value but also the patterns of intra-European trade, a phenomenon which has to be considered in the perspective of the SEM completion.

(b) Currency depreciation leads to specialisation, the share of intra-industry trade is decreasing. The latter effect is particularly acute for IIT stemming from horizontal differentiation.

Lastly, some factors act in different directions on the share of IIT, depending on the nature of product differentiation, thus underlining the important distinction between two-way trade in horizontal and in vertical product differentiation:

(a) Differences in market size reduce the share of IIT in horizontally differentiated products. The related explanation is twofold. One the one hand, the potential for gains in variety is reduced as country sizes are different. On the other hand, a negative relationship between differences in market size and the share of IIT can be interpreted as the result of *agglomeration economies at the country level*: external economies of scale, or spillover effects at the country level, might have led to inter-industry trade.

(b) In contrast, differences in factor endowments (*i.e.* the economic distance proxied by differences in *per capita* income) creates more opportunities for specialisation in industries, or along the quality spectrum inside industries: therefore it reduces (increases) the share of IIT in horizontally (vertically) differentiated products.

(c) The vertical differentiation of products *reduces* IIT in horizontally differentiated products contrary to IIT in vertically differentiated products.

Having identified these determinants of intra-EC trade patterns, they can be controlled for in order to address the question of an *anti-monde*. How could trade patterns have evolved without the completion of the SEM? Some measures such as the cancellation of NTBs have directly led to a reduced share of IIT, contrary to the cancellation of border formalities. But the SEM completion as a whole (which also embodies a mutual recognition of norms, a deregulation etc.), and accompanying measures such as structural funds, might have fuelled growth in the EC and led to income convergence, leading to potentially counteracting indirect effects. Finally, the growing share of IIT -especially in vertical differentiation- is the result of i) exogenous events, ii) direct effects of the SEM, and iii) indirect effects of the SEM.

Finally, the major direct effects of the SEM are the following:

(a) Since Non-Tariff Barriers were obstacles for a clear-cut specialisation among European countries, intra-industry trade had been boosted to artificially high levels before the completion of the SEM. In contrast, cancelling NTBs largely reduced this effect, leading to less intra-industry trade. This effect took place around 1986.

(b) In contrast, the cancellation of border formalities, while reducing transaction costs, has boosted intra-industry trade: border formalities were not an obstacle to specialisation along comparative advantages in Europe. Where comparative advantages were the basis for trade, differences in costs were large enough to overcome additional transaction costs in the pre-completion period: contrary to public procurement practices, transaction costs were not a major hindrance to trade

when differences in production costs between Member states were large enough. In contrast, any extra transaction costs would hinder trade for similar products.

(c) Turning to microeconomic expectations and adjustments, trade has not been displaced by FDI, thus not fulfilling Markusen's convergence hypothesis. The large increase of M&As associated with the private expectation of the completion of the SEM has led to large increases in intra-industry trade. FDI in Balance of Payments statistics has had the same effect.

(d) The evolution referred to above where associated to the completion, not to the accession of Spain and Portugal in the dataset. Controls were carried out showing that the results are not affected by the inclusion of both countries.

(e) Taking into account bilateral exchange rates variations does not affect the panel estimates.

(f) Agglomeration economies -potentially associated with the combination of increasing returns to scale and factor mobility, a pattern of integration potentially detrimental to the cohesion of the Community- *have been identified for some industries*: the difference in market size has clearly led to a reduced share of IIT in total trade for *chemicals*, *non electrical machinery*, *motor vehicles*, *mining and quarrying*.

In addition, the SEM has had *indirect* effects:

(a) a general impact of the SEM, largely underlined in the *ex ante* studies, was an expected increase in GDPs: here, growth translates in more intra-industry trade, as larger countries achieve returns to scale.

(b) at the same time, in order to foster real convergence, structural funds were implemented in Europe: they might have led to a decrease in differences in income within the Community. Nevertheless, as far as differences in per capita income are taken into account the real convergence over 1986-94 is far from clear[60], for example for Spain *vis-à-vis* core European countries. Thus, over the completion period, real convergence might not have reduced intra-industry trade in vertically differentiated products to the benefit of intra-industry trade in horizontally differentiated ones.

Thus, the empirical evidence on the nature of intra-EC trade is the result of complex relationships, influencing trade types with different intensities. On the whole, intra-European trade has been changed in the following ways, to the benefit of the internal market programme:

(a) cancellation of border formalities has increased intra EC trade flows and has led to a greater share of IIT in bilateral intra-European trade flows;

[60] The effective convergence in real incomes is considered here; it does not exclude catching-up, as a result of structural funds, openness, structural changes etc. But asymmetric shocks might have hindered an effective decrease in *per capita* income dispersion within Europe over the short period taken into account (Hénin and Le Pen, 1995).

(b) cancellation of NTBs has opened the door to a specialisation of countries along lines of comparative advantages: but this latter phenomenon might have played incompletely;

(c) FDI, potentially associated with microeconomic expectations -as suggested by the differentially high increase in intra-European FDI flows and the wave of M&A during the completion period- has finally be a complement rather than a substitute to trade flows, the latter being increased on an IIT basis. It has not been trade displacing.

(d) potential agglomeration economies have played, but have not been sector specific. On the contrary they have been based on spillover effects potentially detrimental to smaller economies.

Thus, the SEM has acted through several channel —namely the cancellation of border formalities, cuts in transaction costs and, increased factor mobility— influencing trade patterns in opposite ways, thus disqualifying a clear-cut diagnosis. The evidence of limited agglomeration economies and the pre-eminence of IIT in vertically differentiated products suggest that so far the implementation of the SEM has neither validated the pessimism of a scenario associating integration with a boost in specialisation, nor replicated the optimistic conclusions emphasised in *ex ante* studies, focusing on gains of increased trade in varieties.

**APPENDIX : NOMENCLATURES**

All calculations for trade types, price/quality ranges and the proxy for product differentiation are done at the elementary level of the Eurostat "Combined nomenclature" (11 countries-10 partners-about 10,000 products-15 years). Only then the figures are aggregated to an industry level: on the one hand for the presentation of the main results, and on the other hand to introduce trade types as dependent variables in the econometric model (country-partner-industry-year).

The most obvious way would be to link our trade data to a production nomenclature (e.g. the NACE), thereby permitting to incorporate industry statistics into the model.

Unfortunately, there are no tables of correspondence on a systematic, year-by-year basis between the Nimexe or HS and the Nace or Nace Rev.1 or any other. There are some incomplete tables, but we would loose information on those products which are not defined.

We therefore propose using the information that already exists for each product, i.e. keep the first 2 digits of 6-digit Nimexe and 8-digit CN products which already defined as "99 Chapters" by Eurostat. These Chapters are then in turn aggregated to 14 industries, partly in interaction with production data available for the econometric analysis.

**Table A-23. Table of correspondence of Eurostat CN-2 Chapters and our 14 industries**

| Industry | CN-2 | Eurostat 2-digit chapters (Combined nomenclature) |
|---|---|---|
| **Agriculture, hunting, forestry (AA)** | | |
| | 01 | live animals |
| | 02 | meat and edible meat offal |
| | 03 | fish and crustaceans, molluscs and other aquatic invertebrates |
| | 04 | dairy produce; birds' eggs; natural honey; edible products of animal origin, not elsewhere specified or |
| | 05 | products of animal origin not elsewhere specified or included |
| | 06 | live trees and other plants; bulbs, roots and the like; cut flowers and ornamental foliage |
| | 07 | edible vegetables and certain roots and tubers |
| | 08 | edible fruit and nuts; peel of citrus fruits or melons |
| | 09 | coffee, tea, mate and spices |
| | 10 | cereals |
| | 11 | products of the milling industry; malt; starches; inulin; wheat gluten |
| | 12 | oil seeds and oleaginous fruits; miscellaneous grains, seeds and fruit; industrial or medical plants; straw a |
| | 13 | lacs; gums, resins and other vegetable saps and extracts |
| | 14 | vegetable plaiting materials; vegetable products not elsewhere specified or included |
| **Food, Beverages, toabacco (AB)** | | |
| | 15 | animal or vegetable fats and oils and their cleavage products; prepared edible fats; animal or vegetable w |
| | 16 | preparations of meat, fish or crustaceans, molluscs or other aquatic invertebrates |
| | 17 | sugars and sugar confectionery |
| | 18 | cocoa and cocoa preparations |
| | 19 | preparations of cereals, flour, starch or milk; pastrycooks' products |

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| | |
|---|---|
| 20 | preparations of vegetables, fruit, nuts or other parts of plants |
| 21 | miscellaneous edible preparations |
| 22 | beverages, spirits and vinegar |
| 23 | residues and waste from the food industries; prepared animal fodder |
| 24 | tobacco and manufactured tobacco substitutes |
| **Mining, quarrying, petroleum (B)** | |
| 25 | salt; sulphur; earths and stone; plastering material, lime and cement |
| 26 | ores, slag and ash |
| 27 | mineral fuels, mineral oils and products of their distillation; bituminous substances; mineral waxes |
| **Chemicals (CD)** | |
| 28 | inorganic chemicals: organic or inorganic compounds of precious metals, of rare-earth metals(...) |
| 29 | organic chemicals |
| 30 | pharmaceutical products |
| 31 | fertilizers |
| 32 | tanning or dyeing extracts; tannins and their derivatives; dyes, pigments and other colouring matter (...) |
| 33 | essential oils and resinoids; perfumery, cosmetic or toilet preparations |
| 34 | soaps, organic surface-active agents, washing preparations, lubricating preparations, artificial waxes, (...) |
| 35 | albuminous substances; modified starches; glues; enzymes |
| 36 | explosives; pyrotechnic products; matches; pyrophoric alloys; combustible materials |
| 37 | photographic or cinematographic products |
| 38 | miscellaneous chemical products |
| 39 | plastics and plastic products |
| 40 | rubber and articles thereof |
| **Wood, paper, printing (E)** | |
| 44 | wood and articles of wood; wood charcoal |
| 45 | cork and articles of cork |
| 46 | wickerwork and basketwork |
| 47 | pulp of wood or of other fibrous cellulosic material; waste and scrap of paper or paperboard |
| 48 | paper and paperboard; articles of paper pulp, paper or paperboard |
| 49 | books, newspapers, pictures and other products of the printing industry; manuscripts, typescripts and pla |
| **Textiles, leather (FD)** | |
| 41 | hides and skins (other than furskins) and leather |
| 42 | articles of leather; saddlery and harness; travel goods, handbags and similar containers;(...) |
| 43 | furskins and artificial fur; articles thereof |
| 50 | silk |
| 51 | wool, fine and coarse animal hair; yarn and fabrics of horsehair |
| 52 | cotton |
| 53 | other vegetable textile fibres; paper yarn and woven fabrics of paper yarn |
| 54 | man-made filaments |
| 55 | man-made staple fibres |
| 56 | wadding, felt and nonwovens; special yarns; twine, cordage, rope and cable and articles thereof |
| 57 | carpets and other textile floor coverings |
| 58 | special woven fabrics; tufted textile products; lace; tapestries; trimmings; embroidery |
| 59 | impregnated, coated, covered or laminated textile fabrics; articles for technical use, of textile materials |
| 60 | knitted or crocheted fabrics |
| 61 | articles of apparel and clothing accessories, knitted or crocheted |
| 62 | articles of apparel and clothing accessories, not knitted or crocheted |
| 63 | other made up textile articles; sets; worn clothing and worn textile articles; rags |

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| | |
|---|---|
| 64 | footwear, gaiters and the like; parts of such articles |
| 65 | headgear and parts thereof |
| 66 | umbrellas, sun umbrellas, walking-sticks, seat-sticks, whips, riding-crops and parts thereof |
| 67 | prepared feathers and down and articles made of feathers or of down; artificial flowers; articles of human |
| **Non metallic mineral products (G)** | |
| 68 | articles of stone, plaster, cement, asbestos, mica or similar materials |
| 69 | ceramic products |
| 70 | glass and glassware |
| 71 | natural or cultured pearls, precious or semi-precious stones, precious metals,(...) |
| 72 | iron and steel |
| **Basic metals and fabricated metals products (HI)** | |
| 73 | articles of iron or steel |
| 74 | copper and articles thereof |
| 75 | nickel and articles thereof |
| 76 | aluminium and articles thereof |
| 78 | lead and articles thereof |
| 79 | zinc and articles thereof |
| 80 | tin and articles thereof |
| 81 | other base metals; cermets; articles thereof |
| 82 | tools, implements, cutlery, spoons and forks, of base metal; parts thereof of base metal |
| 83 | miscellaneous articles of base metal |
| **Non electrical machinery (JA)** | |
| 84 | nuclear reactors, boilers, machinery and mechanical appliances; parts thereof |
| **Electrical machinery (JB)** | |
| 85 | electrical machinery and equipment and parts thereof; sound recorders and reproducers, television image |
| **Motor vehicles (KA)** | |
| 87 | vehicles other than railway or tramway rolling-stock, and parts and accessories thereof |
| **Other transport equipment (KB)** | |
| 86 | railway or tramway locomotives, rolling-stock and parts thereof; railway or tramway track fixtures (...) |
| 88 | aircraft, spacecraft, and parts thereof |
| 89 | ships, boats and floating structures |
| **Professional goods (LA)** | |
| 90 | optical, photographic, cinematographic, measuring, checking, precision, medical or surgical instruments |
| 91 | clocks and watches and parts thereof |
| 92 | musical instruments; parts and accessories for such articles |
| **Other industries (N)** | |
| 93 | arms and ammunition; parts and accessories thereof |
| 94 | furniture; medical and surgical furniture; bedding, mattresses, mattress supports, cushions (...) |
| 95 | toys, games and sports requisites; parts and accessories thereof |
| 96 | miscellaneous manufactured articles |
| 97 | works of art, collectors' pieces and antiques |
| 98 | components of complete industrial plants of chapter 63: power production, (...) |
| 99 | other products |

Note: The chapters in the NIMEXE nomenclature (until 1987) change slightly compared to those in the CN. Their aggregation towards the 14 industries takes into account these differences..

**Table A-24. Table of correspondance of ISIC and our 14 industries**

| Industry | Code | ISIC |
|---|---|---|
| Agriculture, hunting and forestry | AA | 1000 |
| Food, beverages and tobacco | AB | 31 |
| Mining, quarrying and petroleum | B | 2000+353+354 |
| Chemical products | CD | 35 - 353-354 |
| Wood, paper and printing | E | 33+34-332 |
| Textiles and leather | FD | 32 |
| Non metallic mineral products | G | 36 |
| Basic metall industries | HI | 37+381 |
| Non electrical machinery | JA | 382 |
| Electrical machinery | JB | 383 |
| Motor vehicles | KA | 3843+3844 |
| Other transp equipment | KB | 384-3843-3844 |
| Professional goods | LA | 385 |
| Other manufacturing nes | N | 39 |

**Figure A-32. Share of trade types in bilateral trade, 1994**

Two-way trade in similar products

| | F | BL | NL | D | I | UK | IRE | DK | G | P | E | UE12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| F | | 29.0 | 13.4 | 28.2 | 22.9 | 24.3 | 1.6 | 5.6 | 1.4 | 13.4 | 24.5 | 24.1 |
| BL | 29.0 | | 31.4 | 24.6 | 14.3 | 8.7 | 4.2 | 2.6 | 0.6 | 2.9 | 10.2 | 23.2 |
| NL | 13.4 | 31.4 | | 20.7 | 7.4 | 16.4 | 6.7 | 7.5 | 0.7 | 4.0 | 5.7 | 18.9 |
| D | 28.2 | 24.6 | 20.7 | | 15.5 | 18.1 | 1.9 | 11.9 | 6.3 | 4.8 | 18.0 | 20.5 |
| I | 22.9 | 14.3 | 7.4 | 15.5 | | 11.4 | 1.2 | 2.5 | 5.2 | 3.5 | 25.7 | 16.2 |
| UK | 24.3 | 8.7 | 16.4 | 18.1 | 11.4 | | 13.0 | 8.2 | 2.1 | 4.0 | 19.9 | 16.5 |
| IRE | 1.6 | 4.2 | 6.7 | 1.9 | 1.2 | 13.0 | | 2.6 | | 1.5 | 3.7 | 7.9 |
| DK | 5.6 | 2.6 | 7.5 | 11.9 | 2.5 | 8.2 | 2.6 | | 0.4 | 1.4 | 2.6 | 8.1 |
| G | 1.4 | 0.6 | 0.7 | 6.3 | 5.2 | 2.1 | | 0.4 | | 0.2 | 1.6 | 3.7 |
| P | 13.4 | 2.9 | 4.0 | 4.8 | 3.5 | 4.0 | 1.5 | 1.4 | 0.2 | | 11.1 | 7.5 |
| E | 24.5 | 10.2 | 5.7 | 18.0 | 25.7 | 19.9 | 3.7 | 2.6 | 1.6 | 11.1 | | 18.9 |
| UE12 | 24.1 | 23.2 | 18.9 | 20.5 | 16.2 | 16.5 | 7.9 | 8.1 | 3.7 | 7.5 | 18.9 | 19.2 |

Two-way trade in vertically differentiated products

| | F | BL | NL | D | I | UK | IRE | DK | G | P | E | UE12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| F | | 41.3 | 42.4 | 54.8 | 38.2 | 44.4 | 23.5 | 25.9 | 17.0 | 23.4 | 38.9 | 44.3 |
| BL | 41.3 | | 43.7 | 42.3 | 30.0 | 55.4 | 22.0 | 28.8 | 7.9 | 18.7 | 28.4 | 42.0 |
| NL | 42.4 | 43.7 | | 44.3 | 27.8 | 51.1 | 14.2 | 36.2 | 4.9 | 12.3 | 27.1 | 41.9 |
| D | 54.8 | 42.3 | 44.3 | | 43.3 | 56.8 | 29.5 | 38.8 | 12.5 | 23.6 | 42.2 | 46.9 |
| I | 38.2 | 30.0 | 27.8 | 43.3 | | 42.7 | 16.1 | 18.1 | 7.7 | 18.6 | 30.2 | 36.9 |
| UK | 44.4 | 55.4 | 51.1 | 56.8 | 42.7 | | 46.4 | 32.7 | 12.6 | 15.1 | 31.1 | 47.9 |
| IRE | 23.5 | 22.0 | 14.2 | 29.5 | 16.1 | 46.4 | | 17.5 | | 3.9 | 8.6 | 34.4 |
| DK | 25.9 | 28.8 | 36.2 | 38.8 | 18.1 | 32.7 | 17.5 | | 4.9 | 9.4 | 13.8 | 31.9 |
| G | 17.0 | 7.9 | 4.9 | 12.5 | 7.7 | 12.6 | | 4.9 | | 1.5 | 5.5 | 10.3 |
| P | 23.4 | 18.7 | 12.3 | 23.6 | 18.6 | 15.1 | 3.9 | 9.4 | 1.5 | | 37.1 | 23.9 |
| E | 38.9 | 28.4 | 27.1 | 42.2 | 30.2 | 31.1 | 8.6 | 13.8 | 5.5 | 37.1 | | 35.2 |
| UE12 | 44.3 | 42.0 | 41.9 | 46.9 | 36.9 | 47.9 | 34.4 | 31.9 | 10.3 | 23.9 | 35.2 | 42.3 |

One-way trade

| | F | BL | NL | D | I | UK | IRE | DK | G | P | E | UE12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| F | | 29.7 | 44.2 | 17.0 | 38.9 | 31.3 | 74.9 | 68.5 | 81.7 | 63.2 | 36.5 | 31.6 |
| BL | 29.7 | | 24.9 | 33.1 | 55.7 | 35.9 | 73.9 | 68.7 | 91.6 | 78.4 | 61.4 | 34.8 |
| NL | 44.2 | 24.9 | | 35.0 | 64.9 | 32.5 | 79.0 | 56.4 | 94.4 | 83.7 | 67.2 | 39.3 |
| D | 17.0 | 33.1 | 35.0 | | 41.2 | 25.1 | 68.5 | 49.3 | 81.3 | 71.6 | 39.8 | 32.6 |
| I | 38.9 | 55.7 | 64.9 | 41.2 | | 45.9 | 82.7 | 79.4 | 87.1 | 77.9 | 44.1 | 46.9 |
| UK | 31.3 | 35.9 | 32.5 | 25.1 | 45.9 | | 40.7 | 59.1 | 85.3 | 80.9 | 49.0 | 35.6 |
| IRE | 74.9 | 73.9 | 79.0 | 68.5 | 82.7 | 40.7 | | 79.8 | | 94.6 | 87.7 | 57.7 |
| DK | 68.5 | 68.7 | 56.4 | 49.3 | 79.4 | 59.1 | 79.8 | | 94.8 | 89.2 | 83.6 | 60.0 |
| G | 81.7 | 91.6 | 94.4 | 81.3 | 87.1 | 85.3 | | 94.8 | | 98.4 | 92.9 | 86.0 |
| P | 63.2 | 78.4 | 83.7 | 71.6 | 77.9 | 80.9 | 94.6 | 89.2 | 98.4 | | 51.8 | 68.6 |
| E | 36.5 | 61.4 | 67.2 | 39.8 | 44.1 | 49.0 | 87.7 | 83.6 | 92.9 | 51.8 | | 45.9 |
| UE12 | 31.6 | 34.8 | 39.3 | 32.6 | 46.9 | 35.6 | 57.7 | 60.0 | 86.0 | 68.6 | 45.9 | 38.5 |

The sum of the three part of the trade types add up to 100 percent for each couple.

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