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***Changes in Industrial Competitiveness
as a Factor of Integration: Identifying
Challenges of the Enlarged Single
European Market***

Competitiveness

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EU RESEARCH ON SOCIAL SCIENCES AND HUMANITIES

Changes in Industrial Competitiveness as a Factor of Integration: Identifying Challenges of the Enlarged Single European Market

Competitiveness

Final report

HPSE-CT-2002-00148

**Funded under the Key Action
'Improving the Socio-economic Knowledge Base' of FP5**

**DG Research
European Commission**

Issued in
N/A

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Luxembourg: Office for Official Publications of the European Communities, 2007

ISBN 978-92-79-07565-0

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Printed in Belgium

PRINTED ON WHITE CHLORINE-FREE PAPER

Preface

Within the Fifth Community RTD Framework Programme of the European Union (1998–2002), the Key Action 'Improving the Socio-economic Knowledge Base' had broad and ambitious objectives, namely: to improve our understanding of the structural changes taking place in European society, to identify ways of managing these changes and to promote the active involvement of European citizens in shaping their own futures. A further important aim was to mobilise the research communities in the social sciences and humanities at the European level and to provide scientific support to policies at various levels, with particular attention to EU policy fields.

This Key Action had a total budget of EUR 155 million and was implemented through three Calls for proposals. As a result, 185 projects involving more than 1 600 research teams from 38 countries have been selected for funding and have started their research between 1999 and 2002.

Most of these projects are now finalised and results are systematically published in the form of a Final Report.

The calls have addressed different but interrelated research themes which have contributed to the objectives outlined above. These themes can be grouped under a certain number of areas of policy relevance, each of which are addressed by a significant number of projects from a variety of perspectives.

These areas are the following:

- ***Societal trends and structural change***

16 projects, total investment of EUR 14.6 million, 164 teams

- ***Quality of life of European citizens***

5 projects, total investment of EUR 6.4 million, 36 teams

- ***European socio-economic models and challenges***

9 projects, total investment of EUR 9.3 million, 91 teams

- ***Social cohesion, migration and welfare***

30 projects, total investment of EUR 28 million, 249 teams

- ***Employment and changes in work***

18 projects, total investment of EUR 17.5 million, 149 teams

- ***Gender, participation and quality of life***

13 projects, total investment of EUR 12.3 million, 97 teams

- ***Dynamics of knowledge, generation and use***

8 projects, total investment of EUR 6.1 million, 77 teams

- ***Education, training and new forms of learning***

14 projects, total investment of EUR 12.9 million, 105 teams

- ***Economic development and dynamics***

22 projects, total investment of EUR 15.3 million, 134 teams

- ***Governance, democracy and citizenship***

28 projects; total investment of EUR 25.5 million, 233 teams

- ***Challenges from European enlargement***

13 projects, total investment of EUR 12.8 million, 116 teams

- ***Infrastructures to build the European research area***

9 projects, total investment of EUR 15.4 million, 74 teams

This publication contains the final report of the project 'Changes in Industrial Competitiveness as a Factor of Integration: Identifying Challenges of the Enlarged Single European Market', whose work has primarily contributed to the area 'The challenge of socio-economic development models for Europe'.

The report contains information about the main scientific findings of Competitiveness and their policy implications. The research was carried out by 10 teams over a period of three years, starting in January 2003.

The abstract and executive summary presented in this edition offer the reader an overview of the main scientific and policy conclusions, before the main body of the research provided in the other chapters of this report.

As the results of the projects financed under the Key Action become available to the scientific and policy communities, Priority 7 'Citizens and Governance in a knowledge based society' of the Sixth Framework Programme is building on the progress already made and aims at making a further contribution to the development of a European Research Area in the social sciences and the humanities.

I hope readers find the information in this publication both interesting and useful as well as clear evidence of the importance attached by the European Union to fostering research in the field of social sciences and the humanities.

J.-M. BAER,

Director

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Abstract

The principal aims of this project were to evaluate the progress of the Czech Republic, Hungary and Poland (the AC-3) in their readiness to compete with EU-15 manufacturing industries in the period 1995-2003, to determine the factors of changes in their competitiveness, to examine the links between competitiveness changes and several aspects of economic developments in the three countries, and to draw conclusions for European policy.

Progress in the competitiveness of AC-3 manufacturing proved to have varied among the countries, industries, quality segments and over time. Most of the AC-3 industries increased competitive pressure on their EU counterparts by gaining an increasing part of the increment in EU-15 demand. Closing the productivity gap between the AC-3 and the EU-15 and lower wage dynamics in the AC-3 were the main drivers of that process. While in the accession countries the dynamics of productivity exceeded that of wages, the opposite happened in the EU-15. On the other hand, despite ongoing product upgrading, the AC-3 continued to export mainly lower and medium technology goods. Thus, the higher quality of EU-15 products protected them from AC-3 competition.

The increased competitiveness of the AC-3 was not helped by government interventions. The policy of "rescue and restructuring" of loss-making state-owned enterprises adopted by the governments of all three countries in the early phase of transition is considered to have been inefficient. State-aid in the pre-accession period – which, contrary to EU-15 standards, was based on sectoral and regional aid and not on horizontal aid – was shown to have had a negative, or at best insignificant, impact on the competitiveness of industrial branches. Similarly, enterprise networks examined by a company survey had a limited influence on firms' competitiveness, and generally they seemed less developed in the AC-3 than in Spain and Ireland. The development of new networks supporting improvements in competitiveness turned out to be a longer term process than expected.

Competitiveness changes co-determined changes in trade specialization and in industrial structure. AC-3 trade specialization patterns largely coincided with those of the cohesion countries, especially when the quality of the products (unit price) was considered. Although the AC-3 were significantly more specialised in labour intensive products than were the EU-15, the export structure of some has been converging to the EU-15 pattern. Although, as in Ireland, FDI stimulated an increase in competitiveness and huge structural changes took place within industries, unlike in Ireland, changes in employment structure generally did not contribute to growth in labour productivity.

Competitiveness factors, such as innovations and human capital, were considered in the macroeconomic analysis of the influence of the real exchange rate on growth and structural change in the EU-25. The principal conclusion from the analysis, which employed both traditional and new approaches, was that massive overshooting and high exchange rate volatility should be avoided; at the same time accession countries would be well advised to promote FDI inflows, to support R&D and to stimulate upgrading of human capital.

The role of human capital was confirmed by an analysis of the labour markets of the AC-3, where educational attainment and skills were significant factors in determining individuals' situations. On the labour demand side, labour costs were a significant co-determinant of employment and their influence was negative.

The fact that competition between the AC-3 and the EU was based on productivity improvement, and not on wages, confirms the importance of improvement in human capital for economic development.

Globalization creates new challenges for EU economic policy and the need to create conditions conducive to success in global competition. Improvements in human capital, stimulation of innovation, and investment in product upgrading should be the main competition tools in old and new member states and should be an EU policy priority.

I. EXECUTIVE SUMMARY

The principal aim of this project was to evaluate the progress of the Czech Republic, Hungary and Poland in their readiness to compete with EU-15 manufacturing industries, to determine the factors of changes in competitiveness, to examine the links between competitiveness changes and structural change, economic growth, specialization in foreign trade, building of companies' networks and labour market developments, and finally to draw conclusions on policy challenges facing the enlarged EU and its member states.

Attaining project goals required a multidimensional analysis consisting of several stages. Therefore, the project consisted of eight work packages

The aim of **Work Package 1** was to evaluate changes in the competitiveness of the manufacturing industries (as defined by the 3-digit level of the NACE-Rev-1 classification) of the three accession countries – the Czech Republic, Hungary and Poland, hereafter abbreviated as the AC-3 – and to examine the factors of change. Dividing the AC-3-based industries into two main groups: those seeing their competitiveness deteriorate as compared to their EU-15 counterparts, and those with improving competitiveness, was an important task for this part of the project.

Analysis within this work package covered three country studies and a comparative study. The comparative study intended to answer three questions. First, was there a trade creation effect of AC-3 integration into the Single Market, i.e., was less-efficient production substituted with more-efficient and improving-efficiency production? Second, if yes, then what were the most active and major participants of that process and the characteristics of AC-3 industries that increased pressures on the EU market the most? Third, what were the sources of this process?

The methodology applied was a consequence of the approach to competitiveness adopted in this project, stressing the rivalry between competitors. Consequently, the effect of competition was measured by changes in the share of AC-3 exports to the EU in the EU-25 internal exports, while a number of comparative measures were used to assess competitiveness factors: relative unit labour costs (RULC – ratio of labour costs and revenues from sales, relative unit investment rate, relative unit intermediate costs and relative unit export value¹). Since competition takes place within a given quality segment

¹ *Unit export value* (UEV) is defined as the ratio of the value of (a bundle of) exported goods over their quantity measured in metric tones.

of the market, we also considered the level and changes in quality of AC-3 products as compared to the EU average. The research consisted of two steps: a multinomial logit regression analysis verifying the relationship between the effects of competition and hypothetical competitiveness factors, and a descriptive analysis of factors of competitiveness factors in three groups of industries:

- Industries whose competitive pressure on the EU market was the strongest (their share of EU-25 internal exports was at least double the average of manufacturing of a given AC-3 country in 2003) and increasing; these were labelled "large winners".
- Industries whose competitive pressure increased the most i.e. share in EU internal exports at least doubled, but in 2003 were much smaller than the share of large winners; these were labelled "small winners".
- Industries whose EU-25 share diminished; these were labelled "losers".

The multinomial logit model performed in this study showed that changes for the AC-3 in the EU-25 share of internal exports followed changes in the relative unit labour costs (RULC). As evidenced by the model, the major source of increased share of the AC-3 in the EU market was a drop in RULC. Although in this respect the biggest progress was made by Polish manufacturing (RULC decreased from 0.77 in 1998 to 0.62 in 2003) in 2003 its RULC still exceeded the Hungarian level (which decreased from 0.61 to 0.55), however, it was lower than the Czech one (0.8 to 0.73). Considerable improvement in the RULC of Polish manufacturing since 1999 was conducive to improvements in its share of EU exports.

The main sources of declining RULC and the increasing AC-3 share in EU-15 intra export were: the process of closing the productivity gap between the AC-3 and the EU-15, and divergence in dynamics of wages as compared to productivity dynamics between the AC-3 and the EU-15. While in the AC-3 the dynamics of productivity exceeded that of wages, the opposite was the case in the EU-15. This means that the competitiveness gain of the AC-3 was the result not only of an improvement in the relationship between increasing wages and productivity, but also the result of a deterioration in this relationship in the EU-15.

In 1998-2003, the EU export share of the AC-3 large winners increased considerably and ranged from 3% to 8%. The increase in the EU share of AC-3 large winners reflected differences in production and export dynamics between these and the EU-15. The share of large winners in total AC-3 manufacturing turnover increased, while the share of

respective branches of the EU-15 in total EU-15 manufacturing turnover dropped. Thus, the first question of comparative analysis – if there was a process of trade creation – was answered positively. As for the second question – who were the main participants in that process – the partial answer is: the group of industries here labelled large winners (we will see that this was not the only group). The RULC of large winners in the three ACs was lower than the average of manufacturing and dropped the most. This was the effect of a much higher (five to twelve times) increase in the productivity of the AC-3 as compared to the EU-15, resulting in a narrowing of the productivity gap. AC-3 dynamics of growth in productivity surpassed that of wages while the opposite was the case in the EU-15. Consequently, the answer to the third question is that the sources of the trade creation process were factors internal to the AC-3 (surpass of growth of wages by productivity, very high dynamics of productivity growth) and external to the AC-3 (low dynamics of growth of productivity in the EU-15 and surpass of the growth of productivity by wages). On the other hand, also highly productive, skill-intensive AC-3 industries (small winners) participated in the trade creation process. A strong drop in RULC was the result of the fact that productivity dynamics surpassed that of wages dynamics, dynamics of productivity and investment were high. However, their share in the EU-25 market was very low, although dynamically increasing. Therefore, we supplement our answer to the first question of the comparative analysis by saying that small winners were also participants in the trade creation process.

This general picture was refined and further developed in the country studies. In the Polish and Czech studies a number of performance indicators were analyzed allowing for more in-depth classifications of manufacturing industries. In the case of Poland, domestic market shares were also calculated. On the other hand, the Hungarian study considered shares in EU-15 external imports (in addition to considering the Hungarian share of EU-25 internal exports) to examine competition against non-EU producers.

The aim of **Work Package 2** was to examine the impact of government policy on the competitiveness of the manufacturing industries in the Czech Republic, Hungary and Poland. The research focused specifically on an analysis of government policies in the early transition, state aid policies in the pre-accession period and their impact on competitiveness not only in individual countries but also in a comparative context.

Three principal research questions were asked in this WP: (i) what were the main features of government intervention in the three countries in the early days of transition; (ii) what were the underlying principles and outcomes of state aid policy following the opening of negotiation on accession (and the passage of Europe Agreements) in the three countries and how did these policies compare across the three countries; (iii) what was

the impact of these policies on the competitiveness of different industries? Our underlying hypotheses are that taxes and subsidies do not improve the competitiveness of industries.

In terms of methodology, first the broad government policy intervention in the first decade of transition was analyzed and the process of gradually bringing that intervention under the 'state aid' umbrella was described. Then, the impact of these policies on competitiveness was investigated. The theoretical framework for the analysis is the 'market failure versus government failure' debate with econometric analysis and case studies used to support and substantiate the investigation. The research consisted of a comparative analysis and three country studies.

The descriptive analysis of the state aid had to face several challenges regarding collecting and interpreting the data, despite the fact that the Europe Agreements committed the governments of the candidate countries to establish a legislative framework and a reporting and monitoring process and institution to ensure that government commitments were realised. Indeed, there is some evidence that in all countries state aid was under-reported for political reasons. Nevertheless, the research concluded that, as far as reported state aid is concerned, its structure was heavily skewed toward sectoral and regional aid (especially in the Czech Republic), rather than toward less distortionary horizontal aid (as is the case in the EU-15 countries).

The comparative analysis included also an assessment of the impact of government policy instruments on competitiveness. The results of econometric analysis, in broad terms, do not provide support for the view that government intervention can improve competitiveness either on the domestic or on the EU market. Taxes and subsidies, generally, have an insignificant effect on competitiveness (occasionally this effect is negative – with taxes it is only marginally significant).

The results largely support the literature on the failure of government policy and weaken the case made by the proponents of 'industrial policy' who believe that taxes and subsidies can be used to bolster the competitiveness of industries.

In Poland, the econometric evidence at 2-digit and 3-digit industry levels showed that continued state involvement in the economy (measured by the share of state-owned enterprises in total employment or output) has a negative impact on competitiveness on both the domestic and EU-15 markets. The tax burden has a negative impact on the competitive position of Polish industry on both domestic and European markets. Subsidies, too, have a negative impact on industrial competitiveness.

Empirical work in the Czech Republic showed that the large industries with stronger market power (and consequently political influence), as measured by the sellers' concentration index, received more subsidies but these subsidies did not improve their domestic competitiveness over time. Changes in domestic competitiveness over the 1998-2002 period have been negatively related to the total amount of subsidies. Similarly, competitiveness of industries on foreign markets is negatively related to the total amount of state subsidies per employee.

The Hungarian analysis of the relationship between state aid and competitiveness focused on the issue of FDI promotion. The authors stated that, currently, foreign firms' relationships to governments are similar to the kind of relationships that big state owned enterprises (SOEs) developed to central authorities in the previous regime. This kind of relationship may help governments to achieve some of their economic policy goals, but might be troublesome when state policy aims clash with foreign sector interests. In its analysis of the results of Hungarian tax policy, the team did not find convincing evidence of the hypothesis that tax holidays induced income flows from countries with higher corporate income tax levels.

The focus of **Work Package 3** was structural change, which was defined as change in shares of individual industries in total manufacturing sales, value added and employment. The principal research questions were, first, what role have changes in competitiveness played in observed structural change in the Czech Republic, Hungary, Poland, Spain and Ireland, and second, what was the relationship between structural change and changes in labour productivity in the manufacturing sectors of these countries.

The methodology used in WP3 has evolved in the course of the project and the elaboration of proper analytical tools has in fact proven to be one of the main challenges in this Work Package. Finally, four principal steps of research have been undertaken:

- a) measurement of structural change;
- b) analysis of correlation between structural change and performance indicators or competitiveness indicators;
- c) regression analysis of the determinants of structural change; and
- d) shift and share analysis of changes in labour productivity.

The synthesis of results follows. Out of the three transition countries under consideration, Poland experienced the most substantial structural change, however in the period 2000-

2003 the Hungarian figures are comparable to the Polish ones. Interestingly, Ireland has undergone substantial structural change in 1995-2003 too. As evidenced by the Polish and the Spanish studies, demand was a significant factor in structural change. In contrast, the Hungarian regression analysis, which did not consider demand changes, failed to deliver satisfactory results. On the other hand, competitiveness variables (both competitive performance and factor competitiveness) proved to have been a significant factor in structural change in Poland and in Spain as well. In Ireland, most of the significant correlations with performance were found when one tried to link changes in performance to changes in value added. Both in Poland and in Ireland foreign ownership was a factor that contributed positively to the growth of branches and to the relationship between competitiveness and structural change. Results of the shift and share analysis of labour productivity growth revealed major differences between Ireland on the one hand, and Poland and Hungary on the other. In Ireland, the structural bonus hypothesis proved to be the correct one and the structural burden hypothesis was rejected, implying that changes in employment structure contributed positively to labour productivity growth owing to both the growth of more productive industries and the growth of industries with increasing productivity. In Poland, exactly the opposite was the case: the structural bonus hypothesis was rejected and the structural burden hypothesis was accepted; this was because both "static shift effect" and "dynamic shift effect" turned out to be negative. Interestingly, in Hungary both hypotheses were confirmed: structural change partly supported productivity growth (due to a positive "static shift effect") and partly had an adverse impact (because the "dynamic shift effect" was negative). Thus, the analysis of structural changes performed in this Work Package brought yet more evidence of the favourable developments in the Irish economy in the 1990s. On the other hand, econometric analyses of factors of structural change performed in WP3 let us draw policy conclusion of a more general kind. These analyses in two transition countries have shown – especially in Poland and to a lesser extent in the Czech Republic – that it was mainly the market mechanism that has driven structural changes, with changes in demand and changes in competitive performance playing the principal role. Indeed, Polish and Spanish results were quite similar in that respect (though the models were different). The general conclusion that can be drawn is that the Polish economy is approaching the stage of a mature market economy and, in this sense, arguments based on its transition character are increasingly ill-founded.

The focus of **Work Package 4** was labour market developments in the AC-3. More specifically, four problems were analysed: the quality of the labour force and its links with economic competitiveness and labour market developments; the relationship between changes in competitiveness and levels of employment; the relationship between

labour costs, competitiveness and employment, and finally demographic trends and migration vs. labour market developments.

Regarding the first problem, the quality of the labour force improved due to changes in employment structure by education, occupations and specialties. In the three analyzed countries there was a decline (in terms of share) of the employed holding primary and less than primary education, as well as those with the lowest levels of qualifications (workers and craftsmen, operators and assemblers of machinery and equipment as well as unskilled workers). On the other hand, an increase was recorded in the share of the employed with tertiary education and those holding highest qualifications (officials, managers, specialists and technicians and other medium level personnel). Regarding the situation of individuals in the labour market, the analysis of unemployment rates by educational and occupational groups showed that persons better educated and those possessing higher qualifications were in a better situation in the labour market. Similar conclusions can be drawn from estimations of probabilities of outflows from employment and unemployment depending on education and qualifications in Poland (a multinomial logit model on data from the Labour Force Survey was applied). In the Czech Republic, the econometric analysis of wage determinants substantiated the finding that the level of educational attainment played an important role for the individual's position in the labour market (on the other hand, current occupation proved even more significant).

The results of research into the problem of the influence of competitiveness on employment differed from one country to another. In Poland, both descriptive and econometric analyses showed that growth in the domestic competitiveness of a branch was most commonly accompanied by an increase in employment. Then again, negative trends in employment were observed in industries that improved their external competitiveness. In the Czech Republic and in Hungary significant relationships between competitive performance and changes in employment could only be observed in some industries.

Labour costs proved to have been significant co-determinants of employment in the manufacturing industries of the three countries, and their influence was negative. Hungary, however, stood out as the country where this negative influence was the weakest. Hungary was also where the biggest heterogeneity among manufacturing branches was observed in terms of the relationship between employment and labour costs.

The part of this work package addressing demography and migration problems indicated that all three countries experience similar demographic trends with the proportion of

young people declining and the share of the active population increasing in the short term (the latter trend will be reversed after 2010). In the long run these trends are going to reduce the emigration potential, yet in the case of Poland the expected short-term increase in the number of graduates, and a particularly high unemployment rate among these, might cause a temporary migration hump if there are no restrictions on worker mobility. Correlation analysis indicated that the most important factor influencing East-West migration flows in the 1990s has been wage differentials. The insignificance of most of the correlation coefficients may be a result of distortions caused by the existence of legal restrictions to the employment of foreigners in the EU-15 countries and the application of selective immigration policies, though.

Work Package 5 analyzed the trade specializations of three accession countries (Czech Republic, Hungary, Poland) and compared these to the trade specializations of the four cohesion countries (Greece, Ireland, Portugal, Spain) in 1993-2001, as well as examined the factors behind observed developments, in particular changes in competitiveness factors. The research concentrated on four questions: what do trade specialization patterns in the enlarged European Union look like; do these specialization patterns tend to converge or diverge within the enlarged EU; against which EU countries do the new EU member states compete particularly; and what drives trade specialization in the enlarged EU; and what are the main determinants of new member states' foreign trade patterns?

The analysis did not explicitly use a model of any of the existing trade theories, but the underlying idea was that specialization in EU-25 trade would follow the predictions of traditional trade theory. That theory suggests that the accession countries will export mainly labour and possibly resource intensive goods, because therein lies their initial comparative advantage.

The main analytic tool has been the modified Revealed Comparative Advantage (RCA) index, which is often referred to as the ratio of 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 exports at a certain point in time. Since we were interested in the question of whether a new EU country or an accession country has a comparative advantage as compared to the EU-15, we took the respective country's exports to the EU-15 instead of total exports worldwide, and intra-EU-15 exports instead of worldwide exports. 2-digit and 3-digit NACE manufacturing industries were analysed.

The analysis of RCA dynamics showed that Poland specialises in labour-intensive and resource-intensive products and so do Greece and Portugal and, to a lesser extent,

Spain. On the other hand, Poland still has a comparative disadvantage in differentiated goods' and especially science-based sectors, even though RCAs of many industries in these sectors seem to have a tendency to increase. Although the Czech Republic and Hungary also show comparative advantage in some labour-intensive and resource intensive industries, they also have high, and growing, RCA in differentiated goods – in medium technology products (Czech Rep.) and in high technology products (Hungary). In contrast to all other countries under consideration, Irish exports are dominated by science-based products.

Regarding the question of de-specialisation, it seems that Hungary (to a greater) and Poland (to a lesser) extent converge to the EU-15 export specialization patterns, as do the cohesion countries. However, the Czech Republic's trade patterns are rather sticky and diverged from the EU-15 average in the course of the 1990s.

Analysis of the competitive structure of suppliers on the EU-15 market yielded the following results. The Czech Republic and Poland seemed to specialize in the EU-15 market in low and middle quality products. Hungary, on the other hand, started off with middle and high quality products and by 2001 it had also entered the market of low quality goods. Thus, now it competes along the entire length of the quality ladder. By contrast, Spain and Ireland have never had a relative comparative advantage with low quality products. Thus, Spain and Ireland seem to specialise in the EU-15 market as suppliers of middle and higher quality goods. Portugal and Greece have spread their comparative advantages across the range of low, middle and high quality products. From this point of view, Poland and the Czech Republic are competitors mainly of Portugal and Greece in lower and middle quality goods, but Hungary is also a potential competitor. In addition, Hungary faces competition from Spain and Ireland in higher quality products.

Moreover, the OECD taxonomy of manufacturing industries, distinguishing labour-intensive, resource-intensive, scale-intensive, industries producing differentiated goods, and science-based industries, was used to analyse the emerging competitive structure of the EU-15 market. It turned out that in labour and resource intensive industries there is an intensive market participation of accession and cohesion countries. With the exception of Spain in labour intensive goods, these countries specialize in medium and lower quality goods, scarcely competing in high quality. Ireland does not participate much in the market for both labour and resource intensive goods, whereas Hungary's only field of non-participation is in resource intensive goods. In scale intensive product groups, the accession countries gained more and more ground in the 1990s and subsequently, again primarily in low and medium quality goods sectors. Only Hungary is able to compete with high quality goods against Ireland. Greece lacks sufficient resources and is therefore not

competing in resource intensive sectors at all. Accession and cohesion countries are very weak in competing in science-based industries. Most countries do not compete in that market segment at all - only Ireland and, more recently, Hungary have been able to enter, however not with high quality products. The situation looks much better for the differentiated goods, where by the end of the 1990s all accession countries were competing. However, Greece and Spain remain on the outside in all cases. Again, the supply of high quality goods is mainly left to other European countries, with only Ireland providing some high quality goods.

Finally, as far as the factors of export specialization are concerned, the following significant determinants were identified: industrial output, especially with a time lag of one year; the labour intensive character of industries; export unit values (especially for science-based and differentiated goods industries, conversely export unit values seem to play little or no role in labour intensive industries); relative wages; FDI stock (only for labour intensive industries, with a time lag of one year also on high tech industries).

Examining the upgrading process at the firm level rather than at the industry level, **Work Package 6** analysed the ways in which networks affect changes in enterprise competitiveness. Our task in the research summarised here was to provide both an in-depth analysis of the experiences of selected countries – the Czech Republic, Hungary, Poland and Spain² – and a comparative analysis which would show how the networking models vary, or resemble each other, across the five countries and four industries: automotive, electronics, food and pharmaceuticals (chemicals in Spain), also taking into consideration differences between foreign-owned and domestically owned companies. We assume that a company's 'networking model' is defined by the kind of external actors in that company's network and by their functions (types of activities) in the network.

In this research our aim was to achieve: a description of national networking models; identification of the relationships between the networking models identified and enterprise competitiveness; identification of the differences between foreign-owned and domestically owned companies with respect to networking models and competitiveness; identification of areas of companies' activities in which networking models and benefits for competitiveness have a sectoral/national character; identification of problems which are specific to transition economies.

In each of the five countries case studies were carried out, with the purpose of piloting a questionnaire which was then used for surveys of larger samples in four countries

² Ireland was also covered in case studies.

(excluding Ireland). Since the same questionnaire was used in all four countries, the survey collected a vast amount of data on the performance of companies, their competitiveness and on the networks they engaged in. In the Czech Republic, data were gathered from 118 firms – 40 from the food industry, 5 from the pharmaceutical industry, 52 from electronics and 21 from the automotive industry. In Hungary, data were gathered from 161 companies, of which 62 were from the food and beverages industry, 72 from electronics, 17 were automotive firms and 10 pharmaceutical companies. In Poland, data were gathered from 227 companies, of which 125 were food and beverages companies, 43 automotive, 38 electronic and 21 pharmaceutical. In Spain, data were gathered from 134 companies, of which 40 were food and beverages companies, 26 automotive, 36 electronic and 32 chemical.

The analysis of survey data was carried out for each of the four countries individually, and then the data from the four countries were combined in a single data base and analysed jointly by the co-ordinator. Several statistical and econometric techniques (including a polynomial logit model) were used. Synthesis of results and conclusions from the econometric analysis of the pooled data for all the countries follow.

1. Description of national networking models: In the Czech Republic, Hungary and Poland, the most important partners in networks are suppliers, followed by customers. The most frequently cited areas of benefits from networking are: product quality and design, R&D, delivery terms and timeliness in the Czech Republic; delivery terms and timeliness in Poland, and quality and timeliness of deliveries in Hungary. As for the role of networks in innovation and R&D, we see that in all the countries the role of public industrial R&D institutes, and of universities, in the R&D and innovation processes of the firms we have studied is a secondary one (after that of customers and suppliers), but it is certainly a non-negligible one, especially in electronic and pharmaceutical industries. In general, the most important partners in firms' networks in these respects are: domestic universities and suppliers in Hungary and Spain; R&D institutes and domestic industrial customers for innovation, and suppliers (domestic universities for pharmaceuticals) and R&D institutes for R&D, in Poland; suppliers, followed by domestic universities and research institutes, for Czech firms in the area of R&D.

2. Relationships between the networking models identified and enterprise competitiveness: The results of regression on the combined data base indicate that the strategic use of networking to obtain competitiveness improvement is still in an early stage of development, with much remaining to be learned, as the implications for competitiveness are still ambiguous: we observe both positive and negative impacts of network variables on competitiveness. On the other hand, regressions performed on the

Spanish and Polish data indicated a positive relationship between networking and competitiveness.

3. Differences between foreign-owned and domestically owned companies: In all of these countries foreign investors play an extremely important role in the economy, though this role is much smaller in the food industry, which is largely (though far from exclusively) domestically owned and domestic market oriented. In all of them, foreign ownership still means much greater dynamics than domestic ownership, indicating that domestic players still have a long way to go to become world players. Importantly, we find no evidence of a low level of backward linkages of foreign-owned companies (i.e. the proportions of supplies obtained from the domestic market by companies in foreign ownership and domestic ownership are similar). Interestingly, the Hungarian results suggest that low numbers of local suppliers in industries dominated by foreign investors are not due to a lower propensity of foreign producers to utilise domestic sources, but rather to shortages of potential domestic suppliers.

4. National vs. sectoral networking models: Our cluster analysis suggests that national networking models tend to dominate sectoral models, although the former also tend to be weak. It is only in the area of cooperation with suppliers that sectoral affinity among firms is more significant than national affinity.

5. Problems which are specific to transition economies and those which are of a broader nature: Since our analysis does not show the number of years since the firm's foundation or acquisition to be a significant factor in competitiveness, we conclude that 15 years after the beginning of the transformation, the socialist-era legacy is no longer an important factor affecting the competitiveness of firms in these industries. It seems that there may be more that unites these four countries than divides them: all four can be described as "peripheral" economies, with industrial production using factors such as unskilled labour and natural resources (and, to some extent, capital) relatively intensively, and using skilled labour relatively less intensively. In many ways, it is now country size rather than the socialist legacy that determines the differences among countries: Hungary and the Czech Republic, having small domestic markets, tend to have manufacturers which are export-oriented, while a country without a socialist past, Spain, and one with a socialist past, Poland, have more domestic market oriented producers, due to the much larger size of their domestic markets. Although the synthetic competitiveness indicators we constructed indicate the greater competitiveness of Spain relative to the other three countries, the evidence would seem to indicate that this is not due to any disadvantage of the former socialist countries resulting from their socialist legacy, but rather to the advantage of Spain in having been integrated with EU markets

longer. Moreover, the small number of usable observations for Spain indicates the need for caution, and this caveat is strengthened by the fact that regression results showed a competitive advantage for Hungarian, rather than Spanish, firms.

The results demonstrate that all four countries remain peripheral (some more, some less) in terms of R&D intensity and innovativeness, which are among the key components of competitiveness and have been targeted for special action by the Lisbon Strategy. The fact that Spain differs relatively little from the other three countries in this respect indicates that this is an area which has not been adequately addressed by EU policies and instruments supporting convergence (specifically, the Structural and Cohesion Funds), and the fact that this area is of particular concern for the Lisbon Strategy is, moreover, an indication of a more generalised weakness of European firms which extends into the core countries as well. Thus, the question of what to do about this issue is a crucial one. It is clear that the Lisbon Strategy's use of numerical targets (R&D expenditures of 3% of GDP) is ineffective, yet it is not clear what would be a better approach.

The main goal of **Work Package 7** was to analyze the impact of the real exchange rate on trade, structural change and growth both in terms of theoretical analysis and by an empirical study. Assuming that the law of one price is not valid automatically, the approach presented showed a new quasi-Balassa-Samuelson effect. We also looked into the more traditional Balassa-Samuelson effects and considered the major impact of real exchange rate changes on structural change and on economic growth – the latter included a modified neoclassical model with endogenous growth; in addition we consider aspects of optimum growth. However, we also considered nominal exchange rates: the analysis was based on a new theoretical approach to exchange rate determination and stock market price dynamics. Also, first empirical results for selected transition countries were presented. Finally, the analysis put the focus on the macroeconomic impact of process innovations and product innovations.

Our central research problem was the medium term exchange rate dynamics where the traditional assumption for catching-up countries is that the rise of per capita income will go along with a rise in the relative price of nontradables (the absolute price of tradables is determined through international arbitrage). This increase of the relative price – determined by relative sectoral productivity differentials or different income elasticities – translates into a rise of the real exchange rate. The latter, in turn, affects various markets, e.g. financial markets as the change in the real exchange rate will affect international capital flows and international interest rate differentials. Moreover, the real exchange rate will affect (according to the Froot-Stein hypothesis) the inflows of foreign direct investment. FDI, in turn, is an important element of capital accumulation and a

source of innovation in transition countries; this indeed raises important issues for growth modelling in open economies. Our study thus has picked up some traditional issues but the research was conducted in a new analytical framework. In particular we have considered economies with technological progress (process innovations) and product innovations. This Schumpeterian setup is adequate for the new European division of labour in the EU-25.

We have used neoclassical growth models as a basis, but also considered endogenous growth modelling. Moreover, we have modified traditional production functions in various ways, and have also combined an analysis of innovation dynamics with an analysis of money market equilibrium. Modified neoclassical growth models and new exchange rate models have shed new light on the topic of economic dynamics in open economies with trade and foreign direct investment.

The empirical results based on quarterly data revealed the following. Within the two-stage approach we estimated first an equation for the stock market price index and then presented the estimation for the exchange rate. The three stage estimation reflected – which is a superior approach in terms of exploiting the information in the data of the sample – the theoretical basis, namely that exchange rate dynamics and stock market prices are interdependent. The estimations for Hungary, the Czech Republic and Poland showed significant coefficients for the lagged exchange rate, the stock market price and US GDP, as well as other variables which were significant only in some of the countries considered. The in-sample forecast was excellent for all three countries, so that anticipation of future exchange rate changes seems to be possible: this is not only relevant for economic actors but also for the issue of Euro-zone membership. Moreover, the considerable impact of stock market prices on the nominal exchange rate suggests that problems of stock market bubbles in the US might strongly contribute to unstable exchange rates in Europe.

The main policy conclusions from the analysis of impact of the real exchange rate on trade, structural change and growth in Work Package 7 are that massive overshooting and high exchange rate volatility should be avoided on the one hand, while on the other poor countries willing to catch up with partner countries in an integration area would be well advised to promote foreign direct investment inflows and to stimulate upgrading of human capital; supporting R&D is crucial as well for economic catch-up. We have argued that policymakers should consider the implications of optimum growth models and that the role of FDI should be carefully considered.

Drawing policy conclusions from the whole project was the task of **Work Package 8**. The principal findings were the following. The Enlargement process opened opportunities for the EU-15, as the market increased, but also introduced changes into EU product, capital, and labour markets. To fully exploit the single market, the fragmented national systems in many economic areas have to be removed and fundamental reforms in the member states should be introduced. Before considering any state intervention in support of the industrial sector, the EU could achieve advances now by pushing for reductions in non-tariff barriers, which are still a strong reality. There has been also a certain lack of trans-national cooperation, which lead to innovation and industrial structures being more fragmented than they should. The EU can play a role in improving that kind of cooperation. It should put pressure to increase macroeconomic, labour and fiscal policy coordination, especially in the euro zone. Policy inconsistency between the member-states and EU objectives should be minimised. Furthermore, commitments by the member-states to work towards EU actions, such as the Lisbon Strategy, have failed so far to be followed up by the member-states.

As new member states are still largely producing low to medium technology products, they appear to be potential competitors to the EU cohesion countries and to force them to shift to high technology products. Due to the rising potential of the new member-states to compete in the same product groups as older member-states, and partly as an effect of the operation of MNC of the EU-15 member-states, some industrial sectors of the EU face crowding out effects. This will cause some adaptation and restructuring in the EU-15. The trade vulnerability analysis shows that some implications are not heterogeneous for all member-states.

The policy proposals of the EU for the member states have shown that concerns exist over general weaknesses in competitiveness in the EU. While these proposals have positive aspects, the way these are implemented in practice will have a large impact on their effectiveness in promoting industrial competitiveness. As proposed by the European Commission, countries and regions should provide a strategic reference document defining objectives and priority actions. Member-states should ensure that the objectives are effectively reached and deliver on actions they have committed themselves to follow, such as the Lisbon Strategy.

The free provision of services is a crucial element for enhancing growth and competitiveness in Europe, and this report underlines the importance of renewing efforts to implement the Services Directive.

One of the clearest messages of the studies for the new member states is that selective state aid policies damage, rather than strengthen, the competitiveness of the industrial sector and that opportunity costs are high. Countries should consider reducing bureaucratic burdens, and improving the rule of law, quality of bureaucracy and the heavy charges affecting the private sector, through institutional reform. The quality of domestic institutions can be more effective than state aid.

As the economic development of the new member states will depend, to an important extent, on the more advanced technological sectors and product upgrading, an increase in investment, innovation and human capital quality is required. This is the more so given that competition from developing countries in products in which the new member-states are specializing is increasing. Without product upgrading, the former will be out-competed by the latter. The shift into strategy enhancing investment and innovation will also impact changes in the structure of production and increases in employment. Basing growth on cheap, labour-intensive industries is not the correct strategy for encouraging convergence with the EU economy. Labour market policies fostering labour mobility and transferable skills are primordial to the successful development of these countries.

The area in which the "old" member-states can make an important contribution to competitiveness is in improving the business environment in the EU by improving the regulatory framework. Various member-states have an unfriendly business environment and reducing their bureaucratic and often excessive tax and social contributions could give a first spur to the economy. Member-states industrial policy should be geared toward creating the necessary physical environment for industries to develop and prosper. Assistance should always aim at restructuring and adapting industries to new challenges and not at sustaining their losses.

II. BACKGROUND AND PROJECT OBJECTIVES

The principal aim of this project, submitted to the European Commission in the beginning of 2002, was to evaluate the progress of three then-EU candidate countries, the Czech Republic, Hungary and Poland in their readiness to compete with the EU-15 manufacturing industries and to show the differences existing among them in this respect. Moreover, the project sought to determine the factors of changes in competitiveness, to investigate how is this process linked to economic growth, specialization in foreign trade, building of companies' networks and labour market developments. Finally, it was the ambition of the project to show related challenges facing the Single Market and for EU policy.

Drafted one year after the Lisbon Summit, at the time of accession negotiations, the project based on the observation that the diminishing competitiveness gap between the three candidate countries and the EU-15 states had profound consequences for both groups of countries. The former saw a deep restructuring of their manufacturing sectors, a reorientation of trade flows and substantial changes in their labour markets. The latter had to find their way in a new competitive environment containing suddenly companies from Eastern Europe. We noted that the success of several EU policies formulated in the aftermath of the Lisbon Summit depended on to what extent would they acknowledge these changes in competitive environment of the EU-15 companies.

While the term *competitiveness* is given different meanings in the literature and some of these meanings are incredibly broad³, this project rested on the competitive approach to competitiveness that originates in the works of Joseph Schumpeter. We presume that competitiveness derives from competition and thus directly reflects the competition struggle. The term "competition" is used in the sense of rivalry among actual and potential competitors. It was synonymous with terms such as "struggle", "contest", "rivalry" or "conflicts" (Neumann, Weigand 2003). Competition regards the situations in which the parties producing substitutes – aiming to achieve the same, but effectively an opposite target – end up in a conflict. It contains the process of certain firms pushing other (and therefore the goods produced by them) out of the market and allows only for some competitors to survive. Consequently the measure of competitive performance most frequently used in the project were changes in the market shares of companies and branches. On the other hand, since Schumpeter's conception of creative destruction is

³ The Lisbon Summit, for instance, understood competitiveness as the ability to maintain a high rate of economic growth.

strongly related to the innovating activities of the companies, that problem was also given massive attention in the course of the project.

Attaining project goals required a multidimensional analysis consisting of several stages. Therefore the project consisted of eight work packages and the research goals of the individual work packages (WPs) were the following:

WP1: To evaluate changes in competitiveness of manufacturing industries of the three accession countries (the Czech Republic, Hungary and Poland) and to examine the factors of change.

WP2: To examine the impact of government policy on the competitiveness of the manufacturing industries in the Czech Republic, Hungary and Poland and to analyse the evolution of various aspects of that policy in the run-up to the EU accession.

WP3: To examine the influence of changes in competitiveness on structural changes in manufacturing i.e. the relationship between competitiveness of industrial branches and their share in manufacturing sales, value added and employment in the three accession countries and in two cohesion countries (Ireland and Spain)

WP4: To assess the relationship between changes in competitiveness and labour market development, both from the labour demand point of view and by analysing changes in labour supply. To examine relevant migration problems.

WP5: To analyse export specialisations emerging in the candidate countries as a result of changes in competitiveness and the place those countries are taking in the European division of labour in connection with export specialisation.

WP6: To assess the role of networks in developing the competitiveness of firms, looking both at foreign and domestic firms. In particular to analyse the role of actors such as investors, creditors, customers, suppliers, local governments, various types of research institutions, etc., in their relationships with the firm.

WP7: To examine the relationships between real exchange rate, economic growth, structural change and competitiveness (especially innovations) of candidate countries and some member countries.

WP8: To examine policy implications of changes in competitiveness patterns of the candidate countries for the EU and assess various policy stances. To examine the need and directions of policy modifications in reaction to CEECs accession to the Single Market and to analyse the rationale of policy adaptations in new and old member states.

III. SCIENTIFIC DESCRIPTION OF PROJECT RESULTS AND METHODOLOGY

Scientific achievements of the project will be presented work package by work package. In these parts of the project where the research has been done by several country teams, the work of each country team is reported separately preceded by a synthetic report of the entire work package.

1. Work Package 1

The aim of WP1 was to evaluate changes in the competitiveness of the manufacturing industries (as defined by the 3-digit level of the NACE-Rev-1 classification) of the three accession countries – the Czech Republic, Hungary and Poland, hereafter abbreviated AC-3 – and to examine the factors of change. Dividing the AC-3-based industries into two main groups: those who saw their competitiveness deteriorate as compared to their EU-15 counterparts, and those with improving competitiveness, was an important task of this part of the project.

The approach to the notion of competitiveness adopted in this project, which stressed the rivalry between competitors, determined the comparative nature of research (comparison of AC-3 based industries to the EU-15 ones) and the methodology in general. The analysis focused on effects and factors of competition between AC-3 manufacturing industries and their EU-15 counterparts in the EU-15 market. Changes in the share of AC-3 exports to the EU in the EU-25 internal exports were used as a measure of the effect of competition between new and old member states. Competition with non-EU industries in the EU and non-EU market, as well as competition with the EU industries in the non-EU market, was omitted. However, since market share as a measure of effect of competition is not free from deficiencies, some factors responsible for changes in market shares were evaluated and analyzed. These factors were, as said, relative measures: relative unit labour costs (RULC – ration of labour costs and revenues from sales, relative unit investment rate, relative unit intermediate costs and relative unit export value⁴. Comparison of the effect of competition with its factors allows for better understanding of the process of transmission of changes in competitiveness into integration. Since competition takes place within a given quality segment of the market, we also consider the level and changes in quality of the AC-3 products as compared to the EU average.

⁴ *Unit export value* (UEV) is defined as the ratio of the value of (a bundle of) exported goods over their quantity measured in metric tones.

Analysis within this work package covered three country studies and a comparative study. There were some differences in the scope of analysis and methodology used, especially between the Polish and Czech studies on the one hand and the Hungarian analysis on the other, which was to a certain extent caused by the specifics of each country.

The results of the country studies are presented below in separate sections. The discussion of the results of comparative analysis follows.

The comparative study intended to answer three questions. First, was there a trade creation effect of AC-3 integration into the Single Market, i.e., was less-efficient production substituted with more-efficient and improving-efficiency production? Second, if yes, then what were the most active and major participants of that process and the characteristics of AC-3 industries that most increased pressures on the EU market? Third, what were the sources of this process? When answering the three questions, special attention was given to three types of AC-3 manufacturing industries:

- Industries whose competitive pressure on the EU market was the strongest (their share in EU-25 internal exports was at least double the average of manufacturing of a given AC-3 country in 2003) and increasing; they were named "large winners".
- Industries whose competitive pressure increased the most i.e. share in EU internal exports at least doubled, but in 2003 were much smaller than the share of large winners; these were coined "small winners".
- Industries whose EU-25 share diminished; they were called "losers".

The multinomial logit model performed in this study showed that changes of the AC-3 in EU-25 share of internal exports followed changes in the relative unit labour costs (RULC). As evidenced by the model, the major source of increase of the share of AC-3 in the EU market was a drop in RULC. Although in this respect the biggest progress was made by Polish manufacturing (RULC decreased from 0.77 in 1998 to 0.62 in 2003) in 2003 its RULC still exceeded the Hungarian level (which decreased from 0.61 to 0.55), however, it was lower than the Czech one (0.8 to 0.73). Quite considerable improvement in RULC of Polish manufacturing since 1999 was conducive to improvements in its share of EU exports.

The main sources of declining RULC and increasing share of the AC-3 in EU-15 intra export were: the process of closing the productivity gap between the AC-3 and the EU-15, and divergence in dynamics of wages as compared to productivity dynamics between the AC-3 and the EU-15. While in the AC-3 the dynamics of productivity exceeded that of

wages, the opposite was the case in the EU-15. This means that the competitiveness gain of the AC-3 was the result not only of an improvement in the relationship between increasing wages and productivity but also a result of a deterioration in this relationship in the EU-15 (Table 1, *Average of manufacturing*).

Table 1. Level and changes in wages and productivity of three groups of industries of AC-3 and their EU-15 counterparts.

		Wages level		Wages dynamics 1998-2003 (in %)	Productivity level		Productivity dynamics 1998-2003 (in %)
		1998	2003		1998	2003	
Average of manufacturing							
Hungary	forint	1179	2272	93	41.5	80.4	94
Czech	€	5.4	8.4	56	34.6	58.5	69
Poland	PLN	24.1	33.3	38	155	282	82
EU	€	28	37	30	159	191	20
Large winners							
Hungary		1269	2438	92	45.8	30.1	184
EU counterparts	€	33	46	39	176	202	15
Czech	€	5.3	8.3	56	28.6	53	86
EU counterparts	€	26	34	29	115	135	17
Poland		22	29.5	34	121	211	75
EU counterparts	€	22	29	30	109	123	12
Small winners							
Hungary		1491	2718	82	38.9	76.6	97
EU counterparts	€	33	43	30	171	211	23
Czech	€	5.3	8.2	56	35.3	74.7	111
EU counterparts	€	27	39	43	150	192	28
Poland		27.6	38	37	210	368	75
EU counterparts	€	32	41	28	177	210	19

Losers							
Hungary		1015	1800	77	34	70.6	108
EU counterparts	€	20	28	39	152	195	29
Czech	€	5.3	8.8	64	39.8	71.8	81
EU counterparts	€	32	41	31	208	273	31
Poland		20.9	31.5	51	86	155	80
EU counterparts	€	26	34	30	134	181	35

It is worth mentioning that improvement in competitiveness in the AC-3, reflected in market share and RULC, was not halted by appreciation of their national currencies. The negative influence of the appreciation of AC-3 competitiveness was offset by their closing the productivity gap, accompanied by a restrictive wage policy. Appreciation of the AC-3 national currencies also supported the increase in quality of exported goods to the EU-15. However quality upgrading and improvements in competitiveness were very much differentiated among manufacturing industries of the AC-3 and among the three countries, with Hungary producing many the most high quality products. The fact that many of the AC-3 industries produce lower quality goods as compared to the EU-15 means that they compete in the lower quality segment of the EU market. This also means that the higher quality of the EU-15 products is a form of protection of their products against AC-3 competition.

In 1998-2003, the EU export share of the AC-3 large winners increased considerably and ranged from 3% to 8% (see Table 1). If the "large winners" group consisted of the same industries in all three accession countries and if they operated in the same quality segments, then one could expect some of them to dominate some EU markets and push out the EU products. The differences in composition of large winner industries across the three countries (cf. Annex), and the considerable differences in the quality of exported goods meant that the AC-3 exporters of these goods were targeting different EU markets and the cumulative pressure of the AC-3 industries in question on their respective EU industry counterparts did not take place. Therefore, despite the relatively high and increasing share of large winners in EU-25 intra-exports, their sales did not constitute a threat to the functioning of the respective industries in the EU incumbent countries. Such a threat may be the case only in particular industries of a handful of EU countries and across various quality segments of the European market.

The increase in the EU share of AC-3 large winners reflected differences in production and export dynamics between these and the EU-15. The share of large winners in total AC-3 manufacturing turnover increased, while the share of their EU-15 counterparts in the respective branches in total EU-15 manufacturing turnover dropped. Thus, the first question of comparative analysis – if there was a process of trade creation – was answered positively. As for the second question – what were the main participants of that process – the partial answer is: the group of industries called here large winners (we will see that it was not the only group). The RULC of large winners of the three ACs was lower than the average of manufacturing and dropped the most. This was the effect of a much higher (five to twelve times) increase in the productivity of the AC-3 as compared to the EU-15, resulting in a narrowing of the productivity gap. While the AC-3 dynamics of growth in productivity surpassed that of wages., the opposite was the case in the EU-15. Consequently, the answer to the third question is that the sources of the trade creation process were factors internal to the AC-3 (surpass of growth of wages by productivity, very high dynamics of productivity growth) and external to the AC-3 (low dynamics of growth of productivity in the EU-15 and surpass of the growth of productivity by wages).

Surprisingly, although RULC was quite low, the labour productivity of both Polish and Czech large winners and their EU-15 counterparts was lower than the average for manufacturing in these countries. Within the analysed period the gap in productivity between these industries and the average of manufacturing either increased (in the Polish and EU cases) or did not change (in the Czech case). Poland, and to a lesser degree the Czech Republic, increased their competitive pressure on the EU market in those industries whose productivity in comparison to manufacturing average was low and where the gap in productivity against average of manufacturing increased. However, since their productivity increased more than the productivity of their EU-15 counterpart industries, their share of EU internal exports increased. The adjustment processes which take place within the enlarged EU market are based on differences in progress in relative (among countries) productivity. The improvement in both RULC and the EU market shares of the AC-3 large winners stemmed from narrowing the labour productivity gap vis-à-vis the EU-15 counterparts. The weakness of the European counterparts of the Polish and Czech large winners was the basis for increasing their strength on the European market. The liberalisation of AC-3 access to the EU-15 market accelerated the structural changes taking place in the EU incumbent countries' manufacturing, but it did not instigate them. The trade liberalisation of the AC-3 and the EU-15 was, therefore, not the source of economic problems in the manufacturing sector in EU-15, but rather it revealed the weakness of economic performance and progress in various EU industries.

On the other hand, one must keep in mind the relatively low quality level of Polish large winners' goods. These pushed out of the EU market mostly producers of low quality goods and only to a small degree those producing higher quality goods.

Trade creation accompanied shifts in allocation of the labour force. Large winners in ACs attracted new labour force. However, a low investment rate indicates that either return on capital was low or large investments took place before 1998.

On the other hand, also highly productive, skill-intensive AC-3 industries (small winners) participated in the trade creation process. A strong drop in RULC was a result of the fact that productivity dynamics surpasses that of wages dynamics, dynamics of productivity and investment was high. However their share in the EU-25 market was very low, although dynamically increasing. Therefore we supplement our answer to the first question of the comparative analysis by saying that small winners were also participants of the trade creation process.

The third group of industries which were analyzed were losers. In 1998 (excepting the Czech ones) their labour productivity level was below the average for manufacturing. Higher than in the EU-15 dynamics of productivity contributed to a decrease in the productivity gap. A strong fall in employment, several-fold higher than the average decrease in manufacturing's average employment, was the main source of improvement in labour productivity, higher than among this group's EU counterparts. The restructuring of the analysed industries was of a defensive character, though it brought about growth in labour productivity. A strong fall in employment, despite relatively high wage increases, resulted in labour productivity growth higher than wage growth. The interdependencies between the above mentioned changes were stronger than in the EU. This suggests that, despite decreasing share of loser industries in EU internal exports, these industries made a significant improvement in enhancing their competitiveness. The decrease in the share of these industries in AC-3 manufacturing turnover and exports resulted in their fall in EU internal export share. The competitiveness gap inherited from the past, and the especially low quality of exported goods, hampered the possibilities of their expansion on EU markets. For the same reasons an improvement in their EU market share in the future would seem unlikely.

The reported research was innovative in terms of approach, methodology and scope of analysis used.

In most research, competitiveness is analyzed from the point of trade flows and trade structure. In WP1, as we were using a microeconomic approach, we linked competitiveness with the process of competition. This implies that, on the one hand, we

were concerned with competition results and, on the other hand, with factors influencing the ability to compete. Although in the literature this ability is measured by prices, one should keep in mind that in today's global competition prices are not always the main instrument of competition. Prices do not always reflect changes in costs. Besides, higher prices can be the result of higher quality, rather than lack of competitiveness. That is why, by using a Schumpeterian approach, we focused on changes in relative unit costs. On the other hand, considering the relative quality level of products produced by the AC-3 as compared to the EU-15 average we covered additional aspects of scope of competition pressure of the AC-3.

Second, the comparative character of the project was also novel. In research, we compared the effects and factors of competition of manufacturing industries of the AC-3 with that of the EU-15 average at the three digit level in 1996-2003, i.e., during the pre-accession period. The analysis covered 90 industries, while in most research the focus of analysis is on 23 industries. This allows us to show the differentiation of changes in competitiveness on low aggregated level of manufacturing industries.

Third, multilogit model analysis showed that relative unit labour costs in 1996-2003 played a crucial role in changes to AC-3 share in EU and domestic markets. On the other hand, in 2000-2003 the role of investment increased considerably. In depth analysis of changes in relative wages and productivity shows that the drop in the productivity gap was the main factor responsible for changes in the AC-3 share of the EU market. The inclusion of factors of competition shows that competition by productivity and not by wages was the main determinant of changes in competitive pressure of the AC-3 on the EU market. On the other hand, the increased role of investment - the main source of innovation in the accession countries since 2000, in changes in the EU market shares accompanied a shift from a defensive to an offensive strategy of restructuring. This analysis shows that differences in introduced restructuring strategies resulted in a divergence in the progress of competitiveness across AC-3 manufacturing industries. It also implies increasing dependence of changes in competitiveness of the AC-3 on improvements in investment rate.

Fourth, an analysis of quality segments of industries shows another aspect of the scope of competition between two groups of countries. Although the AC-3 increased EU market shares in most industries, the biggest improvement was in low and medium quality products. Differences in the quality of products between the two groups of countries acts as a form of protection for EU-15 products against AC-3 competitive pressure. However, in some high quality products, the competitiveness of the AC-3 is also increasing.

1.1. Report from the work of the CASE research team (Poland)

The research done by CASE proceeded in the following stages. First, to identify factors responsible for changes in market shares, a multinomial logit model has been constructed. Out of the four variables (relative unit labour costs - RULC, relative unit investment rate- RUI, relative unit export value - RUEV and relative unit intermediate costs – RUIC) chosen as potential factors determining competitiveness, only RULC turned out to be a significant determinant of changes in market shares. However, in the period 2001-2003 the rate of investment was a statistically significant factor of market performance. The greater the share of investment in an industry's turnover, the higher the odds of a better market performance. Changes in both domestic and EU market shares followed changes in RULC with a 2 year time lag.

Second, based on the criteria of the direction of changes of Polish exports in the EU-25's internal exports, industries which improved and diminished their share in EU internal exports were selected. Analysis showed that lower growth dynamics of RULC and higher improvement in relative labour productivity supported an improvement in their EU market share. High RULC and its deterioration resulted in a drop in their EU market shares. The Polish case tends to support the conventional wisdom on the importance of changes in export share as a measure of changes in competitiveness. However, most (above 70%) of Polish industries improved EU market shares and changes in their RULC and EU market shares were highly differentiated. This creates a rationale for introducing additional measures allowing the scale of this differentiation to be measured.

Third, a classification based on both domestic and EU market shares was introduced and 4 sub-groups of manufacturing industries were selected: double losers (losers in both markets), double winners and single losers/winners (losers in one market and simultaneously winners in another market). Although the level and the drop in RULC varied considerably among the subgroups, export-oriented industries that increased their share in the EU and simultaneously decreased their share in the domestic market can be regarded as the stars of Polish manufacturing,. They increased product quality and labour productivity the most. The more they diminished RULC and increased RUEV, the more they increased pressure on their EU counterparts. The progress of double winners was less visible and smaller. The industries that saw both market shares diminish remained non-competitive in all respect analysed.

Fourth, to determine industries with similar characteristics (those which are important players in the European market; those which have the potential to win the competition fight with their European adversaries; lagging industries; and losers) a cluster analysis

was performed. Variables describing the position in the EU and domestic market (respective shares) and improvements or deterioration of these positions, as well variables measuring the level and changes of RULC, were chosen as categorical variables. The 86 industries have been grouped into four clusters, named by characteristics (for the content of clusters by industries see Annex): double winners, export led industries, export-oriented industries and losers.

Table 2. Characteristic of the clusters

	Level				changes (in %)			
	1996	1998	2001	2003	1996-1998	1998-2001	2001-2003	1996-2003
double winners (22 industries)								
RULC	0,68	0,72	0,7	0,61	6	-3	-13	-10
RUIV	6,7	8,2	5,4	5,1	22	-34	-6	-24
employment					6,2	-10,2	2,2	-2,6
RUEV	75,1	75,7	91,2	91,6	1	20	0	22
domestic market shares	71,9%	69,6	72,1	71,7	-3	4	-1	-0,3
EU market shares	0,9%	1,1%	1,7%	2,0%	18	50	20	111
export-led (23 industries)								
RULC	0,8	0,81	0,76	0,57	1	-6	-25	-29
RUIV	7,6	8,7	5,3	6,2	14	-39	17	-18
employment					-4,1	-21,1	3,5	-21,7
RUEV	56	66,8	71,1	74,2	19	6	4	33
domestic market shares	56,4	49	41	36,5	-13	-16	-11	-35
EU market shares	1,2%	1,5%	2,5%	3,0%	27	68	21	159
export-oriented (30 industries)								
RULC	0,93	1,04	1,06	0,84	12	2	-21	-10
RUIV	6	7,4	5,2	4,4	23	-30	-15	-27
employment					-10,5	-22,6	-13,3	-39,9

RUEV	44,1	46	51,3	53,6	4	12	4	22
domestic market shares	58,6	53,3	48,5	45	-9	-9	-7	-23
EU market shares	1,1%	1,1%	1,3%	1,4%	1	14	11	27
losers (12 industries)								
RULC	1,2	1,34	1,41	1,17	12	5	-17	-3
RUIV	6,7	6,6	5	5	-1	-24	0	-25
employment					-7,7	-25,8	-11,3	-39,2
RUEV	34,4	37,5	40,4	39,3	9	8	-3	14
domestic market shares	41,1	34,3	29,6	26,2	-17	-14	-11	-36
EU market shares	1,3%	1,1%	0,9%	0,7%	-11	-24	-19	-45
Average of manufacturing								
RULC	0,77	0,81	0,77	0,62	5	-5	-19	-19
RUIV	6,3	7,5	4,8	5	19	-36	4	-21
employment					-3,5	-18,2	-3,6	-23,9
RUEV	55	58,8	66,5	68,2	7	13	3	24
domestic market shares	58,7	54,1	50,5	47,6	-8	-7	-6	-19
EU market shares	1,0%	1,2%	1,5%	1,8%	11%	33%	17%	73%

The distinguishing feature of double winners was their high productivity (turnover per employee) in 1996. This was 38% higher than that of the export-lead industries, 54% higher than that of export-oriented industries and 178% higher than that of losers. High productivity determined low RULC. However, a drop in investment rate since 1999 hampers improvement in productivity and expansion of their sales in the nearest future. As long as the dynamics of investment rate do not increase considerably, they may lose considerable position in both domestic and EU markets. These industries operate in the same quality segment as their EU counterparts, an increase in their EU exports shares implies that they compete fiercely on the EU market. Furthermore, though they have kept a strong position in the domestic market, their exports dynamics were high. They

either pushed out their EU counterparts from the EU market or gained an increasing part of the increment of EU market demand.

In terms of progress made, export-led industries were the stars of Polish manufacturing. Their distinguishing feature was a large increase in productivity, a fall in RULC, the highest level of investment rate and the lowest drop in investment rate. Initial defensive restructuring in 2000, based on a considerable drop in employment, transformed into offensive restructuring based on high investment rate; this can be interpreted as technological progress since investments are the major factor in technological progress. This supported an increase in productivity and helped to improve the quality of exported products, lower - however - than double winner industries. Restrictive wage policy resulted in a drop in RULC. The competitive advantages which they possessed allowed them to increase employment from 2000 onward. High dynamics of exports growth, supported by improvement in RULC, high investment rate and improvement in RUEV, resulted in their biggest increase in EU market share. These industries were the major force behind the dynamics of Polish manufacturing exports to the EU and they also stimulated the growth of Polish manufacturing production the most.

In 1996 in terms of RULC, investment rate and RUEV export-oriented industries lagged behind export-led industries considerably. Progress made in all respects was rather small. Weak improvement in RULC (below the average of Polish manufacturing) was the effect of a low improvement in productivity and a quite high increase in wages. A strong drop in the employment rate to 2003, neutralised by an increase in wages and a continuous drop in investment rate, confirms that they focused on defensive (shallow) restructuring exclusively. Although their share in the EU market increased, their share in Polish manufacturing production dropped. Continuous drop in investment and low RUEV will hamper further expansion on the EU market. This is even more likely because the substantial drop in employment suggests that the potential to increase exports by defensive restructuring has been exhausted. A comparison of this cluster with both losers and exports-led industries suggests that they are slow to restructure.

Losers industries differ quite considerably from others in all respects. In 1996 their productivity lagged behind other clusters the most. It was almost 3 times lower, while wages were only a little bit lower than in double winners. Although they reduced employment as much as export-oriented industries, their high RULC hardly changed. A low and diminishing investment rate did not support improvement in labour productivity. The lowest quality of the products implies that they compete mainly with non-EU producers in the domestic and EU markets. A lack of competitiveness resulted in a drop in domestic and EU market shares and in Polish manufacturing turnover.

The methodological framework used in the Polish part of the project marks a departure from the traditional literature on changes in competitiveness as it was based on the analysis of both domestic and foreign market shares as well as its factors. To date the literature on changes in the competitiveness of Polish manufacturing was based exclusively on the evaluation of export market share. In an open economy there are no special differences between the competitiveness of production exported and that sold on the domestic market. These conditions do not comply with the conditions in Poland in the 1990s. First, the hypothesis that the competitiveness of domestically oriented production is lower than exports is widespread in the Polish economic literature. Second, given that the Polish market was much more protected from foreign competition than, for example, the Czech one, the effects of liberalization were much more severe. This resulted in pushing a considerable part of domestic-oriented production out of the domestic market. Third, Poland is a relatively large country compared to the other ACs and most (over 65%) of its production is still domestically oriented. Knowledge of its competitiveness seems important. Fourth, since May 1st 2004 the Polish domestic market has been a part of the European Single Market. There is, therefore, a need to analyse changes from the pre-membership period. Concluding, we believe that the novel methodology applied in this study was more adequate for the Polish conditions than that represented in the literature.

1.2. Report from the work of the CIAE research team (Czech Republic)

The Czech research team analysed changes in the competitiveness of different branches of manufacturing industry in the EU25 and domestic markets in the period 1997 – 2003 (divided into 2 sub-periods: 1997 – 2000 and 2000 – 2003).

Czech manufacturing performed substantially well during 1997-2003: the share of Czech exports to EU in EU 25 internal exports grew steadily from 0.95% in 1997 to 1.76% in 2003, which represents an 86% increase. On the other hand, domestic production lost its position on the domestic market (Czech production on the Czech market as well as EU production on the EU market), which is a natural consequence of the trade-barriers release and convergence of the Czech Republic to the European Union connected with the specialization process. The share of Czech products on the Czech market decreased mainly during 1997-2000 (by 25.6%, whereas during 2000-2003 the decrease was only 2.4%). The slower loss of share was apparently caused mainly by the improved competitiveness of Czech products at the expense of EU products. While the portion of EU products on the Czech market grew by 57.8% in 1997-2000, during 2000-2003 this was only by 6.2%.

The success of Czech products is even magnified by a stable growth of export prices – the mentioned growth was achieved, although the unit export value increased by 83% between 1997 and 2003. Such a development of concurrent increases of prices, as well as demanded volumes, can be interpreted as a systematically higher improvement of the quality of Czech goods when compared to corresponding EU production.

While the industry-level analysis considered both domestic market share and share in EU-25 internal exports, only the latter is presented here. This is because the Czech statistical data proved to be particularly vulnerable to the problem that is inevitably associated with the calculation of domestic apparent consumption (the denominator of domestic market share): the problem of inconsistency between data on manufacturing production and data on manufacturing trade⁵. Although efforts have been made to overcome this problem, the final results were assessed as not credible enough. Therefore, the analysis focused on external competitiveness.

Industries were divided into four sub-groups according to the evolution of their EU market shares in the two sub-periods under consideration (Table 3).

Table 3. Four subgroups of the Czech manufacturing industries

	Development of the share in period		Characteristic of the subgroup	No of industries
	1997-2000	2000-2003		
I	Decrease	Decrease	Constantly negative trend	10
II	Increase	Decrease	Negative change of the trend	19
III	Decrease	Increase	Positive change of the trend	14
IV	Increase	Increase	Constantly positive trend	60

I. Sixty of the 103 manufacturing industries (which have a two-thirds share in Czech manufacturing production) have had a **constantly positive** development on the EU25 market. This means that each of them displayed an increase in trade share in both analysed sub-periods. Their common trade share increased by 130 % during the total analysed period (1997-2003). Their average relative unit labour costs (relative to the respective EU industries' costs) decreased during this time (by 15 % in the whole period). On the other hand, their unit export prices increased dramatically (by 80 %).

⁵ NACE classification used in producer statistics ascribes a firm to a given NACE category based on firms principal product; however the firm might be still selling different CPA products. This leads to inconsistency.

Thirty-nine industries out of sixty displayed an above-average manufacturing growth of production in both periods. Their share on the EU market almost tripled (190 % growth). The most distinctive parts of this group are manufacturers of motor vehicle components, engineering and manufacturers of electronics. This group's typical feature is a dramatic decrease of relative unit labour costs (by almost 25 %) and doubling of relative unit export prices.

II. Fourteen industries (with 16 % and 11 % share in manufacturing production in 1997 and 2003 respectively) **increased their EU25 trade share** from 1997 to 2003, but **just due to improvement in the second sub-period** (2000-2003). Their trade share decreased in the first period (1997-2000). Their former decrease in trade share was accompanied by an increase in relative unit labour costs and a decrease (!) in relative unit export values. The consecutive increase in market share happened together with an increase of relative unit export values and a decrease in relative unit labour costs.

III. Nineteen industries (23 % and 19 % share in Czech manufacturing turnover in 1997 and 2003 respectively) also **increased their share on the EU market**, but just **owing to development during the first sub-p EU market**, but just owing to de period their market share decreased. Their relative unit labour costs decreased in both periods, but their unit export value increased just in the first sub-period.

This group contains one of the pillars of Czech manufacturing – the manufacture of motor vehicles (NACE 341 and 342) (excepting car components, which are classified under the first group). The share of Czech motor vehicles decreased on the EU25 market during the period 2000 to 2003, but this development was temporary, caused by weaker demand abroad and especially by floods in the Czech Republic in 2002. In 2005 a new car factory (a joint-venture of Citroen, Toyota and Peugeot) was put into operation. Its target capacity is 300,000 cars per year. The Czech Republic seems therefore to be strengthening its position in car production, rather than losing it.

IV. Only 10 industries – with less than 4 % share of Czech manufacturing turnover – **display a permanent decrease in market share on the EU25 market**. Their market share diminished by 50 % on average. The unit export values stagnate in this group. However, the share of these industries on the *domestic* market increased substantially, especially in the second sub-period. At least some of these can thus be characterized as **industries with a focus on domestic market**, rather than as losers. One of the factors in their relative success on the domestic market might be decreasing unit labour costs.

This analysis was the first that has formulated and successfully verified the hypothesis of the relation between relative-unit measures of economic indicators and successfulness of industries in international (EU market) competition. The scope of the study, covering 103 industries over 6 years, contributed to its considerable value added.

1.3. Report from the work of the research team from the Hungarian Academy of Science

The Hungarian research covered the period 1996-2003 and focused on the EU market due to unsatisfactory results for the domestic market. The analysis proved that Hungary almost doubled its share in EU-25 internal exports over the period analysed: from 0.8% in 1995 to 1.5 % in 2006. In the industry level analysis, four groups were distinguished:

1. Industries which increased their EU market share (which was defined, again, as the proportion of Hungarian exports to the EU over EU-25 internal exports)

1.1. These were the industries which increased their shares in the EU market and, similarly, increased their shares in the EU-15 external imports. By implication, these industries out-competed all types of suppliers on the EU markets.

1.2. These were the industries which increased their shares in the EU market but their shares in the EU-15 declined. In other words, they lost some of the EU market to non-EU suppliers.

2. Industries whose EU market share decreased

2.1. Industries whose shares in the EU-15 nevertheless increased. This means they were pushed out of the EU market by EU 25 exporters, but they managed to out-compete non-EU suppliers.

2.2. Industries whose shares in the EU-15 nevertheless declined. These were the industries which increased their shares in the EU market but their shares in the EU-15 declined. These industries diminished competitiveness and were out-competed by all suppliers in the EU 15 market.

As evidenced by the data, out of 95 manufacturing groups analysed, 73 belonged to Group 1. i.e. they were generally assessed as competitive on the EU-25 market. Out of these 62 were Group 1.1. industries, implying that they were competitive against third-country competitors, whereas 11 were Group 1.2. industries. Interestingly there were as many as 18 industries in the group 2.2. Apparently, when Hungarian producers lost market share they were in most cases competed out also by third country producers.

Including the quality aspect in the analysis yielded ambiguous results as far as the levels of the relative unit export values are concerned (Table 4). On the one hand Group 1.1. has the highest relative unit export value. On the other hand it included relatively few industries with RUEV higher than unity as compared to the other three groups. Analysis of the RUEV dynamics shows that the least competitive group of industries (2.2.) was also the one where the quality improvements were the weakest. What is more the increase in the EU market share (Groups 1.1. and 1.2) did not come at the expense of lower prices.

Table 4. Relative unit export values in the four groups of Czech manufacturing

	Group 1.1	Group 1.2	Group 2.1	Group 2.2
Average RUEV	1.13	1.02	1.08	1.04.
No. of industries with RUEV>1	16/62 (25,81%)	4/11 (36,36%)	2/4 (50,00%)	7/18 (38,89%)
No. of industries where RUEV grew	44/62 (70,97%)	8/11 (72,73%)	4/4 (100,00%)	12/18 (66,67%)

2. Work Package 2

The aim of this work package was to examine the impact of government policy on the competitiveness of the manufacturing industries in the Czech Republic, Hungary and Poland. The research focused specifically on the analysis of government policies in the early transition, state aid policies in the pre-accession period and their impact on competitiveness not only in individual countries but also in a comparative context.

Three principal research questions were asked in this WP: (i) what were the main features of government intervention in the three countries in the early days of transition; (ii) what were the underlying principles and the outcomes of the state aid policy following the opening of negotiation on accession (and the passage of Europe Agreements) in the three countries and how did these policies compare across the three countries; (iii) what was the impact of these policies on the competitiveness of different industries? Our underlying hypotheses are that taxes and subsidies do not improve the competitiveness of industries.

In terms of methodology, first the broad government policy intervention in the first decade of transition was analyzed and the process of gradually bringing that intervention

under the 'state aid' umbrella was described. Then, the impact of these policies on competitiveness is investigated. The theoretical framework for the analysis is the 'market failure versus government failure' debate with econometric analysis and case studies used to support and substantiate the investigation.

The descriptive analysis of the state aid had to face several challenges as regards collecting and interpreting the data, despite the fact that the Europe Agreements committed the governments of the candidate countries to establish a legislative framework and a reporting and monitoring process and institution to ensure that government commitments are realised. Not only is there confusion about the definitions used and methodologies followed by different countries, but there have also been many changes in the methodology of allocation of state aid to different objectives and the time period when comparable statistics were collected. A particular area of confusion is whether a specific aid programme should be treated as 'horizontal', 'sectoral' or 'regional'. There is also a basic problem in identifying unambiguously those expenditures by the state which should be classified as 'state aid' according to the relevant state aid legislation, i.e., those that 'distort or threaten to distort' competition.⁶ More significantly, these shortcomings have enabled governments to provide aid to enterprises and sectors for political reasons which cannot be justified under EU rules (Hashi, et al., 2004).

We have used a variety of methodologies to search for the impact of government policy on competitiveness. Overall, we developed an econometric model for testing and estimating the impact of various factors on industrial competitiveness in the three countries. This model, included taxes paid and subsidies received by industries and other indicators of government intervention (such as the share of government in total employment or output of an industry) as well as other factors influencing productivity at industry level (labour cost, material cost, energy cost, investment, etc.).

$$COMPETE = \alpha_0 + \beta_1 TAXES + \beta_2 SUBSIDIES + \delta_i X_i + \sum_{i=1}^n \gamma_{i1} SECTOR_i + \sum_{j=1}^m \phi_j YR_j + \varepsilon (*)$$

where COMPETE represents competitiveness of an industry measured by the share of that industry's sales (i) in the domestic market and (ii) in EU apparent consumption (output plus imports less exports); TAXES is the total tax paid by firms in the industry (profit tax, social insurance and health contributions, local taxes, etc) as a proportion of sales; SUBSIDIES is the total subsidy received by firms in the industry, also as a

⁶ In the Czech Republic, e.g., it has been roughly estimated that during 1997-2000 state aid was twice as high as officially registered (Panec and Zemplerova, 2005).

proportion of industry sales. These two variables are instruments of government interaction. Other regulatory mechanisms (e.g., environmental rules) are less quantifiable and industry-specific and are therefore left out of the model. \mathbf{X} is a vector of variables such as unit labour cost (labour cost/sales ratio) relative to EU labour cost, unit material cost, and investment intensity measured by investment per employee (measuring the productivity of inputs and other industry characteristics which may influence competitiveness); SECTOR is the branch of economic activity to which each of the industries belong (all activities are grouped into nine branches)⁷, YR is the year dummies, and ε is the error term.

For individual country studies we used different methods. In Poland, an econometric model similar to the above, but enhanced with additional variables specific to Poland, was applied to industries at 2-digit and 3-digit levels. Here, the share of government owned enterprises in total sales or employment, the excise tax and the share of sales in each industry subject to lower VAT rates were also included in the analysis. In the Czech Republic, the emphasis of the research was on the impact of subsidies on domestic and foreign competitiveness and the identification of the characteristics of industries receiving the highest share of total subsidies. Here, too, an econometric methodology using rank correlation was employed.

While a detailed discussion of research results is included in the subsequent country reports, the main results are highlighted here. All three countries under consideration followed a similar interventionist policy in the early phase of their transition. The policies were aimed at 'rescue and restructuring' of their large loss making enterprises through similar policies and institutions. Although a vast amount of resources were used to support these industries, much of these resources were used inefficiently and without the expected benefits. What is common in the three countries is that the total cost of these policies remains unknown because of the vast array of forms of support, the complexity of methods of financing, and the insufficient reporting by the multiplicity of aid granting organisations.

This research highlighted not only the interesting structure of state aid and its financing, but -more importantly - the deficiencies and difficulties of the measurement and reporting of state aid. In the pre-accession phase, and in all three countries, the reporting of state aid and the allocation of each element of expenditure to particular categories was problematic. Indeed, there is some evidence that in all countries state aid

⁷ Each branch consists of a number of three-digit industries grouped together on the basis of their technical similarities.

was under-reported for political reasons. Furthermore, as far as reported state aid is concerned, its structure was heavily skewed toward sectoral and regional aid (especially in the Czech Republic), rather than toward less distortionary horizontal aid (as is the case in the EU15 countries). Table 5 shows this major difference between the two blocks of countries. The table also shows the differences in methods of financing state aid. In terms of instruments of financing, too, there were big divergences between the three countries and the EU15. In these countries, tax exemptions and deferrals, followed by soft loans, guarantees and equity participation were larger and more common whereas grants and subsidies were the main form of support in the EU. The instruments used in the three countries are likely to be less transparent, less measurable and easier to hide.

Table 5. Types of state aid and their means of financing, Average 2001-2003.

Objective	Poland	Hungary	Czech Rep2	EU15
Horizontal	11	18	7	52
Sectoral	72	58	90	25
Regional	17	24	3	23
<i>Means of financing*</i>				
Grants (non refundable subsidy, interest subsidy)	36.5	22.7	29.6	67.0
Tax exemptions	32.1	74.2	2.7	22.7
Equity participation	0.7	0	61.8	0.7
Soft loans	9.5	1.2	3.5	4.8
Other soft credits, deferrals	3.7	0	na	2.6
Guarantees	17.4	1.9	2.3	2.2

Note: * The data for means of financing in Poland, Hungary and the Czech Republic refer to 2000-02.

Source: CEC (2005); Hashi, et al. (2004).

The comparative analysis performed by the WP leader (the Staffordshire University) also included an assessment of the impact of government policy instruments on competitiveness. This was accomplished by estimating the equation (*) specified above. Here, our results, in broad terms, do not provide support for the view that government intervention can improve competitiveness either on the domestic or on the EU market. Taxes and subsidies, generally, have an insignificant effect on competitiveness (occasionally this effect is negative – with taxes it is only marginally significant).

Table 6 shows the summary of results for Poland and the Czech Republic.⁸ The impact of other control variables are generally as expected (though these are not the focus of this research). The models used here are robust with respect to model specification and the inclusion of other variables.

Table 6. Government Policy and Competitiveness, Poland and Czech Republic.

	Dependent Variables			
	COMPET1 (share of EU market)		COMPET2 (share of home market)	
	Czech Rep (1997-03)	Poland (1996-03)	Czech Rep (1997-03)	Poland (1996-03)
TAXES	-0.000 (0.999)	-0.113* (0.064)	0.105 (0.835)	0.199 (0.702)
SUBSIDIES	-0.026 (0.570)	-0.021 (0.590)	0.125 (0.936)	-0.671** (0.039)
LOWER VAT RATE		-0.011*** (0.006)		0.044 (0.253)
UNIT LABOUR COST RELATIVE TO EU	0.001*** (0.000)	0.002*** (0.000)	-0.125*** (0.000)	0.002 (0.677)
UNIT MATERIAL COST	0.009*** (0.0.000)	0.024*** (0.002)	0.090 (0.157)	0.092 (0.224)
INVESTMENT PER EMPLOYEE	-0.000 (0.314)	-0.000 (0.199)	0.001 (0.642)	0.000 (0.862)
SECTOR dummies	Yes	Yes	Yes	Yes
YEAR dummies	Yes	Yes	Yes	Yes
No. of observations	669	477	569	442
R ² (overall)	0.127	0.173	0.392	0.416
Wald chi ² , prob	0.000	0.000	0.000	0.000

Notes: For the precise definition of variables, and the results for competitiveness on the domestic market, see Hashi, et al. (2005). Results for Hungary can be found in Deliverable 2.6. There is no data for LOWER VAT RATE in the Czech Republic. All equations include a constant term; p-values are shown in brackets. * Significant at 10%; ** significant at 5%; and *** significant at 1%. Estimation resulted are based on the Random Effect model.

⁸ The result for Hungary, which can be found in Deliverable 2.6, is similar. Here the available data was for a shorter period and normal OLS was performed on average values rather than in a panel form. More recent data has now become available and the panel data analysis will be carried out shortly.

Our results largely support the literature on the failure of government policy and weaken the case made by the proponents of 'industrial policy' who believe that taxes and subsidies can be used to bolster the competitiveness of industries.

The results of country teams are reported in subsequent subsections. Brief summaries follow.

In Poland, the econometric evidence at 2-digit and 3-digit industry levels (Balcerowicz and Sobolewski, 2005) showed that continued state involvement in the economy (measured by the share of state owned enterprises in total employment or output) has a negative impact on competitiveness on both domestic and EU-15 markets. The tax burden has a negative impact on the competitive position of the Polish industry on both domestic and European markets. Subsidies, too, have negative impact on industrial competitiveness.

Empirical work in the Czech Republic showed that the large industries with stronger market power, measured by the sellers' concentration index, (and consequently political influence) received more subsidies but these subsidies do not improve their domestic competitiveness over time. Changes in domestic competitiveness over the 1998-2002 period has been negatively related to the total amount of subsidies. Similarly, competitiveness of industries on foreign market is negatively related to the total amount of state subsidies per employee.

In Hungary, both descriptive analysis of data on FDI involvement and case studies of selected industries (Szanyi, 2004a) highlight the importance of tax exemptions as a means of attracting foreign direct investment (FDI). The government had employed a very proactive policy to attract foreign direct investment into Hungary and these two industries were dominated by foreign multinationals. At the same time the experience of FDI in Hungary shows that foreign investors can be attracted to other countries if they are offered better terms.

The study of state aid, its evolution and its structure was new in all three countries and so was the comparison of the structure of state aid amongst the three countries and with the EU. What is more, none of the previous studies in the field were concerned with competitiveness at industry level (Papp, 1994; OECD, 1995; Szanyi 1996; Török, 1997; Gray and Holle, 1998; Antalóczy, 2000; Kryńska, 2000; Nikodemus, et al., 2000; Tétényi, 2000; Balcerowicz and Bratkowski, 2001; Neneman and Sowa, 2002; Supreme Chamber of Control, 1997, 2002a and 2002b; Csillag, 2003; Szalavetz, 2003; Szalay-Berzeviczy, 2003; Jensen and Winiarczyk, 2004).

2.1. Report from the work of the CASE research team (Poland)

The Polish manufacturing sector as a whole did not receive a substantial amount of direct subsidies in the eight-year period of 1996-2003. In 1996 direct state support to manufacturers accounted for 514.6 million zlotys, which constituted 0.2% of total sales in the sector. In 1997 government subsidies increased (in nominal terms) by 20% (to 623 million zloty) and this 1997 (nominal) level was maintained in the subsequent two years. However, the relative weight of state support decreased. In 2000 the total amount of subsidies to the sector was cut by 22% as compared to the previous year. In the years 2001-2002 the amount was raised by 8- 10% to 510-520 million zloty. In the last year of the analyzed period it fell to a much lower level of 419 million zloty (less than 0.1% of total manufacturing sales). Yet, the experience from the past two years shows that this figure may be underestimated and can be increased in the next edition of statistical yearbooks.

Generally, we are able to conclude that this instrument of direct support to the manufacturing sector was meaningless in the whole period and its scope had been decreasing.

Next, we ran econometric analyses to test the hypothesis that government policies negatively impact performance of the enterprise sector.

The econometric analysis was carried out for:

- 1) 2-digit industries (i.e. manufacturing *divisions*); and
- 2) 3-digit industries (i.e. manufacturing *groups*).

Analysis for 2-digit industries. As our main focus is the impact of government policies on the performance of Polish manufacturing divisions on both domestic and external markets, we took into consideration two dependent variables: domestic market share (DCM)⁹ and EU-15 market share (EMC)¹⁰. Data necessary to calculate DCM was obtained from the Polish statistical databases, while data for ECM - from Eurostat COMEXT database. Values of ECM for *divisions* are aggregated from data available for 3-digit industries. Let us underscore that all 23 *divisions* were included in the analysis. We used the following 10 factors as independent variables:

⁹ The share of Polish sold manufacturing production in the domestic consumption of manufacturing products

¹⁰ the share of Polish exports to the EU-15 in intra-exports of the EU-25 (EMC)

- 1) share of employment in state owned manufacturing companies in the total employment in the manufacturing sector;
- 2) share of sales of state owned manufacturing companies in the total sales of the manufacturing sector;
- 3) the subsidies to sales ratio;
- 4) the total labour cost to sales revenues ratio;
- 5) the gross fixed assets (deflated with the investment goods prices index) to sales (deflated with producer price index - PPI) ratio;
- 6) the income tax to sales ratio
- 7) the total liabilities vis-à-vis government (CIT and PIT income taxes, customs and social security contributions) to sales ratio;
- 8) the investment to sales ratio;
- 9) the concentration coefficient for 2-digit manufacturing sections³⁰;
- 10) the producer price index, 2-digit industries.

Five out of ten independent variables (numbered 1, 2, 3, 6, 7) were regarded as indicators of the size of the Polish government's intervention into areas in which Polish manufacturers are directly or indirectly exposed. While choosing these 5 indicators, we were constrained by accessibility of data for 2-digit industries. Three types of analysis were made for each of the two dependent variables. First, we analyzed the overall competitiveness of the Polish manufacturing sector by making regressions on averages for the entire period under observation. Thanks to this step, we could receive a general model and separate key economic factors explaining change in DCM and ECM. Second, competitiveness in subsequent years was analyzed separately. As a result, a set of models was obtained, allowing us to examine what factors influenced both DCM and ECM in different years. That enabled us to observe trends. Third, we carried out panel data regressions with fixed effects in order to look for differences among manufacturing *divisions*. Individual effects appeared to be significant.

Final specifications of all models were obtained by applying general to specific methodology. With some exceptions, the specifications are resistant to problems arising from autocorrelation, heteroscedasticity and multicollinearity.

Additionally, regressions were made on the restricted sets of variables which had appeared to be significant in the previous analysis made for the years 1996- 2001 (see: Sobolewski 2004a). These models, applied to an enlarged data set, have lower explanatory power (lower fitting) than new models elaborated in the present study, which are estimated on an unrestricted data set. In the process of estimation, a proper functional form of models used in the analysis of both types of competitiveness turned out to be linear.

Results of regressions from various models made for 2-digit manufacturing industries show that the overall domestic competitiveness of the Polish manufacturing sector in the whole studied period was positively influenced by: the share of total labour costs in the revenues from sales¹¹; producer price index (PPI); size of investment; and share of sales of state owned manufacturing companies in the total manufacturing sales

Three out of five factors related to state policy proved to have a significant and negative impact on DCM. These were: the subsidies to sales ratio; the employment in state owned manufacturing companies to total manufacturing employment ratio; the total liabilities vis-à-vis government to sales ratio.

The bigger the relative size of subsidies and total liabilities vis-à-vis government, the smaller domestic competitiveness of the manufacturing sector turned out to be. The same was found to be true for state ownership in the manufacturing sector. These three findings support our hypothesis regarding the unfavourable impact of the government's fiscal policies and involvement in corporate governance on the performance of the enterprise sector.

Regressions made for each year of the analyzed period indicated the growing negative importance of concentration on domestic competitiveness of the manufacturing sector, and a growing positive impact of investment size (increasing coefficients) for the years 1999-2001.

As regards, external competitiveness, results of the linear modelling for 2-digit industries show that six factors turned out to be important for the performance of external competitiveness (or strictly speaking the EU-15 one) of the Polish manufacturing sector. One of them – the total labour costs to sales revenues ratio – positively influenced ECM in the whole period under observation. It is worth noticing that this factor was found significant and positive also in the case of domestic competitiveness.

¹¹ This does not contradict the findings of WP1, where labour cost *dynamics* was analysed, not level of labour costs.

The remaining five factors (four of them indicating the government's intervention into the business environment) had a major negative impact: income tax payments; total liabilities vis-à-vis government; concentration; subsidies; and size of the state owned sector (measured by its share in the total manufacturing employment).

These findings seem to support our hypothesis that fiscal duties and state ownership do not facilitate an increase of ECM. It provides us with yet another piece of evidence that direct state support to enterprises in the form of subsidies does not contribute to improvement of the position of Polish manufacturers on the EU-15 market, but, on the contrary, weakens their performance on foreign markets.

Analysis of 3-digit industries. In order to make estimations for 3-digit industries we took the same two variables (as for 2-digit industries) treated as dependent ones: DCM and ECM. Because of the lack of data for a number of manufacturing *groups*, the analysis could not embrace the entire population: for DCM, regressions were made only for 77 out of the total number of 102 industries, while for ECM 89 industries were taken into account.

We applied the following 13 factors as independent variables:

- 1) the subsidies to sales ratio
- 2) the relative unit labour cost: Poland to the EU-15 (i.e. a ratio of labour costs to sales revenues in Poland to labour cost to sales revenues in the EU-15)
- 3) unit energy costs (the energy costs to sales ratio)
- 4) the income tax to sales ratio
- 5) the depreciation to sales ratio
- 6) the depreciation to investment layouts ratio
- 7) the investment layouts to sales ratio
- 8) investment per employee (the investment layouts to employment ratio)
- 9) the excise tax to sales ratio
- 10) the ratio of revenues from VAT free sales to total sales revenues from production subject to VAT taxation

- 11) the ratio of revenues from sales subject to a special VAT rate to total sales revenues from production subject to VAT taxation
- 12) the ratio of revenues from sales subject to a regular VAT rate (22%) to total sales revenues from production subject to VAT taxation
- 13) the ratio of revenues from VAT free sales and special VAT rate sales to revenues from sales subject to a regular VAT rate (22%)

Nine out of thirteen independent variables (1, 4, 5, 6, 9, 10, 11, 12, 13) measured the scale of government's intervention into activity and the performance of manufacturing companies. In the analysis we focused on their impact on the competitiveness of the manufacturing sector. In the case of domestic competitiveness, the subset consisted of 12 variables (1- 12). In the case of external competitiveness, the subset contained variables 1-9 and 13. We applied the same methodology as in the case of 2-digit industries. In the process of estimation the proper functional form of models used in the analysis of external competitiveness proved to be log-linear, whereas for domestic competitiveness it was linear.

Results of regressions from various models made for 3-digit manufacturing industries show that the overall domestic competitiveness of the Polish manufacturing sector in the whole period under consideration was positively influenced by: depreciation relative to sales revenues; excise tax payments relative to total sales revenues, and size of sales subject to preferential VAT taxation

Two factors listed below had a significant negative impact on domestic competitiveness in the whole period under the analysis: unit energy costs, and relative size of income tax.

Let us put emphasis on the fact that outcomes of regressions done for 3-digit manufacturing industries indicate different factors as positive and significantly important for overall competitiveness of the manufacturing sector on the domestic market than do outcomes produced by regressions performed on data for 2-digit industries, but this is also due to a different set of explanatory variables. Relative depreciation partly responds to the investment intensity considered above, since depreciation is a significant source for financing investment layouts in enterprises.

The finding that preferential VAT rates affect DCM positively is consistent and may be explained by an increased demand for goods sold at lower prices due to a lower VAT imposed on them. A positive influence of the excise tax (which is an *ad valorem* tax) on domestic competitiveness could be explained with the following argument. The excise tax imposed on a limited number of goods hinders imports of more expensive foreign

products levied with the tax (cigarettes, alcohol, cars), thus making more room for cheaper domestic producers. This explanation needs further verification, though. At the same time the excise tax appears to have a negative effect on foreign competitiveness, which results from its impact on consumer price, curbing consumers' demand. Corporate income tax payments proved to have a strong and negative effect not only on the position of Polish manufacturers on the domestic market vis-à-vis importers, but - as we demonstrate below - also on their market share in the EU- 25. The reason is that due CIT payments are deducted from profits, and in that way they decrease enterprises' internal sources of financing investment and growth. The regressions indicate that unit energy costs hinder domestic competitiveness. We may attempt to explain this phenomenon with prices of energy in Poland higher than in other countries, which would give a comparative advantage to foreign manufactures and place them in a better position vis-à-vis Polish producers on the Polish market. This hypothesis needs to be verified, especially taking into account the results of the regressions on external competitiveness that seem to question such an explanation (see next subsection). These outcomes show that unit energy costs in Poland are found to affect positively competitiveness of Polish manufacturers on the EU-15 market. A correct explanation here may be cheaper imports to Poland from countries other than the EU-15.

Regressions made for each year of the analyzed period separately revealed a stable positive impact of the excise tax and an increasing positive impact in the size of sales subject to preferential VAT taxation on domestic competitiveness.

Results of regressions made for the entire eight-year period indicate that external competitiveness of the Polish manufacturing sector was positively influenced only by unit energy cost, and negatively affected by the following five factors: the income tax relative to sales revenues ratio; the depreciation to investment layouts ratio; the investment layouts to employment ratio; the excise tax to sales revenues ratio; and the size of sales subject to preferential VAT taxation ratio.

Two variables, unit energy cost and excise duties, were commented on above. The significance of income tax payments for ECM resembles the same result from other regressions in this study. The negative impact of the investment layouts on employment and depreciation on investment layouts ratios is difficult to explain. A negative effect of investment on external competitiveness might be caused by the past structure of Polish exports that could concentrate more on labour-intensive products.

Results of regressions performed for each year separately show that a negative influence of investment layouts to employment decreases every year. Moreover, a negative impact

of both depreciation to investment layouts and the income tax on external competitiveness was rather stable and significant in almost every year. Regressions based on a general-to-specific methodology suggest that, apart from the three above mentioned factors, relative unit labour cost (growing in importance) and unit energy cost are also persistent regressors.

2.2. Report from the work of the CIAE research team (Czech Republic)

The analysis of aid provided by the Czech state to the manufacturing firms revealed several interesting facts. First, the bulk of state aid – which is very high as compared to the EU-15 countries and reached 4.5% of manufacturing value added in 2002 – was mainly addressed to the rescue and restructuring of enterprises. More than 40% of total subsidies allotted by the state to manufacturing during 1997-2003 supported food industries, of which more than half dairy products. This can be explained by several factors – by strong lobbying and links to agricultural subsidies, by efforts to harmonise with environmental and other regulations, and last but not least, by efforts to rescue enterprises that were facing import competition. The principal receivers of state subsidies were manufacturers of plastic products, manufacturers of automotive parts, manufacturers of electricity distribution and control apparatus, manufacturers of rail and tram locomotives, manufacturers of power-generating machinery except transport, and manufacturers of other chemical products. Listing of subsidized industries not only confirms a relationship with the subsidizing of agriculture but also industries such as car and car parts or industries that need to be restructured such as manufacturers of basic iron, steel, and Fe-alloys or footwear.

Correlation analysis of the impact of state subsidies on the competitiveness of Czech manufacturing during 1998-2002 has shown that the long-term (cumulative) competitiveness of industries on the domestic market is positively related to the total amount of state subsidies and also to the total change of state subsidies. On the contrary, long-term (cumulative) competitiveness of industries on the EU market is negatively related to the total amount of state subsidies per employee and also to the total change of state subsidies per employee, so there exists a systematic relationship between the cumulative competitiveness of manufacturing industries and governmental policy of subsidizing: larger (more competitive on domestic market) industries receive more subsidies and larger (more competitive on EU market) industries receive less subsidies per employee.

Table 7. Correlation analysis of state aid and competitive performance

Correlation	Pearson coef.	Spearman coef.
c_d 98-02 & s 98-02	-0,12	-0,27***
summa c_d & s 98-02	0,38***	0,58***
summa c_d & delta s 98-02	0,32***	0,31***
c_d 98-02 & delta s 98-02	-0,11	-0,23**
c_{eu} 98-02 & s/l 98-02	-0,17	-0,16
summa c_{eu} & s/l 98-02	-0,19*	-0,38***
summa c_{eu} & delta s/l 98-02	-0,13	-0,24**
c_{eu} 98-02 & delta s/l 98-02	-0,10	-0,08

* significance level 0,1; ** significance level 0,05; *** significance level 0,01

c_d 98-02	Change of domestic competitiveness 98-02
c_{eu} 98-02	change of foreign competitiveness 98-02
summa c_d	sum of (=cumulative) domestic competitiveness 98-02
summa c_{eu}	sum of (=cumulative) foreign competitiveness 98-02
s 98-02	share of the industries on the total amount of state subsidies received
s/l 98-02	share of the industries on the total amount of state subsidies received per employee
delta s 98-02	share of the industries on the total change of state subsidies received
c_d 98-02	Change of domestic competitiveness 98-02

Source: Eurostat, CSO, MIT, own calculations

Finally it was demonstrated that there exists a relationship between growth (change) of domestic competitiveness and state subsidies: evolution of domestic competitiveness negatively relates to the total amount of state subsidies and also to the total change of state subsidies – industries that receive subsidies do not improve domestic competitiveness.

2.3. Report from the work of the research team from the Hungarian Academy of Science

When analysing the evolution of state aid in Hungary, the research team asked the question if the change of accents in economic policy goals – from stabilization and liberalization at the beginning of the transition period to the creation of competitive, technologically up-to-date facilities – was reflected in measurable tools of economic policy i.e. in the composition of state aid expenditures? Then, in their analysis of the relationship between state aid and competitiveness, the Hungarian colleagues focused on the issue of FDI promotion. Specifically, they asked two questions: (i) what are the consequences of the dominant role of foreign-owned companies on Hungarian manufacturing (ii) does tax policy (tax holidays) induce income flows from countries with higher corporate income tax levels?

In terms of methodologies, these were similar to those used by the other country teams with the exception of the problem of tax holidays. In that case the analysis consisted of testing if Germany-based multinational firms transferred incomes from Germany (or elsewhere in the world) to Hungary in order to make use of Hungary's corporate income tax holidays. This could be checked by comparing the relative value added content of NACE 3-digit level sales figures.

The analysis showed clearly that government policies' accent changed substantially after the Hungarian economy was stabilized during the mid-1990s and the structure of state aid reflected this shift. The most important determinant of state aid expenditure was subsidization of ailing industries in the first 6-7 years of transition, and this gave room for more pro-active policy targets. The late 1990s' and the 2000s' state aid expenditure was more limited in size and of a changed structure, and tax incentives took over the dominant role. The change of shares was the result of both the absolute decline of subsidies, and the more modest increase of tax allowances for investments.

As regards the consequences of domination by foreign-owned firms, the authors state that currently foreign firms' relationship to governments is very similar to the kind of relationship that big state owned enterprises (SOEs) developed to central authorities in the previous regime. Industrial policy (including investment promotion) favoured large scale foreign investments in the researched period and many of the goals of economic policy were attributed to the presence and activities of foreign companies. Statistical and anecdotal evidence shows that foreign firms now enjoy similar status in the Hungarian economy to that of the SOEs in the previous regime. This kind of relationship may help governments to achieve some of their economic policy goals (those which are in line with

the business interests of the foreign firms). However, some state policy aims contradict the foreign sector's interests. In such cases a similar bargaining process to that described between SOEs and governments in the previous regime may be the result. Perhaps the most visible example of this bargaining process is when governments of developing countries compete for FDI.

The analysis did not find convincing evidence of the tax holidays hypothesis. Not only was the general level of profits higher in Germany than in Hungary, but the industries in relatively better profitability position in Hungary were by far not identical with those branches that received the highest amounts of tax subsidies. Based on the results of the usage of our rather limited analytical tools, we can therefore reject the original hypothesis of multinational companies' misusing certain countries' tax incentives for the purpose of tax evasion.

The project made a solid contribution to the Hungarian economic literature. Previous research on competitiveness-relevant policies in Hungary concentrated on mere description of various policy tools, counting the lists of priorities and the allocated financial resources (OECD 1995, Szanyi 1996, Nikodemus, et.al. 2000, Szalay-Berzeviczy, 2003). While policy analysis could properly identify the turn of policies from subsidization of loss-making activities towards promotion of creating new capacities (Szalavetz, 2003, Tétényi, 2000, Csillag, 2003), it fell short of expressing the magnitude and potential impacts of the policies. One exception was Török (1997) who provided an estimation of state expenditure on subsidization of ailing state owned companies. The official publications on state aid (TVI, 2002) and industrial policy (MITT, 1997, GKM, 2002) on the other hand did not try to interpret the importance of the changes in the structure of state aid. The following project analyzed changes in the state aid structure and used this analysis as a kind of measure of policies' real impact on competitiveness. To the knowledge of the authors it was the first to express the quasi-character of Hungarian state aid: the internationally high level of state aid in fact did not cover actual payments from the state budget, but was in fact only a decline by the state from would-be tax incomes. It was also the first attempt to check if that quasi-state-aid affected international income flows.

3. Work Package 3

The focus of Work Package 3 was structural changes, which were defined as changes in shares of individual industries in total manufacturing sales, value added and employment. The principal research questions were, first, what role have changes in competitiveness played in observed structural change in the Czech Republic, Hungary, Poland, Spain and Ireland, and second, what was the relationship between structural change and changes in labour productivity in the manufacturing sectors of these countries.

The analysis of factors of structural change was an important question which attracted the attention of many transition economists in the first decade of transition, and to which no conclusive answer has yet been given. Was it change in demand that led firms to produce goods wanted by the consumers and discontinue or reduce the output of unwanted goods? Was it the enterprise managers' desire to improve the performance of their companies by altering the organisation of the production process in order to increase productivity and stay in business? Or was it the pressure of competition, especially from imported goods that imposed a bankruptcy threat on firms and forced them to embark on measures designed to improve factor productivity which facilitated effective restructuring? Another question worth asking is: did government interaction through taxes and subsidies encourage or discourage active restructuring? In terms of theory, our research was rather eclectic as regards the logic behind our empirical analyses: development economics, Industrial Organization, trade theory and the Schumpeterian approach were all invoked in constructing the models.

The methodology used in WP3 has evolved in the course of the project and elaboration of proper analytical tools has in fact proven one of the main challenges in this Work Package. Finally, four principal steps of research have been undertaken:

- a) measuring structural change;
- b) analysis of correlation between structural change and performance indicators or competitiveness indicators;
- c) regression analysis of the determinants of structural change; and
- d) shift and share analysis of changes in labour productivity.

Starting with measuring structural change, we treated the structure of manufacturing industry in a given year t , as a point in the R^n space: $x^t = (x_1^t, x_2^t, \dots, x_n^t)$, where x_i^t is

share of the industry i in total manufacturing output, value added or employment, and $\sum_i x_i^t = 1$. Structural change between the base year t , and the end year, s , can then be defined as distance between the two points measured by a given metric d . The measure of structural change was defined as

$$d_E(x^t, x^s) = \sqrt{\sum_i (x_i^t - x_i^s)^2}$$

or:

$$d_M(x^t, x^s) = \sum_i |x_i^t - x_i^s|$$

The second measure is similar to the Michaeli index (see Aiginger, 2001), which is defined as $M(t,s) = 100 \times d_M(x_t, x_s)$. Structural change was measured by all country teams except for the Spanish colleagues.

Second, several correlation analyses were run to examine the relationship between structural change and various performance or competitiveness indicators, such as productivity, profitability, unit labour costs etc, as well as two composite measures: the supply side indicator (SCOM) including average growth rate of market share of a given industry, change in unit labour cost relative to EU average, relative per capita wage levels and relative investment efforts; the demand side indicator (DCOM) describing demand growth on both the domestic and the main export market. Because of the methodological and data-related problems, the research team decided not to use very complicated statistical measures and to use Spearman rank-correlation indices instead.

We also estimated several cross-sectional regression models which attempted to explain observed structural changes¹². The work of the Staffordshire University team consisted entirely in the analysis of data for the three accession countries. Since the models estimates differed from one analysis to another, we will discuss them below in the separate reports of the individual country teams.

The fourth element of the WP3 methodology was the shift and share analysis of changes in labour productivity, performed by all country teams, with the exception of the Czech team. We defined aggregate labour productivity in manufacturing as a weighted sum of sectoral labour productivity, where the weights are equal to sectoral employment shares.

¹² The Irish model was an exception, as it attempted to explain changes in labour productivity.

Thus, if r stands for labour productivity and s_i for the share of the i -th industry in manufacturing employment and operator Δ denotes the difference in the variable between the base year and the end year, then the following identity holds (see e.g. Fagerberg 1999):

$$\Delta r = \sum \Delta r_i s_i + \sum r_i \Delta s_i + \sum \Delta r_i \Delta s_i$$

where symbols without Δ stand for the value of variables in the base year.

This is the so-called shift and share methodology pioneered by Fabricant (1942). The three components can be interpreted as follows. The first component measures the productivity change "within industries". If there is no structural change at all, this is equal to the overall productivity change. Now assume that there is structural change, i.e. employment in some branches grows/declines faster than in others. In that case, the second component measures the impact of these differences in employment growth on productivity, provided there is no productivity growth within industries. The third component combines productivity growth within industries with structural change. While the second term is interpreted as the effect of labour moving to more productive branches, the third one can be regarded as the effect of labour moving to more dynamic industries (Fagerberg 1999). Following Peneder (2002) and Timmer and Szirmai (2000) we use the sign on the static and dynamic shift terms to test the following hypotheses. First, the structural bonus hypothesis of industrial growth posits that during the process of economic development, economies upgrade from activities with relatively low labour productivity levels to industries with relatively higher labour productivity levels, with a consequent positive relationship between structural change and growth from the reallocation of labour favouring industries with higher levels of labour productivity. The structural bonus hypothesis thus corresponds to an expected positive contribution of the static shift effect to aggregate growth in labour productivity;

$$\sum r_i \Delta s_i > 0$$

Second, Baumol's (1967) structural burden hypothesis postulates that employment shares shift away from progressive industries towards industries with lower growth of labour productivity.

$$\sum \Delta r_i \Delta s_i < 0$$

Additionally, the Irish and Polish researchers examined the contributions of individual sectors or groups of sectors to each of the individual terms in the shift-share equation.

Specific results of the research carried out by country teams are presented below in separate subsections. The synthesis of results follows. Out of the three transition countries under consideration, Poland experienced the most substantial structural change, however in the period 2000-2003 Hungarian figures are comparable to the Polish ones. Interestingly, Ireland has undergone substantial structural change in 1995-2003 too. As evidenced by the Polish and the Spanish studies, demand was a significant factor of structural change. By contrast, the Hungarian regression analysis, which did not consider demand changes, failed to deliver satisfactory results. On the other hand, competitiveness variables (both: competitive performance and factor competitiveness) proved to have been a significant factor of structural change in Poland and in Spain as well. In Ireland, most of the significant correlations with performance were found when one tried to link changes in performance to changes in value added. Both in Poland and in Ireland foreign ownership was a factor that contributed positively to the growth of branches and to the relationship between competitiveness and structural change.

Results of the shift and share analysis of labour productivity growth revealed major differences between Ireland on the one hand, and Poland and Hungary on the other. In Ireland, the structural bonus hypothesis proved to be the correct one and the structural burden hypothesis was rejected, implying that changes in employment structure contributed positively to labour productivity growth owing to both the growth of more productive industries and the growth of industries with increasing productivity. In Poland, exactly the opposite was the case: the structural bonus hypothesis was rejected and the structural burden hypothesis was accepted; this was because both "static shift effect" and "dynamic shift effect" turned out to be negative. Interestingly, in Hungary both hypotheses were confirmed: structural change partly supported the productivity growth (due to a positive "static shift effect") and partly had an adverse impact (because the "dynamic shift effect" was negative).

3.1. Report from the work of the CASE research team (Poland)

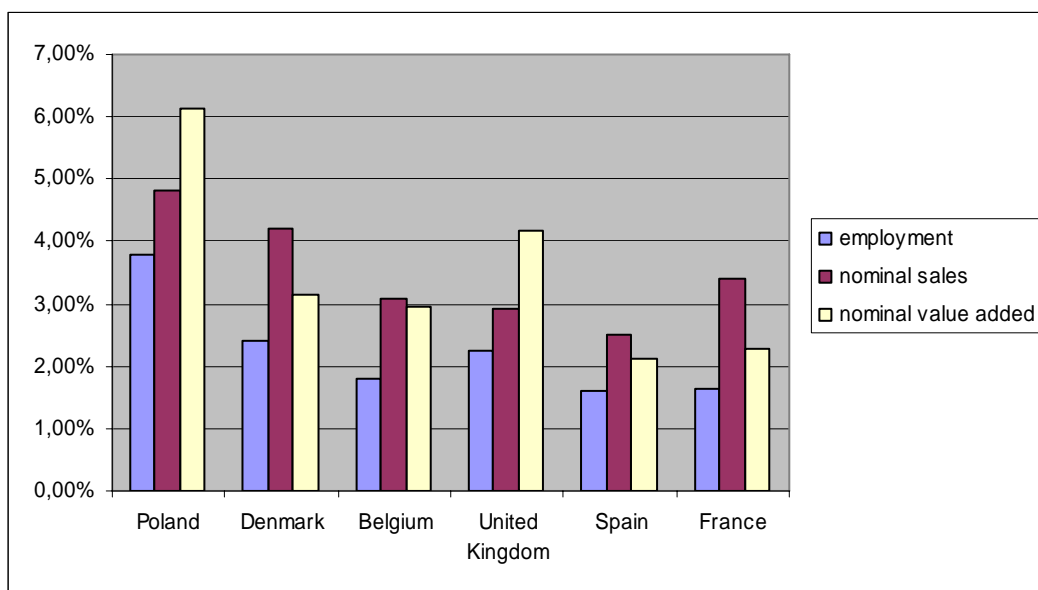
We start the presentation of results with the characteristics of the scale of structural change between 1995 and 2003. We analysed changes in shares of the 3-digit NACE-Rev-1 manufacturing branches, in nominal sales, employment, nominal value added and in value added in constant 1995 prices. Total structural change between 1995-2003 is presented in Table 8.

Table 8. Structural change in 1995-2003 according to the Euclidean and the city bloc measures

x	employment	nominal sales	real value added	nominal value added
$d_E(x_{1995}, x_{2003})$	6,39%	6,09%	8,42%	7,65%
$d_M(x_{1995}, x_{2003})$	38,16%	34,52%	44,95%	41,63%

Structural change in the Polish manufacturing industry can be assessed as considerable, at least as compared to developments in the EU-15. Figure 1. illustrates this comparison for the period 1996-2000, for which data for all the countries under consideration were available. Poland experienced the biggest structural changes in all the categories. Note that everywhere employment structure is the variable that changed least (this applies also to Poland in this particular period).

Figure 1. Comparative analysis of structural change in Poland and five EU-countries between 1996 - 2000



In the next step, the OLS econometric analysis was performed using data for 85 branches of manufacturing industry in 1995 and 2003, for which sufficient data was available¹³. Dependent variables were change in the structure of employment and change in the structure of value added (in real terms). Both variables were expressed as ratios of the growth rate in a given branch to the average growth rate in manufacturing. In each model (expressed in log-linear form) we used a uniform set of explanatory variables (in growth terms) which can be grouped in three types:

- 1) Demand
 - a) domestic demand (apparent consumption in Poland);
 - b) external demand (external imports plus internal imports of EU-15).
- 2) Factor competitiveness
 - a) relative unit labour cost i.e. Polish unit labour cost over EU unit labour cost, where unit labour cost is defined as wages-output ratio (in physical units) and expressed in a common currency.
- 3) Competitive performance
 - a) share in the domestic market;
 - b) share in the EU market defined as Polish export to the EU-15 over internal export of the EU-15.

We expected all parameters to the above variables to have a positive sign, except for the parameter for relative unit labour cost, which should have a negative sign as an indicator of cost competitiveness.

The fourth type of factor of structural change is represented by additional variables reflecting the taxonomic position of branches under consideration. They are treated as fixed effect factors. We refer to seven branch characteristics:

- 1) Structural characteristics
 - a) technology level;
 - b) type of labour skill;
 - c) WIFO multidimensional taxonomic position;
 - d) concentration level;
 - e) type of internationalisation;
 - f) level of import penetration ratio;
 - g) share of foreign-owned companies in output in the beginning of the period.

¹³ The econometric analysis discussed here replaced the correlation analysis realized at an early stage of the project.

The first five of them are expressed as sets of binary variables and they are based on taxonomies. The last two characteristics were represented as continuous variables in the regressions.

The econometric analysis was conducted for the whole period under consideration: 1995-2003 and two sub-periods: 1995-1998 and 1999-2003.

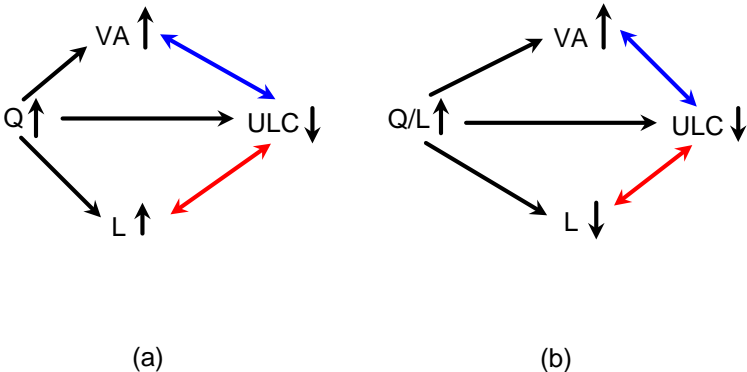
The results of the regression analysis for the whole period 1995-2003 were the following. In general, we find the same degree of explanation by the chosen set of exogenous variables of changes in employment structure and changes in real value added structure (in terms of the adjusted coefficients of determination R^2). As regards the four types of factors analysed in this study our findings are as follows:

1. Demand. Impact of domestic demand is strongly statistically significant (at the 1% significance level) in all regressions. EU-15 demand has a significant impact only on changes in real value added structure. However, inclusion of the FOC initial share in output to the equation makes even this relationship insignificant.

2. Competitive performance Share in the domestic market is significant at the 1% level in all regressions. Share in the EU-15 market has a significant impact only in relation to changes in employment structure.

3. Factor competitiveness Relative unit labour cost has a significant impact on changes in employment structure, but a positive sign of the estimate suggests the transmission mechanism be not based on changes in output but rather on changes in labour productivity (compare transmission channels (a) and (b) in Figure 2). On the other hand, the relative ULC effects negatively (though not always significantly) changes in real value added structure, which can be interpreted as a competitiveness effect. However, inclusion of the FOC initial share in output to the equation makes the latter effect insignificant.

Figure 2. Alternative transmission channels between employment and ULC



4. Structural characteristics. WIFO taxonomy is relevant in explanations of changes in employment, which is primarily caused by a positive contribution generated by labour-intensive and mainstream branches and a negative one generated by capital-intensive branches. Taxonomy by a type of internationalisation shows a significant impact in some cases. Especially export dependant branches are contributing positively to the relationship between basic explanatory variables and structural change indicators. Import penetration ratio has a significant negative impact on both indicators of the structural change. Initial share of the FOC in output has a positive impact both on changes in employment and in value added. However, it is significant (even at the 1% level) solely in the latter case.

It is worth noticing the importance of change in demand as a factor shaping structural change, though high, was not overwhelming. Adjusted R^2 in regressions relating structural change solely to demand variables was equal to 0.254 when explaining changes in employment structure and to 0.314 for changes in value added structure. The role of competitive performance and cost competitiveness was at least of a similar explanatory power as adjusted R^2 coefficients for regressions including both demand and competitiveness factors, which were respectively equal to 0.714 and 0.713. **This yields support to the hypothesis that changes in competitiveness had a significant influence on structural change in the Polish economy.** Analysing dynamics of the process, by repeating the above regression for the two sub-periods, we recognised an increasing role of cost competitiveness and certain branch characteristics (especially labour skills and type of internationalisation) while a decreasing role of import competition as factors influencing structural change.

Results of the shift and share analysis of changes in labour productivity are presented in Table 9. The fact that the "within growth" component is the biggest is rather normal - this is also the case with most countries in the Fagerberg (1999) study. The negative sign of the second term implies that branches that grew in terms of employment structure had on average lower labour productivity than the ones whose share in employment decreased, i.e. the structural bonus hypothesis can be rejected. The structural burden hypothesis, however, should be accepted. This is not only because the "dynamic shift effect" is negative. The regression analysis also indicated that branches that increased productivity (i.e. reduced the unit labour costs) decline in terms of employment shares, which is exactly what the structural burden hypothesis foresaw.

Table 9. Shift and share analysis of increase in labour productivity 1995-2003 (thousands PLN per person employed, constant 1995 prices) – 98 branches

Δr	$\sum \Delta r_i s_i$ (within growth effect)	$\sum r_i \Delta s_i$ (static shift effect)	$\sum \Delta r_i \Delta s_i$ (dynamic shift effect)
28,76	30,77	-1,15	-0,86
100,00%	106,99%	-4,00%	-2,99%

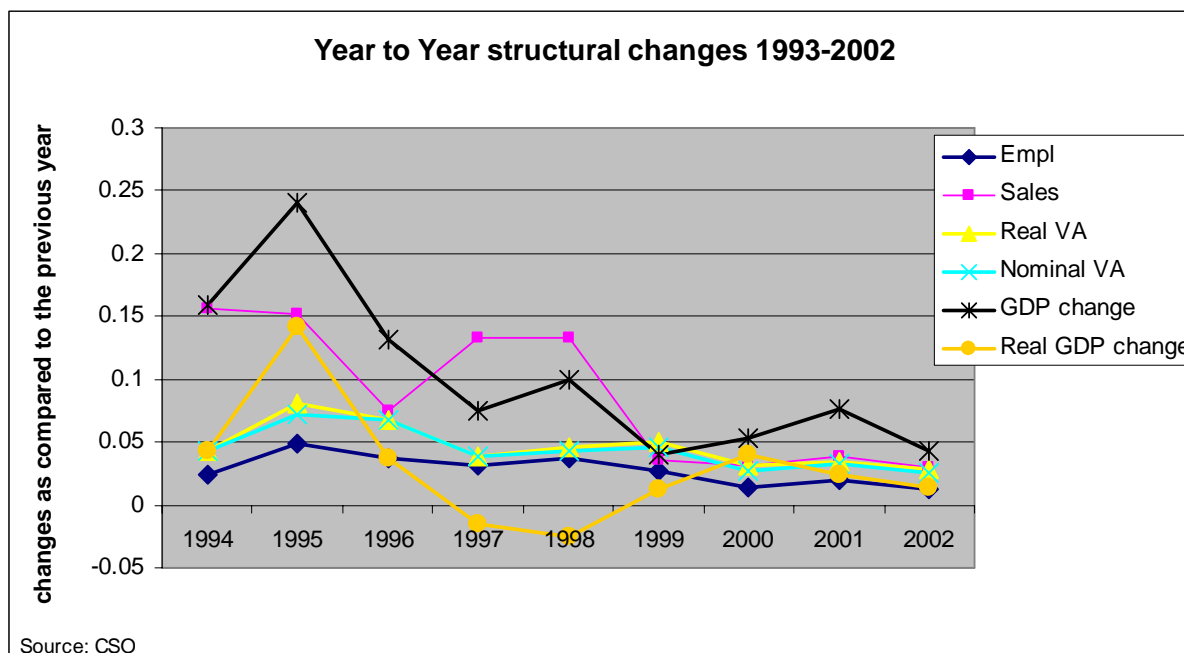
Although the changes in the employment structure between 1995 and 2003 contributed negatively to growth in labour productivity, this was not always the case when we consider changes in shares of employment of groups of branches defined by some of the taxonomy groups. In particular, it seems that the relative growth of foreign-owned companies (which proved to be significant in the econometric analysis) contributed positively to productivity growth.

The reported study contributed in several ways to the discussion on structural change in Polish manufacturing (see e.g. Lipowski 2000). First, for the first time since the beginning of transition, the actual scale of changes was calculated and their evolution over time was analysed. Second, no previous studies have investigated the factors of structural change that thoroughly: in fact there has been only one econometric study (Czyżewski, Orłowski 2000), which failed to show significant results. By contrast, our study examined a wide range of possible factors of structural change and revealed a number of statistically significant relationships. Third, the presented analysis was the first attempt to analyse the relationship between structural change and changes in labour productivity (shift and share analysis).

3.2. Report from the work of the CIAE research team (Czech Republic)

Analysis of the scale and evolution of structural changes in the Czech Republic between 1994 and 2002 made it possible to distinguish two sub-periods (Figure 3): the period of moderate changes 1993-1997 and the period of minor changes 1998-2002.

Figure 3. Structural change in the Czech Republic



We calculated Spearman correlation between performance indicators including productivity, efficiency, income generation and investment vigour (yearly investment outlays over investment outlays during the whole period) and indicators of structural change. Unfortunately, the results were rather weak; only investment vigour showed positive and significant correlation with the growth in value added, sales and employment.

In the core of our analysis we investigated econometrically the influence of domestic and import competition as well as the impact of foreign ownership on the growth in sales of the 3-digit NACE manufacturing industries in 1998-2002. Our panel-data analysis identified a strong increasing non-linear (diminishing) relationship between growth in sales and domestic competition measured by the Herfindahl-Hirschman Index (HHI). Import competition measured by the import penetration ratio was negatively related to the growth in sales of Czech industries, while foreign direct investments were correlated positively.

The analysis of the data indicated that concentration in Czech manufacturing was decreasing during 1998 to 2002. The average value of the HHI also decreased from 2303 to 1957 over the same period, which is a significant drop in industry concentration over the 5 year period. During the same period of time import and FDI penetrations in the Czech manufacturing increased significantly. Median import penetration increased in Czech manufacturing from 69.8 % as of 1998 to 78.8% in 2002, and median FDI

penetration ratio increased from 16.7% to 51.1% over the period. These facts indicate an increase in both external and internal competition pressure on Czech manufacturers during the analyzed period of time.

There exist studies on transition economies that have investigated the relationship between the growth of industries and the concentration level and import penetration (e.g. Sabrianova et al. 2004), yet only a small number of them analyzed that relationship at the industry level. In this respect our analysis was rather innovative.

3.3. Report from the work of the research team from the Hungarian Academy of Science

Concerning the measures of structural change we found that structural change in Hungary was rather quick and deep, as expected (

Table 10). Analysis of year-to-year changes shows that the biggest changes occurred while economic growth was slow.

Table 10. Structural change in Hungary 1998-2003

<i>x</i>	employment	nominal sales	nominal value added
$d_E(x_{1998}, x_{2003})$	4,70%	10,80%	11,00%
$d_M(x_{1998}, x_{2003})$	26,80%	37,70%	43,70%

When these results are compared with some selected EU-15 countries (see Figure 1. above) Hungarian figures show higher values, comparable to those calculated for Poland.

Statistical and econometric analyses did not yield evidence of a significant influence of changes in competitiveness on structural changes in Hungarian manufacturing. The lists of structural winners/losers and the comprehensive list of performance winners/losers did not overlap. Both the Spearman rank correlation index, as well as the panel regression analysis, proved that performance measures significantly correlated with structural change if measured by changes in value-added. On the other hand, changes in sales and employment did not prove to be strongly correlated with performance nor with competitiveness.

The comparison of shift-share analysis on Hungary’s manufacturing branches was largely similar to the general findings of the literature: most of the productivity gains stemmed from within the individual branches. We could not find any clear evidence of either the structural bonus or the structural burden hypothesis.

Table 11. Shift and share analysis of increase in labour productivity 1998-2003

Total change	within growth effect	static shift effect	dynamic shift effect
15,10 %	25,19 %	4,68 %	-14,76 %

3.4. Report from the work of the research team from the University of Limerick

The main objective of the research for this work package was to examine and document in detail the characteristics of structural change in Irish manufacturing. Our initial focus was on the period before and after Ireland’s accession to the European Community (EC) in 1973, covering the years 1968-73 and 1973-78. During the research, this was extended to also include the more recent 1995-02 period to facilitate comparison with the other countries in this work package as well as providing more up to date and recent information on structural change in Irish manufacturing. The data used was detailed Census of Industrial data; this covered 40 sectors for the pre-accession period, 69 sectors for the post-accession period and 59 sectors for the 1995-02 period.

On the issue of the scale of structural change for all periods, as summarised in Table 1, in the pre-accession period, output exhibited the largest change of distribution among the different sectors of manufacturing, with structural change in value added and employment of almost of equal magnitude according to the d_E measure and structural change in value added slightly greater than that in employment based on the d_M measure. In the post-accession period however, we found that the speed or scale of structural change in value added was greatest, followed by output and then employment. The magnitude of structural change in output and employment was not markedly different in the pre and post-accession periods according to the d_E measure, but was greater for output than for employment abased on the d_M measure. For the most recent 1995-2002 period, we saw the greatest degree of structural change in value added, followed by output and then employment for both measures. The larger magnitude of structural change indicated by both measures for this period as compared to the pre or post-accession periods indicates that the speed of structural change has been greatest in the 1995-2002 period.

Table 12. Scale of Structural Change in Ireland

		Output	Value Added	Employment	Sales	Exports
1968-73	$d_E(x_{1968}, x_{1973})$	5.2	3.6	3.5		
	$d_M(x_{1968}, x_{1973})$	20.0	17.7	15.7		
1973-78	$d_E(x_{1973}, x_{1978})$	5.1	7.6	3.7		
	$d_M(x_{1973}, x_{1978})$	26.0	32.8	20.1		
1995-02	$d_E(x_{1995}, x_{2002})$	17.0	24.0	5.6	16.9	21.8
	$d_M(x_{1995}, x_{2002})$	46.0	58.9	21.6	45.2	51.5

We also calculated both indices of structural change on an annual basis; these calculation indicated that prior to accession the speed of structural change in output, value added and employment increased between 1968-73, and in the aftermath of accession the pace of structural change declined for output and value added and remained broadly stable for employment between 1973-78. More recently, structural change for value added was about the same in 1995 and 2002, but structural change in both employment and output increased over this period. Given that the magnitude of structural changes for all variables was greatest in the most recent period than either before or after accession, the pace of structural change in Irish manufacturing has increased over time, indicating that Irish manufacturing is still undergoing substantial changes in its structure.

Next, we investigated the relationship between structural change and performance of industries by calculating a series of Spearman rank correlations. Structural change was measured by relative growth in output, value added, employment, investment, turnover and exports, while performance was measured by value added intensity of production (value added over sales), profitability and labour productivity. The analysis of correlation between structural change and growth in performance indicators yielded the following results (Table 13). For profitability, we found no significant correlations between relative growth in any of the structural variables and relative improvements in profitability in the pre-accession period. For the post-accession and 1995-02 periods, only sectors which experienced relatively higher growth in value added also experienced relatively greater improvements in profitability ratios. Relative growth in labour productivity is also significantly positively correlated with relative growth in value added at 1% level in all periods; in addition to this, for the pre-accession period, it is also associated with relatively higher growth in output, but only at 5% level. For the more recent 1995-02

period, relative growth in output, turnover and exports were also all positively correlated with relative growth in labour productivity, but the magnitude of the correlation coefficients are weaker than that for value added in all periods. For value added as a proportion of output, while there are no significant correlations for the post-accession or 1995-02 periods, we found strong and positive significant correlations for the pre-accession period; in particular, sectors which experienced relatively large increases in the value added intensity of production also experienced relatively faster growth in output, value added and employment and the magnitude of these correlations are the strongest of all significant coefficients in this table. Let us note that changes in employment structure showed only one significant correlation with changes in performance indicators.

Table 13. Correlation coefficients rank of growth, rank of growth of performance

		Output	Value Added	Employment	Investment	Turn-over	Exports
Profitability	68-70 vs 71-73	-0.04	0.23	-0.23	-0.01		
	73-75 vs 76-78	0.15	0.44**	-0.04	-0.14		
	95-97 vs 00-02	0.01	0.39**	0.05	0.00	0.11	0.11
Labour productivity	68-70 vs 71-73	0.39*	0.57**	-0.07	0.21		
	73-75 vs 76-78	0.32	0.50**	-0.07	-0.08		
	95-97 vs 00-02	0.33**	0.59**	0.12	0.22	0.34**	0.36**
Value added intensity of production	73-75 vs 76-78	0.69**	0.82**	0.65**	0.15		
	68-70 vs 71-73	-0.27	0.13	-0.17	-0.03		
	95-97 vs 00-02	-0.15	0.29*	0.00	0.07	-0.13	-0.08

A particular characteristic of the Irish study was that apart from examining correlations for the entire set of industries, calculations for separated groups of industries were also done. Two kinds of classification were used. The first one split the manufacturing sectors in *export-oriented* and *non-export oriented*. We defined export-oriented sectors as those sectors where exports as a proportion of turnover are higher than the manufacturing average. We took the average between 1995-02 to classify sectors according to this

classification¹⁴. The second classification took account of the foreign ownership in the Irish manufacturing and distinguished *foreign-dominated industries* (where more than 60% of output is accounted for by foreign-owned firms), *Irish-dominated industries* (where less than 40% of output is accounted for by foreign firms), and *mixed industries* (where the proportion is between 40% and 60%). We took the average output between 1995-00 to classify sectors according to this classification¹⁵.

These classifications were used among other things to analyse the correlations between performance levels and structural change in 1995-2002 and the result was that the groups of industries defined by export-related classification indeed differed with respect to the correlations, while the other classification did not yield significant results. For the non-export oriented group there appears to be no relationship between relative growth (in output, value added, employment etc.) and relative labour productivity, profitability or value added intensity levels, while for the export oriented group there is a stronger association between relatively faster growth and relatively better level of performance. Then again, the differences across sectors in terms of relative growth and relative performance do not appear to be influenced by the presence of foreign ownership.

The shift and share analysis of changes in labour productivity proved the predominance of the within growth effect in explaining aggregate labour productivity growth in Irish manufacturing in all periods; that is, the overwhelming part of labour productivity growth is due to productivity growth within individual industries (Table 14). The relative importance of the contribution of productivity growth within individual industries has however declined over time and was relatively more important in the pre-accession period than either the post-accession or 1995-02 periods. Consequently, the role of structural change in explaining labour productivity growth has increased in importance over time. For the pre-accession period the transfer of resources from low productivity to high productivity industries, or from low productivity growth to high productivity growth industries does not appear to have been an important factor in aggregate labour productivity growth. While the sign on the two structural terms are positive for the pre-accession period, we can accept the structural bonus hypothesis and reject the structural

¹⁴ As the Census of Industrial production did not publish data on exports or ownership for the pre or post-accession periods, the separate groups analysis here is restricted to the more recent 1995-00 period.

¹⁵ The drawback with the data on ownership in the Census of Industrial Production is that it is only available at 2-digit level and some of the 2 digit categories are quite highly aggregated. Applying this to the 3-digit data means allocating all 3-digit sectors within each 2-digit sector to the same classification. While this does not take account of the variation within sectors, it should give some indication of whether there are significant differences in structural change and performance in Irish and foreign dominated sectors. Overall we have 21 sectors which are foreign-dominated, 25 which are mixed and 24 which are Irish-dominated.

burden hypothesis, but the combined effects at just 2.2% of total labour productivity growth in Irish manufacturing are small.

Table 14. Labour Productivity Growth Explained by Each Effect

	Static Shift Effect	Dynamic Shift Effect	Within-growth effect	Total
Proportion of Total (%)				
1968-73	1.8	0.4	97.7	100.0
1973-78	2.9	7.8	89.2	100.0
1995-02	8.1	16.6	75.3	100.0
Actual % changes				
1968-73	1.96	0.47	103.7	106.1
1973-78	5.2	14.0	159.5	178.8
1995-02	9.9	26.3	83.8	120.0

For the post-accession period, structural changes were relatively more important in contributing to aggregate labour productivity growth, with shifts to industries with relatively higher productivity growth rates being more important than the shift into industries with relatively higher productivity levels. Again here, while we accept the structural bonus and reject the structural burden hypotheses, the magnitude of the contribution of the static shift effect at just 2.9% of total productivity growth is relatively small. There are significant differences however between the pre and post-accession periods and the more recent 1995-02 period. Here we see that almost a quarter of total labour productivity growth has been due to structural change in manufacturing; given the sign on the static shift effect, we accept the structural bonus hypothesis for this period; the shift of resources into sectors with relatively higher productivity levels has provided a boost to aggregate labour productivity growth in this period. We reject the structural burden hypothesis given the positive sign on the dynamic shift effect for this period; for Irish manufacturing, the increasing importance of industries with relatively higher labour productivity growth rates has contributed positively to overall labour productivity growth.

To summarise, we accept the structural bonus hypothesis and reject the structural burden hypothesis for all periods; the relative contribution of structural change to sectors with higher productivity levels and growth rates has increased in importance over time in terms of its effect on labour productivity growth rates in Irish manufacturing, with the shift to sectors with relatively higher labour productivity growth rates relatively more important than the shift to sectors with relatively higher labour productivity levels.

Finally, the relative contribution of structural change in each industry to labour productivity growth in each industry was examined, with the most important conclusion being that over time Ireland has become increasingly reliant on individual sectors in determining labour productivity growth.

3.5. Report from the work of the research team from the University of Madrid

In the case of Spain, the cross-section regression analysis of structural change factors covered 58 industries and was performed for two periods of time: 1993-95 and 1998-2000. A three-year average has been selected in order to avoid annual fluctuations in the data. In order to analyse the changes over time, we have performed two regressions, so it was possible to analyse the changes in elasticities over time. Dependent variables were changes in value added structure and changes in employment structure. We used a set of explanatory variables in growth terms consisting of:

- wages relative to the EU (representing *labour costs*);
- EU-15 market share (*international competitiveness*);
- labour productivity (*efficiency of the manufactures*);
- gross capital formation on sales (*investment effort*);
- import penetration ratio (*dependence on imports*).

general supply and demand indicators based on the measures of composites explained above.

A second set of regressions was performed including, in addition to the variables mentioned, a set of three variables related to the technological level of industries and based on the R&D intensity. Thus each industry was classified as traditional low technology, medium technology or high technology.

The analysis offered the following results:

1. As expected, the wage level relative to the EU is negative and significant in all the regressions, that is, the dynamic of structural change is not triggered by the relative labour cost of Spanish manufacturing. This means there is a kind of rigidity in the accommodation of the manufacturing structure to cost changes.

2. EU-market share shows a positive and significant value in all the regressions, so international demand seems to play an important role in the changes in employment and value added. Nonetheless there is another explanation about the role played by market share, that is the capacity of the Spanish manufacturing industry to increase international market share –which is a supply argument based on the competitiveness effect- as a result of the positive evolution of its efficiency, technological level and investment efforts, among other factors.

3. The results point to the very different role played by the supply side composite indicator and the demand side one. The absence of significance of the first reinforces the lack of response of the manufacturing structure to supply changes while the second shows a strong positive sign. In this vein, it seems that the interpretation of the market share influence may be linked to the supply argument more than to the demand one.

4. The impact of labour productivity is positive and significant in all the cases but decreases when the technological level is included in the analysis. This may be due to the huge differences in this variable between the low, medium and high technological industries which absorb part of the relevance of the labour productivity.

5. Investment effort has a significant impact on changes in value added but is rather weak in changes in employment structure showing that investments increase the value added of the manufacturing and are oriented to economize on employment, or in the best case to be neutral in that respect.

6. Finally, impact of the import penetration ratio is negative or not significant in any regression.

When respective coefficients are compared in regressions for 1993-1995 and 1997-2000, it becomes evident that the changes in the elasticities over time are not very high so the analysis gives us a long-term picture of the structural change explanation.

The findings on productivity growth and its sources developed through the shift share analysis show that for the period analysed, the overwhelming part of labour productivity growth is driven by the *within-growth effect* (Table 15). This result is in line with most of the evidence for other countries. The *static shift effect*, that is the shift of labour to more productive branches does not account for the growth of labour productivity. Finally, the *dynamic shift effect* is negative as well. This last result implies that resource allocation occurs towards low productivity branches, that is the Baumolian structural burden hypothesis. By contrast, the structural bonus hypothesis should be rejected for manufacturing industry, so labour reallocation is unimportant in explaining labour

productivity growth, that is structural change has not generated any additional increase in productivity growth. This profile is very common in developed countries which have shown structural change in the past –mainly in the 1960s and 1970s.

Table 15. Shift and share analysis of increase in labour productivity 1993-2000, constant 1995 prices – 58 industries

Total change	within growth effect	static shift effect	dynamic Shift effect
100%	121,91%	-15,98%	-5,93%
10,29%	12,55%	-1,65%	-0,61%

Two aspects are new in the analysis we have done specially for the Spanish manufacturing industry. First, we have used disaggregated data: other studies have used two digit level data –around 20 branches- while we have used a 3 digit level close to 60 industries. Secondly, we have linked structural change and performance for the manufacturing industry - that is we have tried to look at both sides, supply and demand and to look for relationships between them. Usually most research focuses on the supply side e.g. Lains (2003), Katz (2000). This wider view of the relationships between supply and demand let us to expose some aspects which are not easy to explore and to explain and to give a broad and more complete picture of structural change and its supply and demand determinants.

3.6. Report from the work of the research team from the Staffordshire University (United Kingdom)

The Staffordshire University research team performed a comparative analysis of the determinants of structural change in the three accession countries, while taking into account three kinds of factors: demand side factors, supply side factors, and factors related to government policy. The analysis was based on multiple regression methodology, using panel data technique. Given that we had data on about 100 manufacturing industries (at 3-digit level) for a period of 6-8 years, we were able to use a reasonably sized panel to explain the restructuring process. The period of analysis varies from country to country depending on the availability of data, with the longest time period being available for Poland (1995-2001), followed by the Czech Republic (1997-2001) and Hungary (1998-2001). Two models were estimated.

The first model attempted to explain the levels of sales:

$$SALES_t = a1 + a2IMP_t + a3EXP_t + a4 P_t + a5 ULC_t + a6UMC_t + a7INVEMP_t + a7 TAX_t + a8 SUB_t + a9 SECTOR + \epsilon \tag{1}$$

where SALES represents the value of output (or sales) of an industry and explanatory variables can be divided in three principal groups:

- Demand side factors: EXP - industry's exports (foreign demand) and IMP - import in the given product category [jak to wytłumaczyć jako demand factor? Czy higher import to smaller domestic demand??? Ceteris paribus tak, ale wyniki regresji pokazują, że większy import to większa produkcja rodzima, czyli ważniejszy był wzrost ogólnego popytu. Może w ogóle nie wyjaśniać i udawać głupiego?]
- Supply side factors: ULC – unit labour cost (labour costs over sales), UMC – unit material cost, INVEMP – investment per employee of the industry (a proxy for capital intensity).
- Policy-related factors: TAX – the total of taxes paid and SUB – the total of subsidies received by the firms in each industry.

Moreover, P is the producers' price index for the industry and SECTOR is a dummy representing industry groups (two-digit industries). Subscript t represents the year.

Secondly, *the employment restructuring index* RI was modelled, defined as follows:

RI1 Restructuring index; measured by the change in an industry's share of employment in total manufacturing employment between t-1 and t. The absolute value of the change is used in regressions.

RI2 Restructuring index; measured by the sum of jobs lost and jobs created in the constituent firms of an industry, divided by industry employment, between t-1 and t. This index is used for Hungary only where firm level data is available.

Consequently, the following model was considered:

$$RI_t = a1 + a2 D_t + a3 EXP_t + a4 P_t + a5 ULC_t + a6 UMC_t + a7 INVEMP_t + a7 TAX_t + a8 SUB_t + a9 PROF_{t-1} + a10 SECTOR + \varepsilon \quad (2)$$

Where $PROF_{t-1}$, the lagged value of after tax profits.

The regression analysis of the sales level (1) has produced results mostly confirming the expected basic underlying principles. In all the countries both domestic and foreign demand have a positive and significant impact on the output. Unit labour cost always has a negative and significant impact on output while the impact of the unit material cost is rather insignificant. Investment intensity, measured by investment per employee also has a positive and significant impact on output. The same pattern is displayed in all three

countries and the results are robust in terms of the functional form used. The impact of government policy instruments on output response is the most important outcome of this research. Taxes and subsidies do not seem to have any significant impact on firms' output decisions. These results are less robust and vary according to the functional form used.

The results of the second regression analysis (2) were less straightforward. While the significance of demand and supply factors vary from country to country and model to model, the main conclusion is that, in general, taxes and subsidies do not seem to have any significant impact on firms' employment decisions, and are certainly not robust in terms of the functional form used. In the light of the continuing debate on the effectiveness of government policy in the transition period, this is an important conclusion (see the paragraph on Conclusions and Policy Implications).

4. Work Package 4

The research in this Work Package was organized around four principal problems. They are listed below along with the key questions that were addressed in the course of the project

- 1) Quality of labour force and its links with economic competitiveness and labour market developments:
 - a) Is there any improvement in terms of the quality of the labour force (education, skills) in the labour market in the analysed countries?
 - b) If so, does the quality of labour force reveal some connection with the individual's situation on the labour market?
- 2) Changes in competitiveness and labour market developments in the manufacturing industry:
 - a) What is the impact of the changes in competitiveness on the level of employment in particular industries?
- 3) Labour costs and competitiveness versus labour market developments:
 - a) Are labour costs an important determinant of competitiveness in the Polish, Czech and Hungarian manufacturing industries?
 - b) Is the cost of labour a significant determinant of employment in the manufacturing industries of the analysed countries?

- c) Does the labour cost-employment relationship differ considerably both between the analysed countries and between commodity groups in the manufacturing industry within each country?
- 4) Demographic trends, migrations and labour market developments:
- a) What are the trends in demographic processes in Poland, the Czech Republic and Hungary and to what extent do they influence labour markets and migration flows in these countries?
 - b) What are the most important determinants of migration potential?
 - c) Which factors can contribute to lowering or increasing migration potential from Poland – a new member state with the greatest migration potential?

Four teams were involved in this workpackage: one from the Czech Republic, one from Hungary, and two from Poland, with the CASE team responsible for problems 1-2 and for the overall work package co-ordination, and the Torun University team focused on problems 3 and 4.

As regards theoretical background and methodology, the part of the study which undertakes subject no. 1 – the quality of labour force (Kucharski, Wiaderek, 2003; Filipova, Gottvald, Simek, 2003b; Foti 2003b, Kwiatkowski, Kucharski, 2003), was grounded in Becker's human capital theory (Becker, 1964), which examines the issue of the individual's propensity to invest in education and training in order to raise human capital for the sake of improving position in the labour market. In empirical terms, a multinomial logit model was employed. Based on individual data from LFS, this allowed for estimating the probability that (i) an unemployed person would be employed and (ii) an employed person would lose the job. This model has been used only for Poland (Kucharski, Wiaderek, 2003) due to problems with data in the remaining countries.

The research on problem no. 2 – the impact of competitiveness on labour market developments (Gajewski, Kaczorowski, Tokarski, 2005; Buzas, 2005; Filipova, Gottvald, Simek 2005, Kwiatkowski, Gajewski, 2005) was based upon both neoclassical and Keynesian theories. Both theories suggest a positive relationship between competitiveness and labour demand in the long-run. In the short-run, however, this positive dependency might be undermined by various factors connected with restructuring processes. Since this topic has been researched separately by three national teams, a common methodology was employed, to assure the comparability of results. This common methodology, based on two theoretical models, is discussed in detail in a separate paper by Tokarski (2003). In the empirical analysis, two

competitiveness indices were used, CCA and CCC, measuring domestic and external competitiveness respectively. They were incorporated into econometric analyses, which made use of pooled cross-section and time-series data. An econometric model was therefore employed, known as the fixed effect regression model.

The model used in the analysis of the role of labour costs (problem no. 3) was based on assumptions of profit-maximisation behaviour and technology described by a CES production function (Furmańska-Maruszak, 2005). In the empirical part the fixed effect approach was used. Moreover, the country effect analysis was enriched with an examination of the differences between commodity groups (3-digit, NACE). The approach used was similar, but instead of fixed effect procedure OLS regression analysis was performed for a number of commodity groups in the manufacturing industry of each of the three countries for the years 1998-2001. The aim was to check whether there were some significant differences between product groups in terms of both labour cost-employment and output-employment relationship. This part of the work package included also some descriptive analyses.

The study analysing demographic changes and their impact on migration and labour market developments (problem no. 4) was based on a simple theory of migration that stresses the importance of income differentials, the unemployment rate in the sending country and labour demands in the receiving one (Wiśniewski, Oczi, 2005). The empirical analysis was based on descriptive analysis and simple statistical techniques (correlation analysis and tests for pairs of averages).

While the details of the research results obtained by country teams are discussed below in separate subsections, we will now present the synthesis of results in this work package.

Regarding problem 1 (the quality of the labour force) both questions were positively verified. Labour force quality improved due to changes in employment structure by education, occupations and specialties. In the three analyzed countries there was a decline (in terms of share) of the employed holding primary and less than primary education, as well as those with the lowest levels of qualifications (workers and craftsmen, operators and assemblers of machinery and equipment as well as unskilled workers). On the other hand, an increase was recorded in the share of the employed with tertiary education and those holding highest qualifications (officials, managers, specialists and technicians and other medium level personnel). Regarding the situation of individuals in the labour market, the analysis of unemployment rates by educational and occupational groups showed that persons better educated and those possessing highest

qualifications were in a better situation in the labour market. Similar conclusions can be drawn from estimations of probabilities of outflows from employment and unemployment depending on education and qualifications in Poland. In the Czech Republic the analysis of wage determinants substantiated the finding that the level of educational attainment played an important role for the individual's position in the labour market (on the other hand, current occupation proved even more significant)

The results of research into problem 2 (competitiveness vs. labour market developments) differed from one country to another. In Poland both descriptive and econometric analyses showed that growth in the domestic competitiveness of a branch was most commonly accompanied by an increase in employment. Then again, negative trends in employment were observed in industries that improved their external competitiveness. In the Czech Republic and in Hungary significant relationships between competitive performance and changes in employment could only be observed in some industries.

The results of the analysis of problem 3 (labour costs and competitiveness vs. labour market developments) were the following. Labour costs are significant co-determinants of employment in the manufacturing industries of the three countries and their influence is negative. Hungary however stands out as the country where this negative influence is the weakest. Hungary is also where the biggest heterogeneity among manufacturing branches was observed in terms of the relationship between employment and labour costs.

The part of this work package addressing demography and migration problems (problem no. 4) indicated that all three countries experience similar demographic trends with the proportion of young people declining and the share of active population increasing in the short term (the latter trend will be reversed after 2010). In the long run these trends are going to reduce the emigration potential, yet in case of Poland the expected short-term increase in the number of graduates, and a particularly high unemployment rate among these, might cause a temporary migration hump if there are no restrictions on workers mobility. Correlation analysis indicated that the most important factor influencing East-West migration flows in the 1990s has been wage differentials. The insignificance of most of the correlation coefficients may be a result of distortions caused by the existence of legal restrictions to employment of foreigners in the EU-15 countries and the application of selective immigration policies, though.

Presented studies have been innovative in several respects and novelty can be found at all stages of the research. Although there is an extensive literature on competitiveness, the review papers – which preceded own research of the teams – are innovative because

they stress the importance of competitiveness for labour market developments (Kaczorowski (2003), Foti (2003a) and Filipova, Gottvald, Simek (2003a)). The Polish analysis of the quality of the labour force (Kucharski and Wiaderek 2003), based on individual data from the Labour Force Survey, was the first exercise of this kind in the Polish literature. The paper by Gajewski Kaczorowski and Tokarski (2005) is innovative due to its theoretical approach. Moreover, for the first time the analysis was carried out at such a specific level of manufacturing industries (91 NACE-3 digit branches). The same is true of the papers by Filipova, Gottvald and Simek (2005) and Foti (2005). As explained below in the respective subsection, the study on labour-costs employment relationship was also innovative in a number of respects.

4.1. Report from the work of the CASE research team (Poland)

In the Polish case, the research into the quality of the labour force was especially interesting, since it consisted of an econometric analysis of the Labour Force Survey. The authors estimated a multinomial logit model to determine the relative risk ratio (RRR or "odds") of transitions of different groups of people, defined by education and vocational skills, between three states: employment, unemployment and inactivity. The base category were people with basic vocational education - for models with groups defined by educational attainment, and workers and craftsmen - for models with groups defined by educational attainment respectively.

Table 16 contains the results of the analysis of outflows from employment for the groups defined by educational attainment. In the analyzed period, persons with tertiary education had the lowest relative "odds" of moving from employment to unemployment in comparison with persons with basic vocational education. The same is true of persons with secondary vocational education. We can say that, despite drawbacks in vocational education in Poland, persons holding this level of education have significantly higher qualifications than individuals who have finished their education at the basic vocational level. Persons with tertiary education had also lower odds of moving from employment to economic inactivity than individuals belonging to the base category. By contrast, persons with secondary general, primary and less than primary, had higher chances. Persons with primary and less than primary education probably exercised the possibility to benefit from pre-pension relief or earlier pension schemes. Persons with secondary general education were moving to economic inactivity in order to raise their level of education.

Table 16. Estimations of relative odds of transitions from employment by education in Poland, 1st quarter 2000 – 4th quarter 2000

Independent variable	To unemployment		To economic inactivity	
	RRR	t-Student	RRR	t-Student
Base category – basic vocational				
Tertiary	0,27	-5,11	0,71	-2,16
Post-secondary	0,72	-1,10	0,94	-0,25
Secondary general	0,99	-0,02	1,45	2,37
Secondary vocational	0,77	-2,10	0,81	-1,77
Primary and less than primary	0,96	-0,29	1,85	5,98

Number of observations: 30372

Log likelihood: -5211,76

The analysis of outflows from employment for the groups defined by vocational (Table 17) skills suggests that the persons employed in professions subsumed to the highest groups of the classification of professions and specialties (parliamentary deputies, officers, managers, specialists, technicians and other medium level personnel) were to a lesser extent threatened with losing their jobs and moving to unemployment, in comparison to the base category (workers and craftsmen). Individuals working as farmers, gardeners, foresters and fishermen found themselves in a distinctively better situation than workers and craftsmen. This certainly results from the fact that individuals working in these professions work in their own enterprises or farms.

Table 17. Estimations of relative odds of transitions from employment by vocational skills in Poland, 1st quarter 2000 – 4th quarter 2000

Independent variable	To unemployment		To economic inactivity	
	RRR	t-Student	RRR	t-Student
Base category – workmen and craftsmen				
Parliamentary deputies, officials, managers, specialists, technicians and other medium level personnel	0,26	-7,45	0,86	-1,10
Office workers, personal service personnel and salespersons	1,02	0,16	1,22	1,36
Farmers, gardeners, foresters and fishermen	0,34	-6,07	1,52	3,20
Operators and assemblers of machinery and equipment, unskilled workers	1,14	0,99	1,51	2,96

Number of observations: 30372

Log likelihood: -5180,56

Analyses of outflows from unemployment to employment confirmed that people with better education and higher skills were more likely to find a job.

The relationship between the level of labour demand and competitiveness was investigated based on the model constructed on the grounds of the Harrod-Domar growth model employing a Leontief production function with Harrod-neutral exogenous technical progress. The dynamic labour demand function derived from the Harrod-Domar model is modified to account for competitiveness. The rate of technical progress is decomposed into two components: one of them is the rate of technical progress not directly linked to changes of competitiveness, but to e.g. "learning by doing" processes and the other one is the isolated effect of competitiveness changes. Consequently, the following labour demand equation was estimated:

$$\ln L_{it} = \alpha - \beta t + \gamma_A CCA_{it} + \gamma_B CCC_{it} + \phi \ln Y_{it} \quad (\text{A.1})$$

$$\Delta \ln L_{it} = -\beta + \gamma_A \Delta CCA_{it} + \gamma_B \Delta CCC_{it} + \phi \Delta \ln Y_{it} \quad (\text{A.2})$$

where:

L_{it} - number of employees in i-th branch ($i=1, 2, \dots, 91$; accordingly with the NACE 3-digit classification in year t ($t=1995, 1996, \dots, 2003$);

Y_{it} - revenues from sales of products in i-th branch in year t;

CCA_{it} - competitiveness indicator CCA in i-th branch in year t;

CCC_{it} - competitiveness indicator CCC in i-th branch in year t;

t-time variable, $t=1995, 1996, \dots, 2003$;

$\alpha \in \mathbb{R}$ - constant with no direct economic interpretation;

$\beta > 0$ – rate of labour demand decline, which would occur if CCA, CCC and Y variables remained constant. The existence of this rate of decline can result from technical progress inducing labour productivity growth;

$\gamma_A \in \mathbb{R}$ ($\gamma_B \in \mathbb{R}$) are parameters revealing an impact of the CCA (CCC) indicator on labour demand volume;

$\phi \in (0; 1)$ - *ceteris paribus*, elasticity of labour demand with respect to sold production.

Equations (A.1)-(A.2) were estimated employing the constant diversification procedure for each branch. The estimated values of parameters are presented in (Table 18).

Table 18. Estimated values of parameters in equations (A.1)-(A.2) with diversified constant¹⁶

Explanatory variable	Exogenous variable					
	ln(L)			Δln(L)		
Constant	83.72**	130.7***	83.05**	0,02	0,01	-0,01
CCA	0.47***	-	0,47***	-	-	-
CCC	-	-0.06	0,14	-	-	-
ΔCCA	-	-	-	0,14*	-	0,138*
ΔCCC	-	-	-	-	-1,06**	-1,05**
T	-0.039**	-0.063***	-0,039**		-	-
ln(Y)	0.61***	0.67***	0,61***		-	-
Δln(Y)	-	-	-	0,38***	0,41***	0,38***
R ²	0.99	0.99	0,99	0,55	0,55	0,55
Adj. R ²	0.99	0.99	0,99	0,47	0,48	0,48
Number of observations	812			721		

*significant at 10%, **-5%, ***-1%

The following conclusions can be drawn from the estimation results of parameters in equations (A.1)-(A.2)., The elasticity of employment with respect to production sold in the sample took values of 0.61 to 0.67 in case of (A.1) and 0.38 to 0.41 in the case of (A.2). The CCA internal competitiveness indicator turned out to have a significant, positive impact on the volume of labour demand in the case of equation (A.1), whilst in the case of equation (A.2) it is on the edge of significance. On the other hand, the CCC external competitiveness indicator practically proved to be insignificant in determining employment as far as we consider equation (A.1). In the case of equation (A.2), a negative value of parameter was obtained for CCC, which suggests that an increase in its value may have had some negative impact on employment.

¹⁶ Constant was diversified among years and branches

4.2. Report from the work of the CIAE research team (Czech Republic)

In the Czech case, the problem of the relationship between the quality of human capital and the individual's situation on the labour market was analysed by looking at the determinants of wages paid by companies. In particular, the question of how a worker's level of educational attainment and his/her skills influenced his remuneration and how that relationship developed between 1996 and 2002 was examined. The analysis was based on survey data from the Trexima company (www.trexima.cz).

The general form of the wage function estimated in the analysis was a Mincerian one, based on the human capital theory:

$$\ln w_i = W(S, E, F, X)$$

where:

w_i - average hourly wage.

S - education controlled by levels through 6 dummy variables, or by years of schooling, and occupation controlled by 9 dummy variables

E - experience explained by age in years

F - other working experience or personnel characteristics like

- gender
- logarithm of the number of hours worked
- dummies for part time (less than 36 hours per week) and full time job

X - vector of institutional variables:

- type of ownership as 8 dummy variables
- dummy variables for 10 types of legal form
- dummy variables for 14 industries (branches)
- dummy variables for 14 regions
- dummy variables for 3 groups of required skills (job characteristics)

The method of estimation was the standard cross-section OLS regression.

The results of the estimations of the first model, considering the level of educational attainment and the occupation, are presented in Table 19. All variables are statistically significant. The level of achieved education and certain job performance explain nearly 40 % of all differences in wages and the determination coefficient increases with time.

Standardized β -coefficients (not stated in the table) which as non-dimensional figures determine the intensity of individual declarative variables effects on a dependent variable, are for the majority of variables for occupations (except for workers in services and in agriculture) distinctly higher than for variables expressing education (with only one exception for university education) indicating that performed occupation is more important for an individuals wage determination than educational level.

Table 19. Linear regression of wage function for education and occupation

Coefficients	1996	1997	1998	1999	2000	2001	2002
Constant	3.554 <i>1730.8</i> 3	3.612 <i>2113.6</i> 4	3.648 <i>2248.6</i> 3	3.734 <i>2430.5</i> 5	3.829 <i>2537.5</i> 8	3.935 <i>2728.9</i> 0	3.977 <i>2823.9</i> 7
Education (ISCED97) (without education and primary education is omitted dummy variable)							
Vocational	0.060 <i>33.51</i>	0.095 <i>49.59</i>	0.093 <i>53.13</i>	0.121 <i>80.37</i>	0.099 <i>77.83</i>	0.103 <i>85.81</i>	0.111 <i>95.61</i>
Secondary general	0.130 <i>64.10</i>	0.096 <i>44.59</i>	0.080 <i>40.52</i>	0.106 <i>61.71</i>	0.167 <i>109.04</i>	0.196 <i>135.16</i>	0.209 <i>152.27</i>
Higher secondary + BA	- -	0.081 <i>14.45</i>	0.013 <i>2.71</i>	0.077 <i>19.05</i>	0.176 <i>31.95</i>	0.123 <i>35.07</i>	0.194 <i>62.14</i>
University	0.339 <i>126.69</i>	0.354 <i>138.74</i>	0.363 <i>153.61</i>	0.385 <i>176.19</i>	0.464 <i>224.22</i>	0.479 <i>239.63</i>	0.513 <i>275.05</i>
Not reported	0.049 <i>27.74</i>	0.033 <i>16.50</i>	0.023 <i>12.29</i>	0.135 <i>75.82</i>	0.195 <i>104.91</i>	0.171 <i>91.09</i>	0.239 <i>138.83</i>
Occupations (ISCO88) (unskilled workers is omitted dummy variable)							
managers and legislators	0.727 <i>262.15</i>	0.772 <i>303.99</i>	0.945 <i>388.95</i>	0.926 <i>384.71</i>	0.882 <i>371.74</i>	0.906 <i>399.58</i>	0.889 <i>421.00</i>
professionals	0.637 <i>235.07</i>	0.553 <i>246.11</i>	0.534 <i>259.33</i>	0.526 <i>250.42</i>	0.480 <i>219.04</i>	0.580 <i>264.65</i>	0.561 <i>274.77</i>
technicians	0.476 <i>218.82</i>	0.505 <i>246.22</i>	0.574 <i>312.39</i>	0.533 <i>293.70</i>	0.467 <i>257.53</i>	0.454 <i>262.24</i>	0.463 <i>279.86</i>
clerks	0.226 <i>81.02</i>	0.325 <i>143.20</i>	0.359 <i>169.93</i>	0.301 <i>145.36</i>	0.274 <i>136.75</i>	0.237 <i>123.44</i>	0.221 <i>125.45</i>
service workers	0.074 <i>22.64</i>	0.059 <i>24.22</i>	0.047 <i>23.04</i>	0.0198 <i>9.99</i>	0.034 <i>16.99</i>	0.048 <i>25.98</i>	0.066 <i>37.82</i>
skilled agricultural	0.048 <i>7.71</i>	0.087 <i>15.01</i>	0.144 <i>35.41</i>	0.048 <i>13.08</i>	0.074 <i>22.48</i>	0.077 <i>24.32</i>	0.057 <i>17.62</i>
Craft	0.383 <i>188.97</i>	0.419 <i>222.77</i>	0.464 <i>281.45</i>	0.385 <i>235.73</i>	0.387 <i>243.13</i>	0.374 <i>247.08</i>	0.359 <i>244.05</i>

plant and machine operators	0.399 <i>199.97</i>	0.411 <i>226.90</i>	0.427 <i>262.36</i>	0.375 <i>235.77</i>	0.370 <i>235.15</i>	0.361 <i>241.59</i>	0.363 <i>248.51</i>
Adjusted R-squared	0.308	0.319	0.315	0.326	0.336	0.375	0.394
No. of observations	469 005	708 249	1 041 012	1 037 459	1 045 183	1 100 180	1 199 993

Notes: Dependent variable: *ln* average annual hourly wages. All variables are statistically significant on 1% level of significance unless something else is stated; t – statistics are in *italics*; * significant on 5% level of significance ** significant on 10 % level of significance

The model predicative ability is increased by inserting other variables related to personal characteristics (Table 20). Gender is a significant factor in wage differentiation; men receive wages about 20 – 30 % higher than women as shown by the data. Age, which can be considered an indirect indicator, is a statistically significant variable. Then again, its impact on wage determination is very unstable and other analyses suggest that it is actually decreasing. A more significant influence persists only in the public sector and particularly among workers with tertiary education.

Table 20. Linear regression of wage function for human capital characteristics

Coefficients	1996	1997	1998	1999	2000	2001	2002
Constant	2.086 <i>285.06</i>	2.900 <i>748.31</i>	2.095 <i>455.00</i>	1.659 <i>263.79</i>	1.767 <i>287.16</i>	2.205 <i>369.87</i>	2.334 <i>438.29</i>
Age	0.039 <i>115.84</i>	0.0035 <i>26.05</i>	0.0089 <i>76.46</i>	0.028 <i>139.38</i>	0.025 <i>121.73</i>	0.025 <i>126.86</i>	0.028 <i>122.07</i>
Age-squared	-0.042 <i>-98.61</i>	0.0033 <i>16.59</i>	-0.0070 <i>-42.99</i>	-0.031 <i>-124.16</i>	-0.028 <i>-110.56</i>	-0.283 <i>-118.02</i>	-0.026 - <i>113.76</i>
Male	0.208 <i>161.06</i>	0.238 <i>221.21</i>	0.306 <i>393.87</i>	0.281 <i>350.06</i>	0.260 <i>334.81</i>	0.243 <i>332.20</i>	0.233 <i>335.87</i>
Full time job	0.226 <i>125.22</i>	0.021 <i>13.41</i>	0.011 <i>8.47</i>	0.013 <i>9.38</i>	0.021 <i>15.11</i>	0.022 <i>17.18</i>	0.014 <i>12.30</i>
Hours worked	n.a.	n.a.	0.142 <i>244.40</i>	0.133 <i>189.81</i>	0.145 <i>210.00</i>	0.143 <i>215.48</i>	0.137 <i>248.23</i>
Years of schooling	0.040 <i>131.41</i>	0.051 <i>165.71</i>	0.028 <i>147.84</i>	0.048 <i>202.96</i>	0.045 <i>200.67</i>	0.043 <i>197.69</i>	0.046 <i>225.87</i>
Occupation dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R-squared	0.417	0.433	0.457	0.470	0.462	0,482	0.503
No. of observations	316 934	504 592	988 667	877 561	948 425	1 017 797	1 099 429

Regarding the relationship between growth in employment and growth in competitiveness indicators CCA and CCC, as modelled by the Polish co-ordinator of this Work Package, this proved to be very weak in Czech manufacturing. This is understandable if we see how weak was the correlation between growth in these indicators and growth in other characteristics of the 3-digit NACE industries (Table 21).

Table 21. Correlation coefficients of relative changes in selected industry characteristics 1997-2003

	CCC	CCA
CCC	1	0.050
CCA	0.050	1
Employment	0.122	0.111
Turnover	-0.014	0.086
Sales	0.136	0.040
Investment per turnover	0.022	0.144

Finally, the last problem examined in the research was how demographic developments would affect the Czech labour market. In the case of the Czech Republic, immigration might partly compensate the decline in labour force due to population aging and a decrease in the total population by the year 2030 as predicted by the Czech Statistical Office (although according to some optimistic variants, in the years 2002-2018 this could slightly increase). The projection predicts a gradual increase in the Czech Republic's attractiveness, as a main factor of migration flows, after its entry to the EU, but massive immigration can not be counted on. At the end of the year 2004 foreigners in the Czech labour market make up about 3.3 % of overall employment (173 000 economically active foreigners) and it can be assumed that this number will increase due to the entrance of the Czech Republic to the European Union. An active selection of qualified foreign workers could be a solution for population decrease and ageing and unmet demand in certain branches, work activities and professions simultaneously existing with a relatively high structural unemployment. On the basis of the results of several scientific studies, however, there may be approximately 420 000 individuals missing in the labour market of the Czech Republic by the year 2030. Regarding outflows from the Czech Republic, the overall number of Czech emigrants is relatively insignificant.

4.3. Report from the work of the research team from the Hungarian Academy of Science

In the analysis of the quality of labour force the data from the Labour Force Survey between 1994 and 1997 and the Census data for 1990 and 2001 were used. As evidenced by the data in Table 22, there has been a shift towards occupations requiring higher qualifications.

Table 22. Employment pattern of various occupational groups by the main economic sectors between 1994 and 1999

Occupational groups	Agriculture		Industry		Services		Total	
	1994	1999	1994	1999	1994	1999	1994	1999
Legislators, senior officials and managers	5.6	4.6	6.3	5.9	7.7	7.3	7.0	6.6
Professionals	2.4	1.9	3.7	3.8	16.5	17.4	11.0	11.6
Technicians and associate professionals	3.6	2.8	7.6	8.3	16.5	18.0	12.4	13.5
Clerks	6.1	4.0	6.5	4.5	10.2	8.6	8.6	6.9
Service workers & other sales workers	2.4	1.9	2.7	2.4	22.4	25.2	14.0	15.6
Skilled agricultural and forestry workers	37.2	48.2	0.3	0.1	0.3	0.3	3.6	3.7
Craftsmen and related workers	15.3	12.1	49.7	50.4	8.8	7.5	23.1	22.7
Machine operators & assemblers	16.6	15.0	15.6	17.7	6.7	7.1	10.6	11.3
Elementary occupations (unskilled workers)	10.7	9.5	7.6	6.9	10.9	8.6	9.8	8.1
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Source: Central Statistical Office, Budapest (Labour Force Survey)

Comparison of census data for 1990 and 2001 confirms the main tendency, suggested by the Labour Force Survey, namely the shift towards higher occupational groups. Each of the first three occupational groups show an increase. Overall, the share of non-manual workers (that of the first four groups) increased from 33.1% to 40.8%. This shift can be explained to a large extent by major sectoral changes (for example, the number of employees in mining stands at less than 10% of its initial level).

As can be seen in Table 23, the average level of educational attainment in the population has been on the rise since 1990. The expansion occurred mainly in primary and secondary schooling, but the share of people with higher educational attainment has also increased (of course, demographic developments i.e. population ageing also influence these shares).

Table 23. Share of those having primary, secondary and tertiary educational attainment in the population of the relevant age (%)

	Share of those having		
	Primary education	Secondary education	Tertiary
	Attainment within the population of		
	15 years and above	18 years and above	25 years and above
1990	78.1	29.2	10.1
1996	85.2	34.7	12.1
2001	88.2	38.2	12.3

Sources: Életminőség és egészség (Quality of Life and Health), Central Statistical Office (CSO) 2002. Budapest. For the year 2001: Statistical Yearbook of the CSO, 2002. Budapest.

Note: For the years 1990 and 2001 Census data, for the year 1996: Microcensus

As regards educational attainment of the labour force, there was an even more clear-cut shift towards tertiary education. In this respect, the Census data could also be indicative. For example, while in 1990 the share of employees with tertiary education stood at 12.6%, it has increased to 18.3% by 2001. Similarly, the share of those who finished secondary schools, rose from 24.8% to 32.5% during this period (a rise in the absolute number of both groups at a time when total employment dropped considerably explains such an increase in share). These developments were obviously related to the labour market transitions, in particular to the large outflow of unskilled or low-skilled workers from the labour market.

The influence of skills and the level of educational attainment on an individual's situation on the labour market was examined by comparing the numbers of employed and unemployed in the groups defined by the level of education (Table 24). It shows that - just as in the other two countries - the groups with better education were in a more favourable situation.

Table 24. Employed and unemployed persons by educational attainment in 2001 (excluding armed forces)

	Employed		Unemployed	
	Persons in thousands	Share (%)	Persons in thousands	Share (%)
Less than 8 grades of primary (general) school	26,1	0.7	6,5	2.8
Primary (general) school	634,6	16.5	76,0	32.6
Of which: with qualification	46,5	1.2	1,9	0.8
Vocational school	1228,1	31.9	83,4	35.8
Apprentice school	41,5	1.1	3,2	1.4
Secondary school with G.C.E.	1249,4	32.5	54,2	23.3
Of which: with qualification	923,1	24.0	39,2	16.8
College	394,8	10.3	7,0	3.0
University	270,0	7.0	2,6	1,1
Total	3844,5	100.0	232,9	100.0

The econometric analysis of the determinants of changes in labour demand showed their positive correlation with changes in revenues, but failed to find a significant role for changes in competitiveness indicators CCA and CCC. This could be partly the result of (again) lack of lags in our equations, but it is also possible that this is a sign of the rigidity of the labour market, where only the level of production is changing and the level of employment is relatively stable in mid term; thus the change of market share is implicated by changing productivity (in this case: number of employees/level of production ratio). On the 2-digit level employment in industries "Manufacture of other transport equipment" (NACE 35) and industry "Manufacture of office machinery and computers" (NACE 30) was found as more sensitive to change of market share (both on domestic and EU market) than other industries.

Concerning demography and labour market developments, the decrease in fertility in Hungary over the last few decades has resulted in a decline in the number of new labour market entrants and young people of working age. Labour market presence of youth diminished however, not only due to demographic reasons. As a result of an expansion of both secondary and tertiary education, the share of young people attending secondary schools or higher education has increased to a considerable extent, especially during the 1990s. Limited labour demand has led to decreased participation of young people. Among other things, this is reflected nowadays in an increase in unemployment of first-

time job-seekers and other young people (it is true that a couple of years ago their labour market performance improved, but this proved to be of a temporary nature). These factors have contributed to the fact that the share of those below 25 years in employment is continuously decreasing (from 16.6% in 1990 to 12.5% in 2001 according to the census data) and this proportion deteriorated further over the last couple of years. The decline was especially strong in the age group of 15-19 years, their share falling to less than one third between 1990 and 2001.

At the same time, from the point of view of employment, the demographic situation in Hungary can be assessed as favourable because at the turn of the millennium, economic activity of prime age groups¹⁷ was quite considerable and 54% of the employed are prime-aged people. Then again, it is clear that the labour market performance of these groups has also deteriorated since 1990, as evidenced by increasing open unemployment. The collapse of industries that employed the most prime age people and various social-policy schemes has also contributed to the inactivation of people in prime age or to their moving to the informal economy.

As in many other European countries, Hungary has a rapidly ageing population. This fact, however, is hardly reflected in the age structure of the employed. In terms of migration, Hungary has changed from a sending country to a receiving one. Since the early 1990s more than 100 thousand foreigners have settled in the country. It is clear that the age structure of migrants is more favourable (i.e. generally younger, a higher share belonging to the working age population) than that of the native population. The impact of demographic patterns of migrants on the whole population, however, is negligible, due to the small size of immigrants as compared to the natives. As far as their effects on likely future developments are concerned, it has to be also emphasised that fertility patterns of most of the immigrants are not different from those of the indigenous population, since a large majority of them are ethnic Hungarians (coming mainly from Romania), whose traditions, religious and cultural background are very similar to the national population in Hungary. Therefore their presence will not lead to any significant increase in fertility.

¹⁷ 30-39 years and to some extent also the 40-49 years

4.4. Report from the work of the Torun University (Poland)

The research team from the Torun University focused on two different issues: on the relationship between labour cost, competitiveness and employment in the three countries in 1998-2001; and on the role of demographic processes and migration flows in labour market developments.

4.4.1. Labour costs vs. employment and competitiveness

Labour costs were examined in two perspectives: the traditional perspective and the competitive approach.

The traditional perspective emphasises the role of labour costs (per employee) in establishing the employment level. Two contradictory effects of an increase in labour costs are usually taken into consideration: movements along the labour demand curve, which result in reduced employment; and increase in effective demand caused by higher wages. We focused on the former by employing a static micro-economic model of the optimising firm with CES production function. We assumed that the industry in aggregate maximises its profit Π which is given by:

$$\Pi = pY - wE - cK$$

subject to:

$$Y = [\alpha K^{\frac{\sigma-1}{\sigma}} + \beta E^{\frac{\sigma-1}{\sigma}}]^{\frac{\nu\sigma}{\sigma-1}}$$

where p is the price at which the output Y is produced, w is real labour costs per one employee ($w = \frac{\text{TotalLC}/p}{E} = \frac{LC}{E}$), E is the flow of labour services (employment), c is the "user" cost of capital service, K is the flow of capital service (utilisation x capital stock) and α, β, σ and ν represent production function parameters such as capital efficiency, labour efficiency, the elasticity of substitution between factor services and returns to scale respectively.

That approach lead to a simple employment (labour demand) equation with a labour cost and a simple output effect:

$$\log E = \alpha_0 + \alpha_1 \log Y - \alpha_2 \log \left(\frac{LC}{E} \right) + \alpha_3 t$$

where $\left(\frac{LC}{E}\right)$ stands for labour costs per one employee in real terms and t is time.

In our analysis we used panel data regression models with fixed effects. In the panel the same cross-sectional unit (282 commodity groups which stand for 94 commodity groups in the three analysed countries) was surveyed over time (four years – from 1998 to 2001), thus we pooled in total 1128 observations. After a discussion (see Furmańska 2005), two models were estimated. The first one was a short-term model with time-lags (u_{it} is the error term):

$$\log E_{it} = \beta_0 + \beta_1 \log Y_{it} + \beta_2 \log \left(\frac{LC}{E} \right)_{it} + \beta_3 Dum_{2001} + \beta_4 \log E_{it-1} + \beta_5 \log E_{it-2} + u_{it} \quad (A)$$

where i stands for commodity groups and countries and t stands for years)

The second model attempted to check whether the differences between the three countries in terms of the labour costs-employment relationship were significant. To that end we introduced composite variables by multiplying each of the country dummies by each of the two variables (output and labour costs per one employee):

$$\begin{aligned} \log E_{it} = & \alpha'_0 + \alpha'_1 \log Y_{it} + \alpha'_2 \log \left(\frac{LC}{E} \right)_{it} + \alpha'_5 Dum_{2001} + \alpha'_6 (Dum_{POL} \log Y_{it}) + \alpha'_7 (Dum_{HUN} \log Y_{it}) + \\ & \alpha'_8 \left(Dum_{POL} \log \left(\frac{LC}{E} \right)_{it} \right) + \alpha'_9 \left(Dum_{HUN} \log \left(\frac{LC}{E} \right)_{it} \right) + \beta'_1 \log E_{it-1} + \beta'_2 \log E_{it-2} + u_{it} \end{aligned} \quad (B)$$

The results of the estimations are presented in Table 25 (only significant dummies are listed). In both cases there was a negative and significant relationship between labour costs and employment; this effect was stronger in the second model. Similarly, the levels of employment in the previous year were significant in both models. Only one time dummy turned out to be significant, indicating an “additional” fall in manufacturing employment in 2000. Finally, most differential coefficients turned out to be insignificant, with the exception of the one for Hungary.

Table 25. Results of the estimates of labour demand

$$\log \hat{E}_{it} = 1.941 + 0.574 \log Y_{it} - 0.680 \log \left(\frac{LC}{E} \right)_{it} - 0.024 Dum_{2000} + 0.115 \log E_{it-1}$$

(A) t = (7.33) (29.82) (-17.45) (-2.91) (5.29)

$$R^2 = 0.9308$$

$$\log \hat{E}_{it} = 1.693 + 0.611 \log Y_{it} - 0.840 \log \left(\frac{LC}{E} \right)_{it} - 0.022 Dum_{2000} + 0.387 \left(Dum_{HUN} \log \left(\frac{LC}{E} \right)_{it} \right) + 0.091 \log E_{it-1}$$

(B) t = (5.69) (16.35) (-8.81) (-2.65) (3.90) (4.23)

$$R^2 = 0.8145$$

Moreover, we enriched the country effect analysis with an examination of the differences between commodity groups (3-digit, NACE). The approach we used was similar to the one presented above. Instead of fixed effect procedure we introduced *OLS regression analysis* for a number of commodity groups for the manufacturing industry of each of the three countries for the years 1998-2001. The aim was to check whether there were some significant differences between product groups in terms of both labour cost-employment and output-employment relationship.

Moreover, we enriched the country effect analysis with an examination of the differences between commodity groups (3-digit, NACE). The approach we used was similar to the one presented above. Instead of a fixed effect procedure we introduced *OLS regression analysis* for a number of commodity groups for the manufacturing industry of each of the three countries for the years 1998-2001. In other words, an OLS regression with 94 dummies was estimated. The aim was to check whether there were significant differences between product groups in terms of both labour cost-employment and the output-employment relationship.

Differential coefficients for each commodity group for the Czech, Polish and Hungarian manufacturing industries for the years 1998-2001 are presented in the Annex. The contents of Table 26 summarize the estimation results. The base-line models for the manufacturing industries of each country are specified under the table.

Table 26. The differences between product groups in Czech, Hungarian and Polish manufacturing

Number of product groups							
Labour cost-employment relationship				Output-employment relationship			
Country	Poland	Czech Republic	Hungary	Country	Poland	Czech Republic	Hungary
Strongly negative	4	12	32	Strongly positive	42	28	9
Moderately negative	43	45	0	Moderately positive	5	15	54
Equal	46	36	52	Equal	47	51	31
Positive	1	1	10	Negative	0	0	0
Total	94	94	94	Total	94	94	94

as compared to the following base model:

Czech manufacturing:

$$\log \hat{E}_{it} = 1.434 + 0.619 \log Y_{it} - 1.330 \log \left(\frac{LC}{E} \right)_{it} - 0.023 Dum_{2000} + 0.050 Dum_{2001} + 0.202 \log E_{it-1}$$

$$t = \quad (8.80) \quad (28.98) \quad (-19.35) \quad (-2.52) \quad (4.01) \quad (8.06)$$

$$R^2 = 0.9988$$

Polish manufacturing:

$$\log \hat{E}_{it} = -1.701 + 0.645 \log Y_{it} - 0.707 \log \left(\frac{LC}{E} \right)_{it} + 0.071 Dum_{1999} + 0.015 Dum_{2000} + 0.375 \log E_{it-1}$$

$$t = \quad (-10.08) \quad (33.92) \quad (-20.67) \quad (5.04) \quad (1.72) \quad (19.46)$$

$$R^2 = 0.9994$$

Hungarian manufacturing:

$$\log \hat{E}_{it} = 3.237 + 0.543 \log Y_{it} - 0.331 \log \left(\frac{LC}{E} \right)_{it}$$

$$t = \quad (12.16) \quad (25.53) \quad (-5.42)$$

$$R^2 = 0.9974$$

Regarding the labour cost-employment relationship in the Polish manufacturing industry, the differences between product groups were not so substantial. In only 4 out of 94 commodity groups was labour demand more sensitive to labour costs than in the base model, while in all other product groups it was equally (46 groups) or less sensitive. There was one commodity group (223 - reproduction of recorded media) where the labour cost-employment relationship turned out to be positive.

In Hungarian manufacturing the deviations from the base line model were much higher. In 32 out of 94 commodity groups the influence of labour costs on employment was more negative than the base model would suggest. The highest cost elasticity of demand could be observed in the following product groups: 296 (weapons and ammunition), 273 (other first processing of iron and steel and production of non-ECSC ferro-alloys), 334 (optical instruments, photographic equipment), 343 (parts, accessories for motor vehicles). There were 10 groups in which labour cost-employment relationship was positive. In 52 product groups there were no deviations from the base line model.

Czech manufacturing showed high sensitivity of labour demand to labour costs. In 12 out of 94 product groups labour demand was more responsive to labour costs in comparison to the base. The highest elasticity with respect to the cost of labour was observed in product groups such as: 174 (made-up textile articles, except apparel), 181 (leather clothes), 271 (basic iron and steel and of ferro-alloys), 297 (domestic appliances n.e.c.), 351 (building and repairing of ships and boats), 352 (railway, tramway locomotives, rolling stock) and 364 (sports goods). In 45 commodity groups the impact of labour costs on employment was less negative than the base. Significantly, lower sensitivities to labour costs were observed in product groups: 152 (processing and preserving of fish and fish products), 182 (other wearing apparel and accessories), 205 (other products of wood; articles of cork, straw and plaiting), 267 (cutting, shaping and finishing of stone), 268 (other non-metallic mineral products), 274 (basic precious and non-ferrous metals), and 314 (accumulators, primary cells and primary batteries). There was only one

commodity group in which the labour cost-employment relationship turned out to be positive: 365 (games and toys).

In terms of the output-employment relationship the differences between commodity groups were not substantial – especially in Poland where the variation was the smallest. The most differences appeared in Hungary where in 63 (54+9) out of 94 commodity groups the relationship between output and employment was different than the base.

The second approach to the labour cost-employment relationship was the competitive approach. Herein the key variable analysed was not labour cost per employee but the ratio of labour costs-revenues from sales, called unit labour costs or ULC, or more specifically relative unit labour cost (RULC) which was defined as the ratio of ULC in the candidate country under consideration over ULC in the EU-15. As proved by the research team in Work Package 1, RULC can be considered a valid indicator of competitiveness. Consequently, WP4 considered the relationship between changes in RULC and changes in employment in the Czech Republic, Hungary and Poland in 1998-2001 by means of descriptive analysis. The result suggests that high RULC was not favourable for employment, especially in Poland and Hungary: out of Polish manufacturing branches with RULC higher than unity only 12% increased employment, in Hungary this was true of 3.5% of cases. Out of branches with $RULC < 1$, in Poland 42% increased employment; in Hungary the proportion was 52%.

4.4.2. Demographic trends vs. migration processes and. labour market developments

This part of the work of Torun University covered the present and future demographic trends in Poland and their impact on domestic labour markets and migration flows. A simple theory of migration was employed that stressed the importance of income differential, the unemployment rate in the sending country and labour demand in the receiving one. The principal tool was descriptive analysis.

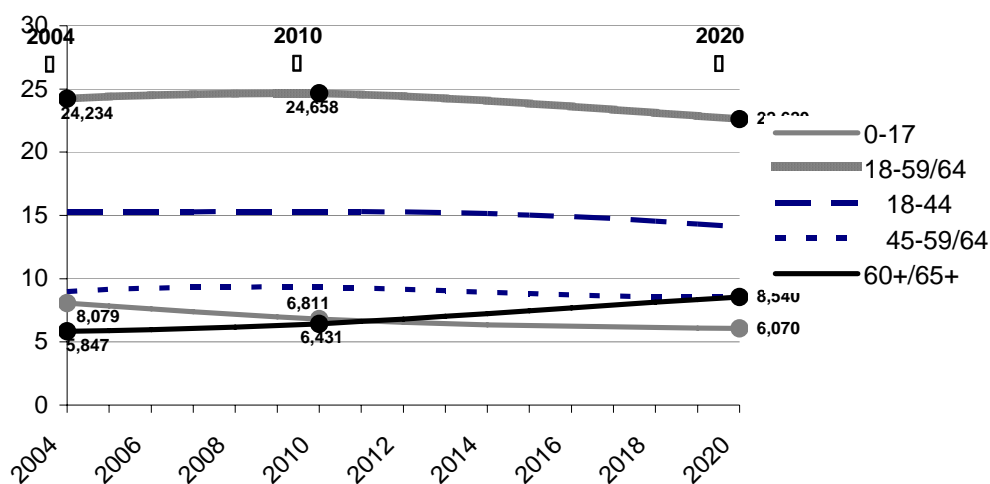
The demographic situation in Poland is one of the main causes of the high unemployment rate, because of the rising labour supply. At the same time, the most important demographic tendencies in Polish society are declining fertility and rising life expectancy. General trends in Poland's population age structure are as follows:

- decline in the share of the youngest age group;
- rise in the proportion of working age population;
- growth in the number of persons at the retirement age (men at the age of 65 and above, women at the age 60 and above), resulting in increasing expenditures for social insurance benefits, increase in social security costs, which in turn increases the tax wedge and triggers unemployment.

The following changes are expected with regard to the age structure of the Polish population in the period 2000-2020 (Table 27):

- stable increase in the number of retired people;
- strong decline in the population aged 0-17 by the year 2010, and then another, more moderate fall by 2020;
- modest rise in the working age population in the period 2006-2010. Population in this group will decline between 2011 and 2015 by approximately 800,000, and by 1,200,000 in the period 2015-2020.

Table 27. Forecast of Polish population in the main age groups until 2020 (in mio.)



Source: Central Statistical Office in Warsaw.

Unemployment and demographic trends are potentially the most important push factors that determine migration flows from Poland. Demographic tendencies (ageing) will reduce future emigration pressure in the long run. Although in the next several years a rise in the working age population will be observed, most of it concerns a relatively

immobile age group above 44. The expected short-term increase in the number of graduates and particularly high unemployment rate among them might cause a temporary migration hump if there were no restrictions to the movement of workers.

The possible impact of overemployment in Poland's agriculture on present and future migration potential has been investigated. Estimates in the literature show that rural areas in Poland are characterized by very low productivity and substantial hidden unemployment of over a million persons. Due to low educational levels and insufficient regional mobility, most of those unproductively employed workers are not likely to find jobs in other sectors and in the case of structural change will most likely become unemployed (potential migrants). However, their socio-economic characteristics, which makes them immobile at the regional level, will also reduce their international mobility.

Economic growth and convergence in per capita incomes and wages, giving an optimistic outlook for future prospects in the region, will to some extent limit future emigration. Even assuming that there would be an accession related short-term rise in migration potential and there would be no barriers to the employment of foreigners, one could expect that the limited demand for unskilled workers on Western labour markets would reduce the scale of labour flows significantly.

5. Work Package 5

Changes in international competitiveness result in new patterns of trade specialization. These developments are particularly interesting in the context of EU enlargement, which has created a wider single market. Consequently, Work Package 5 has analyzed the trade specialization of three accession countries (Czech Republic, Hungary, Poland) and compared it to trade specialization of the four cohesion countries (Greece, Ireland, Portugal, Spain) in 1993-2001, as well as examined the factors behind observed developments. The following four questions were asked:

- 1) What do trade specialization patterns in the enlarged European Union look like?
We were especially interested in analyzing which industrial sectors have developed successfully in selected new and old EU member states.
- 2) Do these specialization patterns tend to converge or diverge within the enlarged EU? (this is particularly important in the context of the Economic and Monetary Union).
- 3) How has the competitive picture in the enlarged European Union changed?
Against which EU countries do the new EU member states compete particularly?
One hypothesis is that initially they have competed against the less developed old

EU member states, the cohesion countries. However, later on, specialization towards higher technology industries is expected.

- 4) What drives trade specialization in the enlarged EU? What are the main determinants of foreign trade patterns?

The analysis did not explicitly use a model of any of the existing trade theories, but the underlying idea was that specialization in EU-25 trade would follow the predictions of “Traditional Trade Theory”. That theory suggests that the accession countries will export mainly labour and possibly resource intensive goods, because therein lies their initial comparative advantage.¹⁸

The main analytic tool has been the modified Revealed Comparative Advantage (RCA) index, which is often referred to as the ratio of 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 exports at a certain point in time. Since we were interested in the question of whether a new EU country or an accession country has a comparative advantage as compared to the EU15, we took 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:

$$RCA_{ik}^{modified} = \frac{\left(\frac{x_{ik}}{\sum_{k=1}^n x_{ik}} \right)}{\left(\frac{x_{jk}}{\sum_{k=1}^n x_{jk}} \right)}$$

¹⁸ By contrast, the “New Trade Theory” indicates that the extent of intra-industry trade in accession countries will depend on country characteristics, such as demand characteristics. Thus the share of IIT will be high, if demand characteristics place emphasis on product differentiation indicating a high level of economic integration of the respective country. The “New Economic Geography” shows that for mature products the importance of fixed costs e.g. R&D expenditure is less relevant, so that mature products tend to be produced and exported by countries richly endowed with skilled workers and physical capital, e.g. the EU15. “Old” products, referring to non-innovative products, will therefore be rather exported by the accession countries.

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 .

In terms of empirical research, the industries were defined by the 2-digit level or the 3-digit level of the CPA/NACE classification. Moreover, the OECD taxonomy of manufacturing industries, distinguishing labour-intensive, resource-intensive, scale-intensive, industries producing differentiated goods, and science-based industries, was used extensively. The choice of taxonomy was preceded by an extensive discussion of other possible classifications (Borbély 2004).

The methodologies for testing questions 1 and 2 – whether countries are stable across sectors or whether they tend to become more or less specialized on an intra-country level (*intra-country/cross sectoral analysis*), and whether countries tend to converge within the same sectors or whether a specific sector tends to become more or less concentrated (*intra-sectoral/cross-country analysis*) – are basically analogous. The following testing method for technological specialization patterns is based on Pavitt (1989) and Cantwell (1989). They were inspired by a Galtonian regression model of Hart (1974). Further discussion can be found in the context of convergence in Hart (1994). Specialization patterns are tested by the following regression:

$$RCA_{ik}^{t_1} = \alpha_k + \beta_k RCA_{ik}^{t_0} + \varepsilon_{ik}^{t_1}$$

The initial year of observations is referred to by t_0 , whereas t_1 represents the final year. Note that within this analytical framework nothing can be said about the determinants of the initial export specialization patterns.

Concerning (de-)specialization, we are interested in the value of β . Holding i fixed, if $\beta=1$, specialization patterns of the respective country i across all industries k have not changed from t_0 to t_1 . If $\beta>1$, the existing patterns of specialization have strengthened. Since we measure the direct comparative (dis-)advantage towards EU15, we can also say that $\beta>1$ implies a divergence from the EU15 specialization patterns between the initial and the final period of time. In analogy to the convergence literature on growth theory we might term this β -specialization. If $0<\beta<1$, the initial patterns have changed implying a convergence of the country's export patterns towards EU15 patterns and might be called β -de-specialization. The case of $\beta<0$ would mean a reversed ranking: sectors with

RCA's below the country's average in the initial period would be above the average in the final period and vice versa.

Another question raised within this regression analysis is a test as to whether the degree of specialization changes. *β-de-specialization* is a necessary, but not sufficient, condition for a decline in the degree of overall national specialization patterns measured by a decrease in the dispersion of the distribution. Although dispersion of the RCA's is reduced within a country in case of $0 < \beta < 1$ for the time being, new shocks seized by the error term could lead to an increase again. Thus the degree of change in specialization depends also on the R^2 , the quality of the regression, or on the relative importance of random errors. According to Hart (1974) it is shown that

$$\frac{\sigma_k^{2t_1}}{\sigma_k^{2t_0}} = \frac{\beta_k^2}{R_k^2}$$

This is equivalent to:

$$\frac{\sigma_k^{t_1}}{\sigma_k^{t_0}} = \frac{|\beta_k|}{|R_k|}$$

The standard deviation is referred to by σ , and R^2 stands for the measure of quality in the regression. If $\beta=R$, which is equivalent to $\beta/R=1$, the dispersion (standard deviation) is unchanged. If $\beta > R$ (or $\beta/R > 1$), the standard deviation has increased over time, thus the degree of specialization has increased. In analogy to above, this is termed as *σ-specialization*. If $\beta < R$ (or $\beta/R < 1$), the standard deviation has decreased over time, thus the degree of specialization has decreased. Likewise, this can be described as *σ-de-specialization*. The same methodology is used for the second question stated above.

In the analysis of despecialization all EU-25 countries were considered, not only the accession and the cohesion countries.

The methodology of question 3 was based, again, on the RCA calculations but also on the calculations of unit export values (UEV)¹⁹. It was assumed that if two countries have comparative advantage in a given industry, then these countries compete in terms of quantity. Yet it is only if their exports have similar unit values that the two countries compete also in terms of quality. The quality scale was defined by the quartiles of the export unit value distribution of the EU-15 countries, whereby low quality products are situated lower than the 25%-quartile, middle quality products between 25% and 75%-quartile, and high quality products are found above the 75%-quartile of the distribution.

Question no. 4 – the determinants of specialization – was tested empirically through a dynamic panel analysis. Explanatory variables included: sectoral industrial production, wage differentials and export unit values. Unfortunately, their choice was strongly influenced by the restrictions the data availability imposed. Some additional regressions were estimated including variables such as unit productivity (output in currency units per employee), unit labour cost (average wage to productivity), FDI, R&D expenditures. Because of data unavailability, the Czech Republic was excluded from the analysis.

We used the so-called “system GMM” estimator developed by Blundell and Bond (1998). The estimated model has the following form:

$$\Delta y_{it} = \alpha \Delta y_{it} + \beta \Delta X_{it} + \Delta \varepsilon_{it}$$

where y_{it} stands for the RCA (i indicates the cross-section dimension, which is a combination of country c , and industry j ; t denotes the year), X is the vector of the exogenous variables, and ε is the error term.

The results of the analysis were the following.

Concerning the RCA dynamics (Questions 1 and 2) we found that Poland specialises in labour-intensive and resource-intensive products and so do Greece and Portugal and, to a lesser extent, Spain. On the other hand, Poland still has a comparative disadvantage in differentiated goods’ and especially science-based sectors, even though RCAs of many industries in these sectors seem to have a tendency to increase. Although the Czech Republic and Hungary also show comparative advantage in some labour-intensive and resource intensive industries, they also have high and growing RCA in differentiated goods – in medium technology products (Czech Rep.) and in high technology products

¹⁹ *Unit export value* (UEV) is defined as the ratio of the value of (a bundle of) exported goods over their quantity measured in metric tones.

(Hungary). In contrast to all other countries under consideration, Irish exports are dominated by science-based products.

Regarding Question no. 2, there is a strong tendency to de-specialization at the intra-country cross-sectoral level. Most countries have moved closer to EU15 average export specialization patterns in the time period of 1993-2001. Only the Czech Republic, Italy and Slovenia diverge from the EU15 if we consider 2-digit level industries, however, all countries show converging patterns if we consider 3-digit level industries. Thus, we never find diverging patterns from EU15 specialization in regressions based on the more disaggregated level of industries. The dispersion of the distribution does not always decrease, in case de-specialization is found. Comparing part-time regressions, we find that in the second half of the 1990s, more countries show rather sticky export specialization patterns, while in the earlier, and over the total, period this is rather an exception.

At the inter-sectoral cross country level our findings confirm the main body of the literature, which finds that there is an overall tendency in industries towards de-concentration in the OECD and also in the EU countries. We test this hypothesis for all three groups of countries, EU15, EU18 and EU25. It is rather challenging to differentiate the results between industries along the technology ladder. At least at the more disaggregated industry level we find the highest concentration in scale intensive industries exploiting economies of scale. However, also in labour and in resource intensive industries there is a relatively strong increase in concentration in the time horizon considered in this analysis.

Focusing on the three accession countries, it seems that Hungary to a greater and Poland to a lesser extent converge to the EU15 export specialization patterns, as do the cohesion countries. However, the Czech Republic's trade patterns are rather sticky and diverge from the EU15 average in the course of the 1990s.

Let us discuss now the competitive structure of suppliers on the EU15 market (Question no. 3). First, we can compare each country's position in all industries throughout the 1990s to reveal the following picture. The Czech Republic has never had a comparative advantage with a high quality product. Poland seems to have downgraded its export product quality on the EU15 market: while in the year 1993 it supplied the EU15 with all three types of quality goods, it no longer had a relative comparative advantage in high quality products in 2001 – whether this implies concerns for economic policy is difficult to say. Thus, the Czech Republic and Poland seem to specialize in the EU15 market in low and middle quality products. Hungary, on the other hand, started off with middle and

high quality products and by 2001 it had also entered the market of low quality goods. Thus, now it competes along the entire length of the quality ladder.

By contrast, Spain and Ireland have never had a relative comparative advantage with low quality products. Thus, Spain and Ireland seem to specialise in the EU15 market as suppliers of middle and higher quality goods. Portugal and Greece have spread their comparative advantages across the range of low, middle and high quality products.

From this point of view, Poland and the Czech Republic are competitors mainly of Portugal and Greece in lower and middle quality goods, but Hungary is also a potential competitor. In addition, Hungary faces competition from Spain and Ireland in higher quality products. Second, we can analyse each product category separately, leading to the following conclusions. In labour and resource intensive industries there is an intensive market participation of accession and cohesion countries. With the exception of Spain in labour intensive goods, these countries specialize in medium and lower quality goods, scarcely competing in high quality. Ireland does not participate much in the market for both labour and resource intensive goods, whereas Hungary's only field of non-participation is in resource intensive goods. In scale intensive product groups, the accession countries gain more and more ground in the 1990s and subsequently, mostly again in low and medium quality. Only Hungary is able to compete with high quality goods against Ireland. Greece lacks sufficient resources and is therefore not competing in resource intensive sectors at all. Accession and cohesion countries are very weak in competing in science-based industries. Most countries do not compete in that market segment at all - only Ireland and, later, Hungary have been able to enter, however not with high quality products. The situation looks much better for the differentiated goods, where by the end of the 1990s all accession countries were competing. However, Greece and Spain remain on the outside in all cases. Again, the supply of high quality goods is mainly left to other European countries, with only Ireland providing some high quality goods.

Finally, as far as the determinants of export specialization (Question 4) are concerned we came to the following conclusions:

- Industrial production, especially with a time lag of one year, plays a very important role in explaining comparative advantage. This is valid across all the 22 considered manufacturing industries.
- Eastern European countries are still significantly more specialized in labour intensive industries and thus have a significantly higher comparative advantage in labour intensive industries as compared to all 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. Conversely, export unit values seem to play little or no role in labour intensive industries.
- Relative labour productivity and relative wages are highly correlated, showing that rises in labour productivity are to a great extent reflected in wage increases.
- Relative wages determine comparative advantages strongly, not only for labour intensive industries, but even at a cross-industrial basis. For high technology industries relative wages hardly matter.
- Foreign direct investment is strongly correlated both with labour productivity and industrial production. 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.

There are two main parts of the WP5, which are rather innovative in terms of research. First, although there is a great body of literature on RCAs and on trade development (e.g. Dyker and Kubelias 2000, Balassa 1965), there is hardly any complete and comprehensive explanation of national comparative advantages for the new EU countries. Especially a dynamic panel analysis (here we used Blundell and Bond, 1998) for explaining comparative advantages in trade has not been done yet for the new EU member states. Some literature exists with the same methodology for explaining FDI in Eastern Europe (see Carstensen, Toubal 2004).

Second, there is a long tradition of analysing structural change in the economic literature both for the OECD and the EU15 countries (e.g. Dalum and Villumsen 1996, and Laursen 1998). Furthermore, a lot has been written about income convergence (e.g. Gaulier 2003, Fleissig and Strauss 2001), but the topic of convergence in trade structures has been treated in the empirical literature to a much lesser extent (e.g. Dalum et al. 1996,

Hoekman and Djankov 1997). EU eastern enlargement, however, presents a new challenge for research on structural change and trade, to which this analysis contributes.

6. Work Package 6

Examining the upgrading process at the firm level rather than the industry level, Work Package 6 analysed the ways in which various actors affect changes in enterprise competitiveness. We focused on the roles of external actors such as investors, creditors, customers, suppliers, local governments, various types of research institutions, etc. In other words, we were concerned with the effects of various kinds of networks on competitiveness. Our task in the research summarised here was to provide both an in-depth analysis of the experiences of selected countries – the Czech Republic, Hungary, Poland and Spain²⁰ – and a comparative analysis which would show how the networking models vary, or resemble each other, across the five countries and four industries: automotive, electronics, food and pharmaceuticals (chemicals in Spain), also taking into consideration differences between foreign-owned and domestically owned companies. We assume that a company's 'networking model' is defined by the kind of external actors in company's network and by their functions (types of activities) in the network.

In this research our aim was to achieve:

- 1) Description of national networking models, with a special focus on the role of networks in developing innovations (e.g., stable cooperation between industry and the science and technology sector).
- 2) Identification of the relationships between the networking models identified and enterprise competitiveness.
- 3) Identification of the differences between foreign-owned and domestically owned companies with respect to networking models, competitiveness, and the relationships between the two.
- 4) Identification of areas of companies' activities in which networking models and benefits for competitiveness of various forms of networking have a sectoral character and in which they have a more national.
- 5) Identification of problems which are specific to transition economies and those which are of a broader nature.

²⁰ Ireland was also covered in case studies.

Much of the theoretical work on which our research is based employs evolutionary and institutional approaches. In our empirical work we have relied heavily on a descriptive approach on the one hand and exploratory techniques in our statistical and econometric work on the other.

In each of the five countries case studies were carried out, with the purpose of piloting a questionnaire which was then used for surveys of larger samples in four countries (excluding Ireland). Since the same questionnaire was used in all four countries, the survey collected a vast amount of data on the performance of companies, their competitiveness and on the networks they engaged in. In the Czech Republic, data were gathered from 118 firms – 40 from the food industry, 5 from the pharmaceutical industry, 52 from electronics and 21 from the automotive industry. In Hungary, data were gathered from 161 companies, of which 62 were from the food and beverages industry, 72 from electronics, 17 were automotive firms and 10 pharmaceutical companies. In Poland, data were gathered from 227 companies, of which 125 were food and beverages companies, 43 automotive, 38 electronic and 21 pharmaceutical. In Spain, data were gathered from 134 companies, of which 40 were food and beverages companies, 26 automotive, 36 electronic and 32 chemical.

The analysis of survey data was carried out for each of the four countries individually, and then the data from the four countries were combined in a single data base and analysed jointly by the co-ordinator. Generally speaking, the analysis consisted of six elements:

- a) Factor analysis reducing the number of variables; selected variables can be grouped in the following categories: competitiveness measures, network measures, competitiveness determinants not related to networking;
- b) Descriptive analysis of selected variables.
- c) Calculating composite competitiveness measures and descriptive analysis thereof.
- d) Calculating composite networking measures and descriptive analysis thereof.
- e) Econometric analysis of the factors of competitiveness.
- f) Cluster analysis to determine the role of the national and sectoral networking models.

First, the factor analysis was applied to several groups of variables. Then, some of the competitiveness measures (or networking measures) selected in the factor-analysis entered the composite indicators. For instance, the non-financial composite competitiveness indicator CED2 (see below) was based on the following five variables: *share of sales on domestic and EU market; product and process innovation; company's evaluation of its product and process competitiveness; domestic market share; and innovation within the firm and on domestic and international markets*. Each composite measure was calculated in two versions according to the formulae:

$$E_j = \sqrt{\sum_i (1 - x_{ij})^2} \qquad B_j = \sum_i |1 - x_{ij}|$$

where:

$$x_{ij} = \frac{y_{ij} - \min_k y_{ik}}{\max_k y_{ik} - \min_k y_{ik}}$$

where y_{ij} is the value of the i -th selected variable in the j -th firm; this assured that the range of values of every component of E and B (x_{ij}) was between 0 and 1. For each company, its E_j was the distance between the company and the hypothetical "ideal" company measured in Euclidean space, while B_j was the same distance in the city block space²¹.

Two composite competitiveness measures and one composite networking measure were calculated; since each was calculated in two versions, these totalled six indicators:

- composite competitiveness indicators including financial variables: CED1 and CCD1 (CED1 responding to the Euclidean space, CCD1 responding to the city block space);
- non-financial composite competitiveness indicators: CED2 and CCD2;
- networking competitiveness indicators: NED and NND.

²¹ That is why, e.g. in case of the composite competitiveness measures CED, the lower the value of the indicators, the better.

The next step was an econometric analysis of the impact of networking on competitiveness. Using ordered logit, we first performed partial regressions of the CED and CCD indicators on, respectively, the selected network measures and possible competitiveness determinants not related to networking as well as the number of years since the foundation of the company, the type of controlling owner (two types: domestic or foreign), and – where this information was available – number of years since the controlling owner acquired its share. Having identified variables that have a statistically significant influence on competitiveness in the various partial regressions, we performed regressions of CED and CCD on those variables.

Finally, in order to investigate the role of national vs. sectoral systems of innovation, we performed cluster analysis using two measures of association (Cramer's V and the contingency coefficient) between country or industry on the one hand and clusters based on groups of variables related to network activity and competitiveness on the other.

The methodology described above was implemented by the Polish and Spanish country teams and by the Polish co-ordinator in his analysis of the combined data for the four countries. In the cases of the Hungarian and the Czech research, points a.-d. of the above list were realised.

The results of the research carried out by each of the five country teams are presented below in separate subsections. What follows is the synthesis of results and conclusions from the econometric analysis of the pooled data for all the countries

1. Description of national networking models: In the Czech Republic, Hungary and Poland, the most important partners in networks are suppliers, followed by customers. The most frequently cited areas of benefits from networking are: product quality and design, R&D, delivery terms and timeliness in the Czech Republic; delivery terms and timeliness in Poland, and quality and timeliness of deliveries in Hungary. As for the role of networks in innovation and R&D, we see that in all the countries the role of public industrial R&D institutes, and of universities, in the R&D and innovation processes of the firms we have studied is a secondary one (after that of customers and suppliers), but it is certainly a non-negligible one, especially in electronic and pharmaceutical industries. In general, the most important partners in firms' networks in these respects are: domestic universities and suppliers in Hungary and Spain; R&D institutes and domestic industrial customers for innovation, and suppliers (domestic universities for pharmaceuticals) and R&D institutes for R&D, in Poland; suppliers, followed by domestic universities and research institutes, for Czech firms in the area of R&D.

2. *Relationships between the networking models identified and enterprise competitiveness:* The results of regression on the combined data base indicate that the strategic use of networking to obtain competitiveness improvement is still in an early stage of development, with much remaining to be learned, as the implications for competitiveness are still ambiguous: we observe both positive and negative impacts of network variables on competitiveness. On the other hand, regressions performed on the Spanish and Polish data indicated a positive relationship between networking and competitiveness.

3. *Differences between foreign-owned and domestically owned companies:* In all of these countries foreign investors play an extremely important role in the economy, though this role is much smaller in the food industry, which is largely (though far from exclusively) domestically owned and domestic market oriented. In all of them, foreign ownership still means much greater dynamics than domestic ownership, indicating that domestic players still have a long way to go to become world players. (This does not mean that by all measures foreign-owned firms are more competitive than domestically owned firms. In terms of costs and profitability *levels*, they are indistinguishable. What really distinguishes the two groups is *dynamics* – the rate of growth, although there are exceptions – for example, investment intensity is higher in domestic firms, and the growth of investment similar in the two groups.) Importantly, we find no evidence of a low level of backward linkages of foreign-owned companies (i.e. the proportions of supplies obtained from the domestic market by companies in foreign ownership and domestic ownership are similar). Interestingly, the Hungarian results suggest that low numbers of local suppliers in industries dominated by foreign investors are not due to a lower propensity of foreign producers to utilise domestic sources, but rather to shortages of potential domestic suppliers.

4. *National vs sectoral networking models:* Our cluster analysis suggests that national networking models tend to dominate sectoral models, although the former also tend to be weak. It is only in the area of cooperation with suppliers that sectoral affinity among firms is more significant than national affinity.

5. *Problems which are specific to transition economies and those which are of a broader nature:* Since our analysis does not show the number of years since the firm's foundation or acquisition to be a significant factor in competitiveness, we conclude that 15 years after the beginning of the transformation, the socialist era legacy is no longer an important factor affecting the competitiveness of firms in these industries. It seems that there may be more that unites these four countries than divides them: all four can be described as "peripheral" economies, with industrial production using factors such as

unskilled labour and natural resources (and, to some extent, capital) relatively intensively, and using skilled labour relatively less intensively. In many ways, it is now country size rather than the socialist legacy that determines the differences among countries: Hungary and the Czech Republic, having small domestic markets, tend to have manufacturers which are export-oriented, while a country without a socialist past, Spain, and one with a socialist past, Poland, have more domestic market oriented producers, due to the much larger size of their domestic markets. Although the synthetic competitiveness indicators we constructed indicate the greater competitiveness of Spain relative to the other three countries, the evidence would seem to indicate that this is not due to any disadvantage of the former socialist countries resulting from their socialist legacy, but rather to the advantage of Spain in having been integrated with EU markets longer. Moreover, the small number of usable observations for Spain indicates the need for caution, and this caveat is strengthened by the fact that regression results showed a competitive advantage for Hungarian, rather than Spanish, firms.

6.1. Report from the work of the CASE research team (Poland)

The regression results indicate that networking has a positive impact on firm's competitiveness. More specifically, there seem to be a strong positive link between competitiveness and:

- cooperating with suppliers (including acquisition of foreign suppliers) in the areas of product design, access to modern production technologies and increasing production opportunities;
- cooperating with suppliers to improve inventory and delivery management;
- outsourcing related to obtaining new EU suppliers;
- obtaining technical assistance from customers;
- engaging in OEM cooperation and strategic alliances; and
- participating in trade fairs with customers and suppliers.

It is interesting to note that factors relating to R&D cooperation and cooperation with sister companies and subsidiaries did not turn out to have significant effects on the competitiveness of the Polish firms we studied.

What is more, the regression analysis shows that foreign ownership appears to be positively related to competitiveness, although there is little difference between domestically owned and foreign-owned companies with respect to the propensity to

innovate. Foreign ownership means much greater dynamics than domestic ownership, indicating that domestic players still have a long way to go to become world players. This is particularly notable with respect to employment growth, including the growth in the numbers of the most highly-skilled employees, which is much stronger in the foreign-owned companies than in domestically-owned ones (though this may be due to the fact that the shares of such workers in their work forces are generally lower than in domestically-owned companies). Importantly, we find no evidence of a low level of backward linkages of foreign-owned companies. If we look, for example, at the proportions of supplies obtained from the domestic market by companies owned by foreign industrial investors and domestic industrial investors, we find that they are almost identical.

6.2. Report from the work of the CIAE research team (Czech Republic)

The analysis allows us to conclude that sample companies only start to develop their networks and so far these networks do not play an important role in improving the firm's competitiveness. Although a significant fraction of the firms report that they do cooperate with various types of institutions, it seems that this cooperation by and large does not involve R&D cooperation, which firms mostly prefer to keep in-house. Comparing the NED and NCD indicators in the four industries, one can observe that the differences between the industry means are very small, so that on average the picture is surprisingly homogeneous which confirms the lesser importance of networks, especially in R&D. However, the car industry and pharmaceutical industries have the highest variance of both indicators, which allows to conjecture that within these two industries firms are more heterogeneous in their attitude towards R&D-related networking. Finally, according to the indicators, R&D cooperation is more important for foreign firms than for domestic firms in the food and car industries, while the result is reversed in the electronics and pharmaceuticals industries. It seems that lack of networking limits companies' innovative potential, especially given the low level of own R&D activities reflected e.g. in the small amount of patents awarded in the last five years²².

Firms under foreign ownership consider themselves more competitive in both domestic and international markets. They are also more innovative than the firms under domestic ownership and tend to introduce new products and new technologies more often than the latter. On the other hand, the analysis of CED and CCD indicators reveals that foreign-owned companies perform clearly better only in the case of the food industry, while domestic firms both in the pharmaceuticals and electronics industries have lower (i.e.

²² 2.7 patent per firm on average

better) values of CED and CCD indicators, than the foreign firms. In the car industry domestic firms perform marginally better than foreign firms.

6.3. Report from the work of the research team from the Hungarian Academy of Science

Our study revealed a relatively low, though increasing, frequency of networking activities. On the other hand, all the forms of networking customary in developed market economies are present. Among these, the most frequent ones are acquisitions, OEM, subcontracting and technical assistance, though other forms (e.g. secondment, licensing, strategic alliances) are rarely used. The persistent lack of trust between partners is indicated by the predominance of more formal forms of cooperation. Principal benefits from networking include timeliness and terms of delivery, and improved product quality: basically every second company indicated, that the first two fields of beneficial cooperation were relevant for them! At the same time, cooperation in the field of marketing and distribution was among the least frequent. On average, every fourth company has a "sister company" (owned by the same owner), and such companies are more likely to engage in networks.

As far as R&D-related networking is concerned, our survey indicated that in this field companies work together least frequently, though we found that around one-fifth of the companies in the sample cooperate with at least one partner in at least one stage of the innovation process. Nevertheless, domestic universities and public research institutes are more important actors in this respect: almost every third company in the sample has R&D cooperation with domestic universities, while almost every fifth with domestic public research institutes. Cooperation with domestic universities and domestic public research institutes is especially frequent among the pharmaceuticals and automotive companies, and among companies owned by domestic industrial companies and domestic individuals, but the shares are surprisingly high even in companies with foreign participation.

6.4. Report from the work of the research team from the University of Madrid

While looking for explanatory variables of CED the following seven indicators were calculated: R&D cooperation (NED 1), cooperation with sister companies and subsidiaries (NED 2), cooperation with suppliers (NED 3), cooperation with customers and competitors (NED 4), benefits from cooperation for customers and suppliers (NED 5), and areas of benefits from cooperation (NED 6), human capital and innovation (CDED).

The findings presented in Table 28 confirm the importance acquired by internal networks existing in large business groups where firms belonging to them share complementary competences. The character of the sample, which included mainly medium and large firms (average size was 186 employees), may condition the coefficient achieved by NED2. Therefore, it may be plausible to think that these results would differ if the analysis were repeated only for SME. The explanation of this result is confirmed by the presence of multinational companies (MNC) in Spain in the four industries analysed here. This result is influenced by both the role played by the headquarters of Spanish companies and the relationships of these with their subsidiaries abroad, and the international networks to which the foreign subsidiaries belong (Cantwell and Molero, 2003).

Table 28. Results of the regression of Competitiveness in products and markets Indicator

		Estimate	Std. Error	Wald	Df	Sig.
Threshold	[CED = 0]	4,52	2,60	3,03	1	0,082
	[CED = 1]	7,55	2,74	7,62	1	0,006
	[CED = 2]	28,81	6,06	22,64	1	0,000
Location	NED1	0,77	0,72	1,14	1	0,287
	NED2	4,90	1,53	10,32	1	0,001
	NED3	0,78	1,33	0,34	1	0,559
	NED4	2,67	1,08	6,06	1	0,014
	NED5	0,66	0,61	1,20	1	0,274
	NED6	-0,66	0,78	0,71	1	0,401
	CDED	2,64	1,37	3,68	1	0,055
	Foreign	-1,23	0,57	4,68	1	0,031
	Domestic	0(a)	.	.	0	.

Link Function: Logit.

(a) This parameter is set to zero because it is redundant.

The fact that the parameter for the NED4 coefficient is significant is quite interesting. It clearly reveals the role of inter-firm cooperation in improving a company's position in the market. On one hand, the relationships that firms establish with their customers seem to be positive in terms of their competitiveness. It confirms that better information about the interests and requirements from the market side provides inputs for better firm performance. This would contribute, for instance, to the reduction of risks associated with the introduction of a new product into the market (Von Hippel, 1988). On the other hand, formal relationships with competitors also positively affect the performance of Spanish firms. In these cases, it can be understood that the complexity of products and processes and the necessity to join efforts with competitors are crucial elements behind these kinds of company strategies. The positive effect that cooperation with competitors has on productivity levels is an issue confirmed also by recent empirical evidence existing for Dutch firms (Belderbos, 2004).

The indicator of human capital and innovation (CDED) has also been significant. The coefficient is positive, showing again that better values of this indicator imply a higher likelihood of improving firms' competitiveness. These findings denote that, beyond the traditional cost determinants, the qualitative aspects are also of importance. The improvement of market positions requires some effort from firms in order to hire qualified personnel and to be highly innovative. Moreover, this result coincides with the idea that networking firms are generally engaged in higher levels of innovation activities (Rosenfeld, 1996; Belderbos, 2004). This behaviour is especially important in those industries where technological changes are frequent – such as the electronics and chemical industries – but also in those characterised by high economies of scale, such as the automotive industry.

When it comes to the industry in which a firm operates, the descriptive analysis of indicators reveals the existence of different company competitiveness profiles across industries. As a consequence, we ran the same analysis controlling for the four sectors but the results did not differ from those obtained above. In fact, neither of the industries showed a significant coefficient.

Finally, considering the ownership of capital assets, foreign firms present a better competitiveness profile than do domestic ones. This implies that foreign firms are likely to present lower CED values. This is fully consistent with other analyses carried out into manufacturing industries in Spain. Foreign firms present, in general, better productivity levels than Spanish firms (Merino and Salas, 1995; 1996; Bajo and López, 1996; Álvarez, 2003). This would confirm the assumption generally made about the superior

performance of foreign firms in host economies and it still justifies questioning the possibilities of positive spillover effects in local companies.

6.5. Report from the work of the research team from the Limerick University

In the case of Ireland the scope of the research for this work package involved presenting, on the basis of six case studies, the various types and extent of cooperation between firms and outside actors. Our case studies cover six firms, one each from the dairy, chemical, pharmaceutical, office machinery, medical/surgical equipment and electronics sectors.

The research focused on five specific areas. First, we examined the types of contractual cooperative relationships firms are engaged in with outside actors i.e. external to the firm. Second, we were interested in examining the ways in which firms cooperate with other firms belonging to the same owner, or 'sister-companies'. Third, we examined the relative importance of domestic and foreign cooperation in a range of activities. Fourth, we were interested in the extent to which firms cooperated with other firms on R&D and innovation related activities. Finally, we examined cooperation between firms and public authorities and non-profit organisations.

Regarding types of extra-firm co-operation, the most prevalent ones were subcontracting, followed by cooperation with other competitors and OEM, then research consortia and joint ventures, then licensing and acquisitions, with strategic alliances the least prevalent. We also included 'secondment' in this table but none of the firms reported seconding employees for the purposes of training or use of new technologies. Overall there were more foreign than domestic contractual links with other companies, although there were differences across sectors in the extent to which firms in different sectors engaged in foreign and domestic contractual cooperation.

We were interested in examining the ways in which firms cooperate with other firms belonging to the same owner, or 'sister-companies' (or "intrafirm cooperation). The most prevalent type of intra-firm cooperation is cooperating on equal terms, followed by design and distribution, acting as a supplier and 'other' types of links. Links with sister companies which are suppliers, and no links, were the least reported types of intrafirm links. Overall, firms reported more foreign than domestic intrafirm links and the extent of domestic intrafirm linkages for the firms in the high tech sectors overall was very weak, with the firms in the pharmaceutical, medical equipment, electronics and chemical sectors reporting no domestic links of any type with sister companies. Again, we observe some differences between the dairy sector and the other sectors with regard to the

nature of intra-firm cooperation as most of the foreign owned firms reported some type of supply, design or distribution related intra-firm link, which was absent for the dairy firm.

Firms were asked to identify the areas where cooperation with foreign and domestic suppliers, customers or investors was important. Comparing the relative importance of domestic and foreign contacts for various activities, foreign contact was rated as more important than domestic contact by firms in almost all areas listed. The only areas where domestic cooperation was rated more important than foreign cooperation were employee training and improvements in inventory management, with cooperation on improved marketing the only area where foreign and domestic contact were rated by firms as equally important. However, there is no great imbalance in foreign over domestic cooperation, with the exception of access to new markets and distribution channels; again, given the highly export-oriented nature of most of the high-tech firms, it is not surprising that more firms would report foreign than domestic cooperation as important in these areas. Improvements in the production process and improved access to modern technologies were the only other areas where there was disproportionately more foreign than domestic cooperation.

Regarding research and development activity in the firms, all firms had an R&D or design unit, and all had a quality control laboratory, with the exception of the firm in the office machinery sector. The only firms which subcontracted out R&D were in the dairy and chemical sectors. Regarding the purpose of the R&D units within firms, this was concentrated in at most five areas for all firms and there was some overlap across firms here. All R&D units engaged in process development, with the firm in the pharmaceutical sector the only firm not to also engage in product development. The dairy, chemical, electronics and pharmaceutical R&D units engaged in gathering commercial and technical information outside the firm. Expenditure by R&D units varied from €100,000 in the dairy sector to €500,000 in the medical equipment sector, €1m in the pharmaceutical sector and €1.25m in the chemical sector. Expressed as a percentage of sales, this represents 0.9% for the dairy sector, 0.7% for the pharmaceutical sector and 3.8% for the chemical sector. However, all firms had received R&D grants from the government or EU, except the firm in the office machinery sector. The range of institutions with which firms cooperate in R&D, varied across sectors. Firms in all sectors cooperated with domestic universities, with the dairy, electronics and chemical firms also cooperating with foreign universities. The dairy firm cooperated with the largest number of organizations. One possible explanation for this is that this firm was the only firm surveyed which was Irish and thus not part of a foreign multinational company where R&D cooperation might be specialized by site. When asked whether contact with third-level institutions had

improved the competitiveness of the company, four firms indicated that this was the case. Reasons given for how these contacts have improved the firm's competitiveness ranged from improving technical competencies and assurances in supplying particular customer needs in the dairy sector, to specialised R&D in the chemical sector. Turning to the organisations with which firms cooperate in the innovation process, for the firms in the office machinery and electronics sectors, there was no external cooperation in the area of innovation as this was considered to be an entirely internal process. Regarding the other firms, there was to be most cooperation with domestic universities, however the area in which firms cooperated differed. The other organization with which there is most cooperation across sectors in the innovation process is with industrial customers; in terms of formulating the idea, firms in the dairy, chemical and medical equipment sectors all cooperated with industrial customers in this area.

Firms availed of different types of support from local authorities, industrial support agencies or government/public authorities. The dairy and electronics firm were the only ones which did not receive some form of financial support. The firm in the chemical sector had received grant aid for research projects, while the pharmaceutical and medical equipment manufacturers received tax reductions or holidays, with the latter also receiving a reduction or waiver of rental fees; the electronics firm had received employment grants. Thus almost all firms availed of some type of support from public authorities. Firms were asked to identify where contact with non-profit organisations had improved the companies competitiveness and replies differed across sectors. The one area where almost all other firms felt that contact had improved the company's competitiveness was through contact with employers' associations, which were regarded as important for industrial relations and employment law.

7. Work Package 7

The main goal of this Work Package was to analyze the impact of the real exchange rate on trade, structural change and growth both in terms of theoretical analysis and by an empirical study.

Assuming that the law of one price is not valid automatically, the approach presented showed a new quasi-Balassa-Samuelson effect. We also looked into the more traditional Balassa-Samuelson effects and considered the major impact of real exchange rate changes on structural change and on economic growth – the latter includes a modified neoclassical model with endogenous growth; in addition we consider aspects of optimum growth. However, we also considered nominal exchange rates: the analysis was based on a new theoretical approach to exchange rate determination and stock market price

dynamics. Also, first empirical results for selected transition countries were presented. Finally, the analysis put the focus on the macroeconomic impact of process innovations and product innovations.

Our central research problem was the medium term exchange rate dynamics where the traditional assumption for catching-up countries is that the rise of per capita income will go along with a rise in the relative price of nontradables (the absolute price of tradables is determined through international arbitrage). This increase of the relative price – determined by relative sectoral productivity differentials or different income elasticities – translates into a rise of the real exchange rate. The latter, in turn, affects various markets, e.g. financial markets as the change in the real exchange rate will affect international capital flows and international interest rate differentials. Moreover, the real exchange rate will affect (according to the Froot-Stein hypothesis) the inflows of foreign direct investment. FDI, in turn, is an important element of capital accumulation and a source of innovation in transition countries; this indeed raises important issues for growth modelling in open economies. Our study thus has picked up some traditional issues but the research was conducted in a new analytical framework. In particular we have considered economies with technological progress (process innovations) and product innovations. This Schumpeterian setup is adequate for the new European division of labour in the EU-25.

We have used neoclassical growth models as a basis, but also considered endogenous growth modelling. Moreover, we have modified traditional production functions in various ways, and have also combined an analysis of innovation dynamics with an analysis of money market equilibrium. Modified neoclassical growth models and new exchange rate models have shed new light on the topic of economic dynamics in open economies with trade and foreign direct investment.

Concerning the empirical part, the methodology used was the following. As the stock market and the foreign exchange market are interdependent markets, it is adequate to proceed on the basis of two-stage and three-stage regressions. At first the empirical analysis is based on a Two-Stage Least Squares (2SLS) estimation, followed by a Three-Stage Least Squares (3SLS) regression analysis. The 2SLS is a single equation estimator, which does not take into account the co-variances between residuals.²³ The use of this is appropriate, but not fully efficient. In case of contemporaneous correlation in the residuals, the 2SLS is a consistent, but not an efficient, estimator. Therefore, we then apply Three-stage least squares (3SLS) estimates, which are both consistent and

²³ See Johnston, J., and Dinardo, J. (1997)

efficient, because they take into account the co-variances between the residuals. So one should prefer them to the two-stage analysis, however, the three stage approach is less transparent. The first two stages of the 3SLS estimation are the same as the 2SLS estimation. In the third stage the system is estimated with a feasible Generalized Least Square method in a way that is analogous to the Seemingly Unrelated Regression (SUR) estimation. Thus the 3SLS estimation is the 2SLS-version of the SUR method. Applying the 3SLS estimation to our system, the same set of instruments is used for both equations.

The empirical results based on quarterly data revealed the following. Within the two-stage approach we estimated first an equation for the stock market price index and then presented the estimation for the exchange rate. The three stage estimation reflected – which is a superior approach in terms of exploiting the information in the data of the sample – the theoretical basis, namely that exchange rate dynamics and stock market prices are interdependent. The estimations for Hungary, the Czech Republic and Poland showed significant coefficients for the lagged exchange rate, the stock market price and US GDP, as well as other variables which were significant only in some of the countries considered. The in-sample forecast was excellent for all three countries, so that anticipation of future exchange rate changes seems to be possible: this is not only relevant for economic actors but also for the issue of Euro-zone membership. Moreover, the considerable impact of stock market prices on the nominal exchange rate suggests that problems of stock market bubbles in the US might strongly contribute to unstable exchange rates in Europe.

The innovation in this research was the idea of combining trade, FDI and innovation dynamics where both process innovation and product innovation were considered. Moreover, we have focused both on medium term adjustment patterns and long term growth as well as exchange rate dynamics; as regards references we point to the literature quoted in Welfens, Wziątek-Kubiak (2005). The combination of innovation dynamics and foreign direct investment – plus traditional trading patterns – in a growth perspective is new; this also concerns the “new production function,” which includes output effects of real money balances and trade (plus FDI). Moreover, it is useful to combine an analysis of transformation and medium term economic dynamics.

8. Work Package 8

The aim of this Work Package was to identify the challenges to EU policy as a result of changes in the competitiveness of the candidate countries and to recommend changes in EU policy. The research consisted of two parts. In the first part the exposure of the EU-15 member states to competition from the three new members in particular branches of manufacturing was examined. In the second step, conclusions for several policies of the EU were drawn, including labour market policy, innovation policy, exchange rate policies and industrial competitiveness policy, wherein the recent developments in regulation on state aid was given special attention.

In this part of the report we focus mainly on the first task of WP8 while most of the results of the work on the second task are presented in the next part (Conclusions and Policy Implications).

The exposure of EU-15 countries to competition from the Czech Republic, Hungary and Poland was assessed from the point of view of traditional trade theory, new trade theory, and economic geography models; also theories on foreign direct investments were relevant for this study. In terms of methodology used, several trade-based indicators were calculated for selected EU-15 countries for 1995 and 2001. These included: import market shares (ratio of EU-15 imports from ACC-3 to total EU-25 imports), Corrected and Modified Revealed Comparative Advantage RCA/CRC, trade vulnerability index TVI, (a composite index of trade balances) that measures a combined effect of trade balances with 3 accession countries for particular EU-15 members, Competitive Vulnerability Index CVI. Moreover, several taxonomies of 3-digit NACE-Rev-1 branches were applied: OECD (1995) by technology intensity; OECD (1987) by sources of competitive advantage; Modified EC (1990) taxonomy by sensitivity to non-tariff barriers NTBs; Neven (1994) by intensity of factor inputs; modified Venables (1996) taxonomy by intensity of industry linkages clustered according to the share of intermediate goods in total value of production; Pratten (1988) and Amiti (1999) by sensitivity to scale economies; Peneder (1998) taxonomy by intensity of tangible and intangible investment and by the level of skills.

The analysis yielded the following results. The EU-15 countries are very heterogeneous in terms of their exposure to competition from the Czech Republic, Poland and Hungary; significant differences exist also in the intensity of exposure calculated for particular products. The most exposed countries are: Germany, Austria and the Scandinavian economies, the least exposed countries are: Portugal, Ireland and Luxembourg while the

most exposed industries are: textiles, wood products, non-metallic mineral products. Regarding industries most exposed in individual countries:

- the Austrian list comprises: telecommunications equipment, railway and tramway locomotives, domestic appliances, meat products;
- the German list comprises: textiles, rubber, electrical equipment, ceramic goods, railway and tramway equipment, motor vehicles, accumulators,
- the Portugal list comprises: textiles, basic iron, structural metal products, motor vehicles;
- the Spanish list comprises: meat products, textiles, wood products, ceramic goods, accumulators, transport equipment.

As far as trade imbalance is concerned, the countries with the biggest number of CPA/NACE product groups with trade deficit in 2001 were Greece –55 groups, Finland - 47, Denmark – 46, Germany-45, Portugal – 45 (95 groups were considered). On the other hand, countries with the biggest number of NACE groups with trade surplus or balanced trade included: Italy (68), Austria (62), France (61), Ireland (60). The product groups in which the EU-15 ran the highest deficit in trade with the ACC-3 are listed in Table 29.

Table 29. Twenty 3-digit NACE groups of EU-15 industry with significant trade deficits with ACC-3 in 2001 (mln EURO)

NACE	Name	Trade balance in mln euro
341	Manufacture of motor vehicles	-4 821.6
361	Manufacture of furniture	-2 548.6
182	Manufacture of other wearing apparel and accessories	-2 170.6
323	Manufacture of television and radio receivers, sound or video recording or reproducing apparatus and associated goods	-1 898.7
316	Manufacture of electrical equipment n.e.c.	-897.1
153	Processing and preserving of fruit and vegetables	-554.9
151	Production, processing, preserving of meat, meat products	-550.0
281	Manufacture of structural metal products	-534.3
174	Manufacture of made-up textile articles, except apparel	-524.7
231	Manufacture of coke oven products	-397.1
315	Manufacture of lighting equipment and electric lamps	-361.0

251	Manufacture of rubber products	-357.1
201	Saw milling and planning of wood, impregnation of wood	-356.4
205	Manufacture of other products of wood; manufacture of articles of cork, straw and plaiting materials	-351.5
274	Manufacture of basic precious and non-ferrous metals	-320.6
203	Manufacture of builders' carpentry and joinery	-295.9
351	Building and repairing of ships and boats	-270.3
193	Manufacture of footwear	-224.2
352	Manufacture of railway, tramway locomotives, rolling stock	-218.3
261	Manufacture of glass and glass products	-206.6

In analyzing trade patterns we used the taxonomies specified above. In terms of taxonomy based on the intensity of non-tariff barriers (NTBs), the EU-15 countries have increased significantly their imports from the ACC-3 of products with high intensity NTBs in 1995-2001. This means that the full accession of PL, Cz. and H is likely to increase competitive pressures on the "old" members. The crowding out effect is possible. As far as the taxonomy based on technological factors (OECD 1995) is concerned, a considerable change in the structure of EU-15 imports from the AAC-3 has occurred and a shift from low-technology groups to high and medium-high technology products can be observed. This may cause an increase in the intensity of competition in the enlarged market of more advanced product segments.

8.1. Report from the work of the CEPS research team (Belgium)

Apart from contributing substantially to the above listed policy conclusions, CEPS research team performed a macroeconomic analysis of the benefits from the EU enlargement. A standard capital and labour model was developed which formalises the most basic set-up in which two separate economies, with different capital labour ratios, become totally integrated. One can then compare world income before and after integration. World GDP increases of course with integration as capital moves from a region with relatively low marginal capital productivity (the EU-15) to a region with relatively high marginal capital productivity (Turkey, or the CEECs). However, this is not the main result. The main result is that the increase in world GDP is higher the greater the difference in capital labour ratios prior to integration. The model also shows that the gain does not go only to the new members (whether CEECs or Turkey). The present EU-

15 also benefit and their gain is also an increasing function of the initial difference in capital labour ratios.

8.2. Report from the work of the research team from the Staffordshire University (United Kingdom)

The researcher from the Staffordshire University focused on one area of EU policy, that is regulation on state aid. The goal was to provide a critical analysis and implications of the idea of 're-targeting of state aid' from sectoral to horizontal as foreseen in the consultation documents prepared by the European Commission "State Aid Action Plan" and the Polish Government's response.

The main research question is how the Commission's proposal (CEC, 2005v) is likely to affect the EU industry and competitiveness of individual undertakings, particularly in the new EU Member States, with an already lower level of competitiveness, where the impact may be crucial. The proposed radical retargeting of state aid to exclusively horizontal objectives may not always be in the best interest of the new Member States since some of the industries in these countries have still not completed their system transformation and may still be in need of some additional assistance.

The methodology of this research was based on the comparative analysis of the European Commission's *„State Aid Action Plan – Less and Better Targeted State Aid: a roadmap for state aid reform 2005-2009"* and the Polish Council of Ministers' *„Policy program on the scope of state aid for the years 2005-2010"*.

Poland developed the *„Policy program on the scope of state aid for the years 2005-2010"* in order to facilitate support from public resources to measures pertaining to the implementation of the Lisbon Strategy, and to maintain the policy of granting state aid to specific undertakings. Both of these aims were related to completing the transformation of the economic system in Poland. It is a framework document for measures conducive to changes in the direction of allocation of state aid and improvement in its effectiveness. At the same time the programme serves the purpose of bringing the policy and practice of state aid granted in Poland into line with standards and trends in place in the EU. It also covers the priorities regarding the completion of the restructuring processes by targeting restructuring state aid to specific undertakings.

Radical restrictions on the facility to support the restructuring processes and social and economic transformation in new member states, however, may be incompatible with other aims of the EU, in particular assisting the new member states to complete the transformation process and improve social and economic cohesion across Europe. It is

important to underline that the EU enlargement in 2004 resulted in an increase of inter-regional and inter-industry disparities and disproportions. The reduction of state aid for regional development and sectoral measures, targeted towards restructuring and improvement of competitiveness, may potentially make the reduction of the development gap between old and new member states more difficult. Of course, there is a much wider discussion in the literature that the continuation of state support for loss making enterprises (particularly in the form of non-horizontal measures) acts as a disincentive to these firms and delays their restructuring (Kopczewski, et al., 2003; Hashi and Balcerowicz, 2004). It is therefore essential that this tendency is taken into account and any sectoral support is made conditional on visible progress and also subject to a time limit.

It is also expected that the sectoral aid, which will be granted to the new member states after accession, will be of an entirely different kind in comparison with the aid which was granted before accession because of the change in the aims of state aid and also its being subject to greater scrutiny and better monitoring. The previous practice of granting aid, which was often not compatible with the EU competition legislation would have to come to an end. It is therefore less likely that sectoral aid will have the kind of distorting effect referred to above. Given the power and competences of the European Commission with respect to state aid, it will also be less likely that new members can grant sectoral state aid which is not in line with the Lisbon Agenda.

In short, the type of state aid that was granted in the accession countries at the beginning of the transformation process was not subjected to the EU competition legislation and therefore should not be the basis for criticizing state aid after accession. The aid which is granted to specific sectors for the completion of the restructuring process (e.g., the hard coal mining sector), and is compatible with the common market rules, may be more likely to improve the competitiveness of such sectors in international trade in the post-accession period.

8.3. Report from the work of the European Institute for International Economic Relations (Germany)

EU eastern enlargement will bring several challenges for economic policy in general and for exchange rate policies in particular: One may anticipate that the real exchange rate will increase parallel to the rise of per capita income (y) in accession countries relative to per capita income (y^*) in EU-15. According to the Balassa Samuelson effect there should be a real appreciation for countries catching up, that is for the accession countries: There

will be a rise of $P/(eP^*)$ – where P is the price level, e the nominal exchange rate in price notation and $*$ denotes foreign variables.

In principle the real exchange rate appreciation can be realized through a rise of P relative to eP^* or via a fall of the nominal exchange rate; the real appreciation can be explained in terms of a relative price effect, namely the rise of the relative price of nontradables in the course of economic catching up and the relative productivity growth over time (domestic sectors relative to foreign sectors). Given the apparent desire of most accession countries to quickly become a member of the Euro zone the rise of the price level P should be avoided so that a fall of the nominal exchange rate would be desirable after EU accession. As accession countries are expected to join the exchange rate mechanism of the European Monetary System (II) there could be conflicts in the sense that the ECB or the European Commission would like to fix a rather narrow parity margin – say $\pm 2.25\%$ - while some or all accession countries might desire to have a broader parity margin. The ECB might be inclined to impose the same strict Maastricht convergence criteria to the eastern European accession countries as to the Euro starter countries in 1999. However, the EU accession countries have much lower per capita incomes than any of those starter countries, that is taking into account the Balassa Samuelson effect is important. If one would interpret the required stability of the exchange rate prior to the membership in a narrow sense one would undermine the working of macro markets in Europe.

A wide parity margin will be useful for two reasons, namely to make speculative attacks more risky for speculators and thus to effectively reinforcing the parity; at the same time only a wide parity margin allows to accommodate easily a real appreciation in line with the Balassa Samuelson effect.

If narrow exchange rate margins were imposed upon EU accession countries one might face both the problem of speculative attacks which in turn could destabilize the financial system in the respective EU accession country; and one might impair economic growth in accession countries – or contribute to relatively high inflation rates in the context of P rising relative to P^* strongly: Fulfilling the Maastricht criterion of having an inflation rate not exceeding that of the three member countries with the lowest inflation rate thus would be undermined. One can only recommend to the ECB and the European Commission to interpret the Maastricht criteria relatively flexible and not to impose inadequately narrow parity margins. The Maastricht criteria clearly were not adopted with the problem of Balassa-Samuelson effects in mind.

EU accession countries at the same time should not adopt narrow parity margins and clearly should not strive for more or less immediate membership in the Euro zone: The potential benefit of having a lower nominal and real interest rate might be more than outweighed by the problem of no longer using the nominal exchange rate as a policy tool vis-à-vis western EU countries and members of the Euro zone, respectively. The natural interest in low interest rates encourages accession countries to consider an early membership of the Euro zone. At the same time early locking of the nominal interest rate is not consistent with the logic of allowing market forces to stimulate adjustment, structural change and growth. Given the fact that most accession countries have not even reached 50% of EU-15 per capita income there indeed is still considerable room for the Balassa Samuelson effect to play a role in the catching-up process. If market forces and adjustment mechanisms are suppressed artificially, low growth and high unemployment in accession countries will set a high price tag on EU eastern enlargement; slow growth and high unemployment in accession countries will in turn raise the political demand for higher structural funds in the EU. This in turn could lead to conflicts between EU-15 members and new member countries from Eastern Europe. Thus all member countries and the Commission should carefully study the policy options which make really sense for Europe and EU-25, respectively.

IV. CONCLUSIONS AND POLICY IMPLICATIONS

This section presents the principal conclusions from the project, discusses their value added, identifies the needs for future research, and – most of all – formulates projects policy implications. Throughout the project the authors were urged to draw conclusions for economic policy from their research results and one of the work packages (no. 8) was dedicated exclusively to the policy problems. Therefore in our presentation of the conclusions and policy implications we start from the results of Work Package 8 which can be regarded as a kind of synthetic analysis and then we continue with conclusions of the remaining seven Work Packages.

1. Policy Implications For The New Member States

The project shows that the speed and the success of transforming the industrial sector into a competitive and growth-contributing sector depends on the interplay of different factors.

1.1. From sectoral towards horizontal state aid and FDI promotion

The research undertaken clearly shows that selective state aid policies are damage, rather than strengthen, the competitiveness of the industrial sector and that opportunity costs are high. The shift from sectoral state aid support to horizontal measures should be continued, in line with EU support measures. Horizontal state aid based on criteria to promote entrepreneurship, such as for SMEs, should not substitute for the private sector where it operates effectively. Policy restraint in producing tax-based incentives for regional development is also recommended. As a first stage, countries should consider reducing the bureaucratic burden and heavy charges affecting the private sector through institutional reform. This can be more effective than state aid.

1.2. Innovation, investments, product upgrading, human capital and labour market policy

One of the clearest messages of the studies is that the economic development of the countries under consideration will depend, to an important extent, on the more advanced technological sectors and product upgrading, which requires an increase in investment, innovation and human capital quality. The shift into strategy enhancing investment and innovation will impact changes in the structure of production and increases in employment. Basing growth on cheap, labour-intensive industries is not a correct strategy for encouraging convergence with the EU economy. Labour market policies fostering labour mobility and transferable skills are primordial to a successful

development of these countries. The new countries should focus principally on human capital development measures that the EU ESF provides, avoiding an emphasis on simple financial transfers for the long-term unemployed. Employment policy must be pro-active. Given the number of unemployed, training and skill development job placements should be a priority.

1.3. Infrastructure

Careful planning of the infrastructure developments and of the use of EU Structural Funds to ensure effective links between suppliers and markets is necessary. A careful analysis of the needs and potential of each country and its regions is necessary to draw maximum benefit from the infrastructure developed. The quality of the National Development Plans and the associated Operational Programmes for the EU Structural Funds are a key element in the development of successful aid strategy. The new member states should ensure that the driving force behind the strategy is efficient allocation of resources, rather than the mere exercise of ensuring prompt absorption of EU funds.

1.4. Governance

One of the key elements that has attracted FDI to the region is the improvement in governance that has been achieved. For the new member states, variables such as external liberalisation, rule of law and quality of the bureaucracy have been the most potent predictors of FDI. The quality of domestic institutions is considered a key determinant of growth.

2. Policy implications for the “old” member states

2.1. State aid

The area in which the member-states can make an important contribution to competitiveness is in improving the business environment in the EU by improving the regulatory framework. Various member-states have an unfriendly business environment and reducing their bureaucratic and often excessive tax and social contributions could give a first spur to the economy.

2.2. Labour market, education and R&D investment policies

Less rigid and more active unemployment and training schemes are required to facilitating the economic adjustment of enterprises to the increasingly changing market environment.

Member-states' commitment to education and R&D investment has to increase. An important factor to unleash the innovation potential is introducing a system of finance based on competitive tendering and excellence. Links between industries and research centres should be fostered.

2.3. Strategy

As proposed by the European Commission (COM487 final, p16), countries and regions should provide a strategic reference document defining objectives and priority actions. This strategic framework should outline the actions necessary. Member-states should ensure that the objectives are effectively reached. It is necessary that member-states deliver on actions they have committed themselves to follow, such as the Lisbon strategy.

2.4. Industrial policy

Member-states industrial policy should be geared toward creating the necessary physical environment for industries to develop and prosper. Investment can be concentrated in developing centres of excellence, ensuring that their location is logical. The location of firms, provision of infrastructures and other key elements should be based on a well-integrated strategy, such as the strategic reference framework.

Industrial policy based on state aids, tax incentives or other forms of soft credit concessions should be limited and, if used, based on stringent criteria and for a strictly limited period of time. Assistance should always aim at restructuring and adapting industries to new challenges and not at sustaining their losses.

Member-states should find the courage to free up trade barriers in the services sector, which the European Commission has proposed with the Services Directive (COM(2004) 2 final/3). This move is overdue, as a lack of progress is contrary to single market aspirations. There will undoubtedly be transitory adjustment periods, but improved services provision in the EU will benefit the competitiveness of Europe across the board.

3. Policy Implications for the Enlarged EU

The enlargement process brings opportunities for the EU15, as the market increases, but also introduces changes into EU capital and labour markets and possible competition with some growing industries of the CEECs. Some of these changes will cause some adaptation and restructuring in the EU15. This is due to the rising potential of the new member-states to compete in the same product groups as older member-states.

As these countries are still largely producing low to medium technology products, they appear to be potential competitors to the EU cohesion countries and to force them to shift to high technology products. The project shows that some industrial sectors of the EU face crowding out effects. The trade vulnerability analysis shows that the implications are not heterogeneous for all member-states.

The studies show that while MNC of the EU15 member states have benefited from the increase in trade with the new members and by relocating some operations to them, some sectors will have to restructure, including a number of 'sensitive' sectors according to the EU, either due to their vulnerability or strategic importance. The increase in size of the single market, while increasing economic opportunities for Europe, may increase the need for fundamental reforms in member states.

The European Union has shown concern over the general weaknesses in competitiveness in the EU. This is reflected in the policy proposals of the EU in the Financial Perspectives (COM(2004)101 final) and the subsequent Communication (COM(2004)187 final) and the calls for better policy coordination in the Treaty Establishing a European Constitution (Articles I-15 and I-17). While these proposals have positive aspects, the way these are implemented in practice will have a large impact on their effectiveness in promoting industrial competitiveness.

The European Commission has rightly pinpointed the economic weaknesses hampering the reaping of the full benefits of the internal market. To fully exploit the single market, the fragmented national systems in many economic areas have to be removed. Furthermore, commitments by the member-states to work towards EU actions, such as the Lisbon strategy fail to be followed up by the member-states.

The free provision of services is a crucial element for enhancing growth and competitiveness in Europe, and this report underlines the importance of renewing efforts to implement the Services Directive.

3.1. Policy coordination

The studies have revealed that before considering any state intervention in support of the industrial sector, the EU could already achieve advances by pushing for reductions of non-tariff barriers, which are still a strong reality. There is also a certain lack of trans-national cooperation, which leads to innovation and industrial structures to be more fragmented than they should. The EU can play a role in improving cooperation.

The EU should put pressure to increase macroeconomic, labour and fiscal policy coordination, especially in the euro zone. Policy conflicts and inconsistency between the member-states and EU objectives should be minimised.

3.2. Cohesion and Structural Funds

The European Commission should ensure that development plans and Operational Programmes are not only drafted to be able to successfully absorb the funds offered by the European Union, but that the strategies underlying the use of EU aid are sound and robust. To do so, the European Commission should reinforce the ex-ante economic evaluation capacity, as well as the subsequent monitoring and ex-post evaluation. This is especially important in the new member-states, where a substantial share of government funds for investment and development are linked to co-financing EU operations. The National Development Plan documents and the Operational Programmes ensuing from it thus become the main development strategy of the country. Given this situation, the Commission should ensure that EU assistance is appropriate and coherent. It is also important to understand the macroeconomic policy context of the country, to ensure that investments are not aimed to develop sectors which fail to develop due to policy failure rather than lack of investment.

This might create conflicts of competence, due to the subsidiarity principle in the preparation of the plans and limits on the Commission's competences. The Commission and member-states may disagree on the strategies. It is thus important to create an improved dialogue between the member states and the Commission, as well as a better guidance for the objectives of the funds.

3.3. Funds for competitiveness and R&D, European Social Fund, Trans European Networks and Growth Adjustment Fund

The EU heading presented in the financial perspectives shows a shift from concentrating on national and regional convergence to actually addressing bottlenecks in Europe's R&D and industrial competitiveness. This shift needs an appropriate strategy for the use of resources, which breaks away from the traditional political allocation by member-state. The direction of the investment should be taken over by an independent evaluation body of experts and not be dominated by bureaucratic rules or political influence.

Education and training looms large as a target of support, which is a positive step. More controversial are other social policies proposed, which are not necessarily handled better at the level of the EU. Furthermore, it is unclear if EU action will favour, or be detrimental to, reduced labour market rigidities.

The concept of having well planned Trans-European Networks is an important step for developing the single market and increasing competitiveness of European industry by reducing the transaction costs of businesses. However, the strategic planning and implementation has not been up to standard. Also the political pressures of member states not wishing to become fast transit areas to divert transport links have to be taken seriously. Such pressures can negatively affect planning.

A Growth Adjustment Fund proposed by the Commission has the large potential to be captured by political pressures or special interest groups. It is difficult to assess if a problem has arisen because of trade or market problems or if the origin is systemic. There is a risk that these funds suffer from policy failures that affect state aid.

3.4. Assessment

The policy competences of the EU cannot by themselves stimulate European Competitiveness. The full participation of the member-states is crucial. Economic strategies approved by member-states have to be followed and enforced, which is not currently the case. The EU needs to further develop the strategic character of its budget interventions, moving away from the simple redistribution and "absorption capacity" of funds to more efficiency and results-driven approaches, across all policies.

4. Conclusions

The principal messages emerging from the project is that industrial competitiveness in the new member states will depend on the level of innovation and their capacity to develop high technology products. The results of the studies do not encourage heavy intervention by the state, as this has not been successful in the past and often damages, rather than assists, the economic development of the country. The state should, rather, aim to ensure that the investment climate in the country is positive.

Furthermore, the decline of the agricultural sector, combined with a rise in productivity in industry, may put pressure on the labour market. Hence, the development of the services sector is crucial.

Efforts and changes are not only required from the new member states, however. The development of the services sector in Europe holds the key to improving European competitiveness in general. For the new member states this has particular relevance. There is a need for the old members of the EU to adapt, restructure their labour markets and implement the revised Lisbon strategy. This study recommends implementing the services directive to allow the EU to develop its economic potential.

4.1. Conclusions from Work Package 1

The increase in EU market share of both large and small winners from the AC-3 was the outcome not only of improvements in their productivity but also of the poor improvement of their EU counterparts in this respect. This sheds new light on the sources of the competitive pressures of the AC-3 winners on the EU market.

Three conclusions can be derived from the above analysis. First, changes in competitive pressures of AC-3 industry on the EU markets reflect changes in relative (i.e. domestic related to foreign) labour productivity and not differences in labour productivity across industries within the AC-3 country. Therefore, Smith's law of absolute advantages takes precedent over the competition and trade creation mechanism and determines changes in market share. Second, an analysis of market quality segments verifies the estimates of changes in the competitive pressure of the AC-3 on EU-15 industries based on changes in relative productivity or market share. The increase in the EU market share of a particular industry may be accompanied by differentiation in competitive pressure across market quality segments. If the focus of the analysis is the low quality segment of large-winner industries, the competitive pressure of Polish and some Czech industries would be much higher than our analysis reveals. However, the demand dynamics for these goods is quite low, which limits export potential. Third, competition by productivity – and not by wages

– was the main factor in competition among the AC-3 countries and the EU-15 industries. The reason for a decrease in the RULC of the AC-3 countries was the high dynamics of productivity growth, exceeding the growth of wages. This led to an increase in employment and resulted in high growth dynamics of production and an increase in EU export shares. The opposite was the case in changes in the EU incumbent countries.

The following general rules seem to govern the process of differentiation of competitiveness across the AC-3 manufacturing industries.

First, the use of EU market share conceals the scope and intensity of the process of differentiation by level and changes in relative labour productivity and quality of goods within industries that increased their EU market share. The analysis, covering changes in both domestic and EU market shares, adds new insights into the research on differentiation in changes in competitive pressure among industries that increased EU market share. It also shows differences in the behaviour of domestic, as compared to export-oriented, industries operating in different competitive environments. Less fierce competition on the AC-3 market during the period of revitalizing growth did not force industries selling a considerable part of their production on the domestic market to increase their productivity. Stronger competition on the EU market forced the AC-3 export-oriented industries to continuously improve their relative productivity.

Second, the lower the initial level of relative labour productivity of the AC-3 manufacturing industry, the lower the propensity to export and the lower the inflow of FDI, and thus a smaller improvement in competitiveness was achieved. The larger the initial relative productivity, propensity to export and inflow of FDI, the higher the improvement in competitiveness. This means that the larger initial differences in labour productivity across industries, the stronger the process of differentiation of changes in their competitiveness. The process of systemic transition and external liberalisation was more conducive to improvement in the competitiveness of more productive industries as well as ones which were restructured by FDI.

Third, improvement in competitiveness across AC-3 industries was dependent on the strategy introduced. In most industries except those of double winners (increased share in both domestic and EU markets), improvements in competitiveness cover two stages. The first was a defensive (shallow) restructuring, based on a considerable drop in employment. In the case of the industries which saw the biggest improvement in competitiveness, this type of restructuring was followed by an offensive restructuring with large increases in the investment rate, which supported an increase in productivity that allowed for increases in export and employment. Poor implementation of the

offensive type of restructuring of industries accompanied little or no progress in improvements in competitiveness.

Fourth, as the multi logit model performed shows, the higher the investment rate in ACC-3 industry and its dynamics, the bigger the increase in competitive pressure on the EU market. This conclusion is of great importance for AC-3 manufacturing, especially for Poland. All the more so given that investment is a main source of innovation and that, in the case of Poland, the potential to diminish employment seems to have been exhausted. This also means that increases in employment in Poland depend on improvements in human and physical capital.

Fifth, competition by productivity – and not by wages – was the main factor in competition among the AC-3 countries and the EU-15 industries. The reason for a decrease in the relative unit labour costs (as relation between wages and productivity) of the AC-3 countries was the high dynamics of productivity growth, which exceeded the growth of wages. This led to an increase in employment in some industries and resulted in high growth dynamics of production and an increase in EU export shares. The opposite was the case of the EU incumbent countries.

Sixth, changes in the competitive pressures of AC-3 industry on the EU markets reflect changes in relative (i.e. domestic related to EU) labour productivity and not differences in labour productivity across industries within the AC-3 country. Therefore, Smith's law of absolute advantages takes precedent over the competition and its effect.

Seventh, an analysis of market quality segments verifies the estimates of changes in the competitive pressure of the AC-3 on EU-15 industries based on changes in relative productivity or market share. The increase in the EU market share of a particular industry may be accompanied by differentiation in competitive pressure across market quality segments. If the focus of the analysis is the low and middle quality segment of the AC-3 large-winner industries, that share in the EU internal export is the biggest and most increased, and the competitive pressure of Polish and some Czech industries should be much higher than our analysis reveals. However, the demand dynamics for these goods is lower than high quality goods, which limits export potential and economic development of both countries.

4.2. Conclusions from Work Package 2

The research results listed above are new findings and contribute to a better understanding of the workings of government policy in the three transition countries under consideration. Although the economic literature on the role of government suggests that government intervention is often counter-productive in terms of improving the competitiveness of firms or industries, these theories have not been tested in the context of transition economies. Similarly, while the role of state aid has been studied in detail in the EU countries, there has been very little systematic study of state aid in the new member states. The research in this Work Package has attempted to respond to some of these gaps. In particular, the application of economic theory regarding the role of government in transition economies and the use of econometric analysis to test the impact of government policies and industrial competitiveness is a new line of research with promising results and policy implications.

In most transition economies, including those that have joined the EU, there is still a lingering belief that governments can improve the competitiveness of their industries by using their taxes, subsidies, VAT bands, etc., in favour of specific firms, industries and regions. This research has cast doubt on the effectiveness of such policies. It has confirmed the view held by a majority of economists these days that government intervention in support of specific sectors is largely politically motivated and is unlikely to improve the performance of these sectors. Subsidies often go to industries with better lobbying power and greater political and electoral influence. Yet they largely provide the recipient industry with a cushion against financial distress without requiring it to engage in serious restructuring. A government's scarce resources are better spent on more horizontal policies which improve the infrastructural dimensions of competition (education and training, support for R&D, environmental projects, etc.) for all firms, rather than on subsidising specific firms, industries and regions which can only distort the state of competition in the EU market. Indeed the pursuit of the aims of the Lisbon Agreement may require greater focusing of community support for such activities.

In order to improve the allocation of state aid in the three countries, it is essential that they are made subject to similar rules as govern the old members, or required to adopt these rules over a number of years. Given the new arrangements for state aid since the accession of the three countries, and the fact the European Commission has a more direct involvement in the allocation of state aid to specific projects, some improvements in this area are to be expected. Given the scale of distortions, however, a conscious effort is needed to redirect the bulk of state aid to horizontal objectives.

The European Commission's new proposal aimed at limiting state aid to horizontal measures (CEC, 2005a) is a welcome measure in line with the above findings. Most (if not all) state aid should be concentrated on horizontal measures to improve the productivity of factors for all firms across the European Union, rather than firms in specific sectors and regions. Some countries, of course, would continue to argue for supporting specific sectors which have not completed the restructuring process inherited from their socialist period. Such attempts should be subjected to serious scrutiny and any sectoral aid should be made conditional upon identifiable and measurable improvement in the operations of the aid recipients.

There is much room to extend the research on the impact of state aid by either obtaining more detailed data and continuing broader studies across countries, or concentrating on individual industries and identifying the real impact of specific state aid initiatives. Major policy initiatives need to be subjected to more detailed analysis highlighting the costs and benefits of these initiatives. A more detailed and comparable state aid data will enable researchers to compare the new and old member states more accurately and comprehensively. It is also ideal to apply the methodology used in this research to different types of state aid, trying to identify the relative impact of horizontal and non-horizontal state aid measures. For this to happen, however, it is necessary to obtain data on state aid at the 3-digit level.

The empirical work presented here (the comparative analysis as well as the work on Poland and the Czech Republic) may be extended further by the inclusion of horizontal and sectoral state aid figures instead of the global subsidy figures to industries. This may better identify the adverse impact of non-horizontal state aid. The panel data technique used here may also be extended by using GMM techniques in order to reduce the possible heteroskedasticity and autocorrelation associated with the panel data. There is some theoretical likelihood of endogeneity of some of independent variables, which may be dealt with using the instrumental variables. Both sets of econometric problems may be resolved by the use of Arellano and Bond's dynamic panel data methodology. Better data sets, identifying the breakdown of different types of taxes and subsidies and other characteristics of industries, will be needed to pursue these new lines of enquiry.

4.3. Conclusions from Work Package 3

The analyses of the relationship between structural change and labour productivity growth carried out in WP3 proved that Ireland was the only country in the pool where structural change clearly worked in favour of productivity growth. Consequently, from the policy point of view, it would be useful to look at the factors that enabled the shift out of traditional industries and into high-tech type industries in Ireland.

The first major factor is Ireland's industrial policy since the late 1950s. Any explanation of the sectoral growth, competitiveness and productivity performance is linked to both foreign direct investment and exporting. Ruane (2001) notes that the key elements of this policy have been consistency with a single apolitical policy for over 40 years, the gradual abandonment of attempts to protect declining industry, sensible selectivity of sectors, financial and fiscal based incentives, investment in education and infrastructure and appropriate macro policies. Some of these elements are of relevance for Poland, where industries that were less productive in 1995 apparently resisted restructuring, as evidenced by the negative "static shift effect".

Although some of the key policy instruments in attracting FDI applied in Ireland would be difficult to repeat in the new member states either due to institutional weaknesses (developing an equally efficient state agency as the Irish Industrial Development Authority – IDA) or because of the EU competition policy (grants designed to promote investment), other locational advantages which were important in attracting FDI are still relevant for the Central and Eastern European countries; these are highly skilled labour forces²⁴, relatively low wages and social partnership agreements on wage moderation. Therefore, with regard to labour market policy, the experience of Ireland indicates that investment in labour - both in terms of skills and education - as part of labour market flexibility policies should be an important focus.

At the same time one, should not forget that Ireland can be faulted for its relative overemphasis on foreign firms to the detriment of indigenous firms, especially in the 1970s and 1980s. This suggests that in learning from Ireland's experience, countries should seek to develop both the foreign and indigenous sectors of manufacturing (a lesson that might be particularly important for Hungary). On the issue of foreign direct investment, there is the related question of whether policy should target certain sectors. Ireland's current policy has been successful in this regard. The difficulty for other countries in pursuing such a policy is the challenge of identifying specific industries to

²⁴ English as native language was an additional advantage of Ireland, but this obviously cannot be matched.

target. Porter (1998) notes that direct targeting is only likely to succeed when a country possesses investment driven national advantage although when implemented properly direct targeting can significantly influence the bases of competitive advantage; to move an economy to innovation driven advantage requires a shift to more indirect forms of government assistance to support efforts by any industry and so governments have an important role at that stage of encouraging the development of skills or technologies that are important in a substantial number of industries.

Finally, econometric analyses of factors of structural change performed in WP3 let us draw policy conclusion of a more general kind. These analyses in two transition countries have shown – especially in Poland and to a lesser extent in the Czech Republic – that it was mainly the market mechanism that has driven structural changes, with changes in demand and changes in competitive performance playing the principal role. Indeed, Polish and Spanish results were quite similar in that respect (though the models were different). The general conclusion that can be drawn is that the Polish economy is approaching the stage of a mature market economy and, in this sense, arguments based on its transition character are increasingly ill-founded.

4.4. Conclusions from Work Package 4

One of the main outcomes of this part of the project is that it has been systematically proven that in all three transition countries, the Czech Republic, Hungary and Poland, the situation of individuals has been strongly determined by his/her skills and level of educational attainment. Considering this, adequate national labour market policies should aim at improving human capital formation. Development of a system of education and trainings in all countries researched should be supported in order to facilitate the process of raising the level of education as well as the level of vocational skills. These systems should also play a role in adjusting the structure of labour supply to the requirements of the market by means of the development of specific vocational trainings. Next, in order to combat structural unemployment, it is important to adjust the qualification of the labour force to current and future market requirements. This can be achieved by active labour market policy instruments focused on the supply side such as: vocational training for the unemployed, job counselling, employment agencies and others. It is also advisable to subsidise employment in the case of the most vulnerable groups in order to enhance labour demand in the most difficult areas. Given that the least educated groups prove to be most vulnerable, it is necessary to address these groups with active policy measures. At least in the case of Poland this is not the case: recent studies have shown that it is mainly the most skilled and best educated groups of unemployed that benefit from most of the active labour market policy schemes (Boni 2005, Bukowski 2005).

Finally, social protection programs for those made redundant as the result of industrial restructuring should be developed. The programs should consist of typically protective measures as well as actions enhancing the chances to change qualifications of persons leaving the branches under restructuring in order to enable them smoother re-entry into the labour market. At the European level, the project results support the Lisbon Strategy's focus on active labour market policy developed in the framework of the so-called European Employment Strategy.

Labour costs significantly and negatively influence employment in the manufacturing industries of the three countries. Therefore, economic policy should avoid increases in labour costs that would exceed the rise in labour productivity. In particular, the problem of an excessive tax wedge resulting from taxes and social security contributions should be addressed. This is vital in the case of lower-paid workers: not only do they face the least favourable labour market situation (see above), but their tax wedge as a proportion of remuneration is the highest, as evidenced by e.g. by (Bukowski 2005).

An analysis of the demographic situation in the three countries led to distinct conclusions for Poland and for the other two countries. In the case of Poland, our study discussed arguments as to why migration pressure might remain considerable. One factor that will contribute to this is over employment in agriculture. Labour market policy in Poland should focus on job creating measures facilitating the outflow of employees from agriculture to other sectors, especially services, while at the same time efforts should be intensified to improve the quality of human capital in rural areas. These measures combined should reduce the Polish migration potential. Conversely, Czech Republic and Hungary, which are receiving countries and not sending ones, should take a particularly active part in the development of the common European immigration policy, covering such aspects as family reunification, immigration of workers, the admission of students, occupational trainees and volunteers, and the status of long-term residents (see also Apap 2003).

The research carried out indicates that there is a need to do further research on the following issues. First, human capital theory claims that differentiation of the human capital stock in possession of individuals is a reason for significant differences in the level of unemployment and wages in particular groups of the labour force. The study performed here focused mainly on links between qualifications and unemployment. Further research should concentrate on links between qualifications and wages. Second, the relationship between competitiveness and labour demand should be further investigated. Branches showing a negative relationship could be subject to case study analyses. Finally, there is room for further research on the factors influencing labour

demand apart from labour costs and output. Moreover, along with the harmonisation of labour costs methodology in the EU25, there is more comparable data available for international comparisons (since 2001). There is also room for labour costs structure analysis and its impact on employment development;

4.5. Conclusions from Work Package 5

In Work Package 5 a new kind of comprehensive approach was used in the analysis of foreign trade specialization patterns in the new EU member states. To the best of our knowledge, there is no analysis of trade specialization patterns for selected new EU member states, which shows detailed descriptive statistics of specialization patterns among the new EU countries and the cohesion countries.

The practical value added of the research consisted as well in including the quality aspect in the analysis of specialization: it has been shown that accession countries in most cases do not specialise in the high quality segments. Consequently, it comes as a policy implication for the new EU member countries that innovations should be stimulated to enhance the quality of products to gain competitiveness in international markets. The econometric analysis underlying the study showed 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.

While the positive impacts of research and development expenditure on comparative advantages of foreign trade were shown empirically, it is clear also from a theoretical and a political perspective 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 spill-over there is some risk that national policymakers will cut incentives for R&D expenditures, causing them to decline, since it can be expected that the positive external effects of innovation would not be fully internalized in the EU. Shifting more R&D funds 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.

What is more, the positive impact of foreign direct investment on the development of foreign trade specialization has clearly been empirically indicated. By implication, 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.

Finally, 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.

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.

There are still some restrictions to the empirical analysis, which can be resolved using better and larger datasets. Therefore, further empirical analysis is definitely needed, when longer time series are available for Eastern European countries. Furthermore, the impact of third countries, such as the US or China, should be included into further analysis, because their influence is rather large on European economic development. Also further research should take into account the services sector, because the interaction between manufacturing and services is important.

4.6. Conclusions from Work Package 6

We have shown in WP6 the significant extent of similarities between the new EU member states and less developed old members such as Spain, indicating that there is a tendency for convergence for the former but at the same time suggesting pessimism with regard to the question whether and when any of these countries may move from the "periphery" to the "core" of the European economy in terms of innovation and knowledge intensity. On the other hand, our research indicates that country may still be a stronger determining factor than industry for many networking models and benefits therefore, and especially for various aspects of internal organisation crucial for competitiveness (e.g., R&D spending, patent activity, and employee training). However, there are also significant differences between the new member countries in this respect, indicating that their paths are not dependent on their socialist past alone. Our results also give grounds for greater optimism than is often found in the literature concerning cooperation between industry and the science and technology sector in the post-Communist countries.

The results demonstrate that all four countries remain peripheral (some more, some less) in terms of R&D intensity and innovativeness, which are among the key components of competitiveness and have been targeted for special action by the Lisbon Strategy. The fact that Spain differs relatively little from the other three countries in this respect indicates that this is an area which has not been adequately addressed by EU policies and instruments supporting convergence (specifically, the Structural and Cohesion Funds), and the fact that this area is of particular concern for the Lisbon Strategy is, moreover, an indication of a more generalised weakness of European firms which extends into the core countries as well. Thus, the question of what to do about this issue is a crucial one. It is clear that the Lisbon Strategy's use of numerical targets (R&D expenditures of 3% of GDP) is ineffective. What would be a better approach?

While the importance of network activity in the innovation process has been demonstrated in a substantial literature on the subject, our results show that firms in the countries studied have, on the whole, not yet begun to utilise this source of competitive advantage; indeed, in factors affecting their competitiveness, innovation-related cooperation (e.g., in the area of R&D) is not even on the map. Network activity in these countries is still largely concentrated within value chain relationships and focuses on quality control and inventory management issues, not innovation. The paths for development in these areas have been very well-researched for at least two decades now, beginning with the literatures on Japanese management systems, total quality control, etc., and the issues involved are very well-known in industry world-wide. Thus, market forces are currently sufficient to ensure that the post-Communist countries catch up in these spheres. The Central and East European countries are currently far enough behind technologically that it usually pays for their firms to import technology rather than seek to develop it. However, if they are to successfully evolve in the direction of knowledge-based economies as the newly industrialised countries of East Asia have done (and as the Lisbon Strategy would have them do), they will have to move beyond this stage and become innovators at some point. At that time it is clear that innovation-related cooperation will become an increasingly important issue, and that those firms which can master these capabilities earlier will acquire significant competitive advantage. The literature on the successful East Asian cases indicates that they face similar problems (see, e.g., Lee, 2000, Pack, 2000), particularly with regard to the role of cooperation with public institutions such as industrial R&D institutes and universities (which have played such an important role in the US experience), so it may not be possible to address these problems directly at this stage. However, our research indicates that, in order to maximise the potential for firms to benefit from innovation-related cooperation in the future, much work can and should be done now to improve their absorption capacity,

concentrating on human capital development through the improvement of education from the pre-school to the postgraduate level as well as training and life-long learning initiatives.

Significant differences across industry with respect to innovativeness and networking models suggest that any national innovation policy, in order to be successful, would have to take into account these industry differences. But we are unable to answer the questions whether post-Communist states, with their limited capacity and high rates of corruption, can handle the challenge of constructing such a fine-tuned policy well, or in what ways the design of such a policy would need to reflect the constraints of EU competition policy. Nevertheless, these new EU member states deserve special attention from the European Commission in their efforts to foster the Lisbon Strategy.

Finally, one possible policy implication of the results showing that foreign-owned companies are, on the whole, not engaged in particularly R&D-intensive activity, is that the countries studied need to integrate their FDI policies with their innovation policies, moving, on the side of FDI policy, beyond simple marketing of the country to more active seeking and encouragement of investors who will be active in R&D and innovation (as well as implementing the kinds of policies, and making the kinds of public infrastructural investments, that would make the country attractive for such investors), and, on the side of innovation policy, away from a focus on financial support of the science and technology sector to a much greater focus on technology development by, and technology transfer to, industry.

4.7. Conclusions from Work Package 7

The main policy conclusions from the analysis of impact of the real exchange rate on trade, structural change and growth in WP7 are that massive overshooting and high exchange rate volatility should be avoided on the one hand, while on the other poor countries willing to catch up with partner countries in an integration area would be well advised to promote foreign direct investment inflows and to stimulate upgrading of human capital; supporting R&D is crucial as well for economic catch-up. We have argued that policymakers should consider the implications of optimum growth models and that the role of FDI should be carefully considered.

By combining trade, FDI and innovation dynamics in the analysis, and considering process and product innovations, we believe that we have obtained a more adequate model of the contemporary EU economies. The traditional analysis has emphasized the trade effects of EU eastern enlargement, mainly in a Vinerian perspective. Also one has emphasized general equilibrium models. The latter, however, are rather inadequate since

both in accession countries and in the Eurozone one does not find a general equilibrium – rather mass unemployment in parts of Western Europe and Eastern Europe are observed.

We show that growth modelling in open economies is quite interesting if we include foreign direct investment flows. Moreover, the topic of optimum growth policies is important, in particular as growth dynamics in the Eurozone are rather weak. As regards exchange rate dynamics, one should take into account the interplay of stock markets and foreign exchange markets – as stock markets are bound to play a bigger role in the context of ageing EU societies and pension reforms there should be considerable analytical benefits plus policy reform benefits if one further explores the modern approach developed. Most important is a broader analysis of EU integration dynamics, namely the interplay of trade, foreign direct investment and innovation – and one certainly should explore how globalization dynamics overlap with regional integration dynamics. Here the present state of knowledge is rather weak.

V. DISSEMINATION AND EXPLOITATION OF RESULTS

Wide dissemination of research results has been one of the top priorities of the coordinator. This focus is reflected in the initial list of project deliverables, which included at least two obligatory publications per partner per Work Package. But the co-ordinators efforts went beyond executing partners' contractually obligations: the consortium members were continuously persuaded to disseminate the findings of the project. Finally, CASE researchers themselves published a number of papers and some books with the results of research undertaken in the project.

In the end, we are happy to report that a total of 5 books, at least 45 papers, 12 articles and 10 book chapters have been published. About 30 presentations have been delivered. A full dissemination list is included in the annex, where also the forthcoming publications are included.

The principal book outcome of the project is the work entitled "Competitiveness and Integration in a Comparative Perspective", which is currently being edited by Prof. Anna Wziątek-Kubiak, Prof. Iraj Hashi and Prof. Paul J.J. Welfens. The book contains the most valuable results from the project and it will be submitted to the publishing house in April 2006.

The Final Conference of the project, which took place in Brussels on 25-26 November 2005 in Brussels, was an occasion to disseminate the results of the project among the persons directly involved in shaping EU policies and in related debates. 31 papers were presented and discussed. The Centre for European Policy Studies (CEPS) was responsible for the organisation and promotion of the conference.

On 28.03.2006 CASE organised in Warsaw a press conference presenting the principal findings of the project. The conference was very well attended and resulted in several press articles as well as radio and TV materials.

The webpage of the project was launched in the first month of the project. It is available at www.compete.case.com.pl and it contains a detailed description of the project, its goals and structure as well as the presentation of the consortium. All the texts issued in the framework of the project (i.e. the deliverables) are available on the webpage. In addition, it contains a Competitiveness Database with principal competitiveness indicators for the three new member states and materials from the General Meetings and from the Final Conference.

What is more, the project has inspired a considerable amount of further research, much of which will be done (or is being done already) jointly by the members of the old consortium. We will now discuss in more detail some of these follow-up projects and publications.

First, CASE is participating actively in the preparatory phase of the 6FP Integrated Project "The competitiveness of firms, regions and industries in the knowledge-based economy: What room for job-rich growth in Europe?" (MICRO-DYN) co-ordinated by the The Vienna Institute for International Economic Studies (WIIW). The partner from the Staffordshire University is also involved. The project will start in the second half of 2006.

Second, CASE is participating in two 6FP projects on knowledge-based economy and networking, where the results obtained in Work Package 6 are useful inputs:

- "Knowledge-Based Entrepreneurship: Innovation, Networks and Systems" - CASE is one of 7 partners in this Specific Target Project coordinated by the Università Commerciale "Luigi Bocconi", Milan, Italy. The aim of the project is to study three types of entrepreneurship - start-ups, corporate entrepreneurship and academic entrepreneurship - in the context of the Knowledge-Based Economy. Within the project, CASE is responsible for coordinating research on knowledge-based entrepreneurship in the new EU member states and accession countries of Eastern Central Europe.
- "Evolving Regional Governance Regimes: Challenges for Institution Building in the CEE Countries", CASE is participating in this project coordinated by the Central European University in Budapest, Hungary, within a larger Integrated Project entitled "New Modes of Governance", coordinated by the European University Institute in Florence, Italy. The project focuses on how various actors - public, private, and not for profit - have acted and interacted in the creation and implementation of regional development policies and strategies. Three Central European countries - the Czech Republic, Hungary and Poland - are being studied within this project, with CASE being responsible for the analysis of the Polish case.

Third, CASE is currently running a project evaluating the involvement of Enterprise Funds in the Central and Eastern European economies (these were equity funds founded by the US government at the beginning of transition to foster the growth of private sector in view of the underdeveloped financial markets). The analytical framework is largely based on the "Competitiveness" inasmuch as the competitive strategies are examined and results of competition are assessed.

Fourth, CASE is working on new applications for research projects together with the German partners involved in this project. More specifically, a draft proposal for a project on the vertical fragmentation of production and its implications for the competitiveness of German and Polish companies has been prepared by colleagues from the Osteuropa-Institut in Munich in co-operation with CASE. There is also preparatory work being done by European Institute of International Economic Relations (EIIW) from Wuppertal and CASE to respond to the next call for proposals related to the European Competitiveness Report.

Fifth, the Staffordshire University has been involved in a research project in Bosnia-Herzegovina on industrial restructuring and competitiveness drawing on the knowledge, methodology and techniques developed in the "Competitiveness" project.

Sixth, the researcher from the University of Limerick, is working jointly with the Department of Economics at the University of Loughborough to conduct research on structural change and productivity growth in CEEC and linking this with FDI flows to these countries to examine the role of FDI as a driver of structural change and productivity growth for the 1993-2003 period. Also, she has become involved in a Productivity Research Advisory Group to the Minister of Enterprise, Trade and Employment. The members of the group comprise academics and policy makers in Ireland who are working on research related to productivity.

Seventh, the Spanish partner (Department of Economics at the University of Complutense, Madrid) has invited the Irish partner to give a seminar on a comparative analysis of productivity growth in Ireland and Spain; it is anticipated that this will be given at the end of April/beginning of May 2006. Moreover, joint research effort and a common publication are envisaged.

Finally, at least five researchers and research assistants have benefited from the project in the sense of inspiration and experience that has contributed to their ongoing or completed PhD theses. This group included representatives of CASE, European Institute of International Economic Relations (EIIW), Staffordshire University and Torun University.

Concluding, the extensive dissemination record and numerous follow-up research projects let us state that the "Competitiveness" project achieved, in addition to other aims, its planned contribution to the development of the European Research Area.

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VII. ANNEXES

1. List of deliverables

Del. no.	Deliverable topic	Status
1.1. Work Package 1		
DEL 1.1	Critical synthesis, review of the main finding, methodologies and current thought on competitiveness of accession countries. Mapping of competence	completed
DEL 1.2	Countries draft reports on differentiation in change in competitiveness of the association countries' branches of manufacturing.	completed
DEL 1.3	Comparative report on similarities and differences among the countries and conclusions	completed
DEL 1.4	Countries draft reports on impact of liberalization on changes in market shares and efficiency of accession countries. Selection of branches with improving and deteriorating competitiveness	completed
DEL 1.5	Comparative report on impact of liberalization of association countries on changes in competitiveness.	completed
DEL 1.6	Publication on research results	completed
DEL 1.7	Countries' draft reports on new trends in competitiveness change (2002 and 2003) and prospects.	completed
DEL 1.8	Comparative report on new trends in competitiveness changes (2002 and 2003) and prospects	completed
DEL 1.9	Publication of final research results	completed
	Book publication of proceedings of final conference	forthcoming
1.2. Work Package 2		
DEL 2.1	Critical synthesis, review of the main finding, methodologies and current thought on impact of policy on changes in manufacturing competitiveness. Mapping of Competence	completed
DEL 2.2	Country draft reports on state aid and government policy	completed
DEL 2.3	Comparative report on state aid and government policy and conclusions	completed
DEL 2.4	Publication of results	completed
DEL	Country draft reports on impact of government policy on	completed

2.5	competitiveness change	
DEL 2.6	Comparative report and conclusions	completed
DEL 2.7	Publication of final research results	completed
	Book publication of proceedings of final conference	forthcoming
1.3. Work Package 3		
DEL 3.1	Critical synthesis, review of the main finding, methodologies and current thought on impact of competitiveness change on industrial restructuring and specialization of the accession countries as well as Spain and Ireland after integration. Mapping of Competence	completed
DEL 3.2	Country draft reports on impact of change in competitiveness on restructuring of accession countries manufacturing. Restructuring of Spain and Ireland's manufacturing after integration with the EU	completed
DEL 3.3	Comparative report and conclusions	completed
DEL 3.4	Country draft reports on impact of competitiveness change on specialization of 3 accession countries. Changes in specialization of Ireland and Spain after integration	completed
DEL 3.5	Comparative analysis of 3 accession countries. Impact of competitiveness change on specialization	completed
DEL 3.6	Publication	completed
DEL 3.7	Countries' supplementary research (2002-2003), conclusions and prospect	completed
DEL 3.8	Comparative supplementary research of 3 accession countries, conclusions and prospects	completed
DEL 3.9	Publication of research result	completed
	Book publication of proceedings of final conference	forthcoming
1.4. Work Package 4		
DEL 4.1	Critical synthesis, review of the main finding, methodologies and current thought on impact of competitiveness change on labour market development before and after integration with the EU. Mapping of Competence	completed
DEL 4.2	Country draft reports on impact of change in competitiveness on labour market development. Unemployment and quality of labour force	completed
DEL 4.3	Comparative report and conclusions	completed

DEL 4.4	Country draft reports on impact of trade linkages on labour market development	completed
DEL 4.5	Comparative analysis of 3 accession countries on impact of trade linkages on labour market development	completed
DEL 4.6	Publication of research results	completed
DEL 4.7	Countries' draft reports on the impact of the demographic situation on the labour market development in accession countries and EU as well as migration	completed
DEL 4.8	Comparative supplementary research of 3 accession countries, conclusions and prospects	completed
DEL 4.9	Publication of final research result	completed
	Book publication of proceedings of final conference	forthcoming
1.5. Work Package 5		
DEL 5.1	Critical synthesis, review of the main finding, methodologies and current thought on evolution of specialization patterns in exports of 3 accession countries as compared to the EU countries and on the emerging division of labour in the Single Market after enlargement	completed
DEL 5.2	Draft reports on evolution of specialization pattern in exports of the 3 accession countries to the EU	completed
DEL 5.3	Comparative analysis of changes in specialization within the EU market and conclusions	completed
DEL 5.4	Comparative analysis of 3 accession countries on potential and direction of future structural adjustment after integration with the EU and factors determining those adjustment	completed
DEL 5.5	Publication of research results	completed
DEL 5.6	Comparative supplementary research, conclusions and prospects.	completed
DEL 5.7	Publication of research result	completed
	Book publication of proceedings of final conference	forthcoming
1.6. Work Package 6		
DEL 6.1	Critical synthesis, review of the main finding, methodologies and current thought on the role of foreign and domestic firms in changes in competitiveness	completed
DEL 6.2	Country draft reports on case studies of 3 accession countries, Spain and Ireland	completed

DEL 6.3	Comparative report on case studies in 5 countries	completed
DEL 6.4	Country draft reports on actors and factors in the process of competitiveness development (analysis of survey data)	completed
DEL 6.5	Comparative report on actors and factors in the process of competitiveness development	completed
DEL 6.6	Publication of research results	completed
DEL 6.7	Country draft reports on policy instruments affecting competitiveness development (analysis of surveyed data)	completed
DEL 6.8	Conclusions and final report	completed
DEL 6.9	Publication of research result	completed
	Book publication of proceedings of final conference	forthcoming
1.7. Work Package 7		
DEL 7.1	Critical synthesis, review of the main finding, methodologies and current thought on linkages between structural change in accession countries to the real exchange rate and economic growth	completed
DEL 7.2	Draft report on real exchange dynamics in accession countries	completed
DEL 7.3	Conclusion on real exchange dynamics	completed
DEL 7.4	Conclusion on impact of RER on structural change, trade and growth	completed
DEL 7.5	Publication of research results	completed
DEL 7.6	Draft report on policy recommendations and prospects	completed
DEL 7.7	Publication of research result	completed
	Book publication of proceedings of final conference	forthcoming
1.8. Work Package 8		
DEL 8.1	Critical synthesis, review of the main finding, methodologies and current thought on challenges facing the EU as a result of changes in the competitiveness of the candidate countries	completed
DEL 8.2	Draft reports on challenges facing the EU on factors and products markets as result of changes in competitiveness of candidate countries	completed

DEL 8.3	Conclusion	completed
DEL 8.4	Publication of research results	completed
DEL 8.5	Draft reports on policy implications of changes in competitiveness patterns of the candidate countries for the EU. Direction of policy modifications in reactions	completed
DEL 8.6	Conclusions and prospects	completed
DEL 8.7	Publication of research result	completed
	Book publication of proceedings of final conference	forthcoming

Three additional papers (not included in the contractual list of deliverables) were prepared:

Determinants of Industrial Restructuring in Transition Economies: Empirical Evidence from Czech Republic, Hungary and Poland (in the framework of WP3)	completed
Changes in Labour Costs vs Changes in Labour Market Development (in the framework of WP4)	completed
Migration and Labour Market Development (in the framework of WP4)	completed

2. List of dissemination materials

2.1. Conference presentations

Anna Wziątek-Kubiak

Improvement in competitiveness as a factor of integration: The case of Poland.

Presentation at Congress of Political Economists. International Fourteenth Annual Conference 2003, "Global Business: the Economic, Political, Social and Cultural Issues", Mexico City, 13-16 July 2003;

Krzysztof Szczygieski

Impact of the EU-related Regulation on the Private Sector: Polish Manufacturing Under the Regime of the Acquis.

Presentation at the conference "The Politics of Regulatory Impact Assessment. Best Practices and Lesson-Drawing in Europe", American University in Bulgaria and Economic Policy Institute, Sofia, 30 February - 1. March 2003;

Anna Wziątek-Kubiak

Competitiveness of the Polish Economy during Transition

Presentation at the Polish-Egyptian Scientific Seminar on "Systemic Changes in the Time of Globalisation: Culture, Society and Economy, Warsaw, 26-27 September 2003;

Klára Fóti

Low Unemployment in Hungary - What is behind Statistics?

Labour and Employment Workshop organised by the Euro-Atlantic Action Commission of the Center for Strategic and International Studies, Bratislava, 28 October 2003;

Lenka Filipova

Vyznam lidskeho kapitalu na ceskom trhu prace (Importance of Human Capital on the Czech Labour market)

Presentation at the 4th International Seminar "Economic policy in Transition Economies", Faculty of Economics, VSB-TU Ostrava, Czech Republic; November 2003;

Jaromir Gottvald

Motivation of Work Behaviour - Wage and its Determinants.

Presentation at the 4th International Seminar "Economic policy in Transition Economies", Faculty of Economics, VSB-TU Ostrava, Czech Republic; November 2003;

Klára Fóti

Standortwettbewerb und Liberalisierungsmöglichkeiten auf dem Arbeitsmarkt Ungarns (National Competitiveness and Possibilities for Liberalisation of the Hungarian Labour Market)

Conference held within the framework of a cooperation between the Institute for World Economics of the Hungarian Academy of Science and Europa-Kolleg, Hamburg, 7-8 November 2003;

Isabel Álvarez, José Molero

Technology and the Generation of International Knowledge Spillovers. An Application to Spanish Manufacturing Firms

Presentation given at the conference of the European International Business Academy (EIBA) in Copenhagen, 11th December 2003;

Klára Fóti

Labour market in Hungary and its implications on migration

Conference "EU Expansion in Central Europe: Challenges and Opportunities" - US Embassy in Austria, Graz, 2. April 2004;

Krzysztof Szczygielski

Lisbon Process and Competitiveness of the Polish Manufacturing Industry

Presentation given at the conference "How will small countries such as the Baltic States compete in the EU single market? " - Baltic International Centre for Economic Policy Studies, Riga, 23. April 2004;

Klára Fóti

Labour Market Trends in Hungary and Free Movement of Labour.

Presentation delivered to Finnish journalists, Budapest, 4 May 2004;

Alena Zemplerova

Auswirkungen ausländischer Direktinvestitionen auf die Umstrukturierung der tschechischen Industrie (Impact of the FDI on restructuring of the Czech industry)

Paper presented at the conference "Continuity and change of foreign direct investments in East Central Europe", Institut für Wirtschaftsforschung Halle (IWH) 13-14. May 2004;

Anna Wziątek-Kubiak, Dariusz Winek

On Measurement of Changes in Competitiveness

Presentation given at the 3rd Annual Conference of the European Economics and Finance Society "World Economy and European Integration" - University of Gdansk, 13-16 May 2004;

Ewa Balcerowicz, I. Hashi, M. Sowa, M. Szanyi, M. Bohata

The Comparative Analysis of State Aid and Government Policy in Poland, Hungary and the Czech Republic

Presentation given at the 3rd Annual Conference of the European Economics and Finance Society "World Economy and European Integration" - University of Gdansk, 13-16 May 2004;

Krzysztof Szczygieski

Lisbon Strategy and Competitiveness of Polish Manufacturing

Presentation given by at the 3rd Annual Conference of the European Economics and Finance Society "World Economy and European Integration" - University of Gdansk, 13-16 May 2004;

Anna Golejewska

The Relationship Between Foreign Direct Investment and Manufactured Trade of Poland

Presentation given at the 3rd Annual Conference of the European Economics and Finance Society "World Economy and European Integration" - University of Gdansk, 13-16 May 2004;

Marie Bohata, Alena Zemplerova

The Effects of State Aid in the Process of Economic Transformation

Presentation prepared for the IT&FA conference in San Antonio, Trinity University, 19-22 May 2004;

Klára Fóti

EU Accession and Labour Force

Presentation delivered to a delegation coming from the University of Havana, Hungary, 4. June 2004;

Krzysztof Szczygielski

Konkurencyjność polskiego przemysłu na rynku rozszerzonej Unii Europejskiej (Competitiveness of the Polish Manufacturing Industry in the enlarged Single European Market)

Presentation given at the Round Table "Poland in the European Union" - Polish Delegation and 'Nasha Sprava' Association, Lutsk (Ukraine), 15. June 2004.

Dariusz Winek, Anna Wziętek Kubiak

Do Relative Unit Costs Reflect Changes in Market Shares of Economies in Transition?

Presentation given at the Fifth Annual Convention of COPE (Congress of Political Economists) International devoted to "Emerging Markets: Social, Political and Economic Challenges", Cairo (Egypt), July 2004;

Alena Zemplerova

Key aspects of the Czech Transition

Paper prepared for the workshop "The Results of Transition in Central Europe", University of Economics, Budapest, 17-18 September 2004;

Iraj Hashi, Ewa Balcerowicz

The Comparative Analysis of State Aid and Government Policy in Poland, Hungary and the Czech Republic

Paper presented at the Bi-annual Conference of European Association for Comparative, Economic Studies, Belgrade, 23-26 September 2004;

Tomasz Brodzicki

Konkurencyjność przemysłowa Unii Europejskiej w handlu z Polską, Republiką Czeską i Węgrami. Analiza oparta na udziałach rynkowych i korzyściach komparatywnych (Industrial competitiveness of the EU in the trade with Poland, Czech Republic and Hungary. Analysis based on market shares and comparative advantages)

Paper prepared for the conference "Consequences of Polish integration with the EU", Warsaw University, 5-6 November 2004;

Miklos Szanyi

Competitiveness and industrial renewal: The role of foreign direct investments in the development of the Hungarian electrical industry

Paper presented at the International Seminar on FDI organized by the Universidad Complutense Madrid Spain 22-23 November 2004;

Miklos Szanyi

Competitiveness and industrial renewal: The role of foreign direct investments in the development of the Hungarian electrical industry

Paper presented at the 4 National Assembly of the Hungarian Association of New Institutional Economists, Debrecen Hungary, 3-5 December 2004.

Agnieszka Furmańska-Maruszak

Labour Costs and Employment Development in Manufacturing

Presentation given at the 8th International Conference of Doctoral Students, Brno University of Technology, Brno (Czech Republic) 2004.

Dora Borbély

EU Export Specialization Patterns of Selected Accession and Cohesion Countries: Tough Competition on the EU15 Market?

Paper presented at the European Trade Study Group, Annual Conference, ETSG 2004 in Nottingham, UK.

Iraj Hashi, Darko Hajdukovic

Determinants of Industrial Restructuring in Transition Economies: Empirical Evidence from Czech Republic, Hungary and Poland

Paper presented at the Sixth International Conference on Enterprise in Transition, Split, 27-29 May 2005

Anna Wziątek - Kubiak

The uneven integration of Polish manufacturing industries into the Single Market

Paper presented at the Fourth Annual EEFS on "Economic and Financial Issues in an Enlarged Europe" held at the Faculty of Economics, University of Coimbra, 19-22 May 2005

Ewa Balcerowicz

The impact of Government Policy on the Industrial Competitiveness. The Case of the Manufacturing Sector in Poland

Paper presented at the Fourth Annual EEFS on "Economic and Financial Issues in an Enlarged Europe" held at the Faculty of Economics, University of Coimbra, 19-22 May 2005

Isabel Alvares, Raquel Martin, Antonio Fonfria

The role of networking in the competitiveness profile of Spanish firms

Paper will be presented at the International Conference on Policy Modelling – EcoMod2006, 26-30.06.2006, Hong-Kong

Isabel Alvares

Cooperative Relationships as a factor of Competitiveness: An Application to Spanish Firms

Paper will be presented at the Academy of International Business 2006 Annual Meeting, 23-26.06.2006, Beijing

2.2. Publications

P.J.J. Welfens, A. Jungmittag, Ch. Schumann, A. Kauffmann

EU Eastern Enlargement and Structural Change: Specialization Patterns in Accession Countries and Economic Dynamics in the Single Market.

EIIW Discussion Paper 106, University of Wuppertal 2003;

P.J.J. Welfens

Exchange Rate Dynamics and Structural Adjustment in Eastern Europe.

EIIW Discussion Paper 107, University of Wuppertal 2003;

Jaromir Gottvald

Determinanty mezd zamestnancu v podnikich v Ceske a Slovenske republice (Determinants of Individual Wages in the Czech and Slovak Republic Firms)

Politicka ekonomie No.4/2003; Prague 2003, ISSN 0032-3233;

Eugeniusz Kwiatkowski, Leszek Kucharski

Unemployment and Quality of Labour Force in the Czech Republic, Hungary and Poland in Comparative Economic Research

Comparative Economic Research No. 1/2/2003 (volume 6), Łódź University Press, Łódź 2003;

Anna Wziątek-Kubiak, Dariusz Winek

Are changes in market shares a relevant indicator of changes in competitiveness? A case of Poland

Opere et Studio pro Oeconomia No. 2 (Vol. 1), Graduate School of Business Economics - Higher School of International Commerce and Finance, Warsaw 2004;

Ewa Balcerowicz, Iraj Hashi

The Comparative Analysis of State Aid and Government Policy in Poland, Hungary and the Czech Republic

Opere et Studio pro Oeconomia No. 2 (Vol. 1), Graduate School of Business Economics - Higher School of International Commerce and Finance, Warsaw 2004.

Alena Zemplerova

The importance of foreign-owned enterprises in the catching-up process,

in: Liebscher, K., Christl, J., Mooslechner, P. and Ritzberger-Grünwald, D. (eds.). The Economic Potential of a Larger Europe. Edward Elgar, Cheltenham, UK and Northampton, MA, USA, 2004;

Zenon Wiśniewski, Jarosław Oczki

Demographic trends, unemployment and Poland's migration potential in the enlarged European Union

"Journal of European Affairs", Volume 2, Number 3, August 2004;

Agnieszka Furmańska-Maruszak

Koszty pracy jako determinanta konkurencyjności (Labour Costs as Determinants of Competitiveness)

Acta Universitatis Nicolai Copernici, Oeconomia XXXIV, Torun 2004;

Jarosław Oczki

Uwarunkowania presji migracyjnej z Polski (The conditions of migration pressure from Poland)

Acta Universitatis Nicolai Copernici, Oeconomia XXXIV, Torun 2004;

Anna Zielińska-Głębocka

Industrial Competitiveness in An Enlarged Europe. Review of Key Theoretical and Policy Issues

"Argumenta Oeconomica", No. 1(15) 2004, Special Issue: European Union Enlargement, Wrocław University of Economics;

Lenka Filipova

Ekonomická rast a lidský kapital (Economic growth and human capital)

"Medzinarodne vzťahy" 2003, pp. 17-22. Virt, SR 4.-5.12.2003, Bratislava: Ekonomická Univerzita, Bratislava, 2004. ISBN 80-225-1880-8

Martin Simek, L. Tvrda

**Procesy transformace na trhu prace v tradicnych prumyslovych regionech.
(Labour market transition proceses in traditional manufacturing regions)**

in: Posilovane regionalne konkurenceschopnosti. Komorne Lhotka, CR 23.4.2004.

Ostrava: VSB-TU Ostrava, 2004. pp. 81-99. ISBN 80-248-0653-3;

Miklos Szanyi

State aid to Hungarian manufacturing sector 1990-2000

IWE Kihívások, 2004 July (in Hungarian);

Miklos Szanyi

State aid to Hungarian manufacturing sector 1990-2000

IWE Working Paper No. 128. September 2004.

Zenon Wiśniewski, Jaroslaw Oczki

**Migracje siły roboczej z Polski w rozszerzonej Unii Europejskiej (Migration of
the Labour Force in an Enlarged European Union)**

in: W. Malachowski (ed.) Polska-Niemcy a rozszerzenie Unii Europejskiej (Poland,
Germany and the EU enlargement), vol 2. p. 115-128, Warsaw School of Economics,
Warszawa 2004;

Leszek Kucharski, Kamila Wiaderek

**Jakosc siły roboczej a bezrobocie w Polsce (The Quality of the Labour Force and
the Unemployment in Poland)**

"Ekonomista", ISSN 0013- 3205, No 4/2005

Jiří Balcar, Marcela Machů, Miroslav Mašlík

**Analysis and comparison of economic indicators in manufacturing sectors in the
Czech Republic in years 1997-2001**

ECON 04, Volume 11, 2004, Faculty of Economics, Technical University of Ostrava, ISBN
80-248-0674-6;

Klara Foti

**Impact of changed in competitiveness on labour market and human resource
development - the case of Hungary**

IWE Working Paper, No 154, April 2005, Budapest;

Dora Borbély

EU Export Specialization Patterns of Selected Accession Countries. European Institute for International Economic Relations

EIIW Discussion Paper No. 116, Wuppertal 2004;

Dora Borbély

Competition Among Cohesion and Accession Countries: Comparative Analysis of Specialization Within the EU Market. European Institute for International Economic Relations

EIIW Discussion Paper No. 122, Wuppertal 2004;

Paul J.J. Welfens, Dora Borbély

Exchange Rate Developments and Stock Market Dynamics in Transition Countries: Theory and Empirical Analysis

EIIW Discussion Paper No. 126, Wuppertal 2004;

Dora Borbély

EU Export Specialization Patterns in Selected Accession and Cohesion Countries: Tough Competition on the EU15 Market?

Papeles del Este No.9. <http://www.ucm.es/BUCM/cee/papeles/>, 2005;

Paul J.J. Welfens, Anna Wziątek-Kubiak (eds)

Structural Change and Exchange Rate Dynamics in the Context of the EU Eastern Enlargement

Springer, Heidelberg 2005, ISBN 3-540-27-687-4

Iraj Hashi, Ewa Balcerowicz

The Comparative Analysis of State Aid in Poland, Hungary and the Czech Republic Prior to Accession

"The International Journal of Economic Research" (forthcoming).

Sándor Buzás

Competitiveness and changes in position of Hungarian manufacturing product groups in the EU market

IWE Working Paper 163/05

Vlastimil Gejdoš, Martin Mrázek, David Vonka

Vývoj konkurenceschopnosti odvětví zpracovatelského průmyslu ČR, Polska, Maďarska a Slovenska ve vztahu k EU (za období 1996-2002) (Development in competitiveness of the manufacturing industry of the Czech Republic, Poland, Hungary and Slovakia in relation to the EU in the period 1996-2002)

Publication of the Czech Ministry of Trade and Industry;

Antonio Fonfría, Isabel Alvarez, Carlos Díaz de la Guardia

Structural changes and competitiveness in Spanish manufacturing industry: Analysis of some relationships

Working Paper 2005-004, Faculty of Economics, Universidad Complutense de Madrid, 2005

Miklós Szanyi

Do multinationals "misuse" corporate income tax holidays? An analysis based on Hungarian balance-sheet figures

IWE Working Papers 164/05

Isabel Álvarez, Antonio Fonfría, Raquel Marín

Results of a the Competitiveness Survey of the manufacturing firms

ICEI Working Papers Series (Instituto Complutense de Estudios Internacionales)

Andrei Medvedev, Alena Zemplerova

Competition and Performance in Manufacturing Sector in the Czech Republic

CERGE - EI Discussion Paper no 145; Prague, Czech Republic and in Prague Economic Papers

Anna Wziątek - Kubiak, Iga Magda

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3. Annexes to the scientific part

3.1 Work Package 1 – Annex to the comparative part

Large winners:

HUNGARY	
157	Manufacture of prepared animal feeds
204	Manufacture of wooden containers
311	Manufacture of electric motors, generators and transformers
312	Manufacture of electricity distribution and control apparatus
313	Manufacture of insulated wire and cable
315	Manufacture of lighting equipment and electric lamps
316	Manufacture of electrical equipment n.e.c.
322	Manufacture of television and radio transmitters and apparatus for line telephony and line telegraphy
323	Manufacture of television and radio receivers, sound or video recording or reproducing apparatus and associated goods
CZECH REPUBLIC	
171	Preparation and spinning of textile fibres
174	Manufacture of made-up textile articles, except apparel
203	Manufacture of builders' carpentry and joinery
222	Printing and service activities related to printing
251	Manufacture of rubber products
261	Manufacture of glass and glass products
262	Manufacture of non-refractory ceramic goods other than for construction purposes; manufacture of refractory ceramic products
266	Manufacture of articles of concrete, plaster, cement
281	Manufacture of structural metal products
282	Manufacture of tanks, reservoirs and containers of metal; manufacture of central heating radiators and boilers
283	Manufacture of steam generators, except central heating hot water boilers
287	Manufacture of other fabricated metal products
311	Manufacture of electric motors, generators and transformers
312	Manufacture of electricity distribution and control apparatus
313	Manufacture of insulated wire and cable

316	Manufacture of electrical equipment n.e.c.
343	Manufacture of parts, accessories for motor vehicles
352	Manufacture of railway, tramway locomotives, rolling stock
355	Manufacture of other transport equipment n.e.c.
361	Manufacture of furniture
POLAND	
153	Processing and preserving of fruit and vegetables
174	Manufacture of made-up textile articles, except apparel
182	Manufacture of other wearing apparel and accessories
183	Dressing and dyeing of fur; manufacture of articles of fur
203	Manufacture of builders' carpentry and joinery
204	Manufacture of wooden containers
205	Manufacture of other products of wood; manufacture of articles of cork, straw and plaiting materials
231	Manufacture of coke oven products
262	Manufacture of non-refractory ceramic goods other than for construction purposes; manufacture of refractory ceramic products
281	Manufacture of structural metal products
282	Manufacture of tanks, reservoirs and containers of metal; manufacture of central heating radiators and boilers
283	Manufacture of steam generators, except central heating hot water boilers
313	Manufacture of insulated wire and cable
314	Manufacture of accumulators, primary cells and primary batteries
315	Manufacture of lighting equipment and electric lamps
316	Manufacture of electrical equipment n.e.c.
323	Manufacture of television and radio receivers, sound or video recording or reproducing apparatus and associated goods
352	Manufacture of railway, tramway locomotives, rolling stock
355	Manufacture of other transport equipment n.e.c.
361	Manufacture of furniture

Small winners:

HUNGARY	
155	Manufacture of dairy products
175	Manufacture of other textiles
212	Manufacture of articles of paper and paperboard
222	Printing and service activities related to printing
244	Manufacture of pharmaceuticals, medicinal chemicals and botanical products
245	Manufacture of soap, detergents, cleaning, polishing
291	Manufacture of machinery for the production and use of mechanical power, except aircraft, vehicle and cycle engines
300	Manufacture of office machinery and computers
332	Manufacture of instruments and appliances for measuring, checking, testing, navigating and other purposes, except industrial process control equipment
334	Manufacture of optical instruments, photographic equipment
353	Manufacture of aircraft and spacecraft
CZECH REPUBLIC	
158	Manufacture of other food products
175	Manufacture of other textiles
233	Processing of nuclear fuel
245	Manufacture of soap, detergents, cleaning, polishing
247	Manufacture of man-made fibres
291	Manufacture of machinery for the production and use of mechanical power, except aircraft, vehicle and cycle engines
300	Manufacture of office machinery and computers
322	Manufacture of television and radio transmitters and apparatus for line telephony and line telegraphy
323	Manufacture of television and radio receivers, sound or video recording or reproducing apparatus and associated goods
POLAND	
156	Manufacture of grain mill products, starches and starch products
157	Manufacture of prepared animal feeds
171	Preparation and spinning of textile fibres
175	Manufacture of other textiles
211	Manufacture of pulp, paper and paperboard

212	Manufacture of articles of paper and paperboard
221	Publishing
222	Printing and service activities related to printing
243	Manufacture of paints, varnishes and similar coatings, printing ink and mastics
245	Manufacture of soap, detergents, cleaning, polishing
247	Manufacture of man-made fibres
251	Manufacture of rubber products
252	Manufacture of plastic products
263	Manufacture of ceramic tiles and flags
268	Manufacture of other non-metallic mineral products
286	Manufacture of cutlery, tools and general hardware
297	Manufacture of domestic appliances n.e.c.
312	Manufacture of electricity distribution and control apparatus
331	Manufacture of medical and surgical equipment and orthopaedic appliances
333	Manufacture of industrial process control equipment
341	Manufacture of motor vehicles
343	Manufacture of parts, accessories for motor vehicles

Losers:

HUNGARY	
151	Production, processing, preserving of meat, meat products
158	Manufacture of other food products
174	Manufacture of made-up textile articles, except apparel
181	Manufacture of leather clothes
182	Manufacture of other wearing apparel and accessories
191	Tanning and dressing of leather
193	Manufacture of footwear
202	Manufacture of veneer sheets; manufacture of plywood, laminboard, particle board, fibre board and other panels and boards
205	Manufacture of other products of wood; manufacture of articles of cork, straw and plaiting materials
232	Manufacture of refined petroleum products
242	Manufacture of pesticides and other agro-chemical products
243	Manufacture of paints, varnishes and similar coatings, printing ink and mastics

264	Manufacture of bricks, tiles and construction products
271	Manufacture of basic iron and steel and of ferro-alloys (ECSC)
365	Manufacture of games and toys
CZECH REPUBLIC	
154	Manufacture of vegetable and animal oils and fats
181	Manufacture of leather clothes
191	Tanning and dressing of leather
192	Manufacture of luggage, handbags and the like, saddler
193	Manufacture of footwear
201	Sawmilling and planing of wood, impregnation of wood
204	Manufacture of wooden containers
241	Manufacture of basic chemicals
242	Manufacture of pesticides and other agro-chemical products
244	Manufacture of pharmaceuticals, medicinal chemicals and botanical products
264	Manufacture of bricks, tiles and construction products
265	Manufacture of cement, lime and plaster
267	Cutting, shaping and finishing of stone
354	Manufacture of motorcycles and bicycles
363	Manufacture of musical instruments
POLAND	
154	Manufacture of vegetable and animal oils and fats
182	Manufacture of other wearing apparel and accessories
192	Manufacture of luggage, handbags and the like, saddler
193	Manufacture of footwear
244	Manufacture of pharmaceuticals, medicinal chemicals and botanical products
265	Manufacture of cement, lime and plaster
273	Other first processing of iron and steel and production of non-ECSC ferro-alloys
296	Manufacture of weapons and ammunition
321	Manufacture of electronic valves and tubes and other electronic components
351	Building and repairing of ships and boats
363	Manufacture of musical instruments

3.2. Work Package 1 – Annex to the Polish part

1st cluster	
151	Production, processing, preserving of meat, meat products
153	Processing and preserving of fruit and vegetables
155	Manufacture of dairy products
157	Manufacture of prepared animal feeds
158	Manufacture of other food products
159	Manufacture of beverages
202	Manufacture of veneer sheets; manufacture of plywood, laminboard, particle board, fibre board and other panels and boards
203	Manufacture of builders' carpentry and joinery
211	Manufacture of pulp, paper and paperboard
212	Manufacture of articles of paper and paperboard
222	Printing and service activities related to printing
231	Manufacture of coke oven products
245	Manufacture of soap, detergents, cleaning, polishing
247	Manufacture of man-made fibres
252	Manufacture of plastic products
261	Manufacture of glass and glass products
263	Manufacture of ceramic tiles and flags
266	Manufacture of articles of concrete, plaster, cement
268	Manufacture of other non-metallic mineral products
281	Manufacture of structural metal products
282	Manufacture of tanks, reservoirs and containers of metal; manufacture of central heating radiators and boilers
342	Manufacture of bodies (coachwork) for motor vehicles; manufacture of trailers and semi-trailers

2nd cluster	
171	Preparation and spinning of textile fibres
174	Manufacture of made-up textile articles, except apparel
175	Manufacture of other textiles
191	Tanning and dressing of leather
243	Manufacture of paints, varnishes and similar coatings, printing ink and mastics
251	Manufacture of rubber products
262	Manufacture of non-refractory ceramic goods other than for construction purposes; manufacture of refractory ceramic products
271	Manufacture of basic iron and steel and of ferro-alloys (ECSC)
286	Manufacture of cutlery, tools and general hardware
287	Manufacture of other fabricated metal products
297	Manufacture of domestic appliances n.e.c.
312	Manufacture of electricity distribution and control apparatus
313	Manufacture of insulated wire and cable
314	Manufacture of accumulators, primary cells and primary batteries
315	Manufacture of lighting equipment and electric lamps
316	Manufacture of electrical equipment n.e.c.
323	Manufacture of television and radio receivers, sound or video recording or reproducing apparatus and associated goods
341	Manufacture of motor vehicles
343	Manufacture of parts, accessories for motor vehicles
352	Manufacture of railway, tramway locomotives, rolling stock
355	Manufacture of other transport equipment n.e.c.
361	Manufacture of furniture
366	Miscellaneous manufacturing n.e.c.
3rd cluster	
152	Processing and preserving of fish and fish products
154	Manufacture of vegetable and animal oils and fats
156	Manufacture of grain mill products, starches and starch products
172	Textile weaving
176	Manufacture of knitted and crocheted fabrics

177	Manufacture of knitted and crocheted articles
181	Manufacture of leather clothes
201	Sawmilling and planing of wood, impregnation of wood
204	Manufacture of wooden containers
205	Manufacture of other products of wood; manufacture of articles of cork, straw and plaiting materials
221	Publishing
241	Manufacture of basic chemicals
264	Manufacture of bricks, tiles and construction products
265	Manufacture of cement, lime and plaster
267	Cutting, shaping and finishing of stone
274	Manufacture of basic precious and non-ferrous metals
283	Manufacture of steam generators, except central heating hot water boilers
291	Manufacture of machinery for the production and use of mechanical power, except aircraft, vehicle and cycle engines
292	Manufacture of other general purpose machinery
293	Manufacture of agricultural and forestry machinery
294	Manufacture of machine-tools
295	Manufacture of other special purpose machinery
296	Manufacture of weapons and ammunition
311	Manufacture of electric motors, generators and transformers
322	Manufacture of television and radio transmitters and apparatus for line telephony and line telegraphy
351	Building and repairing of ships and boats
354	Manufacture of motorcycles and bicycles
363	Manufacture of musical instruments
364	Manufacture of sports goods
365	Manufacture of games and toys
4th cluster	
182	Manufacture of other wearing apparel and accessories
192	Manufacture of luggage, handbags and the like, saddler
193	Manufacture of footwear
242	Manufacture of pesticides and other agro-chemical products

244	Manufacture of pharmaceuticals, medicinal chemicals and botanical products
246	Manufacture of other chemical products
321	Manufacture of electronic valves and tubes and other electronic components
331	Manufacture of medical and surgical equipment and orthopedic appliances
332	Manufacture of instruments and appliances for measuring, checking, testing, navigating and other purposes, except industrial process control equipment
333	Manufacture of industrial process control equipment
334	Manufacture of optical instruments, photographic equipment
353	Manufacture of aircraft and spacecraft

3.3. Work Package 4 – Annex to the part of the University of Torun

Differential coefficients for commodity groups for Czech, Polish and Hungarian manufacturing industry, 1998-2001

Industry	Czech Republic		Poland		Hungary	
	$\log\left(\frac{LC}{E}\right)_{it}$	$\log Y_{it}$	$\log\left(\frac{LC}{E}\right)_{it}$	$\log Y_{it}$	$\log\left(\frac{LC}{E}\right)_{it}$	$\log Y_{it}$
151	-1,3302	0,6194	-0,7075	0,6453	-0,3307	0,5433
152	-0,5666	0,4508	-0,7075	0,6453	-0,3307	0,2854
153	-1,3302	0,6076	-0,5744	0,6453	-0,3307	0,5056
154	-1,3302	0,6107	-0,7075	0,6453	-0,3307	0,3560
155	-1,3302	0,6050	-0,6553	0,6453	-0,8091	0,5433
156	-1,4321	0,6194	-0,7075	0,6453	-0,3307	0,4794
157	-1,3302	0,6194	-0,7075	0,6321	-0,3307	0,4583
158	-1,0234	0,6194	-0,5465	0,6453	-0,3307	0,5522
159	-1,1446	0,6194	-0,7075	0,6453	-0,5212	0,5433
171	-1,3302	0,6376	-0,7075	0,6923	-0,6641	0,5433
172	-1,0702	0,6194	-0,7075	0,6943	-0,3307	0,5045
173	-1,2383	0,6194	-0,7075	0,6960	-0,3307	0,4088
174	-4,2871*	1,0239*	-0,2907	0,6453	-0,3307	0,5714
175	-1,1746	0,6194	-1,3690	0,7660	-0,6590	0,5433
176	-1,5579	0,6194	-0,4733	0,6453	-1,1276	0,5433
177	-1,0100	0,6194	-0,7075	0,7115	-0,3307	0,5069
181	-2,4549*	0,8054*	-0,0972	0,6453	-0,5551	0,5433
182	-0,7936	0,6194	-0,3984*	0,6719*	-0,3307	0,6122
183	-1,3302	0,6100*	-0,1727	0,6453	-0,3307	0,2339
191	-1,3302	0,5974	-0,7075	0,6823	-1,0758	0,5433
192	-1,1229	0,6194	-1,1831	0,7931	-0,3307	0,5112

193	-0,9935	0,6194	-0,2899	0,6453	-0,3307	0,5747
201	-1,3302	0,6194	-0,7075	0,6836	-0,6729	0,5433
202	-1,3302	0,6194	-0,6627	0,6453	-0,3307	0,4355
203	-1,1745	0,6194	-0,4445	0,6453	-0,3307	0,5105
204	-1,3302	0,6194	-0,1358	0,6094*	-0,3307	0,5121
205	-0,3730*	0,5155*	-0,3162	0,6453	-0,3307	0,4917
211	-1,3302	0,6128	-0,7075	0,6453	-0,8960	0,5433
212	-1,2291	0,6194	-0,5576	0,6453	-0,3307	0,4942
221	-1,3302	0,6734	-0,4262	0,6453	-0,6480	0,5433
222	-1,0622	0,6194	-0,7075	0,6824	-0,3307	0,5295
223	-1,3302	0,6194	0,0200	0,5425	0,7210	0,1617
241	-1,3302	0,6395	-0,6079	0,6453	-0,3307	0,4996
242	-1,3302	0,6194	-0,6048	0,6453	-1,0217	0,5433
243	-1,3302	0,6194	-0,5692	0,6453	-1,0112	0,5433
244	-1,1015	0,6194	-0,7075	0,6906	-0,3307	0,5238
245	-1,3302	0,6041	-0,6524	0,6453	-0,3307	0,4377
246	-1,1408	0,6194	-0,7075	0,6839	-0,3307	0,4372
251	-1,3302	0,6522	-0,7075	0,6843	-0,3307	0,4999
252	-1,0487	0,6194	-0,7075	0,6641	-0,3307	0,5433
261	-0,9683	0,6194	-0,7075	0,6897	-0,3307	0,5100
262	-1,3302	0,6693	-0,7075	0,6987	-0,3307	0,5181
263	-1,3302	0,6395	-0,4142	0,6453	-0,3307	0,4462
264	-1,2046	0,6194	-0,4121	0,6453	-0,8636	0,5433
265	-1,2167	0,6194	-0,7075	0,6749	-0,9462	0,5433
266	-1,1149	0,6194	-0,5240	0,6453	-0,7581	0,5433
267	-0,7167	0,5379	-0,7075	0,7023	3,0209	-0,0707
268	-0,5888*	0,5164*	-0,5499	0,6453	0,6177	0,2273
271	-1,9980*	0,7537	-0,7075	0,6599	-0,7100	0,5433

272	-1,1958	0,6194	-0,4518	0,6453	-1,3634	0,5433
273	-1,2080	0,6194	-0,5934	0,6453	-2,3481	0,7522
274	-0,6903	0,5188	-0,5809	0,6453	-0,3307	0,4678
275	-0,9482	0,6194	-0,7075	0,7034	-0,3307	0,4990
281	-1,0139	0,6194	-0,4131	0,6453	-0,3307	0,5647
282	-1,0931	0,6194	-0,4190	0,6453	-0,3307	0,4856
283	-1,3302	0,6574	-0,7075	0,7123	0,0783*	0,3741
284	-1,0752	0,6194	-0,7075	0,7080	-0,3307	0,4499
285	-1,3302	4,6749	-0,2790	0,6453	1,4195	0,2964
286	-1,3302	0,6685	-0,7075	0,6977	-0,5958	0,5433
287	-1,0831	0,6194	-0,4821	0,6453	-0,3307	0,5363*
291	-1,3302	0,6846	-0,4143	0,6453	-0,4499	0,5433
292	-1,3302	0,6735	-0,3475	0,6453	-0,3307	0,5433
293	-1,3302	0,6730	-0,7075	0,6872	-0,5264	0,5433
294	-0,9152	0,6194	-0,7075	0,7210	-0,9035	0,5857
295	-0,8222	0,6194	-0,7075	0,7006	-0,4158	0,5433
296	-1,3302	0,6734	-0,7075	0,7564	-6,6042	1,5616
297	-2,4476*	0,8051	-0,7075	0,6746	-0,3307	0,5007
311	-1,3302	0,6605	-0,3839	0,6453	-0,3307	0,5136
312	-0,9833	0,6194	-0,7075	0,6953	-0,3307	0,4912
313	-1,2243	0,6194	-0,6133	0,6453	-0,3307	0,4787
314	-0,3739	0,4894	-0,5319	0,6453	-1,3224	0,5433
315	-1,3302	0,6467	-0,5092	0,6453	-0,3748*	0,5433
316	-0,9638	0,6194	-0,7075	0,6873	-0,5403	0,5433
321	-1,3302	0,6624	-0,2686	0,6453	0,2892*	0,4673*
322	-1,1956	0,6194	-0,5652	0,6453	-0,3307	0,4654
323	-1,5738	0,6194	-0,7075	0,6453	2,1088	0,1535
331	-1,0560	0,6194	-0,7075	0,7085	-0,3307	0,5067

332	-1,3302	0,6430	-0,1651	0,6033*	-0,6149	0,5433
333	-1,0947	0,6194	-0,3397	0,6453	-0,3307	0,4306
334	-1,0000	0,6194	-0,7075	0,7433	-2,3290	0,7684
341	-1,3302	0,6350	-0,7075	0,6238	-0,3307	0,4439
342	-1,3615*	0,6194	-0,4321	0,6453	-0,3307	0,3922
343	-1,0626	0,6194	-0,7075	0,6735	-2,1376	0,7497
351	-4,2596*	1,2096*	-0,7075	0,6915	-0,3307	0,3307
352	-3,1190	0,9380	-0,7075	0,6969	1,2681*	0,2423*
353	-1,3302	0,6790	-0,2255	0,6453	-0,3307	0,4404
354	-1,3302	0,6336	-0,5131	0,6453	-1,6824	0,5433
355	-1,4688	0,6194	-0,7075	0,7353	1,3124*	0,0762
361	-1,0767	0,6194	-0,7075	0,6751	-0,3307	0,5433
362	-0,1215	0,4484	-0,7075	0,6854	-1,2501	0,5433
363	-1,0844	0,6194	-0,8584	0,7675	-0,3307	0,3062
364	-6,9456	1,4888	-1,3934*	0,8615	1,6913*	0,1293
365	1,0405	0,2920	-0,7075	0,7168	-0,3307	0,4611
366	-1,3302	0,6574	-0,7075	0,6933	-0,3307	0,5014
All significant at 5% level or better except these marked with *						

European Commission

**EUR 23116 — EU RESEARCH ON SOCIAL SCIENCES AND HUMANITIES — Changes in
Industrial Competitiveness as a Factor of Integration: Identifying Challenges of the
Enlarged Single European Market - Competitiveness**

Luxembourg: Office for Official Publications of the European Communities

2007 — 206 pp. — 21,0 x 29,7 cm

ISBN 978-92-79-07565-0

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