

**Paper Title: International Trade and Industrial Restructuring in Romania  
from 1995 to 2006**

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# **International Trade and Industrial Restructuring in Romania: 1995-2006**

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## **Abstract**

This article analyses changes in the volume, structure and quality of Romanian manufacturing exports to the EU in order to determine the extent of industrial restructuring in Romania. It is argued that the observed five-fold increase in the volume of manufactured exports from Romania to the EU over more than a decade-long period, albeit a positive development in of itself, still hides a persistent reliance upon labour-intensive and low-value added products, where price competition dominates the quality improvement gains of industrial restructuring. Nevertheless, in recent years Romania's export patterns have started to resemble those of other, more advanced Central Eastern European (CEE) countries. As a policy prescription, Romania's active industrial policy (to encourage the production of new, innovative, high-value added products) and open trade approach have to continue in order to catch up rapidly with the economically more advanced CEE countries.

## **Introduction**

Industrial restructuring represents the last and longest phase of the economic reform undertaken by all CEE countries when transitioning from a centrally-planned to a market-based economy. With macroeconomic stabilisation, price liberalisation and privatisation reforms well on the way, the industrial restructuring process requires a major shift in the structure of production and the creation of a whole new economy. It implies the liquidation of loss-making state-owned enterprises (SOE), the technological upgrading of potentially profitable units and, ideally, the emergence of a dynamic SMEs sector (Blanchard et al, 1991). By 1995, Romania achieved price liberalisation and macroeconomic stability and revived its earlier attempts at privatisation but, with no exposure to market-driven reforms prior to 1989 and 90% of output still generated by SOEs, industrial restructuring presented a considerable task (WTO, 2005).

Under the assumption that changes in the volume, structure and quality of products as a result of industrial restructuring process are reflected in the changes in export patterns, present research analyses the characteristics of Romania's manufacturing exports to the EU<sup>1</sup> since industrial restructuring began in the country. When successful, industrial restructuring allows a country to replace gradually its traditional, labour- and resource-intensive products with a wider range of new, differentiated products, preferably of higher technology-intensity. Moreover, if successful, industrial restructuring enables an economy in transition to avoid the so-called 'low-quality trap', i.e. to become an 'export platform' of low-quality, labour- and resource-intensive

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<sup>1</sup> For consistency, given the enlargement of the EU in 2004, the analysis focuses on the core EU15 countries comprising: Austria, Belgium, Germany, Denmark, Spain, Finland, France, United Kingdom, Greece, Ireland, Italy, Luxemburg, Sweden, Netherlands and Portugal.

manufactures produced in 'assembly type' factories. Empirical studies suggest that most advanced CEE countries, or the so-called 'early reformers' such as Slovenia, Hungary, Poland and the Czech Republic, managed to avoid relying upon low-value added products and were successful in upgrading the quality of their exports over time (Kandogan, 2005; Sheets and Boata, 1998). Regrettably, despite its large market of over 22 million people, Romania is a 'late reformer' that has attracted considerably less attention from the academic community. Hence a detailed analysis of Romania's changing trade patterns after 1995 is long overdue, especially given its relevance for estimating the country's economic reforms and, implicitly, its convergence with the other CEE countries.

In line with existing empirical trade literature, Romania's export patterns to the EU are analysed with the help a large number of relevant indices and indicators grounded in classical, neoclassical and modern trade theory. Whenever possible, a parallel is drawn between emerging export patterns in Romania and those of other CEE countries. Present research focuses on the exports of manufactures alone as this sector accounts for over 92% of the total trade between Romania and EU, and is most affected by the restructuring process. Besides, as in the case of other CEECs, with over 60% of Romania's trade by value EU remained by far the main trade partner of Romania throughout the period.

The analysis utilises trade data provided by EUROSTAT (EC), based on SITC Rev. 3 classification at 1, 2, 3 and 4 levels of disaggregation. Trade indexes and indicators are adapted, calculated and analysed in order to answer questions surrounding the process of industrial restructuring in Romania: given changes in the volume of exports with the EU, is the country exporting more of the same, traditional products or new, diversified ones instead? Has there been a change in the composition of exports? What role does intra-industry exports of differentiated products play today, as opposed to inter-industry exports of homogenous products from different industries? Are manufacturing exports from Romania labour-, resource- or human-capital intensive? How does the composition of Romanian exports compare to that of other CEECs? Has the country managed to improve the competitiveness of its manufacturing products through successful industrial restructuring or is it shifting towards more labour-intensive assembly activities?

The article has 5 sections. The first section calls upon trade theory to explain and predict likely changes in the composition of exports from low-middle income (CEE) to middle-high income countries (EU). It also includes a discussion of what the theory predicted changes in trade patterns imply from an ongoing industrial restructuring standpoint. The second section presents empirical results as found in extant literature on trade between EU and CEE countries and raises the question of whether Romania has managed as yet to close the gap with other CEE countries. The following section introduces the research method and the indexes applied, while the fourth section analyses bilateral exports between Romania and EU (RO-EU exports) over the last 12 years. The article concludes that changes observed, albeit recent, are significant and point in the direction of economic convergence. The process of

industrial restructuring in Romania has made some progress but is far from complete and there are still aspects which would require the attention of domestic policy makers.

## **1. Theoretical Predictions on CEECs-EU Trade Patterns and their Implications for Industrial Restructuring**

Based on the natural trade potential determined by differences in factors of production between CEE and EU countries, classical trade theory predicts an increase in the volume of trade between the two groups of countries, as a result of specialisation in production. CEE countries would specialise in the production and export of labour products; the EU countries would export technology-based products. As early as 1990s, research by Collins and Rodrik (1991) and Hamilton and Winters (1992) predicted that trade liberalisation together with the introduction of economic reforms in the CEE countries would lead to considerably higher volume of exports to the EU in the sectors, industries and products in which the former had comparative advantages.

Similarly, the neo-classical trade theory predicts further specialisation in production based on factor intensity and a gradual convergence in factor prices. Those CEE countries abundant in low wage workforce and natural/mineral resources will specialise in producing labour- and natural resource-intensive products and export them in exchange of technology and capital-intensive products from the EU. Hamilton and Winters' trade models (1992) predicted a five-fold increase in the volume of trade between the two groups of countries and advocated a relatively rapid catching up period as CEE countries' comparative advantages shift from low-skilled labour-intensive to high-skilled labour-intensive products. According to the authors above, the long-run comparative advantages of CEE countries rest in human capital-intensive products (i.e. educated workforce) and such countries will gradually start to export more sophisticated manufacturing products, rather than the traditional labour-, energy-intensive ones.

Changes in CEECs' comparative advantages are also predictable under the factor equalisation theorem which explains how, through increased volumes of trade and investment, wage differentials between CEE and EU countries will diminish and that will affect the type of products exchanged (Samuelson, 1948). Informed by neo-classical trade theory, Salvatore (2001) even proposed a model of trade restructuring during transition whereby given the initial differences in resource endowments, CEE and EU countries will exchange homogenous products belonging to different industries, i.e. will engage in inter-industry trade. Over time, however, trade (by way of competitive pressures, new technologies, organisational skills and factor price convergence) will create conditions for CEE countries to produce more sophisticated manufacturing products and engage in intra-industry trade with EU countries. A shift is therefore predicted by theory in the composition of trade over time: inter-industry trade is to be replaced by intra-industry trade when, through industrial restructuring, CEE countries will be able to offer new, differentiated, higher quality products. The more similar the countries are, the

higher the share of intra-industry trade in total trade. The higher the discrepancy in income levels, the higher the share of inter-industry trade. Hence, an increasing share of intra-industry trade in total trade between CEE and EU countries will reflect not only a successful industrial restructuring but also a convergence in income levels between the two groups of countries.

Moreover, while specialisation in production (as predicted by classical and neo-classical theories) behind most of inter-industry trade may or may not be a result industrial restructuring, intra-industry trade, representing a two-way trade in same industry products (i.e. differentiated products) implies it clearly. Intra-industry trade is best explained by new trade theory based on economies of scale and product differentiation (Krugman, 1981). This type of trade has two components: vertical intra-industry trade (VIIT) and horizontal intra-industry trade (HIIT). The VIIT is defined as the simultaneous exports and imports of products at different stages of production (lower stages of production associated with low-skill labour-intensive, low quality products; late stages of production implying high-skilled labour-, technology-intensive, high quality products), but in the same industry. Falvey (1981) showed that VIIT pattern follows the traditional endowment-based model: the relatively capital abundant country exports higher quality products at later stages of production whereas relatively labour-abundant countries export lower quality goods at early stages of production. By contrast, HIIT represents the simultaneous exchange of products at the same stage of production, i.e. close substitutes of similar quality. Research on this type of trade found that HIIT is positively associated with product differentiation, foreign direct investment and industry concentration (Lancaster, 1980; Krugman, 1981; Helpman 1981, 1985; Bergstrand, 1990). According to other studies, the more similar the countries, the greater the share of HIIT in total trade is (driven by product differentiation and economies of scale). Based on these considerations, theory predicts that VIIT will dominate intra-industry trade between CEE and EU countries.

In short, understanding the factors behind changes in exports patterns (volume, structure and composition) is crucial for this research. According to Hummel and Klenow (2002) an increase in exports can be a result of three factors: the 'intensive margin' (or the export of the same set of goods but in larger volumes); the 'extensive margin' (or the export of a larger set of products, often differentiated products) or the exports of higher quality goods. The intensive margin would reflect specialisation in production according to comparative advantages, whereas the last two factors would imply industrial restructuring. Therefore, evidence of the last two factors is especially relevant for present research.

## **2. Empirical Results on CEECs-EU Trade and Implications for Industrial Restructuring**

To what extent are the above theoretical predictions supported by empirical results? Overwhelmingly, empirical studies on CEE and EU trade patterns focused on the most advanced countries and validated the theory. For example, it was shown that exports from CEE to EU countries rose steadily since early 1990s and CEE countries specialised in labour-, resource – and

energy-intensive exports of a limited range of products, typical of less developed economies (Resmini and Traistaru, 2003; Salvatore, 2001; Lowinger et al, 2000). In contrast, the EU countries display diverse specialisation, even if there were obvious differences among them, particularly between the northern countries of the EU, focused upon capital-, R&D- and human capital-intensive exports, and the southern EU, that had higher levels of labour-intensive exports (Landesmann, 2000).

As predicted by theory, exchanges between CEE and EU countries were initially dominated by inter-industry trade with the former exporting low-skill labour-intensive goods such as textile, cloth and leather products, fuel, basic chemicals and metals (reflecting the specialisation in production inherited from central planning regimes) in exchange for consumer goods from EU (Djankov and Hoekman, 1996; Resmini and Traistaru, 2003). Later shifts in CEE countries' comparative advantages led to a change in the composition of exports after 1995 towards more sophisticated manufactures such as machinery products, electrical and motor vehicles, in exchange for technology-intensive imports. As a result and, again, in line with theory, it was shown that the share of intra-industry trade in total trade between CEE and EU countries increased since 1990s (Firdmunc, 2005; Palazuelos-Martinez, 2007) and countries have become 'more similar'. Although initial research on intra-industry trade between CEE and EU countries did not distinguish between its vertical and horizontal components, later studies concluded that VIIT prevailed in the early 1990s (Aturupane et al, 1997).

With respect to the quality of CEE countries' exports since early 1990s, the empirical results are less clear cut. Some studies found limited improvement in the quality of products exported (Brendon and Gross, 1997); other studies acknowledged that some CEE countries managed to avoid the 'low-quality trap' (Sheets and Boata, 1998, Kandogan, 2005). Importantly, some researchers confirmed that between 1989 and 1994 the exports from CEE countries concentrated on lower quality products (most likely due to obsolete technologies inherited from the past) but the quality gap between EU and Hungary, Poland, Slovenia and Czech Republic declined, while that between EU and Romania and Bulgaria widened (Landesmann and Burgstaller, 1998).

Research into the post-1995 period suggests that the most advanced CEE countries started to close the gap with the EU as suggested by increased shares of intra-industry trade and other indicators measuring the quality of their exports. It is less clear whether Romania is part of this trend or not, given the limited research on this country to date. The analysis in section four will explain Romania's export position vis-à-vis the EU and thus inform the assessment of its ongoing industrial restructuring process.

### **3. Research Methods**

Present research on Romania's manufacturing exports to EU utilises trade indexes, indices and indicators frequently used in specialist trade literature to measure the extent of specialisation in production (based on shifts in comparative advantages); identify changes in the structure of exports and in

the quality of products exported over the last 12 years. For example, specialisation in production is well captured by total coverage index and the revealed comparative advantage index (Balassa, 1965). An increase in intra-industry trade is commonly captured by the Gruebel-Lloyd index (developed by the authors in 1975) while product differentiation is often reflected in the share of horizontal intra-industry exports in total exports, which are to be determined here by decomposing trade according to an intuitive method proposed by Kandogan (2003a, 2003b). Evidence of product upgrading will be found applying the Wolfmayr-Schnitzer classification of products by intensity of factors of production (1998). Table 1 summarises the main indicators used and their specific relevance for current analysis. These various measures and indicators will be used to help our assessment of industrial restructuring in Romania: is this country still relying on resource- or labour-intensive exports, mainly of inter-industry type or has it managed to shift towards more capital-intensive, differentiated products and intra-industry exchanges as a result of industrial restructuring?

Table 1: Relevant Indexes and Indicators

Indexes and Indicators	Formulae	Application	Level of Analysis
Total Coverage Index (TCI)	$TCI_j = \frac{x_j}{m_j}$ <p>where  <math>x_j</math> = Romanian exports of good <math>j</math>  <math>m_j</math> = Romanian imports of good <math>j</math></p>	When $TCI_j$ greater than 1, the country has a comparative advantage in product/group of products $j$ (known as ‘internal’ comparative advantage)	2-digit SITC level (or a total of 69 divisions, often regarded as ‘industry’ level). Applied across all sectors, not only manufacturing.
Revealed Comparative Advantage Index (RCA), or the Balassa Index (1965)	$RCA_{Ro,j} = \frac{\left( \frac{x_j^{RoEU}}{X^{RoEU}} \right)}{\left( \frac{x_j^{EU}}{X^{EU}} \right)}$ <p>where  <math>RCA_j</math> = the Revealed Comparative Advantage of Romania in the products <math>j</math>; <math>x_j^{RoEU}</math> = the export of Romania to the EU in product <math>j</math>; <math>X^{RoEU}</math> = the total exports of Romania to the EU; <math>x_j^{EU}</math> = the total exports to the EU of the product <math>j</math>;  <math>X^{EU}</math> = the total exports to the EU.</p>	A high $RCA_j$ indicates that Romania is a preferential supplier of product $j$ to the EU (known as the ‘external’ comparative advantage)	3-digit SITC level, often regarded as ‘product group’ level. Applied across all sectors, not only manufacturing.
Hummel and Klenow Index (2002) or the Intensive Margin Index (HKIM)	$HKIM_t^{Ro} = \frac{\sum_C \sum_{p \in P_{95}^{RoC}} X_{pt}^{RoC}}{\sum_C \sum_{p \in P_{95}^{WC}} X_{pt}^{WC}}$ <p>and <math>P_{95}^{RoC} = \{p / X_{p95}^{RoC} \succ 0\}</math> where <math>HKIM_t^{Ro}</math> = the Hummel-Klenow intensive margin index for Romania in year <math>t</math></p>	HKIM shows the extent to which an increase in a country’s exports is due to exporting the same sets of goods in larger volumes	4-digit SITC level, often regarded as ‘product’ level data.



	C = the set of EU market economies; $X_{pt}^{ROC}$ = the export from Romania to a country in C in product p at time t and $X_{pt}^{WC}$ = world exports to a country in C in product p at time t.		
Intra Ind. Exports (IIX); Inter-Ind. Exports (INX); Horizontal Intra Ind. Exports (HIIX); Vertical Intra Ind. Exports (VIIX) (Kandogan, 2003a, 2003b)	$X = \sum_i X_i = \sum_i \sum_p X_{ip}$ $IIX = \sum_i IIX_i = \frac{1}{2} \sum_i (TT_i - abs(X_i - M_i))$ $INX = \sum_i INX_i = \sum_i (X_i - IIX_i)$ $HIIX = \sum_i HIIX_i = \sum_i \left( \frac{1}{2} \sum_p X_{ip} + M_{ip} - abs(X_{ip} - M_{ip}) \right)$ $VIIX = \sum_i VIIX_i = \sum_i (IIX_i - HIIX_i)$	<p>IIX = The amount of exports in each industry that are matched by imports.</p> <p>INX = The difference between total exports and intra industry exports.</p> <p>HIIX = Matched exports (with imports) in each product of an industry (or trade in similar products).</p> <p>VIIX = Matched exports of different products or goods, at different stages of production within an industry.</p>	<p>IIX and INX calculated at 2-digit SITC level, seen as the ‘industry’ level.</p> <p>HIIX and VIIX calculated at 4-digit SITC level, or ‘product’ level</p>
Grubel Lloyd adjusted Index (1965), or GL adj	$GLadj = \frac{\sum_i (X_i + M_i) - \sum_i abs(X_i - M_i)}{\sum_i (X_i + M_i) - abs(\sum_i X_i - \sum_i M_i)}$	Alternative measure of intra-industry trade, adjusted for trade deficits. GLadj takes values between 0 and 1. Higher values suggest higher levels of intra-industry trade.	3-digit SITC level, regarded as ‘product’ level.
Factor Intensity (Wolfmayr-Schnitzer classification, 1998)	Products are grouped in different categories depending upon the intensity of factors of production: (1) resource-intensive; (2) human capital intensive and low technology; (3) labour intensive; (4) human capital intensive and medium technology and labour intensive; (5) human capital intensive and medium technology and capital intensive; (6) human capital intensive and high technology and labour intensive; (7) human capital intensive and high technology and capital intensive.	The last four categories (4-7) are preferable in terms of factor intensity content, indicating higher quality products.	At 4-digit SITC level, regarded as ‘product’ level.

## 4. Trade Data Analysis (1995 and 2006)

### 4.1. Changes in the Value of RO-EU Trade

From 1995 to 2006, Romania's trade with EU increased fivefold. Throughout the period under study, Romania's exports and imports to EU rose at an annual average rate of 12% and 15% respectively. The EU consolidated its position as the main trading partner of Romania, while the latter became the 10<sup>th</sup> largest market for EU exports. Table 2 shows changes in the value of RO-EU trade in both absolute and relative terms.

Table 2: Changes in the Value of RO-EU trade over time.

0 (year)	1 (%)	2 (bn euros)	3 (%)	4 (Rank)	5 (%)	6 (bn euros)	7 (%)	8 (Rank)
1995	46.9	3.8	0.7	29	53.2	3.4	0.6	28
2000	-	9.9	0.9	21	-	8.2	0.7	26
2005	62.2	21.9	2.0	10	67.6	14.8	1.3	19

Source: Eurostat data and National Romanian Bank, 2005: 'Annual Report on Balance of Payments'. 1- %EU exports in total RO imports; 2- value of EU exports to RO; 3 - % of EU exports to Ro in total extra-EU exports; 4- rank of Romania among importers from EU; 5- % of EU imports in total RO exports; 6- value of EU imports from RO; 7- % of EU imports from RO in total extra-EU imports and 8- rank of Romania among exporters to EU.

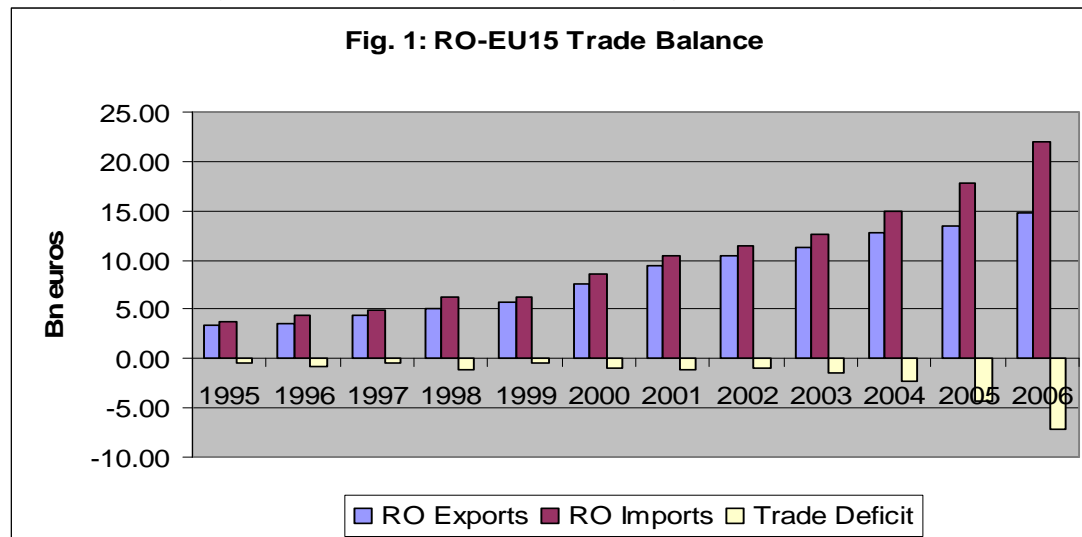
As in the case of other CEE countries, the increase in the volume of trade between Romania and the EU is not surprising from a theory standpoint. It is believed that the European Association Agreements (EAs), signed by CEECs with the EU in the early 1990s<sup>2</sup>, stimulated bilateral trade with their trade liberalisation measures (Smith et al, 2005). Although trade liberalisation, with its resultant increase in trade flows between CEE and EU countries, was regarded by both sides as a necessary and mutually beneficial step towards rapid economic growth in CEECs and faster integration in Europe, concerns over short-term implications were raised in various quarters. Firstly, labour-intensive sectors in the EU countries feared job losses to lower labour cost industries of CEECs – although, in part, the former benefited from temporary protection: under EAs, the most sensitive sectors (steel products, foodstuff, textiles and clothing) were liberalised later.<sup>3</sup> Second, technology-intensive industries in CEECs feared that sudden competition from more efficient EU counterparts would leave them exposed if industrial restructuring had not yet taken place. In particular, policy makers in many CEECs wanted to avoid the 'low-quality trap' by gradually replacing previous exports of low-value, labour and resource-intensive products with high value added products of better quality and technology. An export structure based primarily on labour- and resource-intensive products was thus undesirable: the industrial restructuring process was expected to upgrade and modernise technologies and products.

<sup>2</sup> Romania signed the EA in 1993.

<sup>3</sup> For example, the bilateral agreement stipulated that EU tariffs on steel products from Romania were to be removed by 1996, on textiles and clothing by 1997 and quotas on textiles by 1998.

The extent to which this objective was achieved in Romania will be revealed by present analysis.

As imports grew faster than exports, RO-EU trade deficit widened from 0.4bn euros in 1995 to 7.1bn euros in 2006. Importantly, the deficit increased steadily especially after 2003 when the country removed all quantitative restrictions on imports. In 2006 the trade deficit with the EU represented 19% of the total value of bilateral trade and 7% of GDP (the largest part of the total foreign trade deficit which was 10% of GDP). According to official reports, most of the trade deficit was matched by foreign direct investment which grew fast since 2003 (BNR, 2006). Higher imports in recent years are explained by increased demand for consumer goods, higher energy prices and the need to modernise the industrial base and the infrastructure of an economy in transition. The RO-EU trade represented 29% of Romania's GDP in 1995; 51% in 2002-2004 and 38% in 2006: the slight decline after 2004 was caused by faster GDP growth rates compared to trade growth rates during the period.



#### 4.2. Changes in the RO-EU structure of exports and imports

Across broadly defined product groups, more than 90% of Romania's trade with the EU represented manufacturing products.<sup>4</sup> As per data in table 3, the annual average growth rate in machinery and transportation equipment (SITC section 7) for the period under study, was much higher than that of total exports and, not surprisingly, the relative importance of this sector increased considerably, while the relative importance of the other manufacturing sectors declined. On the other hand, the exports of Chemicals ceased to play an important role in the total manufacturing exports to the EU.

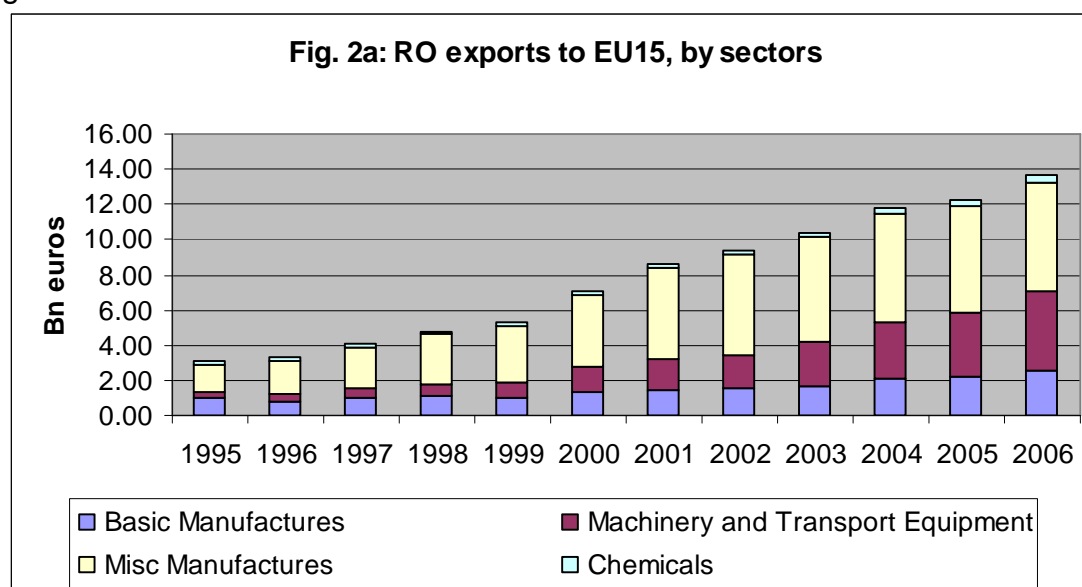
<sup>4</sup> Based on SITC classification at 1-digit level (sections level), Primary Products include food and live animals (SITC 0), beverages and tobacco (SITC 1), crude materials, inedible except fats (SITC 2), mineral fuels (SITC 3) and animal and vegetable oils, fats and waxes (SITC 4); Manufacturing products include chemicals (SITC 5), basic manufacturing goods classified by material (SITC 6), machinery and transport equipment (SITC 7) and other, miscellaneous manufacturing articles (SITC 8).

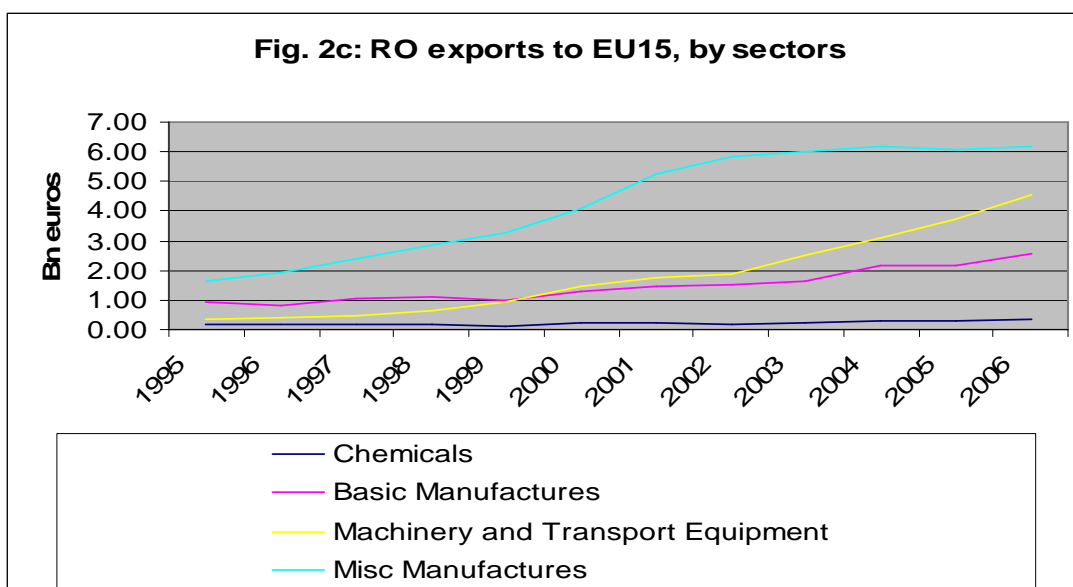
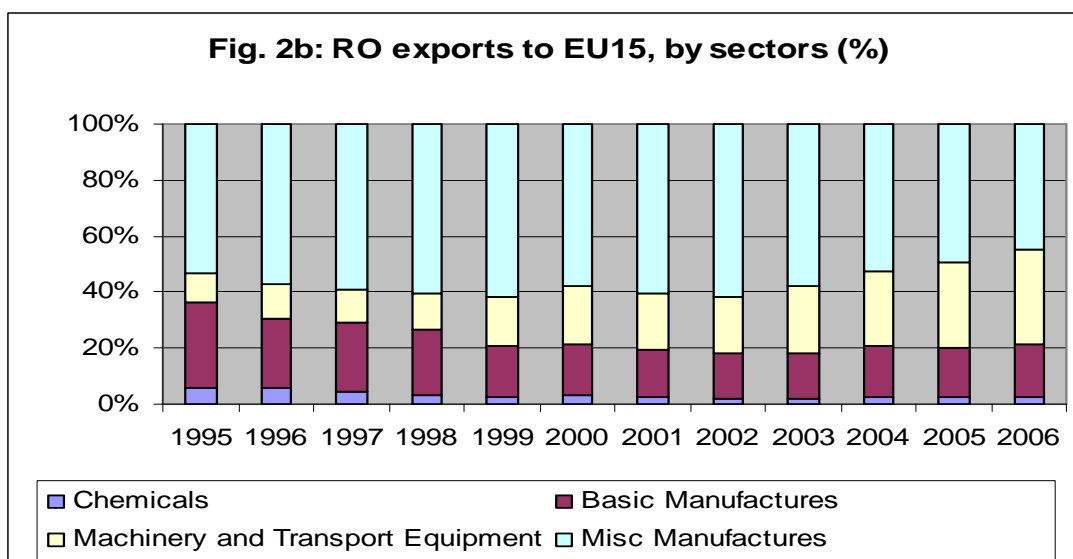
Table 3: The Structure of RO-EU exports, by SITC sections (in %)

<b>SITC sections</b>	<b>1-digit level</b>	<b>1995</b>	<b>2000</b>	<b>2006</b>	<b>Annual Average Growth Rate</b>
0- Food and Live Animals		3	2	2	9
1- Beverages and Tobacco		0	0	0	0
2- Crude Materials		2	5	3	16
3- Mineral Fuels		2	0	2	13
4-Animal and Vegetable Fats		0	0	0	7
5- Chemicals		6	3	3	6
6- Basic Manufactured goods (by materials)		28	17	17	8
7- Machinery, Transport Equipment		10	19	31	22
8- Misc. Manufactured goods		49	53	42	11
9- Other		1	1	1	7
Total Exports		100	100	100	12
% Exports of Manufactures (cat. 5-8) in total exports		93	92	93	-

Source: Data compiled by the author from Eurostat (EC)

Figures 2 a, b, c show that the exports of miscellaneous manufactures ended the upward trend after 2002, whilst exports of machinery and transport equipment and, to a lesser extent, exports of basic manufactures continued to grow in absolute and relative terms.





Turning to imports from the EU, table 4 shows machinery and transport equipment as the single largest category of products imported while the share of manufacturing sector in total imports increased from 87% in 1995 to 93% afterwards.

Table 4: The structure of RO-EU imports, by SITC sections (in %)

SITC Rev 3, 1-digit level sections	1995	2000	2006	Annual Average Growth Rate
0- Food and Live Animals	6	2	3	8
1- Beverages and Tobacco	1	1	1	11
2- Crude Materials	2	1	1	12
3- Mineral Fuels	3	1	1	4
4-Animal and Vegetable Fats	0	0	0	15
5- Chemicals	10	9	10	15
6- Basic Manufactured goods (by materials)	29	28	23	13

7- Machinery, Transport Equipment	34	39	47	17
8- Misc. Manufactured goods	14	17	13	14
9- Other	2	1	1	8
Total Imports	100	100	100	15
% Imports of Manufactures (cat. 5-8) in total imports	87	93	93	-

Based on aggregated trade data, one can therefore conclude that most of the growth in the bilateral manufacturing trade was due to a surge in exports and imports of machinery and transport equipment (SITC section 7), especially after 2002. Until 2003 the growth manufacturing exports to the EU was driven by steady growth in exports of misc. manufactures (SITC section 8). Afterwards, the relative importance of basic manufactures and machinery and transport equipment increased by comparison. Our data suggests that in 2003 a significant change in the structure of manufactured exports to EU has taken place. Next we explore the basis for this change at section and group of products level.

### **4.3. Changes in Comparative Advantages of Romania's exports**

Changes in the volume and structure of RO-EU exports can be explained by changes in comparative advantages over the period. According to neo-classical trade theory, comparative advantages are determined by the abundance of factors of production and the intensity with which those are used in production. The modern theory of trade links comparative advantages with economies of scale and product differentiation. Irrespective of their determinants, as previously explained, comparative advantages do change as a result of increased flows of trade and investment and such changes are captured best by two indicators: the total coverage index and the revealed comparative advantage (see table 1). Below, we apply these indicators to Romania's trade with the EU and report on results.

#### **4.3.1. Total Coverage Index (TCI)**

TCI, the simplest indicator of comparative advantage, measures the 'internal' comparative advantage of a country. Applied to RO-EU trade, the index suggests that, between 1995 and 2006, Romania improved its comparative advantage in electrical machinery, apparatus and appliances (SITC 77), i.e. in human capital intensive, low technology products. By contrast, Romania lost comparative advantages in some industries in chemical and basic manufactures sections, many of these producing resource-intensive products. At the same time Romania maintained comparative advantages in many labour-intensive products belonging to misc. manufactures, basic manufactures and chemicals sections. Therefore, as per table 5, a shift away

from resource- and raw materials-based exports towards more human capital-intensive exports can be noted.<sup>5</sup>

Table 5: Trend in TCI for RO-EU trade, 1995-2006

<b>SITC 2-digit level sections</b>	<b>Maintains CA</b>	<b>Gains CA</b>	<b>Loses CA</b>
5- Chemicals	Inorganic chemicals; fertilizers	-	Plastics in primary forms
6- Basic Manufactures	Rubber manufactures; cork and wood manufactures (excl. furniture); iron and steel	-	Non-metallic mineral manufactures; non-ferrous metallic manufactures
7- Machinery	-	Electrical machinery, apparatus and appliances	Power generation machinery and equipment
8- Misc Manufactures	Furniture and parts thereof; travel goods, handbags and similar containers; articles of apparel and clothing accessories; footwear.	-	-

#### 4.3.2. Revealed Comparative Advantage Index (RCA)

The RCA index compares the share of a given sector in national exports with the share of that sector in the world exports. The index was adjusted to determine the RCA of RO-EU exports (see table 1). In comparison to  $TCI_j$ , a high  $RCA_j$  index indicates that a country is a preferential supplier of product  $j$  to the EU and, therefore, a country has a comparative advantage for that product relative to other countries. RCA therefore measures the 'external' comparative advantage, the position of a country's product on an external market. The ranking of the specialisation indices so obtained are displayed in tables 6a and 6b below.

Table 6a: Product Groups with the highest RCA (2006)

	<b>RCA Trend</b>	<b>% total exports 1995</b>	<b>% total exports 2000</b>	<b>% of total exports 2006</b>
773- Equipment for distributing electricity	+	1.71	2.98	7.86
841- Men's or boy's coats, capes, jackets, suits, blazers, etc of textile fabrics	-	11.13	10.91	6.92
842- Women's or girls coats, capes, jackets, suits, blazers, etc of textile fabrics	-	10.46	12.29	9.16
851- Footwear	+	9.11	11.27	9.31
811- Prefabricated buildings	+	0.12	0.23	0.28
635- Wood manufactures	+	0.73	1.50	1.31
821- Furniture and parts thereof; bedding, mattresses, cushions and similar stuffed furnishings	-	8.73	5.51	5.54
844- Women's and girl's coats, etc knitted or	+	0.80	1.48	1.20

<sup>5</sup> This should not be surprising as, over the last decade, Romania started to export low wage workers who could not longer work in those once protected sectors

crocheted				
791- Railway vehicles and associated equipment	+	0.19	0.54	0.55
843- Men's or boy's coats, etc knitted or crocheted	+	0.50	0.78	0.57

Table 6b: RCA of the most important export products of Romania (2006)

	<b>RCA Trend</b>	<b>% total exports 1995</b>	<b>% total exports 2000</b>	<b>% of total exports 2006</b>
851- Footwear	+	9.11	11.27	9.31
842- Women's or girls coats, capes, jackets, suits, blazers, etc of textile fabrics	+	10.46	12.29	9.16
773- Equipment for distributing electricity	+	1.71	2.98	7.86
841- Men's or boy's coats, capes, jackets, suits, blazers, etc of textile fabrics	-	11.13	10.91	6.92
821- Furniture and parts thereof; bedding, mattresses, cushions and similar stuffed furnishings	-	8.73	5.51	5.54
784- Parts and accessories of motor vehicles of groups 722, 781, 782 and 783	+ (*)	0.59	0.98	4.42
845- Articles of apparel, of textile fabrics, whether or not knitted or crocheted	-	4.63	7.05	4.08
772- Electrical apparatus for switching or protecting electrical circuits or for making connections to or in electrical circuits	+ (*)	0.23	0.34	2.01
673- Flat-rolled products of iron or non-alloy steel, not clad, plated or coated	-	5.44	1.78	1.81
699- Manufactures of base metal, nes	+ (*)	0.79	0.77	1.73

*Note: + = increase; - = decrease; \* = change from disadvantage to advantage*

Analysis of data using RCA reveals interesting results. First and not surprisingly, the tables are dominated by manufacturing products (the products with the highest RCA and with the largest share of Romanian exports are all manufacturing products). Second, product groups with increasing RCA belong to Misc. Manufactures (SITC 8), Machinery (SITC 7) and Basic Manufactures (SITC 6), in decreasing order of importance according to their share in total exports. The Misc. Manufactures products still dominate exports, although some of them (841, 842, and 821) lost their competitiveness (as reflected in declining RCI during the period) and it is expected their shares in exports to decline in the future. Other groups of Misc. Manufacturing products increased their competitiveness (811, 844, and 843) but have seen little or no rise in their overall export share. On the contrary, groups of products belonging to Machinery and Transport Equipment (773, 791) are becoming more competitive relative to the EU markets and their export shares have risen considerably, especially after 2000. Third, the RCA of the top export group of products over the period suggests that new groups of products belonging to Machinery and Transport Equipment are becoming competitive, as their initial comparative disadvantage is being reversed, especially after 2000 (784 and 772). Such changes suggest once again that the share of Machinery and Transport Equipment group of products in total exports is set to increase in the future. Also to be noted another reversal in comparative advantage by a group of products belonging to Basic

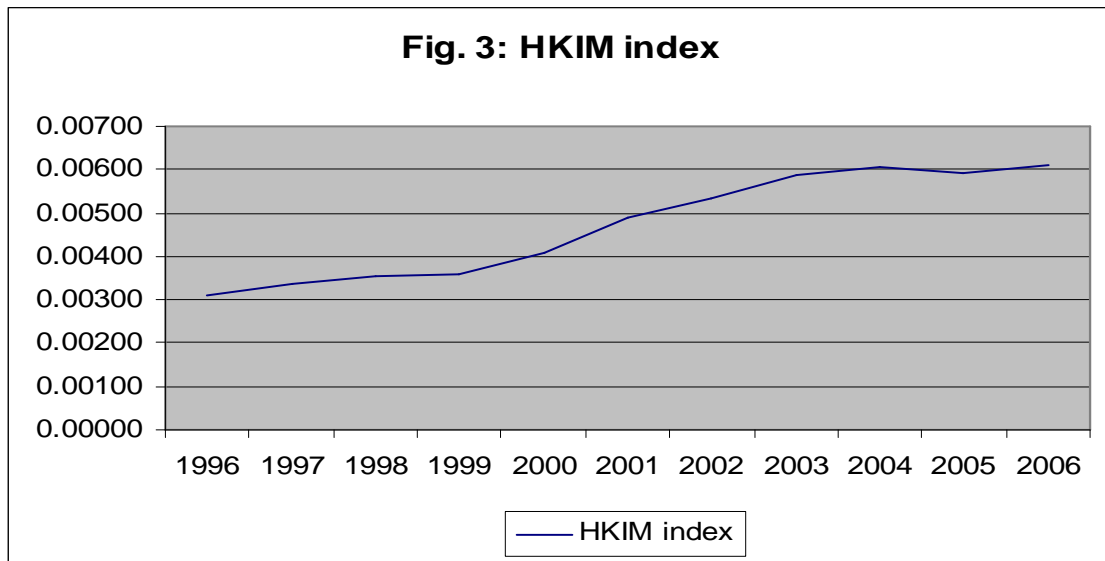


Manufactures (699) and its rapidly increasing export shares (albeit from a low level). Fourth, it is remarkable that all products groups (except one) with increasing RCAs over the period are labour-intensive: this suggests that Romania (unlike the most advanced CEECs) continues in the 2000s to specialise in labour-intensive rather than technology-intensive products.

To summarise, although Romania's exports are still dominated by misc. manufactures, their share in total exports is being eroded by machinery and transport equipment products as a result of noticeable improvements and reversals in comparative advantages. Importantly, even though Romania's comparative advantages are shifting within the manufacturing sector they persist in labour-intensive products. We now turn to examine in which way the identified changes in comparative advantages have contributed to the increase in the value of RO-EU exports. We seek evidence of specialisation in production (i.e. the exports of the same products in larger quantities, often leading to inter-industry exports) versus industrial restructuring (implying the sale of new, differentiated products, taking the form of intra-industry exports).

#### **4.4. Evidence of Specialisation in Production**

The Hummel and Klenow intensive margins index (HKIM) shows the extent to which and increase in a country's exports is due to exporting the same sets of goods in larger volumes (table 1). We adapted and applied the HKIM index to RO-EU exports (as per table 1) and the values of intensive margins index obtained for Romania are shown in fig. 3. Our calculations indicate that the change in the intensive margins during the period under study is 98%, which is much lower than the 337%, the rate of increase in the overall manufacturing exports to the EU during the same period. This suggests that selling the same products that were previously sold to EU (i.e. specialisation in production) accounts for less than a third of the increase in exports to the EU. Importantly, the value of HKIM index did not change in later years. This indicates that from 2003 the increase in RO-EU exports is no longer due to increases in the selling of traditional products in larger volumes but to other factors, such as increase in the variety of products or product quality. As noted before, 2003 marks a shift from previous trends: the contribution of specialisation in production to raising exports reaches its limit. Instead, increases in exports would be driven solely by the sale of new, differentiated products or products of higher quality (all of which require industrial restructuring).

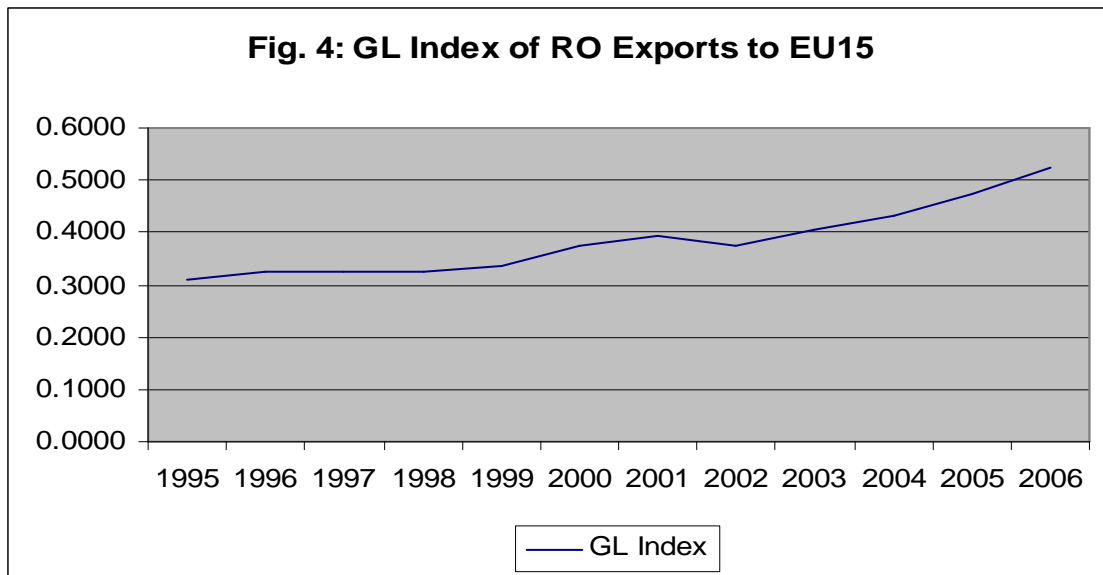


#### 4.5. Evidence of Industrial Restructuring

As explained, a successful industrial restructuring process encourages production (and exports) of new, differentiated products, often of higher quality. In the following subsections we examine in more detail the role played by differentiated products in the increased volume of trade and the likely changes in the quality of products exported over the period under study.

##### 4.5.1. Changes in RO-EU Intra-Industry Exports (GL Index)

Changes in the trade of new and/or differentiated products are reflected in intra-industry trade Grubel-Lloyd index. The index measures intra-industry trade based on models that assume balanced trade. When substantial trade deficits exist the index should be adjusted (see table 1): the value of  $GL_{adj}$  index has a range between 0 (inter-industry trade) and 1 (intra-industry trade). Many studies use this index on SITC trade data at 3-digit level, taken to approximate the industries/products traded. At this level, during the period under study, the evolution of  $GL_{adj}$  for Romania suggests a steady, upward trend, albeit from lower levels compared to other CEE countries.

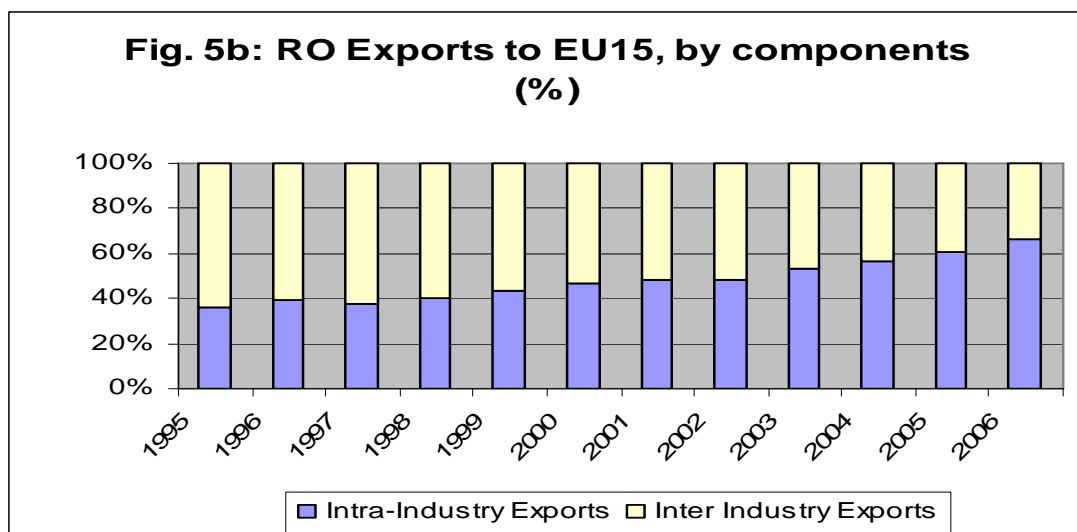
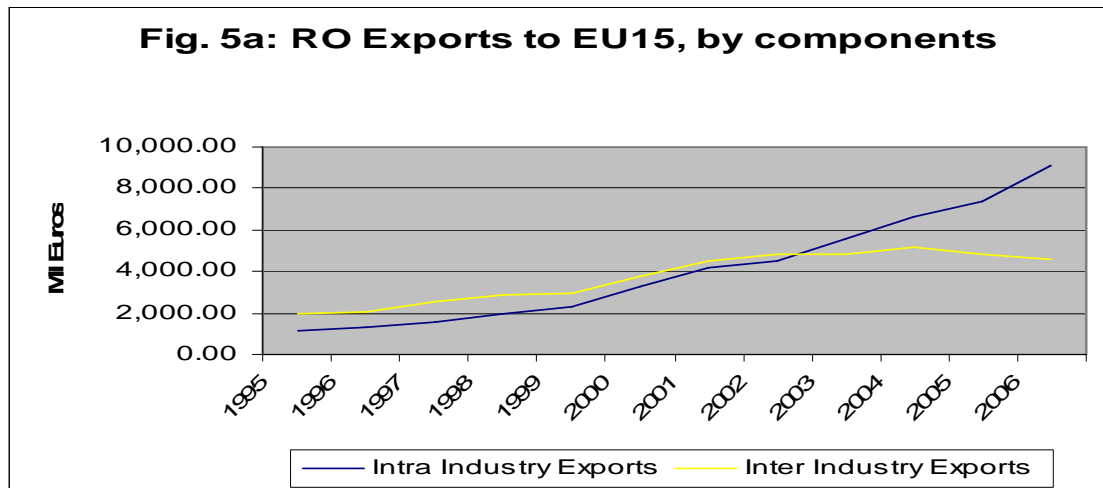


As indicated previously, the increase in IIT represents the most important feature of the recent development in CEECs-EU trade and reflects technological progress and income convergence. At the beginning of transition, the IIT for CEECs with EU was around 20-50%, whereas the IIT for intra-EU trade was 60-80%. Overtime, however, the level of IIT increased in the most advanced CEECs and caught up (and, in some cases, even surpassed) with other EU countries (Firdmunc, 2005). In Romania, GL index (adjusted) increased over the last 12 years by 69.8%, from 0.379 to 0.5229, or 1.69 times. This is an encouraging trend for Romania's trade patterns vis-à-vis other CEE countries but a gap still remains. On average, GL index for Romania during 1995-2006 was 0.42, compared to 0.56 for Slovakia and 0.68 for the Czech Republic during 1993 and 2000 (Palazuelos-Martinez, 2007). Importantly, from 2002 onwards, the index takes a steeper upward slope, indicating a growing role for intra-industry trade which is consistent with our previous findings.

#### 4.5.2. Horizontal versus Vertical Intra-Industry Exports

To take the analysis further, it is necessary to discuss changes in the pattern of exports according to their main components: intra-industry exports (IIX), inter-industry exports (INX), vertical intra-industry exports (VIIX) and horizontal intra-industry exports (HIIX). To determine these components and their evolution over the last 12 years, we employ the intuitive method proposed by Kandogan (2003a; 2003b) who makes use of the amount of exports and imports at two different levels of aggregation. The higher level of aggregation defines industries and the lower level of aggregation defines different products in each industry. At the higher level of aggregation, the total amount of IIX in each industry is computed by finding the amount of exports that are matched by imports. Then, the amount of matched exports in each products of an industry is computed using the lower level of aggregation. This will give the trade in similar products, i.e. horizontal IIX. The rest is the matched export of different products or goods at different stages of production within an industry, i.e. vertical IIX (formulas in table 1).

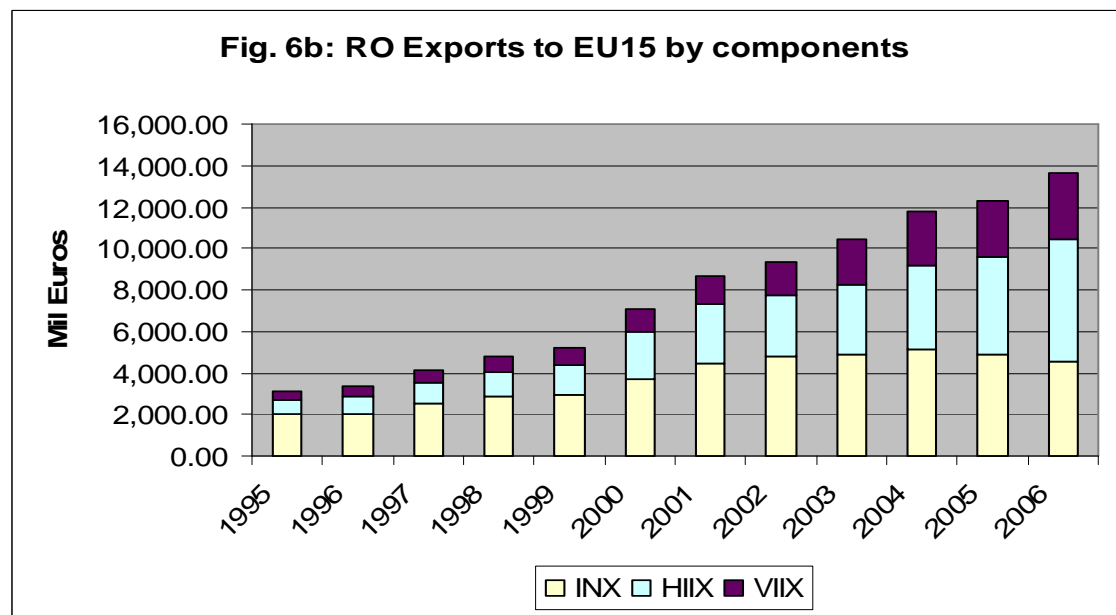
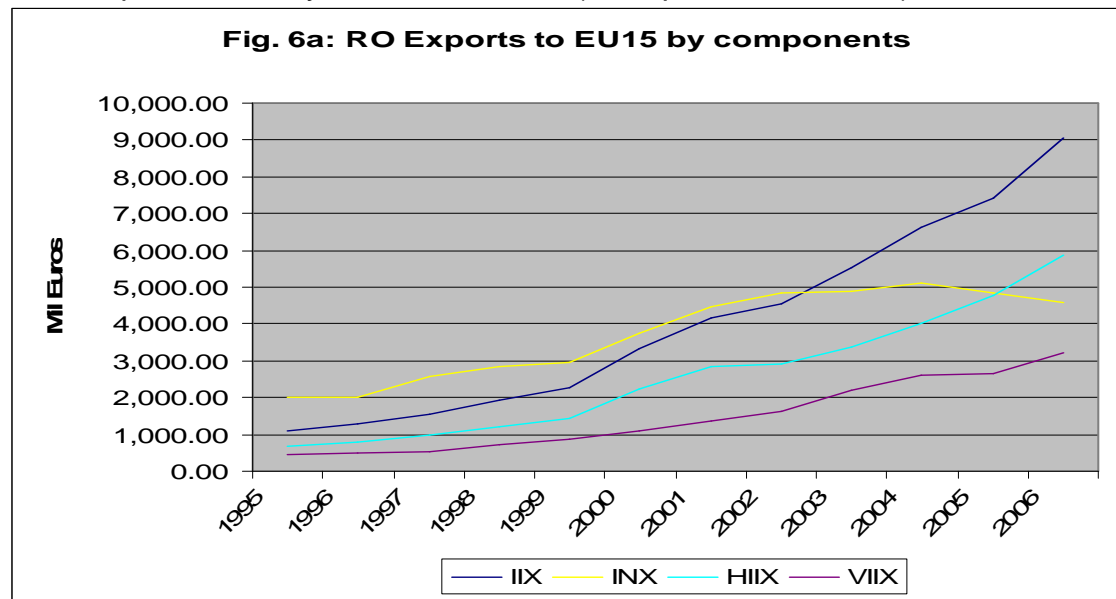
Using SITC 2-digit data as the higher level of aggregation (representing industries) and SITC 4-digit data as the lower level of aggregation (representing products), changes in the composition of Romanian exports to the EU can be studied. The two components of total exports (IIX and INX) grew steadily until 2002, from an initial situation in which INX represented 64% the total exports. After 2002, however, INX stagnated and even declined slightly, while IIX increased steeply and surpassed INX as the dominant component in the total exports. By 2006, IIX represented 66.4% of the total exports of Romanian manufacturing products.

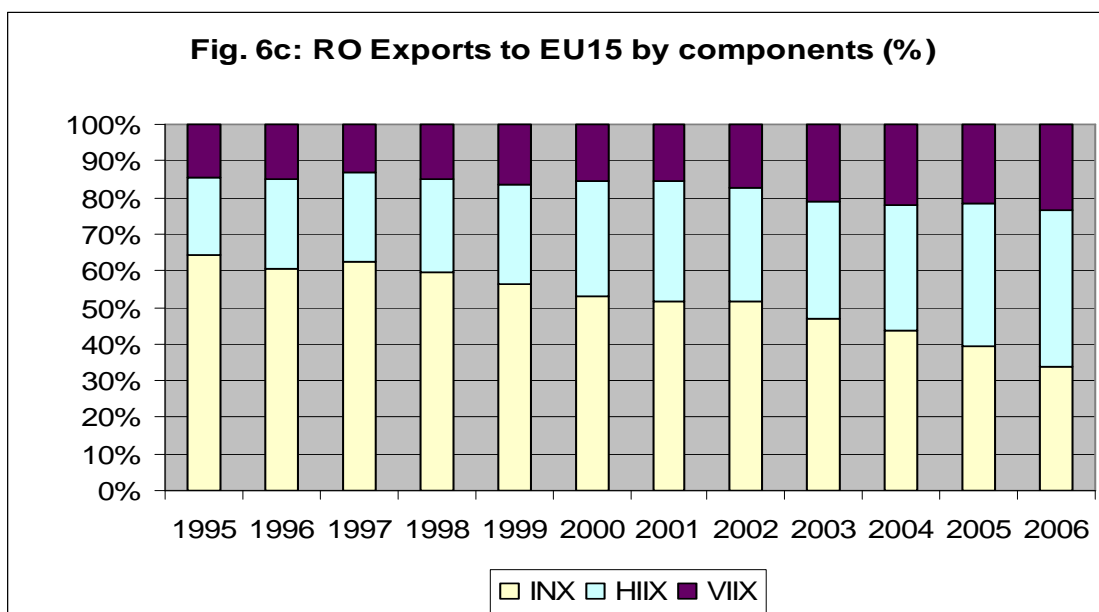


Clearly, bilateral trade with the EU led, as predicted by theory, to an increasing share of intra-industry exports. The growth in IIX has been gradual until 2002 when IIX and INX enjoyed equal shares in total exports. Afterwards, the relative importance of IIX versus INX increased steadily. The annual average rate of growth throughout the period was 17% for IIX and 7% for INX.

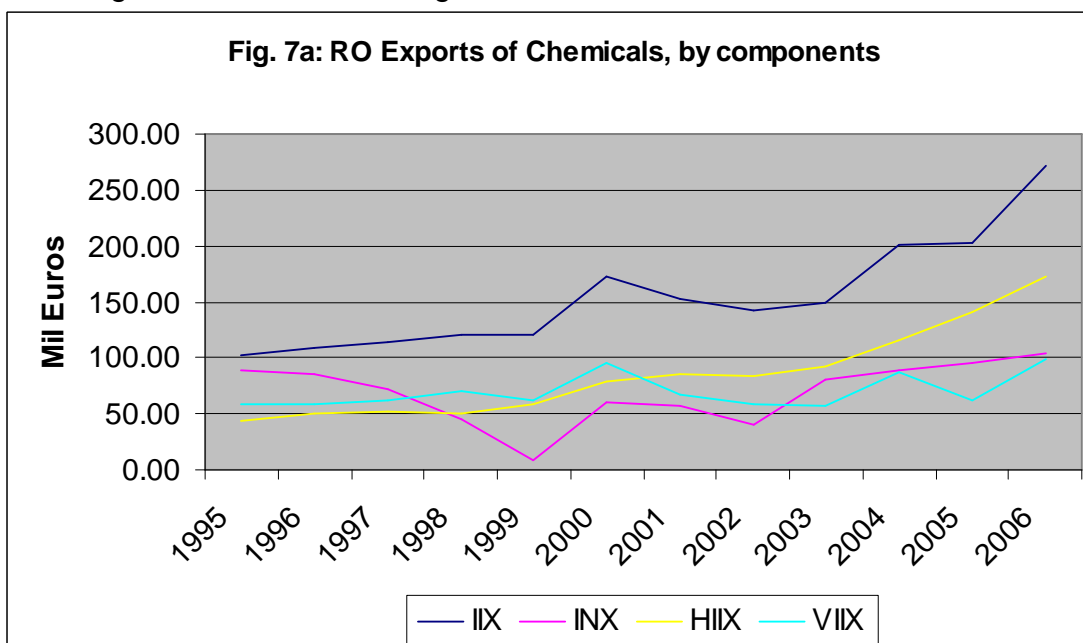
Considering the changes in horizontal and vertical IIX during the period under study, much of the increase in IIX was due to higher average rate of growth in HIIX (18%) compared to VIIX (16%). Both IIX components increased faster after 2002. Although differences in average growth rates are marginal, the trend is significant as it shows that HIIX is more important than VIIX for Romania, suggesting an upgrading in production processes. This contradicts

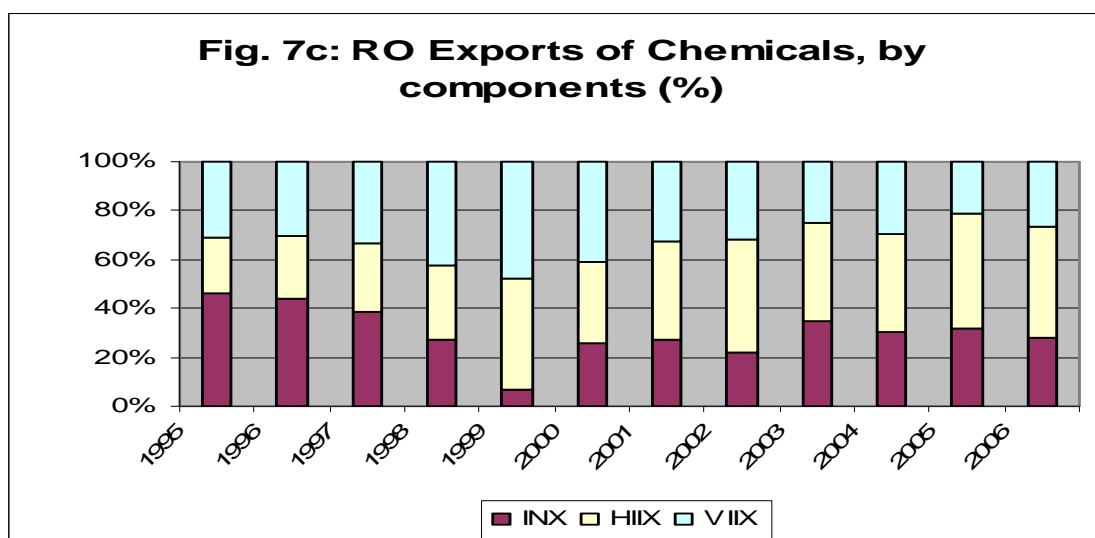
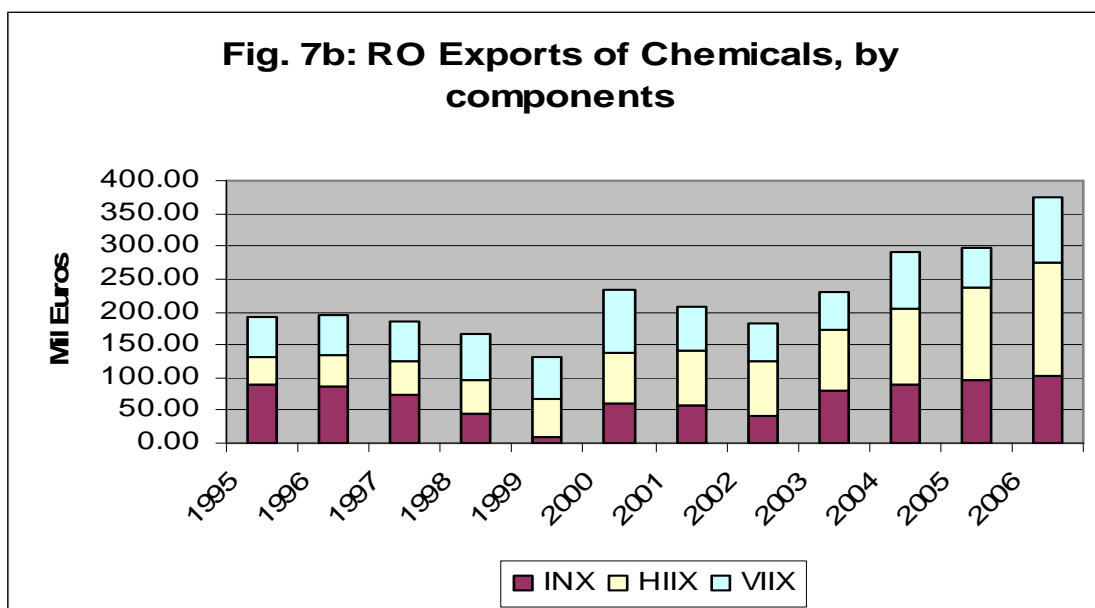
previous findings that concluded that intra-industry trade between CEECs and EU was predominantly vertical in nature (Aturupane et al., 1997).





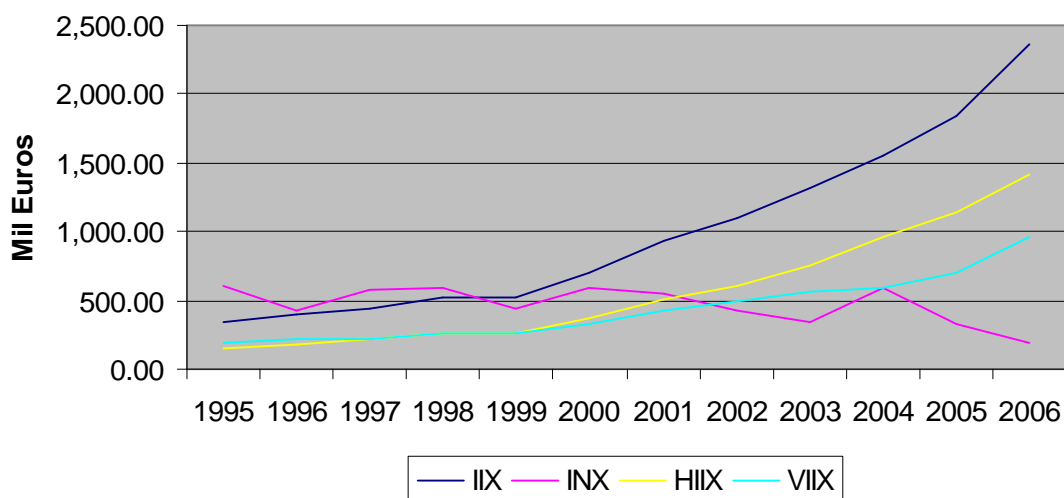
Given the relevance of horizontal IIX for the process of industrial restructuring, the following analysis traces changes in HIIX across the main SITC manufacturing sections. Starting with chemicals (SITC 5) we note great variation in the absolute value of exports throughout the period. Exports fell in 1999, resuming a year later. From 2002 onwards, HIIX became the largest component of chemicals exports, supporting our previous conclusion that growth in exports to EU was driven mainly by horizontal intra-industry exports, reflecting industrial restructuring efforts.



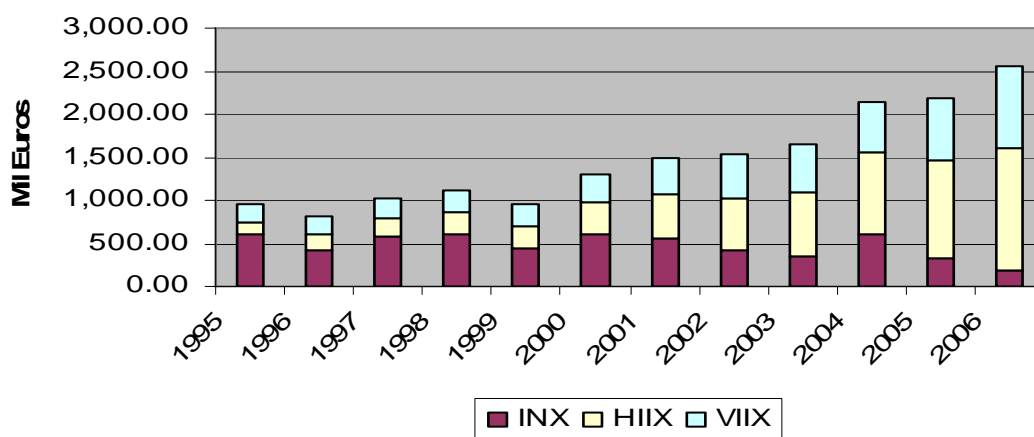


In the case of basic manufactures (SITC 6) the trend is more pronounced: INX declined in absolute and relative terms throughout the period, while the volume of horizontal and vertical IIX increased steadily, especially after 2000, when INX equalled IIX. Horizontal IIX grew at a faster rate than vertical IIX and by 2006 represented 50% of total basic manufactures exports (from 16% in 1995). This again is a reflection of the industrial restructuring process taking place in this SITC section.

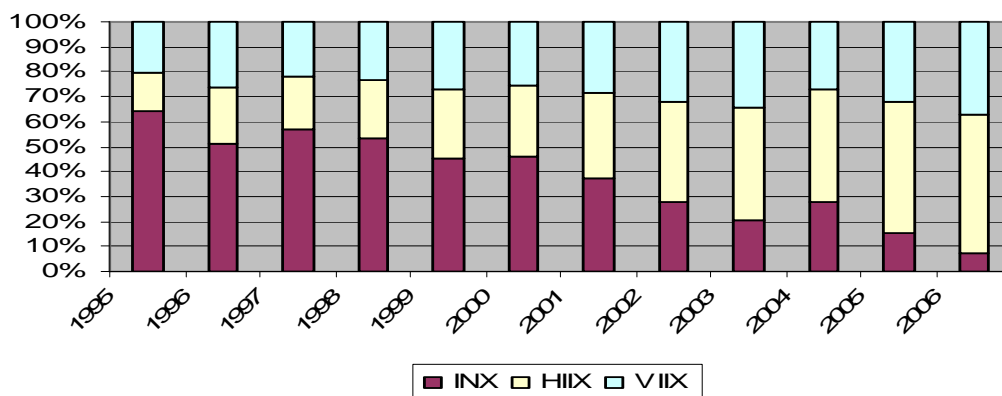
**Fig. 8a: RO Exports of Basic Manufactures, by components**



**Fig. 8b: RO Exports of Basic Manufactures, by components**



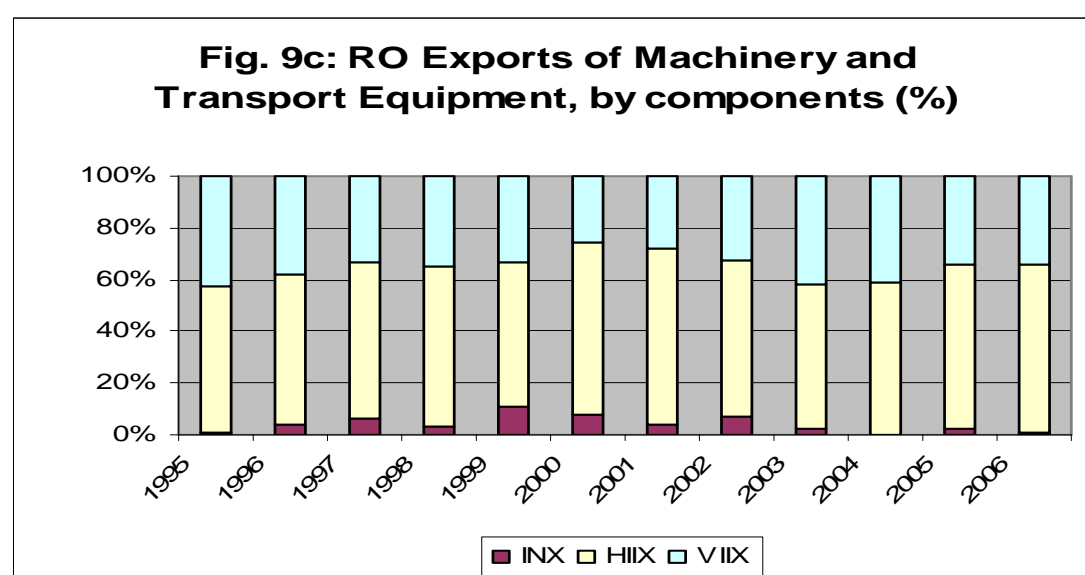
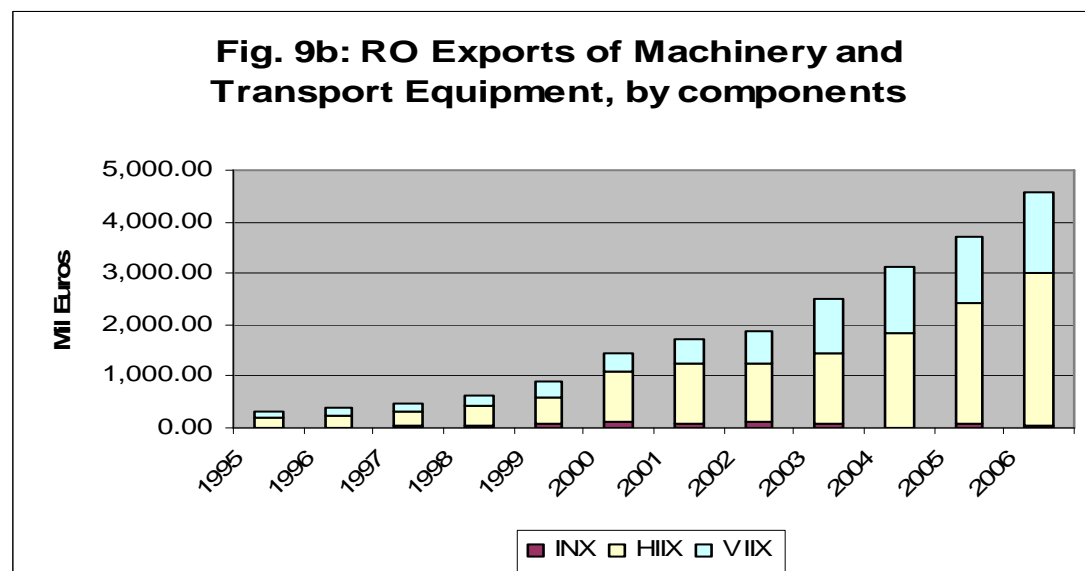
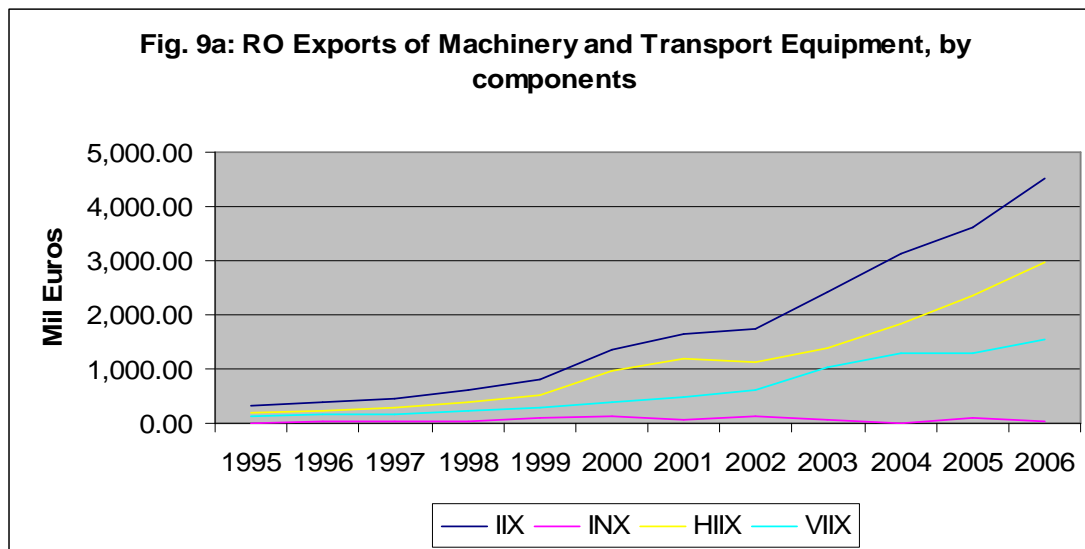
**Fig. 8c: RO Exports of Basic Manufactures, by components (%)**



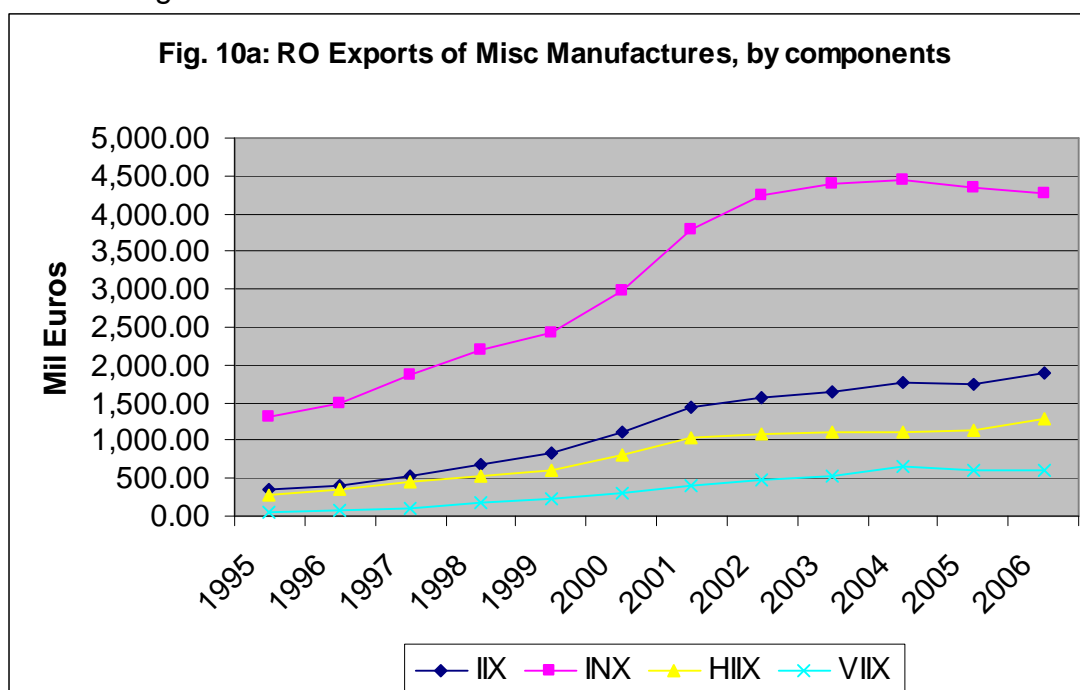
Similarly, in the case of machinery and transport equipment (SITC 7), INX played a marginal role throughout the period (and no role at all in 2004), while

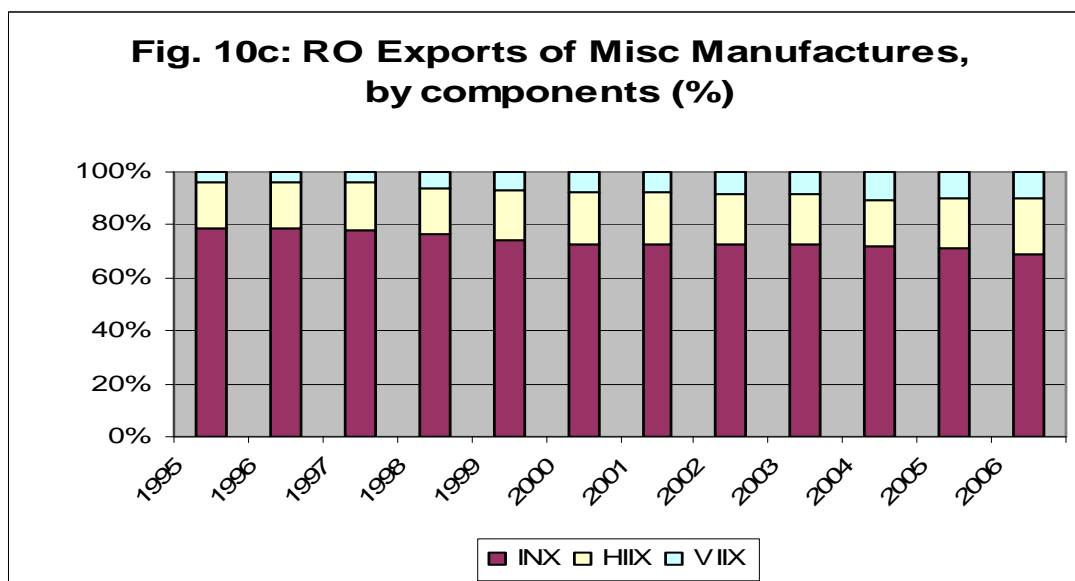


IIX accounted for much of the absolute increase in the volume of exports. As noted in previous two cases, horizontal IIX grew at a faster rate than vertical IIX.



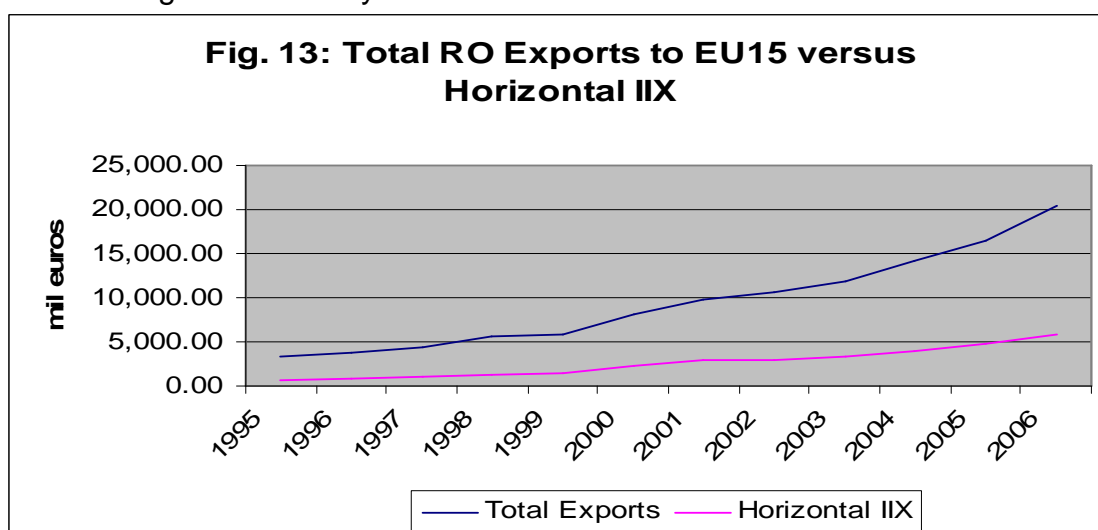
Only in the case of misc. manufactures (SITC 8) the situation is different: throughout the period, INX dominate exports although its share has been declining from almost 80% in 1995 to 68% in 2006. However, this may be due to low level of imports, Romania being a net exporter of such products, especially after 1998 when EU removed their impediments to imports of these particular products. Total exports flattened after 2000 but the composition of exports remained largely unchanged, with INX first and overwhelmingly important, followed by horizontal IIX and, to a less extent vertical IIX. The growth in this sector in absolute value was remarkable from 1999 to 2002, most likely in consequence of the European Agreements and the Export Processing Zones promoted on that occasion that stimulated domestic production and export of labour intensive products such as footwear, textiles and clothing.





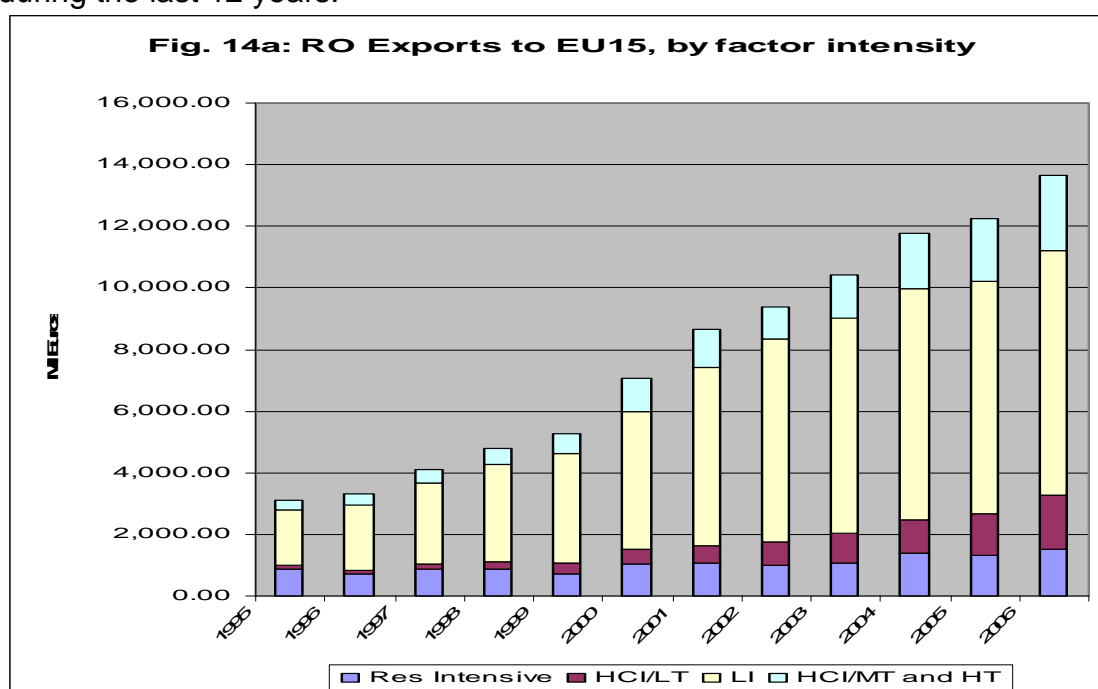
#### 4.5.3. Evidence of Product Differentiation

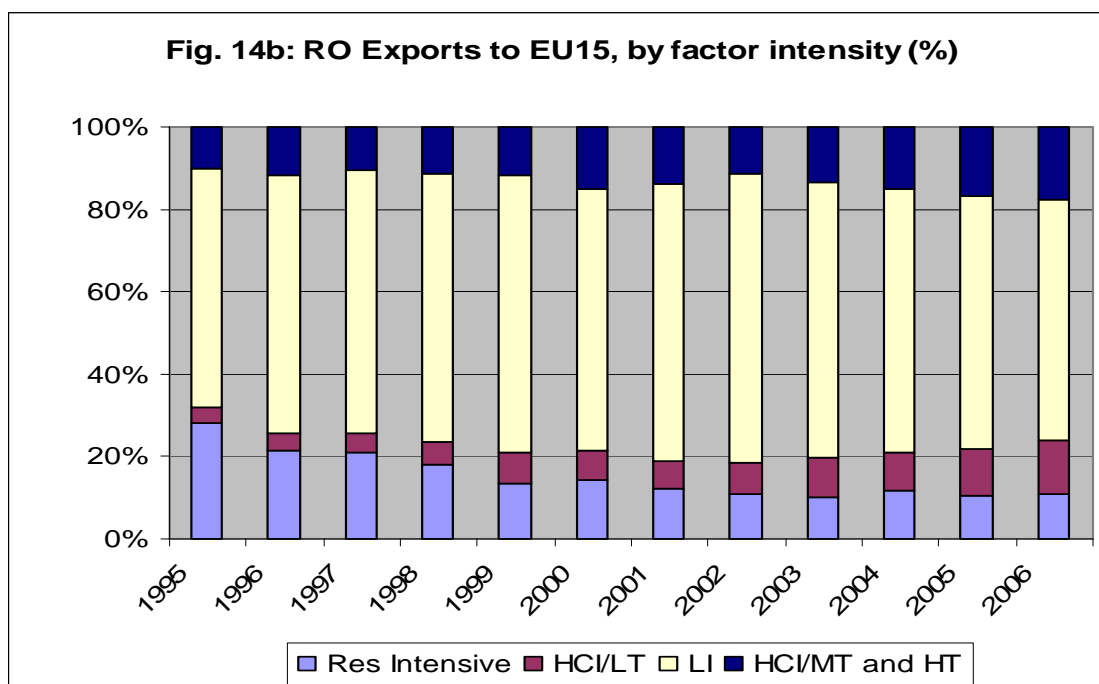
The analysis so far indicates that exports of new, differentiated products are playing a growing role in total exports to the EU. In of itself, this implies industrial restructuring effort that permit companies to produce new and diversified products according to newly revealed comparative advantages. But how important is product differentiation in the overall increase in Romania's exports to the EU? To answer this question, we calculate HIIX for RO-EU exports over the last 12 years would also offer a good measure of product differentiation. As per figure 13 below, our results suggest that 30% of the increase in the volume of exports of manufactures was due to an increase in product differentiation. The percentage is still below that for Poland and Slovakia (45-51%), but close to those for Hungary and Estonia, as recorded in a recent study for 1992-1999 period, when only 20% of Romania's exports were due to HIIX (Kandogan, 2006b, p.17). Therefore, over an extended period of time, the share of differentiated products in total exports of manufactures has increased in Romania, which speaks well of industrial restructuring in the country.



#### 4.5.4. Evidence of Product Upgrading

Changes in the quality of exports can be inferred from changes in production technologies, which may use over time different mix of factor endowments. Historically, the exports of CEECs countries were resource-intensive and a move towards human- and capital-intensive production would imply improvements in production technology. Our analysis uses the quality classification of Wolfmayr-Schnitzer (1998) according to which the quality of production increases with the intensity of factors of production in the order indicated in table 1. Of the seven categories so identified, the top four quality categories represent human capital intensive products. Accordingly, figures 14a and 14b indicate the structure of Romanian exports by factor intensity during the last 12 years.





Importantly, the share of resource-intensive exports has declined steadily from 28% in 1995 to 11% in 2006, whilst the share of human capital intensive (with low, medium and high technology) has grown from 14% to 31% respectively. However, the share of the four top human capital intensive products exported has grown slowly, from 10% to 18% in 2006. Labour-intensive products were the largest category throughout the period, with 58% of total exports in both 1995 and 2006, a decline from a staggering 70% in 2002. The recent decline in the share of labour-intensive exports and the growth in human capital intensive products are encouraging signs, suggesting gradual improvement in production technologies and the quality of products exported by Romania. This is a welcome departure from the gloomy results of previous studies according to which the export pattern of Romania differed from that of other CEECs in terms of high resource and labour-intensive products. Although Romania has made good progress over the last 12 years, it is still behind other CEECs where the high-quality categories accounted for 29% to 51% of in 1999 (Kandogan, 2005). The decline in labour-intensive exports since 2002 is a noticeable and encouraging trend, indicating that the structure of Romania's export with EU reflects its ongoing economic reforms. Future research on these aspects may reveal the beginning of a healthy and long-term trend.

## 5. Conclusions

This paper analysed changes in the volume, structure and composition of Romania's exports to the EU with a view to understanding the extent of industrial restructuring in this transition economy. Over the last 12 years, Romania's exports to the EU increased five times, with manufacturing products accounting for more than 90%. Given the more stringent quality standards applied by the EU countries, the increase in the volume of exports to EU suggests some degree of product quality upgrading, achieved through

industrial restructuring. Recent changes in the share of intra-industry exports versus inter-industry exports and in horizontal versus vertical intra-industry exports provide detailed evidence of industrial restructuring. Based on our analysis, the increase in the volume of exports to the EU between 1995 and 2006 is the result of three factors of equal importance: the intensive margin (the selling of more of the same products as in 1995, evidence of specialisation in production), the extensive margin (the selling of new, differentiated products) and improved product quality (the last two factors reflecting the restructuring process). Hence, industrial restructurings accounts for two thirds of the increase in the RO-EU exports.

It is also important to note that 10 years after the European Agreement, Romania's export pattern with EU started to resemble that of other CEECs. The process of economic convergence with began in after 2002 is reflected in the raising share of horizontal intra-industry exports in total exports, the increase in the percentage of human-capital-intensive exports and the decline in the, albeit still dominant, share of labour-intensive exports. Further research on trade data for the remaining of the decade should consolidate our findings.

On the policy side, given Romania's growing trade deficit with the EU, attention should be paid to the quality of products exported. Although there is scope for more detailed research on the changes in the quality of Romania's exports, present research indicates that further product upgrading should be made a priority. The more so as price pressures for high quality, high technology products are lower than for standardised, homogeneous, labour and resource-intensive products where price competition is important. Therefore, policy makers should encourage production of higher value added goods in order to avoid low-quality exports. Our warning is consistent with recent research on low-quality traps which concluded that Romania (and Bulgaria for that matter) tends to specialise low-quality high-tech products (Dulleck and al, 2005). This is a tendency that needs redressing and the growing importance of a competitive private sector (with dynamic SMEs) is as relevant as is the continuation of Romania's open trade policy.

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