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# Determinants of Trade Specialization in the New EU Member States

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**Summary:** European integration brings about major impulses for structural change in industry within the enlarged European Union. Underlying paper aims at explaining trade specialization patterns of the new EU member states as suppliers on the EU 15 market. The analysis is based on the key shifts in sectoral developments as shown via changing RCA indicators of relative export shares to the EU15. A dynamic panel analysis displays that the most important factors driving comparative advantages in trade are industrial production, export unit values, FDI, R&D, and low relative wages as compared to the EU 15 countries. The impact of these variables varies considerably when dealing either with total manufacturing, with labour intensive or with high-tech industries.

**Zusammenfassung:** Europäische Integration bringt starke Impulse für den industriellen Strukturwandel in der erweiterten Europäischen Union. Dieses Arbeitspapier untersucht die Außenhandelsspezialisierungsmuster von den neuen EU Mitgliedstaaten als Anbieter auf dem EU 15 Markt. Die Analyse basiert auf der Erklärung von modifizierten RCAs, die die sektorale Exportposition relativ zu den EU 15 Ländern darstellen. Eine dynamische Panelanalyse zeigt, dass die wichtigsten Erklärungsfaktoren für die Außenhandelsspezialisierung die Industrieproduktion, die Exportdurchschnittserlöse, ausländische Direktinvestitionen, Ausgaben für Forschung und Entwicklung, sowie relative Lohnunterschiede zu den EU 15 Länder sind. Der Einfluss dieser Variablen hängt stark davon ab, ob man das gesamte verarbeitende Gewerbe, oder nur arbeitsintensive oder high-tech Industrien in Betracht zieht.

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# Determinants of Trade Specialization in the New EU Member States

## Contents



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# 1. Introduction

EU enlargement creates a wider single market, which stimulates structural adjustment and economic specialization. These impulses are expected to be part of the driving forces for structural change in the European economies, and for changes in their competitiveness, which are reflected in changes in relative factor prices and technological upgrading.

One may anticipate accelerated structural change in Eastern European accession countries since the middle of the 1990s as the impulses from system transformation and from EU membership have stimulated a dynamic adjustment process, including a shift in specializations in particular countries. These impulses included trade liberalization and rising FDI inflows from EU countries. This process should be accompanied by shifts in revealed comparative advantage. Moreover, it is widely accepted that the regional trade orientation of eastern European countries shifted strongly towards the EU in the 1990s. It is therefore clear that major changes in sectoral specialization in Western Europe will reflect major changes in new EU member states.

This implies an increasing interest in analysing foreign trade patterns, in particular export specialization, within the EU market, to which this paper contributes. It aims at analysing the determinants of export specialization patterns of the new EU member states. The remainder of it is organised as follows. Section 2 given an overview on the trade specialization patterns in the new EU member states. Section 3 carries out a dynamic panel estimation in order to find out the determinants of these trade specialization patterns. Finally, chapter 4 draws policy conclusions.

# 2. Trade Specialization Patterns in new EU Member States

Subsequent analysis makes use of a Revealed Comparative Advantage (RCA) Index (Balassa 1965). This is done at a disaggregated level for eight accession countries: the focus is on trade with the EU15 countries. Data on exports and imports to the EU15 in the manufacturing sector are used a 2-digit-level.[1] Data is classified according to NACE rev.1.1. The list of product groups can be found in the Annex.

There is a wide range of modifications of the original RCA commonly used in the economic literature.[2] The specialization indicator used here is a modification of the classical RCA index. This modification often referred to as relative export shares. It reveals the relative comparative advantage of an industry within a country by comparing the share of that particular industry in the country's total exports to the share of that industry in total world

1 Data is extracted from the COMEX database of the European Commission.

2 The original RCA shows the export/import share of an industry as compared to total the total export/import share of an economy.

exports at a certain point in time. Since we are interested in the question, whether an accession or a cohesion country has a comparative advantage as compared to the EU15, we take the respective country's exports to the EU15 instead of total exports worldwide, and intra-EU15 exports instead of worldwide exports. The modified RCA-Balassa for a specific industry *k* in country *i* is defined as follows:

$$(1) \qquad RCA_{ik}^{\text{mod}\textit{ified}} = \frac{x_{ik} / \sum_{k=1}^{n} x_{ik}}{x_{jk} / \sum_{k=1}^{n} x_{jk}}$$

where *i* stands for the accession or cohesion country and *j* for the EU15. Modified RCA-Balassa has a minimum value of 0 and a maximum value of infinity. If $RCA_{ik} > 1$, country *i* has a comparative advantage in that industry *k* as compared to the EU15. If $RCA_{ik} < 1$, there is a comparative disadvantage of country *i* in industry *k*. Instead of exports one could also use different variables, such as patents or value added.

Figures 1-3 show the modified RCA indices for selected new Eastern European EU countries. The horizontal dotted line at 1 (on the left hand scale) indicates the boarder between comparative advantage and disadvantage. The vertical dotted lines indicate the border between the different product categories according to the OECD taxonomy (OECD 1987). At the same time one should take a closer look at export unit values (EUV), whose development over time indicates the ability of a country to fetch adequate – if possible higher – prices in world markets. The black line on the right hand side scale shows the export unit values – expressed in €/kg – of the respective product group in the year 2003, the shaded line the export unit values for 1993.

Figure 1 makes clear, that some very high and some very low technology intensive products play the most important role in Hungary's EU exports. RCAs exceed unity in two labour intensive product groups, wearing apparel (18) and leather products (19), with export unit values of 30 and 17 Euro/kg respectively. However, RCAs have been declining throughout the 1990s in these and in other labour and resource intensive – low and medium technology – product groups. On the contrary, RCAs are rising and exceed unity in the differentiated goods' sectors, especially in electrical machinery and apparatus (31) and in radio, television and communication equipment (32) industries. Here, export unit values rose between 1993 and 2003 reaching roughly 10 and 30 Euro/kg respectively in the year 2003. In most of the other product groups, especially in resource and scale intensive industries, which mostly belong to medium technologies, both RCAs and export unit values are rather low. One exception might be the manufacturing of motor vehicles (34), where Hungary had a comparative advantage throughout the second half of the 1990s with steadily rising RCAs and an export unit value of 10 Euro/kg in the year 2003. Furthermore, there is a comparative advantage in one science-based product group, namely office machinery and computers (30), where export unit values rose considerably between 1993 and 2003.

**Figure 1: Hungary – RCA of exports 1993-2003 and Export Unit Values 1993 and 2003**

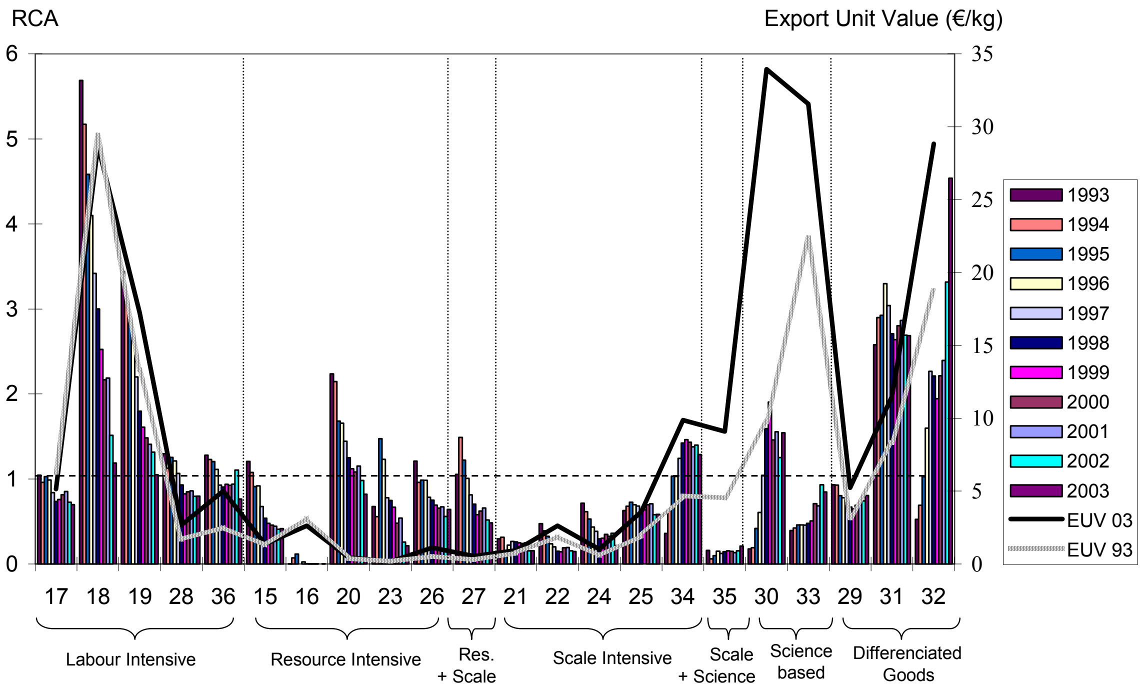



Figure 2 shows the respective picture for Poland. Most industries with a relative comparative advantage compared to the EU15 belong to the labour and resource intensive sectors, meaning they are positioned rather low on the technology ladder. The highest RCAs are yield in wearing apparel (18), furniture (36) and wood and its products (20). However, especially for the latter two, export unit values are extremely low at clearly below 5 €/ kg. The value of one kg of exports in wearing apparel is considerably higher at roughly 20 Euro. In most of the scale intensive, science-based and differentiated goods' sectors Poland still has a comparative disadvantage, however, many RCAs in these sectors seem to have a tendency to increase. Thus, rubber and plastic products (25), motor vehicles (34) and especially electrical machinery and apparatus (31) have reached levels of RCA exceeding unity by the year 2003. Among these categories, export unit values are the highest in the science-based sector with up to 30 €/kg in the year 2003; however, especially in the science-based sector, Poland's comparative disadvantage is very distinct.

A similar tendency is visible in the Czech Republic (figure 3) as in Hungary. Many of the RCAs in the lower technology sectors have been declining and many in the higher technology intensive sectors have been rising in the course of the time period considered in the analysis. At the same time rather strong comparative advantages can be found all along the technology ladder. Export unit values are similar to the other two countries analysed so far, especially to Poland. Comparative advantages can be found mainly in the labour intensive, in the resource intensive and also in the differentiated goods' sectors. Within the labour intensive category, wearing apparel (18) with an export unit value of more than 30 €/kg is losing comparative advantage, as do leather products (19), which have an export unit value of less than 15 Euro per kg. There was a very sharp decline of RCAs as well as of export unit values within the resource intensive category, where export unit values are extremely low in 2003. Similar to the other accession countries, the Czech Republic also has a relative comparative disadvantage in science-based product groups, although, export unit values grew considerably from 12 Euro/kg in 1993 up to almost 35 Euro per kg in 2003. [3]

**Figure 2: Poland – RCA of exports 1993-2003 and Export Unit Values 1993 and 2003**

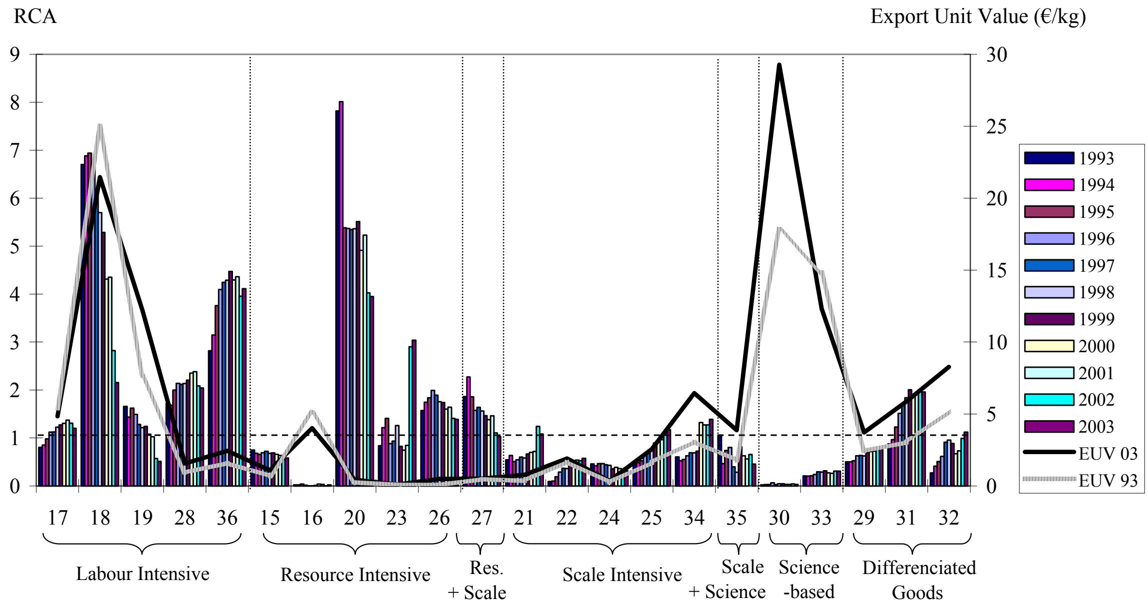
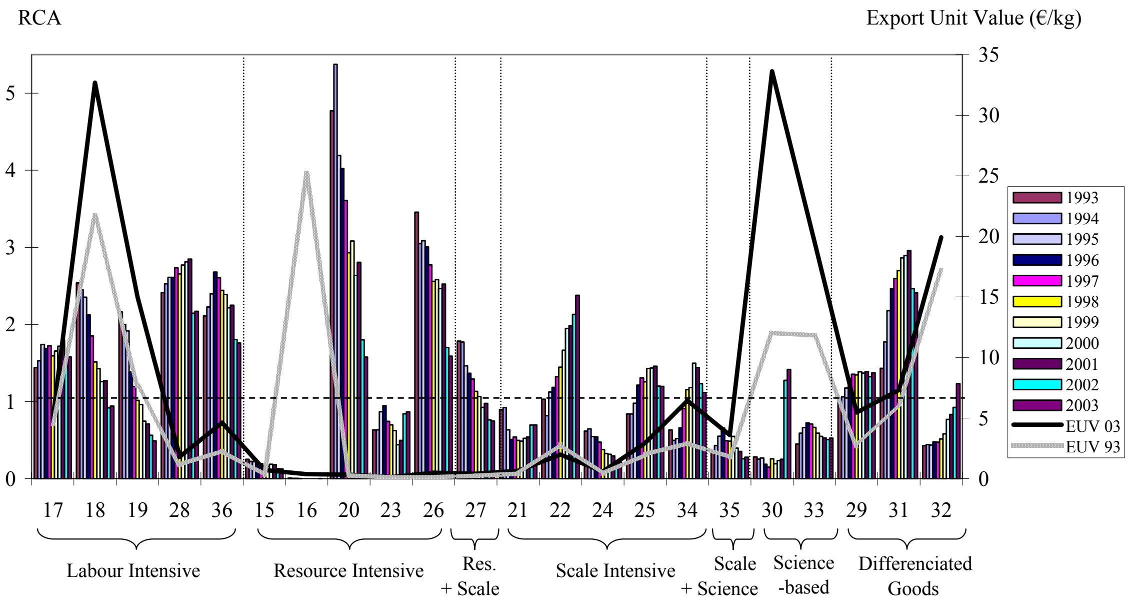



**Figure 3: Czech Republic – RCA of exports 1993-2003 and Export Unit Values 1993 and 2003**




3 For a more detailed and extended analysis including a convergence analyis see Borbély 2004a, 2004b.

# 3. Determinants of Export Specialization: A Dynamic Panel Analysis

Several factors play a major role in explaining export specialization patterns. Mainly they depends on the production structure of an economy, which again is dependent on factor endowments (e.g. labour and capital), and factor prices according to the Traditional Trade Theory. Other theoretical models, such as the New Trade Theory models stress the importance of distance, and explain why intra-industry trade exists. Furthermore interregional demand differences and trade costs are emphasized by the New Economic Geography. In addition, newer theories show the major role played by investments, especially foreign direct investments, innovation and technological development. In this section we will analyze the impact of different variables on the sectoral modified RCAs, as shown in detail in the previous sections. Unfortunately, such a sectoral analysis is strongly restricted by data unavailability for Eastern European countries. Even if data is available from different sources, one has to control for unmatch in the data. To minimize such measurement, and incomparability problems, it is advisable to use not too many different data sources.

## 3.1 Underlying Data

The choice of the exogenous variables for explaining the modified RCAs is unfortunately strongly influenced by the restrictions that the data availability imposes. Since the main idea of this analysis is to stick to industry levels, some severe data availability restrictions appear.

The endogenous variable is the modified RCAs as already used in the first part of this chapter, which can also be called the relative export share of industries on the EU15 market (data source: European Commission, 2004). The choice of the exogenous variables for explaining the modified RCAs is unfortunately strongly influenced by the restrictions that the data availability imposes.

Sectoral industrial production is expected to be one of the most robust explanatory variables. Ignoring pure trade with final products, exported products are usually generated domestically, thus they appear in the sectoral industrial output. It is reasonable to assume that an increase in the sectoral industrial production will lead to a rise in the relative export position. Hence the expected sign of the coefficient is positive. In this analysis we use nominal industrial production for 22 NACE 2-digit level manufacturing industries in Eastern European EU countries, provided from the WIIW Industrial Database Eastern Europe (2004).

Wage differentials are one of the main driving forces for the European division of labour, thus enhancing export specialization patterns in Eastern European countries. Especially for labour intensive industries, high wages countries from Western Europe see the possibilities to adjust. They can either relocate the labour intensive part of the production to a lower wage country e.g. in Eastern Europe, which is called offshoring, and which mechanisms would be included in the FDI variable, or such a company can buy parts or intermediate products from a lower wage country and import it. This mechanism is called outsourcing and it enhances the exports of the respective lower wage country, e.g. in Eastern Europe. From a European perspective, the greater the wage differential between West and East, the greater the incentives for outsourcing and the stronger the enhancing effect for Eastern European exports towards Western Europe. In this analysis we use relative wages to capture wage differentials. More precisely we use average nominal monthly wages in Euro per employee for Eastern European countries, provided by the WIIW (2004) and relate it to average nominal monthly wages in Euro in the aggregate of 12 Euroland countries. The wages for the individual Euroland countries are published in the OECD Stan Industrial Database (2005), whereas the aggregate of the 12 countries is calculated by the author using nominal GDP weights from the year 2000. By definition a rise in the Eastern European country's wage lowers the wage differential, more precisely it raises our variable, the relative wage share, which hampers relative export shares of Eastern European countries. Thus we expect the sign of this variable to be negative.

Furthermore in the basic specification of our regression, we expect the impact of export unit values (source: European Commission, 2004) to appear with a positive sign. Export unit values are measured - identical to the beginning of this chapter - as the value measured in Euro of one unit exports. Thus we use Euro/kg. If you achieve to raise the value of one unit of your exports, for most products this tends to be a sign for an increase in quality. For some products, however, such as high quality clothing as a down jacket, a decline in the weight implies a rise in quality. Also for products with a very fast technological development, such as the computer industry, there is a general tendency for lowering prices while increasing quality at the same time. Although these effects are not captured by the export unit value variable, for the total of 22 industries we expect to see a positive correlation between EUV and modified RCAs.

So far we have introduced all the variables that are used in the baseline specification of the panel setting. As indicated before our panel comprises 8 countries c, 22 industries j, and 11 years t, 1993-2003. Since data on industrial production and wages is not available for the Czech Republic and Slovakia at the two digit level, these two countries drop out of the panel, which gives a number of potential maximum observations of 6*22*11=1452. Besides data problems, also the choice of estimation method is demanding, which will be dealt with in the next part.

## 3.2 Methodology

Since we are interested in explaining the dynamics of specialization patterns, one should include the lagged endogenous variable as explanatory variable in the regression. Such a dynamic panel data model can be estimated with a Least Square Dummy Variables (LSDV) estimator, which is, however, only consistent if t is very large. Since this is not the case for our data set, another alternative is the use of a Generalized Method of Moments (GMM) estimation, which is advisable for smaller t dimensions, although it is also biased in a dynamic panel model setting.

We will use the so called “system GMM” estimator developed by Blundell and Bond (1998), which fits well two related dynamic panel data models. The first is the Arellano-Bond (1991) estimator, which is often called the "difference GMM". While first differencing the equation, the individual fixed effects are removed, which eliminates a potential source of omitted variable bias in the estimation. At the same time predetermined variables become endogenous. The authors develop a GMM estimator, which treats the model as a system of equations, one for each time period. The only difference between the equations is the use of their set of instruments. The endogenous and predetermined variables in first differences are instrumented with lags of their own levels. However, it is shown in the literature that lagged levels are often bad instruments for first differences. Exogenous variables enter the instrument matrix in first differences with one column per instrument.

Here steps in the second model, which is extended version of a model by Arellano and Bover (1995), further developed by Blundell and Bond (1998), and is called the "system GMM" estimator. Arellano and Bover show that efficiency of the estimator can be raised by adding the original equations in levels to the system, thus having additional moment conditions. In these equations in levels predetermined and endogenous variables are instrumented with lags of their own first differences. Bludell and Bond develop the necessary assumptions for this model augmentation and test it with Monte Carlo simulations.

Furthermore, the "system GMM" is available as a one- and a two-step estimator. The two-step estimator is asymptotically more efficient, but at the same time its standard errors are often downward biased (Arellano and Bond, 1991, Blundell and Bond, 1998). However, this is controlled for in the used two-step "system GMM" estimation. A finite-sample correction is available for the two-step covariance matrix, as described by Windmeijer (2000), which dramatically improves the accuracy as shown in Monte Carlo simulations. Therefore the two-step estimator, which is used here, is more efficient than the one-step estimator in the "system GMM".

Thus the estimated model has the following form:

(2) $$\Delta y_{i,t} = \alpha \Delta y_{i,t-1} + \beta \Delta X_{i,t} + \Delta \varepsilon_{i,t}$$

where y stands for the RCAs, X is the vector of the above mentioned exogenous variables, and finally there is the error term. i indicates the cross-section dimension, which is a combination of country c, and industry j.

## 3.3 Estimation Results

The basic specification of the model includes those variables, which has been explained further above. Dummy variables for the different groups of industries as described by the OECD - such as labour, resource, scale intensive, science based and differentiated goods - are also included into the basic specification. However, the only dummy with a significant impact is the one for labour intensive industries. Table 1 shows the results for total manufacturing.

Due to already mentioned data unavailabilities, only 935 observations could be realized from the potentially available 1452 in the basic specification. However, the results are meaningful. As expected the lagged endogenous variable is highly significant with a positive sign. That indicates that a one percent increase (decline) in the modified RCA of the previous period leads to an increase (decline) of the RCA in the current period by 0.77 percent. Thus there is an adjustment process of RCAs in the time dimension. Also the sectoral industrial production has a positive impact on RCAs. This impact is the most distinctive considering the one year lagged industrial output. Accordingly, a one percent rise in output results in 0.11 percent increase in the RCA one year later. As a matter of course, the coefficient for the industrial production is much lower then the coefficient for the lagged endogenous variable. The expected positive influence of the export unit value as an indicator for the quality of exports could - with an error probability of seven percent - also been proved. A one percent increase in the export unit value brings about a 0.04 percent rise in the relative export share. However, since this coefficient is rather low, one can also see from table 30 that the 95 percent confidence interval includes negative values for the coefficient of the export unit value. As indicated before, also dummy variables for the five OECD industry groups are included. The only dummy variable to prove to be significant is the one for the labour intensive industries. It shows that the relative export shares in the labour intensive industries are still significantly higher than the RCAs in the other industries. Although RCAs are clearly declining in the labour intensive industries in some Eastern European countries, such as Hungary, a strong specialization in those industries is still present. This result remains robust even if one runs the regression without Poland, which shows one of the highest RCAs in the labour intensive industries among the six countries considered in the analysis.

**Table 1: Determinants of Export Specialization in Total Manufacturing**

Arellano-Bond Dynamic Panel-Data Estimation, Two-Step System GMM Results

| | | | | | | |
|---|---|---|---|---|---|---|
| Group variable: cross | | | Number of obs = 935 | | | |
| Time variable: time | | | Number of groups = 122 | | | |
| Number of instruments: 34 | | | Obs per group: min = 3 | | | |
| F(5,121) = 278.96 | | | avg = 7.66 | | | |
| Prob > F = 0.000 | | | max = 9 | | | |
| Dep.var: $lnrcamod_t$ | Coef. | Corr. Std.Error | t | P>\|t\| | 95 % Conf.Intervall | |
| $lnrcamod_{t-1}$ | 0.774 | 0.039 | 19.38 | 0.000 | 0.695 | 0.853 |
| $lnip_{t-1}$ | 0.116 | 0.035 | 3.30 | 0.001 | 0.046 | 0.187 |
| $lneuv$ | 0.040 | 0.022 | 1.79 | 0.075 | -0.004 | 0.085 |
| $lnwagerel$ | -0.100 | 0.059 | -1.69 | 0.094 | -0.218 | 0.017 |
| $dlab$ | 0.242 | 0.062 | 3.89 | 0.000 | 0.119 | 0.366 |
| $constant$ | 0.152 | 0.147 | 1.03 | 0.303 | -0.139 | 0.444 |

Hansen test of overid. restrictions: chi2(28)=33.39 Prob >chi2=0.222
Arellano-Bond test for AR(1) in first differences: z = -2.13 pr>z =0.033
Arellano-Bond test for AR(2) in first differences: z = 1.31 pr>z =0.189

Source: own calculations

Finally, with an error probability of nine percent to relative wages in Eastern Europe play an important role in determining comparative export advantages. A one percent rise in the relative wage of Eastern

European EU countries, which corresponds to a decline in the wage differential, implicates a 0.1 percent decline in the sectoral revealed comparative advantage considering all 22 industrial sectors. This is some prove for the widely spread expectation that comparative advantages of the new EU member states result to some extent from the fact that they have sufficiently lower wages then the Western European EU countries. At the same time one should not oversee that the 95 percent confidence interval includes negative coefficient values. At the end of the table some tests are included to assess the validity of the specification. The Hansen test rejects the hypothesis of over-identifying restrictions. That means that the instruments as a group appear as exogenous. Furthermore the Arellano-Bond test for autocorrelation of first and second order delivers the expected results. Per construction we should find first order autocorrelation in the regression. However, second order autocorrelation should be avoided, since this would imply that the instruments for the lagged endogenous variable are not exogenous. Both autocorrelation tests deliver the correct and expected results for our basic specification.

It is worth testing the robustness of our results for subsamples by excluding some countries, industries or years. Since the number of years and also of countries is already very limited, the most reasonable, and from an economic point of view the most interesting appears to be to run the regression for specific industries or groups of industries. Especially the impact of relative wages and maybe also of export unit values might differ among industries. Therefore we now run the basic regression just for the five labour intensive industries according to the OECD classification, which include manufacture of textiles, of wearing apparel and dressing, of leather, luggage, handbags and footwear, of fabricated metal products, and manufacture of furniture. The results are shown in table 2.

First of all it is striking that the number of observations declines to 221 if one excludes all non-labour-intensive manufacturing industries. Still, all tests on the validity of the specification indicate no problem. Note that the number of instruments has also been reduced. The lagged endogenous variable is still highly significant, the coefficient is even higher than in the respective estimation for all industries. At the same time the impact of the lagged industrial production - though displaying roughly the same coefficient - is only significant with an error probability of 13 percent. Interestingly, the coefficient for the export unit variable has turned out to be insignificant, indicating that competition on the EU15 market in labour intensive products is not to a great extent influenced by quality competition. Finally, and this is the most important part of this exercise, the impact of relative wages on comparative advantages in labour intensive industries is significant with with an error probability of less than 1 percent. Also the coefficient is clearly higher as in the estimation for total manufacturing. For labour intensive industries a 1 percent increase in relative wages results in a 0.17 percent decrease in comparative advantages. Surely, this is perfectly in line with the Heckscher-Ohlin theorem, which focuses on the importance of relative endowments in shaping foreign trade patterns.

In the next step we only consider the upper end of the technology ladder and do the basic regression just for science-based and differentiated goods. According to the OECD classification these include manufacture of office machinery and computers, of medical precision and optical instruments, of machinery and equipment, of electrical machinery and apparatus, and manufacture of radio, television and communication equipment and apparatus. The results are displayed in table 3.

**Table 2: Determinants of Export Specialization for Labour Intensive Industries**

Arellano-Bond Dynamic Panel-Data Estimation, Two-Step System GMM Results

| | | | | | | |
|---|---|---|---|---|---|---|
| Group variable: cross | | | Number of obs = 221 | | | |
| Time variable: time | | | Number of groups = 29 | | | |
| Number of instruments: 27 | | | Obs per group: min = 5 | | | |
| F(4,28) = 568.62 | | | avg = 7.62 | | | |
| Prob > F = 0.000 | | | max = 9 | | | |
| Dep.var: $lnrcamod_t$ | Coef. | Corr. Std.Error | t | P>\|t\| | 95 % Conf.Intervall | |
| $lnrcamod_{t-1}$ | 0.914 | 0.123 | 7.43 | 0.000 | 0.662 | 1.166 |
| $lnip_{t-1}$ | 0.123 | 0.079 | 1.55 | 0.132 | -0.039 | 0.285 |
| $lneuv$ | 0.011 | 0.059 | 0.19 | 0.852 | -0.109 | 0.132 |
| $lnwagerel$ | -0.172 | 0.041 | -4.21 | 0.000 | -0.256 | -0.088 |
| $constant$ | 0.251 | 0.331 | 0.76 | 0.454 | 0.427 | 0.930 |

Hansen test of overid. restrictions: chi2(22)=25.95 Prob >chi2=0.254
Arellano-Bond test for AR(1) in first differences: z = -2.54 pr>z =0.011
Arellano-Bond test for AR(2) in first differences: z = -1.15 pr>z =0.248
Source: own calculations

The number of observations in the high technology groups is with 258 very similar to the labour intensive industries regressed before. Also here, the Hansen test for overidentifying restrictions, as well as the both Arellano-Bond tests for AR(1) and AR(2) indicate no problem in the estimation. The results clearly correspond to the prior expectations. The lagged endogenous variable and the lagged industrial production show a highly significant positive sign. Thus a one percent increase in the RCA in the previous period results in a 0.42 percent higher RCA in the current period; and a one percent increase in the industry output in the previous year brings about a 0.48 percent higher RCA in the current period. For high technology industries, export unit values as indicators for quality matter a lot. This is shown in the highly significant and positive coefficient for the EUV. A rise in the EUV by one percent improves the revealed comparative advantage in high technology industries by 0.27 percent. It seems that in these industries competitiveness is much more influenced by quality differences, than in lower technology industries. Advancing comparative advantages in science-based and differentiated goods apparently depend to a great extend on the ability of upgrading quality. Considering fast technological change and tough competition in these industries, this finding is to a great extent reasonable. So are the findings on the impact of relative wages on comparative advantages in high technology industries, which is basically not existent. The coefficient is not significant, indicating that wages do not play an important role for export advantages in these industries.

**Table 3: Determinants of Export Specialization for High-Technology Industries**

Arellano-Bond Dynamic Panel-Data Estimation, Two-Step System GMM Results

| | | | | | | |
|---|---|---|---|---|---|---|
| Group variable: cross | | | Number of obs = 258 | | | |
| Time variable: time | | | Number of groups = 34 | | | |
| Number of instruments: 27 | | | Obs per group: min = 3 | | | |
| F(4,33) = 142.48 | | | avg = 7.59 | | | |
| Prob > F = 0.000 | | | max = 9 | | | |
| Dep.var: $lnrcamod_t$ | Coef. | Corr. Std.Error | z | P>\|z\| | 95 % Conf.Intervall | |
| $lnrcamod_{t-1}$ | 0.426 | 0.059 | 7.19 | 0.000 | 0.305 | 0.547 |
| $lnip_{t-1}$ | 0.486 | 0.092 | 5.25 | 0.000 | 0.298 | 0.675 |
| $lneuv$ | 0.274 | 0.072 | 3.77 | 0.001 | 0.126 | 0.422 |
| $lnwagerel$ | 0.064 | 0.143 | 0.45 | 0.659 | -0.228 | 0.356 |
| $constant$ | 1.341 | 0.422 | 3.18 | 0.003 | 0.482 | 2.201 |
| Hansen test of overid. restrictions: chi2(22)=22.15 Prob >chi2=0.451 | | | | | | |
| Arellano-Bond test for AR(1) in first differences: z = -1.76 pr>z =0.078 | | | | | | |
| Arellano-Bond test for AR(2) in first differences: z = -0.01 pr>z =0.989 | | | | | | |

Source: own calculations

In the next step we will modify the basic specification by adding other exogenous variables, which are expected to have an impact. The results are briefly summarized.

*Labour Productivity*

First of all one shall take a look at labour productivity, which is measured as sectoral industrial output in million Euro per employee in Eastern European countries in relation to the same measure in Euroland. Output for Eastern European countries is provided by the WIIW (2004) in national currency and has been converted to Euro using annual average exchange rates to the Euro published by Eurostat. Number of employees on a sectoral level is also provided by WIIW (2004). Output for Euroland is taken from the OECD STAN Industry Database (2005), such as the number of employees. Again, the Euroland is calculated using GDP shares of 2000. Using this measure one might at first sight expect a positive coefficient in explaining revealed comparative advantages. If labour productivity in Eastern Europe rises, assuming Euroland productivity to remain stable, relative productivity rises, which is expected to enhance comparative advantages. However, we find that labour productivity is strongly correlated with wages. Thus, if productivity rises, wages rise, and this has a negative effect on RCA. Therefore the expected sign of labour productivity on RCA is negative. As a matter of course we drop wages from the equations.

The results show that labour productivity has a negative effect on RCA for total manufacturing only with an error probability of 15%. For high-tech industries this impact is not significant. However, for labour intensive industries a rise in productivity by 1 % results in a decline of RCA by 0.14%, with a significance level of 99%.

*Unit Labour Costs*

It is not only wages and labour productivity that might play an important role in explaining comparative advantages, but also relative unit labour costs. They are calculated as the ratio of wages to productivity. On the one hand, the intuitive impact of relative unit labour costs would be negative, since a rise would deteriorate competitiveness of especially in labour intensive industries. On the other hand, since wages and productivity are strongly correlated in our sample, one could expect that in the combination of these two variables there is no movement, no explanatory power left in the data. Indeed, the regression results including relative unit labour costs show no significant impact of it in any of the three samples. The other coefficients remain robust, but since there is no additional information provided by the estimations, the results are not reported.

*Foreign Direct Investment*

It seems clear that foreign direct investment is an important factor driving economic development in Eastern European countries. FDI stock in million Euro is provided from the WIIW FDI Database (2005). GDP in million Euro is taken from Eurostat. However, before running the estimation several problems appear. Sectoral FDI data in percent of GDP as described above is not only correlated with RCAs, the endogenous variable of the panel, but also with several exogenous variables of the basic specification, such as relative wages, export unit values and even with industrial output. In order to bring some clarity into the situation, we prefer to run the dynamic panel regression just for RCAs and FDI. The results show no contemporary correlation for any of the three samples. For high-tech industries the one year lagged FDI has a small, but significant impact. For labour intensive industries, however, the boosting effect of FDI on RCA is highly significant (with coefficients of 0.019-0.024) for both the contemporary and the lagged influence.

*Research and Development*

Finally we analyse the impact of R&D expenditure on RCA. R&D expenditure aggregated at the firm level for NACE 2-digit level industries is available for the Eastern European countries from Eurostat. The data is given in million Euro. The explanatory variable in our model additionally controls for the size of the sector by relating R&D expenditures to GDP. Also the R&D variable shows a strong and significant correlation with industrial production. We therefore drop industrial production as an explanatory variable. The dynamic panel estimation with the R&D-extended basic specification reveals no significant influence of the simultaneous R&D variable neither for the total sample, nor for the two subsamples. Concerning the first lag of R&D as an explanatory variable, we find no significant correlation for total manufacturing and for the labour intensive industries. We do, however, find a significant coefficient for the high technology industries. A one percent increase in the R\&D to GDP ratio results in a 0.065 percent higher RCA one year later. This seems to underline the importance of research and development for higher technology industries, which one would expect from theoretical and practical considerations. It also seems reasonable that research and development expenditure materializes with some time lag.

# 4. Summary and Policy Conclusions

Concerning the dynamic development of RCAs we find that Poland exports to the EU15 rather low and some medium technology (or labour intensive) products  The Czech Republic, however, shows clear specialization patterns also in the field of medium and even high technology products, while in Hungary we also find export specialization in some very low technology products in the 1990s.

Concerning the determinants of export specialization we can summarize the results as follows:

- Firstly we put to record that the industrial production, especially with a time lag of one year plays a very important role in explaining comparative advantage. This is valid cross all the 22 considered manufacturing industries.
- Eastern European countries are still significantly stronger specialized in labour intensive industries and thus have a significantly higher comparative advantage in the labour intensive industries as compared to all the other industries.
- Export unit values play an important role in explaining comparative advantages. This is valid in a cross-sectoral perspective, but especially for science-based and differentiated goods industries, which are situated at the upper end of the technology ladder. Furthermore export unit values seem to play hardly any role for labour intensive industries.
- Relative labour productivity and relative wages are highly correlated, showing that rises in labour productivity are to a great extend reflected in wage increases.
- Relative wages determine comparative advantages strongly, not only for labour intensive indusries, but even at a cross-industrial basis. For high technology industries relative wages hardly turn out to be mattering.
- Foreign direct investment is strongly correlated both with labour productivity and industrial production. A contemporary impact on comparative advantages is only found for labour intensive industries. With a time lag of one year FDI stock has a positive impact both on labour intensive and on high tech industries. For labour intensive industries FDI even displays export enhancing effects after two years.
- contemporary positive impact of research and development expenditure is found for total manufacturing. For high technology industries the export enhancing effects seem to unfold only after one or two years. For labour intensive industries no significant impact is found.

Bearing in mind the results of the previous analysis, one of the main policy conclusions is to highlight the importance of an investor friendly economic environment. Policy makers should clearly focus on attracting foreign direct investment in diversified industries. This can be done by political and legal security, as well as an adequate tax system. The positive impact of foreign direct investment on the development of foreign trade specialization has clearly been empirically indicated.

Although, the Eastern European new EU member states witnessed a relatively favourable economic development in the past decade, among others Poland, Hungary, the Czech Republic still show rather high – partially stubborn - unemployment rates. At first it seems that labour markets in the new EU member states will benefit from outsourcing and offshoring from Western European companies, which is for sure not deniable. However, as European integration proceeds, firms in new EU member states themselves face considerable pressure for outsourcing internationally, especially from Asian countries, such as China. Given high sustained unemployment rates in many new EU member states, one must be worried about unemployment problems. Jobless growth could be one of the new problems in the new EU member states. To the extent that the mass unemployment problem contributes to social and political conflicts as well as political radicalization, high long term unemployment could contribute to political destabilization which in turn will raise the political risk premium and weaken growth in the long run. Therefore two policy conclusions should be drawn: Firstly, policy makers have to put emphasis on upgrading human capital formation by increasing the quality and quantity of education and training activities, which will be important to enhance productivity and to encourage the creation of new firms which often not only create new jobs but contribute to overall flexibility and innovativeness. Secondly, it is inevitable that policymakers stimulate innovations and thus enhancing the quality of products to gain competitiveness on international markets. Underlying econometric analysis shows the positive influence of export unit values on revealed comparative advantage, thus stating that a higher quality product can better be placed on international (especially European) markets, than a low quality product. Therefore quality upgrading by enforcing innovativeness is one of the main ingredients of a successful economic policy in Eastern European countries.

Also the positive impacts of research and development expenditure on comparative advantages of foreign trade were shown empirically. But also form a theoretical and a political perspective it is clear that national R&D programs are likely to generate a positive effect on the economic development and on the competitiveness of countries and industries. However, due to cross-border benefits through international technology spillovers there is some risk that national policymakers will cut incentives for R&D expenditures, causing them to decline, since it can be expected that positive external effects of innovation would not be fully internalized in the EU. Shifting more funds in R&D to the supranational policy level might not be a reasonable way to cope with the problem. Due to poor political control of the European Commission and the established budgetary priorities for agriculture and structural funds we cannot expect an efficient EU innovation policy. However, the EU could be quite useful in innovation policy, in particular by regular analysis of innovation dynamics in EU countries and in the regions of the EU. More transparency could generate stronger incentives towards adequate national policy reforms.

To conclude, for policy makers in new EU member states it is advisable to emphasize education and R&D support in the course of European Integration and worldwide globalization, as well as to enforce the creation and the maintenance of an investor friendly economic and political environment.

**Annex:**

NACE rev. 1.1. Classification (in parts)

| | |
|---|---|
| D | Manufacturing |
| 15 | Manufacture of food products and beverages |
| 16 | Manufacture of tobacco products |
| 17 | Manufacture of textiles |
| 18 | Manufacture of wearing apparel; dressing and dyeing of fur |
| 19 | Tanning and dressing of leather, manufacture of luggage, handbags, saddlery, harness and footwear |
| 20 | Manufacture of wood and of products of wood and cork, except furniture; |
| 21 | Manufacture of pulp, paper and paper products |
| 22 | Publishing, printing and reproduction of recorded media |
| 23 | Manufacture of coke, refined petroleum products and nuclear fuel |
| 24 | Manufacture of chemicals and chemical products |
| 25 | Manufacture of rubber and plastic products |
| 26 | Manufacture of other non-metallic mineral products |
| 27 | Manufacture of basic metals |
| 28 | Manufacture of fabricated metal products, except machinery and equipment |
| 29 | Manufacture of machinery and equipment n.e.c. |
| 30 | Manufacture of office machinery and computers |
| 31 | Manufacture of electrical machinery and apparatus n.e.c. |
| 32 | Manufacture of radio, television and communication equipment and apparatus |
| 33 | Manufacture of medical, precision and optical instruments, watches and clocks |
| 34 | Manufacture of motor vehicles, trailers and semi-trailers |
| 35 | Manufacture of other transport equipment |
| 36 | Manufacture of furniture, manufacturing n.e.c. |

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