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Structural Changes in EU's Trade with Central Europe

DIPLOMOVÁ PRÁCA

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Prehlasujem, že diplomovú prácu som vypracoval samostatne, len s použitím konzultácií a literatúry uvedenej v zozname.

Ďakujem svojmu školiteľovi Doc. Dr. Jarkovi Fidrmucovi za odbornú pomoc, cenné pripomienky a podnety, ako aj za všestrannú ochotu a podporu prejavenú pri vedení práce.

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Abstract

This thesis shows that the so called new trade theory provides an appropriate theoretical framework to explain several features of the trade development of the European Union (EU) with the Central and Eastern European countries (CEECs) as well as with other comparative countries. The new trade theory has developed efficient tools for deep analysis of trade structure and structural changes.

From the point of view of recent developments, the Eastern enlargement of the EU comes hand in hand with the questions and discussions about the catching-up of the transition countries. The thesis shows that intraindustry trade and its importance in trade between selected countries indicates, beside the integration degree of their economies, the process of the economic convergence. The development and dynamics of intraindustry trade allows us to explore the basic principles of structural changes and the general features of the catching-up process. In particular, the diploma thesis presents various aspects of intraindustry trade and empirical analysis of EU's trade with the CEECs and other comparative countries (including OECD and several transition countries not acceding to the EU in 2004).

Contents

I. Introduction

Why do countries trade with other countries? Although the answer to this classical question might seem obvious, indeed, there are many theories and models trying to cover and explain the trade factors. Beginning with the Ricardian model of foreign trade, the questions regarding trade factors and effects are still a subject to an intensive discussion, which has gained further impetus with the emergence of globalisation issues in the last decade. In recent decades new approaches to trade theory have weakened or removed the assumptions of the traditional trade theory (constant returns to scale, homogeneity of production and perfect competition). In particular, the so-called new trade theory (which was motivated by ground breaking works by Norman, Krugman and Helpman) stresses the importance of increasing returns to scale, product differentiation and imperfect competition.

The traditional theory explains trade by differences between countries, especially by differences in relative factor endowments (Heckscher-Ohlin model) or differences in production technologies (Ricardian model). In particular, the Heckscher-Ohlin model derives an inverse relationship between the similarity of factor endowments and the volume of trade between the countries. In practise, however, "*nearly one half of the world's trade consists of trade between industrial countries that are relatively similar in their relative factor endowments"* (Helpman and Krugman, 1985, p.2).

On the one hand, the traditional trade theory implies that countries should export goods intensive in those natural resources (production factors) which are relatively abundant in their economies. From the point of view of the traditional trade theory, the existence of high intraindustry trade (which is not just an artefact of inappropriate statistical aggregation) cannot be sufficiently explained (except for basic cases of e.g. trade in seasonal agricultural products between countries of different climatic zones). We would get the same result when turned to foreign direct investment. In the perfectly competitive, constant-returns world of traditional theory there are no visible gains to multinational firms. However, empirical observations in these areas provide numerous rejections of conclusions derived from traditional trade theory. There are apparent failures in the attempts to explain the volume of trade, its composition, the volume and role of intrafirm trade and foreign direct investment.

On the other hand, the new trade theory based on economies of scale provides us with a relatively straightforward explanation of several empirical puzzles. Let's consider the problem of trade between similar countries. If there are economies of scale, such trade presents no puzzle for the theory at all. Even if differences in factor rewards do not create an incentive for specialisation and trade, the advantages of large-scale production will still lead to specialisation and trading between countries. Increasing returns also provide an explanation of intraindustry trade. The more similar the countries are in their natural resources, the greater is also the importance of intraindustry trade in the bilateral exchange.

The concept of intraindustry trade and its explanation offers also a very useful and precise way of surveying and studying the link between trade and the issues of economic convergence, economic development, industrial location, economic integration and the globalisation.

II.1 A Brief Introduction to New Trade Theory: Economies of Scale, Comparative Advantage and Intraindustry Trade

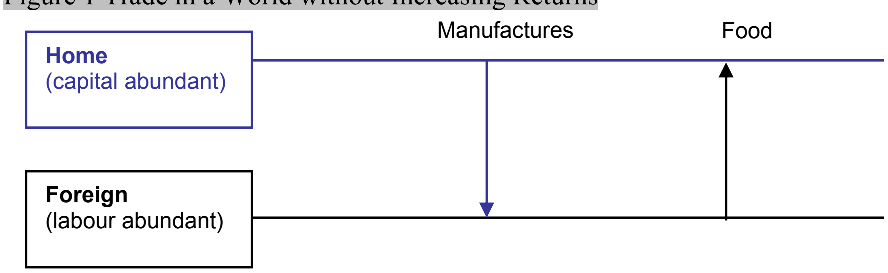
Let us imagine the world economy consisting only of two countries, Home and Foreign. There are two factors of production in both countries, Capital and Labour. We assume Home as a capital-abundant country, considering that it has a higher capital-labour ratio than Foreign. Let us also imagine that there are two kinds of industry, manufactures and food industry, with manufactures the more capital-intensive one.

Instead of taking manufactures as a perfectly competitive industry, we suppose it to be a monopolistically competitive industry with firms all producing differentiated products. When considering the idea of economies of scale, neither country is producing the full range of manufactured products by itself. Both countries may produce some manufactures, but they will be producing slightly different products.

Let's discuss the difference between considering manufactures as a perfectly competitive industry and monopolistically competitive industry.

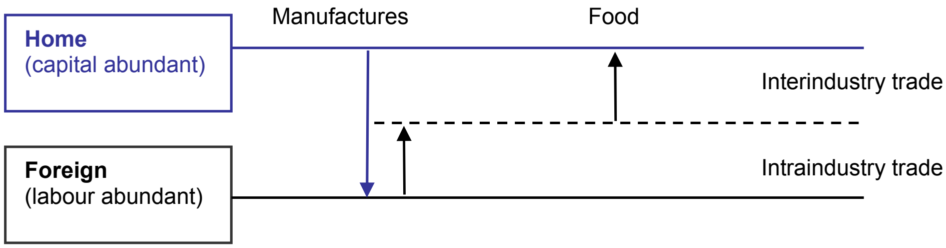
If manufactures were not a differentiated product sector, Home as a capital-abundant country (and manufactures as a capital-intensive industry) would have larger relative supply of manufactures and therefore would export them and import food on the other hand.

Figure 1 Trade in a World without Increasing Returns



If we assume that the manufacturing is a monopolistically competitive sector with firms producing products differentiated from other firms', Home will still be a net exporter of manufactures and importer of food products, but there will be a difference. Foreign firms in the manufacturing sector will produce products different from those Home firms produce. Because some Home consumers will prefer Foreign varieties, Home will import as well as export within the manufacturing industry.

Figure 2 Trade in a World with Increasing Returns and Monopolistic Competition



In summary, we can think of world trade in a monopolistic competition model as consisting of two parts. There is a two-way trade within the manufacturing sector. This exchange of manufactures for manufactures is the so called intraindustry trade. The remainder of the trade, the exchange of manufactures for food is called interindustry trade.

Interindustry trade reflects the comparative advantage principle. Home as the capital-abundant country is a net exporter of capital-intensive manufactures and a net importer of the labour-intensive food. Comparative advantage continues to be a major part of the point of trade existence.

Intraindustry trade, that is the exchange of manufactures for manufactures as mentioned above, does not reflect comparative advantage. Even if we omit the fact that the overall capital-labour ratios of the countries differ, still the firms in both countries produce differentiated products and the demand of consumers for the products made abroad is generating intraindustry trade. The reason for keeping each country from producing the full range of products for itself is the idea of economies of scale, an independent source of international trade.

The relative importance of interindustry and intraindustry trade depends on the similarity between the countries. If countries pose similar capital-labour ratios, then there is little interindustry trade, yet, the intraindustry trade based on economies of scale is dominant. On the other hand, if the capital-labour ratios are significantly different, there is little intraindustry trade based on economies of scale. Nearly all trade is based on comparative advantage.

As formulated by Krugman and Obstfeld (2000), intraindustry trade tends to be prevalent between countries that are similar in their capital-labour ratios, skill levels, and so on. Thus, intraindustry trade will be dominant between countries at a similar level of economic development. This well-known conclusion of the new trade theory will be derived in the next section.

II.2 Product Differentiation and Intraindustry Trade – Theoretical model

The model described in this section is based on assumptions of product differentiation, economies of scale and imperfect competition. Following Dixit and Norman (1980), the model includes two sectors. First, the industry consists of close substitute products produced with the same technology characterized by increasing returns to scale. Second, other products characterized by constant return to scale technology are summarized in the numeraire sector. The model assumes two countries, Home and Foreign (the rest of the world). Nevertheless, the model can be easily extended to a larger number of countries. Although both countries can also fully specialize on particular sectors, the presentation below is for a case when all countries produce both types of products.

Demand

For simplicity, the model uses the assumption of identical and homothetic preferences of consumers in both countries. This means, that consumers have the same preferences and moreover, consumers with different income but facing the same prices, demand the goods in the same proportions. This simplifies the derivation of aggregate commodity demands from the same utility functions in both countries. Two types of consumer goods enter into the utility function. The first one, labelled 0, is a numeraire good intended to embody all goods other than those of the industry under focus, the other kind being differentiated products. The latter goods are differentiated, in other words the elasticity of substitution between any pair of them is finite.

The model uses a special form of a utility function. Utility is Cobb-Douglas in the quantity of the numeraire good and a scalar measure of consumption of differentiated products. This scalar measure is based on a constant elasticity of substitution function in the quantities of each product type. The total number of consumer in the two countries is fixed. For simplicity, the world population is indexed to 1. As a result, there is no difference between total and per capita quantities. The utility function,

$$U(c_0, c_1) = \left(\sum_k c_k^{\beta} \right)^{\frac{\alpha}{\beta}} c_0^{1-\alpha}, \tag{1}$$

is increasing and homothetic in its arguments, where c_0 and c_k denote the respective quantities of the numeraire and the differentiated goods. The assumption of concavity of the utility function requires $0 < \alpha < 1$. The term in brackets measures the consumption of differentiated products. The subutility function of the consumption of differentiated products,

$$u = \left(\sum_i c_i^{\beta} \right)^{\frac{1}{\beta}} , \tag{2}$$

is concave and symmetrical (every pair of varieties is equally well substitutable for each other). These properties imply that the individuals will choose to consume equal quantities of all varieties if they are equally priced. The elasticity of substitution for the Cobb-Douglas utility function between the differentiated goods and the numeraire is unity. Therefore $0 < \beta < 1$, because otherwise the differentiated products among themselves would be worse substitutes than both product types to each other.

World demand is found by maximizing the utility function to the budget constraint

$$c_0 + \sum_k p_k c_k = y , \tag{3}$$

where p_k are prices and y is the total of factor income and profits for the world.

Let us derive the inverse demand function. The demand for the numeraire in terms of consumption of differentiated products and income can be found from the consumer's budget condition, $c_0 = y - \sum_k p_k c_k$, which can be inserted into the utility function. The first order condition is

$$\alpha c_k^{\beta} \left(\sum_k c_k^{\beta} \right)^{\frac{\alpha - \beta}{\beta}} c_0^{1-\alpha} - (1-\alpha) p_k c_k^{-\alpha} \left(\sum_k c_k^{\beta} \right)^{\frac{\alpha}{\beta}} = 0 \tag{4}$$

and after rearranging we see
$$p_k = \frac{\alpha c_k^{\beta - 1} c_0}{(1-\alpha) \sum_k c_k^{\beta}} . \tag{4'}$$

Solving the budget constraint we get

$$c_0 = y - \sum_k p_k c_k = y - \frac{\alpha c_0 \sum_k c_k^{\beta}}{(1-\alpha) \sum_k c_k^{\beta}} = y - \frac{\alpha c_0}{(1-\alpha)} , \tag{5}$$

what implies

$$c_0 = (1-\alpha) y . \tag{6}$$

This gives us, together with (4'), the inverse demand function

$$p_j = \frac{\alpha c_j^{\beta - 1} y}{z} , \tag{7}$$

where

$$z = \sum_k c_k^{\beta} . \tag{8}$$

These functions are describing the world as a whole. Country's quantities are found by multiplying world demands by the country's share in world income, which follows from the assumption of identical preferences between the countries. As a result, the pattern of consumption is the same, although the pattern of production is different between the countries.

Production

The numeraire good is produced with constant returns to scale in a perfect competition. There are economies of scale in the production of the differentiated products and the market structure is one of the Chamberlinian monopolistic competition. The potential range of varieties is assumed to be so large that only a finite subset of the range is actually produced. The number of differentiated goods produced will therefore be determined by the entry condition for the industry. Production functions are the same for all product varieties. Both countries are on the same level of technology. The numeraire good has a unit cost function $b(w)$ of factor prices. Let w be the vector of factor prices in the home country and W the same in the foreign country. We assume for the moment both countries produce the numeraire good, so the zero-pure-profit conditions are

$$b(w) = 1 = b(W) \ . \tag{9}$$

When speaking about differentiated products, each product type has the same total cost function $f(\ )h(\ )$, where f is dependent on factor prices and h depends on the output quantity. Thus the production functions are homothetic; in particular the factor proportions are independent of the output level. This is restrictive but has the merit of highlighting certain aspects of the question of the factor price equalization. There are clear economies of scale, as $h(x)/x$ is decreasing over the relevant range of output levels x. Only one producer undertakes production of each variety of differentiated products. A new potential producer entering the market can do better by introducing a new product variety than by sharing in the production of an existing product type. The number of produced varieties is large enough to take oligopolistic interactions as unimportant and negligible, so it is a monopolistically competitive industry. Each producer is trying to maximize profit given the inverse demand function facing him and treating the outputs of others as fixed and world income as beyond his control.

We find the elasticity of the inverse demand function for the producer of good j as follows. From (7) we get

$$\varepsilon_{c_j, p_j} = \frac{c_j}{p_j} \frac{\partial p_j}{\partial c_j} = (\beta - 1) - \frac{c_j}{z} \frac{\partial z}{\partial c_j} \ . \tag{10}$$

The second term on the right hand side of the equation reflects the indirect effect that an increase in the quantity of one product type has on the price of that variety. Using (8) we see the effect is

$$\frac{c_j}{z}\frac{\partial z}{\partial c_j} = \beta \frac{c_j^{\beta}}{\sum_k c_k^{\beta}} = \beta \frac{1}{n}, \tag{11}$$

where n is the number of product varieties (note that each variety is produced at the same volume by the symmetricity assumption). We see that this is inversely related to the total number of product varieties and multiplied by β. Under our assumptions of a large number of firms, this term is negligible. Thus we get approximated elasticity of inverse demand above equal to $(1-\beta)$ in absolute value, so the marginal revenue for the producer of product type j is βp_j. This is equal to marginal costs when maximizing profit. The marginal costs are $f(w)h'(x_j)$, so for a differentiated product j, we get

$$\beta p_j = f(w)h'(x_j). \tag{12}$$

We consider only long-term equilibrium, which means no producer has incentives to leave or enter the industry. If the differentiated products are produced in the home country at all, there must be zero pure profits in the industry, what means that the number of product types must be such that average revenue equals average costs:

$$p_j = \frac{f(w)h(x_j)}{x_j}. \tag{13}$$

From (12) and (13) by dividing we find

$$\beta = \frac{x_j h'(x_j)}{h(x_j)}. \tag{14}$$

This is true for all products j produced, regardless of factor prices (so long as differentiated products are produced at all in the country we are looking at). Provided the right-hand side is a monotonic function of x_j, the equation will have a unique solution. This implicates that all product varieties in existence have the same output level, the common value of x defined by

$$\beta = \frac{xh'(x)}{h(x)}. \tag{15}$$

This result depends on homotheticity in production. The special form of the utility function is less important; also for more general function the left side will be a function of x alone, which is all that matters. The convenience of the result lies in the fact that it allows us to concentrate on the number of products in the industry.

General Equilibrium

We assume that each country is active in the production of at least one variety from the industry. Then we have equations like (12) and (13) for each country for at least one *j*. Using (15), all these can be summarized into the following:

$$\beta p = f(w)h'(x), \tag{16}$$

$$px = f(w)h(x). \tag{17}$$

With given (15), only one of the (16) and (17) can be regarded as independent. Given for example (15) and (16) we can derive (17).

Let's have a look at the equilibrium conditions in the factor markets. We know that the cost-minimizing factor inputs are the derivates of the appropriate cost functions with respect to factor prices. Let x_0 be the home production of the numeraire good and n the number of differentiated products produced in the home country. Let X_0 and N be the corresponding entities for the foreign country. Then we have the equilibrium conditions

$$x_0 b_w(w) + nf_w(w)h(x) = v, \tag{18}$$

$$X_0 b_w(W) + Nf_w(W)h(x) = V, \tag{19}$$

where v and V are the factor endowments vectors. We require that the world output levels be are compatible with equilibrium in the goods markets. Noting that world income is factor income alone, since profits vanished in Chamberlinian equilibrium, total income is $(wv + WV)$. Substituting in (6) and (7) we see

$$p = \frac{\alpha(wv + WV)}{x(n+N)}, \tag{20}$$

$$x_0 + X_0 = (1-\alpha)(wv + WV). \tag{21}$$

If m is the number of factors in each country, we have in (18)-(21) ($2m$+2) equations, of which one is redundant by Walras's law. To complete the determination of the equilibrium, we append previously mentioned (9) and (15)-(17). So we have ($2m$+6) equations, these suffice to determine the ($2m$+6) unknowns p, x, n, N, x_0, X_0, w and W, subject to the usual caveats concerning existence and uniqueness.

We can also see the equilibrium from a different point of view. Let (15) fix x and then think of the industry under consideration as producing just one good, namely the number of products. This is produced at constant unit cost $\phi(w) = f(w)h(x)$ and sold competitively at price $\rho = px$.

The equilibrium conditions then become

$$b(w) = 1 = b(W), \tag{22}$$

$$\phi(w) = \rho = \phi(W), \tag{23}$$

$$x_0 b_w(w) + n\phi_w(w) = v\,, \qquad (24)$$

$$X_0 b_w(W) + N\phi_w(W) = V\,, \qquad (25)$$

$$x_0 + X_0 = (1-\alpha)(wv + WV), \qquad (26)$$

$$n + N = \frac{\alpha(wv + WV)}{\rho}. \qquad (27)$$

Intraindustry Trade

Let us suppose that the home country accounts for a fraction λ of the world income. With homothetic preferences, it consumes the same fraction λ of the world output of each good, $c_0 = \lambda(x_0 + X_0)$ and $c = \lambda x$ for each of the (n+N) differentiated goods produced. Its production is x_0 for the numeraire good and x for each of n varieties of the differentiated goods. We can also suppose without loss of generality that the home country is a net exporter of differentiated goods. Suppose it produces the first n of these by choice of labelling. Define $\sigma = n/(n+N)$, so σ is the home country's share in world production of differentiated products. For the home country, net imports of the numeraire are $c_0 - x_0 = \lambda X_0 - (1-\lambda)x_0$. Its exports of varieties 1, 2, …, n are $(1-\lambda)x$ each and its imports of varieties (n+1), …, (n + N) are λx. The total trade is balanced, that is

$$\lambda X_0 - (1-\lambda)x_0 = np(1-\lambda)x - Np\lambda x\,. \qquad (28)$$

Total exports of differentiated goods are of value

$npx(1-\lambda) = (n+N)px\sigma(1-\lambda)$, where $\sigma = \dfrac{n}{n+N}$,

while net exports of differentiated goods are

$npx(1-\lambda) - Npx\lambda = (n+N)px(\sigma(1-\lambda) - (1-\sigma)\lambda) = (n+N)px(\sigma - \lambda)$.

We have chosen labels so that the home country is a net exporter of these goods, that is, $\sigma > \lambda$. For the foreign country, gross exports of differentiated goods are similarly seen to be $(n+N)px(1-\sigma)\lambda$. For the world as a whole, we have the gross trade

$$T_G = (n+N)px(\sigma(1-\lambda) + (1-\sigma)\lambda) \qquad (29)$$

and net trade with differentiated products

$$T_N = (n+N)px(\sigma - \lambda)\,. \qquad (30)$$

The difference between them is intraindustry trade. Simplifying we see

$$T_I = 2(n+N)px\lambda(1-\sigma)\,. \qquad (31)$$

From these expressions, we see some implications.

The first one is the confirmation of our observation, that net trade (the net exchange of differentiated goods for the numeraire good) is explained by conventional comparative advantage. In the formula for net trade the share of the home country in the production of differentiated goods is larger than its share of world income. If both countries were identical, we would have $\lambda = \sigma = \frac{1}{2}$ and no net trade.

The next implication is that the gross trade is not related to comparative advantage only, but to the correlation between the comparative advantage and the size of the country. Fixing $(n+N)px$ in (29) we find that the right side of the formula takes on its maximum value when $\lambda = 0$ and $\sigma = 1$, which in other words means a small country with a great comparative advantage in the production of differentiated goods.

From (31) we see that intraindustry trade is more important when λ is large and on the other hand σ small. Since we have the assumption $\sigma > \lambda$, this means that intraindustry trade will be at its height when each of these is $\frac{1}{2}$, or in other words, if the two countries are of a similar size and have no clear comparative advantage in their industries, then we see the predominant pattern of trade as one of intraindustry trade.

We can relate these conclusions to the work of Grubel and Lloyd (1975). They defined the Grubel-Lloyd index (GLI) for the manufacturing sector as

$$GLI = 1 - \frac{|T_N|}{T_G}.$$

This index shows that the more different the countries are the lower is the value of the index. We will use this index in empirical part of this thesis later to identify the levels of intraindustry trade between trading countries.

III. Empirical Measurement of Intraindustry Trade

The empirical part of the thesis is based on the trade flows 3-digits SITC commodity groups data provided by UN statistics. The investigated period 1989-2001 is characterized by dramatic institutional changes which can be observed from the results. Newly emerging market economies arose. Germany reunified (1990), Slovenia became independent (1991), Czechoslovakia divided into Czech and Slovak Republics (1993), Austria, Finland and Sweden joined the EU (1995). Apart from that, UN introduced a new scheme of trade statistics (SITC Revision 3). All these facts probably have significant impact also on the quality of the trade data.

The aim of the empirical part of this thesis is to measure the scale of convergence of central and eastern European trade to the trade structure of the EU member states (I will examine also some other countries, though). The analysis of trade growth is separated into three parts.

In the first part, the level of intraindustry trade is measured using Grubel-Lloyd index. This part evaluates intraindustry trade from the static point of view.

In the second part, the estimation of the Grubel-Lloyd indices based on theoretical assumptions will be discussed as well as determinants of the intraindustry trade themselves.

Finally, the third part looks at intraindustry trade from the 'dynamics' side. I compute transition probabilities of mobility among different segments of the production distribution and compute transition matrixes.

III.1 Grubel-Lloyd Index and Intraindustry Trade

The Grubel-Lloyd index (GLI) was originally introduced in 1971. It is defined as the share of the absolute value of trade balance, called also volume of intraindustry trade, in trade turnover by highly disaggregated commodity groups:

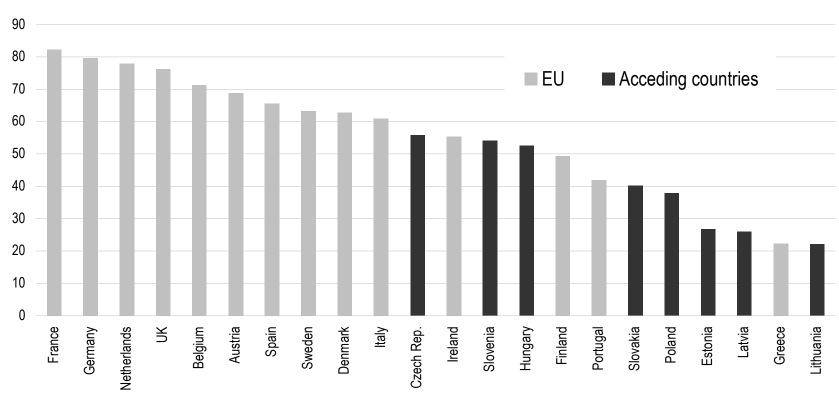
$$GLI_{it} = 1 - \frac{|X_{it} - M_{it}|}{X_{it} + M_{it}}$$

where *X* and *M* denote EU exports and imports (in 3-digit SITC commodity groups defined by UN), respectively. An index value of 0 shows that there is exclusive interindustry trade, i.e. a complete specialization on different products for each country, while an index value of 1 indicates exclusive intraindustry trade. *GLI* is widely used as a measurement of intraindustry trade. However, it is measured in only one period and therefore does not capture changes in trade flows.

According to the Transition report 2003 published by European Bank for Reconstruction and Development (EBRD), transition countries are striking examples of the fact, that the world economy is becoming increasingly integrated. Formerly a largely isolated trade bloc, with few interactions with the world economy, the region now sends and receives more than two-thirds of its goods and services to and from the rest of the world (EBRD, 2003). Detailed trade flow table (Table A1) can be found in the appendix.

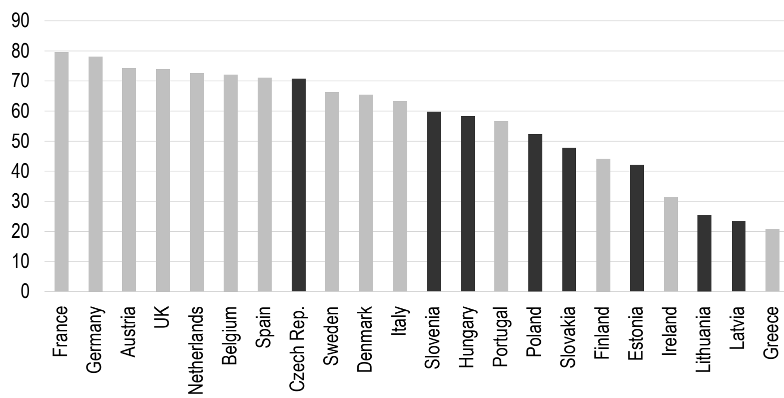
The EU's intraindustry trade is concentrated on manufacturing products. The shares of intraindustry trade in total trade (including manufacturing and non-industrial products) of EU are slightly lower than those of manufacturing trade alone (Fidrmuc, 2001). Figure 1 (see Table A2 and A3 in appendix for the full list of examined countries and examination period 1989-2001) shows the countries' level of intraindustry trade in manufacturing products with EU-15 countries in 1993.

Figure 1: Intraindustry trade in the manufacturing products with the EU-15 in 1993, per cent



At the beginning of the economic transition, the acceding countries' levels of intraindustry trade in manufacturing products with the EU-15 were in range from 20 per cent (Lithuania - 17.7 per cent in 1992) to about 50 per cent (Hungary - 40.5 per cent in 1989, Slovenia – 50.7 per cent in 1992). In other words we can say that in the first years of transition in acceding countries, intraindustry trade between them and EU-15 was more or less equally important as in more peripheral EU countries such as Greece (25.62 per cent in 1989) and Portugal (41.8 per cent in 1989). These shares were far below the shares reported by the more centrally located EU countries, which were between about 60 percent (Italy – 62.2 per cent in 1989, Spain – 66.5 per cent in 1989) up to about 80 per cent (Netherlands – 77.4 in 1989, France – 80.5 in 1989).

Figure 2: Intraindustry trade in the manufacturing products with the EU-15 in 2001, per cent

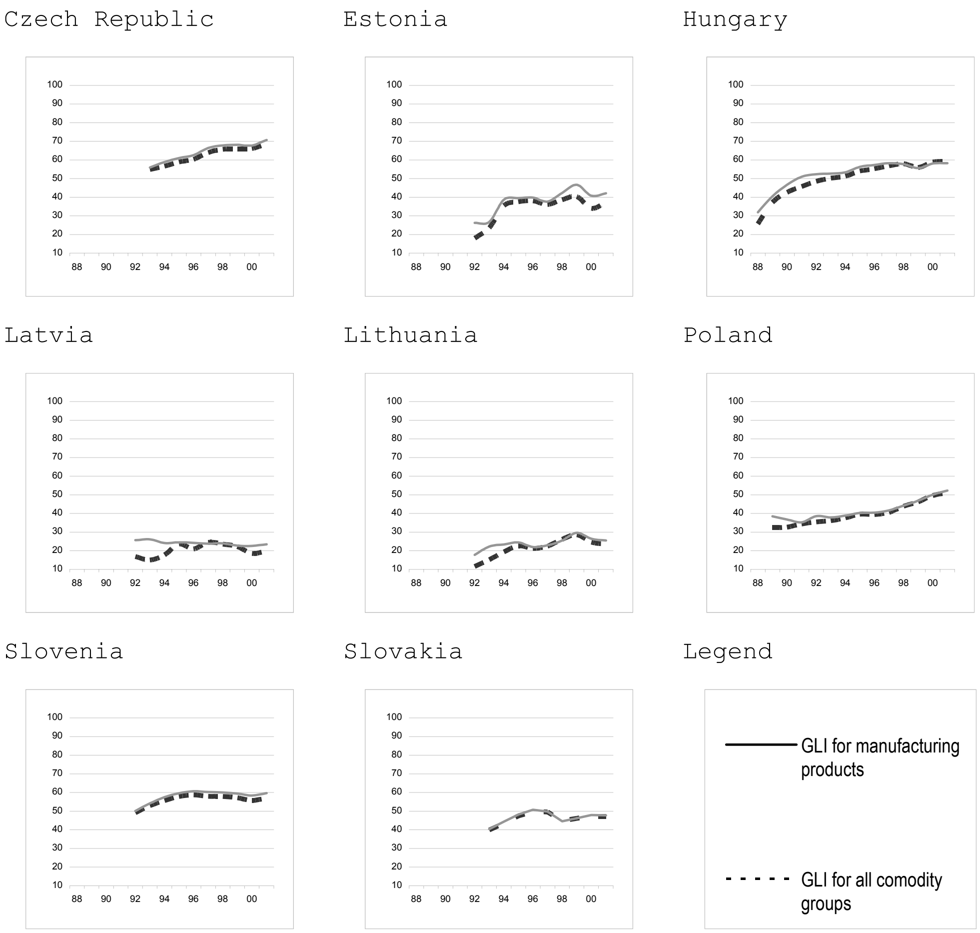


The situation changed in the 1990s. Almost all CEECs experienced significant growth of intraindustry trade (Figure 2). Best performing CEECs (Czech Republic – 70.7 per cent in 2001, Slovenia – 59.7 per cent in 2001, Hungary – 58.2 per cent in 2001) reached intraindustry shares in trade with EU-15 comparable to member countries (Spain – 71.0 per cent in 2001, Italy – 63.2 per cent in 2001). The shares of other countries (Estonia – 42.1 per cent, Slovakia – 47.7 per cent, Poland – 52.3 per cent) in 2001 were lower than in 1989, but still comparable to the share of Finland (44.2 per cent). However, the position of Latvia (23.4 per cent) and Lithuania (25.5 per cent) was not changed; their shares remained comparable to those of Greece (20.8 per cent) or Ireland (30.4 per cent).

Several CEECs have experienced declines of intraindustry trade following after the initial optimistic growth: Slovakia (the highest share if intraindustry trade observed in 1996 – 50.7 per cent) and to some extent also Latvia. According to (Fidrmuc, 2001), this may indicate a stabilization of the EU's intraindustry trade with these countries at long-run levels. These fluctuations, however, can bee seen also in the intraindustry trade among EU member countries.

Figure 3 shows the overall development of the CEECs' intraindustry trade shares in trade with EU-15 in recent decade (for other countries see Figure A1 in Appendix).

Figure 3: CEECs intraindustry trade shares in trade with EU-15



III.2 Determinants of Intraindustry Trade in the EU's trade

As the new trade theory concludes, the shares of intraindustry trade of catching-up countries should increase as part of the convergence to the income level of developed countries. Furthermore, large countries are expected to have more diversified trade structure than smaller countries (specialized only on few products). Barriers to trade (such as natural geographical borders or long distances) also influence the structure of trade. Originally, Loertscher and Wolter (1980) note that intraindustry trade between countries is intense if

a) The GDP per capita of these countries is high and the difference in this indicator is small
b) The average size of their aggregate outputs is high and similar.

Helpman (1987) estimates this formula

$$GLI_{ij} = \alpha_0 + \alpha_1 \log\left|y_i - y_j\right| + \alpha_2 \min\left(\log(Y_i), \log(Y_j)\right) + \alpha_3 \max\left(\log(Y_i), \log(Y_j)\right) \quad (1)$$

on separate cross-sections of 91 country pairs from 1970 to 1981, where GLI_{ij} is the Grubel-Lloyd index (for 4-digit SITC commodity groups) in trade between countries *i* and *j* and *Y* and *y* are aggregate income and income per capita of the countries. Based on models of trade in differentiated products, Helpman argues that the share of intraindustry trade is negatively correlated with income difference ($\alpha_1 < 0$) and positively correlated with country size ($\alpha_2 > 0$ and $\alpha_3 < 0$). His assumptions were supported by the data and this result was confirmed also by other authors (Hummels and Levinsohn in 1995). Correspondingly, I use a slightly different form of the Helpman's regression equation

$$\log\left(\frac{GLI_{i,t}}{1 - GLI_{i,t}}\right) = \alpha_0 + \alpha_1 \log\left|y_i - y_{EU}\right| + \alpha_2 \log\left(Y_i\right) + \alpha_3 \log\left(Y_{EU}\right) + \beta X \qquad (2)$$

for estimating the determinants of intraindustry trade between EU and OECD countries in manufacturing products. In comparison to equation (1), regression specification given by (2) reflects that Grubel-Lloyd index for manufacturing products is defined between 0 and 1. Hummels and Levinsohn (1995) suggest using the logistic transformation which removes this restriction. Following Fidrmuc (2001) I also don't distinguish between the maximum and minimum of total incomes of trading partners, because the aggregate output of the EU-15 represents the highest GDP in the data sample in nearly all periods. This doesn't change of course the interpretation of α_2, which is still expected to be positive. The equation includes also several other explanatory variables denoted as *X* such as the distance between the countries (trading partners) – a proxy for the transport or transaction costs or the participation in the EU. These have also important effects on the trade volume as documented by some authors (Krugman, Fidrmuc). The distance between two countries is typically measured as the distance between their capitals; however, for the EU as a whole, this measure is not appropriate (it would for example imply zero transaction and transport costs for Belgian trade with the EU). Deardoff (1995) argues that the overall geographic position of the country is more important than the position relative to other countries. Therefore the remoteness measure (Wei, 1996) as a weighted-average of bilateral distances is used:

$$R_i = \sum_{j=1}^{14} w_j D_j \ , \tag{3}$$

where *Dj* denotes the country's distance (the distance between the capitals) to 14 member states of EU (Belgium and Luxemburg are taken as a single region) and the weight w_j is the share of member *j* in the EU's aggregate output.

The participation in the EU might also have important effects on trade structure, although sometimes it might be ambiguous. For example Krugman (1993) argues that countries may rely more on their comparative advantages in a free trade area and specialize more. In addition to the direct effect of participation in a free trade area, other effects (for example transport costs) may be different in the intra-union and extra-union trade.

Table 1 reports some formulations of the estimation equation, including various sets of explanatory variables.

Table 1 Determinants of intraindustry trade in the EU's trade with OECD countries, 1989-2001

	R1	R2	R3	R4
CONSTANT	-3.576	3.087	3.415	3.334
	(-0.839)	*(-1.473)*	*(1.621)*	(10.068)
$\log\lvert y_i - y_{eu}\rvert$	-0.237	-0.094	-0.106	-0.095
	(-5.859)	(-4.597)	(-4.762)	(-4.785)
$\log(Y_i)$	0.177	0.234	0.242	0.236
	(-4.946)	(13.268)	(13.044)	(13.532)
$\log(Y_{eu})$	0.217	0.012	0.018	
	(-0.798)	*(0.087)*	*(0.135)*	
EU		0.119	-0.540	
		(2.330)	*(-1.114)*	
log(R)		-0.701		
		(-27.902)		
EU*log(R)			-0.670	-0.695
			(-19.899)	(-26.895)
(1-EU)*log(R)			-0.753	-0.710
			(-16.489)	(-29.409)
Adjusted R-squared	0.191	0.807	0.807	0.808
# of observations	286	286	286	286

Note: t-statistics in parenthesis
source: own calculations

In the first specification R1, the coefficients of the basic explanatory variables (differences in GDP per capita and country size) are very similar to those reported by Helpman (1987) and Fidrmuc (2001). However, the model provides a relatively poor fit for the EU intraindustry trade, with an adjusted R^2 below 0.2, which is not sufficient, although relatively obvious for similar analysis. The inclusion of additional explanatory variables remarkably improves the quality of explanation. In particular, more than 80 per cent of the variance of the EU's intraindustry trade is explained when the remoteness indicator is added to the model (R2). In model R3, I test whether the effects of this variable are different between two EU countries and EU's trade with non-EU countries. I create two product variables of the remoteness and the EU/non-EU dummies. This approach breaks up the effect of the geographical location, transport and/or transaction costs included in the remoteness indicator into two distinct groups of countries, EU and non-EU members. Although the similarity of the coefficients might indicate that the coefficients of the remoteness indicator are the same for EU and the non-EU members, a Wald test (F-test) rejects this hypothesis. This result is confirmed again by estimating an alternative formulation of the same specification (not included in the table; log(R) and (1-EU)*log(R) are taken as explanatory variables), with the same result.

The coefficient of the differences in income per capita, which stand as a proxy for differences in factor equipments, is significant in all specifications and so is the coefficient representing the output of the trading partners. By contrast, the aggregate EU output Y_{eu} is insignificant in all models and was excluded from the last model. It seems that the differences in income per capita, the size of the country and the distance to its markets are the most important determinants of intraindustry trade.

The last specification R4 provides a parsimonious estimation of the determinants of the EU's intraindustry trade, which excludes all insignificant variables.

Application to the CEECs

At the beginning of the economic transition, the shares of intraindustry trade of the CEECs with EU increased despite sharp reductions in output in these transition countries. This can be explained by the fact, that development of EU's intraindustry trade with the CEECs was probably influenced largely by convergence to 'standard' levels (from the perspective of theoretical assumptions and models estimated above) of intraindustry trade. This development differs from the pattern observed in the OECD countries, which predicts a positive relation between intraindustry trade and aggregate income. This phenomenon may be also explained by a convergence to 'potential' shares of intraindustry trade given countries' structural determinants. However, the dominance of the adjustment dynamics results in insufficient statistical performance of (1) when applied to CEECs.

Although the basic model applied on CEECs explains the intraindustry trade even better (see Table 2) than when applied on OECD countries, the dominance of adjustment dynamics is likely to bias the estimations. Therefore, the estimations for the CEECs do not provide a good guidance for future developments. In particular, continuing catching-up is likely to cause further increases of intra-industry trade, which are however unlikely given comparisons with realized levels within the EU. These regressions also do not indicate possible effects of the EU enlargement, because I cannot estimate EU specific coefficients. The pooling of data with other countries is not possible given the differences between coefficients estimated for both regions separately.

It is also interesting to note that the adjustment dynamics in trade structure of the CEECs was strongly driven also by aggregate output of the EU. Boom periods in the EU speeded up increases of intraindustry trade. We should keep in mind that this variable is insignificant for the OECD countries (also when estimating separately for the EU and non-EU countries).

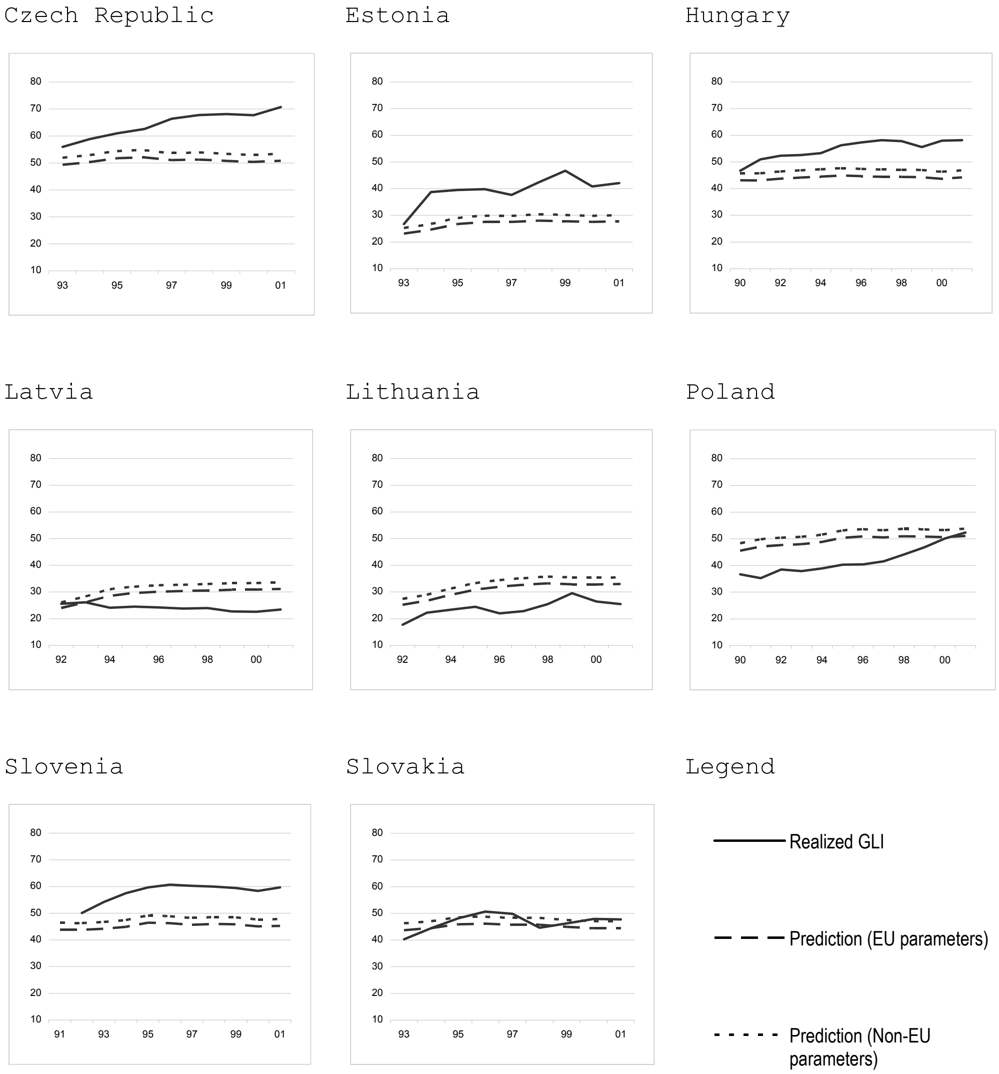
Table 2 Determinants of intraindustry trade in the EU's trade with CEECs countries, 1989-2001

	R1	**R2**
CONSTANT	-28.045	-7.089
	(-6.441)	*(-1.379)*
$\log\|y_i - y_{eu}\|$	-2.882	-1.503
	(-9.768)	(-4.373)
$\log(Y_i)$	0.176	0.151
	(5.012)	(4.935)
$\log(Y_{eu})$	3.405	1.714
	(8.469)	(3.825)
log(R)		-0.997
		(-5.999)
Adjusted R-squared	0.578	0.683
# of observations	109	109

Note: t-statistics in parenthesis
source: own calculations

Nevertheless, the results of previous estimations for the OECD countries may be used to compute out-of-sample forecasts for the EU's trade with the CEECs. This reflects the assumption that the CEECs are on a convergence path to more stable OECD economies. Although this approach may be doubted because of fundamental differences between both regions, it was successfully used by various authors.

Figure 1 Estimations of intraindustry trade for acceding countries



The solid line in the Figure above denotes the actual development of the Grubel-Lloyd indices in the manufacturing sector, as computed from the UN (SITC 3-digits) data. The dashed line (EU parameters) denotes prediction using

$$\log\left(\frac{GLI_i}{1-GLI_i}\right) = 3.334 - 0.095 * \log|\mathrm{y_i} - \mathrm{y_{eu}}| + 0.236 * \log(\mathrm{Y_i}) - 0.695 * \log(\mathrm{R_i}),$$

while the dotted line (Non-EU parameters) denotes prediction using

$$\log\left(\frac{GLI_i}{1-GLI_i}\right) = 3.334 - 0.095 * \log|\mathrm{y_i} - \mathrm{y_{eu}}| + 0.236 * \log(\mathrm{Y_i}) - 0.710 * \log(\mathrm{R_i}).$$

Figure 1 shows the realized intraindustry trade development and the out-of-sample predictions computed on the basis of specification R4. The scenarios including and excluding the EU effects are computed because the structural parameters in some CEECs might have already converged towards their EU equivalents (in a response to various EU agreements and the adoptions of the *acquis communautaire*). Figure 1 reveals the expected pattern of adjustment from relatively low shares at the beginning of transition to standard levels (which can be observed especially for Lithuania, Poland and partially also for Slovakia). Finally, specification R4 might be used for making long run predictions for the development of intraindustry trade, however, this chapter tried to focus more on revealing the determinants of the intraindustry trade based on empirical data.

III.3 Distribution Dynamics, Transition Probabilities

The methodological approach we are going to use in this chapter is based on a technique successfully implemented in the study of cross-country income convergence and imported in the trade analysis by Proudman and Redding (2000) and Redding (2002).

I compute Grubel-Lloyd indices for all commodity groups in a particular year. Four quartiles of their distribution can be computed easily, for each year of the examined period. The idea of our approach is, for any two given years, we can compute a transition matrix representing the relation between these four intervals (based on quartiles' values in given years). The value of each cell of the matrix represents a transition probability, namely the probability that an item beginning in a given cell to which is associated a segment of the specialization range, moves to another distinct cell, characterized by a different specialization interval. The probabilities may be easily estimated by counting the number of transition out of and into each cell. These transition probabilities describe structural changes in trade of analyzed countries.

From the transition probabilities it is possible to infer the extent of the mobility among different segments of the distribution: high values of transition probabilities along the diagonal indicate persistence, while larger off-diagonal terms imply greater mobility. Figure 1 represents transition matrices for the eight acceding countries between 1993 and 2000. This period was selected because I have data on all acceding countries.

For computation of the transition probabilities I used quartile intervals, derived from the segment distribution. The values of the quartiles can be found in the appendix (Figure A2).

Generally, transition matrices can be used to identify the dynamics (stability or mobility) among the segments of distribution of defined index (in our case the Grubel-Lloyd index of intraindustry trade) for the country. These matrices, however, can't be used for comparison with other countries; they characterize only the dynamics among the country's movements.

For this purpose, we define average quartile intervals as an average of the intervals of all EU-15 countries and use them for computing new transition matrices. Similarly like in the previous section, this approach reflects the general expectations that the acceding countries will become largely comparable to standard member states of the EU. The result can be seen in Figure 2.

Figure 1 Transition probabilities 1993-2000, CEECs (per cent)

Czech Rep. (rows: 1993, columns: 2000)

%	1	2	3	4
1	63	27	10	0
2	16	38	31	16
3	13	20	36	31
4	9	15	22	54

Estonia

%	1	2	3	4
1	51	20	12	16
2	20	42	28	9
3	16	25	31	28
4	11	12	29	48

Hungary

%	1	2	3	4
1	59	29	9	3
2	30	36	25	9
3	3	23	42	31
4	5	14	25	57

Latvia

%	1	2	3	4
1	60	31	7	2
2	35	33	23	10
3	9	25	31	34
4	9	17	28	46

Lithuania

%	1	2	3	4
1	64	22	6	8
2	9	47	23	20
3	9	27	38	27
4	9	9	34	48

Poland

%	1	2	3	4
1	55	25	12	8
2	27	45	19	9
3	11	20	38	31
4	5	11	32	52

Slovakia

%	1	2	3	4
1	53	27	11	9
2	22	28	28	22
3	8	25	36	31
4	11	23	26	40

Slovenia

%	1	2	3	4
1	63	30	3	3
2	27	36	31	6
3	6	25	39	30
4	2	11	26	62

Figure 2 Transition probabilities 1993-2000, CEECs, EU-15 quartiles (per cent)

Czech Rep. (rows: 1993, columns: 2000)

%	1	2	3	4
1	57	26	10	7
2	26	19	28	26
3	17	15	24	44
4	14	12	18	55

Estonia

%	1	2	3	4
1	78	9	8	4
2	59	16	16	9
3	47	32	5	16
4	33	20	13	33

Hungary

%	1	2	3	4
1	64	21	10	5
2	22	32	26	20
3	19	22	34	25
4	9	17	24	50

Latvia

%	1	2	3	4
1	84	7	5	4
2	77	23	0	0
3	33	29	10	29
4	61	18	18	4

Lithuania

%	1	2	3	4
1	82	10	3	6
2	60	8	16	16
3	43	29	0	29
4	52	10	28	10

Poland

%	1	2	3	4
1	74	14	5	7
2	21	28	30	21
3	29	11	39	21
4	11	13	30	46

Slovakia

%	1	2	3	4
1	60	18	11	11
2	30	33	22	15
3	31	22	22	25
4	29	10	37	24

Slovenia

%	1	2	3	4
1	82	9	6	3
2	34	30	18	18
3	22	31	22	25
4	12	12	22	53

We find some common characteristics for matrices above. Relatively high values in the first column of the matrix for each country indicate a high probability that a commodity group located in 1993 in some particular quartile of the distribution changes its categorization in 2000 to 'lover' category, in other words falls to the group of commodity groups characterized by lower levels of the Grubel-Lloyd indices. Actually, this feature cannot be found for comparable OECD countries, where major transition can be found in the middle part of the tables (see Figure A3 and A4 in appendix). This means, that the specialization of the acceding countries in the particular commodities increases, while the intraindustry trade index for the commodity group lowers. This implies that the economic transition has been associated, most likely, with increased use of comparative advantage despite the general increase of intraindustry trade, as documented in the previous sections. Further research could concentrate on this feature.

Another observed common characteristic for transition matrices computed for both border values is the fact, that values along the diagonal are relatively low, except the (1,1) cell, what implies high mobility among the segments of distribution. This could be explained by convergence to potential shares of intraindustry trade what implies movement across segments. Nevertheless, we can see that diagonal elements are slightly higher for transition matrices computed for country-specific border values (but still clearly below comparable figures computed for OECD countries). Strikingly high values in the (1,1) cell means that in all of these countries still many commodity groups are not represented by higher shares of intraindustry trade.

A relatively high persistence (around 50%) in the fourth segment can be noticed in transition matrices of Czech Republic, Hungary, Poland and Slovenia. This suggests that in these countries, there are already some stable sectors with high levels of intraindustry trade which are less likely to fall.

List of the tables for both individual and EU-average quartile intervals of all examined countries can be found in appendix.

IV. Conclusions

The recent trade data indicate that the CEECs are already participating successfully in the European division of labour. The difference between the EU and the acceding countries in factor endowments at the beginning of the transition period resulted in general expectation that the latter would have specialized in products intensive in labour, raw materials and land. This thesis suggests instead that some of these countries show a similar trade structure like the EU. The European Union is also the most important trading partner for all acceding countries. The regional reorientation of Central and Eastern European trade towards the EU has been associated with successful restructuring. The increase of intraindustry trade has been the most important feature of the recent developments in East-West trade in Europe.

However, there are also large differences among the acceding countries. The Czech Republic, Hungary and Slovenia have already reached the levels of intraindustry trade comparable to those of some EU member states like Italy, Sweden or Spain. Slovakia and Poland show some slightly lower shares of intraindustry trade, but still comparable with some EU members e.g. Finland or Portugal. Lithuania and Latvia are represented by lower shares of intraindustry trade. However, differences between acceding countries should not be overvalued, as similar differences can be found among the EU member countries as well. Actually, the results show that nearly all countries have already achieved levels of intraindustry trade which correspond to countries' factor endowments, market size, and the geographical position.

V. References

Deardorff, Allan V. (2002), 'What Might Globalization's Critics Believe?', Discussion Paper No 492, Research Seminar in International Economics, University of Michigan

Dixit, Avinash K., Norman Victor, (1980), 'Theory of International Trade', Cambridge

EBRD, (2003), 'The Transition Report: Integration and regional cooperation', EBRD

Fidrmuc, Jarko (1999), 'Verification of the New Trade Theory in EU's Trade with CEECs: Evidence from Panel Data 1990-1997', Institute for Advanced Studies, Vienna

Fidrmuc, Jarko, Daniela Grozea-Helmenstein and Andreas Wörgötter (1999), 'Intra-industry trade dynamics in East-West trade relations', Weltwirtschaftliches Archiv

Fidrmuc, Jarko (2000), 'Restructuring European Union Trade with Central and Eastern European Countries', Atlantic Economic Journal

Fidrmuc, Jarko (2001), 'Intra-industry trade between the EU and the CEECs: The Evidence of the First Decade of Transition', Focus on Transition

Fidrmuc, Jarko, Djablik Martin (2003), 'Intraindustry Trade between the EU and the CEECs: The importance of FDI in Trade Structures', East-West Conference 2003

Helpman, Elhanan (1999), 'The Structure of Foreign Trade', Journal of Economic Perspectives

Helpman, Elhanan, Krugman Paul R., (1985), 'Market Structure and Foreign Trade', The MIT Press, Cambridge

Hummels, David and James Levinsohn (1995), 'Monopolistic competition and international trade: reconsidering the evidence', Quarterly Journal of Economics

Krugman, Paul R. (1990), 'Rethinking International Trade', The MIT Press, Cambridge

Krugman, Paul R., Obstfeld Maurice (2000), 'International Economics, Theory and Policy'

Redding, Stephen, (2001),'Specialization dynamics', Journal of International Economics

Zaghnini, Andrea, (2003) ,'Trade Advantages and Specialisation Dynamics in Accession Countries', European Central Bank

VI. Appendix

Table A1 Direction of trade by country between 1995 and 2002, in per cent

		Exports				Imports			
		Transition countries (TC)		Non-transition countries		Transition countries (TC)		Non-transition countries	
		Within the sub-region	Other TC	EU	Others	Within the sub-region	Other TC	EU	Others
Czech Rep.	1995	25.4	6.5	54.0	14.1	14.8	11.0	55.9	18.2
	2002	15.8	4.8	68.8	10.6	8.7	8.2	71.7	11.4
Estonia	1995	13.1	25.2	54.7	7.0	3.0	20.6	66.0	10.4
	2002	13.5	7.2	61.8	17.6	4.0	28.4	52.1	15.4
Hungary	1995	8.4	14.0	62.8	14.9	5.6	16.7	61.5	16.3
	2002	6.6	7.2	73.5	12.8	5.1	14.2	57.5	23.2
Latvia	1995	12.3	38.3	44.2	5.3	12.4	24.6	50.0	13.0
	2002	13.8	8.3	62.3	15.7	15.0	17.8	52.3	14.8
Lithuania	1995	14.1	42.9	36.4	6.6	5.8	40.0	37.2	17.0
	2002	24.1	16.1	47.1	12.7	4.0	30.2	51.2	14.6
Poland	1995	6.7	11.0	70.1	12.2	6.3	9.8	64.7	19.2
	2002	11.8	9.0	67.6	11.6	8.0	13.2	67.5	11.2
Slovak Rep.	1995	45.8	8.7	37.4	8.2	30.6	19.6	34.8	15.0
	2002	28.4	4.9	59.5	7.2	19.9	17.9	52.3	9.9
Slovenia	1995	5.0	19.1	67.3	8.6	6.2	10.4	69.3	14.0
	2002	7.7	21.4	61.9	9.0	6.8	10.2	72.0	11.0

source: IMF Direction of Trade Statistics, 2003

Table A2 Intraindustry Trade of selected countries with EU-15

%	Austria	Australia	Belgium	Bulgaria	Canada	Switzer-land	China	Czech Rep.	Germany	Denmark	Estonia	Spain	Finland	France	UK	Greece	Hungary	Ireland
1989	65.31	15.61	71.49	28.34	34.46	62.05	16.06		64.95	59.54		63.29	46.04	76.31	67.52	26.55	37.17	52.33
1990	66.55	18.98	71.92	30.48	37.52	62.43	15.10		67.55	59.64		63.38	45.29	77.82	69.79	27.30	42.62	52.99
1991	67.20	18.44	71.88	30.26	39.43	63.35	16.66		75.64	58.41		60.09	47.49	79.19	72.62	27.48	45.75	53.94
1992	67.57	21.08	72.61	31.31	39.67	64.02	15.87		74.95	59.11	17.99	63.22	47.15	80.35	73.26	25.82	48.48	51.86
1993	66.87	19.88	72.63	36.79	42.73	65.60	15.55	54.86	75.35	59.01	23.55	62.43	45.46	78.56	72.97	26.55	50.23	50.23
1994	66.90	18.57	72.26	35.29	41.03	64.35	17.59	56.63	76.18	56.91	35.49	62.08	45.50	79.24	74.35	27.78	51.30	49.74
1995	66.92	19.57	73.07	32.31	40.83	63.82	20.32	58.86	76.84	58.96	37.57	63.36	45.36	78.61	75.67	26.89	54.04	48.07
1996	67.20	19.97	74.21	35.23	46.03	64.37	22.50	60.33	76.08	59.58	38.09	64.73	45.97	78.74	75.77	26.44	55.24	49.88
1997	68.10	20.16	74.35	34.10	48.73	64.89	24.42	63.98	76.42	59.78	36.15	64.73	48.15	78.40	75.14	29.34	56.79	48.51
1998	68.35	22.01	74.57	33.66	50.40	64.85	26.27	65.72	76.76	60.68	38.62	65.62	45.34	79.38	74.92	25.83	57.98	45.89
1999	68.77	23.58	75.07	33.16	52.88	63.22	28.50	65.91	76.94	60.61	40.30	66.01	48.30	78.84	74.54	26.91	55.97	44.71
2000	70.67	24.78	76.16	33.55	50.35	65.41	30.83	66.15	76.72	60.50	34.00	66.20	46.20	77.88	73.64	27.02	58.84	47.36
2001	72.64	18.56	71.68	34.78	43.79	66.64	31.24	68.56	76.66	61.33	37.18	68.87	44.86	78.20	71.83	26.64	59.26	31.54

%	Italy	Japan	Lithuania	Latvia	Nether-lands	Norway	New Zealand	Poland	Portugal	Romania	Russian Fed.	Sweden	Slovenia	Slovakia	Turkey	Ukraine	U.S.A
1989	57.56	34.25			67.82	35.80	13.43	32.41	40.89	15.72		60.98			23.88		32.90
1990	57.94	38.00			69.14	34.11	15.27	32.70	43.00	23.81		62.31			23.77		34.89
1991	57.55	35.01			69.75	32.34	12.21	34.34	42.53	29.26		61.05			25.40		34.68
1992	56.89	33.10	11.56	16.89	70.30	33.10	13.33	35.49	41.57	25.61	16.99	61.22	49.14		22.76	16.77	35.68
1993	58.38	36.72	15.18	15.02	70.93	33.14	13.53	36.15	42.83	27.52	20.40	59.81	52.97	39.85	21.15	22.53	36.35
1994	57.90	39.37	19.36	17.72	71.59	33.32	14.33	37.55	41.92	30.43	18.30	60.23	55.65	43.50	26.01	23.83	41.40
1995	59.88	43.31	22.66	23.62	71.82	35.90	14.61	39.64	46.64	29.63	18.63	60.08	57.90	47.39	29.13	23.32	41.10
1996	59.55	47.32	21.20	20.93	72.01	34.12	14.73	39.41	50.16	30.29	17.73	60.56	58.67	49.65	26.76	20.49	43.29
1997	60.24	44.76	22.38	24.48	73.43	34.73	14.41	40.59	50.73	30.89	16.31	60.14	57.99	49.55	26.96	22.11	47.17
1998	60.96	38.56	26.14	23.51	72.65	35.46	17.00	43.85	50.40	29.16	13.86	60.37	57.89	44.65	28.53	21.69	44.45
1999	61.53	39.19	28.63	22.24	72.36	34.49	18.54	46.17	52.42	31.70	11.32	60.81	57.19	46.16	32.47	24.69	41.99
2000	62.58	41.25	24.57	18.55	73.10	31.39	17.26	49.62	55.90	35.28	16.13	62.96	55.71	47.29	31.30	23.84	42.16
2001	61.69	46.71	23.50	19.74	66.57	28.91	10.31	51.07	56.07	38.22	9.80	64.38	56.99	47.29	36.70	20.77	41.31

source: UN, own calculations

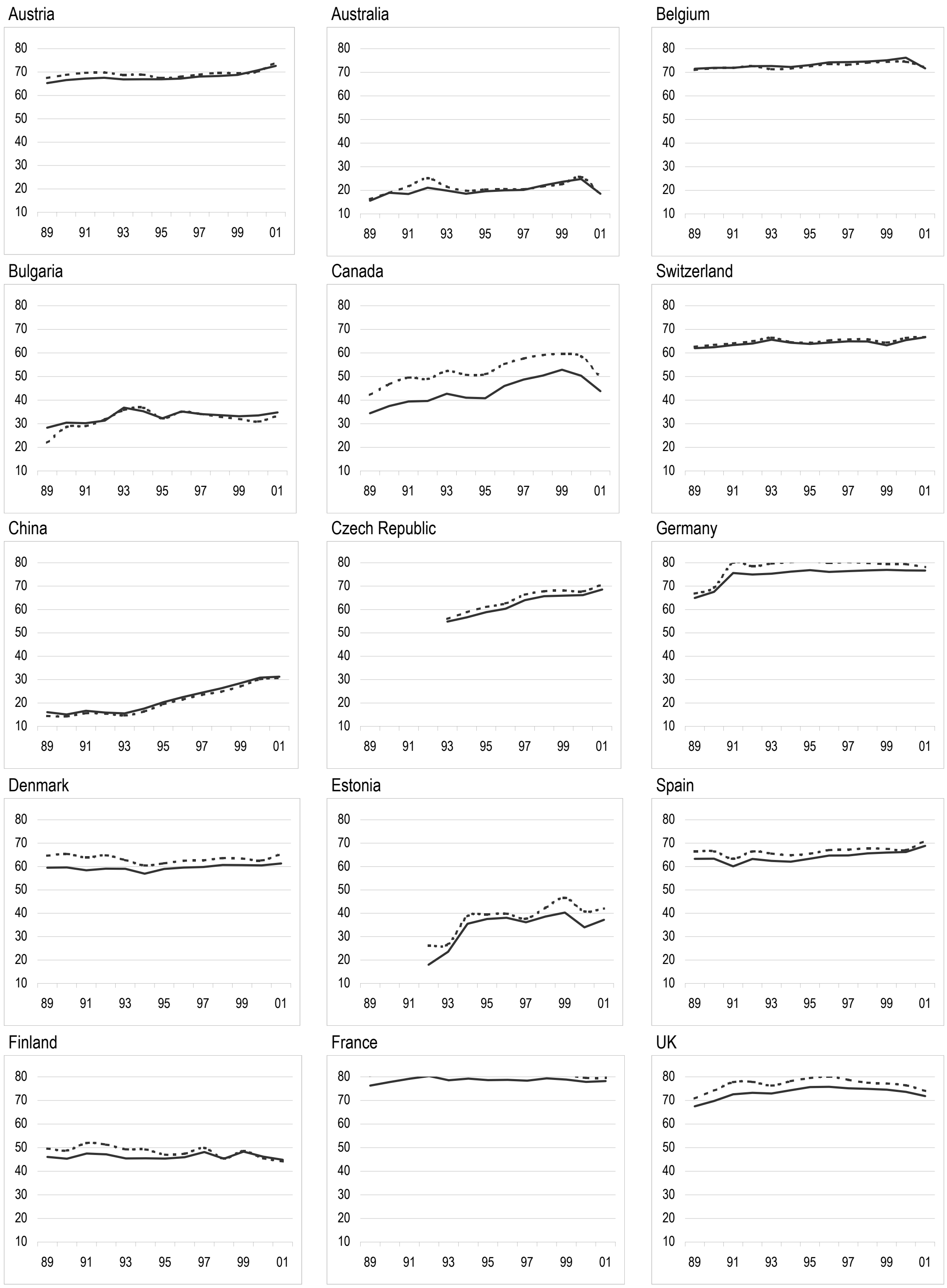
Table A3 Intraindustry Trade in manufacturing products of selected countries with EU-15

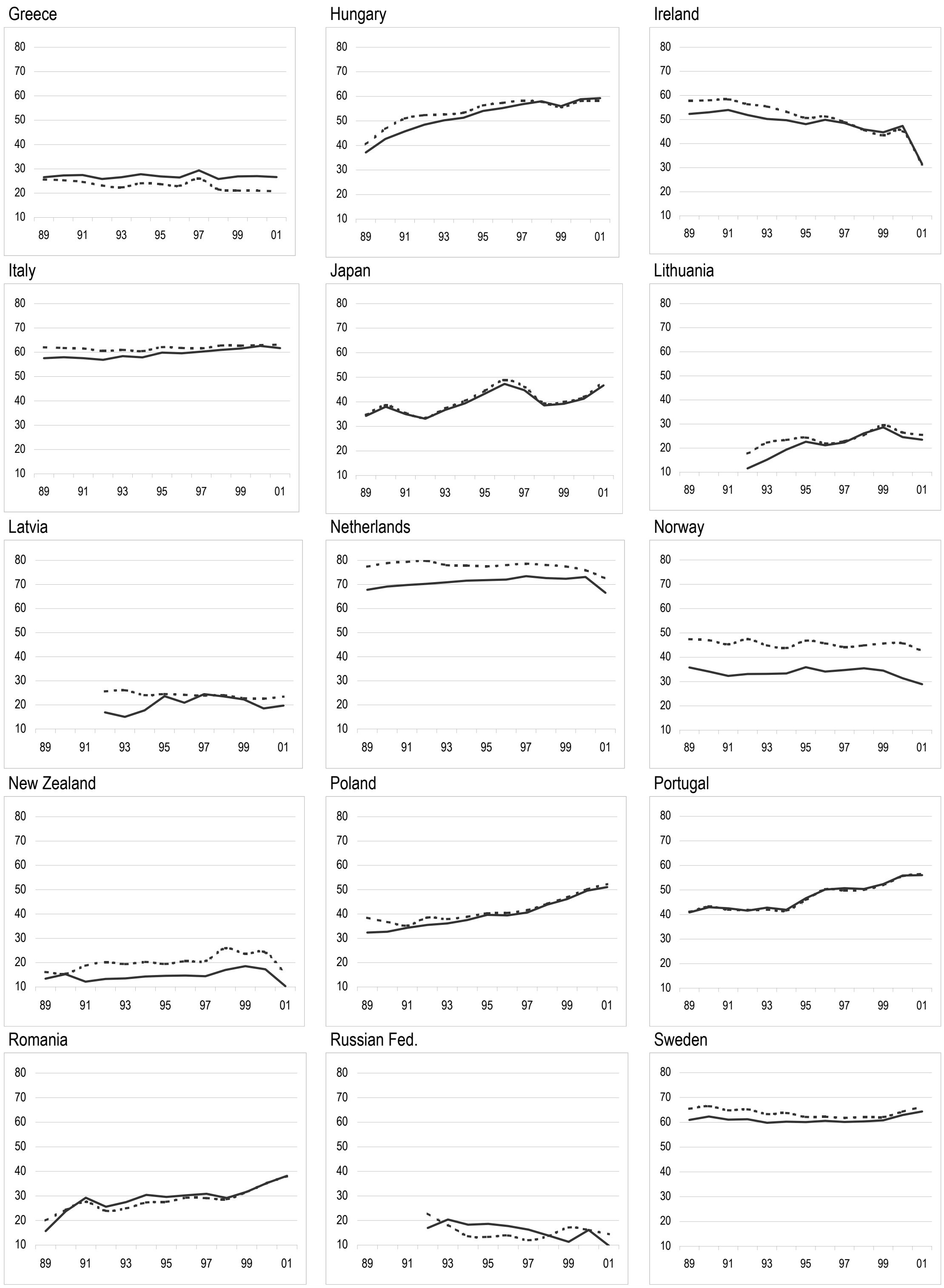
%	Austria	Australia	Belgium	Bulgaria	Canada	Switzer-land	China	Czech Rep.	Germany	Denmark	Estonia	Spain	Finland	France	UK	Greece	Hungary	Ireland
1989	67.46	16.25	70.97	21.98	42.18	62.58	14.45		66.83	64.66		66.52	49.62	80.47	70.79	25.62	40.50	57.82
1990	68.80	18.90	71.72	28.61	46.73	63.40	14.29		69.46	65.43		66.50	48.78	81.86	74.16	25.34	46.70	57.97
1991	69.64	21.70	71.89	29.04	49.51	64.03	15.61		79.96	63.88		63.31	51.99	83.55	77.75	24.65	50.98	58.39
1992	69.76	25.15	72.63	31.85	48.94	64.99	15.44		78.51	64.79	26.21	66.45	51.26	84.90	77.85	23.16	52.34	56.38
1993	68.78	21.54	71.34	35.77	52.31	66.46	14.64	55.93	79.65	62.80	26.74	65.56	49.28	82.36	76.28	22.37	52.64	55.43
1994	68.92	19.83	71.62	36.82	50.74	64.64	16.37	58.84	80.22	60.50	38.72	64.88	49.24	82.49	78.14	24.03	53.35	53.22
1995	67.42	20.32	72.47	32.26	51.01	64.27	19.46	61.06	80.68	61.36	39.51	65.51	47.05	81.59	79.47	23.70	56.29	50.68
1996	68.04	20.58	73.51	35.09	55.28	65.31	21.45	62.60	79.97	62.47	39.83	67.05	47.46	81.74	80.09	23.04	57.36	51.27
1997	68.91	20.44	73.24	34.19	57.62	65.75	23.50	66.36	80.28	62.67	37.65	67.26	49.90	80.98	78.75	25.99	58.21	48.97
1998	69.64	21.67	74.09	32.95	59.07	65.79	24.84	67.81	79.88	63.57	42.35	67.76	45.37	81.63	77.54	21.60	57.77	45.68
1999	69.56	22.62	74.40	32.02	59.52	64.37	27.16	68.13	79.44	63.43	46.68	67.56	48.48	80.95	77.15	21.09	55.62	43.43
2000	70.07	25.66	74.42	30.93	58.55	66.36	30.13	67.75	79.44	62.60	40.81	67.04	45.46	79.52	76.41	21.01	58.05	45.18
2001	74.16	18.57	72.12	33.44	49.74	66.74	30.65	70.73	78.14	65.33	42.07	71.04	44.17	79.51	73.97	20.79	58.21	31.36

%	Italy	Japan	Lithuania	Latvia	Nether-lands	Norway	New Zealand	Poland	Portugal	Romania	Russian Fed.	Sweden	Slovenia	Slovakia	Turkey	Ukraine	U.S.A
1989	62.02	34.64			77.38	47.46	16.15	38.46	41.08	20.01		65.45			24.29		36.26
1990	61.77	38.56			78.88	46.97	15.43	36.74	43.21	24.37		66.53			22.34		38.06
1991	61.55	35.43			79.37	45.30	18.74	35.25	41.97	27.59		64.88			21.17		37.30
1992	60.55	33.47	17.74	25.62	79.77	47.44	20.20	38.52	41.82	23.94	22.84	65.27	50.07		21.49	17.60	37.68
1993	60.98	37.39	22.25	26.10	78.03	44.89	19.40	37.89	41.97	24.94	18.14	63.34	54.21	40.29	19.18	15.73	38.42
1994	60.49	40.37	23.38	24.08	77.87	43.82	20.29	38.89	41.59	27.33	13.66	63.73	57.49	44.41	24.91	16.06	43.65
1995	62.12	44.52	24.41	24.50	77.52	46.81	19.48	40.26	45.90	27.62	13.35	62.15	59.64	48.18	27.37	17.67	41.99
1996	61.77	48.92	22.00	24.18	78.04	45.68	20.61	40.45	50.30	29.28	13.91	62.21	60.74	50.72	26.01	20.46	43.88
1997	61.61	46.17	22.87	23.83	78.63	44.17	20.64	41.59	49.81	29.10	11.97	61.76	60.26	49.83	25.90	21.61	47.74
1998	62.78	39.45	25.50	23.99	78.07	44.84	25.95	44.18	50.08	28.65	13.69	62.17	59.97	44.63	27.53	20.84	44.93
1999	62.73	39.97	29.56	22.77	77.43	45.62	23.65	46.89	52.09	31.60	17.15	62.10	59.41	46.22	31.65	24.83	42.70
2000	62.94	41.97	26.48	22.58	75.90	45.74	24.21	50.11	55.61	35.24	16.12	64.25	58.38	47.92	30.59	24.74	42.90
2001	63.18	48.16	25.51	23.44	72.55	42.60	15.13	52.33	56.54	38.03	14.45	66.17	59.68	47.74	35.95	23.05	42.44

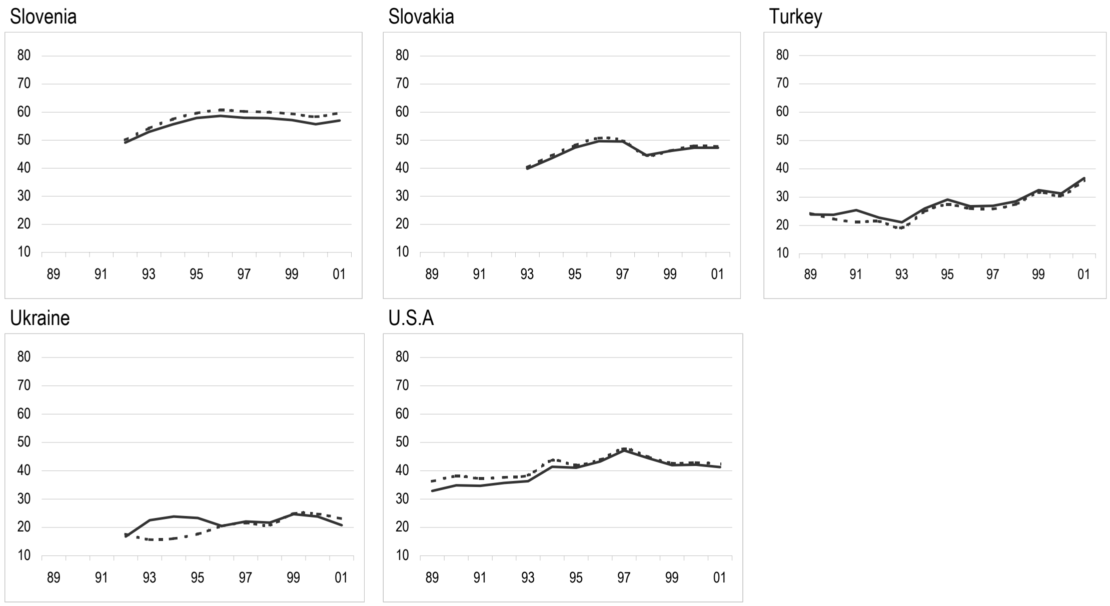
source: UN, own calculations

Figure A1 Grubel-Lloyd indices (The Whole Trade vs. Manufacturing Production)





Greece
Hungary
Ireland
Italy
Japan
Lithuania
Latvia
Netherlands
Norway
New Zealand
Poland
Portugal
Romania
Russian Fed.
Sweden
80
70
60
50
40
30
20
10
89
91
93
95
97
99
01



Slovenia
Slovakia
Turkey
Ukraine
U.S.A
80
70
60
50
40
30
20
10
89
91
93
95
97
99
01

Figure A2 Quartiles

YEAR		90	91	92	93	94	95	96	97	98	99	00	01
	quartiles												
Austria	I	26.95	27.30	28.79	27.78	28.82	29.60	32.00	34.17	33.58	35.16	32.31	39.41
	II	54.96	58.65	58.75	58.43	57.61	58.08	57.72	59.76	61.60	61.52	61.92	65.57
	III	83.08	81.47	79.99	79.79	81.45	82.15	83.29	81.88	82.76	82.96	83.60	84.39
	IV	99.91	99.73	100.00	98.87	99.89	99.77	99.94	99.39	99.78	99.83	99.58	99.51
Australia	I	1.58	2.23	2.34	2.32	2.02	2.47	2.53	2.63	3.06	4.58	3.15	1.98
	II	8.91	10.31	9.27	11.39	9.46	11.29	10.44	10.46	12.48	14.41	14.48	8.05
	III	24.64	26.77	29.54	28.01	28.13	36.21	27.56	29.54	34.10	38.17	39.05	28.72
	IV	98.63	99.54	99.32	98.03	96.07	99.40	98.64	98.75	98.10	98.91	98.22	99.75
Belgium	I	54.27	57.85	55.25	53.47	53.53	54.96	56.10	57.81	56.69	56.50	56.84	52.58
	II	74.06	75.44	73.05	70.97	72.05	73.45	74.10	72.25	70.84	73.10	74.40	69.78
	III	87.35	87.24	87.80	87.99	87.68	87.58	86.71	86.83	87.94	87.10	87.77	85.54
	IV	99.62	99.64	99.95	99.86	99.48	99.85	99.93	99.99	99.99	99.93	99.93	100.00
Bulgaria	I	2.52	2.52	3.33	4.01	4.43	2.89	3.48	3.85	2.52	3.41	4.31	3.79
	II	14.53	19.86	26.50	29.23	22.88	23.31	23.84	25.21	23.75	22.17	21.63	22.80
	III	44.19	52.39	55.17	54.84	59.91	58.34	59.79	57.34	58.95	56.13	58.58	56.97
	IV	98.76	99.97	99.33	99.38	99.86	99.62	99.52	99.00	99.88	99.91	98.94	99.42
Canada	I	12.69	12.51	13.88	11.78	13.04	13.56	14.76	14.91	17.04	14.22	16.11	9.54
	II	31.89	36.00	36.04	35.42	36.96	37.75	36.72	39.12	41.39	41.22	41.11	28.33
	III	60.14	59.77	61.81	62.41	56.85	61.36	67.49	67.31	68.67	67.59	67.77	57.27
	IV	98.28	99.69	98.82	97.56	99.93	99.47	99.22	99.41	99.69	99.86	98.89	99.76
Switzerland	I	23.81	30.79	31.32	26.95	25.81	24.65	27.16	26.02	22.62	21.73	27.92	22.45
	II	54.25	57.68	57.88	55.93	54.62	55.48	55.47	53.69	53.98	53.33	53.73	49.98
	III	82.37	81.37	77.87	80.72	79.51	79.50	79.19	77.73	78.32	79.35	80.29	77.79
	IV	99.49	99.76	99.88	99.46	99.79	99.53	99.93	99.97	99.94	99.27	99.74	99.55
China	I	0.51	0.70	0.70	0.83	1.62	1.77	2.07	3.41	3.43	4.00	4.32	4.02
	II	7.30	10.41	9.93	10.75	13.30	15.81	15.60	17.65	21.93	23.43	21.73	24.47
	III	38.69	46.26	39.46	47.43	45.41	48.72	45.55	47.73	48.79	50.47	48.51	51.68
	IV	99.16	99.73	98.01	95.41	98.46	99.50	99.97	98.84	97.89	99.63	99.95	99.80
Czech Rep.	I	0.00	0.00	0.00	18.55	19.93	19.90	18.96	21.08	25.32	23.87	21.99	18.28
	II	0.00	0.00	0.00	45.93	47.70	47.63	52.27	54.55	53.84	55.68	54.51	56.03
	III	0.00	0.00	0.00	72.99	73.20	74.97	75.49	76.96	78.03	78.87	79.65	80.90
	IV	0.00	0.00	0.00	99.99	99.85	99.48	99.77	98.56	99.95	99.49	99.78	99.62
Germany	I	26.28	57.25	56.45	56.89	54.01	57.59	60.50	60.04	57.68	60.95	59.91	56.43
	II	59.49	77.26	76.56	77.36	76.43	76.71	78.26	77.74	75.23	77.14	77.20	74.67
	III	83.66	89.21	88.72	90.54	88.82	89.61	89.23	89.36	88.57	89.92	89.86	87.38
	IV	99.59	99.82	99.26	99.87	99.96	99.99	99.96	99.93	99.64	99.72	99.98	99.99
Denmark	I	28.08	30.87	27.71	28.77	29.53	31.49	30.89	29.35	30.22	32.66	31.45	32.75
	II	54.42	55.06	59.29	55.71	54.23	56.89	55.98	56.56	59.01	58.31	59.90	60.10

	III	79.67	76.98	80.61	77.75	78.12	79.32	77.28	77.38	78.70	79.62	77.62	81.67
	IV	99.83	99.88	99.52	99.81	99.45	99.80	99.84	99.99	99.04	99.89	99.52	99.98
Estonia	I	0.00	0.00	0.00	0.05	1.66	1.59	1.79	1.07	1.91	2.38	4.76	3.65
	II	0.00	0.00	3.81	13.59	13.82	14.40	12.95	12.61	14.36	17.19	19.13	17.93
	III	0.00	0.00	39.22	46.17	48.01	45.76	47.76	46.07	46.41	44.49	45.27	45.73
	IV	0.00	0.00	99.99	99.68	99.78	98.22	97.03	98.89	99.28	99.38	99.81	98.91
Spain	I	30.27	33.68	33.30	37.06	39.48	39.68	40.80	42.66	39.75	41.89	41.40	42.17
	II	56.93	56.32	56.35	61.58	60.59	62.74	62.11	61.88	63.22	61.13	62.16	62.61
	III	79.64	77.25	75.40	77.81	76.32	81.11	78.40	78.74	80.42	79.62	79.69	80.42
	IV	99.92	98.91	99.66	99.91	99.46	99.67	99.50	99.99	99.89	99.33	99.12	99.47
Finland	I	14.58	16.09	15.16	17.26	16.41	16.33	15.61	13.66	13.46	15.06	16.40	15.20
	II	42.97	46.49	45.81	46.18	44.75	41.13	43.33	42.15	36.77	41.17	39.62	39.18
	III	67.41	75.61	73.35	72.53	73.30	68.66	66.19	72.01	67.37	72.93	65.78	66.79
	IV	99.89	99.20	99.68	99.62	99.54	99.84	99.52	99.67	99.88	99.67	98.74	99.02
France	I	57.34	59.65	60.01	58.01	59.21	58.51	59.22	57.37	59.83	58.86	57.95	54.15
	II	75.22	78.24	79.17	75.07	77.76	76.67	75.89	76.66	77.51	75.93	72.41	71.93
	III	87.73	88.82	90.27	88.17	88.77	89.36	88.73	89.20	87.96	87.57	85.10	86.04
	IV	99.90	99.93	99.83	99.95	99.97	99.75	99.94	99.80	99.75	99.95	99.81	99.99
UK	I	48.71	53.40	51.95	51.73	52.84	52.03	54.98	54.53	53.69	54.14	51.22	48.97
	II	74.28	75.43	74.03	72.33	73.76	72.68	75.42	73.88	72.47	73.73	71.02	70.82
	III	87.69	88.76	88.30	87.52	87.02	89.63	86.79	86.87	87.09	86.64	86.75	85.40
	IV	99.95	99.95	100.00	99.97	99.91	99.68	99.96	99.79	99.72	99.52	99.68	99.95
Greece	I	2.07	2.77	2.66	3.79	3.84	2.86	3.10	3.27	3.45	3.69	3.58	2.61
	II	10.52	10.01	9.38	11.12	10.68	9.31	9.65	10.99	10.73	10.54	9.82	9.57
	III	37.48	34.95	35.45	31.81	35.09	35.18	37.96	33.83	37.96	37.41	37.36	34.37
	IV	98.37	99.40	99.33	98.71	98.34	98.31	99.61	97.56	98.39	99.59	98.30	98.51
Hungary	I	11.80	13.14	17.10	14.70	15.50	15.34	14.08	14.59	17.23	16.00	17.96	16.69
	II	33.55	36.60	38.76	37.07	39.00	38.38	41.37	42.82	44.98	42.17	44.19	46.47
	III	65.33	71.37	71.82	69.99	68.49	65.91	71.30	69.25	69.04	72.27	69.49	69.51
	IV	99.90	99.77	99.90	99.76	99.34	99.00	98.91	99.16	99.63	99.80	98.06	99.60
Ireland	I	24.14	22.74	20.70	19.99	20.24	21.93	25.73	22.84	24.18	22.14	21.15	10.42
	II	48.44	43.49	46.27	48.59	43.70	48.10	49.93	46.87	44.64	43.50	40.73	29.91
	III	77.80	75.04	75.95	76.12	71.66	72.52	69.99	69.97	68.50	67.40	68.57	63.05
	IV	99.98	99.71	98.65	99.44	99.88	99.41	99.89	99.38	99.89	99.27	99.70	99.62
Italy	I	29.18	29.16	33.09	33.91	30.94	32.57	33.21	37.90	38.95	37.23	38.96	37.54
	II	61.23	60.34	59.88	60.61	57.68	58.19	56.72	55.97	59.68	57.05	56.31	59.24
	III	79.65	79.95	78.74	80.29	78.85	78.79	78.69	79.18	79.81	79.24	79.24	80.42
	IV	99.97	99.82	99.45	99.82	99.70	99.77	99.92	99.81	98.53	99.65	99.59	100.00
Japan	I	8.93	8.60	7.69	7.06	8.89	8.07	8.06	6.88	5.94	6.60	8.55	4.25
	II	33.08	30.13	30.00	30.88	31.33	30.13	32.17	31.69	30.87	30.69	30.21	31.81
	III	64.08	62.02	63.17	61.05	59.33	56.88	63.17	61.76	59.30	57.83	58.19	65.94

	IV	99.64	99.57	99.72	99.80	99.47	99.34	98.42	99.28	99.83	99.92	98.97	99.04
Lithuania	I	0.00	0.00	0.00	0.04	0.03	0.16	0.36	0.55	0.75	1.62	1.27	0.63
	II	0.00	0.00	6.52	5.21	5.79	8.47	6.15	7.11	6.28	10.58	9.97	8.03
	III	0.00	0.00	37.69	36.27	41.59	40.05	31.61	33.50	31.93	39.61	36.45	31.74
	IV	0.00	0.00	97.20	99.94	99.97	99.90	98.81	99.95	99.36	98.02	98.12	98.85
Latvia	I	0.00	0.00	0.00	0.00	0.06	0.08	0.15	0.52	0.60	0.78	1.12	0.72
	II	0.00	0.00	6.37	4.37	4.06	5.57	5.92	7.42	5.81	7.89	9.97	7.07
	III	0.00	0.00	34.47	26.06	25.82	32.17	32.04	34.61	30.30	29.17	33.05	31.22
	IV	0.00	0.00	99.86	99.68	99.91	99.14	92.73	98.99	98.55	96.78	98.29	96.04
Netherlands	I	54.37	55.24	56.53	56.99	55.51	53.98	54.20	56.88	53.97	53.57	53.57	55.71
	II	75.40	74.53	75.19	75.54	73.19	73.99	73.95	74.95	74.31	72.57	73.32	71.31
	III	89.03	89.43	87.83	88.28	88.08	87.72	86.59	88.59	87.80	88.34	89.27	87.11
	IV	99.50	99.89	99.71	99.94	99.78	99.75	99.91	99.58	99.83	99.93	99.99	99.92
Norway	I	12.15	12.20	12.61	11.57	10.88	14.58	14.38	15.51	15.18	16.93	13.72	14.90
	II	37.50	35.77	37.90	37.59	35.46	37.89	36.35	38.26	35.25	38.13	37.98	37.98
	III	64.45	62.18	66.56	61.51	60.96	65.36	63.55	60.56	59.92	61.16	60.04	59.33
	IV	99.58	99.95	98.55	98.97	99.32	99.67	99.70	99.38	98.86	99.68	99.31	97.02
New Zealand	I	0.19	0.20	0.21	0.18	0.13	0.46	0.75	0.43	0.65	0.97	0.82	0.18
	II	4.86	6.53	6.27	6.10	6.40	6.90	8.07	6.95	9.63	10.90	10.50	5.15
	III	21.62	27.85	29.90	31.87	25.08	30.97	30.73	28.35	33.22	32.33	36.82	22.33
	IV	98.91	99.81	98.58	97.16	98.84	96.42	94.81	99.54	99.79	99.48	99.62	98.71
Poland	I	9.08	8.77	11.24	9.72	9.98	10.66	12.23	11.61	11.71	15.24	14.94	12.14
	II	30.83	30.76	33.55	30.00	33.29	32.79	30.77	31.00	29.67	33.97	39.13	38.16
	III	57.25	63.75	62.70	62.50	63.51	63.05	60.06	63.79	64.24	67.08	67.80	67.80
	IV	98.53	99.61	97.81	99.99	99.41	99.58	99.26	99.93	97.69	99.71	99.95	99.80
Portugal	I	9.63	9.81	9.46	9.83	10.68	11.08	15.67	15.27	14.40	14.79	16.69	17.25
	II	29.39	29.15	27.40	29.15	30.37	31.25	31.36	32.11	34.48	34.43	39.17	36.46
	III	62.71	60.81	57.11	58.18	56.91	60.44	55.90	60.60	60.54	63.81	63.79	62.33
	IV	99.17	98.42	99.95	99.41	99.94	99.58	98.74	99.98	99.43	99.32	99.65	99.37
Romania	I	0.27	2.23	1.79	2.67	3.29	2.83	2.73	3.66	3.14	3.62	4.03	4.62
	II	9.14	17.12	17.02	19.64	18.48	22.04	22.41	22.55	20.52	25.19	27.01	29.59
	III	41.99	51.59	49.13	56.28	58.39	55.42	56.37	57.38	51.79	59.67	58.06	60.16
	IV	99.78	99.84	98.97	99.68	99.16	99.70	99.75	97.54	97.35	99.59	99.32	98.81
Russian Fed.	I	0.00	0.00	1.79	1.60	1.47	1.27	0.96	0.89	1.25	1.35	1.74	0.99
	II	0.00	0.00	11.12	9.84	7.61	7.21	8.15	6.64	6.61	7.79	7.40	7.27
	III	0.00	0.00	39.07	35.46	34.67	34.47	29.28	26.77	24.84	30.55	39.05	29.52
	IV	0.00	0.00	98.05	99.64	99.78	99.83	98.99	97.21	99.85	97.86	98.45	99.50
Sweden	I	25.81	26.10	24.10	27.05	27.99	31.74	31.20	32.13	34.69	33.09	33.70	37.09
	II	56.23	57.49	54.55	57.09	55.14	55.04	55.25	57.87	55.67	58.07	57.83	60.80
	III	80.75	80.65	80.43	79.72	79.29	75.24	76.44	77.93	77.69	76.91	77.28	78.81
	IV	99.48	98.24	99.59	99.52	99.90	99.87	99.43	99.09	99.18	99.87	99.87	99.98

Slovenia	I	0.00	0.00	9.81	12.11	10.24	12.31	10.71	8.84	9.51	9.70	9.34	7.86
	II	0.00	0.00	36.29	37.66	41.02	39.69	39.69	36.54	38.33	37.08	36.83	35.99
	III	0.00	0.00	69.10	71.67	74.31	72.88	74.94	69.28	70.63	72.24	70.06	70.46
	IV	0.00	0.00	99.52	99.43	99.17	99.88	99.98	99.26	99.27	99.86	99.84	99.99
Slovakia	I	0.00	0.00	0.00	8.14	10.23	7.86	6.94	6.70	6.45	8.54	6.96	5.79
	II	0.00	0.00	0.00	30.80	31.73	31.88	27.79	34.02	32.36	36.30	40.07	33.68
	III	0.00	0.00	0.00	62.95	67.95	62.44	64.57	64.56	62.03	65.20	65.34	61.54
	IV	0.00	0.00	0.00	97.94	99.99	99.73	100.00	99.42	99.16	98.51	99.40	98.79
Turkey	I	2.61	2.69	2.96	2.93	4.81	3.38	3.57	3.48	4.98	5.36	5.73	6.05
	II	12.14	10.52	14.01	11.03	19.60	17.35	16.35	14.99	18.53	19.48	20.60	23.27
	III	40.76	40.12	42.64	38.39	48.77	51.71	41.73	43.72	49.46	54.96	53.97	56.09
	IV	100.00	99.78	99.89	99.51	99.33	99.57	99.89	99.59	98.40	99.65	99.90	99.56
Ukraine	I	0.00	0.00	0.00	0.66	0.39	0.97	1.00	1.18	1.68	2.61	1.36	0.96
	II	0.00	0.00	3.94	8.17	6.45	7.58	8.30	11.33	11.74	12.81	10.19	8.77
	III	0.00	0.00	32.39	38.17	37.16	38.27	38.70	39.78	38.33	45.81	43.88	38.32
	IV	0.00	0.00	99.46	97.77	99.30	99.91	99.49	99.16	99.89	98.97	99.91	97.32
US	I	0.36	0.00	0.01	0.38	0.13	0.21	0.56	1.28	2.79	2.66	1.53	2.91
	II	16.68	21.54	22.07	24.91	24.47	22.00	23.17	29.64	29.11	25.22	29.99	29.64
	III	53.51	55.76	56.25	59.30	58.77	57.84	61.72	65.43	62.03	58.80	61.64	61.27
	IV	99.56	99.68	99.91	99.50	99.05	98.19	99.51	99.93	99.69	99.73	99.52	100.00

Figure A3 Transition probabilities 1993-2000, individual quartile borders

Rows: 1993; columns: 2000

Austria

%	1	2	3	4
1	70	10	16	5
2	23	55	11	11
3	5	28	48	19
4	2	8	25	66

Australia

%	1	2	3	4
1	65	22	8	5
2	20	47	27	6
3	5	28	38	30
4	8	5	28	60

Belgium

%	1	2	3	4
1	58	19	13	11
2	25	34	23	17
3	8	22	38	33
4	9	25	26	40

Bulgaria

%	1	2	3	4
1	63	22	6	9
2	17	47	27	9
3	6	23	39	31
4	8	11	29	52

Canada

%	1	2	3	4
1	63	27	5	5
2	22	44	23	11
3	6	17	41	36
4	6	14	31	49

Switzerland

%	1	2	3	4
1	76	18	6	0
2	16	58	20	6
3	8	19	47	27
4	0	5	36	59

China

%	1	2	3	4
1	62	22	7	9
2	20	44	27	9
3	9	20	39	31
4	5	15	28	52

Czech Rep.

%	1	2	3	4
1	63	27	10	0
2	16	38	31	16
3	13	20	36	31
4	9	15	22	54

Germany

%	1	2	3	4
1	73	22	3	2
2	14	47	27	13
3	3	20	42	34
4	9	11	28	52

Denmark

%	1	2	3	4
1	71	23	3	3
2	14	52	17	17
3	13	17	39	31
4	2	9	40	49

Estonia

%	1	2	3	4
1	51	20	12	16
2	20	42	28	9
3	16	25	31	28
4	11	12	29	48

Spain

%	1	2	3	4
1	63	20	9	8
2	17	39	27	17
3	8	25	41	27
4	12	15	23	49

Finland

%	1	2	3	4
1	65	23	5	7
2	22	33	33	13
3	5	31	33	31
4	6	14	29	51

France

%	1	2	3	4
1	70	17	10	3
2	22	50	20	8
3	6	22	47	25
4	2	11	23	65

UK

%	1	2	3	4
1	75	16	6	3
2	14	42	27	17
3	3	27	28	42
4	8	15	38	38

Greece

%	1	2	3	4
1	47	37	15	2
2	23	39	30	8
3	17	23	39	20
4	8	3	17	72

Hungary

%	1	2	3	4
1	59	29	9	3
2	30	36	25	9
3	3	23	42	31
4	5	14	25	57

Ireland

%	1	2	3	4
1	61	26	10	3
2	20	39	25	16
3	14	20	31	34
4	5	14	34	48

Italy

%	1	2	3	4
1	76	19	5	0
2	16	41	42	2
3	5	26	36	33
4	6	14	15	65

Japan

%	1	2	3	4
1	73	19	5	3
2	14	55	22	9
3	8	17	48	27
4	3	11	25	62

Lithuania

%	1	2	3	4
1	64	22	6	8
2	9	47	23	20
3	9	27	38	27
4	9	9	34	48

Latvia

%	1	2	3	4
1	60	31	7	2
2	35	33	23	10
3	9	25	31	34
4	9	17	28	46

Netherlands

%	1	2	3	4
1	62	22	10	6
2	17	50	20	13
3	6	13	48	33
4	14	15	22	49

Norway

%	1	2	3	4
1	73	18	8	2
2	20	42	25	13
3	5	28	50	17
4	2	12	17	69

New Zealan

%	1	2	3	4
1	65	17	13	4
2	17	52	17	14
3	8	28	45	19
4	3	6	26	65

Poland

%	1	2	3	4
1	55	25	12	8
2	27	45	19	9
3	11	20	38	31
4	5	11	32	52

Portugal

%	1	2	3	4
1	71	19	5	5
2	20	48	22	9
3	5	20	50	25
4	3	12	23	62

Romania

%	1	2	3	4
1	59	25	7	9
2	20	44	17	19
3	9	25	38	28
4	8	9	38	45

Russian Fe

%	1	2	3	4
1	58	32	5	5
2	31	30	28	11
3	11	19	36	34
4	3	9	31	57

Sweden

%	1	2	3	4
1	56	30	5	10
2	23	41	23	13
3	14	19	41	27
4	6	11	31	52

Slovenia

%	1	2	3	4
1	63	30	3	3
2	27	36	31	6
3	6	25	39	30
4	2	11	26	62

Slovakia

%	1	2	3	4
1	53	27	11	9
2	22	28	28	22
3	8	25	36	31
4	11	23	26	40

Turkey

%	1	2	3	4
1	58	27	12	3
2	22	48	23	6
3	8	22	41	30
4	9	5	25	62

Ukraine

%	1	2	3	4
1	41	25	19	15
2	22	39	25	14
3	22	23	22	33
4	12	14	34	40

U.S.A.

%	1	2	3	4
1	58	21	15	6
2	13	52	25	11
3	5	30	33	32
4	2	12	34	52

Figure A4 Transition probabilities 1993-2000, EU average quartile borders

Rows: 1993 quartile; columns: 2000 quartile.

Austria

%	1	2	3	4
1	68	8	15	9
2	22	48	14	16
3	9	21	43	27
4	4	4	20	72

Australia

%	1	2	3	4
1	83	11	4	2
2	34	45	17	3
3	80	10	0	10
4	18	29	24	29

Belgium

%	1	2	3	4
1	48	26	13	13
2	10	37	23	31
3	3	18	41	38
4	2	6	25	67

Bulgaria

%	1	2	3	4
1	79	10	4	7
2	37	22	20	20
3	31	15	23	31
4	24	22	30	24

Canada

%	1	2	3	4
1	71	18	3	7
2	17	31	25	27
3	13	18	49	21
4	21	13	31	36

Switzerland

%	1	2	3	4
1	82	11	5	1
2	27	45	16	13
3	13	23	28	36
4	3	5	21	71

China

%	1	2	3	4
1	77	12	6	6
2	57	13	10	20
3	29	24	14	33
4	13	38	13	38

Czech Rep.

%	1	2	3	4
1	57	26	10	7
2	26	19	28	26
3	17	15	24	44
4	14	12	18	55

Germany

%	1	2	3	4
1	68	24	8	0
2	3	50	40	8
3	2	7	54	37
4	2	3	16	80

Denmark

%	1	2	3	4
1	77	15	3	4
2	23	32	28	18
3	15	13	38	34
4	2	6	33	59

Estonia

%	1	2	3	4
1	78	9	8	4
2	59	16	16	9
3	47	32	5	16
4	33	20	13	33

Spain

%	1	2	3	4
1	60	22	8	10
2	17	40	23	19
3	6	19	40	34
4	7	13	24	56

Finland

%	1	2	3	4
1	75	11	6	7
2	48	30	11	11
3	19	30	19	32
4	19	17	30	35

France

%	1	2	3	4
1	72	24	4	0
2	14	40	34	11
3	3	16	60	21
4	2	2	26	69

UK

%	1	2	3	4
1	79	9	12	0
2	25	27	32	16
3	1	19	41	39
4	0	11	21	68

Greece

%	1	2	3	4
1	89	7	3	1
2	17	34	41	7
3	36	36	21	7
4	31	31	25	13

Hungary

%	1	2	3	4
1	64	21	10	5
2	22	32	26	20
3	19	22	34	25
4	9	17	24	50

Ireland

%	1	2	3	4
1	74	13	6	6
2	35	31	20	14
3	22	29	27	22
4	16	16	29	39

Italy

%	1	2	3	4
1	72	25	3	0
2	15	47	38	0
3	2	27	40	32
4	4	16	11	69

Japan

%	1	2	3	4
1	82	11	5	2
2	43	27	22	8
3	11	34	20	34
4	20	14	23	43

Lithuania

%	1	2	3	4
1	82	10	3	6
2	60	8	16	16
3	43	29	0	29
4	52	10	28	10

Latvia

%	1	2	3	4
1	84	7	5	4
2	77	23	0	0
3	33	29	10	29
4	61	18	18	4

Netherlands

%	1	2	3	4
1	59	26	7	7
2	14	32	41	14
3	9	18	46	28
4	5	4	19	72

Norway

%	1	2	3	4
1	75	17	7	1
2	31	45	21	3
3	12	21	50	18
4	8	16	21	55

New Zealan

%	1	2	3	4
1	87	8	4	1
2	31	19	28	22
3	17	17	25	42
4	47	18	12	24

Poland

%	1	2	3	4
1	74	14	5	7
2	21	28	30	21
3	29	11	39	21
4	11	13	30	46

Portugal

%	1	2	3	4
1	72	16	9	4
2	23	38	17	21
3	10	23	33	35
4	15	15	19	52

Romania

%	1	2	3	4
1	77	9	6	8
2	33	25	17	25
3	29	12	24	35
4	33	27	20	20

Russian Fe(

%	1	2	3	4
1	85	9	3	2
2	41	33	15	11
3	56	13	13	19
4	36	5	36	23

Sweden

%	1	2	3	4
1	58	25	6	10
2	22	39	25	14
3	18	20	35	27
4	6	9	35	49

Slovenia

%	1	2	3	4
1	82	9	6	3
2	34	30	18	18
3	22	31	22	25
4	12	12	22	53

Slovakia

%	1	2	3	4
1	60	18	11	11
2	30	33	22	15
3	31	22	22	25
4	29	10	37	24

Turkey

%	1	2	3	4
1	82	6	8	4
2	33	23	13	30
3	7	27	33	33
4	16	20	28	36

Ukraine

%	1	2	3	4
1	76	11	8	4
2	56	18	12	15
3	56	17	11	17
4	53	18	24	6

U.S.A.

%	1	2	3	4
1	78	8	7	7
2	41	18	18	23
3	22	25	25	28
4	17	22	22	39