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The opinions expressed in this paper are those of the authors and do not necessarily reflect the views of the Bank of Finland.

Peter Westin\*

## Comparative Advantage and Characteristics of Russia's Trade with the European Union<sup>1</sup>

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### Abstract

The paper analyzes the development in Russian–European Union trade in the transition. After a significant adjustment of the trade data, and a short overview of the general development in Russian trade, the author analyses the trade dynamics and the commodity composition of exports and imports, using 3 and 5-digit Standard International Trade Classification. The outcome of the analysis shows that although Russian exports since 1992 have increased in terms of variety, the development in manufacturing exports is disappointing, especially with regard to light manufacturing and consumer goods. And not surprisingly Russia reveals a comparative advantage in minerals and metals. The level of intra-industry trade between Russia and the EU remains low and there is no sign of an increase; the opposite pattern from that of the Central European countries. On the whole this study shows that there are no clear signs of changes to the structure of foreign trade between Russia and the EU, to some extent the result of the lack of restructuring in the Russian economy.

Keywords: Russia, European Union, foreign trade, revealed comparative advantage, intra-industry trade

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## 1 Introduction

This paper, part of a larger study on Russia's trade, presents some initial results and explores the characteristics and comparative advantages in Russia's trade with the European Union (EU) 1992–95<sup>2</sup>. After a brief discussion surrounding the data used in this study, Section 3 presents the overall development in Russia's total trade. In Section 4 Russia's trade with the EU is analysed. The manufacturing sector is of special interest as it is often seen as the engine of growth in the economy. However, Russia (USSR) has never been a major exporter of manufactured goods, and the legacy from central planning has left Russia with a largely outdated capital stock in need of upgrading. Has there been any major changes in Russia's comparative advantage during the first four years of Russian reforms which for example has included the break-up of the monopoly on foreign economic activities, and the fastest privatisation programme ever initiated? Also, I examine if Russia, as the countries in Central Europe, has seen a change in the structure and characteristics of trade, and especially in the level of intra-industry trade.

## 2 Statistical sources: adjustment of trade data

The foreign trade statistics of both Post-Communist Economies (PCEs) and the EU suffers from methodological weaknesses which result in major problems of interpretation. Trade data published by EU sources exclude information on trade which member-states consider to be confidential. Two types of confidentiality exist; product confidentiality (when a member state does not provide data relating to trade in certain individual products in its published statistics) and trade-partner confidentiality (when a member-state does not provide data relating to the country of origin or destination of certain trade flows). In both cases, however, the relevant trade flows are included in the member state's data for total imports and exports and can

be identified as residuals between the total and its components. Similarly, information which has been withheld on grounds of product confidentiality can also be included in the aggregate data on exports and imports with the country concerned, while data which has been withheld on grounds of country confidentiality is normally included in the appropriate data on commodity trade.

These problems considerably complicated the interpretation of EUROSTAT COMEXT data which are derived from the trade statistics provided by the member states. Germany, which is the largest importer of natural gas from Russia applies trade-partner confidentiality to these imports while Italy, which is the second largest importer of gas from Russia applies product confidentiality to this sector. As a result EUROSTAT publications do not show Russia to be a major exporter of natural gas (Standard International Trade Classification (SITC) 343)<sup>3</sup> to the EU, although in practice it is the largest exporter of gas. Similarly, data published according to the Combined Nomenclatura (CN) trade classification system, also in EUROSTAT COMEXT, show EU imports of natural gas from Russia as zero<sup>4</sup> and total imports of natural gas from outside the EU as 4–5 billion ECU which is considerably below the real figure. The former results from both product and partner and product confidentiality which exclude imports of Russian natural gas, while the latter results from product confidentiality which has led to the exclusion of a significant proportion of extra-EU trade in natural gas.

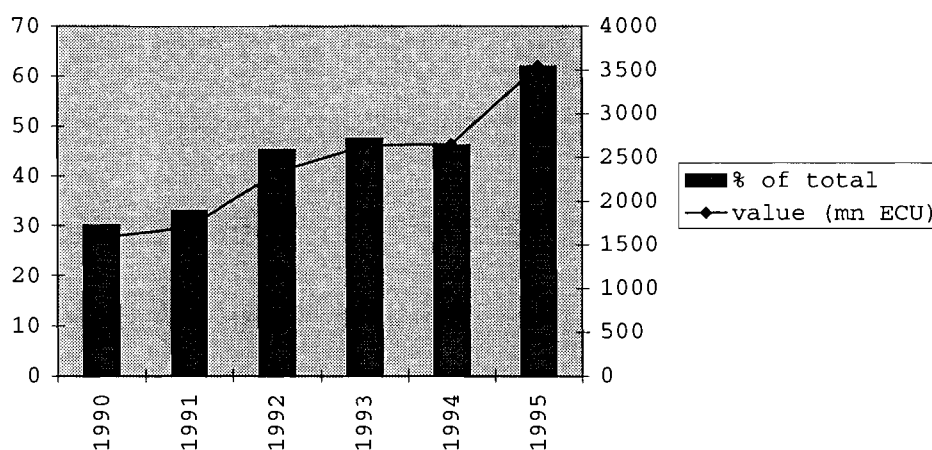
EUROSTAT (1996 and 1997) provides a breakdown of the EU's main extra-EU trade partners for specific imports. For SITC 34 (gas, natural and manufactured), the main partners are given as Norway and the OPEC countries, while Russia, according to EUROSTAT (1997), accounted for ten percent of extra-EU15 imports of natural gas in 1992–94, falling to only 0.6 percent in 1995. As can be seen in Figure 1 about half of EU's imports of gas is still unaccounted for at a time when the EU's access to supplies from the former Soviet Union increased significantly.

<sup>2</sup>Data broken down in great detail for 1996 was not yet available from EUROSTAT at the time of writing.

<sup>3</sup>See Appendix I for definition of one-digit SITC.

<sup>4</sup>This is also the case with respect to SITC 343.

Figure 1 **The EU15: Unaccounted imports of natural gas with respect to country of origin**  
(percent of total extra-EU imports of gas and value (million ECU))



Source: EUROSTAT, 1997.

It is, however, possible to estimate the size of trade that has been excluded from EU sources by consulting Russian sources. The Customs Authorities of the Russian Federation have provided detailed figures of the product breakdown of Russian trade since 1994 in terms of both quantity<sup>5</sup> and values. Estimates of Russian exports of natural gas to the EU in terms of billion cubic metres and price per cubic metre is shown in Table 1. The information shown in Table 1 has been used to adjust EU data of trade with Russia in the following analysis.

Table 3 below shows the composition of Russia's trade with the EU by one-digit SITC categories for 1992–95 according to the EUROSTAT COMEXT statistics. However, Russian exports in category 3 (mineral fuels, lubricants and related products) include my re-estimates of Russian export of natural gas to the EU which have been excluded from the EUROSTAT data on grounds of product and partner confidentiality. SITC 9 is then shown as the difference between

<sup>5</sup>For the years 1992–93, information about the quantity of gas imported by the EU from Russia the source has been the International Energy Agency.

total trade and trade shown in SITC category 0–8 (when category 3 includes the re-estimate of Russian exports of natural gas)<sup>6</sup>.

### 3 Trends and Developments in Russia's trade<sup>7</sup>

Table 2 shows the geographical distribution of Russia's trade, derived from Goskomstat data. Goskomstat (1996) provided data for trade with the enlarged (15 member) EU for all years from 1992–95, whereas EUROSTAT COMEXT data

<sup>6</sup>Consequently both imports and exports of SITC 9 still include some residual trade that has been excluded from other SITC categories on grounds of product confidentiality. Data on Russian imports from the EU derived from the EUROSTAT COMEXT data have not been adjusted to take account of this.

<sup>7</sup>For a more thorough overview of developments in Russian trade see Smith, 1993 and 1996.

Table 1 Russian export of natural gas to the EU<sup>(1)</sup>

	1988 <sup>(2)</sup>	1992	1993	1994	1995
Billion kbc metre	37.8	49.1	51.2	55.3	70.9
Dollars per 1000 kbc metre	65.11	85.10	77.70	72.80	80.1
Total export (billion dollar)	2.46	4.18	3.98	4.03	5.68
Total export (billion ECU)	2.08	3.22	3.39	3.39	4.34

Source: Customs Authorities of the Russian Federation, International Energy Agency, Russian Economic Trends, PlanEcon, IMF.

<sup>(1)</sup> For 1988 and 1992–94 the data represent Russia's exports of gas to EU12, and EU15 for 1995, i.e. comparable to EUROSTAT COMEXT.

<sup>(2)</sup> USSR.

includes only the pre-1995 twelve members of the EU from 1992–94 and fifteen members from 1995 onwards. Inevitably this leads to differences between the two sources<sup>8</sup>, which are exacerbated by the inadequate collection and processing of data on trade between Russia and the EU, by both sets of authorities in the early years of the transition. These problems are gradually being overcome.

Since 1993 overall exports have grown amounting to 62.8 billion ECU in 1995. Recovery in imports have lagged behind and in 1993 Russian imports still experienced a decline by almost 10 percent. Although growth materialized in 1994, by 1995 imports were just above the 1992 level at 36.5 billion ECU. In its trade with the CIS Russian export has continued to fall while export to non-CIS countries has grown consistently. Exports to the EU, driven by minerals and raw materials, did grow up to 1995 when, as can be seen in Table 2, a marginal fall was recorded. However, the strengthening of the ECU relative to the dollar meant that measured in dollar terms export to the EU grew by about 12 percent in the same year. It is also worth mentioning that Russia as an EU trading partner only represents four percent of extra-EU imports and only two percent of the EU's export to non-EU countries. Russia has become increasingly dependent on Europe for imports,

with 53 percent of non-CIS import in 1995 coming from the EU, equal to 78 percent of imports from DMEs. The share of exports to Europe has fallen from 45 percent of non-CIS export in 1992 to 39 percent in 1995, representing 65 percent of export to DMEs.

Russia's exports to "other" countries (see Table 2 for definition) have increased while imports have been falling. In 1995 Russian exports to these countries amounted to 12.6 billion ECU or 20 percent of total export, indicating the increasing importance of the Asian markets. The negative development in imports to other countries can be explained by the shift in demand in Russia towards Western commodities in terms of consumer goods. As for imports of foodstuffs Russia has increasingly become dependent on the CIS and other East European countries, causing such import activities from "other" countries to fall temporarily. But the potential of the markets south and east of Russia also implies that imports from these markets should pick up in the future.

Table 1 shows a significant and growing trade surplus, both in overall trade and in trade with non-CIS countries. Russia's trade surplus has increased from 10 billion ECU in 1992 to over 26 billion ECU in 1995. Non-CIS trade accounts for 98 percent of the 1995 surplus. In its trade with CIS Russia's surplus has been declining since 1993 as imports from CIS countries have been growing at a faster rate than exports to the region. Russia's trade surplus with the EU has been increasing from 1992–95 according to EUROSTAT (adjusted by the author to take into account confi-

<sup>8</sup> In addition, differences occur because both sources present their respective statistical value for imports cif and exports fob.

Table 2 **Russian Trade According to Geographical Distribution (billion ECU)<sup>9</sup>**

<b>EXPORT</b>	<b>1992</b>	<b>1993</b>	<b>1994</b>	<b>1995</b>
Total Trade	43.9	51.0	57.6	62.8
<b>CIS trade</b>	<b>8.7</b>	<b>12.7</b>	<b>11.7</b>	<b>10.9</b>
<b>Non-CIS trade</b>	<b>35.3</b>	<b>38.3</b>	<b>46.0</b>	<b>51.9</b>
DMEs <sup>(1)</sup>	19.5	23.0	29.4	30.7
EU	16.0	16.8	20.2	20.1
EE <sup>(2)</sup>	6.5	6.6	6.9	8.7
Other <sup>(3)</sup>	9.2	8.7	9.6	12.6
<b>IMPORT</b>	<b>1992</b>	<b>1993</b>	<b>1994</b>	<b>1995</b>
Total Trade	34.2	30.9	33.0	36.5
<b>CIS trade</b>	<b>4.6</b>	<b>7.9</b>	<b>8.7</b>	<b>10.3</b>
<b>Non-CIS trade</b>	<b>29.6</b>	<b>23.0</b>	<b>24.3</b>	<b>26.2</b>
DMEs	18.1	14.2	16.9	17.8
EU	12.7	9.6	12.9	13.8
EE	3.8	2.0	2.9	3.5
Other	7.6	6.8	4.5	4.9
<b>BALANCE</b>	<b>1992</b>	<b>1993</b>	<b>1994</b>	<b>1995</b>
Total Trade	9.7	20.1	24.6	26.3
<b>CIS trade</b>	<b>4.0</b>	<b>4.8</b>	<b>3.0</b>	<b>0.5</b>
<b>Non-CIS trade</b>	<b>5.7</b>	<b>15.3</b>	<b>21.6</b>	<b>25.8</b>
DMEs	1.4	8.7	12.5	12.9
EU	3.3	7.2	7.2	6.3
EE	2.7	4.6	4.1	5.2
Other	1.6	2.0	5.1	7.7

Source: Goskomstat (1996), (for ECU exchange rate: IFS, IMF)

<sup>(1)</sup> DMEs = Well developed market economies equal to the OECD countries

<sup>(2)</sup> EE = Eastern Europe, or the Baltic states, Poland, Hungary, Czech Republic, Slovak Republic, Romania and Bulgaria.

<sup>(3)</sup> The countries not in DMEs, CIS or EE.

<sup>9</sup>The data in Table 2 does not include any estimates for trade not recorded by customs authorities.

dential trade in natural gas), amounting to seven billion ECU in 1995, compared to 6.3 billion ECU according to Goskomstat. Goskomstat also disclose a somewhat different trend with the surplus being higher in both 1993 and 1994<sup>10</sup>. As for "other countries", there has been an increase in the share of exports to Asian countries, especially China, Japan and South Korea, resulting in the trade surplus increasing dramatically, from 592 million ECU in 1992 to 8.5 billion ECU in 1995<sup>11</sup>.

There are obvious difficulties with relating the latter development to international competitiveness. For example it would be very difficult to claim that Russia's competitiveness towards Asia has increased anything like the trade surplus would indicate (see below). Aggregate demand in many European countries has been negatively affected by the EU countries' attempts to meet the Maastricht criteria, and this in turn has affected EU imports from third countries. One may therefore assume that Russia's trade surplus with the EU would have increased more, had meeting the Maastricht criteria not been the priority of the EU countries. Geographical location is also an important factor. Russia has borders with two continents, and it is probable that it will increasingly trade with Asia and the Far East. Further more, non-payment for deliveries has become systemic in intra-CIS trade, and barter and other unofficial means dominate this trade. Russia, at the same time, needs hard currency and therefore markets containing customers that are making payments in cash are becoming increasingly attractive.

According to the competitiveness approach a surplus in the current account is treated as a sign of higher competitiveness (Dluhosch, Freytag, and Kruger, 1996). In other words, higher competitiveness, or the ability to sell, shows up as a surplus on the current account. "Although the competitiveness approach is not a systematically developed theory, it can draw on a number of balance of payment theories which describe the relationship between ability to sell and the current account in a

similar fashion"<sup>12</sup>. When choosing the proper variable for evaluating Russia's competitiveness according to the aforementioned approach, there are reasons for concentrating on the trade balance as compared to the current account. First, unilateral transfers are normally less affected by issues related to international competitiveness. Secondly, for Russia, trade in services is still small (although growing). Interpreted according to the competitiveness approach the large, and increasing trade surplus should indicate that Russia has a high, and increasing, degree of competitiveness. However, this approach has serious drawbacks. The fact that the bilateral balance is in surplus with almost all countries should not be interpreted as evidence in favour of this approach. Instead the product range of Russian foreign trade, primarily consisting of natural resources and minerals, does fit the import demand of most countries. Russia's geological conditions means that it has a comparative advantage in the production of commodities such as oil, gas and other raw materials. Russia's export revenue depends heavily on the development of world market prices of oil and gas. Earnings from export therefore help to finance import, and as for other primary goods producing countries, the import structure of Russia is different from the export.

A very important point to make is that relying on bilateral trade balances in order to explain and determine a country's competitiveness relies on the assumption that markets are separated from each other. The contrary is true, the world trading system is multilateral and markets are integrated. Under such circumstances bilateral trade imbalances alone cannot be judged as a sign of a country's lack of international competitiveness. Instead the balance of trade or current account is the result of the utilization of comparative advantages and international capital flows, the latter affecting the exchange rate.

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<sup>10</sup> The differences in data between EUROSTAT and Goskomstat will not be explored further in this article. The analysis made for Russia-EU trade is fully based on adjusted EUROSTAT COMEXT database.

<sup>11</sup> However, import from Asia fell from 6.2 billion ECU to 3.5 billion ECU in the same period.

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<sup>12</sup> Dluhosch, Freytag, and Kruger, 1996, p 7.



## 4 Russia-EU trade

### 4.1 Commodity Composition

Table 3 displays the commodity composition of Russia's trade with the EU according to SITC. Imports from the EU consist mainly of foodstuff and manufacturing accounting for 88 percent of total imports<sup>13</sup>. This is down from 96 percent in 1994, and is partly due to the unexplained increase in SITC 9 plus residual in 1995. Machinery and equipment (SITC 7) is still the main commodity group with 35 percent of total imports from the EU in 1995, down however, from 45 percent in 1992. Although hitherto only modest changes have taken place in the commodity structure for Russia's imports from the EU, future restructuring and growth should leave Russia dependent on import of machinery and equipment as this will require the import of new technology and updating of the present decayed capital stock. Equally manufactured consumer goods imports, the majority of which classified in SITC 8, may be strengthened by increased consumer demand associated with growth.

Russia's exports to the EU continue to be dominated by oil and gas (SITC 3), up from 7.3 billion ECU in 1992 to 12 billion ECU in 1995. However, as a percentage of total exports it has fallen from 73 percent to 52 percent in the same period. The reason is the rapid increase in export of commodities in SITC 6, and especially non-metallic mineral manufactures (66); iron and steel (67), and non-ferrous metals (68). Together these account for more than 90 percent of SITC 6. As a share of total exports SITC 66–68 accounted for almost 20 percent of exports to the EU in 1995 (up from seven percent in 1992). Applied on 2-digit SITC, six commodity classifications; the three just mentioned plus coal, coke and briquettes (32); petroleum and petroleum products (33); and gas, natural and manufactured (34), account for 75 percent of total export to the EU<sup>14</sup>. Manufacturing

exports to the EU by definition in 1995 amounted to 8.2 billion ECU (up from 1.9 billion in 1992), and what is exported are mainly the items just mentioned from SITC 6, accounting for 65 percent of manufactured export. However, the more narrow definition of manufactured goods, SITC 7 and 8 (machinery and transport equipment, and miscellaneous manufacturing), does provide the scope of additional analysis. Russian export to the EU of SITC 7–8 amounts to only 3.6 percent of total trade while imports of the same accounts for 47 percent of total imports. The picture emerging is that of a completely different structure of exports compared to that of imports in Russia's trade with EU.

The structural difference between Russia's exports and imports is also confirmed by using Leamer goods classification (LGC). Leamer (1984) categorized commodities into five groups: Primary Goods (PG), Crops and Animal Products (CAP), and Manufactured Products: the latter was divided into three groups depending on input structure: Labour-Intensive (LI), Moderately Capital- and Skill-Intensive (MCSI), and Highly Capital- and Skill-Intensive (HCSI). Figure 2 presents the picture for Russia's import and export structure vis-a-vis EU divided into Leamer goods classification. Whereas 72 percent of Russia's exports are classified as primary products, in imports this represents only 1.4 percent. As for manufactured goods, it totals 19 percent of exports to the EU of which 16 percent is LI, 47 percent MCSI, and 37 percent is classified as HCSI. Not surprisingly imports from the EU contain 28 percent CAP, and a massive 70 percent manufactured goods. Of that, 73 percent (52 percent of total import) is MCSI. Interestingly only nine percent of total import from EU is classified as HCSI. This highlights one of the problems of using Leamer goods classification. HCSI is totally composed of chemicals (SITC 5), which is the reason for the relatively high figure for HCSI exports (7 percent of total export). Nevertheless, this does not dramatically change the general picture of the radical difference in the commodity structure between exports and imports in Russia's trade with the EU.

One simple way to analyse the progress of trade development is to examine the development in number of goods exported. For a solid result a large sample is needed. In this case 5-digit SITC,

<sup>13</sup> Foodstuff here categorized as SITC 0–1, and manufactured goods equal to SITC 5–8.

<sup>14</sup> In total 2-digit SITC divides trade into 71 different commodity categories.

Table 3 Russia's Trade with the EU according to SITC (1000 ECU)

RUSSIAN EXPORT TO EU				
SITC	1992	1993	1994	1995
0	157954	259599	283276	317695
1	10519	14391	17329	16175
2	490148	1073535	1478174	2265052
3	7295818	9760443	10339948	12045847
4	535	2489	7311	2103
5	322190	784422	1137769	1602291
6	1224048	2485005	3692624	5728532
7	292315	384647	424482	579749
8	65009	180379	190381	247464
9*	75579	594836	829300	302689
<b>Total</b>	<b>9934115</b>	<b>15539746</b>	<b>18400594</b>	<b>23107597</b>

RUSSIAN IMPORT FROM EU				
SITC	1992	1993	1994	1995
0	994254	2335520	2024609	2719905
1	183610	548755	696953	667448
2	45735	92872	138824	197323
3	21660	47185	61639	60767
4	38855	46672	52673	129119
5	409192	964132	1064821	1296112
6	583854	854443	1097982	1912971
7	2594098	4824676	4804405	5695562
8	617994	1471492	1977140	1840739
9*	225978	338674	249642	1583408
<b>Total</b>	<b>5715230</b>	<b>11524421</b>	<b>12168688</b>	<b>16103354</b>

Source: EUROSTAT COMEXT and author's adjustments.

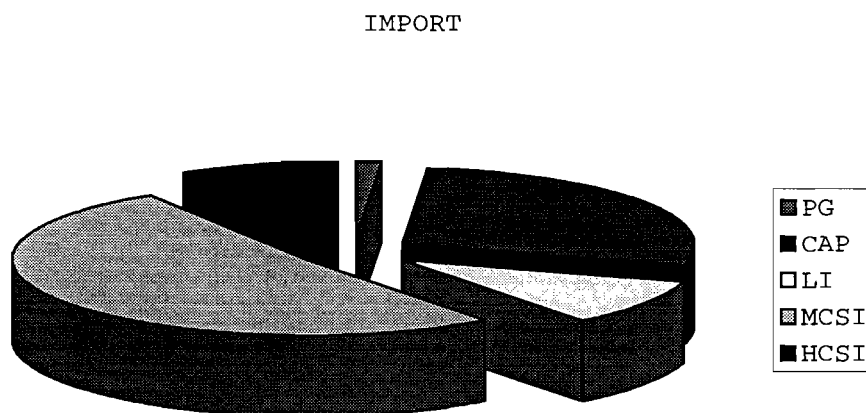
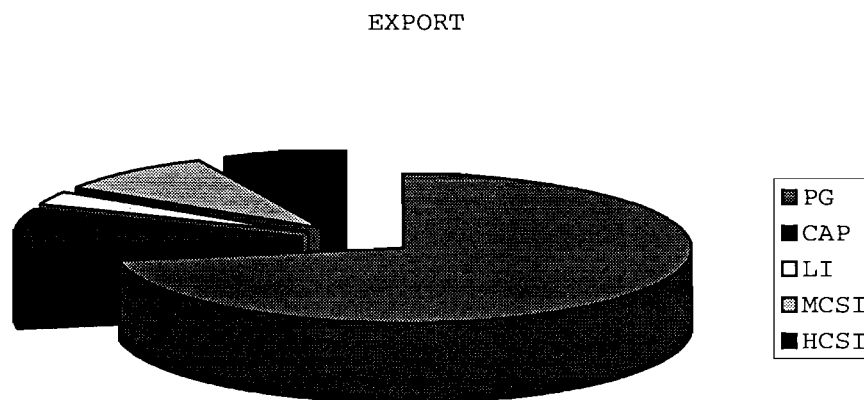
\*SITC 9 plus residual

equal to 3,252 different commodities, has been used. In 1992 Russia exported goods from 1,615 commodity groups of which 1,325 were manufactured goods. By 1995 this had increased to 2,149 and 1,785 goods respectively. Compared to 1992, in 1995 Russia increased the number of commodities exported to the EU by 691 new commodities. At the same time it lost exports in 157, achieving

a net gain of 534 new commodities<sup>15</sup>. In the case of manufactured goods the numbers for the same period were 569 gained, 109 lost, and therefore a net gain of 460 commodities, thus indicating that Russia has achieved a relatively high degree of success in expanding its trade in manufactured goods. However, the use of SITC in this manner

<sup>15</sup> It has to be said that part of this development is explained by the fact that the 1995 data includes trade with Austria, Finland, and Sweden.

Figure 2 Russian-EU trade in 1995\* according to Leamer goods classification



\*Excluding SITC 9 plus residual.

misleading as manufactured products are displayed in more detail. Of the 3,252 commodities 2,487, or 76 percent, belong to SITC 5–8. As a consequence the picture changes somewhat when commodities gained and lost are considered according to value.

In terms of value, new goods in 1995 amounted to 1.7 billion ECU, or 7.4 percent of total export, while the value of the 157 commodities lost in 1995, amounted to 18,500 ECU in 1992, equal to 0.2 percent of total export. The majority of new items exported (465) amounted to less than 100,000 ECU each, and in only 44 of the 691 new commodities did exports exceed 1 million ECU. As for items where export exceeded 10 million ECU (Table 4) the most significant was SITC 33408 (Gasoline/Petroleum oil (unspecified type)) of which Russia exported close 1 billion ECU to EU in 1995. There is however a possibility that commodities from SITC 2 and 3 show up as "new exports" mainly because of previous confidentiality<sup>16</sup>. The appearance of commodity 51208 in table 4, the unspecified type of alcohol, is somewhat puzzling. However, Table 4 should not be interpreted as if Russia did not export any alcohol prior to 1995. On 5-digit level alcohol (SITC 512) is divided into 21 commodities of which Russia in 1995 exported 19, and of these nine were "new" exports in 1995 compared to 1992, i.e. ten types of alcohol were also exported to the EU prior to 1995. Further more, the commodities iron ore agglomerates, electric current and gaseous hydrocarbons (liquefied) show up as "new" commodities as a result of the enlargement of the EU in 1995, as all three commodities are exported to Finland<sup>17</sup>.

Table 5 displays value and share of the new commodities exported in 1995 as well as commodities for which export ceased, arranged by SITC 0–9. Not surprisingly the most significant increase was in SITC 3 where new commodities accounted for 4.4 percent of total exports in 1995. New commodities in manufactured exports amounted to

<sup>16</sup> Non of the commodities 20308, 28608, and 51208 are listed in United Nation's "Commodity Indexes for the Standard International Trade Classification, Revision 3" (1994). These may have been created on an ad hoc basis by EUROSTAT just for Russia–EU trade.

<sup>17</sup> In total nine of the commodities in Table 4 are exported to a single country. The exceptions are SITC 03521, 56219 and 67349.

480 million ECU or 2.1 percent of total exports. And for SITC 7 new commodities exported accounted for 44 percent of export of goods classified in the same group. However, related to total exports the value of new SITC 7 commodities only amounts to 1.1 percent.

## 4.2 Revealed Comparative Advantages

The concept of Revealed Comparative Advantage (RCA) is based on traditional theory of international trade and comparative advantage. Because of the problems associated with estimating comparative advantage from a trade model, the RCA index is based on a country's trade performance in different industries. Balassa coined the expression of Revealed Comparative Advantage in an often quoted article in 1965, and since then many versions of RCA has been constructed (see Vollrath (1991) for an overview). Most indices can in some way or another be criticised for not being consistent with others, as the properties of different indices differ<sup>18</sup>.

### 4.2.1 The Formulas

I will use two alternative measures for RCA:

$$(1) \quad RCA(1)_j = (X_{ij}^0/X_{nj}^0) / (X_{it}^0/X_{nt}^0)$$

Where X equals export of commodity j for country i at period t, as well as a comparator n that can represent the world or a group of countries. Equation 1 is derived from Balassa (1965 and 1989) now often referred to as export specialisation index. Constructing the RCA index, based only on export data, Balassa divided a country's share of export of a given commodity by its total export of manufactured goods and expressed that as a share of total export of a number of countries (in Balassa's case (1965, 1989); subscript n equal to ten industrial countries).

<sup>18</sup>For a critique of the Balassa RCA see Yeats (1985).

**Table 4 New commodities exported by Russia to the EU in 1995 compared to 1992 in which export > 10 million ECU**

Commodity	SITC	Value (1000 ECU)
Cod	03521	24,926
Iron ore agglomerates	28160	10,415
Copper ore	28308*	35,312
Uranium ore	28608*	30,127
Gasoline/Petroleum oil (unspecified type)	33408*	939,360
Gaseous hydrocarbons, liquefied	34420	15,451
Electric current	35100	63,754
Alcohol (unspecified type)	51208*	16,872
Other nitrogenous fertilizers	56219	27,561
Flat-rolled products of iron & steel (width < 600 mm)	67349	59,278
Aeroplanes (propelled) weight 2,000 – 15,000 kg	79230	129,244
Aeroplanes (propelled) weight > 15,000 kg	79240	101,829

\*SITC not listed by UN.

**Table 5 New Commodities Traded 1995 Compared to 1992 (1000 ECU)**

SITC	Gains		Losses	
	Value	Percent	Value	Percent
0	35122	0.15 %	1405	0.01 %
1	309	0.00 %	5	0.00 %
2	106256	0.46 %	4771	0.05 %
3	1025876	4.44 %	177	0.00 %
4	1668	0.01 %	6	0.00 %
5	89562	0.39 %	5023	0.05 %
6	113600	0.49 %	3036	0.03 %
7	254928	1.10 %	576	0.01 %
8	20946	0.09 %	237	0.00 %
9	67119	0.29 %	3255	0.03 %
<b>Total</b>	<b>1715386</b>	<b>7.42 %</b>	<b>18491</b>	<b>0.19 %</b>

An index number of 110 illustrates that a country's share of export of commodity  $j$  is 10 percent higher than its share of total export. Thus a number above 100 indicates a comparative advantage which then is more obvious the higher the index, and equally an index number below 100 represents a comparative disadvantage. This indicator reveals in which commodities a country's export is concentrated, and can therefore be used as a measure for comparative advantages.

The second RCA measure is simply a relative export-import measure where the relative trade balance for commodity  $j$  in relation to the overall trade balance is divided by relative trade volume of commodity  $j$ . This method is used by Dimelis and Gatsios (1995) in their study of Greece's trade relations with CEE, and equally by Gual and Martin (1995).

$$(2) \quad RCA(2)_j = [(X_j/X) - (M_j/M)] / [(X_j/X) + (M_j/M)]$$

Equation (2) defines RCA as the ratio of net share of commodity  $j$  of total net trade divided by combined share of export and import of commodity  $j$ . A positive number indicates a comparative advantage whereas a number below zero represents a comparative disadvantage.

Before presenting the result and analysis of these two indices just a few words on a third version of RCA. Equation 3 which has been used as an indicator for RCA by Dluhosch, Freytag and Kruger (1996) does bear striking similarities with Equation 2.

$$(3) \quad RCA(3)_j = (X_j/M_j) / (X/M)$$

However unless trade is flowing in both directions using this indicator has a disadvantage. If, for example, Russia is exporting but not importing commodity  $j$  the nominator will become an error term, while according to equation 2 this would reveal a high degree of RCA. Equally, if no export is taking place the nominator will amount to zero, and therefore the sum of Equation 3 will be zero. Using Equation 2, the goods where Russia does report some export but no import would indicate a RCA. From this would follow that what would amount to 100 according to Equation 2, and therefore indicate clear and full RCA, would not be displayed at all using Equation 3.

In this study the calculations of RCA is made

on the basis of 3 digit SITC, or 270 goods. In addition RCA is estimated for SITC group 5–8, or trade in manufacturing amounting to about 170 goods. By calculating Equation 1 with respect to total exports to the EU as well as Central and Eastern Europe's (CEE)<sup>19</sup> export to the EU, Russia's RCA relative to CEE on one hand and to the World on the other should be revealed. To be more exact this means that RCA is calculated for the years 1988 (USSR), 1992–95 using Equation 1 in the following way:

$$(4a) \quad RCA1_jTotal(t) = (X_{ij}^0/X_{Wj}^0) / (X_{it}^0/X_{Wt}^0)$$

$$(4b) \quad RCA1_jTotal(m) = (X_{ij}^0/X_{Wj}^0) / (X_{im}^0/X_{Wm}^0)$$

$$(5a) \quad RCA1_jCEE(t) = (X_{ij}^0/X_{CEEj}^0) / (X_{it}^0/X_{CEEt}^0)$$

$$(5b) \quad RCA1_jCEE(m) = (X_{ij}^0/X_{CEEj}^0) / (X_{im}^0/X_{CEEm}^0)$$

where subscript  $t$  and  $m$  indicates total trade and total manufacturing trade respectively<sup>20</sup>. Further more, in Equation 4a and 4b the subscript  $W$  represents total exports to the EU from non-EU countries. Equally in Equation 5a and 5b the subscript CEE designates total CEE exports to the EU. Equally, RCA2 is calculated according to total trade and manufacturing trade respectively. However, as the latter is constructed from domestic export and import data only, no distinction between World and CEE trade can be made.

#### 4.2.2 Russia's RCA

Appendix II displays the top 30 commodities according to the export RCA for the years 1988, 1992 and 1995, for total trade, and Appendix III the equivalent for trade in manufactures (SITC 5–8). Not surprisingly the majority of the top commodities in Appendix II are minerals and raw materials. About half of the top commodities in

<sup>19</sup> CEE is composed by Estonia, Latvia, Lithuania, Poland, Czech Republic, Slovak Republic, Hungary, Bulgaria, Romania, Slovenia, Russia, Ukraine, Belarus, and Kazakhstan

<sup>20</sup> I.e. total trade being SITC 0–9 and total manufacturing trade SITC 5–8.

Appendix II are classified as manufactured goods. However, as such they are of a very basic nature e.g. radioactive material, refined nickel, semi-finished products of iron and steel, etc. Interestingly in 1988 the most competitive product for the USSR was natural gas, as was the case for Russia in 1992. Nevertheless, by 1995 uranium, which was not even among the top 30 products until 1993,<sup>21</sup> had become the most competitive commodity when using Balassa's export specialisation index (RCA1) as a measure. This development can partly be explained by the anxiety of Western Europe and the United States, and efforts to prevent Russian uranium from ending up in the wrong hands, resulting in a dramatic increase in imports of uranium from Russia. However, it is also likely that some EU countries have changed the policy of reporting trade in uranium.

Calculating RCA with reference to total exports to the EU by CEE countries seems to indicate an increase in the competitiveness of Russia's export of raw materials and minerals whereas manufactured goods now only account for about a third of the top 30 commodities. In other words it tends to show that other CEE countries are better equipped to export goods classified in SITC 5–8 to the EU.

Table 6 shows the number of commodities of the 270 in the years 1988, 1992–95 in which  $RCA > 1$ . After an initial drop in 1992 compared to 1988 to 33 and 30 goods for RCA with respect to total trade and to CEE trade respectively, the number of commodities with an RCA above unity has increased reaching 49 and 51 goods in 1995, which is still significantly above the 1988 level. Thus an indication that Russia's RCA is spreading; an encouraging sign indeed.

The number of commodities of the 170 3-digit SITC manufactured goods which came out with  $RCA > 1$  have remained more or less constant with respect to total export of manufactured goods to the EU, while there has been a slight decline for Russia when calculated on the basis of CEE export of manufactured goods to the EU.

When analysing the characteristics of Russia's manufacturing trade with the EU, the picture is somewhat different. Initially there is no surprise.

The top 30 commodities are dominated more or less exclusively by goods derived from SITC 5 (chemicals) and 6 (manufactured goods classified chiefly by material). In terms of the former, basic chemicals and radioactive material are dominating Russia's top 30 commodities, while the top goods from SITC 6 are mainly low processed raw materials and manufactured goods. When RCA is calculated with respect to total CEE export to the EU it is clear from Table 6 that, although a larger proportion of these top commodities originate from category 7 (machinery and transport equipment) and 8 (miscellaneous manufactured articles), i.e. manufactured goods of a more processed nature, the presence of such goods among the top 30 has fallen from 10 in 1988 (for the Soviet Union), 8 in 1992, and by 1995 only 4 of the top 30 commodities belong to these two categories. Increasingly, Russia seems to have become more dependent on minerals and raw material on one hand and basic, unprocessed manufactured goods on the other.

A similar picture emerges when using RCA2, although the properties of Equation 2 are such that Russia appears to have a RCA in a larger number of commodities compared to when the formula for RCA1 is used. Table 7, depicting the trend in RCA2, shows an increase in 1992–95 of overall trade with the EU from 70 to 85 commodities, while for manufacturing trade the result has been a small decline from 49 to 47.

So far these indicators have confirmed Russia's (revealed) comparative advantage using observed trade flows. It cannot be emphasised enough that these measures alone are insufficient to give a clear indication of Russia's long-term comparative advantage. In the transition current trade flows will be affected by the "normalization" of trade and the ongoing restructuring of the real economy. Thus, the RCA measures may support some evidence of this. In Table 8 the number of commodities that went from having  $RCA1 < 1$  in 1992 to  $RCA1 > 1$  in 1995 (and vice versa) are displayed. The figures in brackets represent the number of commodities that went from having  $RCA1 < 1$  in 1988 to  $RCA1 > 1$  in 1995 and vice versa). Total trade has experienced a net gain, i.e. a higher number of commodities have gained RCA. This trend can partly be explained by privatisation and restructuring. The fact that the bulk of such activities have been concentrated to minerals, raw material, and heavy industrial sectors also ex-

<sup>21</sup> In 1992, according to COMEXT, no uranium was imported to the EU from Russia.

Table 6 Number of commodities with RCA &gt; 1 for Russia in its trade with the EU

	1988*	1992	1993	1994	1995
RCA1. Total Trade	35	33	37	38	49
RCA1. Total Manufacturing Trade	30	31	34	31	32
RCA1. CEE Trade (total)	36	30	40	46	51
RCA1. CEE Manufacturing Trade	38	35	41	35	35

\*Soviet Union trade.

Table 7 Number of commodities with positive RCA2 for Russia in its trade with the EU

	1988*	1992	1993	1994	1995
RCA2. Total Trade	79	70	76	78	85
RCA2. Total Manufacturing Trade	50	49	53	49	47

\*Soviet Union trade.

plains why the gains have been concentrated to these sectors (SITC 2–6). Nevertheless, restructuring of the Russian industry has been limited compared to the pace of privatisation, and one may therefore assume that further restructuring will lead to further gains.

For manufactured goods trade the trend is different. The gains in manufactures' RCA are more or less the same as the losses. In the broader definition of manufacturing (SITC 5–8) Russia reveals a high degree of RCA in goods such as non-ferrous metals like aluminium and zinc, and in ferrous metals (see Appendix III). In addition, Russia is successful in exporting certain chemical products which, according to Leamer goods classification, are high skills industries. Light manufacturing and consumer goods exports (SITC 7 and 8), on the other hand, not only continue to reveal Russia's comparative disadvantage in its trade of these commodities, but the trend is deteriorating. In 1992 Balassa's export specialisation index (RCA1) reveals six commodities in RCA1 (Total) and eight commodities in RCA1 (CEE) among the top 30 stemming from SITC 7 and 8. By 1995 there are no SITC 7 and 8 goods among

the top 30 for RCA1 (Total) and only four in RCA (CEE). As for RCA2, there is an increase from two to four: However, the properties of Equation 2 also means that these four shows up as the top commodities in 1995 (see Appendix II).

The losses of RCA are concentrated to the more processed and sophisticated manufacture-producing sectors. Unfortunately the quality and standard of Russian manufactures do not meet EU requirements and therefore have difficulty competing with similar products from other parts of the world, including other Central and East European countries. This is one reason behind the lack of investment interest, and therefore restructuring, of these sectors in Russia.

Concerning Russia's manufacturing exports to the EU in relation to total CEE's export, almost 70 percent as many manufactured goods gained RCA, and twice as many lost RCA between 1988–95 compared to 1992–95. Again, the gains appear in SITC 5 and 6, and the losses in SITC 7 and 8. Part of the explanation for this lies in the break-up of the USSR. When the Baltic states became independent, the more productive parts of the FSU's manufacturing industry went with them. Equally,



the substantial difference in loss of RCA in 1988–95 compared to 1992–95, using RCA2 for total trade, can partly be explained this phenomenon. Most of the 25 commodities turning from a positive to a negative RCA in the years 1988–92 were foodstuffs, animal products and basic textiles, i.e. commodities that are currently produced in Ukraine and Belarus. Having said that, the explanatory value of using 1988 and the USSR data as part of the comparison is not completely adequate, and should be treated with some caution.

In another attempt to evaluate the degree of restructuring undertaken by Russia in its trade with the EU, Spearman's rank correlation has been calculated for exports and imports, comparing 1995 with 1992. The very strong correlation of 0.81 for exports and 0.75 for imports can be interpreted as indicating the lack of restructuring in Russia's industry. In other words, by ranking trade by 3-digit SITC according to size of exports and imports in ECU, does not reveal any significant change in 1995 compared to 1992. Such coefficient would be much lower if applied on Central and Eastern Europe where significant restructuring has accompanied trade reorientation. Equally, rank correlation for RCA bear similar results (see Table 9). The interpretation of the latter is that commodities revealing a comparative advantage/disadvantage in 1995 are much the same as in 1992. Although this is not surprising for total trade, as Russia will remain competitive in oil, gas, and raw materials for some time, the lack of restructuring in Russia's manufacturing trade is more worrying. There is no sign that Russia will see a major increase manufacturing exports. Without foreign direct investments (FDI) and restructuring in this sector the current situation will remain for some time. FDI into manufacturing so far has been concentrated to activities related to the domestic market rather than export activities.

As already mentioned, several versions of RCA formulas exists, and as has been shown here the result will differ depending on which formula one chooses. The correlation between RCA1 and RCA2 is presented in Table 10. A significant and positive correlation does exist between the different measurements of RCA used in this study. Further more, the correlation has been increasing. One possible explanation is that the distortions from using a formula with an import component fade with trade liberalization. Thus indicating that,

given trade liberalization, the choice of RCA definition becomes less important over time.

### 4.3 Intra-Industry Trade

Whereas traditional trade theory focuses on trade in different commodities as countries are assumed to have different factor endowments, Balassa in 1975 found that trade within the EEC increasingly was an exchange of similar goods. Equally Grubel and Lloyd (1975) estimated that 71 percent of the increase in trade 1959–67 between the EEC members was intra-industry trade.

According to traditional trade theory, trade is determined by differences in factor endowments between countries, hence trade will occur in different products and industries, whereas increased specialisation, imperfect competition, and economies of scale lead to intra-industry trade being predominant between countries of similar structure and factor endowments. From this argument it follows that trade between Russia and the EU should be mainly inter-industry trade. Nevertheless, over time intra-industry trade should increase and eventually dominate. In fact the experience from Central European countries is that export growth and rapid reorientation of trade has been associated with an increase in the level of intra-industry trade (Hoekman and Djankov, 1996). A distinction can be made of horizontal versus vertical intra-industry trade. Whereas the theory tends to concentrate on horizontal intra-industry trade, i.e. trade in commodities with similar input structure and of similar quality, vertical intra-industry trade does not necessarily have to rely on imperfect competition and economies of scale. Vertical intra-industry trade is the result of vertical specialization and/or vertical product differentiation. This manifests itself in Russia and other CEE countries exporting and importing similar goods of different quality. To measure the degree of intra-industry trade in Russian-EU trade the Grubel-Lloyd index has been used:

$$B_i = \{ 1 - [ |X_i - M_i| / (X_i + M_i) ] \} \times 100$$

where B is the Grubel-Lloyd coefficient and i the industry of commodity for which it is calculated.

Table 8 Changes in specialisation and RCA\*

	RCA92 < 1: RCA95 > 1	RCA92 > 1: RCA95 < 1
RCA1 Total Trade	22(25)	5(9)
RCA1 Tot. Manufact. Trade	11(13)	10(11)
RCA1 CEE Total	27(25)	6(10)
RCA1 CEE Manufacturing	9(15)	9(18)
RCA2** total	28(31)	12(25)
RCA2 manufacturing	15(18)	17(21)

\* Within brackets RCA88 < 1: RCA95 > 1 and RCA88 > 1: RCA95 < 1 respectively.

\*\* For RCA2 the number given is indicating RCA92 < 0: RCA95 > 0 and RCA92 > 0: RCA95 < 0.

Table 9 Spearman's Rank Correlation of Revealed Comparative Advantage

	Total trade	Manufacturing trade
RCA1(t) 92-95	0.75 N(252)	0.76 N(166)
RCA1(cee) 92-95	0.71 N(252)	0.70 N(166)
RCA2 92-95	0.78 N(257)	0.75 N(166)

Table 10 Correlation between RCA1 and RCA2

	1988	1992	1993	1994	1995
RCA1 CEE(t) - RCA2(t)	0.66	0.63	0.7	0.72	0.71
RCA1 TOTAL(t) - RCA2(t)	0.50	0.41	0.49	0.57	0.60
RCA1 CEE(m) - RCA2(m)	0.61	0.59	0.68	0.67	0.69
RCA1 TOTAL(m) - RCA2(m)	0.51	0.62	0.57	0.58	0.61

Table 11 Weighted Grubel-Lloyd coefficients for Russian-EU trade

SITC	1988	1992	1993	1994	1995
0	9.89	2.68	3.75	7.73	8.55
1	58.83	10.84	5.11	4.85	4.73
2	8.95	3.64	4.76	5.38	5.99
3	1.23	0.59	0.96	1.19	1.00
4	24.79	1.00	10.13	24.38	3.21
5	26.34	19.46	21.13	16.98	13.32
6	7.55	23.91	17.34	11.71	13.21
7	7.21	19.23	14.73	15.62	15.60
8	12.61	19.01	21.60	17.55	18.92

It measures the value of total trade minus the value of total import of the difference, regardless of sign, of exports and imports as a percentage share of the value of total trade, calculated for the respective industry or commodity. If  $B_i = 100$  then this signifies complete intra-industry trade, whereas  $B_i=0$  indicates complete inter-industry trade.

Calculated on the basis of 3-digit SITC, Table 11 presents weighted Grubel-Lloyd coefficients for SITC 0–8 for the years 1988<sup>22</sup> and 1992–95.

Intra-industry trade within OECD countries has been increasing since the 1970s (OECD 1994). Equally, intra-industry trade between Central European countries and the EU has seen the same development since the collapse of CMEA. For Russia, on the other hand, the figures in Table 11 show extremely low levels of intra-industry trade in its trade with EU. Although this may not be surprising as gas and oil producing countries tend to have different composition in exports and imports. Nevertheless what is surprising, especially for manufacturing trade, is that there has been no sign of an increase in the level of intra-industry trade. In fact for SITC 5–8 the 1995 Grubel-Lloyd coefficient is lower than that of 1992. Again, part of the explanation is the lack of restructuring in Russian industry. And although further research into the characteristics of present intra-industry trade is needed, the first indications are that this is predominantly vertical intra-industry trade. The coefficients for SITC 0–4 remains low, and this situation is likely to continue as Russia is expected to remain a significant net-

exporter of raw materials and minerals and a net-importer of foodstuffs, preserving mainly a Heckscher-Ohlin trade pattern with the EU. However, it is interesting to note that the Grubel-Lloyd indicators for SITC 0 and 2 have increased 1992–95. As can be seen from Table 11 there has been a huge fall in the Grubel-Lloyd coefficient for SITC 1 between 1988–1992, from 58.8 to 10.8, and since then it has fallen further, reaching 4.7 in 1995. On 3-digit level SITC 1 is made up of only four commodities of which in 1988 SITC 112 (alcoholic beverages) made up 87.5 percent. Also, there was a significant degree of intra-industry trade taking place in SITC 112 between USSR and the EU with a Grubel-Lloyd coefficient of 67.1. However in 1992 SITC 112 accounted for 53 percent of trade in SITC 4 and the Grubel-Lloyd indicator had fallen to only 20.4 as imports from the EU of mainly French wine increased more rapidly than the exports of Russian alcoholic beverages. And this is also the explanation for the continued downward trend in intra-industry trade in SITC 4 as imports of alcoholic beverages produced in the EU has increased dramatically. Equally, the inconsistency in SITC 4 over the studied period is explained by the fact that, as SITC 1, on 3-digit level SITC 4 is also made up of merely four commodities, and therefore the impact of a change in either the weight or the Grubel-Lloyd coefficient of any of these four commodities will influence the aggregate.

As when constructing RCA indices, Grubel-Lloyd indicators require a certain degree of desegregation of data in order to enable functional conclusions to be drawn. For example calculations

<sup>22</sup> USSR-EU trade.

on 1 or 2-digit SITC would give a higher degree (higher Grubel-Lloyd coefficient) of intra-industry trade, especially for SITC 5 (chemicals). A lower coefficient at a higher desegregated level indicates that Russia is exporting low quality chemicals while importing high quality chemicals. In relation to new goods traded, the increase in product coverage has not been associated with increase in intra-industry trade.

## 5 Conclusions

This paper has examined the pattern of revealed comparative advantage of Russia in its trade with the EU at 3-digit SITC level of aggregation, using two approaches; the Balassa export specialisation index, and an index based on import-export ratios. Furthermore, the author has tried to evaluate the development of trade in Russia by analysing commodities traded at 5-digit SITC level.

Russian exports are showing a healthy development in terms of a broader variety of goods being traded in 1995 compared to 1992. In 1995 EUROSTAT recorded EU imports from Russia in 66 percent of total SITC classification, up from 50 percent in 1992. The findings show, not surprisingly, that Russia reveals a comparative advantage in primary products and that there is no sign of change in terms of manufacturing export, which is still suffering from being unsalable on Western markets due to weakness in quality. Rank correlations also show that few changes have taken place during 1992–95, demonstrating the consequences for trade of the lack of restructuring of Russia's industry. These findings can be explained by the legacy of central planning and the high dependency on primary goods production. The real appreciation of the ruble has also contributed to creating

the obstacles for Russian manufacturing sector. There are, however, in the broader definition of manufacturing, goods in which Russia reveals a high degree of RCA, such as non-ferrous metals like aluminium and zinc, and ferrous metals i.e. iron and steel. These are capital intensive industries employing large amounts of unskilled labour. In addition, Russia is successful in exporting certain chemical products which, according to Leamer goods classification, are high skills industries. However, the position of light manufacturing and consumer goods exports seems to be deteriorating, and there are no signs of improvements.

Assessing the level of intra-industry trade, Russia displayed very low Grubel-Lloyd coefficients. In fact for the manufacturing sectors, the sectors where one would expect to find more trade within industries, and indeed where Russia demonstrates a higher level of intra-industry trade, Russia's increase in trade with the EU 1992–95 has been associated with a modest fall in intra-industry trade. This is the opposite pattern from that of the experience of CEE where reorientation of trade and growth in export has been associated with high level of growth in intra-industry trade.

This study has shown that there are no clear signs of changes to the structure of foreign trade between Russia and the EU, and this is especially true for Russian exports. Accordingly Russia will remain dependent on export of minerals and raw materials for a foreseeable future. However with increased prospect for economic growth and with a possibility of a debt servicing problem in the near future, keeping a significant trade surplus may become more difficult. And to attain and continue substantial growth in future exports will also require large amounts of capital investments to update technology; investments currently imperceptible.

## Appendix I

### SITC classification

- 0 Food and live animals
- 1 Beverages and tobacco
- 2 Crud materials, inedible, except fuel
- 3 Mineral fuels, lubricants and related materials
- 4 Animal and vegetable oils and fats
- 5 Chemicals
- 6 Manufactured goods classified chiefly by material
- 7 Machinery and transport equipment
- 8 Miscellaneous manufactured articles
- 9 Commodities and transactions not classified elsewhere in SITC

## Appendix II

Ranking of the Top 30 Commodities According to Revealed Comparative Advantages in Soviet Union Trade with the EU 1988.

RANK	SITC	RCA1TOT	SITC	RCA1CEE	SITC	RCA2
		Commodity		Commodity		Commodity
1	343	Natural gas	284	Nickel ore	333	Crude oil and petroleum
2	683	Nickel, refined	281	Iron ore	321	Coal
3	334	Refined oil products	525	Radioactive materials	284	Nikel
4	282	Ferrous and wase scrap	667	Pearls and precious stones	281	Iron ore
5	525	Radioactive materials	333	Crude oil and petroleum	272	Fertilizers, crude
6	335	Residual petroleum products	683	Nickel, refined	281	Iron ore
7	322	Briquettes, Lignite adn peat	263	Cotton	351	Electric current
8	263	Cotton	261	Silk	289	Ores & concentr. of precious metals
9	672	Semi-finished prod. of iron & steel	211	Hides and skins	223	Oil-seeds and oleaginous fruits
10	212	Furskins	O37	Fish, crustaceans, etc.	325	Coke and semi-coke of coal
11	245	Fuel wood	272	Fertilizers, crude	343	Natural gas
12	333	Crude oil and petroleum	343	Natural gas	667	Pearls and precious stones
13	667	Pearls and precious stones	351	Electric curret	411	Animal oils and fats
14	248	Wood, simple worked	212	Furskins	282	Ferrous and wase scrap
15	211	Hides and skins	334	Refined oil products	288	Non-ferrous base metals waste
16	342	Liquified propane and butane	689	Miscell. non-ferrous metal based	342	Liquified propane and butane
17	677	Rail and railway track	268	Wool	322	Briquettes, Lignite adn peat
18	512	Alcohols	714	Engine and motors	248	Wood, simple worked
19	511	Hydrocarbons	282	Ferrous waste and scrap	681	Silver and platinum
20	232	Synthetic rubber	342	Liquified propane and butane	689	Miscell. non-ferrous metal based
21	671	Pig-iron	687	Tin, alloyed	683	Nickel, refined
22	524	Other inorganic chemicals	871	Optical instruments	246	Wood chips and wood waste
23	689	Miscell. non-ferrous metal based	335	Residual petroleum products	211	Hides and skins
24	613	Furskins; tanned or dressed	O72	Cocoa	247	Wood; roughly squared
25	681	Silver and platinum	251	Pulp and waste paper	268	Wool
26	891	Arms and ammunition	248	Wood, simple worked	613	Furskins; tanned or dressed
27	112	Alcoholic beverages	885	Watches and clocks	O59	Fruit and vegetable juices
28	562	Fertilizers (other than group 272)	287	Ores & concentrates of base metals	291	Crude animal materials
29	246	Wood chips and wood waste	672	Semi-finished prod. of iron & steel	O36	Crustaceans, etc.
30	O37	Fish, crustaceans, etc.	681	Silver and platinum	251	Pulp and waste paper

Ranking of the Top 30 Commodities According to Revealed Comparative Advantages in Russia's Trade with the EU 1992.

RANK	RCA1TOT		RCA1CEE		RCA2	
	SITC	Commodity	SITC	Commodity	SITC	Commodity
1	343	Natural gas	343	Natural gas	333	Crude oil and petroleum
2	334	Refined oil products	667	Pearls and precious stones	343	Natural gas
3	683	Nickel, refined	525	Radioactive materials	321	Coal
4	288	Non-ferrous base metals waste	283	Copper ores	281	Iron ore
5	525	Radioactive materials	333	Crude oil and petroleum	325	Coke and semi-coke of coal
6	684	Aluminium	272	Fertilizers, crude	245	Fuel wood
7	673	Flat-rolled prod. of iron and steel	263	Cotton	284	Nickel ore
8	263	Cotton	683	Nickel, refined	261	Silk
9	562	Fertilizers (other than group 272)	261	Silk	265	Vegetable textile fibres
10	333	Crude oil and petroleum	O36	Crustaceans, etc.	322	Briquettes, Lignite adn peat
11	686	Zinc	684	Aluminium	342	Liquified propane and butane
12	335	Residual petroleum products	284	Nickel ore	251	Pulp and waste paper
13	682	Copper, refined	334	Refined oil products	263	Cotton
14	667	Pearls and precious stones	681	Silver and platinum	689	Miscell. non-ferrous metal based
15	282	Ferrous waste and scrap	281	Iron ore	683	Nickel, refined
16	689	Miscell. non-ferrous metal based	335	Residual petroleum products	667	Pearls and precious stones
17	511	Hydrocarbons	671	Pig-iron	562	Fertilizers (other than group 272)
18	592	Starches	871	Optical instruments	671	Pig-iron
19	671	Pig-iron	O34	Fish, fresh; chilled or frozen	248	Wood, simple worked
20	672	Semi-finished prod. of iron & steel	251	Pulp and waste paper	247	Wood; roughly squared
21	O22	Milk and cream	689	Miscell. non-ferrous metal based	282	Ferrous waste and scrap
22	791	Railway vehicles	792	Aircrafts	212	Furskins
23	211	Hides and skins	O37	Fish, crustaceans, etc.	681	Silver and platinum
24	232	Synthetic rubber	248	Wood, simple worked	525	Radioactive materials
25	O34	Fish, fresh; chilled or frozen	553	Perfume and cosmetic	272	Fertilizers, crude
26	212	Furskins	212	Furskins	682	Copper, refined
27	248	Wood, simple worked	682	Copper, refined	211	Hides and skins
28	681	Silver and platinum	511	Hydrocarbons	672	Semi-finished prod. of iron & steel
29	524	Other inorganic chemicals	524	Other inorganic chemicals	288	Non-ferrous base metals waste
30	522	Inorganic chemicals	686	Zinc	684	Aluminium

Ranking of the Top 30 Commodities According to Revealed Comparative Advantages in Russia's Trade with the EU 1995.

RANK	RCA1TOT		RCA1CEE		RCA2	
	SITC	Commodity	SITC	Commodity	SITC	Commodity
1	286	Uranium	286	Uranium	333	Crude oil and petroleum
2	683	Nickel, refined	343	Natural gas	343	Natural gas
3	343	Natural gas	284	Nickel ore	821	Furniture
4	525	Radioactive materials	525	Radioactive materials	286	Uranium
5	672	Semi-finished prod. of iron & steel	683	Nickel, refined	896	Works of arts
6	274	Sulphur & unroasted iron pyrites	333	Crude oil and petroleum	891	Arms and ammunition
7	344	Petroleum gases	667	Pearls and precious stones	811	Prefabricated buildings
8	334	Refined oil products	272	Fertilizers, crude	281	Iron ore
9	282	Ferrous waste and scrap	261	Silk	247	Wood; roughly squared
10	682	Copper, refined	344	Petroleum gases	282	Ferrous waste and scrap
11	689	Miscell. non-ferrous metal based	281	Iron ore	325	Coke and semi-coke of coal
12	246	Wood chips and wood waste	687	Tin	683	Nickel, refined
13	247	Wood; roughly squared	277	Natural abrasives	272	Fertilizers, crude
14	211	Hides and skins	689	Miscell. non-ferrous metal based	685	Lead
15	288	Non-ferrous base metals waste	036	Crustaceans, etc.	351	Electric current
16	685	Lead	334	Refined oil products	344	Petroleum gases
17	043	Barley; unmilled	035	Fish; dried, smoked, salted, etc.	562	Fertilizers (other than 272)
18	684	Aluminium	792	Aircrafts	274	Sulphur & unroasted iron pyrites
19	686	Zinc	091	Margarine and shortening	321	Coal
20	562	Fertilizers (other than 272)	342	Liquified propane and butane	342	Liquified propane and butane
21	671	Pig-iron	251	Pulp and waste paper	277	Natural abrasives
22	675	Flat-rolled prod. of alloy steel	263	Pulp and waste paper	671	Pig-iron
23	351	Electric current	283	Copper ores	263	Pulp and waste paper
24	673	Flat-rolled products of iron & steel	211	Hides and skins	289	Ores & concentr. of precious metals
25	333	Crude oil and petroleum	672	Semi-finished prod. of iron & steel	268	Wool
26	522	Inorganic chemicals	034	Fish, fresh; chilled or frozen	211	Hides and skins
27	212	Furskins	682	Copper, refined	681	Silver and platinum
28	681	Silver and platinum	684	Aluminium	246	Wood chips and wood waste
29	232	Synthetic rubber	288	Non-ferrous base metals waste	251	Pulp and waste paper
30	511	Hydrocarbons	671	Pig-iron	689	Miscell. non-ferrous metal based

### Appendix III

Ranking of the Top 30 Commodities According to Revealed Comparative Advantages in Soviet Union Trade in Manufacturing with the EU 1988.

RANK	RCA1TOT		RCA1CEE		RCA2	
	SITC	Commodity	SITC	Commodity	SITC	Commodity
1	683	Nickel, refined	525	Radioactive materials	667	Pearls and precious stones
2	525	Radioactive materials	667	Pearls and precious stones	681	Silver and platinum
3	672	Semi-finished prod. of iron & steel	683	Nickel, refined	689	Miscell. non-ferrous metal based
4	667	Pearls and precious stones	689	Miscell. non-ferrous metal based	683	Nickel, refined
5	677	Rail and railway track	714	Engine and motors	613	Furskins; tanned or dressed
6	512	Alcohols	687	Tin, alloyed	524	Other inorganic chemicals
7	511	Hydrocarbons	871	Optical instruments	885	Watches and clocks
8	671	Pig-iron	885	Watches and clocks	677	Rail and railway track
9	524	Other inorganic chemicals	672	Semi-finished prod. of iron & steel	634	Veneers, plywood, etc.
10	689	Miscell. non-ferrous metal based	681	Silver and platinum	781	Cars
11	613	Furskins; tanned or dressed	524	Other inorganic chemicals	671	Pig-iron
12	681	Silver and platinum	671	Pig-iron	562	Fertilizers (other than group 272)
13	891	Arms and ammunition	613	Furskins; tanned or dressed	722	Tractors
14	562	Fertilizers (other than group 272)	512	Alcohols	891	Arms and ammunition
15	682	Copper, refined	532	Dyeing and tanning extracts	672	Semi-finished prod. of iron & steel
16	634	Veneers, plywood, etc.	514	Medicinal & pharmaceutical prod.	897	Jewellery
17	522	Inorganic chemicals	891	Arms and ammunition	684	Aluminium
18	514	Medicinal & pharmaceutical prod.	551	Essential oils and perfume	659	Floor coverings, etc.
19	781	Cars	659	Floor coverings, etc.	652	Cotton fabrics
20	722	Tractors	677	Rail and railway track	682	Copper, refined
21	684	Aluminium	781	Cars	512	Alcohols
22	592	Starches	896	Works of art	761	Televisions and videos
23	532	Dyeing and tanning extracts	522	Inorganic chemicals	775	Household equipment
24	659	Floor coverings, etc.	634	Veneers, plywood, etc.	525	Radioactive materials
25	551	Essential oils and perfume	741	Heating and cooling equipment	511	Hydrocarbons
26	523	Metal salts and peroxysalts	511	Hydrocarbons	821	Furniture
27	673	Flat-rolled prod. of iron and steel	752	Data processing machinery	579	Waste and scrap of plastics
28	775	Household equipment	712	Steam turbines	523	Metal salts and peroxysalts
29	664	Glass	562	Fertilizers (other than group 272)	541	Medicinal and pharmaceutical prod.
30	746	Ball- or roller bearings	682	Copper, refined	785	Motor cycles & bicycles



Ranking of the Top 30 Commodities According to Revealed Comparative Advantages in Russia's Trade in Manufacturing with the EU 1992.

RANK	RCA1TOT		RCA1CEE		RCA2	
	SITC	Commodity	SITC	Commodity	SITC	Commodity
1	683	Nickel, refined	667	Pearls and precious stones	689	Miscell. non-ferrous metal based
2	525	Radioactive materials	525	Radioactive materials	683	Nickel, refined
3	684	Aluminium	683	Nickel, refined	667	Pearls and precious stones
4	673	Flat-rolled prod. of iron and steel	684	Aluminium	562	Fertilizers (other than group 272)
5	562	Fertilizers (other than group 272)	681	Silver and platinum	671	Pig-iron
6	686	Zinc	671	Pig-iron	681	Silver and platinum
7	682	Copper, refined	871	Optical instruments	525	Radioactive materials
8	667	Pearls and precious stones	689	Miscell. non-ferrous metal based	682	Copper, refined
9	689	Miscell. non-ferrous metal based	792	Aircrafts	672	Semi-finished prod. of iron & steel
10	511	Hydrocarbons	553	Perfume and cosmetic	684	Aluminium
11	592	Starches	682	Copper, refined	686	Zinc
12	671	Pig-iron	511	Hydrocarbons	511	Hydrocarbons
13	672	Semi-finished prod. of iron & steel	524	Other inorganic chemicals	522	Inorganic chemicals
14	791	Railway vehicles	686	Zinc	634	Veneers, plywood, etc.
15	681	Silver and platinum	761	Televisions and videos	579	Waste and scrap of plastics
16	524	Other inorganic chemicals	673	Flat-rolled prod. of iron and steel	524	Other inorganic chemicals
17	522	Inorganic chemicals	896	Works of arts	592	Starches
18	512	Alcohols	562	Fertilizers (other than group 272)	883	Cinematographic film
19	781	Cars	781	Cars	541	Medicinal and pharmaceutical prod.
20	613	Furskins; tanned or dressed	675	Flat-rolled prod. of alloy steel	685	Lead
21	693	Wire and fencing products	592	Starches	687	Tin
22	676	Iron and steel bars, rods, etc.	522	Inorganic chemicals	678	Wire of iron or steel
23	891	Arms and ammunition	791	Railway vehicles	676	Iron and steel bars, rods, etc.
24	722	Tractors	512	Alcohols	515	Organo-inorganic compounds
25	634	Veneers, plywood, etc.	672	Semi-finished prod. of iron & steel	661	Cement and construction materials
26	513	Carboxylic acids, etc.	551	Essential oils	652	Cotton fabrics
27	793	Ships and boats	793	Ships and boats	613	Furskins; tanned or dressed
28	611	Leather	541	Medicinal and pharmaceutical prod.	514	Medicinal & pharmaceutical prod.
29	661	Cement and construction materials	883	Cinematographic film	771	Electrical power machinery
30	775	Household equipment	598	Miscellaneous chemical products	513	Carboxylic acids, etc.

Ranking of the Top 30 Commodities According to Revealed Comparative Advantages in Russia's Trade in Manufacturing with the EU 1995.

RANK	RCA1TOT		RCA1CEE		RCA2	
	SITC	Commodity	SITC	Commodity	SITC	Commodity
1	683	Nickel, refined	525	Radioactive materials	821	Furnitures
2	525	Radioactive materials	683	Nickel, refined	896	Works of arts
3	672	Semi-finished prod. of iron & steel	667	Pearls and precious stones	891	Arms and ammunition
4	682	Copper, refined	687	Tin	811	Prefabricated buildings
5	689	Miscell. non-ferrous metal based	689	Miscell. non-ferrous metal based	683	Nickel, refined
6	685	Lead	792	Aircrafts	685	Lead
7	684	Aluminium	672	Semi-finished prod. of iron & steel	562	Fertilizers (other than group 272)
8	686	Zinc	682	Copper, refined	671	Pig-iron
9	562	Fertilizers (other than group 272)	684	Aluminium	681	Silver and platinum
10	671	Pig-iron	671	Pig-iron	689	Miscell. non-ferrous metal based
11	675	Flat-rolled prod. of alloy steel	524	Other inorganic chemicals	682	Copper, refined
12	673	Flat-rolled prod. of iron and steel	685	Lead	686	Zinc
13	522	Inorganic chemicals	681	Silver and platinum	524	Other inorganic chemicals
14	681	Silver and platinum	511	Hydrocarbons	687	Tin
15	511	Hydrocarbons	512	Alcohols	522	Inorganic chemicals
16	524	Other inorganic chemicals	522	Inorganic chemicals	672	Semi-finished prod. of iron & steel
17	592	Starches	686	Zinc	684	Aluminium
18	512	Alcohols	592	Starches	511	Hydrocarbons
19	573	Polymers of vinyl; primary form	675	Flat-rolled prod. of alloy steel	667	Pearls and precious stones
20	634	Veneers, plywood, etc.	871	Optical instruments	525	Radioactive materials
21	678	Wire of iron or steel	562	Fertilizers (other than group 272)	678	Wire of iron or steel
22	571	Polymers of ethylene; primary form	611	Leather	677	Rails or railway truck
23	667	Pearls and precious stones	881	Photographic apparatus	571	Polymers of ethylene; primary form
24	677	Rails or railway truck	896	Works of arts	512	Alcohols
25	676	Iron and steel bars, rods, etc.	598	Miscellaneous chemical products	573	Polymers of vinyl; primary form
26	611	Leather	516	Other organic chemicals	513	Carboxylic acids, etc.
27	687	Tin	634	Veneers, plywood, etc.	676	Iron and steel bars, rods, etc.
28	579	Waste and scrap of plastics	513	Carboxylic acids, etc.	634	Veneers, plywood, etc.
29	513	Carboxylic acids, etc.	597	Additives for mineral oils	515	Organo-inorganic compounds
30	679	Tubes and pipes	571	Polymers of ethylene; primary form	673	Flat-rolled prod. of iron and steel

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