Technological Intensity and Patterns in Slovenian Trade

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Consistently with the OECD classification of manufacturing industries by technology level, we distinguish low technology, medium-low technology, medium-high technology and high technology industries to investigate the interaction between technological intensities of sectors, trade structures, intra- versus inter-industry trade differences, trade advantages, and price competitiveness in Slovenian trade developments between and within industries in the post-independence years since 1992. While industries seem to be rather homogenous in extent of a decline in external trade integration measured by Grubel-Lloyd and marginal intra-industry trade indices and in a presence of relative trade advantages, we found considerable differences in the investigation of trade structures and trade quality differences using the ratio of export to import unit values. In exports we confirmed the climbing up technological development approach, including the jump-up in the medium-high technology industries in the non-EU-15 markets. The medium-low and the medium-high technology industries experienced greater price competitiveness in trade with the EU-15 countries. The high-technology industries and to a lesser extent the low-technology industries experienced greater competitiveness in the EU-15 internal and external trade. These similarities and differences imply implications for industries with different technological intensity, which are associated with trade and policy shifts before and after the accession of Slovenia in the EU.

INTRODUCTION

One of the key issues in trade theory and trade analysis are patterns in trade specialization suggesting that developed countries would specialize in more advanced medium-high-technology and high-technology industries, while emerging and developing countries in lower-technology industries (e.g. Krugman 1986; Barro and Sala-i-Martin 1995; Laursen 2000). Considering literature from a dynamic view in economic development and trade patterns, Stehrer and Wörz (2003) distinguish three types of technological catching-up processes: a continuous-convergence

approach equally rapid in all industries; a climbing-up-the-ladder approach with catch-up first in low-technology industries and then in medium-low-technology industries, and so on; and a jumping-up approach with first catch up in high-technology or fast-growing industries when a higher learning potential in these fast growing sectors is available.

Different concepts and a classification of products and activities are used in the empirical analysis of trade by technological intensities. Murn and Kmet (2002) analysed structures of Slovenian exports by UNCTAD product classification according to factors contents. They found a greater and increasing share of products by human capital and technological intensity but a reduction in natural resource based products and low-qualified labour intensive products. According to Rojec at al. (2004) this recording of favourable patterns seems to be less optimistic when these developments are compared with some previous EU-15 members, such as Finland and Ireland, and some new EU members, such as the Czech Republic and Hungary.

Our results are based on Slovenian merchandise trade patterns by technological intensity which are obtained on the basis of the methodology presented in Bojnec and Novak (2005). Some more detailed results are also presented in Bojnec and Novak (2004). However, most disaggregated results are available from the authors. In the case of trade structures we compare our results with Stehrer and Wörz (2003) for four groups of countries: the United States of America (USA), OECD North (without the USA, but including Australia, Austria, Canada, Denmark, Finland, France, Germany-western, Italy, Japan, the Netherlands, New Zealand, Norway, Sweden, and the United Kingdom), OECD South (Greece, Portugal, Spain, and Iceland), and East Asian countries (Hong Kong, Indonesia, the Republic of Korea, Malaysia, Singapore, and Thailand). The comparison is possible because we use the same classification of industries by technological intensities as Stehrer and Wörz (2003), namely the OECD classification of manufacturing industries by technology level: low technology, medium-low technology, medium-high technology and high technology industries (see also Hatzichronoglou 1997).

In this paper we present patterns in Slovenian merchandise trade by four main activities of technological intensity according to four analysed groups of trade indicators: export-import structures, development of intra-industry trade, development of comparative trade advantages, and international price competitiveness. Primary analyses are conducted using the 8-digit Combined Nomenclature (CN) classification on the ba-

sis of trade data obtained from the Statistical Office of the Republic of Slovenia (SORS) for total Slovenian trade and on the basis of the Comext CD-ROM data obtained from the Statistical Office of the European Community (EUROSTAT) for trade between Slovenia and the EU-15 countries as well as for all internal and external EU-15 trade. The focus of the analysis and our presentation is on post-independence Slovenia (1991 onwards) and its merchandise trade developments focusing on characteristics in technological convergence and trade patterns.

TRADE STRUCTURES BY TECHNOLOGICAL INTENSITIES

The medium-high technology products are the most important item in the Slovenian export trade structures (table 1). Their share is increasing, while the share of low-technology products is declining. This clearly suggests that the induced quality improvements are consistent with the *jumping-up* approach from the low-technology products to the medium-high technology products. The share of the medium-low technology products is more stable and represents around one-fifth of merchandise exports. The share of the high-technology exports is increasing, although is still less than 7.2%. The medium-high technology industries are the most important item in the Slovenian import structures, but their increase is lower than that of the export structures. The low-technology products are less important in imports than in exports, but their export and import structures tend to converge to reach around one-fourth of trade. The high-technology products and the medium-low technology products are relatively more important in imports than in exports.

The Slovenian export share of the low-technology industries is higher than that of the USA and East Asian countries, but lower than that of the North- and South-OECD countries (table 2). With further increases in Slovenian real wages, it is more likely that their export shares will decline further.

The relative importance of the medium-low technology industries in Slovenian trade structures is greater than in the USA. In these industries, Slovenian import structures explore similar patterns as the North OECD countries, while Slovenian export shares are lower than those of the North-OECD countries. The South OECD countries and East Asian countries experience greater import and export shares in medium-low technology industries than Slovenia.

The medium-high technology industries play a crucial role in the Slovenian merchandise trade. Their export share is approaching the level

TABLE 1 Slovenian trade structures (%)

	1992	1996	1997	1998	1999	2000	2001	2002
Export structure								
High technology	5.73	6.39	6.00	6.94	6.07	7.11	6.87	7.11
Medium-high	34.06	36.35	42.60	43.27	43.38	42.58	43.69	44.15
Medium-low	19.74	22.83	19.60	20.17	20.27	20.85	20.16	20.82
Low technology	40.47	34.43	31.80	29.62	30.29	29.46	29.28	27.93
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Import structure								
High technology	6.45	9.37	9.00	9.11	9.34	9.69	8.29	8.71
Medium-high	34.14	39.01	39.99	39.96	40.19	42.32	40.38	40.90
Medium-low	29.54	25.19	25.26	24.68	24.84	27.57	26.23	25.85
Low technology	29.88	26.43	25.74	26.25	25.63	20.42	25.10	24.55
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Source: Own calculations on the basis of data from SORS.

of the USA, where it is declining due to an increasing role of the high-technology industries. The similarity with the USA is also evident from import shares of the medium-high technology industries. The Slovenian export share of the medium-high technology industries *catch up* the North OECD countries and it is greater than that of the South OECD countries and the East Asian countries. In Slovenia the import shares of the medium-high technology industries are greater than those of the North OECD countries, the South OECD countries, and the East Asian countries.

Considerable differences across countries are recorded for trade patterns in the high-technology industries. The high-technology industries in Slovenia are still much less important in trade than in the USA and East Asian countries. There are therefore considerable differences between the USA, East Asia and Europe. The latter is lagging behind. Slovenian export share in the high-technology products is greater than that of the North OECD countries and similar to the South OECD countries. The latter experience higher import shares than Slovenia, while shares of the North OECD countries are lower than those of Slovenia.

SLOVENIAN TRADE STRUCTURES WITH THE EU-15 MARKETS

After Slovenian independence, the EU-15 markets have been the most important destination for Slovenian exports and the origin of its im-

TABLE 2 Trade structures and patterns (%)

	USA		OECD North		OECD South		East Asia	
	1981	1997	1981	1997	1981	1997	1981	1997
Export structure								
High technology	21.14	28.23	4.06	3.22	3.90	6.99*	15.72	29.38
Medium-high	49.73	46.08	28.55	34.97	27.15	12.88	17.86	24.91
Medium-low	13.71	11.88	34.27	29.66	35.19	41.00	32.70	23.94
Low technology	15.42	13.81	33.12	32.15	33.76	46.12	33.72	21.77
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Import structure								
High technology	12.37	23.74	6.47	4.34	10.35	12.55*	11.29	15.46
Medium-high	36.16	38.77	31.27	30.15	43.73	24.69	38.58	32.52
Medium-low	28.41	17.68	29.38	27.29	25.83	32.28	22.77	29.74
Low technology	23.06	19.81	32.43	38.22	20.09	43.03	27.36	22.28
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

* Data for 1992. Source: Stehrer and Wörz (2003). Note: USA – the United States of America. OECD North: Australia, Austria, Canada, Denmark, Finland, France, Germany-west, Italy, Japan, the Netherlands, New Zealand, Norway, Sweden, and the United Kingdom. OECD South: Greece, Portugal, Spain, and Iceland. East Asia: Hong Kong, Indonesia, the Republic of Korea, Malaysia, Singapore, and Thailand.

ports with around two-thirds of its merchandise exports flowing to the EU-15 markets, and even a bit more from those to the Slovenian markets. As shown in table 3, the medium-high technology industries are the most important item in the Slovenian exports to the EU-15 markets, but with a slight decline in the export share, which has been observed since 1994. This declining tendency in Slovenian export shares to the EU-15 markets differ from general Slovenian export trade patterns, suggesting that Slovenia has been facing a considerable competitive pressure on these products at the EU-15 markets and less at other markets. The initial Slovenian advantages at the EU-15 markets have deteriorated over time. The declining tendency in Slovenian export shares to the EU-15 markets is also observed for the low-technology industries, which seems to be caused by increasing Slovenian wages reducing cost-competitiveness and increasing competitive pressures at the EU-15 markets from emerging regional or world market competitors. A tendency towards continuous technological catch-up is confirmed for the high technology industries, although at a relatively lower level, and for the medium-low technology

TABLE 3 Slovenian trade structures with EU-15 (%)

	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Export structure										
High technology	7.6	7.6	9.1	9.0	8.6	9.2	11.2	11.9	11.6	12.9
Medium-high	48.4	48.4	46.6	45.2	44.7	45.1	44.9	43.0	44.4	43.5
Medium-low	16.9	17.9	18.4	20.3	22.4	23.1	22.8	24.4	23.3	23.1
Low technology	27.2	26.2	25.9	25.5	24.3	22.6	21.1	20.7	20.8	20.5
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Import structure										
High technology	5.3	5.4	5.1	8.4	4.7	4.9	5.3	6.9	5.7	7.1
Medium-high	34.7	37.6	39.4	39.9	42.0	46.3	45.4	45.0	46.1	48.1
Medium-low	18.1	19.2	20.6	19.5	20.7	19.6	20.4	21.2	22.0	21.0
Low technology	42.0	37.8	34.9	32.2	32.6	29.1	28.8	26.9	26.2	23.7
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Source: Own calculations on the basis of data from Eurostat Comtext CD-ROM (2004).

industries. These two export shifts from the low-technology industries to the medium-low technology industries and from the medium-high technology industries to the high technology industries could be referred as the *climbing up approach* in the Slovenian exports to the EU-15 markets.

As far as the Slovenian import from the EU-15 markets is concerned, there is a continuous decline in the low-technology imports, but a slight increase in the medium-low and high-technology industries, and a considerable increase in the medium-high technology imports.

INTRA-INDUSTRY TRADE

Slovenian trade is dominated by intra-industry trade (table 4). This is expected to increase over time due to the economic growth and trade liberalization. This tendency is not clearly confirmed by our results. The evidence indicates some instabilities and even a declining tendency in the Grubel-Lloyd GLIIT indices for degree of intra-industry trade suggesting persistence of some bottlenecks reducing the degree of external trade integration. However, the majority of trade flows remain of intra-industry type.

Our results for Slovenia on intra-industry trade are a bit more consistent with theory in the case of its trade with the EU-15 (table 5). In 1993, at least 80% of Slovenian trade flows were characterized by the intra-industry type suggesting that similar products were exported and im-

TABLE 4 GLIIT index for Slovenian trade (%)

	1992	1996	1997	1998	1999	2000	2001	2002
High technology	70.3	64.0	91.2	68.1	92.2	82.2	78.0	76.8
Medium-high	92.6	74.2	68.8	72.1	67.9	97.8	65.7	64.0
Medium-low	87.4	82.9	83.8	83.6	81.0	83.7	81.5	77.4
Low technology	77.7	94.5	62.3	92.9	63.9	84.3	62.4	61.8

Source: Own calculations on the basis of data from SORS.

ported at the same time. Since then, two diverging patterns have been observed. First, there was an increasing tendency toward intra-industry trade for the low-technology industries (particularly between 1993 and 1997) and for medium-high technology industries. These industries were heavily integrated with the EU-15. Second, there was a declining tendency toward intra-industry trade for the medium-low technology industries and the high-technology industries, which is inconsistent with the Slovenian efforts for a greater integration with the EU-15 markets. More likely it resulted from the prevalence of export in the case of the medium-low technology industries and the prevalence of import in the case of the high technology industries.

For a comparison we also present GLIIT indices for both the internal and the external EU-15 trade. The internal trade between the EU-15 countries is exclusively of intra-industry type. The intra-industry trade component contains more than 95% of trade flows. This holds true for main technological groups and for single analysed years suggesting that the borderless single EU market leads to the export and import of similar products at the same time. The external EU-15 trade with the rest of the world indicates an increasing tendency in the already relatively high degree of intra-industry trade for the low-technology, the medium-low technology, and the high-technology industries. In the case of the medium-low technology industry, the intra-industry trade is also prevailing but at a lower degree (around 70%). Thus, the evidence for the EU-15 suggests that the prevalence and a further increase in the intra-industry trade are consistent with theoretical expectations that economic growth and trade liberalization are pushing up the degree of intra-industry trade.

The marginal intra-industry trade (MIIT) index measures the degree of intra-industry trade in trade changes over a certain period of time. It is confirmed again that there is a prevalence of intra-industry trade, which

TABLE 5 GLIIT index (%)

	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Slovenian trade with the EU-15										
High technology	80.0	81.4	65.2	64.0	59.4	60.2	55.3	62.8	56.2	61.6
Medium-high	81.8	85.5	84.4	86.1	84.0	90.4	89.3	90.5	90.5	94.3
Medium-low	98.5	98.5	98.4	90.4	83.0	81.2	83.4	81.4	85.9	84.7
Low technology	80.4	83.9	92.5	96.0	98.4	98.3	95.7	98.5	99.8	96.7
Trade between the EU-15 *countries*										
High technology	98.7	98.3	97.2	97.2	95.7	97.4	95.9	95.9	95.1	95.2
Medium-high	99.6	98.8	99.7	99.8	99.9	99.8	99.5	99.8	99.9	99.4
Medium-low	95.9	97.2	97.0	97.2	97.0	97.7	96.3	96.8	95.7	95.6
Low technology	96.0	96.2	96.6	96.5	96.6	97.1	96.8	96.5	96.6	96.4
EU-15 *trade with the rest of the world*										
High technology	92.1	92.5	94.5	95.3	96.4	94.6	92.3	91.3	96.1	97.1
Medium-high	70.4	70.5	69.0	66.6	68.8	73.6	77.6	78.1	74.8	72.0
Medium-low	93.4	94.9	96.1	90.9	91.2	96.3	96.6	99.7	99.6	97.8
Low technology	92.2	92.9	99.8	99.0	99.6	97.2	94.3	93.9	93.8	94.5

Source: Own calculations on the basis of data from Eurostat Comtext CD-ROM (2004).

TABLE 6 MIIT index for Slovenian trade (%)

	$MIIT_i$	$MIIT_i$	$MIIT_i$
	1996–1992	2002–1992	2002–1996
High technology	64.9	99.6	69.0
Medium-high	84.3	81.8	64.5
Medium-low	98.4	81.1	77.4
Low technology	81.9	95.5	72.1

Source: Own calculations on the basis of data from SORS.

differs across technological product groups and periods (table 6). For the low-technology, the medium-low technology, and the medium-high technology industries, the degree of intra-industry trade was higher in the first period (1992–1996) than in the second period (1996–2002), and vice versa for the high technology industries. The MIIT for the whole period 1992–2002 was higher than for the two sub-periods in the case of the low-technology industries and the high-technology industries. This could be explained by the fact that some shifts in the trade flows occurred in the mid-1990s, which biases the empirical results.

TABLE 7 Relative export advantage

	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Benchmark: Internal EU-15 *trade*										
High technology	0.5	0.4	0.6	0.6	0.6	0.4	0.6	0.6	0.6	0.6
Medium-high	1.7	1.6	1.8	1.9	2.2	1.5	1.9	1.9	2.0	1.8
Medium-low	1.0	1.1	1.2	1.6	2.0	1.7	2.1	2.1	2.0	2.1
Low technology	1.2	1.2	1.4	1.6	1.7	1.2	1.4	1.4	1.4	1.4
Benchmark: External EU-15 *trade*										
High technology	0.4	0.4	0.5	0.5	0.4	0.4	0.5	0.6	0.5	0.6
Medium-high	1.5	1.5	1.6	1.5	1.8	1.8	2.1	2.2	2.0	1.7
Medium-low	1.1	1.2	1.5	1.7	2.2	2.3	2.6	2.9	2.7	2.4
Low technology	1.8	1.7	1.8	1.9	2.0	1.9	2.0	2.2	2.0	1.9

Source: Own calculations on the basis of data from Eurostat Comtext CD-ROM (2004).

The majority of MIIT is of a vertical type. This tendency towards diversity rather than similarity is consistent with structural changes, which have occurred in the Slovenian economy causing the supply side changes, and changes in demand by consumers towards diversity of products at the markets.

COMPARATIVE TRADE ADVANTAGES

According to relative export advantages, Slovenian exports in the internal EU-15 exports would enjoy comparative advantages (measure greater than 1) in the case of the low-technology, the medium-low technology, and the medium-high technology industries, but not in the case of the high-technology industries (measure less than 1; table 7). Although there exist some differences in the absolute size of the measures, a similar conclusion can be derived on the basis of comparisons of Slovenian exports to the EU-15 countries vis-à-vis the EU-15 external exports.

When Slovenian imports from the EU-15 countries are compared with the EU-15 external imports it can be noticed that the Slovenian high-technology industries and to a lesser extent the medium-high technology industries were more successful (measure lower than 1) than the low-technology industries (measure greater than 1). As far as the latter are concerned, some improvements have been recorded recently (table 8). As far as the medium-low technology industries are concerned, the measure around 1 or slightly greater than 1 suggests that it was difficult from relative import penetration point of view to decide whether to choose

TABLE 8 Relative import penetration

	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Benchmark: Internal EU-15 *trade*										
High technology	0.3	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Medium-high	0.9	1.0	0.8	0.9	0.8	0.9	0.9	0.9	1.0	1.1
Medium-low	1.1	1.1	1.0	1.0	1.0	1.0	1.1	1.1	1.2	1.2
Low technology	2.3	2.0	1.5	1.5	1.3	1.2	1.3	1.2	1.2	1.1
Benchmark: External EU-15 *trade*										
High technology	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.2
Medium-high	1.7	1.9	1.8	1.9	1.7	1.8	1.6	1.6	1.8	2.1
Medium-low	1.2	1.3	1.3	1.4	1.3	1.2	1.3	1.2	1.3	1.3
Low technology	2.4	2.0	1.8	1.7	1.5	1.4	1.3	1.3	1.2	1.1

Source: Own calculations on the basis of data from Eurostat Comtext CD-ROM (2004).

domestic Slovenian products or import them from the EU-15 countries.

When Slovenian imports from the EU-15 countries are compared with the EU-15 external imports it can be noticed that there is not a substantial difference in the case of the low-technology industries and the high-technology industries. For the medium-low technology industries a disadvantage in import penetration is more clearly recorded. Even more evident is the disadvantage in import penetration for the medium-high technology industries. Before the Slovenian accession to the EU, the EU-15 external markets were more relevant for comparison purposes but with the Slovenia's EU membership, the internal EU market has become more relevant. However, some other countries from the Central European region joined the EU at the same time, so the internal EU market has slightly changed.

According to our results, Slovenia enjoys a relative trade advantage in the EU-15 markets in the high-technology industries that was caused by an advantage in import penetration rather than by export advantage (table 9). For other industries the results are mixed, but the trade advantage is more evident than the trade disadvantage.

The ratio of export-to-import prices, which were achieved by Slovenia in trade with the EU-15, indicates that Slovenia exported better quality products and thus more expensive ones to the EU-15 countries than vice versa (table 10). However, the ratio has declined over time and has been close to one, which means that the quality of exported and imported products for the low technology and the high technology indus-

TABLE 9 Relative trade advantage

	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Benchmark: Internal EU-15 *trade*										
High technology	0.2	0.1	0.4	0.4	0.4	0.3	0.4	0.4	0.4	0.4
Medium-high	0.8	0.6	1.0	1.1	1.4	0.5	1.0	0.9	1.0	0.7
Medium-low	–0.1	–0.1	0.2	0.5	1.0	0.7	1.0	1.1	0.8	0.8
Low technology	–1.1	–0.8	–0.1	0.1	0.3	0.0	0.1	0.2	0.2	0.3
Benchmark: External EU-15 *trade*										
High technology	0.2	0.2	0.3	0.3	0.3	0.3	0.4	0.5	0.4	0.4
Medium-high	–0.2	–0.4	–0.2	–0.4	0.1	0.0	0.4	0.5	0.2	–0.4
Medium-low	–0.1	–0.1	0.2	0.3	0.9	1.2	1.3	1.7	1.4	1.1
Low technology	–0.6	–0.4	0.0	0.2	0.5	0.5	0.7	0.9	0.8	0.7

Source: Own calculations on the basis of data from Eurostat Comtext CD-ROM (2004).

TABLE 10 Export-to-import price ratio in Slovenian trade with the EU-15

	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
High technology	1.13	1.12	1.22	1.11	1.09	1.13	1.09	1.12	1.08	0.98
Medium-high	1.57	1.55	1.47	1.38	1.44	1.38	1.38	1.25	1.24	1.31
Medium-low	1.47	1.67	1.43	1.32	1.42	1.56	1.41	1.27	1.32	1.44
Low technology	1.23	1.19	1.14	1.18	1.17	1.07	1.09	1.06	1.01	1.02

Source: Own calculations on the basis of data from Eurostat Comtext CD-ROM (2004).

tries is similar. The declining tendency in the ratio is also confirmed for the medium-high technology industries, but in this case it is greater than one. The ratio for the medium-low technology industries at around 1.4 suggests a more stable quality and thus price advantages of Slovenian exports vis-à-vis Slovenian imports from the EU-15 in these products.

The ratio of Slovenian export prices achieved at the EU-15 markets vis-à-vis the internal EU-15 import prices indicates Slovenian price competitiveness for the high-technology industries with an additional improvement over time, and the low-technology industries with some deteriorations (table 11). The evidence suggests a lack of Slovenian price competitiveness at the EU-15 internal markets for the medium-low technology industries as well as for the medium-high technology industries. In the latter case, the most recent improvements in price competitiveness are recorded. The ratio of the Slovenian export prices at the EU-15 markets vis-à-vis the external EU-15 import prices also indicates Slove-

TABLE 11 Ratio of the Slovenian export price at the EU-15 markets vis-à-vis the EU-15 internal import price

	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
High technology	1.39	1.37	1.29	1.24	–	1.43	1.39	1.49	1.59	1.58
Medium-high	–	0.88	0.85	1.04	0.89	0.97	0.87	0.89	0.93	1.08
Medium-low	0.42	0.23	0.28	0.28	0.25	0.39	0.46	0.19	0.17	0.72
Low technology	1.29	1.19	1.19	1.19	1.06	1.15	1.19	1.18	1.19	1.09

Source: Own calculations on the basis of data from Eurostat Comtext CD-ROM (2004).

TABLE 12 Ratio of the Slovenian export price at the EU-15 markets vis-à-vis the EU-15 external import price

	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
High technology	1.25	1.53	1.49	1.78	1.49	1.39	1.39	1.45	1.31	1.25
Medium-high	1.12	0.76	0.76	0.73	0.89	0.94	0.89	0.84	0.93	1.07
Medium-low	0.38	0.29	0.28	0.19	0.36	0.39	0.38	–	0.17	1.26
Low technology	1.52	1.61	1.68	1.62	1.77	1.64	–	1.19	1.13	–

Source: Own calculations on the basis of data from Eurostat Comtext CD-ROM (2004).

nian price competitiveness for the high-technology industries, which revealed a more stable tendency over time, and the low-technology industries with some deteriorations (table 12). The evidence suggests a general lack of price competitiveness for the medium-low technology industries with the exception of the year 2002. To a lesser extent this was also the case for the medium-high technology industries.

CONCLUSIONS

Slovenian trade structures explore three significant patterns with two considerable shifts. First, we have confirmed that there is the shift from the low-technology industries, where Slovenia is loosing its comparative advantage, towards the medium-low, the medium-high and the high technology industries. This shift is consistent with the climbing up technological development approach. As more and more low-technology industries, which are largely low-skill-labour-intensive, are lost at the EU-15 and other markets to the catching-up countries from the region and the rest of the world, Slovenian low-technology industries are shrinking. Thus the demand for low-skilled workers is declining. Second, Slovenia gains comparative advantage particularly by the jump-up in the medium-high technology industries in the non-EU-15 markets. On

the EU-15 markets it has been loosing its initial comparative advantage caused by the EU-15 trade liberalization towards other Central and East European countries and the rest of the world. Finally, Slovenian trade patterns in the medium-low and the high technology industries indicate more mixed trade patterns with the continuous-convergence and the climbing-up-the-ladder approaches. Slovenian trade by technological intensities seems to be more similar with trade patterns observed in the North OECD countries. However, the mixture of the continuous-convergence, climbing-up and jumping up technological approaches has also some elements, which are observed in rapidly growing East Asian countries. However, the technological jump-up has been much less remarkable in both: the high technology industries, which are a key feature in the jumping-up trade in Slovenia as well as in most European countries, and in high-technology based export-led industries in some East Asian countries.

The role of education, research and development activities is crucial in these technological development shifts. However, there is also an important role of government policies in reducing market failures and in providing a proper incentive mechanism for trade and developments. The indicators of intra-industry trade for Slovenia do not reveal that trade liberalisation and economic growth have led to an increase in intra-industry trade. These trade patterns are observed in Slovenian trade with the EU-15 countries for the low-technology and the medium-high technology industries. Except for the high technology industries, Slovenia has enjoyed relative export advantage in the EU-15 markets. On the other hand, Slovenia has been more successful in import penetration from the EU-15 countries for the high technology industries. As a result of the effects of export advantage and import penetration, the high technology industries have trade advantage in the EU-15 markets. To a lesser extent and with considerable differences by individual years this holds also for the medium-high, the medium-low and the low technology industries. Slovenia was competitive in quality and prices in trade with the EU-15 in the medium-high and medium-low technology industries, but less for the low technology and the high technology industries. The Slovenian high technology industries perform better when the Slovenian export prices at the EU-15 markets are compared with the internal and external EU-15 import prices. The Slovenian low technology industries perform better when the Slovenian export prices at the EU-15 markets are compared with the external EU-15 import prices. The Slovenian industries,

which fulfil the EU-15 external trade conditions better than the EU-15 internal trade conditions are likely to face greater difficulties upon the Slovenian accession in the enlarged borderless EU markets.

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