

TRADE SPECIALISATION PATTERNS: THE CASE OF RUSSIA

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Abstract

This paper aims to contribute to a better understanding of trade specialisation in Russia. In particular, the work examines the changes in trade patterns at sectoral level over the transition period. In order to distinguish between the two types of trade specialisation (inter-industry specialisation and intra-industry trade (IIT)) the empirical work was carried out using the Aquino index and the Grubel-Lloyd index. The former examines the degree of inter-industry specialisation by sector, the latter considers the level of IIT between industries. The empirical results support both the new trade theory, which predicts an increasing level of intra-industry trade with liberalisation processes, and the new strand of trade theory, which distinguishing between horizontal and vertical IIT, suggests a co-existence between inter- and intra industry trade. The final econometric estimation of the factor content of Russia's exports pinpoints that Russia is specialised in the production/exports of resource intensive products, thus supporting the conducted index analysis.

1 Introduction

Throughout the 90s, Central and Eastern European countries have liberalised and reformed their economies to a varying degree. This together with the differences in their manufacturing bases, administrative reforms and political framework, has led to different developments in trade structure and comparative advantages. Several studies have assessed the evolution of the trade patterns in the transition economies. The attention was given especially to the so-called accession countries, i.e. transition countries currently seeking EU accession (Aturupane et al. (1997), Fidrmuc et al. (1999), Kaitila (1999), Kaitila and Widgren (2001), Traistaru et al. (2002)). The present work aims to extend these studies to the Russian economy, as a dearth of empirical research has been carried out up to now. The purpose of this paper is therefore two-fold. First, it attempts to show how the Russian specialisation has evolved over time. Second, it seeks to identify the peculiar characteristics of Russia's export structure. The present paper is organised as follows. Section 2 discusses the theoretical framework of trade specialisation. Section 3 reviews the different ways of measuring inter- and intra-industry trade specialisation and exposes the considered indices for the empirical analysis. Section 4 presents the empirical evidence on the patterns of trade specialisation in Russia. Section 5 displays the econometric findings of the factor content of the Russian exports. Section 6 concludes.

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2 *Theoretical framework*

Trade specialisation evolves considerably over time, thus bringing about different kinds of economic development across countries as well as across regions within countries. There are three main strands of literature concerning trade specialisation: neo-classical trade theory, new trade theory and new geography theory. Neo-classical trade theory explains patterns of regional specialisation on the basis of comparative advantages resulting from differences in productivity (technology) (Ricardo, 1817) or endowments (Heckscher, 1919-Ohlin, 1933) between countries and regions. The basic characteristics of these models are perfect competition, constant return to scale and homogeneous goods. The neoclassical theory envisages that, as factors of production and consumers are scattered across regions, the structure of industrial production will be dispersed geographically. Each region will specialise in the production in which has a comparative advantage, and in this way inter-industry specialisation is stimulated. Inter-industry trade refers to the simultaneous exchange of goods belonging to different sectors.

During the 1980s, new trade theory models were developed to explain high levels of intra-industry trade (IIT) and the large proportion of world trade between very similar countries (Amiti, 1998). IIT is defined as the simultaneous export and import of products which belong to the same sector (Vollrath, 1991). Intra-industry trade is also dubbed “two-way trade”. IIT is prevalent in regions and industries where increasing return to scale in production, monopolistic competition and product differentiation play an important role, although endowments do not differ significantly between them (Erkkilä, 1996). The new trade models postulates that increasing returns to scale and trade costs will induce activities to locate in regions with good market access (“the core”) away from remote areas (“the periphery”), this will translate in inter-industry specialisation between the core regions. Besides, scale economies will lead to intra-industry trade across companies, which will concentrate in the production of a unique differentiated product. These two driving forces will continue until all increasing-returns activities are concentrated near the core of the market, thereby, showing that intra-industry trade between the core and the periphery vanishes (Brühlhart, 1998). Although, geographical advantage plays a role in the new trade theory, it is however considered as exogenous, as if it was determined by physical rather than economic characteristics.

The new economic geography models indicate instead, that geographical advantage is endogenous and regional specialisation is the result of the spatial pattern of agglomeration of economic activities (Krugman, 1991). Firms locate in an economic centre, which can be considered as it only because other firms locate there. This means that there is a cumulative causation process according to which the access of new firms in a location makes it a more attractive site to additional firms. The cumulative causation process is based on technological externalities (learning by doing and knowledge spillovers) and pecuniary externalities between firms. As long as externalities are localised, also production is geographically concentrated, and the logic of increasing returns to scale implies that once pattern of industrialisation has been established, it will persist over time.

3.1 *Inter-Industry Specialisation Indices*

Researchers have employed a number of measures of trade specialisation to study the structure and determinants of country's foreign trade and to identify the basis on which to build competitive advantages. The task of quantifying comparative advantage empirically is not a trivial endeavour because the rigor of economic theory imposes severe restrictions and because country and commodity aggregations necessarily entail conceptual compromise. The economic literature identifies about seven techniques to measure the inter-industry specialisation: the Balassa index, the Normalised Balance and the Neven index, the Donges and Riedel index, the Hine and Greenway method, the Sapir method, the Gini index and the Aquino index.

Balassa index

Balassa (1965) explored the possibility of relying on various theoretical explanations of international trade to determine the patterns of comparative advantage. He stated that “comparative advantages appear to be the outcome of a number of factors, some measurable, other not, some easily pinned down, other less so. One wonders, therefore, whether more could not be gained if, instead of enunciating general principles and trying to apply these to explain actual trade flows, one took the observed patterns of trade as a point of departure...”. Balassa suggested to consider the comparative advantages as they “*are revealed*” by international trade because actual exchange “reflects relative cost as well as differences in non-price factors”. He proposed a specialisation indicator also known as the Balassa index:

$$B_{yi} = 100 \cdot \frac{x_{yi}}{\sum_{y=1}^N x_{yi}} \bigg/ \frac{\sum_{i=1}^M x_{yi}}{\sum_{y=1}^N \sum_{i=1}^M x_{yi}}$$

where x_{yi} stands for country i 's exports of commodity y . The Balassa index has a lower bound of zero and no upper bound. A country, that is more specialised in some industry than the average of all countries taken together, presents an index value greater than 100 for this industry, whereas a value smaller than 100 reveals despecialisation compared to the average of all countries. In other terms values greater than 100 reveal the presence of comparative advantages. The standard deviation of this index across products can be used as measure of the comparative importance of inter-industry specialisation and intra-industry trade. In fact, the greater the extent of inter-industry specialisation, the greater is the value of standard deviation.

Many researchers have used the Balassa index to determine a country's weak and strong sectors. Michael Porter, for instance, adopted a Balassa index exceeding 1, in some cases strengthened to a Balassa index exceeding 2, to identify a country productive sector. Other empirical analyses have been

carried out by Ariovich (1979), Aquino (1981), Reza (1983), Yeats (1985), Peterson (1988), Crafts (1989), Amity (1999), Hinloopen and van Marrewijk (2000), Kaitila (2001).

The Balassa index, however, does not give a complete representation of the trade performance of one country because only exports are considered. In some cases, it gives implausible information. It is possible, for instance, that a country has strong comparative advantage in the production of a certain good (e.g. pc) and at the same time that country registers a value of imports of that good higher than its exports. Other indicators that consider both imports and exports should be considered.

Normalised Balance and Neven index

The Normalised Balance is given by the ratio between the value of trade balance and the value of total trade. This index, which take into account both imports (m) and exports (x) is a good indicator for the economic performance of a country i. It is defined as:

$$NB_{ji} = \left(\frac{x_{ji} - m_{ji}}{x_{ji} + m_{ji}} \right)$$

This ratio ranges between -1 and 1 . When the Normalised Balance is 1 , a country or a region is completely specialised in the production of commodity j. When it is -1 , there is despecialisation. When the index is zero, imports and exports are even. The Normalised Balance presents a limitation in that, since it focuses each time on a single commodity j, it does not fulfil the contrasting dimension inherent in the principle of comparative advantages.

Neven (1995) provided an extended Normalised Balance formula to overcome the aforementioned shortcoming:

$$NEV_{ji} = (x_{ji}/X_i - m_{ji}/M_i) / (x_{ji}/X_i + m_{ji}/M_i)$$

where X and M are the total exports and imports of country i. The Neven index, however does not take into account world imports and exports.

Donges and Riedel index

The Donges and Riedel index (1977) circumvents the Neven index's limitation by including both country and world trade performances. Formally it is expressed as:

$$D\text{-}R_{ki} = \left[\left(\frac{(x_{ki} - m_{ki}) / (x_{ki} + m_{ki})}{(x_{kw} - m_{kw}) / (x_{kw} + m_{kw})} \right) - 1 \right] * \left[\text{sign}(x_{kw} - m_{kw}) \right]$$

where x_{ki} refers to the exports of commodity k in country i, m_{ki} to the imports of commodity k in country i and x_{kw} and m_{kw} to the total world exports and imports of the commodity k.

Aquino index

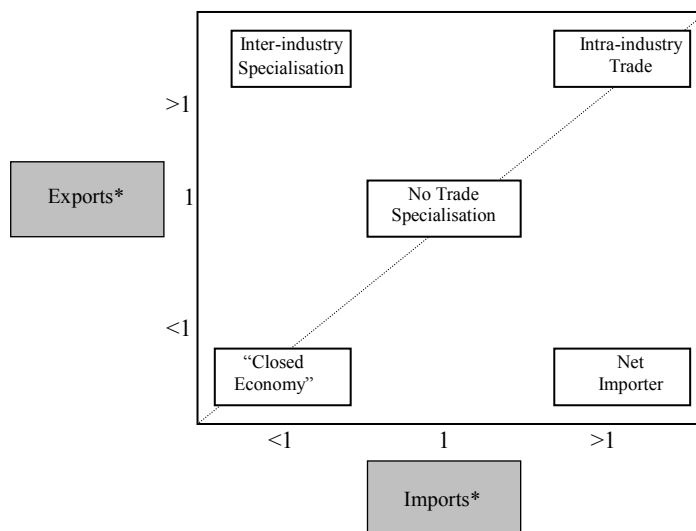
Aquino (1999) suggests a new index given by:

$$A_{ki} = 100 * \left(\frac{x_{ki} / \sum_{k=1}^M x_{ki}}{\sum_{i=1}^N x_{ki} / \sum_{i=1}^N \sum_{k=1}^M x_{ki}} \right) \Bigg/ \left(\frac{m_{ki} / \sum_{k=1}^M m_{ki}}{\sum_{i=1}^N m_{ki} / \sum_{i=1}^N \sum_{k=1}^M m_{ki}} \right)$$

where x_{ki} refers to the exports of commodity k of a country or region i and m_{ki} to the imports of commodity k of a country or region i . This index is the ratio between the Balassa index calculated for exports and the Balassa index for imports. The numerator represents the share of commodity k in the exports of region i relative to the share of commodity k in the exports of the country. The denominator represents the same relative share for imports. The Aquino index therefore, gives a measure of specialisation by sector and region for the country. By considering the normalised quotas of exports as well as imports, this indicator appears to be an unbiased measure of specialisation and an unbiased predictor of the intensity of comparative advantage. In fact, the Aquino index overcomes the shortcomings of the Balassa index, in which only exports are considered. In order to get a measure of country trade specialisation for all sectors rather than for each sector, we use the standard deviation of the Aquino index (Algieri et. al. 2001).

One limitation of the Aquino index is that it measures only the relative values of the Balassa index for imports and exports. For example, when $A_{ki}=1$, the index does not distinguish whether this is due to either high relative exports and imports of commodity k (that is the Balassa index for imports and the Balassa index for exports of an industry are equal and both greater than one), or due to low relative exports and imports of commodity k (that is the Balassa index for imports and the Balassa index for exports are equal and both smaller than one), or whether the trade profile of commodity k does not differ from the one of the country (that is the Balassa index for imports and the Balassa index for exports are both equal to one). To gain more detailed information out of the index, one could look separately at the numerator and denominator of the Aquino index for each industry, that is the Balassa index for imports and the Balassa index for exports. It then becomes possible to determine not only the sectors of specialisation but also to define the areas of trade structure. Plotting the Balassa index for exports on the vertical axis against the Balassa index for imports on the horizontal axis, we get the following matrix:

Fig. 1 The Aquino Matrix - Regional Specialisation Patterns Relative to the Country - *The Balassa index



The economic literature identifies other three techniques to measure the inter-industry specialisation which do not make use of import and export flows: the Hine and Greenaway method, the Sapir method, and the Gini index.

Hine and Greenaway method.

Hine (1990) and Greenaway and Hine (1991) use the Finger-Kreinin statistic (F-K) applied to production and export data on 28 manufacturing industries in order to compute specialisation in Europe over the period 1980-1985. They prove that inter-industry specialisation has been increasing in the European Community and in the EC-EFTA areas. The first step in their analysis was to calculate for individual countries the share of each industry in total production. These shares were then compared between countries to obtain a measure of industrial similarity. The Finger-Kreinin statistic is defined as follows:

$$(F-K)_{ij} = \sum_{m=1}^N \min(x_{mi}, x_{mj})$$

where x_{mi} refers to the industry- m 's share in total production of country i and x_{mj} to the industry m 's share in total production of country j . This index ranges between zero and one: it gives a unit value if countries have identical production patterns (intra-industry trade), and it gives a zero value for disjoint ones (inter-industry trade). Finger-Kreinin is a relative index in that it compares the industrial share in total exports of one country with respect to another¹.

The drawback of this index is that the mean of the F-K index may not be a satisfactory summary measure of specialisation, if the bilateral comparisons of a country j with every other country in the

¹ It is possible to consider more than two countries, but in this case we should calculate the indices for one country with respect to each of the other countries, and then take the arithmetic mean of these indices.

sample move in different directions. Large variations in production shares of small countries could easily drive the value of the index (Amiti, 1999). The index is, therefore, misleading because it does not take into account the size and the different characteristics of the countries.

Sapir method

Sapir (1996) adopts the Herfindhal index to measure manufacturing specialisation in Europe using data on 100 manufacturing industrial sectors. He finds that specialisation remained constant in Italy, Germany and Great Britain between 1977 and 1992, and increased in France since 1986. The index is formalized in the following way:

$$\mathbf{H}_i = \sum_i (s_i)^2$$

where s_i is the share of sector i in the total exports of the country. A value of H close to unity implies little specialisation in one sector, while a value close to 100 implies complete specialisation in one sector. The main implication is that the Herfindhal index is an absolute measure because it indicates the geometric distance between the distribution of production share and a uniform distribution (Amiti, 1999).

Gini index

Another method to measure the intensity of specialisation is to calculate the Gini index. In order to do so, it is first necessary to construct a Lorenz curve by ranking the Balassa index in descending order and then by representing the cumulative of the denominator on the horizontal axis and the cumulative of the numerator on the vertical axis. The area between the 45° line and the Lorenz curve multiplied by two gives the Gini index. This index can take values between 0 and 1. If the index is zero, there is no specialisation; the higher the Gini index, the more specialised the country.

The Gini index is based on comparisons between the geographic patterns of employment for one industry and in the aggregate. With the Gini index, inter-industry comparisons appear to be very sensitive to industry characteristics and results are highly dependent on the concentration of production within the industry (Maurel and Sédillot, 1999). For this reason, it is a better measure of productive specialisation rather than trade specialisation. Moreover, the Gini index places implicit relative value on changes in the middle parts of the distribution. This implies that a transfer from a big industry to a small one has a much greater effect on the country if the two industries are near to the central part of the distribution rather than at either end² (Amiti, 1999).

3.2 Intra-Industry Trade Indices

² For example, the horizontal axis indicates region j 's production of industry i as a proportion of total country production of industry i , while the vertical axis indicates region j 's share of manufacturing in the total manufacturing of the country.

In the traditional approach to IIT, models of monopolistic competition with increasing returns to scale, combined with homogeneous consumer preferences in the partner countries, explain the existence and significance of IIT³. This theory predicts a negative relationship between comparative advantage and IIT trade, in fact the more similar the factor endowments of each country, the greater the extent of intra- industry trade and, therefore, the lesser the extent of inter-industry specialisation.

The share of IIT is usually high between industrialised countries and fairly low between countries with a different degree of economic development. IIT has indeed been lower in trade between Eastern countries in transition and the European Union (EU) than in intra-EU trade. But as the countries of Central and Eastern Europe have narrowed their differences in economic structures and income levels, the share of IIT in total trade has risen (Kaitila, 2001). The European Integration and the transition processes of Eastern countries and Russia have caused an upsurge in international trade flows of goods and factors of production. Liberalisation has contributed to boost IIT relationships among countries which have reduced or eliminated trade barriers (Fontagné and Freudenberg, 1997; Brühlhart and Hine, 1999; Lovely and Nelson, 2002). Intra-industry trade can take two forms *horizontal* (HIIT) and *vertical* (VIIT). The latter consists of exchange of similar goods of different quality while the former comprises exchange of similar commodities which are differentiated by characteristics rather than quality. Abd-el-Rahman (1991) and Greenaway (1995) argues that making such a distinction is important as the determinants of each type of IIT differ. In particular, vertical IIT is more likely to be driven by differences in endowments. Horizontal IIT, in contrast, is more likely to be driven by scale economies and imperfect competition. Some applied economists have shown that most of this IIT is vertical and not horizontal (Aturupane et al. 1997; Kaitila, 1999; Blanes and Martin, 2000), involving an exchange of varieties that are of different quality. In this case, it is usually assumed that the level of quality is positively associated with the intensity of capital used in the production.

The existence of vertical IIT challenges the view according to which there is a negative relationship between comparative advantage and IIT. The theoretical models for this type of IIT were developed by Falvey (1981), Falvey and Kierzkowsky (1987) and Shaked and Sutton (1984). They can be summed up as follow. On the supply side, the distinguishing feature of each variety is the capital–labour ratio (K/L) used in its production, with high quality products requiring more K intensive production techniques and having higher prices. On the demand side, goods are distinguished by perceived quality. Although all consumers have the same preferences, each individual demands only one type of differentiated product which is determined by individual income. Given that the aggregate income is not equally distributed, there is an aggregate demand for a variety of differentiated products. The country, which is relatively labour-abundant, will tend to export the lower-quality/labour intensive varieties of the differentiated product (demanded abroad by low-income consumers) and to import the higher-quality/capital-intensive varieties (demanded by high-income consumers in that country). In

³ See Kol and Tharakan (1989) for references.

this sense, it is an application of the H-O paradigm to IIT⁴. Moreover, Greenaway and Milner (1994) noted the importance of human capital in producing high quality varieties of differentiated goods. Likewise, Flam and Helpman (1987) emphasised technological and income differences between countries as determinants of intra-industry flows. The source of the North-South divide is not the quantity of capital used in producing goods, as in Falvey and Kierzkowski (1987) model, but the technology used. Labour input per unit output of the quality-differentiated commodities varies across countries and the North has a comparative advantage in high quality products. Thereby, the North exports products of high quality and imports goods of lower quality from the South. Given an overlap of income distribution, IIT materialises. In these studies, intra-industry trade is thus determined by comparative advantages derived from differences in physical and human capital and technology, with IIT being greater, the greater the differences in factor endowments between countries.

3.2.1 *Measurements of IIT.*

Intra-industry trade is conventionally measured by the Grubel-Lloyd index (GL) (1975), defined as:

$$GL = 1 - \frac{\sum_{i=1}^N |x_{ij} - m_{ij}|}{\sum_{i=1}^N (x_{ij} + m_{ij})}$$

Where x_{ij} and m_{ij} are exports and imports of commodity j and country i . Its value ranges between zero and one. The zero value implies a complete inter-industry trade of country i in commodity j , and the unit value stands for complete intra-industry trade. A series of low GL values of one region or country reflect a centripetal process of industrial agglomeration and high specialisation, while a series of high GL values reflect a centrifugal process of industrial dispersion.

This index is unbiased if and only if total trade of country i is balanced. When this does not occur, the index is a downward biased summary measure of intra-industry trade in each commodity⁵. The methodology to measure the nature of IIT was proposed first by Abd-el-Rahaman (1991), Greenaway et. al. (1994), and then by Blanes, Martin (2000). Horizontal IIT is defined to exist for trade in product i in industry j in country k that satisfies the criterion:

$$1 - \alpha \leq \frac{exp UV_{ijk}}{impo UV_{ijk}} \leq 1 + \beta$$

⁴ These models are also known as neo Heckscher-Ohlin models.

⁵ One way of correcting such downward bias towards intra-industry trade is to estimate the values of exports and imports if trade was balanced and calculate the index with these new values. A weighted average of the values of the new index gives the corrected summary measure of the proportion of intra-industry trade in i 's total trade (Aquino, 1978).

Vertical IIT comprises trade where:

$$\frac{\exp UV_{ijk}}{\text{impo}UV_{ijk}} < 1 - \alpha \quad \text{or} \quad \frac{\exp UV_{ijk}}{\text{impo}UV_{ijk}} > 1 + \alpha$$

Relative unit values (UV) of exports and imports are used to disentangle horizontal from vertical IIT. Unit value indexes are considered as a proxy for prices, assuming that prices properly reflect quality differences. Thus, vertical IIT is defined as two-way trade of item whose per kilogram unit value of exports (measured f.o.b) relative to its per kilogram unit value of imports (measured c.i.f) falls outside a specific range of $\pm\alpha$. Trade in products whose relative unit values fall within the range $\pm\alpha$ is defined as horizontal IIT. Abd-el-Rahman (1991), Greenaway et al. (1995), Aturupane et al. (1999) and Blanes et al. (2000) use a unit value dispersion of 15 percent (i.e. $\alpha = 0,15$). Since vertical IIT indicates that there is specialisation in varieties of different quality, VIIT is assumed to have two components high and low quality vertical IIT. When the relative unit value index of a product is below the limit of 0,85 ($1-\alpha$), it is considered a low-quality, low-price export (VIIT (LQ)). Vice-versa when the unit value index is over 1,15 ($1+\alpha$), we have high-quality exports (VIIT (HQ)). Formally:

$$IIT = HIIT + VIIT = HIIT + (VIIT^{LQ} + VIIT^{HQ})$$

with

$$HIIT \Rightarrow \quad 0,85 < \frac{\exp UV_{ijk}}{\text{impo}UV_{ijk}} < 1,15$$

$$VIIT \Rightarrow \quad \frac{\exp UV_{ijk}}{\text{impo}UV_{ijk}} < 0,85 \quad \text{for VIIT}^{LQ} \quad \text{and} \quad \frac{\exp UV_{ijk}}{\text{impo}UV_{ijk}} > 1,15 \quad \text{for VIIT}^{HQ}$$

4.1 Extent and Nature of Trade Specialisation in Russia

To assess the trade structure and the factor intensity of Russia, the Aquino index and the Grubel-Lloyd index have been employed. The Aquino index (1999) permits to single out the comparative advantages of Russia as they “reveal” (Tab.2). This index, albeit it cannot explain what lays behind the comparative advantage, is a valuable tool to identify the main sectors which drive the Russian trade flows. Other studies (Aturupane et al. (1997); Kaitila (1999)) have used the Balassa index to compute inter-industry trade, but as explained before, this index is not fully comprehensive because it overlooks import flows.

Disaggregated Russian and worldwide trade data have been collected from the International Trade Centre. Data are at 3-digit level according to the SITC (Standard International Trade Classification) and include 81 commodities.

Russia is a big, open and trade dependent economy with an openness ratio, the ratio of exports plus imports to GDP, of 42.40 percent in 1994 and 50.09 percent in 2001. Throughout the 90s, Russia

has registered surpluses in its current account (Tab. 1). Russia's total foreign trade turnover grew consistently in 1992-97, it registered a fall between 1998-99 as a consequence of the financial crisis and it is recording increasing trends since 2000 (Tab. 1). The constraints of autarky attempted under communism and the disruption of payment arrangements with other former Soviet republics (along with their ability to pay) made integration with the world economy a priority for reformers. Although collapsing domestic demand led to a sharp fall in imports in 1992-93, exports grew strongly, leading to large trade surpluses. The main spurs for this export growth were given by the weak domestic demand for raw materials and semi-finished goods, an undervalued rouble exchange rate and “the profit to be gained from diverting previously subsidized intra-Soviet exports to hard-currency markets where world prices could be charged” (The Economist, IU, 2003) . Imports subsequently picked up as a result of real rouble appreciation, and exports declined for the first time in 1997. In part, this reflected a recovery in domestic demand, which both constrained exports and drew in increased imports. When the rouble collapsed in August 1998 imports fell sharply, but exports received a boost (Tab. 1). Not only did the sharp devaluation make Russian goods more competitive on world markets, international prices of Russia's main export items (oil, gas and metals) also rose in 1999-2000, leading to 40% export growth in US dollar terms in these two years. Imports slumped by more than 20% over the same period, or by 38%⁶ if compared with 1997, bearing witness to the sharp fall in real incomes that followed the rouble crisis, but also to the competitiveness gains of domestic producers who managed strongly to expand their local market shares. In 2001, 2002 and 2003 exports continued to record good performance, and imports increased sensibly, due to a real exchange-rate appreciation despite a slowdown in the Russian economy.

Tab. 1 Russian Foreign Trade (US\$ bn.)

	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Exports fob	42.1	44.3	67.8	82.9	90.6	89	74.9	75.7	105.5	101.6	107.2	134.4
Imports fob	36.9	32.8	50.5	62.6	68	72	58	39.5	44.9	53.7	61	74.8
External trade turnover	79	77.1	118.3	145.5	158.6	161	132.9	115.2	150.4	155.3	168.2	209.2

Source: Russian Central Bank, data according to IMF standards.

In order to gauge the stability of Russia's export structure, the linear correlation coefficient of Russia's exports has been calculated (Tab. 2). A linear correlation coefficient equal or close to 1 reflects stability in trade patterns. Vice-versa, a linear correlation coefficient equal or close to zero shows instability in trade flows, i.e. there are consistent changes in the export mix. Russia's export merchandise mix is stable over the considered time frame. Since 1993 in fact, the linear correlation coefficient is above 0,9.

⁶ Calculated according to the classical formula $[(x_t - x_{t-1})/x_{t-1}] * 100$.

Tab. 2 Correlation Coefficient⁷

	1993	1994	1995	1996	1997	1998	1999	2000	2001
1993	1								
1994	0.99	1							
1995	0.98	0.99	1						
1996	0.90	0.94	0.96	1					
1997	0.91	0.95	0.97	1.00	1				
1998	0.936	0.945	0.966	0.970	0.9828	1			
1999	0.991	0.989	0.993	0.992	0.9908	0.96899	1		
2000	0.990	0.988	0.987	0.985	0.9804	0.93634	0.99111	1	
2001	0.991	0.987	0.985	0.983	0.9778	0.93732	0.99049	0.99756	1

Source: Own calculations on ITC data, 2002

The Aquino index indicates that the basic exported commodities are raw materials and products post primary processing. Russia is playing the role of a "raw-material adjunct" of the world's industrially developed countries. The raw-materials-producing sector is the backbone of Russia's economy, and although it employs only 1.5 percent of the country's workers, it provides for 6 percent of the Russian GDP and more than 59 percent of its exports. Moreover, the sector absorbs more than 20 percent of the total of investments in the national economy and more than 60 percent of investments in the country's industries. A sizable propensity toward the raw-materials-producing sector causes Russia's development to be strongly dependent on world market prices for raw materials. According to the Aquino index, the products in which Russia is specialised are natural gas, wood rough squared, oil, nickel, fertilizer, iron, synthetic rubber, refined copper, primary aluminium, organic and inorganic chemicals (Tab. 5, Tab. 6 appendix). At the time of the Soviet Union's collapse, engineering and metal products were Russia's main exported commodities, together accounting for around 30% of the total-compared with only 13% for electricity and fuels. However, the extent of Russia's dependence on primary commodity exports was concealed by their artificially low prices to countries belonging to the Council for Mutual Economic Assistance. The substantial realignment of prices since the end of communist rule has turned fuels into the largest visible export (The Economist, IU 2003). In 2001 in fact, the Aquino index for natural gas was about 184719, for crude oil and oil products 37095 and 33361 respectively. The import bill is correspondingly biased towards intermediate and downstream industrial products. Russia's imports consist almost of medical, electric, heating and cooling machinery and equipment, foodstuffs, high technology products, textile articles (Tab. 6 appendix).

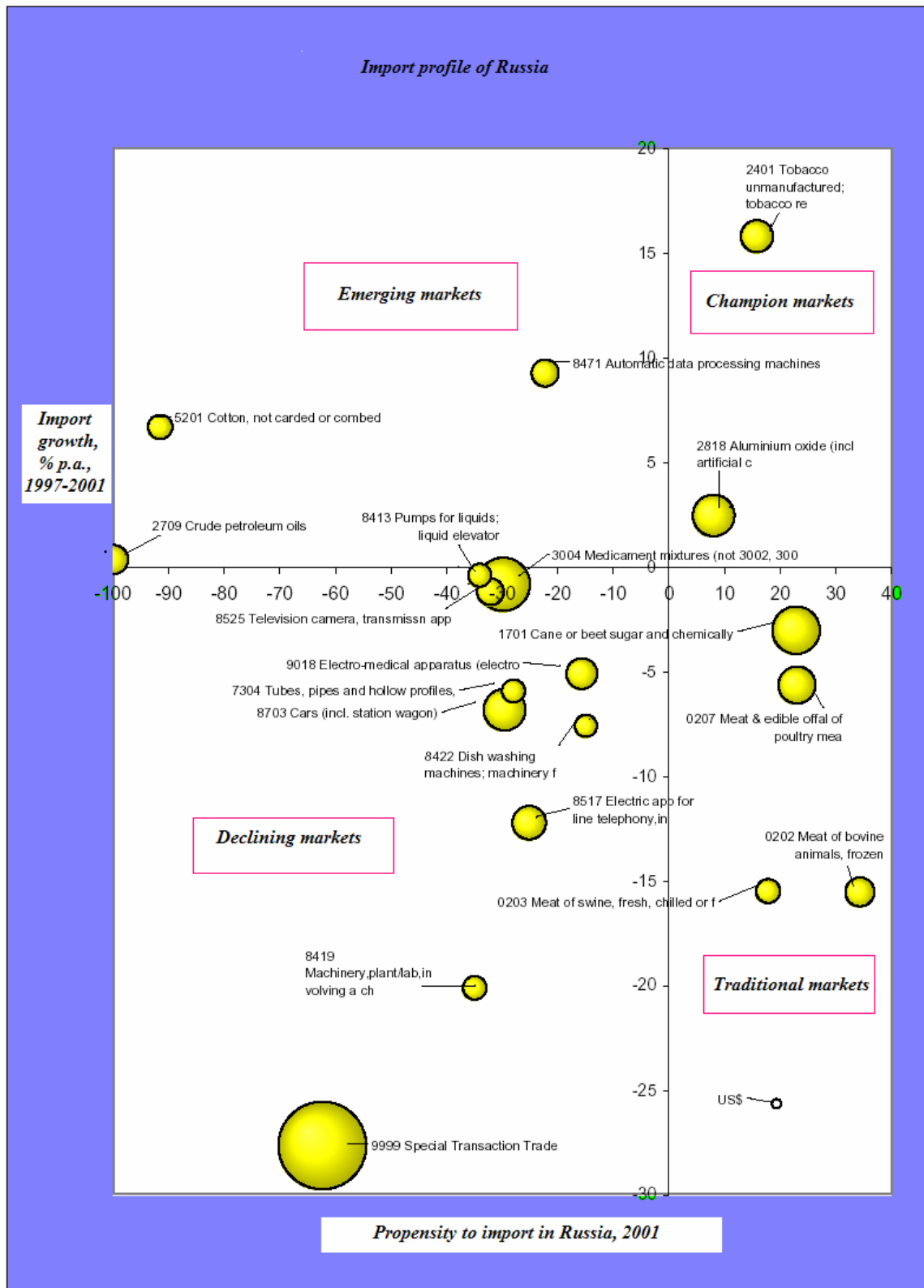
A striking aspect which emerges from the previous figures is that Russia is abundant in natural resources, which exports in massive quantities, but the country is not able to export manufactured goods made of the same raw materials. One reason for such phenomenon can be explained through a brilliant intuition of an Italian economist, Antonio Serra. According to him the fortune and wealth of a nation are more linked to "the beautiful minds and good governance within the country" than to the

⁷ The coefficient of correlation is a measure of the degree of association between two variables. It has been computed as $r = (\sum x_i * y_i) / \sqrt{(\sum x_i^2) * (\sum y_i^2)}$ with $x_i = (X_i - X_{\text{mean}})$ and $y_i = (Y_i - Y_{\text{mean}})$.

abundance in natural resources. A second and most important reason stems from the Dutch Disease literature, which postulates that abundance in natural resources can be a mixing blessing for a country. In the short run, in fact, natural resource abundance triggers exports and economic growth, but it leads to consistent losses in national production and finishes to crowd out the manufacturing sector in the long run

Fig. 2 shows the national import profile for Russia in 2001. Russia's propensity to import and its annual import growth are respectively reported on the horizontal and vertical axis. The propensity to import of a country has been calculated comparing Russia's *per capita* imports and *average per capita* imports in countries with a similar level of development (ITC, 2003). The horizontal axis ranges between -100 (i.e. a very low propensity to import) and +100 (i.e. a very high propensity to import). The dimension of the bubbles mirrors the import value of the considered good. The intercepts spot four different quadrants with peculiar features. I) ***Champion markets***. The products in this quadrant refers to imported goods for which Russia's demand in per capita terms is significantly high and fast growing. These are products, such as *tobacco* and *aluminium oxides* in Russia, for which access to sizeable and expanding markets is easier to achieve. II) ***Emerging markets***. The products in the upper left quadrant are an important spur for traders in Russia. Mainly, the emerging markets for Russia are those of *automatic data processing machines*. For these goods, while per capita import is lower than that of similar countries, national import demand has been growing at high rates, reflecting a catch-up effect or development of new industries in the country. III) ***Declining markets***. The expectations for exporting these products to Russia tend to be bleak. Russia's imports of *crude petroleum oils*, *machinery plan* for example, have been stagnating or have actually declined, and per capita imports are rather low. IV) ***Traditional markets***. As a result of consumer preferences or industrial specialisation, Russia is traditionally a significant per capita importer of the products in this quadrant, such as *meat and cane and sugar*. These imports are, however, declining or growing at a rate below the average.

Fig. 2 Import Profile of Russia



Source: International Trade Centre UNCTAD/WTO 3

4.1.2 Top Export Companies

According to the *Expert RA rating agency*, in 2001 the top 100 enterprises (

Tab. 8 appendix) account for more than 60% of the country's total exports. The best performers are large businesses, which are nearly monopolies. Broken down by industry, the structure of the top 100 enterprises' exports seems to be correlated with that of the country's overall structure of exports, i.e., leading positions belong to Russia's traditional exporting sectors. Thus, the entire oil and gas industry is represented among the Top-100 exporters and accounts for 72.1% of all foreign trade sales made by the companies included in the rating. It is worthwhile noting that the leader of the sector and of the whole ranking, *Gazprom*, with its 2001 exports equalling \$16.4 billion, accounted both for 26.2% of exports by the top 100 enterprises and more than 15 percent of the country's overall exports in the 2001. *Gazprom*, the world largest gas company, exports natural gas to 27 countries, primarily to Eastern and Western Europe.

Like the oil and gas sector, the metallurgical industry, the country's number 2 source of export revenues, basically consists of jumbo conglomerates – industrial groups embracing the full cycle from the mining of ores and coal to the manufacture of final products. Against the background of a general decline in metals exports due to a reduction both in prices and production, the biggest metallurgical holdings appear on the list of the country's top 100 exporters in 2001 with a share in the Top-100 exporters of 17,7%. The metal companies and holdings that appear among the top 100 represent only the tip of the iceberg of Russian metal exports. The iceberg's base, which is less conspicuous and stays beyond the rating list, is comprised primarily of numerous trading companies. It is precisely thanks to this "base of the iceberg" that the difference between the proportions of metals in the exports of the top 100 and the country's overall total is less than that for oil and gas. The share of small traders in metal exports varies in a wide range: from 1 percent for rolled steel to more than 80 percent for rails. At the same time, small traders are virtually uninvolved in exporting oil and gas.

Export volumes of the 48 enterprises representing seven other industries in the top 100 list are minor, and, all combined, are only a little higher than 10 percent of the total volume of exports of the top 100. This does not mean Russia has no alternative to being a raw-materials supplier. Russia's high-tech products are highly valued in the world and some do not have foreign rivals. These include developments in the spheres of military technologies and equipment, aviation, aerospace and the nuclear power industry. In order for Russia not to lose its existing position as an exporter and to be able to stand up to competition with foreign suppliers in the battles for new markets, the government should render assistance to domestic goods producers. The high-tech industries mentioned above are in the year 2001 list of top 100 exporters.

4.2 Russian Intra-Industry Trade

The results for Russia (Tab. 3) show that IIT increased from 73% in 1994 to 88,6% in 1998, decreased during the two following years as a consequence of the rouble depreciation and it picked up again since 2001.

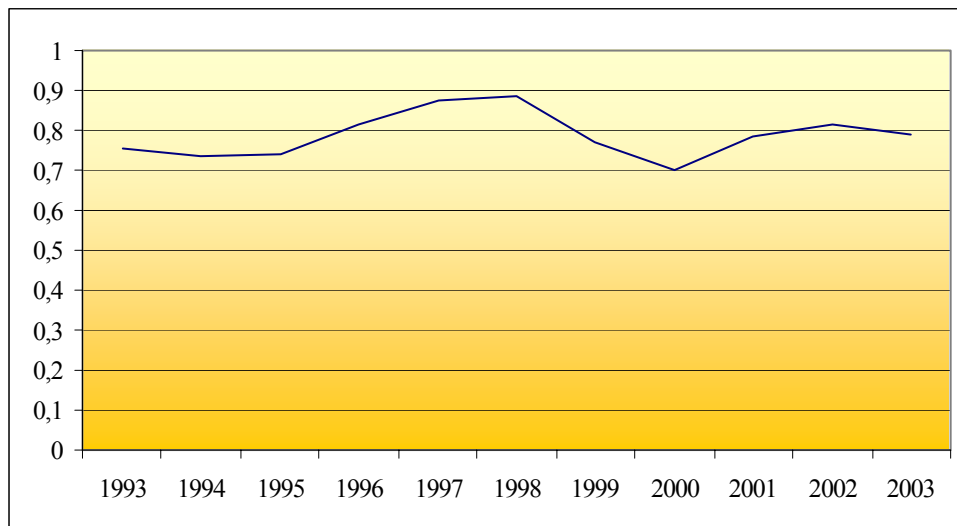
Tab. 3 The GB Index

GL index 1993-2003										
Russia										
0,75401278	0,7327564	0,73803853	0,81610944	0,87257641	0,88562799	0,76859468	0,70170221	0,7863	0,81702	0,79238
Value 1993	Value 1994	Value 1995	Value 1996	Value 1997	Value 1998	Value 1999	Value 2000	Value 2001	Value 2002	Value 2003 (Q1)

Source: Own calculations on UN data, and Bank of Russia.

The reason of the increase in the Russian IIT stems from the higher trade flows between Russia and the European Union (EU) due to the ongoing liberalisation process. In line with the literature, the higher is the degree of integration among countries and reduction in trade barriers, the higher is the associated IIT index (Fontagnè 1997, Brülhart and Hine 1999, Lovely and Nelson 2002, Brülhart and Elliott, 2002, Diaz-Mora, 2002).

Fig. 3 Gruber-Lloyd Index for Russia



Source: Own Calculations on UN data, and Bank of Russia data.

After having calculated the Russian IIT, we broke down its value into its two components: horizontal and vertical.

Russia's vertical and horizontal intra-industry trade indices have been identified by unit values. We have used the range of ± 25 percent to allow the size of Russia to play a more important role in explaining the variation of unit cost⁸.

Vertical IIT dominates horizontal IIT in Russia over the considered period (Tab. 7 appendix). This result is similar to other analysis carried out for emerging Central and Eastern European markets. Aturupane et al. (1999) and Kaitila and Widgren (1999), confirmed in fact, that most of IIT is vertical in character for Poland, Hungary, Czech Republic and so on. The low-quality component is the most important one in the Russian intra-industry trade.

5.1 The Factor Content of Trade Flows

The theoretical foundations for empirical studies of the determinants of export performance lie in the conventional trade theory based on the Heckscher-Ohlin framework, new trade theories and endogenous growth theories.

In line with the existent empirical literature the following model for Russia has been estimated, namely:

$$AQ = f(R, LI, RD, HK, CI)$$

where the dependent variable AQ is the Aquino index of 25 Russian exporting sectors⁹. R is the intensity of resource index, measured as ratio of the resource costs to the gross output value of the considered sectors. LI is the intensity of labour variable, constructed as ratio of the number of employees to the production value. RD is the research and development variable measured as expenditure in R&D on output in each sector. HK is the human capital variable calculated as ratio between the skilled and unskilled workers in the sector. CI is the capital intensity built as ratio between investments and number of employees. The considered year of analysis is 2000. Data have been collected from OECD sources, Russian Economic Trend, IMF and ILO data set. The lack of a broader availability of data has unfortunately reduced the number of observations. The cross section analysis has been carried out using the OLS technique. The results are reported below:

Tab. 4 Factor Content Estimation

Dependent Variable: AQ Method: Least Squares				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
R	6.877963	0.537534	12.79541	0.0000
LI	0.057329	0.027384	2.093496	0.0500
RD	0.026988	0.009071	2.975249	0.0078
HK	0.977690	0.503790	1.940670	0.0673

⁸ Greenaway et al. (1994) chose a range of ± 15 percent for the UK. We increase this range to ± 25 percent as Russia is such a vast country that it should be provided a larger scope for the transport costs to account for the variation in its export and import unit values.

⁹ Electric power industry, Fuel industry, oil extracting, oil refining, natural gas, coal, Ferrous metallurgy, non-ferrous metallurgy, chemical and petrol-chemical industry, machine building, building materials industry, pulp and paper industry, light industry, food industry

CI	-1.115055	0.512404	-2.176125	0.0424
C	-759.6851	264.6107	-2.870954	0.0098
R-squared	0.968054	Mean dependent var		1490.485
Adjusted R-squared	0.959647	S.D. dependent var		3400.349
S.E. of regression	683.0667	Akaike info criterion		16.09663
Sum squared resid	8865022.	Schwarz criterion		16.38916
Log likelihood	-195.2078	F-statistic		115.1493
Durbin-Watson stat	1.996182	Prob(F-statistic)		0.000000

We have checked for autocorrelation and heteroskerasticity in the residuals. The residuals turned out to be uncorrelated since the Lagrange multiplier test does not reject the null hypothesis of no autocorrelation.

Lagrange Multiplier Test:			
F-statistic	0.002811	Probability	0.958299
Obs*R-squared	0.003904	Probability	0.950180

We found instead evidence of heteroskedasticity by implementing the White test (the null hypothesis of no heteroskedasticity against heteroskedasticity).

White Heteroskedasticity Test:			
F-statistic	2.498474	Probability	0.057404
Obs*R-squared	16.02213	Probability	0.099001

In presence of heteroskedasticity, ordinary least squares estimates are still consistent, but the conventional computed standard errors are no longer valid. We choose hence the robust standard errors option to correct the standard errors. Particularly, we adopted the heteroskedasticity consistent covariance matrix estimator (HAC) which provides correct estimates of the coefficient covariances in the presence of heteroskedasticity. Note that using the HAC consistent covariance estimates does not change the point estimates of the parameters, only the estimated standard errors.

Dependent Variable: AQ				
Method: Least Squares				
White Heteroskedasticity-Consistent Standard Errors & Covariance				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
R	6.877963	0.907706	7.577306	0.0000
LI	0.057329	0.016709	3.431108	0.0028
RD	0.026988	0.008908	3.029625	0.0069
HK	0.977690	0.383784	2.547499	0.0197
CI	-1.115055	0.289024	-3.858002	0.0011
C	-759.6851	261.7048	-2.902832	0.0091
R-squared	0.968054	Mean dependent var		1490.485
Adjusted R-squared	0.959647	S.D. dependent var		3400.349
S.E. of regression	683.0667	Akaike info criterion		16.09663
Sum squared resid	8865022.	Schwarz criterion		16.38916
Log likelihood	-195.2078	F-statistic		115.1493
Durbin-Watson stat	1.996182	Prob(F-statistic)		0.000000

The results from diagnostic tests, including normality tests and omitted variable test have shown that there are no serious normality and misspecification problems, justifying the selection of the model. The final equation for Russia can be synthesised as:

$$AQ = 6.878 * R + 0.0573 * LI + 0.027 * RD + 0.978 * HK - 1.115 * CI$$

$$(7.577306) \quad (3.431108) \quad (3.029625) \quad (2.547499) \quad (-3.858002)$$

The estimates for year 2000 confirm the findings obtained from the trade specialisation indices. The results suggest that natural resources are the most important factor determining Russia's export performance. That is, other factors being constant, a 1% increase in the natural resource intensity raise Russia's exports by 6.9%. The economic risk linked to natural-resource-led-exports is in terms of periodic growth collapses owing to the higher volatility of primary good prices as compared to manufactured goods. Moreover, as the Dutch Disease literature postulates, albeit a resource-abundant country experiences a significant economic improvement in the short run due to a substantial upsurge in revenues from raw material exports, in the long run, it faces a risk to hold up its "*cultural, technical and intellectual development which only a strong, healthy manufacturing industry...can provide*" (Kaldor, 1981). Hence, the long term effect may be to erode the country's competitive position in manufacturing from which it may be difficult to recover.

The estimation indicates that the Russian exports have both a slight labour intensity and a low research and development intensity. The coefficient of human capital is positive and statistically significant, showing that the human-capital intensive products play a strategic role in promoting exports. The capital intensity variable carries the negative sign and is statistically significant, demonstrating that Russian trade flows are not made of physical capital. This may be because FDI are not relevant and therefore Russia's policy of encouraging export-oriented FDI should be fostered to generate positive results.

6 Conclusion

As the process of economic change and liberalisation in Central and Eastern Europe evolve, specialisation patterns can be expected to change over time. In this paper we have examined the developments in the trade specialisation patterns at national level in the new Russia. In order to distinguish between inter-industry specialisation and intra-industry trade, the empirical work was carried out using the Aquino index and the Grubel-Lloyd index. The former highlights the degree of inter-industry specialisation by sector, the latter considers the level of IIT between industries. The IIT index has been split into its two components: horizontal and vertical.

The empirical results confirm both the new trade theory, which predicts an increasing level of intra-industry trade as a consequence of the liberalisation process, and the new strand of trade theory, which distinguishing between horizontal and vertical IIT, suggests a co-existence between inter- and intra industry trade. Overall, Russia exhibits mainly specialised intra-industry trade and the tendency appears to increase over time. In Russia, oil and gas are the most important items in the structure of Russian exports. The econometric estimation of the factor content of Russia's exports highlights that

exports are biased toward natural resources and at the same time the traded goods show a slight labour intensity and R&D intensity.

Policy makers should be aware of the effects that resource-led-exports may have upon the Russian economy mainly in terms of the consequences caused by the Dutch Disease. Part of the revenues coming from the natural resource sector should be therefore used to stimulate productivity improvements in technology intensive sectors and in high value added manufactures, and to upscale general infrastructures that are relevant for the broad economic development. Furthermore, improvements of the institutional framework would be essential for the development of a market-based economy that does not rely on the natural resource sector only. This would help to diversify the production/export structure of the Russian economy and make it less vulnerable against the exogenous shocks due to significant declines in international oil and gas prices.

References

- Abd-el-Rahman, K. (1991), 'Firms' Competitive and National Comparative Advantages as Joint Determinants of Trade Composition', in *Weltwirtschaftliches Archiv* 127 (1), Kiel.
- Algieri, B., Ankkuriniemi, S., and Zampieri, L. (2001), Inter-industry Specialisation versus Intra-industry Trade: A Regional Approach, *International Economics*, Vol.LIV, No.3, August p.299-324
- Amiti, M. (1997), *Specialisation Patterns in Europe*. Discussion Paper 363, Centre for Economic Performance, London.
- (1998), *New Trade Theories and Industrial Location in the EU: A Survey of Evidence*. *Oxford Review of Economic Policy*, Vol 14, No 2.
- (1999), *Specialization Patterns in Europe*, in *Weltwirtschaftliches Archiv*, Vol.135.
- Aquino, A. (1981), *Intra-Industry Trade and Inter-industry Specialization as Concurrent Sources of International Trade in Manufactures*. *Weltwirtschaftliches Archiv*, 114.
- (1999), *Aspetti Empirici Essenziali del Processo di Globalizzazione*. In Acocella, N., *Globalizzazione e Stato Sociale*, ed. Il Mulino.
- Ariovich, G. (1979), 'The comparative advantage of South Africa as revealed by export Shares', *South African Journal of Economics* 47, 2: pp. 188-197.
- Aturupane, C., Djankov, S. and Hoekman, B. (1997), *Determinants of Intra-Industry Trade between East and West Europe*, CEPR Discussion Paper 1721.
- Aturupane, C., Djankov, S. and Hoekman, B. (1999), 'Horizontal and Vertical Intra-Industry Trade between Eastern Europe and the European Union', *Weltwirtschaftliches Archiv*, 135 (1), Kiel.
- Balassa, B. (1965). *Trade Liberalisation and Revealed Comparative Advantage*, *The Manchester School of Economics and Social Sciences*, 33.
- Baldwin, R. (1992). *An Eastern Enlargement of EFTA - Why the East Europeans Should Join and Why the EFTAns Should Want Them*. CEPR Occasional Paper No10.
- Blanes, J.V. and Martín, C. (2000), 'The Nature and Causes of Intra-Industry Trade: Back to the Comparative Advantage Explanation? The Case of Spain', in *Weltwirtschaftliches Archiv*, 136, (3), Kiel.
- Brühlhart, M. (1998), *Economic Geography, Industry Location and Trade: The Evidence*. *The World Economy*, Vol. 21.
- (1998), *Trading Places: Industrial Specialization in The European Union*. *Journal of Common Market Studies*, Vol. 36, No. 3.

- Brülhart, M. and Hine, R.C (1999), Vertical and horizontal intra-industry trade: an analysis of country- and industry-specific determinants, Macmillan Press, London.
- Brülhart, M. and Elliott, R. J. R. (2002), 'Labor-Market Effects of Intra-Industry Trade: Evidence for the United Kingdom', 138 Heft 2, pp. 207-228, Weltwirtschaft Archiv, Kiel.
- Crafts, N.F.R. (1989), 'Revealed comparative advantage in manufacturing, 1899-1950', Journal of European Economic History 18, 1: 127-37.
- Davies, D.R. and Weinstein, D.E. (1999), Economic Geography and Regional Production Structure: An Empirical Investigation. European Economic Review, No. 43.
- Diaz Mora, C. (2002), 'The Role of Comparative Advantage in Trade within Industries: A Panel Data Approach for the European Union', 138 Heft 2, pp. 291-316, , Weltwirtschaft Archiv, Kiel.
- Direction Generale des Douanes et Droits Indirectes, Statistiques du Commerce Extérieur: Resultats Regionalises 1985-1996.
- Dixit, A.G. and Stiglitz, J.E. (1977), "Monopolistic Competition and Optimum Product Diversity". American Economic Review, 67.
- Donges, J.B. and Riedel, J. (1977), The Expansion of Manufactured Exports in Developing Countries: an Empirical Assessment of Supply and Demand Issues. Weltwirtschaftliches Archiv, Vol. 113.
- Erkkilä, M., (1996), Finnish Participation in the Internal Market. In Alho, K. Et al., The Economics and Policies of Integration - A Finnish Perspective, ETLA series A22.
- Falvey, R. (1981), 'Commercial Policy and Intra-Industry Trade', in Journal of International Economics 11 (4).
- Falvey, R. and Kierzkowski, H. (1987), 'Product Quality, Intra-Industry Trade and (Im)perfect Competition', in Kierzkowski (ed.) Protection and Competition in International Trade, Oxford: Basil Blackwell.
- Fidrmuc, J.D, Helmenstein, G. and Wörgötter, A. (1999), 'East-West Intra-Industry Trade Dynamics', Weltwirtschaftliches Archiv, 135 (2).
- Flam, H. and Helpman, E. (1987), 'Industrial Policy Under Monopolistic Competition', Journal of International Economics, 22.
- Fujita, M. and Thiessse, J.F. (1996), Economics of Agglomeration. Journal of The Japanese and International Economies, No.10.
- Fontagné, L. and Freudenberg, M. (1997), 'Intra-Industry Trade: Methodological Issues', Document de travail CEPPII, #97-01.
- Greenaway, D. (1995), 'Vertical and Horizontal Intra-Industry Trade: a Cross-Industry Analysis for the United Kingdom', in Economic Journal 105 (3).
- Greenaway, D. and Hine, R.C. (1991), Intra-industry Specialization, Trade Expansion and Adjustment in the European Economic Space. Journal of Common Market Studies, 29 (6), December.
- Greenaway, D., Hine, R., and Milner, C. (1994), 'Country-Specific Factors and the Pattern of Horizontal and Vertical Intra-Industry Trade in the UK' in Weltwirtschaftliches Archiv 130 (1).
- Grubel, H.G. and Lloyd, P.J. (1975), Intra-industry Trade, The Macmillian Press.
- Heckscher, E. (1919), 'The Effect of Foreign Trade on the Distribution of Income', Ekonomisk Tidskrift, pp. 497-512.
- Hine, R.C. (1990), Economic Integration and Inter-industry Specialisation. CREDIT Research Paper 89/6, University of Nottingham.
- Hinloopen, J., and van Marrewijk, C. (2000), On the Empirical Distribution of the Balassa Index, W.P. Erasmus University Rotterdam
- Iapadre, E. (1995), La Specializzazione Internazionale dell'Italia, Economia Italiana, No. 3.
- Kaitila, V. and Widgren, M.(2001), 'Revealed Comparative Advantage in Trade between the European Union and the Baltic Countries', European University Institute, Working Paper RSC 2.

- Kaitila, V. (1999), 'Trade and Revealed Comparative Advantage: Hungary, the Czech Republic, and the European Union', in BOFIT Discussion Papers, 8.
- Kaitila, V. (2001), 'Accession Countries' Comparative Advantage in the Internal Market: A Trade and Factor Analysis', in BOFIT Discussion Papers, 3.
- Kaldor, N. (1981), 'The Energy Issues', in Terry Barker and Vladimir Brailovsky, Oil or Industry, London.
- Krugman, P. (1991), Increasing Returns and Economic Geography. *Journal of Political Economy*, Vol. 99.
- (1998), What's New About the New Economic Geography ?. *Oxford Review of Economic Policy*, 14(2).
- Krugman, P. and Venables, A.J. (1990), Integration and the Competitiveness in Peripheral Industry. In Bliss, C., Unity with Diversity in the European Community.
- (1996), Integration, Specialization and Adjustment. *European Economic Review*, 40.
- Lovely, M.E and Nelson, D. R. (2002), 'Intra-Industry Trade as an Indicator of Labor Market Adjustment', 138 Heft 2, pp. 179-206 *Weltwirtschaft Archiv*, Kiel.
- Maurel, F. and Sédillot, B. (1999), A Measure of the Geographic Concentration in French Manufacturing Industries. *Regional Science & Urban Economics*.
- Neven, D. (1995), 'Trade Liberalization with Eastern Nations: How Sensitive?', in R.Faini and R. Portes (eds.) *European Union Trade with Eastern Europe: Adjustment and opportunities*, CEPR.
- Nugent, N. (1995), *The Government and Politics of the European Union*.
- Ohlin, B. (1933), 'Interregional and International Trade', Cambridge, MA: Harvard University Press.
- Ottaviano, G.I.P. and Puga, D. (1998), Agglomeration in The Global Economy: A Survey of the "New Economic Geography". CEPR Discussion Paper, No. 356.
- Peterson, J. (1988), 'Export shares and revealed comparative advantage, a study of international travel', *Applied Economics* 20, 3: 351-65.
- Puga, D. (1996), The Rise and Fall of Regional Inequalities, Discussion Paper No.314, Centre For Economic Performance, London School of Economics.
- Reza, S. (1983), 'Revealed comparative advantage in the South Asian manufacturing sector: some estimates', *Indian Economic Journal* 31, 2: 96-106.
- Ricardo, D. (1817), 'Principles of Political Economy and Taxation', Prometheus Books, 59 John Glenn Drive, Amherst, New York, 1996. On-line at: www.econlib.org/library/Ricardo/ricPtoc.html.
- Sapir, A. (1996), The Effects of Europe's Internal Market Programme on Production and Trade: A First Assessment. *Weltwirtschaftliches Archiv*.
- Shaked A. and Sutton, J. (1984), 'Natural Oligopolies and International Trade', in Kierzkowski (ed.) *Protection and Competition in International Trade*, Oxford: Basil Blackwell.
- Traistaru I., Nijkamp, P. and Longhi, S. (2002), 'Regional Specialisation and Location of Industrial Activities in Accession Countries', Working paper, 42nd ERSO Congress.
- Venables, A.J. (1996), Equilibrium Locations of Vertically Linked Industries. *International Economic Review*, Vol 37, 2.
- (1998), The Assessment: Trade and Location. *Oxford Economic Policy*, Vol 14, No 2.
- Vollrath, T.L. (1991), 'A Theoretical Evaluation of Alternative Trade Intensity Measures of Revealed Comparative Advantage', *Weltwirtschaftliches Archiv* 130, 2:265-279, Kiel.
- Yeats, A. J. (1985), 'On the appropriate interpretation of the revealed comparative advantage index: implications of a methodology based on industry sector analysis', *Weltwirtschaftliches Archiv* 121, 1: 61-73, Kiel.

Appendix

Tab. 5 The Aquino Index

	Aquino Index 1993-2001								
	Russia								
	1993	1994	1995	1996	1997	1998	1999	2000	2001
001 - live animals except fish	30.79	35.78	38.56	40.12	35.56	89.56	66.33	104.67	59.66
011 - beef, fresh/chilld/froz	7.67	6.79	8.98	13.68	12.74	7.55	0.03	0.29	0.12
012 meat fresh, chilled, frozen	4.78	5.25	6.28	13.23	15.37	9.45	1.88	4.76	4.13
034 fish, fresh, frozen	965.45	978.98	980.78	1005.2	2,945.4	12,598.8	16,202.9	13,289.0	8,791.6
112 alcoholic beverages	24.79	30.41	30.1	33.79	40.86	22.18	37.56	35.3	40.21
122 tobacco	2.23	1.66	1.67	2.27	3.77	1.45	2.79	23.7	86.14
211 furskins, raw	12610	14200.5	14091	15630.6	12,213.4	8,155.2	3,235.4	2,547.6	2,252.6
232 rubber, synthtic	1642.1	1784.01	1966.7	1256.99	2,967.43	4,384.8	1,625.8	1,524.2	2,121.2
247 oth. wood rough squared	31833	22173.6	24132	8824.51	59,571.8	53,338.9	62,157.4	41,652.7	72,806.1
248 wood shaped, sleepers	24550	23590.6	23820	27840	27,899.2	26,500.8	60,650.4	59,753.5	64,831.2
281 iron ore, concentrates	223.28	1863.3	192.85	260.68	883.71	1,001.2	1,389.6	510.8	477.38
282 iron and steel scrap	2428.8	2102.1	2057.2	2797.54	18,164.3	23,738.8	8,636	6,432.5	17,841.2
321 coal lignite and peat	165.5	23.99	208.67	279.92	1,905.28	1,838.91	1,828.8	3,255.9	2,395.65
322 briquets, coke, semi-coke	243.2	243.45	312.67	426.02	503.77	750.24	1,955.3	851.3	126.5
325 - coke semi-coke	789	1034	1898	2578	3,012.93	2,525.28	1,731.82	650.0	5,126.27
333 crude petroleum	24756	24543	32575	24979	21,706.6	19,777.5	26,079.8	18,756.0	37,096
334 petroleum products	1006.7	726.45	784.64	1087.1	3,971.51	4,160.1	15,022.0	36,930.1	33,362
343 gas, natural and manuf.	54061	52480.8	52030	72750.1	64,211.9	92,694.7	54,658.3	8,897.9	184,719
512 organic chemicals: alcohols	910.19	1550.34	1640.2	2722.58	4,459.45	2,812.0	3,160.6	3,795.6	3,810.86
522 inorganic chemicals, oxides	2328.9	2289	2309	2424.1	2,680.84	2,907.6	1,965.64	1,753.6	2,099.79
541 medicinal, pharm products	26.97	25.29	25.38	27.3	20.9	24.36	78.46	71.81	64.54
553 parfumery, cosmetics	12.46	10.97	10.67	12.05	10.93	20.88	60.41	65.96	39.44
562 fertilizers	3147.6	3092.06	3680.7	4261.02	8,029.91	8,709.13	21,999	20,819.5	19,061
583 cellulose derivatives	4.56	7.35	7.64	10.91	26.95	25.45	18.84	25.5	22.69
611 leather	635.79	684.03	797.79	467.79	576.13	1,596	644.63	1127.1	886.54
612 leather manufactures	16.89	17.79	22.68	27.69	28.67	36.53	22.06	90.94	96.46
613 fur skins tanned, dressed	81.16	35.71	25.12	29.82	30.84	66.34	38.85	81.4	37.81
621 materials of rubber	63.6	355.28	455.11	480.03	547.37	358.52	220.88	171.23	195.46
635 woods manufactures	509.19	339.93	343.09	131.3	83.22	132.41	169.36	232.31	247.14
641 paper, paperbord	73.65	1090.47	107.32	146.92	812.7	1,399	1,078	888.98	738.64
653 wovn man-made fib fabric	51.16	55.89	45.96	41.88	43.29	47.44	61.06	55.86	50.41
654 oth woven textile fabric	26.94	35.5	35.19	49.14	35.98	51.29	55.29	45.67	40.64
657 special txtl fabrc, products	24.75	63.78	73.5	78.55	94.25	121.07	66.09	72.43	69.3
658 textile articles	11.78	16.53	14.12	18.76	12.33	18.83	14.99	10.89	15.63
666 pottery	119.25	118.33	118.49	125.63	121.54	162.97	760.57	120.48	111.26
671 pig iron	182.3	181.2	1114.6	1221.7	1644.0	2382.1	1414.7	1091.9	1,781.4
672 iron, steel, primar form	1121.3	1401.4	1357.7	4775.9	8527.6	6562.7	6212.9	6066.9	10,987.7
673 iron, steel shaped	1903.7	1905.2	1920.5	2640.7	5668.0	7947.2	6498.1	5652.8	3,830.20
676 railway rails etc iron, steel	677.5	766.6	665.4	991.1	2118.0	1622.0	1605.9	848.1	1,237.05
678 iron, steel tubes, pipes	520.7	516.4	614.8	722.9	686.3	1533.5	1164.2	1310.6	1,708.44
682 copper exc cement copper	1621.9	1693.6	1685.8	1917.9	4645.9	5946.2	6507.6	6000.4	7,378.52
683 nickel	304064	209714	400913	370217	218612	88300	272112	86498	31,448.60
684 alluminium	14869	15479	13263	14896	14,504.2	17,171.8	7,729.0	4,365.9	6,401.96
686 zinc	1108	1076	806	1008	1,046.0	1,720.1	7,115.7	3,448.2	4,791.07
711 steam boilers & aux plnt	143.25	222.37	214.62	231.27	397.46	1,141.31	984.93	846.52	1,426.70
712 steam engines, turbines	692.32	998.92	1047.2	1005.61	1,284.1	2,756.5	2,275.0	1,958.4	1,019.44
714 engines and motors	165.15	360.01	359.61	485.71	328.24	821.14	768.19	693.54	1,035.83
716 rotating electric plant	56.54	37.72	36.99	49.08	397.7	383.23	451.4	390.59	447.47
721 agric machines	16.03	16.37	17.02	23.29	52.58	29.72	29.18	50.76	60.69
721 agric machines	16.03	16.37	17.02	23.29	52.58	29.72	29.18	50.76	60.69
722 tractors non road	173.71	136.8	134.62	148.03	164.44	526.63	478.96	249.22	493.32
723 civil engneer equip.	75	67.77	79.33	78.32	85.63	109.3	79.98	92.55	88.27

Aquino index 1993-2001										
RUSSIA										
	1993	1994	1995	1996	1997	1998	1999	2000	2001	
725 paper etc mill machinery	13.17	27.03	37.04	39.67	49.9	52.5	35.22	27.83	30.63	
726 printing machines	11.19	13.3	13.23	14.47	13.98	12.24	26.08	28.32	20.06	
727 food machines non domestic	5.06	2.9	2.94	4.02	15.8	14.81	44.47	27.79	15.95	
737 metalworking mach-tools	112.8	119.54	108.67	106.58	117.01	120.44	141.59	258.73	55.85	
741 heating, cooling equip.	10.87	38.93	48.98	61.49	32.97	45.78	77.34	65.35	69.65	
744 mechanical handling equip.	9.12	9.57	9.86	13.66	59.05	66.25	94.83	98.68	70.6	
751 office machines	64.72	79.99	70.37	70.15	89.69	97.04	88.14	51.55	44.13	
752 computer equipment	27.07	34.1	43.66	68.44	78.78	54.87	59.61	67.75	27.91	
759 office equip. parts/ accs.	25.37	37.25	27.7	30.43	57.58	70.33	62.57	76.81	24.69	
761 television receivers	18.9	17.68	28	10.63	39.4	22.67	83.1	25.38	30.8	
762 radio broadcast	8.67	10.89	13.89	15.47	27.42	26	18.8	34.15	7.65	
763 sound / TV recorders	27.77	20.94	20.92	26.75	40.31	28.05	79.39	40.95	15.27	
764 telecomms equipment	37.98	44.07	44.34	49.46	67.56	83.24	89.52	51.74	57.87	
773 electric distributing equip.	136.06	137.52	137.1	149.82	225.22	271.22	307.8	305.26	397.23	
774 elettro medical equip.	2.86	3.7	5.69	4.98	5.6	6.15	5.85	45.5	9.17	
781 passenger cars	107.89	148.78	164.57	170.8	187.59	200.1	253.4	234.72	112.77	
782 goods/service vehicles	150.79	158.98	178.67	201.98	223.38	350.67	390.95	258.46	316.4	
783 road motor vehicles	10.5	19.78	18.68	22.78	26.43	54.11	79.19	70.78	69.09	
792 aircraft/spacecraft/etc	175.67	189.56	197.24	189.78	251.68	267.09	248.53	244.56	820.48	
793 ships and boats	106.87	105.11	107.8	118.07	275.04	325.23	256.81	582.85	190.49	
812 plumbing, heating, lighting equi	14.1	16.5	18.67	20.78	20.34	47.44	46.22	54	50.68	
841 men/boys wear, woven	18.56	28.56	41.89	43.78	51.54	76.73	82.51	77.71	67.18	
842 women/girls wear, woven	65.22	64.97	76.97	86.58	92.12	95.93	96.5	89.55	75.43	
846 clothing and accessories	6.77	7.93	13.67	14.56	18.97	29.9	56.07	26.95	16.14	
848 headgear/non-text clothing	13.75	17.7	18.56	22.34	48.62	46.89	33.12	21.28	22.62	
851 footwear	60.87	75.11	70.8	118.07	53.7	62.49	60.1	63.43	48.98	
871 optical instruments	1127.17	935.74	846.14	837.81	1,960.30	1,405.25	884.46	1,381.12	1,076.11	
872 medical instruments	6.27	9.28	8.73	11.86	18.85	18.8	29.94	23.65	21.08	
881 photo apparat	101.56	105.67	110.67	129.78	188.17	242.16	387.88	98.74	113.57	
882 photo, cinema supplies	23.27	11.86	22.89	27.22	25.25	30.15	23.43	13.12	14.88	
884 optical goods	115.78	115.67	119.67	120.78	145.81	204.57	555.96	333.87	264.79	

Source: Own calculations on UN data, International trade statistics.

Tab. 6 The Aquino Index, 2001

Aquino Index			
2001			
343 gas, natural and manuf.	184,719.10	612 leather manufactures	96.46
247 oth. wood rough squared	72,806.12	723 civil engineer equip.	88.27
248 wood shaped, sleepers	64,831.23	122 tobacco	86.14
333 crude petroleum	37,095.71	842 women/girls wear, woven	75.43
334 petroleum products	33,361.65	744 mechanical handling equip.	70.6
683 nickel	31,448.60	741 heating, cooling equip.	69.65
562 fertilizers	19,060.89	657 special txtl fabr, products	69.3
282 iron and steel scrap	17,841.20	783 road motor vehicles	69.09
672 iron, steel, primar form	10,987.67	841 men/boys wear, woven	67.18
034 fish, fresh, frozen	8,791.63	541 medicinal, pharm products	64.54
682 copper exc cement copper	7,378.52	721 agric machines	60.69
684 alluminium	6,401.96	001 - live animals except fish	59.66
325 coke semi-coke	5,126.27	764 telecomms equipment	57.87
686 zinc	4,791.07	737 metalworking mach-tools	55.85
673 iron, steel shaped	3,830.20	812 plumbing, heating, lighting equip.	50.68
512 organic chemicals: alcohols	3,810.86	653 wovn man-made fib fabric	50.41
321 coal lignite and peat	2,395.65	851 footwear	48.98
211 furskins, raw	2,252.61	751 office machines	44.13
232 rubber, synthtic	2,121.17	654 oth woven textile fabric	40.64
522 inorganic chemicals, oxides	2,099.79	112 alcoholic beverages	40.21
671 pig iron	1,781.44	553 parfumery, cosmetics	39.44
678 iron, steel tubes, pipes	1,708.44	613 fur skins tanned, dressed	37.81
711 steam boilers & aux plnt	1,426.70	761 television receivers	30.8
676 railway rails etc iron, steel	1,237.05	725 paper etc mill machinery	30.63
871 optical instruments	1,076.11	752 computer equipment	27.91
714 engines and motors	1,035.83	759 office equip. parts/ accs.	24.69
712 steam engines, turbines	1,019.44	583 cellulose derivatives	22.69
611 leather	886.54	848 headgear/non-text clothing	22.62
792 aircraft/spacecraft/etc	820.48	872 medical instruments	21.08
641 paper, paperbord	738.64	726 printing machines	20.06
722 tractors non road	493.32	846 clothing and accessories	16.14
281 iron ore, concentrates	477.38	727 food machines non domestic	15.95
716 rotating electric plant	447.47	658 textile articles	15.63
773 eletrric distributing equip.	397.23	763 sound / TV recorders	15.27
782 goods/service vehicles	316.4	882 photo, cinema supplies	14.88
884 optical goods	264.79	774 elettro medical equip.	9.17
635 woods manufactures	247.14	762 radio broadcast	7.65
621 materials of rubber	195.46	012 meat fresh, chilled, frozen	4.13
793 ships and boats	190.49	011 - beef, fresh/chilld/froz	0.12
322 briquets, coke, semi-coke	126.5		
881 photo apparat	113.57		
781 passenger cars	112.77		
666 pottery	111.26		
724 textile/leather machinery	105.17		

Source: Own Calculations on UN data.

Tab. 7 Russia's Horizontal and Vertical Intra-industry Trade

VIIT (low quality products) in Russia						
	1993	1994	1995	1996	1997	1998
001 - live animals except fish	...	...	...	0.42	0.09	0.22
011 - beef, fresh/chilld/froz	...	...	...	0.01	0.00	0.0
012 meat fresh, chilled, frozen	0	0	0	0.02	0.01	...
034 fish, fresh, frozen	0.51	0.53	0.52	0.61	0.72	1.6
112 alcoholic beverages	0.08	0.19	0.18	0.21	0.10	0.04
121 tobacco	0.03	0.03	0.03	0.00	0.00	0.00
541 medicinal, pharm products	0.11	0.09	0.09	0.1	0.07	0.07
553 parfumery, cosmetics	0	0	0	0.03	0.03	0.04
584 cellulose derivatives	0.07	0.1	0.1	0.12	0.05	0.06
613 fur skins tanned, dressed	1.3	0.26	0.25	0.29	0.07	0.12
635 woods manufactures	9.02	6.33	6.43	0.18	0.22	0.24
653 wovn man-made fib fabric	0.2	0.3	0.3	0.35	0.3	0.26
657 special txtl fabr, products	0.46	0.27	0.27	0.31	0.2	0.23
658 textile articles	0.2	0.29	0.24	0.28	0.26	0.34
666 pottery	0.14	0.31	0.31	0.36	0.23	0.26
678 iron, steel tubes, pipes	0.33	0.28	3.64	0.32	0.21	0.25
716 rotating electric plant	0.88	0.61	0.6	0.7	0.76	0.64
721 agric machines	0.26	0.29	0.29	0.33	0.11	0.06
722 tractors non road	1.23	0.62	0.61	0.71	0.36	1.02
723 civil engneer equip.	0.1	0.15	0.15	0.17	0.16	0.18
725 paper etc mill machinery	0.21	0.12	0.12	0.14	0.11	0.1
726 printing machines	0.02	0.06	0.06	0.07	0.03	0.02
727 food machines non domestic	0.08	0.05	0.05	0.06	0.03	0.03
736 metalworking mach-tools	0.22	0.34	0.34	0.39	0.42	0.45
741 heating, cooling equip.	0.18	0.15	0.15	0.18	0.07	0.09
744 mechanical handling equip.	0.16	0.17	0.17	0.2	0.18	0.19
751 office machines	0.07	0.17	0.16	0.19	0.16	0.16
752 computer equipment	0.11	0.22	0.22	0.26	0.15	0.25
759 office equip. parts/ accs.	0.1	0.14	0.14	0.16	0.11	0.11
761 television receivers	0.17	0.16	0.16	0.19	0.94	0.42
762 radio broadcast	0.04	0.07	0.07	0.08	1.12	0.35
763 sound / TV recorders	0.12	0.19	0.19	0.22	1.09	0.46
764 telecomms equipment	0.31	0.26	0.25	0.3	0.22	0.15
773 eletric distributing equip.	0.26	0.61	0.6	0.7	0.55	0.45
774 elettro medical equip.	0.02	0.01	0.01	0.02	0.01	0.01
781 - passenger cars	...	...	...	2.04	0.41	0.38
812 plumbing, heating, lighting equip.	0.12	0.1	0.1	0.11	0.07	...
84 clothing and accessories	...	...	...	0.69	0.58	...
851 footwear	0.07	0.13	0.12	0.15	0.25	0.42
872 medical instruments	0.09	0.05	0.05	0.06	0.04	0.03
881 photo apparat	0.38	0.16	0.15	0.18	0.36	0.39
882 photo, cinema supplies	0.02	0.03	0.03	0.04	0.05	0.05
884 optical goods	0.03	0.08	0.08	0.09	0.15	0.38

Source: Own Calculations on UN data

VIIT (high quality products) in Russia						
	1993	1994	1995	1996	1997	1998
212 furskins, raw	4.44	7.61	7.49	8.72	6.51	5.02
233 rubber, synthtic	2.48	1.42	1.39	1.62	1.32	1.86
247 oth. wood rough squared	3.89	2.82	3.02	1.49	1.45	1.6
248 wood shaped, sleepers	3.78	3.19	3.73	3.73	2.74	3.2
281 iron ore, concentrates	2.77	2.25	2.22	2.59	1.41	1.46
282 iron and steel scrap	3.48	2.98	2.92	3.42	5.68	1.39
322 coal lignite and peat	2.34	2.94	2.9	3.38	3.31	3.4
323 briquets, coke, semi-coke	4.57	4.55	4.49	5.21	5.75	2.17
325 - coke/semi-coke/retort	...	...	...	5.18	11.87	12.16
333 crude petroleum	...	0	0	2.54	2.56	2.15
334 petroleum products	1.64	1.40	1.37	1.60	1.96	1.79
341 gas, natural and manuf.	1.84	1.88	1.87	2.01	1.35	1.78
512 organic chemicals: alcohols	1.39	2.35	2.32	2.7	8.19	4.83
522 inorganic chemicals, oxides	5.31	4.85	4.78	5.56	5.08	4.8
562 fertilizers	4.79	4.88	5.45	5.3	6.39	7.47
641 paper, paperbord	1.16	1.83	1.8	2.1	1.62	2.53
671 pig iron	...	1.16	1.14	1.33	2.52	3.02
672 iron, steel, primar form	1.42	2.23	2.20	2.56	2.58	...
673 iron, steel shaped	...	3.24	3.19	3.72	4.61	2.95
676 railway rails etc iron, steel	1.11	1.1	1.09	1.26	2.6	4.1
682 copper exc cement copper	11.2	11.94	11.76	13.69	10	11.17
683 nickel	5.87	4.83	6.039	3.813	4.89	1.63
684 alluminium	...	...	1.49	3.31	2.92	3.05
711 steam boilers & aux plnt	0.68	0.42	0.42	0.49	0.96	2.08
712 steam engines, turbines	1.66	1.36	0.75	1.56	2.51	4.88
714 engines and motors	1.08	1.09	1.07	1.25	0.69	1.56
793 ships and boats	2.17	2.84	2.81	3.48	1.52	1.53
871 optical instruments	1.58	1.18	1.16	1.35	2.66	3.25

Source: Own Calculations on UN data

HIIT in Russia						
	1993	1994	1995	1996	1997	1998
621 materials of rubber	1.05	0.99	0.98	1.14	1.09	0.67
654 oth woven textile fabric	0.55	0.7	0.68	0.8	0.75	1.01

Source: Own Calculations on UN data

Tab. 8 The Main Exporting Russian Companies, 2001

2001	2000	Position	Companies	Branch	Region	Volume of exports mln. \$ 2001	Volume of exports mln. \$ 2000	Relative export growth (%)	Number of supplies in 2001	Number of countries-importers in 2001
1	1	1	"Gazprom"*	Oil and Gas industry		16400.0	13900.0	17.99	1932	27
2	2	2	OC "LUCoil"*	Oil and Gas industry		6624.5	6218.1	6.54	4272	32
3	3	4	OC "YUKOS"*	Oil and Gas industry		5682.2	5247.5	8.28	4851	40
4	4	7	"Tyumen Oil Company"*	Oil and Gas industry		5597.3	3477.5	60.96	2020	40
5	8	5	"Surgutneftegas"*	Oil and Gas industry		2356.0	1700.5	38.55	2044	13
6	7		"Russian Aluminium"*	Non-Ferrous metallurgy		2231.2	2161.6	3.22	10332	52
7	5	8	"Tatneft"*	Oil and Gas industry	Tatarstan	2136.0	2629.5	-18.77	2572	43
8	12	10	OGC "Slavneft"*	Oil and Gas industry		1762.7	1261.6	39.72	1522	25
9	6	6	MMC "Norilsk Nickel"*	Non-Ferrous metallurgy		1754.5	2246.9	-21.91	996	23
10	9	11	OC "Sibneft"*	Oil and Gas industry		1650.7	1699.9	-2.90	2158	29
11	10	9	OC "Rosneft"*	Oil and Gas industry		1346.7	1298.5	3.71	996	н.д.
12	13	14	SC "Airosa"	Non-Ferrous metallurgy	Yakutia	1173.5	883.8	32.78	109	8
13	15	18	OSC "Bashneft"*	Oil and Gas industry	Bashkiria	871.7	858.7	1.52	253	21
14	16	15	"Magnitogorsk Iron and Steel Works"	Ferrous metallurgy	Chelyabinsk region	827.4	849.2	-2.57	6216	72
15	14	16	"Novolipetsky Metallurgical Combine"	Ferrous metallurgy	Lipetsk region	697.0	857.0	-18.67	16524	86
16	36	19	SC "Sibur"*	Chemical and Petrochemical industry		690.4	179.3	285.07	10018	66

17	11	13	"Severstal"*	Ferrous metallurgy	Vologda region	667.7	1066.7	-37.41	13554	98
18	22	23	"SUAL-Holding"*	Non-Ferrous metallurgy		575.3	506.4	13.61	6112	40
19	20	21	"TVEL"*	Machine-building industry		538.0	458.0	17.47	237	23
20	23		"Eurasholding"*	Ferrous metallurgy		505.5	470.8	7.36	8450	42
21	19		"ITERA Holding"*	Oil and Gas industry		435.1	641.9	-32.22	143	6
22		42	HC "Kuzbassrazrezugol"*	Coal industry	Kemerovo region	375.7	205.6	82.73	3170	24
23	26	24	Nizhnekamsk Oil Refinery	Chemical and Petrochemical industry	Tatarstan	355.4	415.8	-14.53	6918	44
24	25		"Ural Mining and Smelting Company"*	Non-Ferrous metallurgy		352.7	424.3	-16.87	3441	36
25	30	31	MHC "Metalloinvest"*	Ferrous metallurgy		328.8	257.6	27.66	2924	47

Only the top-25 companies have been reported above. The remaining exporting enterprises can be found at www.raexpert.ru

*Companies-holdings, conjoint data on all holding companies

Source: Expert RA, 2003