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Julia Wörz

Industry Patterns in Output, FDI and Trade: A regional comparison of CEECs with OECD and East Asian countries

September 2005

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Industry Patterns in Output, FDI and Trade: A regional comparison of CEECs with OECD and East Asian countries

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Abstract

This report analyses the link between the industrial allocation of FDI and economic development, using a newly constructed data set on industrial FDI stocks for six individual manufacturing industries (food, textiles/wood, petroleum/chemicals/rubber/plastics, metals/mechanical products, electrical machinery, transport equipment). We give a comprehensive overview of the economic structure in a range of countries, including OECD members, the new EU member states and East Asian countries. The time period analysed ranges from 1987 to 2000, with differing coverage for the individual countries. The particular economic development patterns of these countries are described through economic indicators such as industrial output, employment, FDI, exports, imports, wages, productivity, unit labour cost, etc. We further analyse global specialization patterns in terms of production, trade and FDI. We find substantial differences in specialization and catching-up patterns between geographically defined regions. While the transport industry plays a crucial role in the lagging OECD countries, electrical machinery is one of the key industries in East Asia. The relationship between FDI, trade and output patterns varies both across countries as well as across industries. In general, the relationship is stronger in catching-up economies, with a significant role for FDI in the development of certain industries in CEECs (transport equipment) and the four Asian Tigers (electrical machinery).

Keywords: *FDI, FDI structure, specialization patterns, manufacturing, economic development, new EU member states, East Asia*

JEL classification: *C80, F14, L60, O57*

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1 Introduction

The relationship between economic development and the external sector of an economy is well researched at the macroeconomic level. Given the relatively high degree of internationalization through trade and FDI linkages, it is obviously important to know if and how increased openness – to trade but also to foreign capital – impacts on individual sectors of the domestic economy. For the lack of comparable data at the industry level, empirical research in this area has largely remained at the macro level. This is particularly true for research on domestic output, employment and wage patterns, but all the more so for research focusing on foreign direct investment (FDI). FDI data that are comparable across countries are most often available only at the macroeconomic level. More recently, firm-level data sets have been released and as a consequence the number of micro-level studies on FDI and economic performance has grown rapidly. However, in contrast to the macro-level analysis, which can take a truly global perspective and analyses large cross-country data sets (in the cross-section dimension as well as in the panel dimension), many firm-level studies are constrained to one country or a homogenous group of countries (like the EU) due to issues of data availability and comparability.

The data set analysed in this report has been constructed in order to fill this gap and allow a comprehensive analysis of individual catching-up patterns for different world regions. The data set includes all OECD member countries plus the new EU member states in Central and Eastern Europe (CEECs), as well as the five original ASEAN member countries (Indonesia, Malaysia, Philippines, Singapore and Thailand) and India, Hong Kong, Taiwan and South Korea.[1] In order to get a clear indication of the link between inward FDI and growth of individual industries in the receiving countries, we combined several sources in the collection of our data set. Indicators such as output, employment, gross fixed capital formation and wages were taken from the UNIDO Industrial Statistics Database 2003. The greatest challenge with this edition was to overcome the change in nomenclature from the second to the third revision of the ISIC classification. In 2003, about half the countries included in our sample still reported according to the second revision of this classification, while the more advanced countries had already switched to reporting according to the third revision only. Thus, we extracted the data at the most detailed 4-digit level for both revisions and sorted them into eight industry groups, which we could match with the FDI data obtained from the OECD. Data for CEECs were taken from the wiiw Industrial

[1] FDI data for China at the industry level do not exist for manufacturing, therefore China is not included in the data set.

Database 2004. FDI data were collected from different sources: data for OECD members dating back to 1980 are available from the OECD International Direct Investment data base (IDI) and classified by seven industrial activities: food; textiles and wood; petroleum, plastics, rubber and chemicals; metals and mechanical products; office machinery; transport equipment; other manufacturing industries. The mineral and leather industries are not allocated in this scheme and are thus included in other manufacturing. In addition, a remainder category exists which we labelled 'NA' (not allocated). FDI data for nine CEECs (the new members states plus Croatia) were taken from the wiiw FDI Database 2005, which reports the data at the two-digit level of NACE, Revision 1. Again, industries were aggregated to match the OECD grouping. Finally, FDI data for Asian countries were taken from UNCTAD's World Investment Directory Volume VII (2000). More recent data for ASEAN member states were available from the ASEAN Secretariat (see www.aseansec.org/home.htm). The latter data refer to approved investment projects with foreign interest on total project cost basis. Where available, these data were compared to the figures reported by UNCTAD for FDI and they were found to match closely. In general, we used FDI stock data. In cases where only flow data were available, we calculated stock data in the form of cumulated dollar flows. Additional FDI data for Taiwan and South Korea were obtained from Timmer (2003) and the Taiwanese Investment Commission (MOEA).

In total, our data set contains nearly 6000 observations for 33 to 42 countries, depending on the respective year. A list of all countries included and their geographic grouping is given in Appendix Table A1. The grouping of countries is based on geography on the one hand and the level of economic development on the other. Thus, we have six country groups: advanced OECD members; catching-up OECD members (the cohesion countries, Turkey and Mexico); the four Asian Tiger countries; East Asia; India; and the CEECs. It seemed appropriate to single out India because of the economic particularities of this large country compared to the rest of the region. Regional averages for individual variables were calculated as weighted averages, using variable output weights (employment weights for wages). The time range extends from 1981 to 2000 (1993 to 2002 for CEECs). Data coverage varies by individual countries and variables. Data on industry-specific FDI prior to 1987 are available for OECD member countries only. The time series for East Asian countries start in 1987 and FDI data for CEECs are only available at the industry level from 1998 onwards. Data are broken down by the eight types of manufacturing activities mentioned above.

Box 1.1

Definition and calculation of economic indicators

The following variables were either used directly or calculated from the data set to be used for cross-country comparisons in this report:

Output: output is deflated by the producer price index of the respective economy and converted at constant purchasing power parities for GDP in the year 2000.

Employment: number of employed persons.

FDI: inward stocks of foreign direct investment in current USD.

Exports: worldwide exports in current USD.

Imports: worldwide imports in current USD.

Wages: wages are calculated as the yearly wage sum in current USD divided by employment.

Productivity: labour productivity is calculated as output in constant purchasing power parities divided by employment.

Unit labour costs: unit labour costs are defined as the ratio of wage rates to labour productivity in nominal USD (since we are interested in global competitiveness of a respective country group, we deemed this definition of unit labour costs to be more appropriate).

FDI-employment ratio: the ratio of FDI inward stocks to employment of an industry.

FDI-output ratio: ratio of FDI inward stocks to output of an industry.

Export ratio: ratio of exports to output of an industry.

Import ratio: ratio of imports to output of an industry.

Specialization index: defined as a modification of the Balassa index for trade specialization:

$$SI_{ic} = \frac{\frac{x_{ic}}{\sum_{i} x_{ic}}}{\frac{\sum_{c} x_{ic}}{\sum_{i}\sum_{c} x_{ic}}} \quad ,$$

where *x* refers to either output, employment, FDI, exports or imports, *i* refers to industry and *c* to country.

RCA: revealed comparative advantage is calculated as the difference between the index of export specialization and the index of import specialization:

$$RCA_{ic} = ESI_{ic} - MSI_{ic}$$

2 Structural change

Figures 2.1-2.5 display the share of each industrial activity in total manufacturing output for each geographic region in the final period (1998-2000) and relate this to the long-run annual growth rate of output in the same industry. The typical picture is given by the group of advanced OECD countries, where the industries with the highest long-run growth rates over the whole period are those with the highest share in output in the final period. In contrast to this commonly found pattern (see also Laursen, 1998). All other regions display a much higher degree of structural change. The observation that the industries with currently small shares in total manufacturing output are those with the highest growth rates over the last one and a half decades implies at present and for the near future a high degree of structural change in those regions.

Figure 2.1

Changes in industrial output structure in advanced OECD countries, 1987-2000

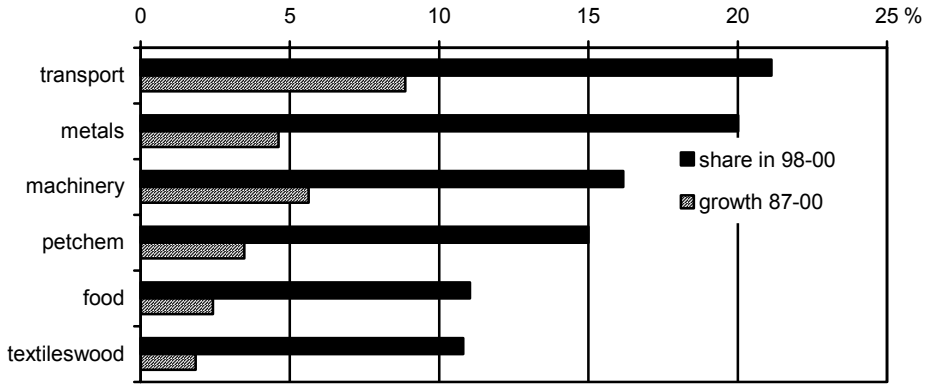


Figure 2.2

Changes in industrial output structure in catch-up OECD countries, 1987-2000

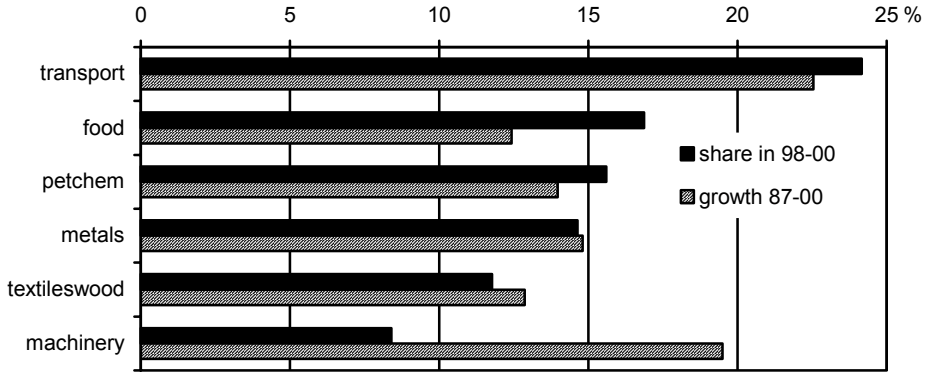


Figure 2.3

Changes in industrial output structure in the four Asian Tigers, 1987-2000

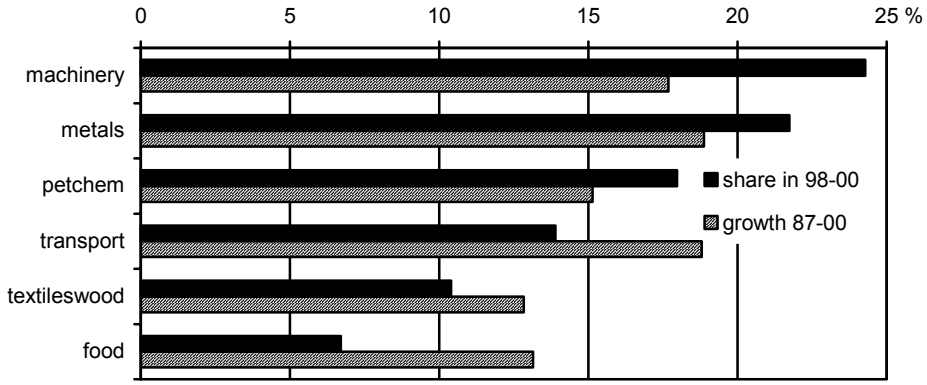


Figure 2.4

Changes in industrial output structure in East Asia, 1987-2000

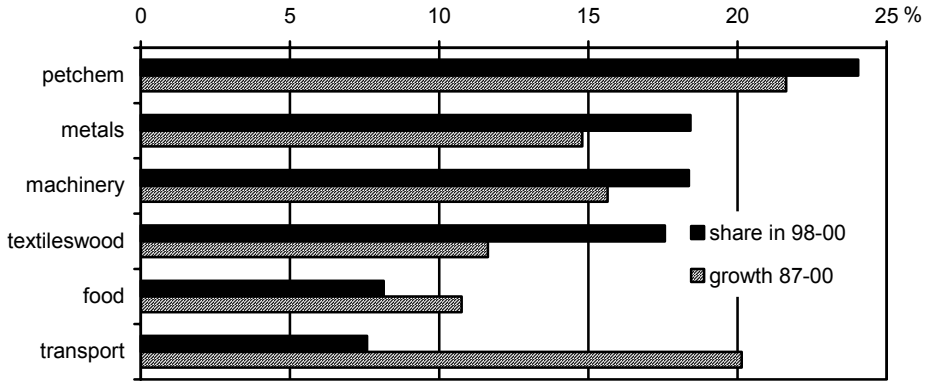
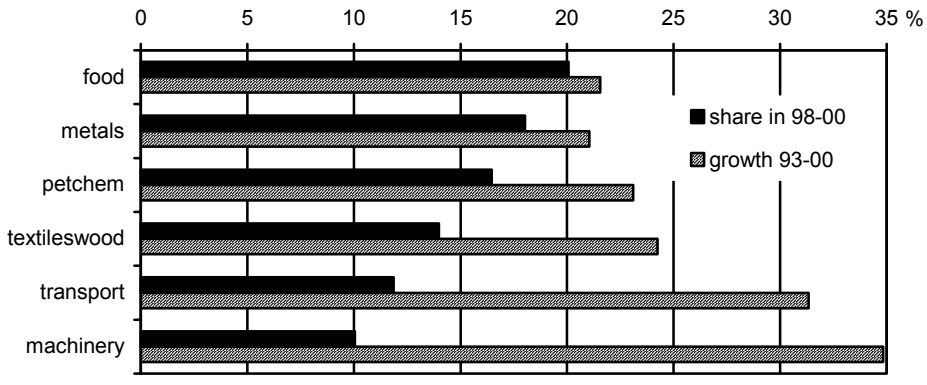


Figure 2.5

Changes in industrial output structure in CEECs, 1993-2000



Thus, while existing industrial output patterns have been reinforced since the mid-1980s in the advanced OECD countries, they are changing dramatically in all other regions. This is quite characteristic of catching-up economies, where closing the gap often proceeds fastest in the industries with the highest initial gap. The highest degree of structural change can be observed in the group of CEECs.[2] Output growth has not only been reversely related to the current importance of an industry in the local production structure, also the average annual growth rates of real output (measured at purchasing power parities) are exceptionally high, especially in electrical machinery and transport equipment. East Asia also display considerable structural change, with the highest growth rate (24%) in the manufacture of electrical machinery, which in 2001-2003 remains still the smallest industry category in this group of countries according to this classification.[3]

Structural change is also present in the catching-up OECD countries and the four Asian Tiger economies. The Southern European catching-up countries plus Mexico clearly specialize in the production of transport equipment with an output share of 24% of total manufacturing output at the end of the 1990s and a long-run average growth rate of 22% over the past 15 years. However, those countries have also recorded high growth rates in the manufacture of electrical machinery (nearly 20%). This is traditionally the domain of the four Tiger countries. With an output share of more than 24%, this category is the most important one for these four countries on average. Also the production of transport equipment becomes increasingly important for these countries, on average output growth has been at around 18%. This indicates some structural convergence between different catching-up regions.

A general feature is the fact that the importance of the individual industry categories differs greatly among all five geographic regions. The manufacture of transport equipment is the most important category for both groups of OECD members, while electrical machinery plays the greatest role in terms of output in the East Asian economies. Finally, the food industry emerges as being very important in the CEECs, due to high shares in Poland and the Baltic states, but also in Croatia.

The second feature worth noting is that output growth has been considerably higher in all catching-up regions than in the advanced OECD countries. While growth rates range between 1.8% (food) and 8.8% (transport equipment) in the latter group, all other country groups exhibit 2-digit growth rates, attaining as much as 20% in East Asia (machinery) and

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2 Apart from their transition from former communist to market economies, the high degree of structural change is also partly related to the shorter length of the observation period for this group of countries.

3 Statements about the importance of individual industries always depend on the specific classification used. The very crude classification used here has been dictated by the OECD classification of FDI data. One of the major weaknesses is the relatively coarse level of aggregation. A finer disaggregation of industrial activities would certainly give a more characteristic picture of individual countries and regions in terms of the skill and technology intensity of their production structures.

more 30% in CEECS (transport equipment and electrical machinery) over a shorter time period.

3 Correlation between the domestic and the external economy

Given these substantial differences in the economic performance of the individual geographic regions at the industrial level, it is interesting to analyse how these developments in output patterns relate to developments in trade and FDI structures.

While the correlation between output structure and the structure of employment and exports is in general very strong, it is much weaker between imports and output and even less between the structure of FDI and output. As can be seen from Table 3.1, there has however been an alignment between output and FDI patterns over time. The figures show a rising correlation coefficient between output and FDI shares across industries over time. Since the 1990s, the correlation has become significant at the 5% level and continues to increase. The correlation coefficients indicate that the link between FDI and domestic output has become stronger over time while the link between output and trade patterns has slightly weakened. The fall in correlation over time is stronger for the link between imports and output than between exports and output. There is no clear trend in the relationship between output and employment patterns: the correlation coefficients are high and fluctuate around 80%.

Table 3.1

Correlation with output structure, all countries, all industries.

	1981-1983	1990-1992	1998-2000
employment	0.7248***	0.8361***	0.8185***
FDI	0.1468	0.1992**	0.3980***
exports	0.8251***	0.7930***	0.7554***
imports	0.6051***	0.5388***	0.5773***

Note: The correlation coefficient is calculated as the Spearman rank correlation between industry shares in output and the respective variable (employment, FDI, exports, imports) of each country. Asterisks denote the significance of the correlation coefficient at the 10% (*), 5% [**] and 1% {***} level.

Table 3.2 provides more detailed information on the correlation between output and trade and FDI patterns in individual country groups towards the beginning and at the end of the observation period.

Table 3.2

Correlation with output structure, all industries

	adv. OECD	catch-up OECD	4 Tigers	East Asia *)	CEECs
			1987-1989		
employment	0.8291***	0.7946***	0.8991***	0.7898***	-
FDI	0.0786	-0.0021	0.6208**	0.6428	-
exports	0.8284***	0.8299***	0.8681***	0.5680***	-
imports	0.6140***	0.3706**	0.8154***	0.3823**	-
			1998-2000		
employment	0.8533***	0.6770***	0.9170***	0.8095***	0.7743***
FDI	0.1578	0.2689	0.7397***	0.4807**	0.7268***
exports	0.8174***	0.5692***	0.8939***	0.7173***	0.6545***
imports	0.6019***	0.3713**	0.8091***	0.6946***	0.3572***

*) Including India.

Note: The correlation coefficient is calculated as the Spearman rank correlation between industry shares in output and the respective variable (employment, FDI, exports, imports) of each geographic region. Asterisks denote the significance of the correlation coefficient at the 10% (*), 5% [**] and 1% {***} level.

The differences among the individual geographic regions are striking. It seems that the correlation between FDI and output patterns is initially driven solely by the four Tiger countries. In the final period, also the East Asian countries and the CEECs exhibit a significant and positive correlation between output and FDI structure. For the CEECs, the correlation between output and FDI structure is even higher than that between output and export as well as import structure. The magnitude of the correlation coefficient is highest for the four Asian Tiger countries and the group of CEECs. This indicates the greater role FDI plays for production in those regions. While in the case of the Tiger economies, the correlation with export patterns is still stronger than with FDI, the situation is reversed in Central and Eastern Europe. This hints towards a greater importance of FDI-related production in these countries as opposed to the strongly export-led output patterns in Asia, particularly in the four Tiger countries. While the above correlations do not give any insights into the direction of causality between output and FDI or trade, they still illustrate the importance of these variables for domestic production. The distinction between East Asian countries and Eastern European countries in this respect is interesting to note.

Also in the case of the other variables there are interesting differences. The correlation between employment and output patterns is strongest in the four Tiger countries, followed by the advanced OECD member countries. Equally, the correlation between output and export patterns is highest for these countries. This suggests in fact specialization according to comparative advantages, where resources are primarily employed in the production of those goods that are exported. For the CEECs, the correlation between employment and

output structure is much lower, which may reflect the presence of a still unexploited labour productivity growth potential. The correlation between exports and output is even weaker, while these countries show the strongest correlation between output and FDI patterns. Thus, the relationship between FDI and output clearly depends to a large extent on the respective country group.

The breakdown of correlation coefficients by individual industries reveals some unexpected details (Table 3.3). In the late 1980s, when FDI and output patterns still failed to be significantly correlated, there were only two industries where high FDI shares went hand in hand with high output shares. Surprisingly, these were not the most high-tech industries: instead, a high correlation between FDI and output shares was found in the textile and wood industry as well as in the – highly heterogeneous – category comprising petroleum, chemicals, rubber and plastics. Over time, output and FDI patterns aligned themselves in all industries alike, with the highest correlation coefficient in electrical machinery, as was to be expected. Still, FDI and output shares remain highly correlated in textiles and wood, as well as in the food industry. The weakest correlation is now found in metals and petroleum, chemicals, plastics and rubber. Substantial increases in correlation coefficients were found in the production of electrical machinery and transport equipment.

Table 3.3

Correlation with output structure, all countries

	food	textile/wood	petr/chem	metals/mech.	el. machinery	transport
			1987-1989			
employment	0.8429***	0.8573***	0.3657*	0.8600***	0.9516***	0.8654***
FDI	0.2814	0.5945**	0.6433**	0.2309	0.4535	0.3996
exports	0.7166***	0.8482***	0.1598	0.8456***	0.8886***	0.4971**
imports	0.1079	-0.2276	0.1297	-0.1338	0.6600***	-0.0794
			1998-2000			
employment	0.8987***	0.9114***	0.6951***	0.9273***	0.9297***	0.8320***
FDI	0.6685***	0.6635***	0.4597**	0.4264**	0.6954***	0.6062***
exports	0.7559***	0.8426***	0.5701***	0.6417***	0.8618***	0.7835***
imports	0.3977**	0.4836***	0.2700	0.0466	0.8492***	0.4729***

Note: The correlation coefficient is calculated as the Spearman rank correlation between industry shares in output and the respective variable (employment, FDI, exports, imports) of each geographic region. Asterisks denote the significance of the correlation coefficient at the 10% (*), 5% [**] and 1% {***} level.

We also calculated correlation coefficients by industries for the subsample of catching-up countries only. The results (see Table 3.4) are somewhat different in the first period. The significant correlation between output and FDI structure in the petroleum, chemical, rubber and plastics industry in 1987-1989 vanishes. On the other hand, output and FDI structure are highly correlated in the production of electrical machinery and transport equipment from the beginning of our observation period. Thus, there are some qualitative differences between the two groups of countries (industrialized versus catching-up) at the beginning, however, these differences become less pronounced over time. In the final years (1998-2000), the correlations are in many industries equally strong as for the sample as a whole – with the exception of the metals and mechanical products industry, where no significant correlation between output and FDI structure is present for the catching-up countries alone. For electrical machinery and transport equipment, the coefficient of correlation decreased over time in strong contrast to the sample as a whole.

Table 3.4

Correlation with output structure, catching-up countries

	food	textile/wood	petr/chem	metals/mech.	el. machinery	transport
			1987-1989			
employment	0.8674***	0.9026***	-0.0633	0.8248***	0.965***	0.9286***
FDI	0.5554	0.9609***	0.7624	0.0967	0.9206**	0.9303*
exports	0.7741***	0.8636***	-0.0676	0.3685	0.9349***	0.5090
imports	0.2285	0.2486	0.1173	-0.1464	0.8582***	-0.1579
			1998-2000			
employment	0.8907***	0.9649***	0.5913***	0.9506***	0.9586***	0.7447***
FDI	0.7047***	0.7309***	0.4745**	0.2841	0.7817***	0.7208***
exports	0.6879***	0.8772***	0.5925***	0.6063***	0.8906***	0.7414***
imports	0.6625***	0.6394***	0.2585	0.1719	0.9047***	0.3722*

Note: The correlation coefficient is calculated as the Spearman rank correlation between industry shares in output and the respective variable (employment, FDI, exports, imports) of each geographic region. Asterisks denote the significance of the correlation coefficient at the 10% (*), 5% [**] and 1% {***} level.

These simple correlations between different variables should give a first illustration of the relationship between FDI and domestic output. It becomes clear from the figures above that there are substantial differences between geographic areas, countries at different stages of development, as well as between individual economic activities. Thus, any analysis of the causes and consequences of FDI has to take account of these heterogeneities.

4 Regional industry patterns

By looking at individual economic indicators, this section investigates one dimension of heterogeneity in the link between output growth and FDI. The differences in output, as well as employment, trade and FDI patterns are described in detail for each geographic region. This is complemented by a discussion of three related indicators of international competitiveness: productivity, wages and unit labour costs. These three indicators are calculated in relation to the US as the benchmark country. The choice of just one country as the benchmark, instead of the average pattern of all countries, results from the fact that the country coverage is varying to some extent from year to year. Comparing an individual country to the average of this varying sample would imply that the benchmark for comparisons varies as well. Thus, we chose the US as the reference point for our assessment of international competitiveness. The details are given in Figures A1-A5 in the Appendix.

As a general remark, output and also employment patterns are in most cases more stable than trade and especially export patterns. FDI patterns are again surprisingly stable over the entire period. However, a more detailed look reveals interesting differences among the country groups.

4.1 Advanced OECD countries

The advanced OECD member countries show a relatively balanced output structure (Figure A1). With a share of about 20%, the metals and mechanical engineering industry produces the largest share of manufacturing output. The importance of the petroleum, chemical, rubber and plastics industry has decreased from formerly 20% to 15%, mainly to the benefit of the transport industry, which has nearly doubled in terms of output shares between 1981 and 2000. The employment structure mirrors these developments to some extent. The rise in relative employment in the transport industry has been less pronounced, yielding a share of 15% in 2000. The activities with the highest share of total employment turn out to be the metals and mechanical machinery industry (with an employment ratio of almost 25%) and the textile and wood industry, whose share in employment has however decreased from 20% to 15%. FDI in these countries is concentrated in the petroleum, chemical, rubber and plastics industry, with a share of more than 30% during the 1990s. Industries such as food, metals and electrical machinery have lost FDI in relative terms, while the share of FDI in the transport industry as well as in textiles and wood has gone up. While these developments are hard to explain, export patterns of advanced OECD countries show a clearer tendency away from labour- and resource-based industries towards more technology- and skill-intensive industries. All industries have lost export shares, with the exception of transport and electrical machinery. The import pattern shows

the same movements, thus highlighting the importance of intra-industry trade in the latter two industries for these countries.

Comparisons with the US as the benchmark show a deterioration of productivity levels of advanced OECD countries in all industries. Particularly in transport equipment and electrical machinery the advanced OECD members, excluding the US, have fallen below the US productivity levels in real terms. Since wage rates relative to the US have also increased, unit labour costs relative to the US have risen, thus further eroding international competitiveness. The downward pressure on wage rates observed in Figure A1 is related to exchange rate dynamics and thus not influencing unit labour costs. However, in some industries – textiles, wood and petroleum, chemicals, rubber, plastics – falling (and thus improving) unit labour costs were observed. Given the focus of this report, it is interesting to note the upward trend in FDI shares in the petroleum, chemical, rubber, plastics industry along with a recent increase in relative labour productivity in this industry. Together with falling unit labour costs this implies an increase in competitiveness in this industry.

4.2 Catching-up OECD countries

The rise of the transport industry is even more pronounced for the group of catching-up OECD members (Portugal, Spain, Greece, Turkey and Mexico, see Figure A2), where this industry reached a share of nearly 25% by 2000. Again, the same increase is strongly represented in export and import patterns. The industry's employment share rose as well, however to a negligible extent. In sharp contrast, the share of FDI – initially concentrated in petroleum-chemicals, metals and transport equipment – dropped from 20% to 10% in the transport equipment industry at the beginning of the 1990s. Since then it has been on the rise again; it reached 14% by 2000. FDI in those countries is still mostly concentrated in petroleum-chemicals-rubber-plastics, but also the food industry receives increasing shares of FDI, accounting for more than 10% of all manufacturing FDI in this region.

International competitiveness has risen strongly in the OECD catching-up economies for two reasons. First of all, labour productivity relative to the US has increased substantially in all industries, particularly so in transport and machinery. Wages have risen relative to the US, but the increases have been moderate allowing for a substantial competitive gain in relative unit labour costs. The latter have fallen in relation to the US level, especially in the transport, metals and mechanical products industries, and in those producing electrical machinery.

4.3 Four Asian Tigers

The four Asian Tiger countries: Taiwan, Hong Kong, Korea and Singapore, show a higher degree of structural change in output over the past two decades than all other country groups in the sample (Figure A3). The importance of petroleum-chemicals-rubber-plastics as well as of the textile and wood industry has declined, while the transport, electrical machinery and metals/mechanical engineering industries have gained output shares. With 25%, the manufacture of electrical machinery is now the most important industrial activity in this region. Also in contrast to the two groups of OECD countries, shifts in employment have been more pronounced here than in output. The textile and wood industry has lost considerable employment shares and occupies now less than 20% of the manufacturing labour force as compared to 34% in the early 1980s. FDI and trade patterns are characterized by more stability than the domestic sector of the economy. While there have been no substantial structural changes in either FDI or trade, the two correlate closely with each other. The majority of FDI in the four Tiger countries is absorbed by the electrical machinery industry and – as usual – by petroleum-chemicals-rubber-plastics. Exports, and increasingly imports as well, are also highly concentrated in electrical machinery production. The share of exports in this industry has reached nearly 50% of all manufacturing exports for the region. The graphs in Figure A3 suggest two things: First, output patterns seem to have followed FDI and export patterns in time, thus the concepts of export-led growth as well as FDI-induced growth might find some support in the case of the four Tiger countries. Second, there is evidence of increasing intra-industry trade in the electrical machinery industry in this region, illustrated by the recent rise of import shares in this industry.

Turning again to the indicators of competitiveness, one can observe further strong increases in labour productivity. These are particularly pronounced in the metal, petroleum and chemical industries and in the electrical machinery industry in this region: these industries reach a higher level of labour productivity than the US towards the end of the observation period. Productivity has also increased in all other industries, such as food, textiles and wood, and transport equipment. However, in these industries productivity gains have often been counteracted by relatively steeper wage increases, thus resulting in small changes in relative unit labour costs, apart from the last period.[4] On the other hand, unit labour costs relative to the US have continuously been low in the metals and electrical machinery industry.

[4] The decline in relative wage rates and the consequent falls in relative unit labour costs in the last period are mainly influenced by currency devaluations as a result of the Asian crisis.

4.4 East Asia

Compared to the four Tiger countries, East Asia shows much more stable patterns in output and employment as well as in exports and FDI (see Figure A4). The following industries are characterized by a continuous decline in output, employment and exports: food, textiles and wood, and metals. Apart from a shift in employment away from food towards electrical machinery, employment patterns are very sticky. Transport and electrical machinery are gaining importance in terms of output and partly in export shares. FDI in the region is traditionally highly concentrated in the petroleum, chemical, rubber and plastics industry with a share of approximately 50% of all manufacturing FDI. The textile and wood industry has moderately gained FDI shares, despite the decline in output and export shares. In terms of export patterns, two observations can be made: On the one hand, the relative stability of the industrial export structure over the past, which seems to be typical of both groups of East Asian countries, should be mentioned. On the other hand, there is a distinct restructuring away from food as well as textile and wood exports towards an increasing share of exports of electrical machinery. Import patterns show a trend away from metals and petroleum, chemicals, rubber and plastics again towards electrical machinery. Thus, also East Asia is moving towards more intra-industry trade in the electrical machinery industry.

The lower three panels of Figure A4 show, for all industries, impressive gains in relative labour productivity that have not been accompanied by a rise in relative wage rates. Rather, relative wages have moderately declined as a result of the Asian crisis. Unit labour costs in relation to the US remained low throughout the period.

India's industry structure is similar to that of East Asia, however, no trend towards more production and exports in the electrical machinery industry are visible for this country. Exports concentrate overwhelmingly in the textile and wood industry, while imports are concentrated in metals and petroleum, chemicals, rubber, plastics. FDI is also concentrated in this industry; relatively high FDI shares are further observed in the production of transport equipment and electrical machinery.

In terms of international competitiveness, India experienced constant and substantial improvements in labour productivity compared to the US while keeping constantly low relative wages (in nominal terms). Relative unit labour costs declined in all industries over the past two decades. This leaves India as a highly competitive country in most industries, particularly in the production of metals and mechanical machinery, besides textiles – India's traditional export goods.

4.5 CEECs

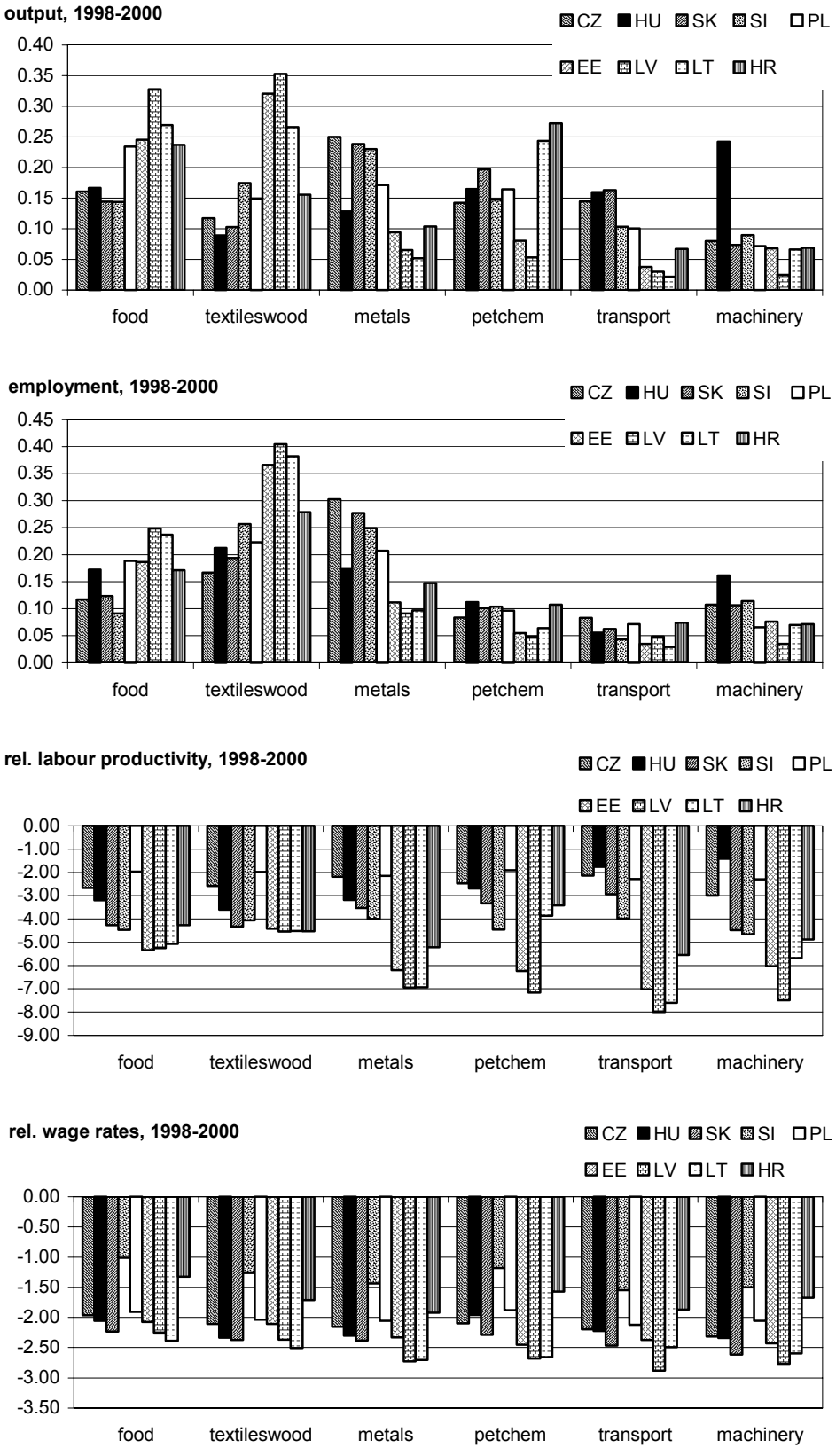
The observation period for the Central and East European countries is much shorter than for all other countries in the sample, starting only in 1993 (Figure A5).[5] As a consequence, more structural stability should be expected over this shorter time period. Nevertheless, a high degree of structural change in output and trade patterns can be observed. There has been a shift away from food, metals and petroleum-chemicals towards transport equipment and electrical machinery. It is a relatively well known fact that the period from 1993 onwards was one of fast and strongly FDI-led restructuring for CEECs (see Hunya and Kalotay, 2000). FDI is equally dispersed across all industries, with the highest share in petroleum and chemicals (19%), followed by the food industry (17%) and the transport industry (16%). These shares are calculated as a weighted average over the whole region, which masks the substantial differences among the individual countries. Therefore, Figure 4.5 shows output, employment, FDI and trade shares for individual CEECs in 1998-2000. The graphs reveal that the high share of FDI in the food industry is driven by Poland and the Baltic states, while the high share in the petroleum and chemical industry can be explained by FDI in Slovenia and Croatia. The Czech Republic and Hungary receive high FDI shares in the transport equipment industry, Hungary also attracts considerable FDI in the electrical machinery industry. With comparably little FDI (especially up until 2000), Slovakia attains high export shares in the transport industry, which at the same time shows large import shares as well.

Turning now to the indicators of competitiveness over time (lower part of Figure A5), one can observe a rapid catching-up process in terms of labour productivity in this brief time period, while relative wage rates did not change much in nominal USD. Relative unit labour costs have increased in most industries with the exception of transport equipment and electrical machinery. Figure 4.5 shows that labour productivity is relatively high in these industries in the Czech Republic and Hungary, while Slovakia relies more on low relative wage costs. Thus, all three countries have a good position in relative unit labour costs vis-à-vis the benchmark country (US) in 1998-2000. Wage rates in Slovenia are markedly higher in all industries, but also wages in Poland are higher than in the three countries mentioned earlier. This, together with a higher productivity gap in transport and electrical machinery, results in a weaker position of Poland and Slovenia in these industries.

[5] This data set covers the period up to 2002 for the CEECs. As data for all other countries are available only up until 2000, relative labour productivity, wages and unit labour costs could be calculated for 1993-2000 only.

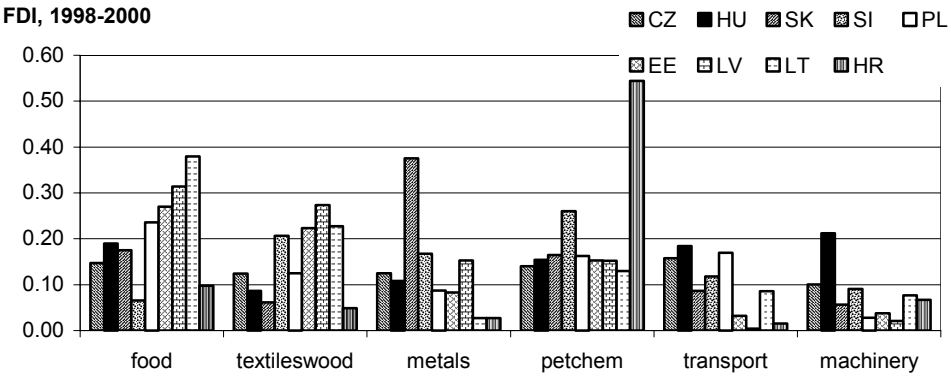
Figure 4.5

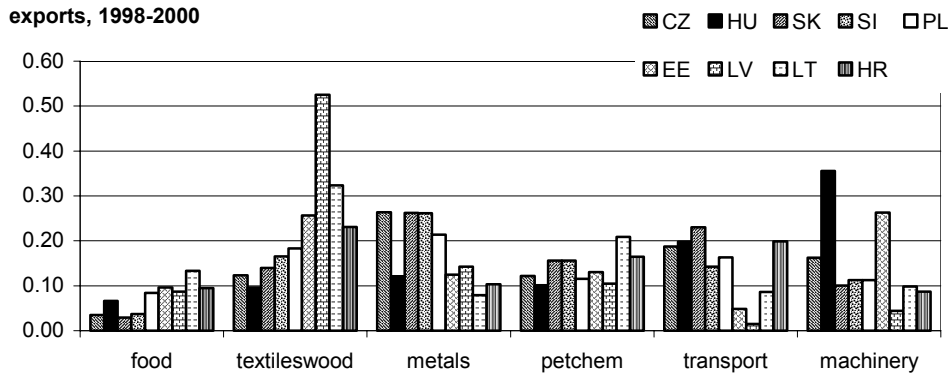
Industrial structure in individual CEECs, 1998-2000

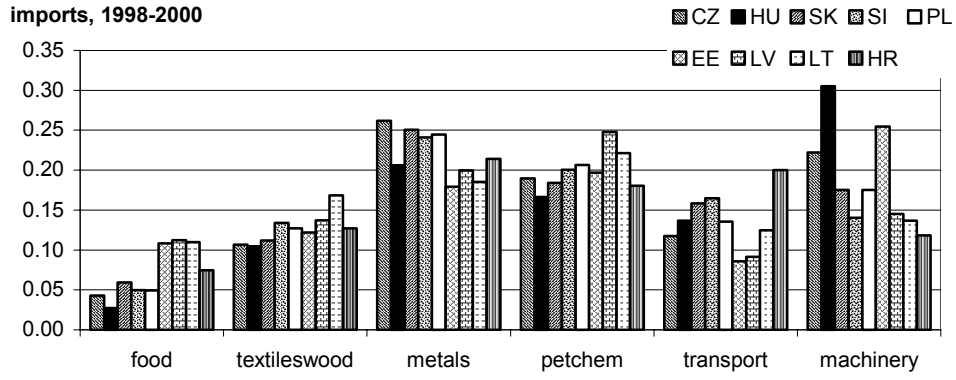


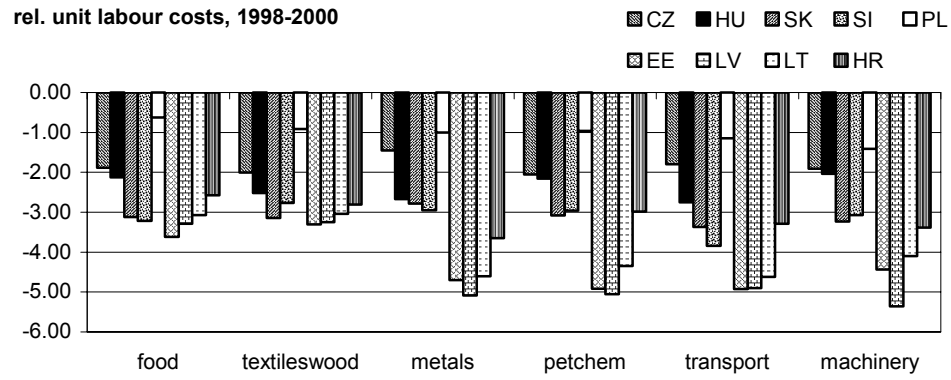
(Figure 4.5 contd.)

Figure 4.5 (contd.)









4.6 Summary

To summarize this section, the five geographic regions covered in the data set show great disparities with respect to current structures in output, employment, trade and FDI. Also structural developments have been diverse among these regions, with greater stability in output and employment patterns and more structural change in trade and FDI in the OECD countries as opposed to more stable trade and FDI patterns in East Asian countries (including the four Tigers) together with a greater volatility in output and particularly in employment in these countries. The group of CEECs has displayed a high degree of structural change in output, employment as well as trade patterns. Very little can be said about developments in FDI structures, given the very short period over which industrial FDI data are available for these countries.

The low correlation between FDI patterns and output patterns reported in Section 3 above becomes visible again in these figures. However, further a low correlation between FDI and trade patterns is expected. This follows implicitly from the high correlation between output and trade on the one hand and the low correlation between output and FDI on the other hand. The four Asian Tiger economies together with the CEECs seem to be an exception to this observation. In their case, FDI and export structures matched closely as did FDI and output patterns. In the case of the four Tiger countries, where the observation period extends over 20 years, the sequencing of industry patterns suggests that high FDI shares in electrical machinery have resulted in subsequently high output shares in the industry. For the CEECs, the time period is too short for any conclusions. However, FDI clearly plays an important role in both regions and less so in other regions.

As a general feature, the electrical machinery and transport equipment industry is gaining importance in all regions, from the most advanced to the least developed ones. There seems to be some specialization in transport equipment by the catching-up OECD members as opposed to specialization in electrical machinery by the Asian countries. The question of who will gain or lose world market shares in these industries cannot be answered by using the above figures. The industrial patterns described here should serve as a background to a comprehensive cross-country analysis, relating individual region-specific industry patterns to each other across industries. This will be done in Section 6 below.

5 Developments in individual industries

It has been stated above that the link between FDI and output or productivity is not a uniform one and cross-country heterogeneity plays an important role. This is also stressed in the empirical literature on FDI and economic growth (Bloningen and Wang, 2004; Borensztein, De Gregorio and Lee, 1998; Nair-Reichert and Weinhold, 2001) and has

been confirmed by the data in the previous section. The present data set further allows to investigate a second source of heterogeneity that may blur or at least influence the relationship between FDI and economic development. Industry-specific characteristics may introduce heterogeneity that further influences the relationship between FDI and the domestic output structure. This section compares different measures of FDI across countries to indicators of competitiveness for individual industries.

5.1 Food industry

Table 5.1.1. reports different indicators of competitiveness and FDI for the food industry. According to these figures, which represent a weighted average of country-specific productivity levels inside each region, the four Asian Tiger economies are currently the productivity leader[6] (measured by output to employment ratios). The industry is in general characterized as being relatively inward-oriented, with comparably low export and import ratios between 10% and 20%. One exception is constituted by the four Tiger countries, with an import ratio of more than 40%. This may also explain their high productivity levels in this industry. While productivity levels and trade ratios are rather similar across all country groups, wage rates and thus unit labour costs vary greatly. Despite their relatively low wage rates, unit labour costs of CEECs are in the range of those in the OECD members. In terms of FDI, CEECs show the highest FDI to output ratio in this industry. Thus, FDI inward stocks play in general a greater role for CEECs than for most other regions in the sample with the exception of East Asia, as we will see below. With an FDI to output ratio three times as large as in the advanced OECD countries, the food industry is most FDI-intensive in Central and Eastern Europe. Still the productivity gap to the advanced OECD countries is high in this industry. On the other hand, productivity catching-up has been fast as is indicated by the growth rates in Table 5.1.2. Wage rates have also grown strongly, and thus unit labour costs increased in CEECs, while all other regions experienced falling unit labour costs over the observation period.[7]

Since data on industry-specific FDI in Central and Eastern Europe are only available from 1998 onwards, the growth rates of FDI ratios for this region refer to the five-year period up to 2002 only. The comparably low growth rates are a result of high initial FDI ratios in these countries. The differences in observation periods between CEECs and all other regions (1993-2000 versus 1987-2000) should also be kept in mind when interpreting the growth rates of all other indicators.

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[6] Productivity is here measured as output to employment ratios. Value added productivity may be lower, particularly in Asian countries, because there is a high import content in this region.

[7] While we report wage rates in current USD, since these are among other things relevant for investment decisions, the unit labour costs reported here were calculated as the ratio of the wages to labour productivity both measured in constant purchasing power parity-based dollars. Thus, we avoid distortions in relative unit labour costs due to the strong depreciation of the Asian currencies in the wake of the Asian crisis.

Table 5.1.1

Competitiveness of individual regions, 1998-2000

	adv. OECD	catch-up OECD	4 Tigers	East Asia	India *)	CEECs
labour productivity (constant ppps)	267846	187793	291291	164025	110327	96094
Wage (current USD)	25687	11418	12260	1454	731	4266
FDI-employment ratio (current USD)	12103	15570	12613	3720	81	6094
FDI-output ratio (%)	4.57	11.74	7.15	11.01	0.57	13.71
Export-ratio (%)	10.74	14.15	14.18	44.10	9.86	15.10
Import-ratio (%)	12.50	17.66	40.82	17.87	5.89	15.37
Unit labour costs	0.086	0.086	0.067	0.037	0.036	0.096

Note: *) FDI ratios for 1993-1995.

Table 5.1.2

Average annual growth rates 1987-2000, in per cent

	adv. OECD	catch-up OECD	4 Tigers	East Asia	India *)	CEECs **)
labour productivity (constant ppps)	4.2	6.4	13.5	7.0	21.0	16.9
Wage (current USD)	1.7	-0.5	5.7	1.6	0.8	7.2
FDI-employment ratio (current USD)	3.6	31.0	24.6	3.2	1.9	0.9
FDI-output ratio (%)	1.6	35.0	19.1	7.1	1.9	0.7
Export-ratio (%)	3.3	3.1	-2.7	1.2	5.2	1.4
Import-ratio (%)	3.1	6.3	5.6	3.2	8.8	1.9
Unit labour costs	-0.9	-1.0	-0.5	-0.3	-2.9	4.1

Notes: *) 1987-1995. **) 1993-2002, 1998-2002 for FDI ratios.

5.2 Textile and wood industry

The advanced OECD countries are still the productivity leader in the textile and wood industry, however, closely followed by the four Asian Tiger countries. The CEECs are again lagging in terms of productivity, but they have already caught up substantially as illustrated by the high growth rate of this variable, reported in Table 5.2.2. With the exception of the group of advanced OECD members, this industry is strongly outward-oriented, with sometimes as much as 55-65% of the output being exported. East Asia, the Asian Tiger countries and the CEECs show the highest export to output ratios, closely followed by India and the catching-up OECD countries. The import to output ratio is high for the Tiger countries and the CEECs, while East Asia and particularly India clearly specialize in this industry in the traditional Ricardian sense. With a ratio higher than 50% East Asia shows the greatest FDI intensity. The CEECs are also characterized by relatively FDI-intensive production, the ratio is 12% for this group. As in the food industry the productivity gap to the leading region is again highest for the CEECs among all regions but also among all industries for this country group. The strong rise of unit labour costs has further eroded the CEECs' competitiveness in this industry.

India's competitiveness in this industry has increased dramatically: labour productivity has risen strongly while unit labour costs diminished. These developments were unrelated to FDI, which played no role in textiles (and wood) in India. The FDI to output ratio has grown strongly in the group of catching-up OECD members, but also in advanced OECD members. The CEECs were already characterized by above-average FDI ratios in 1998 (the year from which data are available) and thus showed no further growth in the FDI to output ratio. The four Tiger economies also saw their FDI to output ratio increase by roughly 20%, accompanied by a rise in labour productivity of nearly 15%.

Table 5.2.1

Indicators of FDI and competitiveness, 1998-2000

	adv. OECD	catch-up OECD	4 Tigers	East Asia	India *)	CEECs
labour productivity (constant ppps)	148822	97882	141637	62952	77523	49367
Wage (current USD)	26773	10277	12736	1335	1006	3651
FDI-employment ratio (current USD)	11499	6595	4287	8033	36	2770
FDI-output ratio (%)	7.40	9.64	4.59	51.91	0.30	12.20
Export-ratio (%)	19.66	37.82	58.49	65.19	39.02	55.79
Import-ratio (%)	27.19	41.90	73.93	20.77	5.70	51.99
Unit labour costs	0.15	0.15	0.13	0.07	0.07	0.16

Note: *) FDI ratios for 1993-1995.

Table 5.2.2

Average annual growth rates, 1987-2000, in per cent

	adv. OECD	catch-up OECD	4 Tigers	East Asia	India *)	CEECs **)
labour productivity (constant ppps)	5.2	6.6	14.9	3.3	20.4	20.5
Wage (current USD)	2.1	-0.1	7.0	-1.0	-1.1	15.5
FDI-employment ratio (current USD)	17.9	33.2	27.0	3.3	0.9	1.5
FDI-output ratio (%)	14.5	30.6	19.7	5.3	0.4	1.1
Export-ratio (%)	5.9	7.7	1.0	9.8	6.0	1.9
Import-ratio (%)	4.9	8.1	12.5	5.2	5.8	4.8
Unit labour costs	-1.9	-1.5	-1.1	0.5	-4.2	8.2

Notes: *) 1987-1995. **) 1993-2002, 1998-2002 for FDI ratios.

5.3 Petroleum, chemicals, rubber and plastics industry

The strongly resource-based industry category comprising petroleum, chemicals, rubber and plastics shows high export ratios in general, but in contrast to the labour-intensive (and partly also resource-based) textile and wood industry, most catching-up regions show a high import dependency in this industry, particularly so the CEECs. Table 5.3.1 confirms the results from the previous section which identified this industry as having the highest FDI shares in almost all regions. The FDI to output ratio was even above 100% in East Asia, while India reported again practically no FDI in this industry up to 1995. On the other

hand, India recorded higher productivity and lower wages in this industry than did East Asia.

With a FDI to output ratio of only 15%, the CEECs even show the lowest FDI intensity in this industry (apart from India). The productivity level in the CEECs is considerably below that of the productivity leader and compares to the level of East Asia. With unit labour costs comparable to catching-up OECD members, the CEECs again do not show competitiveness in this industry, despite their relatively high export ratio. This is reflected in Table 5.3.2 below, which shows strong productivity increases along with high wage growth. Also here, unit labour costs have increased in contrast to falling unit labour costs in all other regions apart from East Asia.

Table 5.3.1

Indicators of FDI and competitiveness, 1998-2000

	adv. OECD	catch-up OECD	4 Tigers	East Asia	India *)	CEECs
labour productivity (constant ppps)	322993	275851	471345	191263	252303	140492
Wage (current USD)	36136	17303	16734	2430	1709	5776
FDI-employment ratio (current USD)	49964	36344	48770	76638	477	9992
FDI-output ratio (%)	15.71	19.47	16.09	164.72	1.25	15.43
Export-ratio (%)	26.05	23.89	29.80	32.81	9.68	38.25
Import-ratio (%)	22.94	50.53	42.54	46.17	17.39	71.56
Unit labour costs	0.099	0.092	0.054	0.044	0.036	0.087

Note: *) FDI ratios for 1993-1995.

Table 5.3.2

Average annual growth rates, 1987-2000, in per cent

	adv. OECD	catch-up OECD	4 Tigers	East Asia	India *)	CEECs **)
labour productivity (constant ppps)	4.4	8.6	13.2	0.2	19.1	20.8
Wage (current USD)	2.5	0.4	7.5	1.5	-0.2	15.6
FDI-employment ratio (current USD)	14.2	41.2	26.5	2.7	-0.2	1.4
FDI-output ratio (%)	11.1	37.4	16.5	5.8	0.0	0.8
Export-ratio (%)	4.9	2.7	4.1	12.4	5.6	0.8
Import-ratio (%)	3.6	5.9	3.1	4.3	1.5	5.6
Unit labour costs	-0.2	-1.3	-2.5	3.1	-2.1	9.7

Notes: *) 1987-1995. **) 1993-2002, 1998-2002 for FDI ratios.

5.4 Metals and mechanical machinery industry

The four Tiger economies are again the productivity leader in the metals and mechanical machinery industry in 1998-2000 while the FDI to output ratio is the smallest among all regions, not including India (see Table 5.4.1). There have been strong productivity increases in this region, only the two laggards in terms of productivity – India and the

CEECs – have seen equally strong productivity growth (Table 5.4.2). While the CEECs are characterized by relatively high FDI ratios of about 19%, India has again not funnelled foreign capital into this industry. Not surprisingly, the differences in wage rates between the CEECs and India as well as East Asia in general are high even if wages in the CEECs were still considerably below the levels found in the OECD countries or the Asian Tiger states. Unit labour costs in Eastern Europe are high, while in East Asia and India they are at about one third of the level prevailing in all other regions. The CEECs are further characterized by an extremely high export and especially import ratio in this industry. Thus, the CEECs are highly dependent on imports in these heavy and resource-based industries. In both industries, petroleum / chemicals and metals / machinery, they show relatively low FDI to output ratios and high trade ratios in international comparisons, while productivity growth – although being high in an international comparison – is moderate compared to developments in other industries in the CEECs.

Table 5.4.1

Indicators of FDI and competitiveness, 1998-2000

	adv. OECD	catch-up OECD	4 Tigers	East Asia	India *)	CEECs
labour productivity (constant ppps)	185937	151007	269116	145437	134979	66714
Wage (current USD)	33862	14738	14751	2726	1665	4691
FDI-employment ratio (current USD)	11055	13787	8178	36627	255	2804
FDI-output ratio (%)	5.68	12.47	4.54	91.43	1.13	9.10
Export-ratio (%)	24.69	34.06	28.87	63.39	8.96	56.26
Import-ratio (%)	20.37	64.57	47.76	153.02	25.91	79.42
Unit labour costs	0.147	0.131	0.083	0.052	0.066	0.151

Note: *) FDI ratios for 1993-1995.

Table 5.4.2

Average annual growth rates, 1987-2000, in per cent

	adv. OECD	catch-up OECD	4 Tigers	East Asia	India *)	CEECs **)
labour productivity (constant ppps)	4.4	8.4	15.1	4.5	19.2	20.4
Wage (current USD)	2.4	0.0	5.2	0.2	0.6	18.4
FDI-employment ratio (current USD)	8.8	32.6	21.5	4.4	1.3	2.1
FDI-output ratio (%)	5.3	28.1	13.9	4.7	1.1	2.0
Export-ratio (%)	2.6	4.6	-1.5	13.1	7.5	2.8
Import-ratio (%)	2.7	4.8	-1.4	4.3	7.4	7.2
Unit labour costs	-1.3	-2.8	-2.9	2.2	-1.4	10.3

Notes: *) 1987-1995. **) 1993-2002, 1998-2002 for FDI ratios.

5.5 Transport equipment industry

One of the first observations to be made when looking at this most dynamically evolving industry are the considerably lower disparities in productivity levels among regions. The

advanced OECD countries are clearly the productivity leader in this industry, followed – with a gap of about 20% – by the four Tiger countries. The CEECs are at about half the productivity level of the advanced OECD countries, still above India but below East Asia. With the exception of India, export ratios are moderate to high, particularly so for the CEECs. For the latter region, a high export ratio correlates with a high FDI to output ratio. The group of catching-up OECD countries shows strong competitiveness in this industry. With a productivity level close to the advanced OECD members and a wage level considerably below, this region is characterized by favourable unit labour costs. Export shares are consequently high and the FDI to output ratio is also high.

East Asia is again characterized by the highest FDI to output ratio; labour productivity is fairly high in this region, while wage rates and unit labour costs are low. Still, East Asia shows the lowest export ratio and one of the highest import ratios (apart from India of course) among all catching-up countries. Clearly, the advanced catching-up OECD members have emerged as an important global player in this industry, while East Asia did not specialize in this industry despite favourable conditions and high FDI. In the transport equipment industry, India for the first time shows a non-negligible FDI to output ratio in 1995. With less than 4% India's export ratio is again very low by international standards. Likewise, the import ratio of only 5.3% is extremely low, not only in the international context but also for India itself.

A strong competitive position of the CEECs in addition to the catching-up OECD countries in this industry can be deducted from relatively high productivity levels together with low wages and therefore low unit labour costs on the one hand and high trade ratios on the other hand. While trade ratios have not expanded strongly in comparison to other regions, the CEECs' productivity gains over the shorter time period are impressive. Given these rapid improvements in labour productivity, unit labour costs have increased only marginally on average.

Table 5.5.2 shows impressive growth rates of FDI ratios in this industry in general. As we know already from Section 3 above, there is a strong correlation between FDI, trade and output in this industry. The results from this section further show a strong link between FDI and labour productivity. However, no statements can be made with respect to the direction of causality between the two. Both relationships may be at work here: on the one hand FDI is attracted by high and growing productivity levels, while on the other hand productivity gains may be reinforced by the presence of FDI in this industry. Clearly, FDI does play a more important role in this industry than in all other industries.

Table 5.5.1

Indicators of FDI and competitiveness, 1998-2000

	adv. OECD	catch-up OECD	4 Tigers	East Asia	India *)	CEECs
labour productivity (constant ppps)	320399	309412	268256	224531	144614	167567
Wage (current USD)	41132	16588	16754	2588	1914	5266
FDI-employment ratio (current USD)	11816	22325	7508	19801	328	12044
FDI-output ratio (%)	3.58	9.86	4.64	34.16	2.17	18.64
Export-ratio (%)	19.50	37.37	26.73	23.81	3.82	74.85
Import-ratio (%)	15.43	32.27	14.93	45.25	5.29	70.96
Unit labour costs	0.096	0.072	0.102	0.037	0.070	0.080

Note: *) FDI ratios for 1993-1995.

Table 5.5.2

Average annual growth rates, 1987-2000, in per cent

	adv. OECD	catch-up OECD	4 Tigers	East Asia	India *)	CEECs **)
labour productivity (constant ppps)	5.5	11.2	14.4	9.9	23.8	31.3
Wage (current USD)	3.2	0.2	5.2	1.1	0.5	21.0
FDI-employment ratio (current USD)	15.2	12.5	15.0	2.9	1.3	1.9
FDI-output ratio (%)	10.9	11.1	8.1	4.8	1.2	1.3
Export-ratio (%)	8.9	22.9	2.8	5.6	7.2	8.5
Import-ratio (%)	9.8	10.3	-4.9	3.5	-0.3	6.3
Unit labour costs	-2.9	-5.9	-1.5	-3.1	-6.0	4.1

Notes: *) 1987-1995. **) 1993-2002, 1998-2002 for FDI ratios.

5.6 Electrical machinery industry

Finally, let us compare the different regions' performances in the second most dynamic industry, the manufacture of electrical machinery. The four Tigers again emerge as the productivity leader in the final period (Table 5.6.1). Also, the differences in labour productivity are more moderate as compared to the industries examined previously, apart from the transport equipment producing industry. East Asia exhibits again the highest FDI to output ratio (32.5%), followed by the CEECs (13.7%). Further, India has had some FDI already in 1995 (of 2.3% in relation to output), highlighting the selective opening strategy of the Indian economy towards FDI (but also trade).

Trade ratios are extremely high with imports often exceeding output levels. Clearly, the fragmentation of production must play an important role in this industry. The CEECs again show large productivity gains (Table 5.6.2), however, also East Asia and India, besides the four Tiger economies, are successfully catching up in terms of productivity. Unit labour costs in this industry were in general low in Asia, and further declining due to moderate wage growth.

The CEECs can compete in terms of unit labour costs with the catching-up OECD countries but not with Asia. In terms of productivity levels, the CEECs still rank last, which implies that strong productivity growth has to continue if they want to keep their current level of competitiveness.

Table 5.6.1

Indicators of FDI and competitiveness, 1998-2000

	adv. OECD	catch-up OECD	4 Tigers	East Asia	India *)	CEECs
labour productivity (constant ppps)	207082	156633	308596	181416	151380	101280
Wage (current USD)	37272	15063	15098	3178	1819	4840
FDI-employment ratio (current USD)	14702	10341	26040	18379	504	5583
FDI-output ratio (%)	6.60	8.99	12.41	32.49	2.25	13.70
Export-ratio (%)	33.64	113.31	91.84	125.31	4.91	90.38
Import-ratio (%)	35.62	126.84	106.79	82.99	20.60	126.69
Unit labour costs	0.142	0.129	0.073	0.046	0.064	0.117

Note: *) FDI ratios for 1993-1995.

Table 5.6.2

Average annual growth rates 1987-2000, in per cent

	adv. OECD	catch-up OECD	4 Tigers	East Asia	India *)	CEECs **)
labour productivity (constant ppps)	5.2	8.2	15.3	9.1	20.8	33.0
Wage (current USD)	3.3	0.2	7.2	1.7	0.2	18.2
FDI-employment ratio (current USD)	10.5	38.2	29.0	3.3	1.5	1.1
FDI-output ratio (%)	6.2	45.4	19.0	4.7	1.2	0.5
Export-ratio (%)	6.9	21.0	2.9	5.1	6.1	8.6
Import-ratio (%)	7.7	5.3	7.8	1.0	4.1	0.6
Unit labour costs	-1.7	-2.3	-3.7	-1.2	-3.3	2.2

Notes: *) 1987-1995. **) 1993-2002, 1998-2002 for FDI ratios.

5.7 Summary

Table 5.7 below summarizes the FDI to output ratios for all industries. There are distinct differences among the individual industries, with the highest ratio in general prevailing in the petroleum, chemical, rubber and plastics industry. India with its very specific economic policy of a dual economy constitutes an exception to this. FDI to output ratios are negligibly small in all industries, except for the manufacture of electrical machinery and transport equipment, where India had an FDI to output ratio of more than 2%. Compared to the ratios for all other regions, this is still very small.

East Asia clearly emerges as the region with the highest FDI to output ratios; in the petroleum, chemical, rubber and plastics industry this ratio is well above 100% (caused by high inward FDI in Indonesia). The CEECs rank second in terms of the importance of FDI

in relation to production. In their case the transport industry turns out to be the most FDI-intensive one. Apart from the generally strong role of FDI in petroleum, chemicals, rubber and plastics, all regions differ with respect to the importance of FDI in the individual industries. Thus, the data exhibit very large disparities across regions as well as across industries, supporting our argument of the two sources of heterogeneity in the relationship between FDI and output or productivity. Let us briefly identify these differences before moving on to a description of international specialization patterns among regions.

Apart from the high FDI to output ratio in the petroleum and chemical industry, the advanced OECD countries show relatively low FDI to output ratios of far less than 10% in all other industries. For the group of catching-up OECD countries, FDI is important in the metals and machinery industry (12.5%). The four Tigers are characterized by a high FDI ratio again in the petroleum and chemical industry (16%), as well as in the manufacture of electrical machinery (12%), where they also show strong international competitiveness. East Asia has an extremely high ratio of FDI in the petroleum and chemical industry (165%), but also high ratios in the metals and mechanical engineering industry (91%), in textiles and wood (52%) as well as in transport equipment (34%) and electrical machinery (33%). Finally, the CEECs are characterized by comparably high FDI ratios in all industries with the exception of metals and mechanical machinery. They receive relatively high inward FDI first of all in transport equipment (19%), followed by petroleum and chemicals (15%), and further in electrical machinery and food (about 14%).

Table 5.7

FDI-output ratios in per cent, 1998-2000

	adv. OECD	catch-up OECD	4 Tigers	East Asia	India *)	CEECs
Food	4.6	11.7	7.1	11.0	0.6	13.7
Textiles/Wood	7.4	9.6	4.6	51.9	0.3	12.2
Pet/Chem	15.7	19.5	16.1	164.7	1.3	15.4
Metals	5.7	12.5	4.5	91.4	1.1	9.1
Transport	3.6	9.9	4.6	34.2	2.2	18.6
Machinery	6.6	9.0	12.4	32.5	2.3	13.7

Note: *) 1993-1995.

The question if and how these differences relate to differences in international competitiveness or domestic development cannot be answered without a rigorous econometric analysis. However, some indications are given by the data and it seems that a significant relationship is most likely to be expected in the transport equipment and electrical machinery industry. The following section will shed some light on the question of international competitiveness by describing the individual regions' international specialization patterns in terms of output, employment, trade, and FDI.

6 Specialization patterns

This section reports region-specific patterns of international specialization. For this purpose, specialization indices are calculated based on the concept of revealed comparative advantage for five different economic indicators: output, employment, FDI, exports and imports. The specific index used here measures the country's share in the respective variable in one industry and compares it to the average representation of that industry in the whole sample (Vollrath, 1991; see also Box 1.1). The index takes a value between zero and infinity, with values greater than one indicating a specialization of the country in the respective industry and values below one indicating below-average representation of the industry in the country. For a better illustration of the results, the log of the index is reported, which makes the index unbound and symmetric around zero. A positive index thus reveals an above-average share of the respective variable in the specific industry and consequently specialization by the respective country, whereas a negative index reveals a below-average representation of that country in this variable. The revealed comparative trade advantage is then calculated as the difference between the index of export and import specialization. This may conceal extreme sectoral specialization if it is equally strong in exports and imports, therefore the export component is also reported separately.

The specialization indices are given in Figures A6-A10 in the Appendix.

6.1 Advanced OECD countries

Figure A6 shows that the comparative advantages of the advanced OECD countries in this sample lie in the heavy industries, such as metals and mechanical machinery, electrical machinery and petroleum, chemicals, rubber, plastics. The very R&D-intensive, high-tech production of drugs and medicines is also included in the latter category. Up to the early 1990s, these countries also showed a comparative advantage in the manufacture of transport equipment, however, more recently the RCA turned negative due to high import shares. This can be read from the continuously high export specialization in this industry. On the other hand, the initially comparative advantage in electrical machinery has disappeared due to falling export shares in this industry. In contrast to these developments with respect to international competitiveness, output and employment patterns have increasingly become specialized in transport and electrical machinery.

The specialization pattern of FDI seems to be largely unrelated to the patterns of other economic indicators for the advanced OECD countries. These countries received above-average FDI in industries such as food, textiles and wood, metals and mechanical machinery. Only in the latter industry a comparative advantage is found for these countries. FDI in the transport equipment industry was well below average in the 1980s and is now

above average. It is interesting to note that at the time when FDI specialization in this industry switched from being negative to becoming positive, imports surged and as a consequence the index of revealed comparative advantage turned negative in spite of strong export, employment, and output specialization. In other words, intra-industry trade has increased in this industry along with increasing inward FDI, which simply reflects a more internationally integrated production structure.[8] While there does not seem to be much correlation between patterns of FDI specialization and developments in output or trade specialization in general, there seems to be an effect in the transport equipment industry, leading to increasing intra-industry trade and output specialization.

6.2 Catching-up OECD countries

Figure A7 displays the same specialization measures for the group of catching-up OECD members. Much more coherence between output, employment, export and trade specialization can be observed. Further, FDI patterns seem to lead these developments or at least match them closely in some industries. The strong FDI specialization in the transport industry, in particular at the beginning of the observation period, is reflected in a switch-over of comparative advantage in this industry at the beginning of the 1990s. Output and export patterns explain this switch-over, while the relatively constant share of employment vis-à-vis the rest of the sample indicates strong productivity increases (see also Figure A2). A similar development can be expected to follow in the electrical machinery industry, given the reduction of the gap in FDI and export shares and to a lesser extent also in output shares. The increasing and recently positive FDI specialization in the food industry for this group of countries is surprising, all the more so if one relates it to the decreasing RCA in this industry. This possibly reflects market-seeking FDI, which is oriented towards gaining market shares on the domestic market, since with rising incomes, the demand for higher quality and brand names (especially in beverages) is rising. Clearly, these countries are losing relative market shares in metals and mechanical engineering, the electrical machinery industry and increasingly so also in the petroleum, chemicals, rubber and plastics industry to the more advanced OECD members, but also to Asian economies, as will be shown below.

6.3 Four Asian Tigers

For the four Asian Tigers, the decline of the textile and wood industry over the past two decades is strongly visible in all variables (see Figure A8). They still hold a comparative advantage in this industry, it has however declined substantially over time. Their

[8] The traditional measure of comparative advantage, based on the Ricardian concept of trade, is clearly misleading in the context of intra-industry trade. In such a case, a finer level of disaggregation is called for if one wants to work with these measures of competitiveness.

advantages are to be found in the manufacture of electrical machinery. Throughout the entire observation period, they show a strong specialization in this industry in terms of output, employment, exports, RCA and also FDI. A strong correlation between FDI specialization and international competitiveness seems to be visible for this group of countries. In terms of employment and less so output, also specialization in the transport industry has increased, leading to a positive RCA in the late 1990s. This is caused by falling import shares and less so by strong export specialization. Export shares have even decreased as compared to the sample average. Also FDI has gone down in relative terms in this industry. The graphs in Figure A8 suggest a different path of development for this industry as compared to the electrical machinery industry. The latter seems to have developed through strong FDI and export orientation, while the transport industry seems to have built up strength in the domestic market and is now becoming internationally competitive because of reduced import dependence.

6.4 East Asia

Turning to East Asia (Figure A9, excluding India), a pronounced specialization in textiles (and wood), but also food becomes visible in strong contrast to the pattern of specialization of the four Tiger countries. Employment in textiles and wood is still increasing in relative terms, however, the RCA is decreasing to some extent while FDI shares remain above average. FDI data for these countries are only available since 1995. In terms of FDI, these countries specialize, besides textiles and wood, in petroleum, chemicals, rubber and plastics and more recently also in electrical machinery. In the petroleum, chemical, rubber, plastics industry little change is observed with respect to output, employment and trade specialization. The transport equipment industry shows some reduction in comparative disadvantage (i.e. an improvement) despite negative FDI specialization. All other indicators point rather towards decreasing specialization in this industry as well. Again, as in the case of the Asian Tigers, the import dependency has decreased, which explains the slight increase in RCA. Developments in the electrical machinery industry are worth noticing for this group of countries. East Asia exhibits a comparative advantage in this industry (stemming from a positive export specialization), based on increasing output specialization and below-average employment shares. Tendencies in FDI are not clear, but more likely to lead to a continuously positive specialization.

For India (Figure A10), we observe more or less opposite specialization patterns between FDI and all other indicators. In terms of FDI, India is specialized in those industries where revealed advantages are lacking and output and employment specialization is low (electrical machinery and transport equipment). In contrast, the industries in which India shows strong comparative advantages and output and employment specialization is high (textiles and wood but also food; other manufacturing – another area with strong

comparative advantages for India – is not reported) are characterized by a strongly negative FDI specialization.

6.5 CEECs

Figure A10 displays specialization patterns for the group of the Central and East European countries for the shorter time period from 1993 to 2000. At first glance, the patterns look similar to those for East Asia. The initial strong comparative advantage in textiles and wood is declining, despite some increases in relative employment and output. However, in the case of the CEECs, this refers to specialization in the wood industry, while in the case of East Asia it was clearly specialization in the textile industry. There are strong improvements in export and output specialization in the transport equipment and electrical machinery industry which are not accompanied by increasing employment shares. Again, this reflects the productivity increases observed earlier. A switch-over in comparative advantage due to strong export specialization occurred in the transport equipment industry in the last subperiod. Also FDI, for which data are only available for this last subperiod, shows a positive specialization in the transport equipment industry while it is still below average in the electrical machinery industry. The CEECs show a positive FDI specialization in food as well as textiles and wood. In both industries this goes hand in hand with a positive RCA.

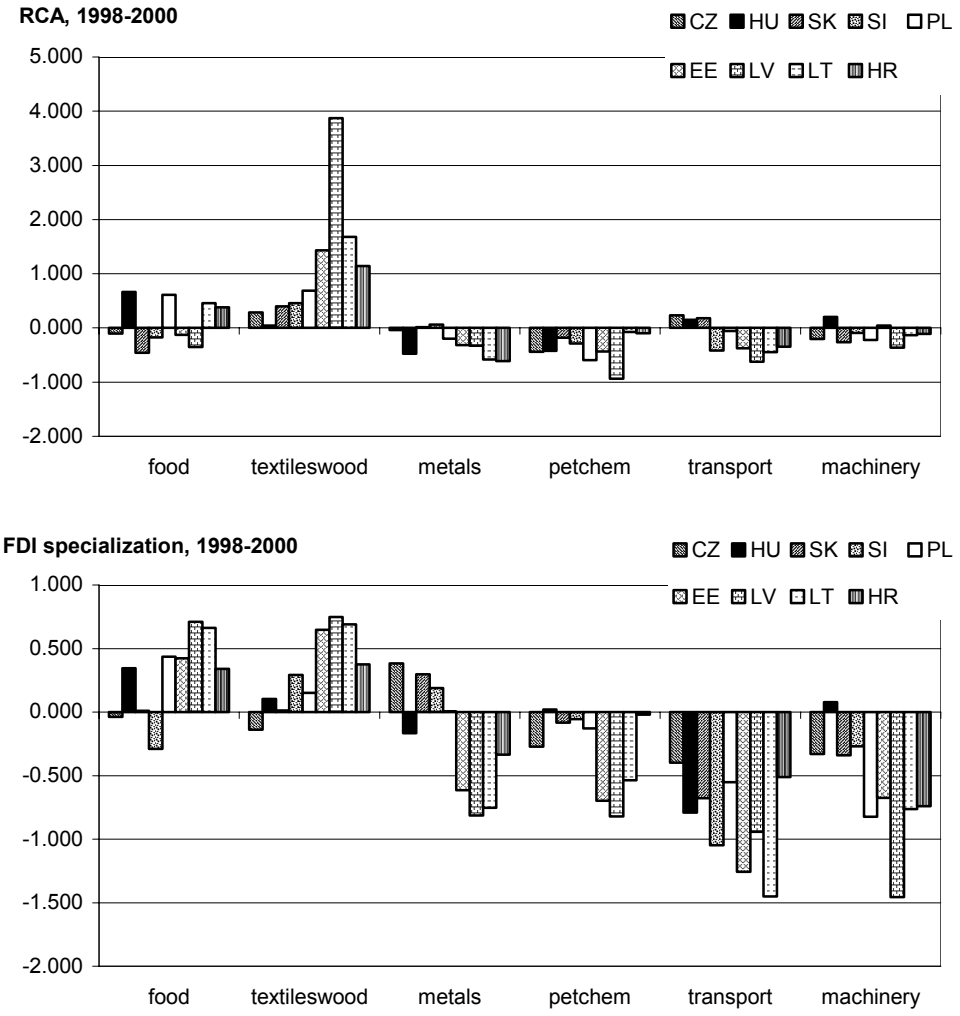
Figure 6.1 shows the specialization patterns for individual CEECs in the subperiod 1998-2000. The strong specialization in textiles and wood, where all CEECs hold a comparative advantage, is mainly driven by Latvia and the remaining Baltic states as well as Croatia. For the group as a whole, the comparative advantage in this industry is declining. Despite the positive RCA in the food industry for the group as a whole, a negative RCA is observed in this industry for individual CEECs (the Czech Republic, Slovakia, Slovenia, Estonia and Latvia). The recent comparative advantage in transport equipment is caused by just three countries: the Czech Republic, Slovakia and Hungary. Hungary is the only country in the region to have gained a comparative advantage in the manufacture of electrical machinery. This is also reflected in FDI specialization patterns. The patterns of trade specialization are matched closely by the patterns of FDI specialization for this group of countries. While nearly all CEECs show a positive FDI specialization in the food industry and in the textile and wood industry, only few show above-average inward FDI in any other industry. This positive FDI specialization may be explained in part by the domestic market orientation and demand for brands and qualitatively high standing products as in the case of the catching-up OECD members.

Let us now briefly examine the FDI specialization patterns in all other industries: The Czech Republic, Slovakia and Slovenia have a pronounced above-average specialization of FDI in metals and mechanical machinery, with a corresponding positive RCA in this

industry for the latter two countries. Finally, Hungary attracts above-average FDI in petroleum, chemicals, rubber and plastics, however without holding a comparative advantage in this industry.

Figure 6.1

Industrial specialization patterns in individual CEECs, 1998-2000



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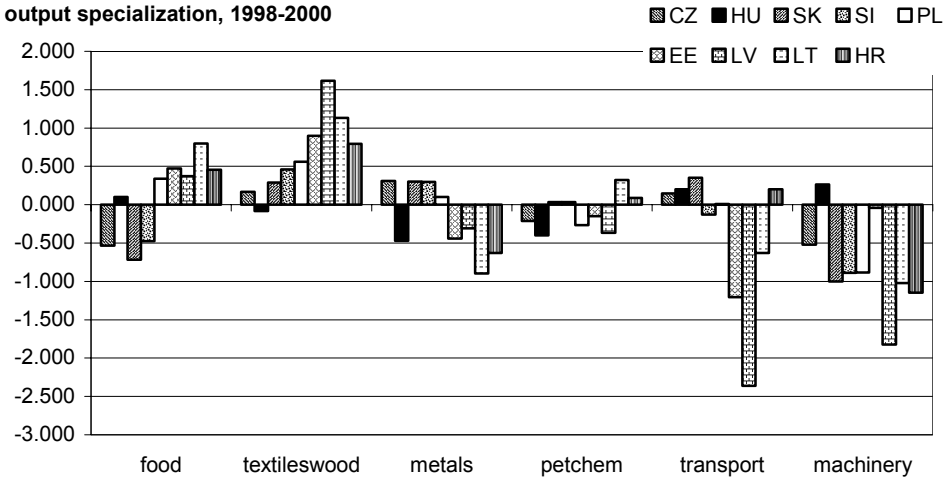

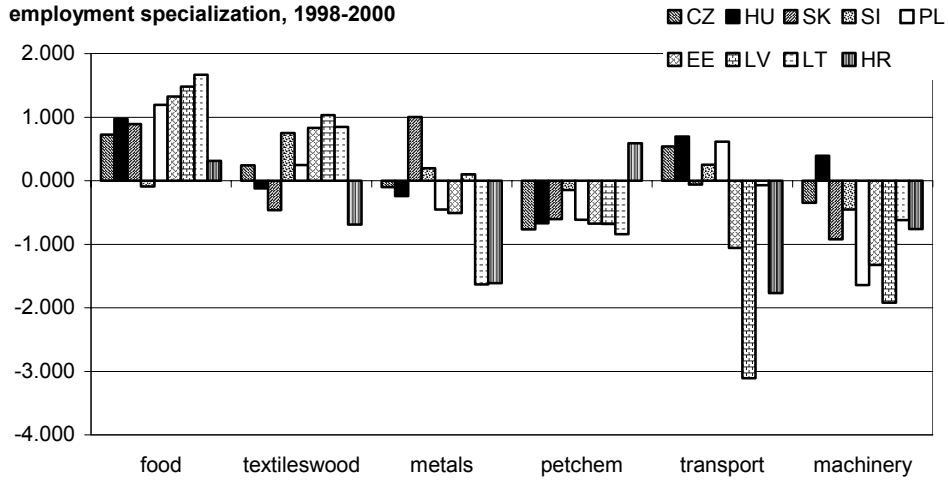

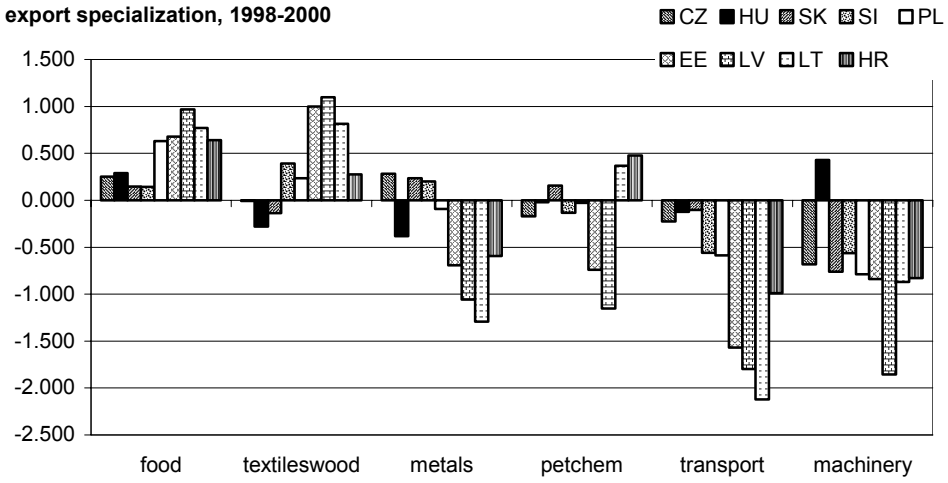

6.6 Summary

As a general feature, RCAs and FDI specialization do not always match, except in some cases. In particular for the advanced OECD countries, the relationship between FDI specialization and trade specialization seems to be weak. This has already been observed for the link between FDI and output patterns earlier. For most of the catching-up regions in the sample, a stronger relationship can be read from the data presented here. For instance in the case of the catching-up OECD countries, a positive correlation between early FDI specialization in the transport equipment industry and a subsequent comparative advantage in this industry becomes visible. For the four Asian Tiger countries a strong positive correlation between above-average inward FDI in electrical machinery and the output, employment, export and hence also trade specialization in this industry is evident. Finally, for the CEECs as a group such a positive link between FDI and trade performance can be observed in the transport equipment industry. The figures alone do not reveal such a relationship in the case of the group of East Asian countries: the relationship between FDI specialization and RCA seems to be rather negative.

7 Conclusions

Taking all evidence together, the link between FDI and output development is not uniform along the three dimensions looked at in this panel. First of all, it is increasing over time. Second, it is decreasing in the development stage of a country. And third, it is dependent on the specific industrial activity. While FDI is in general important in resource-based industries, such as petroleum, chemicals, rubber, plastics, its correlation with output patterns and patterns of international competitiveness is rather weak in this industry. It is however much stronger in more capital- and technology-intensive industries such as transport equipment and electrical machinery.

Summarizing, large heterogeneities can be observed in the relationship between FDI, trade and output patterns for individual groups of countries. The sign and strength of correlation between FDI and output is varying both across countries as well as across industries. In general, the link seems to be stronger for the catching-up countries. In particular for the CEECs and the four Asian Tigers, a strong connection between FDI and output development is evident in certain industries. These are mostly the manufacture of electrical machinery in the case of the four Asian Tiger countries, and the production of transport equipment in the case of the CEECs. A certain degree of specialization on transport equipment by the two regions that are geographically closer to the most advanced group of OECD countries – the catching-up OECD countries and the CEECs – becomes apparent through many indicators in this data set. In contrast, the more remote Asian countries (the four Tigers as well as the East Asian countries) are specializing on the more light-weight production of electrical machinery in terms of output, trade, and partly also FDI. This pattern of global specialization seems intuitively right, in the presence of positive transport costs.

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Appendix

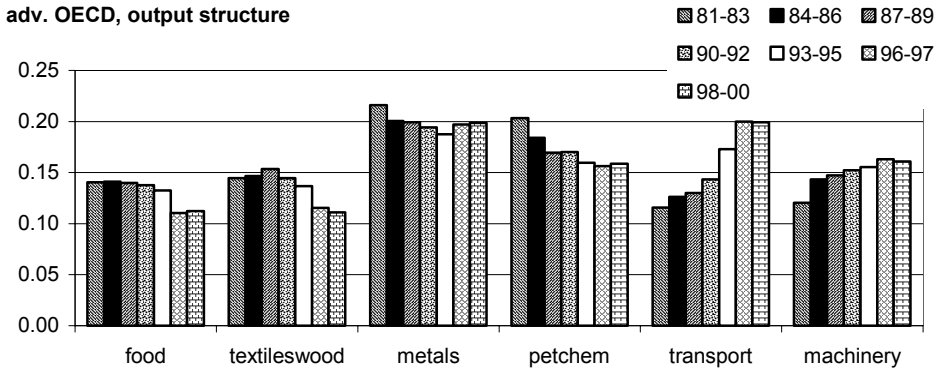
Table A1

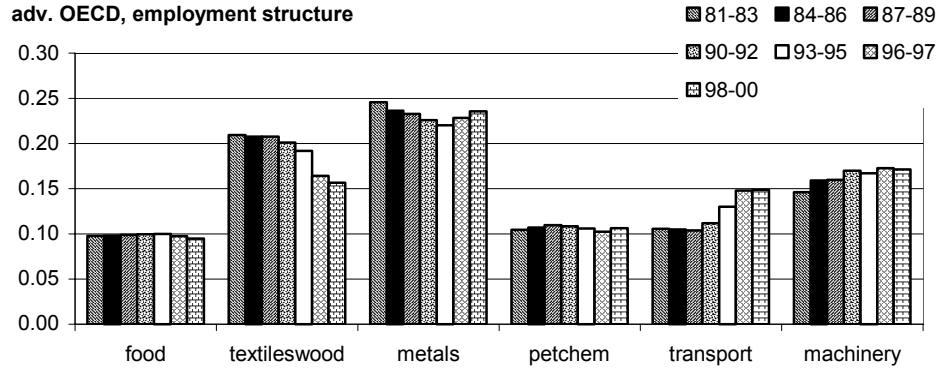
Countries and geographic groupings

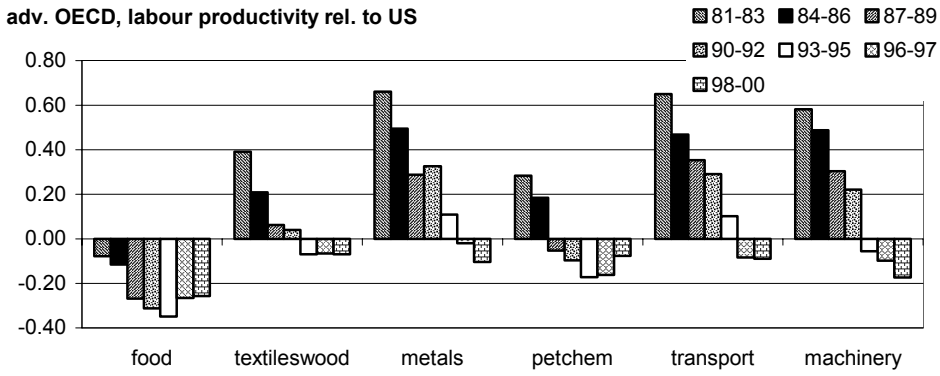
UNIDO code	ISO code	Name	Region	Period covered
36	AUS	Australia	advanced OECD	1981-2000
40	AUT	Austria	advanced OECD	1981-2000
124	CAN	Canada	advanced OECD	1981-2000
208	DNK	Denmark	advanced OECD	1981-2000
246	FIN	Finland	advanced OECD	1981-2000
250	FRA	France	advanced OECD	1981-2000
276	DEU	Germany	advanced OECD	1981-1999
352	ISL	Iceland	advanced OECD	1981-1996
372	IRL	Ireland	advanced OECD	1981-2000
380	ITA	Italy	advanced OECD	1981-2000
392	JPN	Japan	advanced OECD	1981-2000
528	NLD	The Netherlands	advanced OECD	1981-2000
578	NOR	Norway	advanced OECD	1981-2000
752	SWE	Sweden	advanced OECD	1981-2000
756	CHE	Switzerland	advanced OECD	1981-2000
826	GBR	Great Britain	advanced OECD	1981-2000
840	USA	USA	advanced OECD	1981-2000
300	GRC	Greece	catching-up OECD	1981-2000
484	MEX	Mexico	catching-up OECD	1981-2000
554	NZL	New Zealand	catching-up OECD	1981-2000
620	PRT	Portugal	catching-up OECD	1981-2000
724	ESP	Spain	catching-up OECD	1981-2000
792	TUR	Turkey	catching-up OECD	1981-2000
158	TWN	Taiwan	4 Tigers	1981-2000
344	HKG	Hong Kong	4 Tigers	1981-2000
410	KOR	Korea	4 Tigers	1981-2000
702	SGP	Singapore	4 Tigers	1981-2000
356	IND	India	East Asia	1981-2000
360	IDN	Indonesia	East Asia	1981-2000
458	MYS	Malaysia	East Asia	1981-2000
608	PHL	Philippines	East Asia	1981-1998
764	THA	Thailand	East Asia	1981-2000
191	HRV	Croatia	CEEC	1993-2002
203	CZE	Czech Rep.	CEEC	1993-2002
233	EST	Estonia	CEEC	1993-2002
348	HUN	Hungary	CEEC	1993-2002
428	LVA	Latvia	CEEC	1993-2002
440	LTU	Lithuania	CEEC	1993-2002
616	POL	Poland	CEEC	1993-2002
703	SVK	Slovak Rep.	CEEC	1993-2002
705	SVN	Slovenia	CEEC	1993-2002

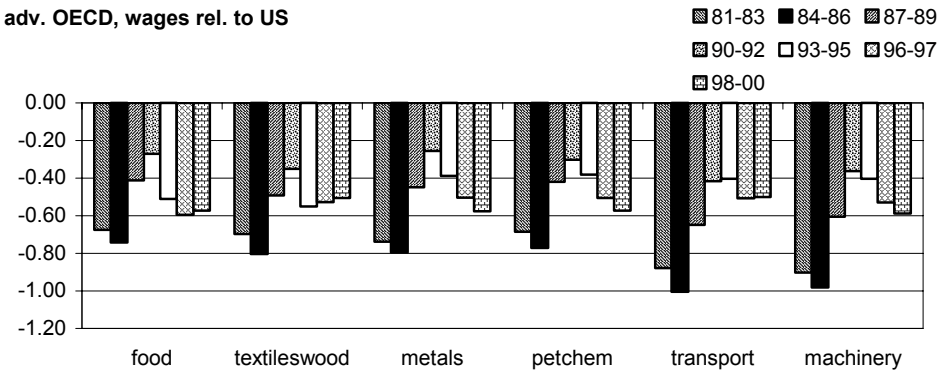
Figure A1

Industrial structure in advanced OECD countries, 1981-2000









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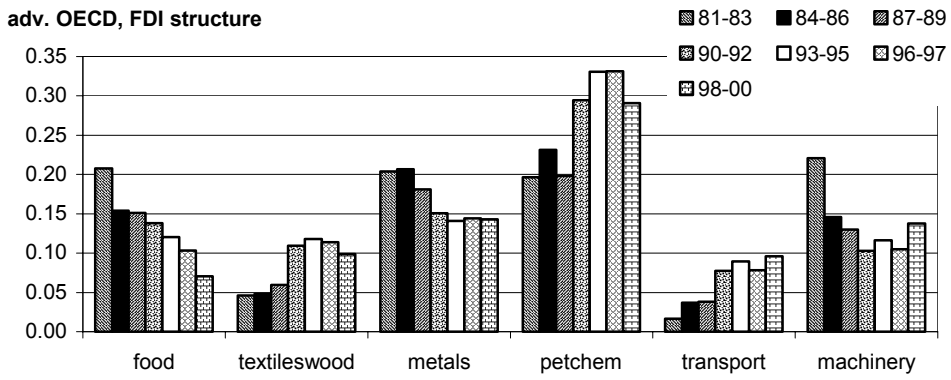
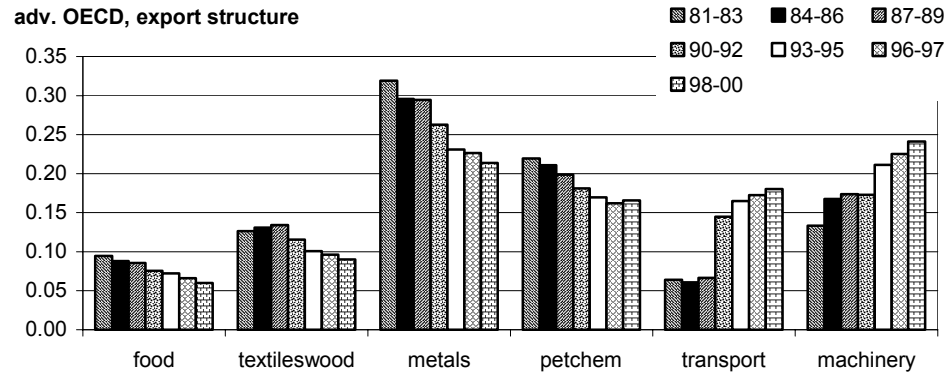
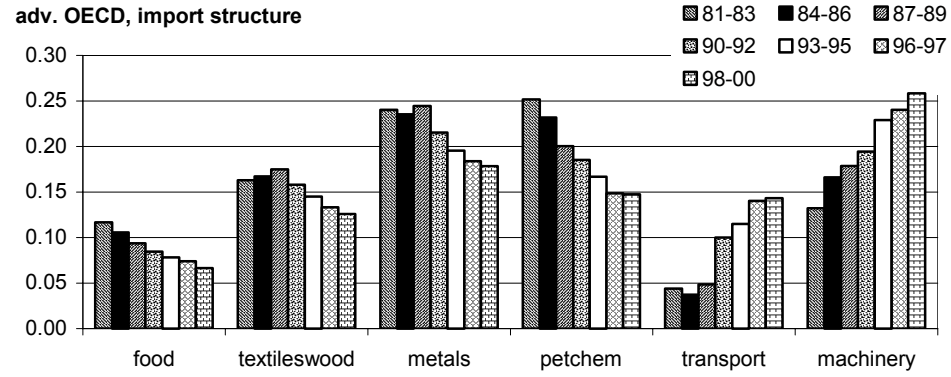






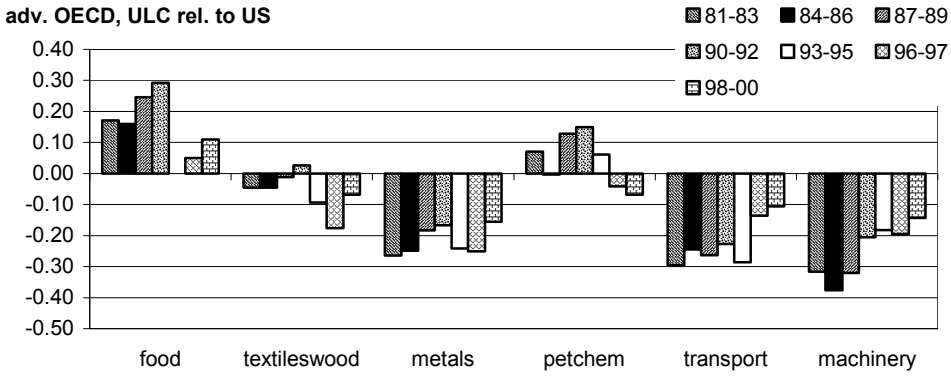
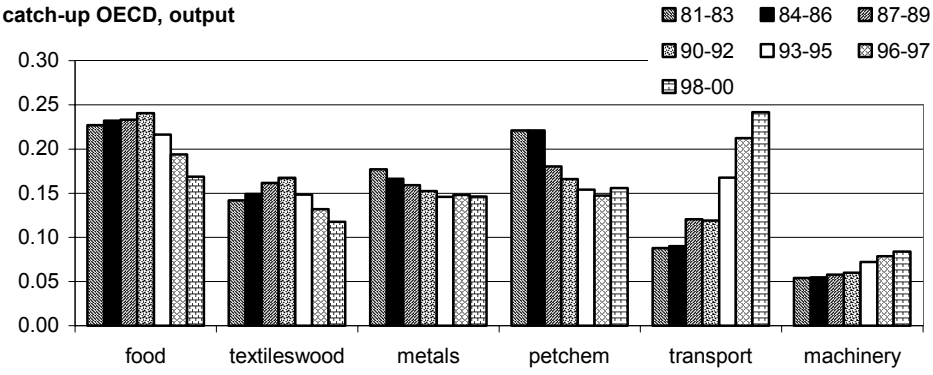
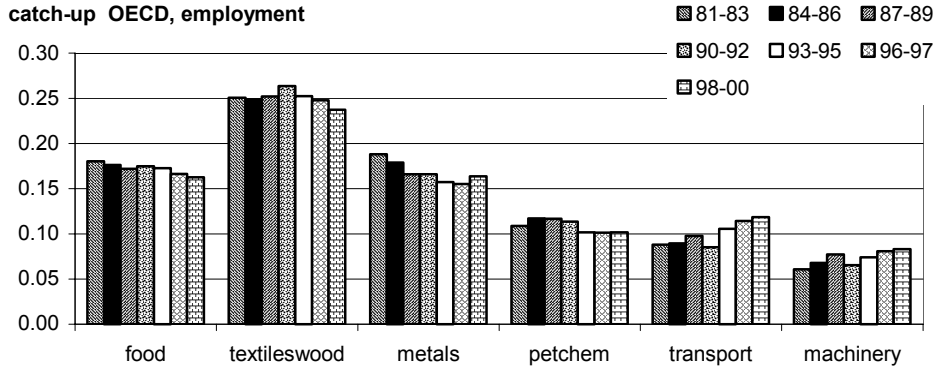
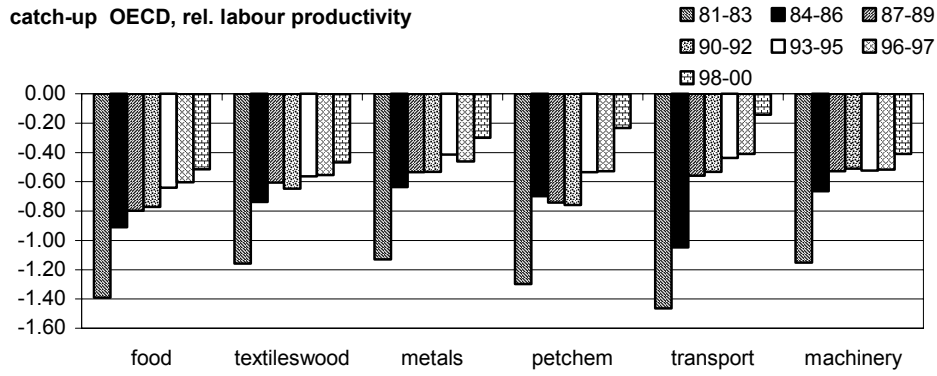


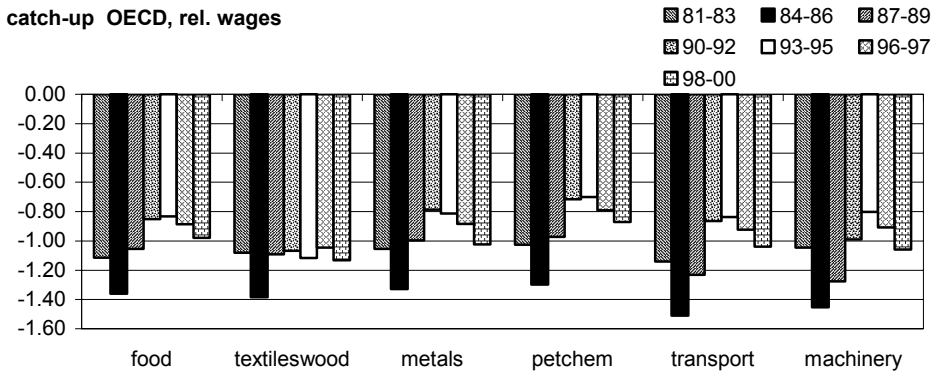
Figure A2

Industrial structure in catching-up OECD countries, 1981-2000









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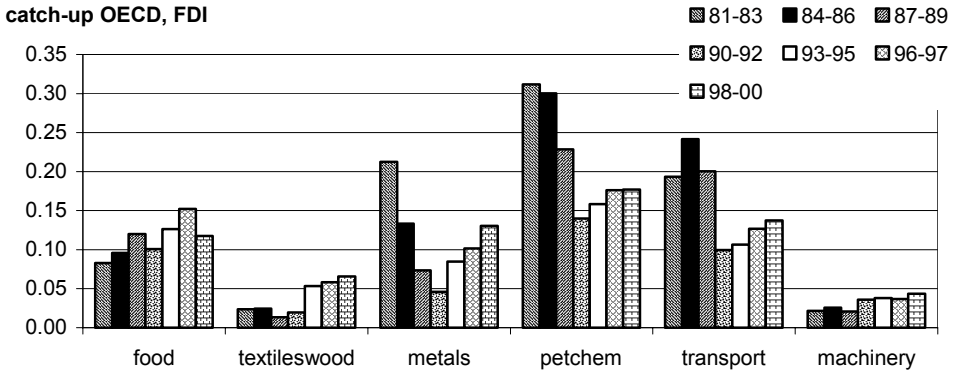
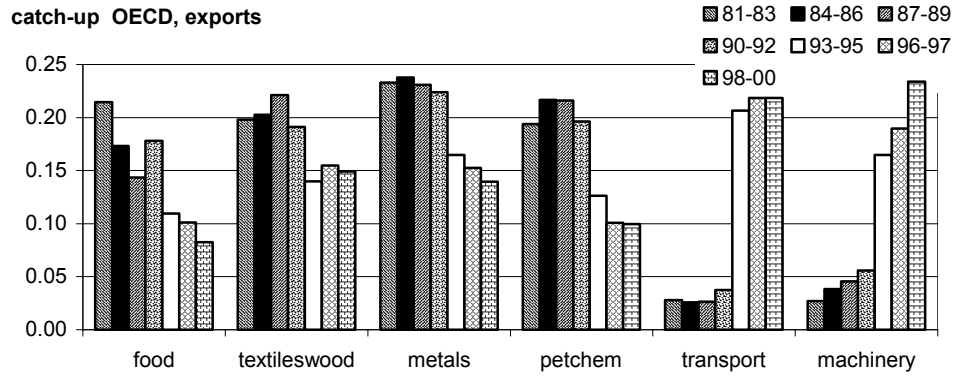
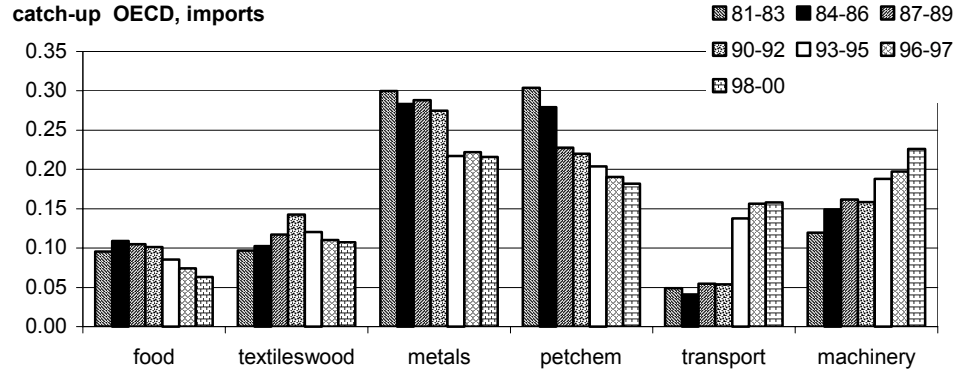






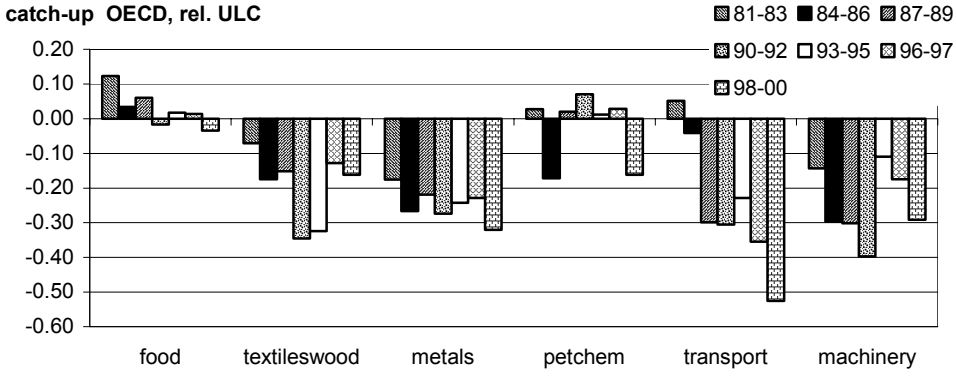
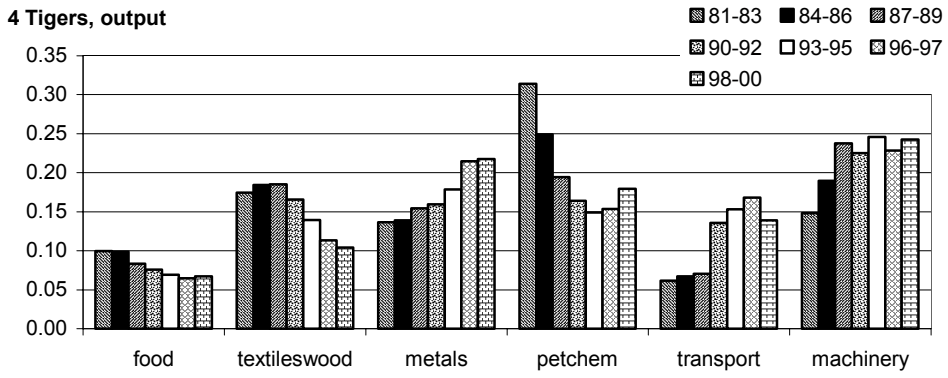
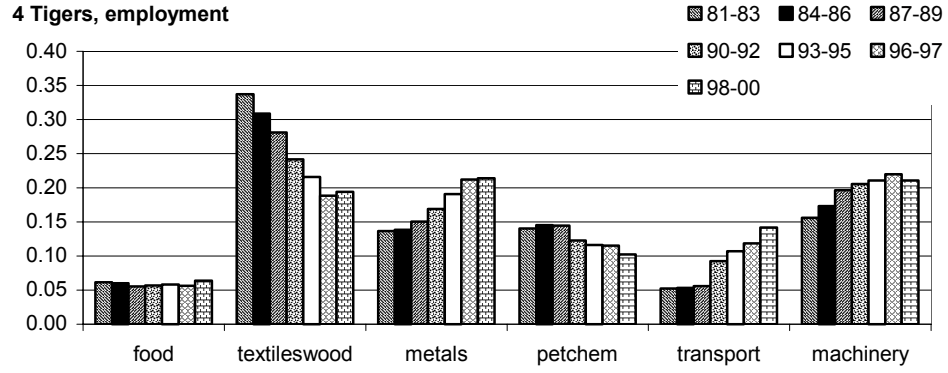
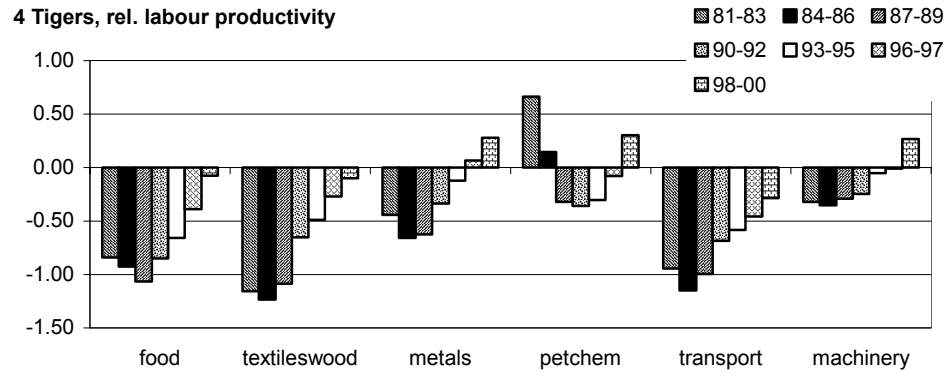


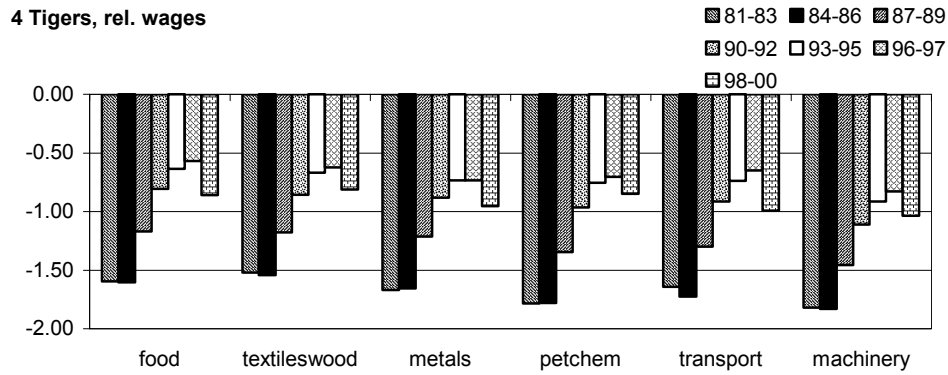
Figure A3

Industrial structure in the four Asian Tigers, 1981-2000









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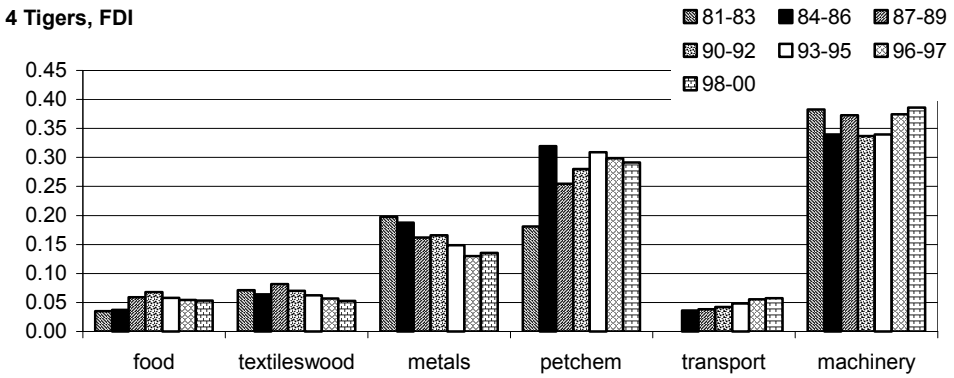
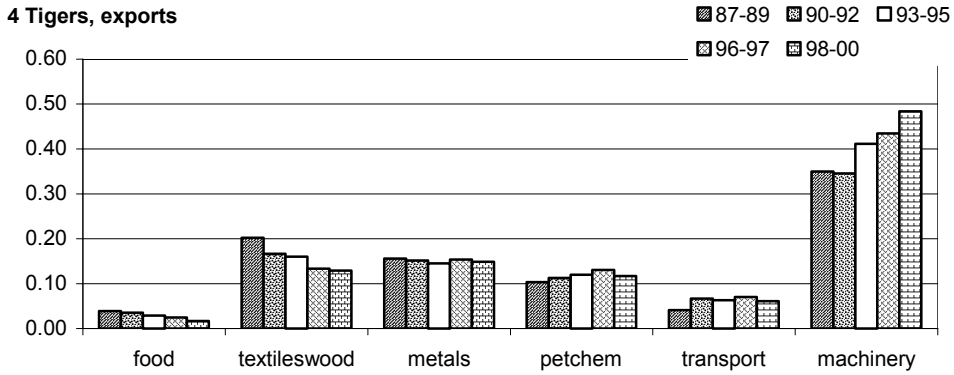
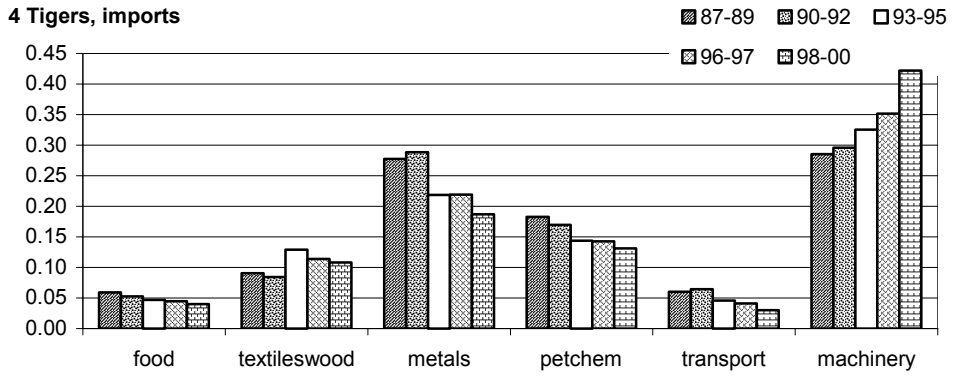






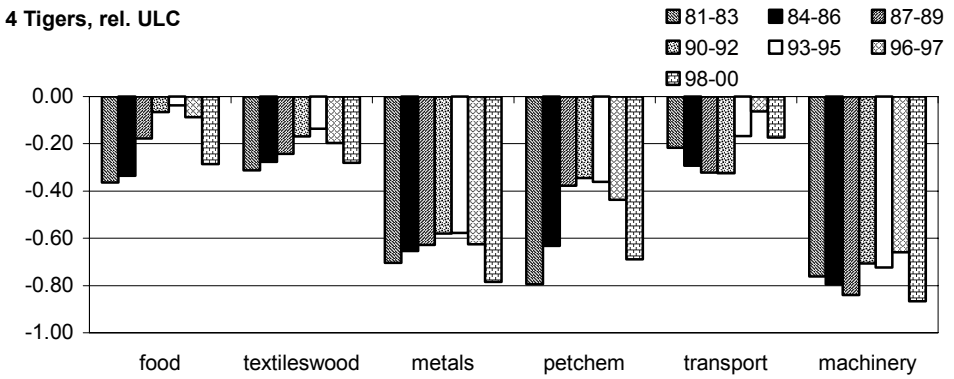
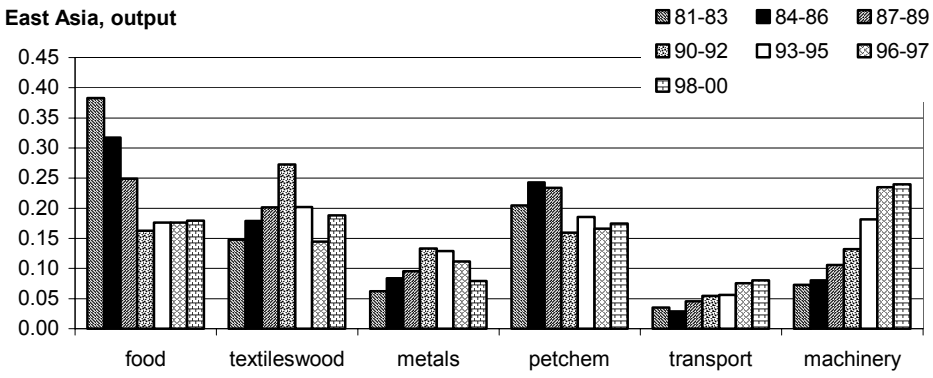
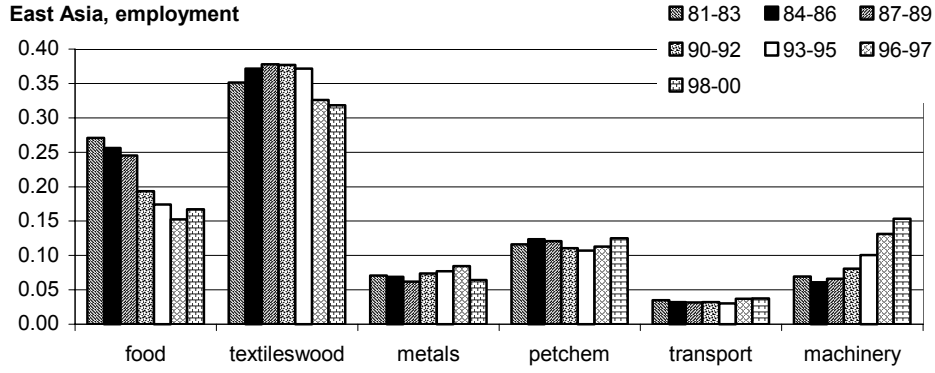
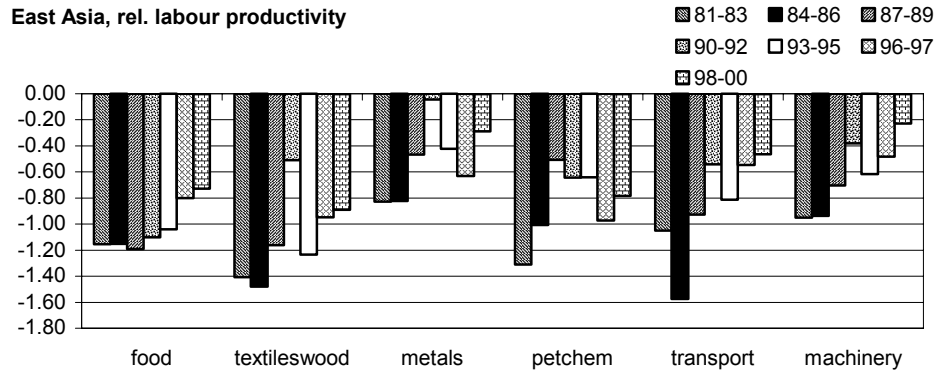


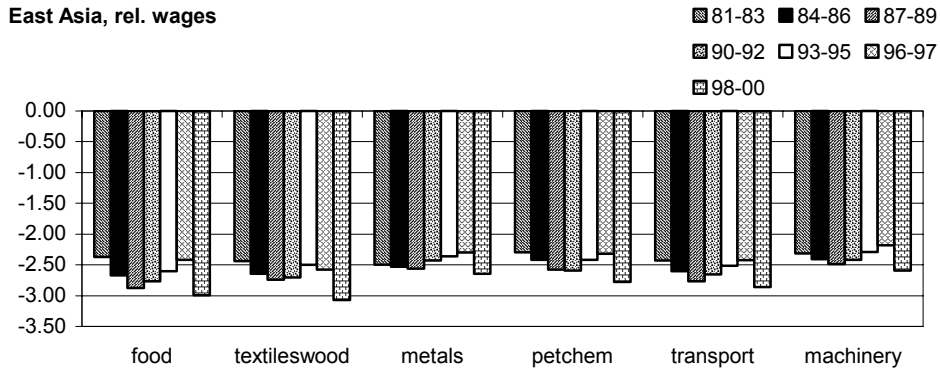
Figure A4

Industrial structure in East Asia, 1981-2000









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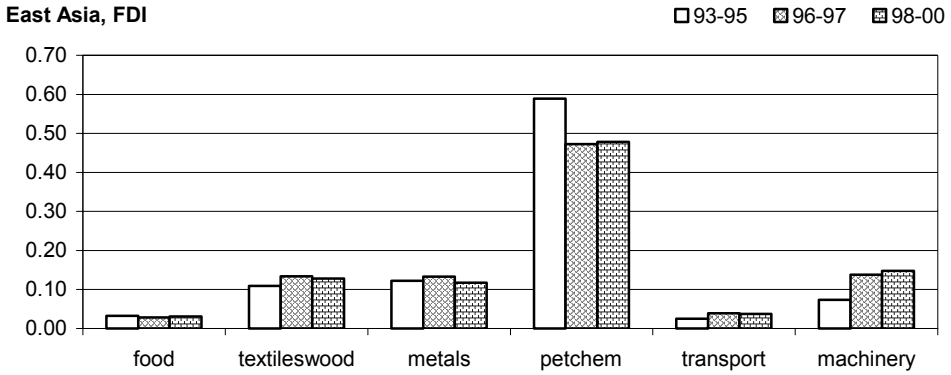
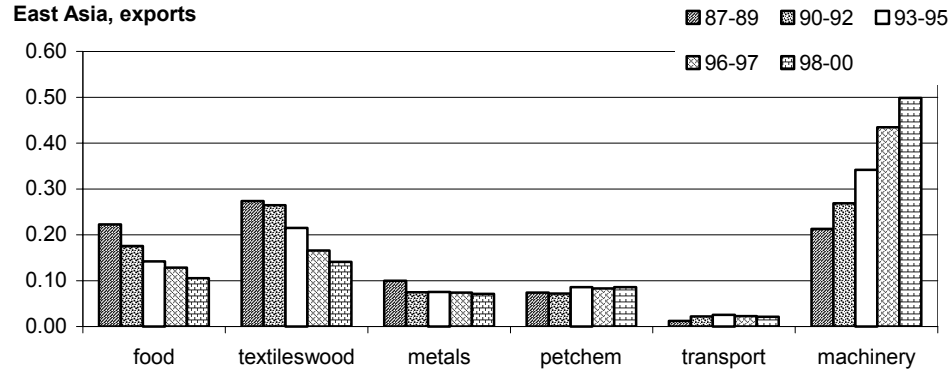
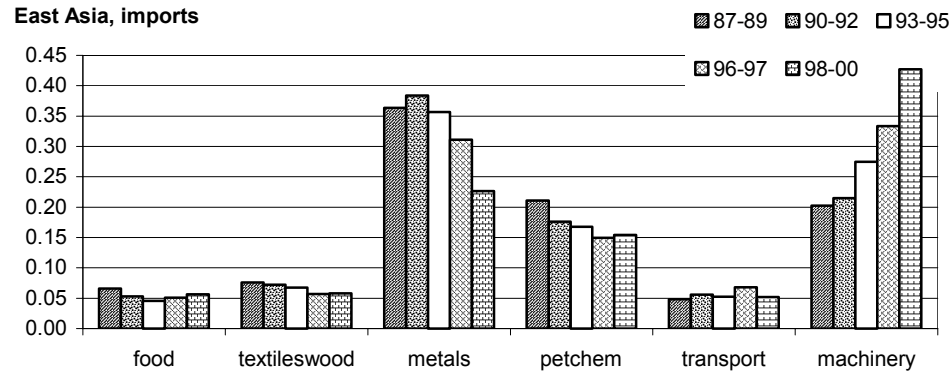






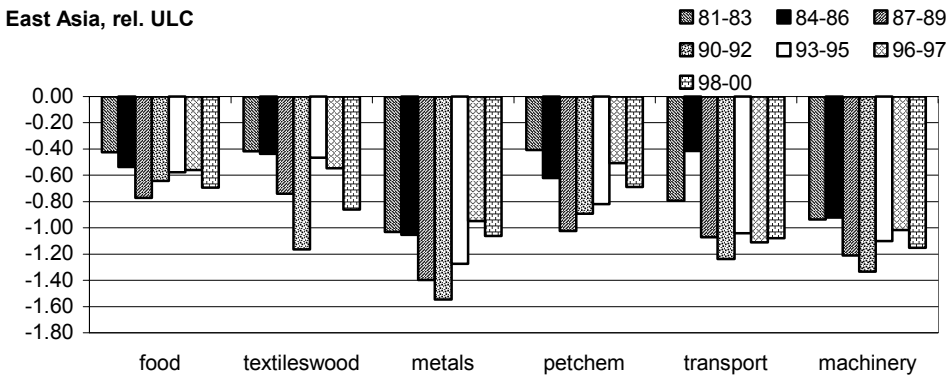
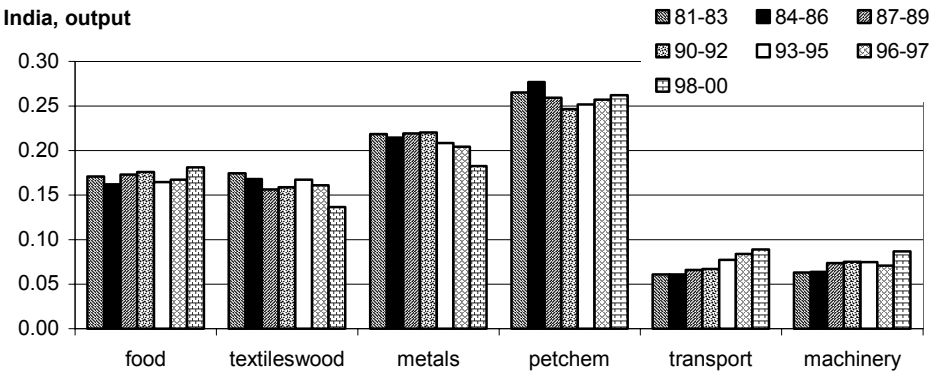
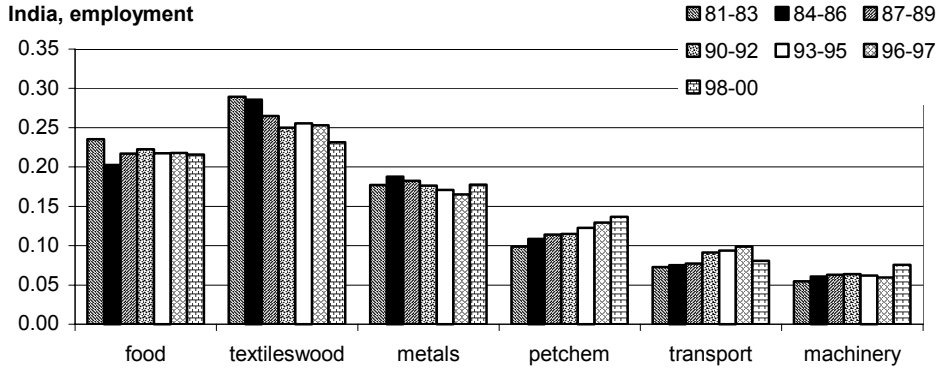
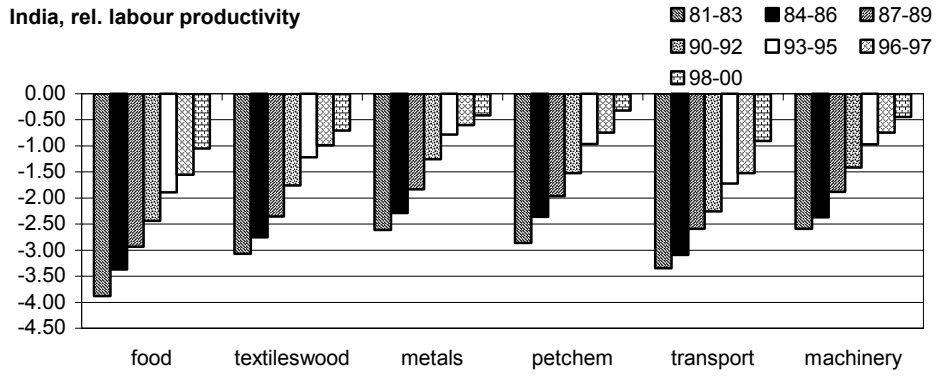


Figure A5

Industrial structure in India, 1981-2000







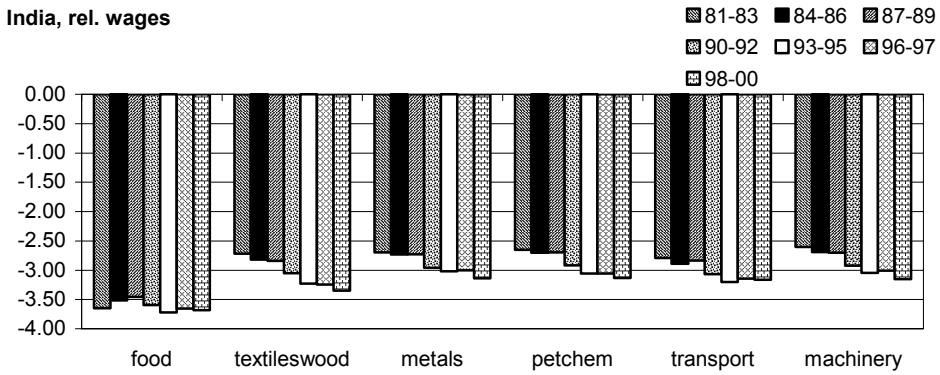


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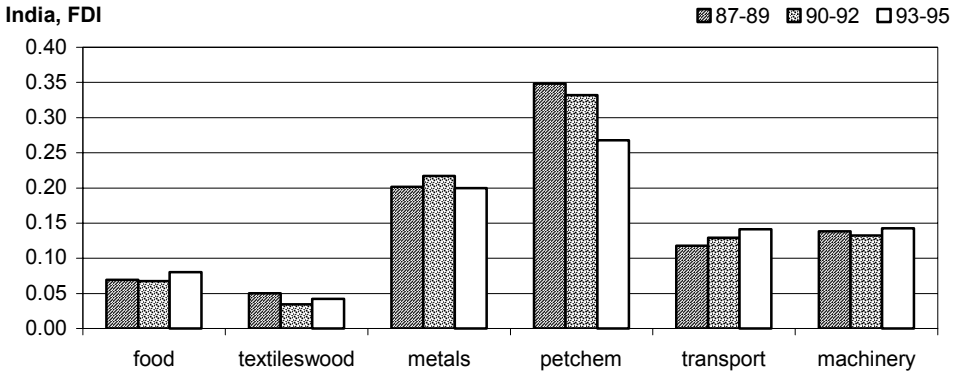
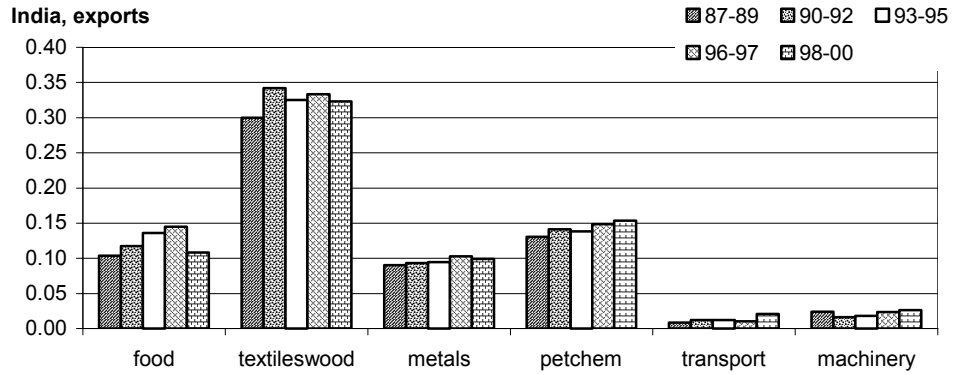
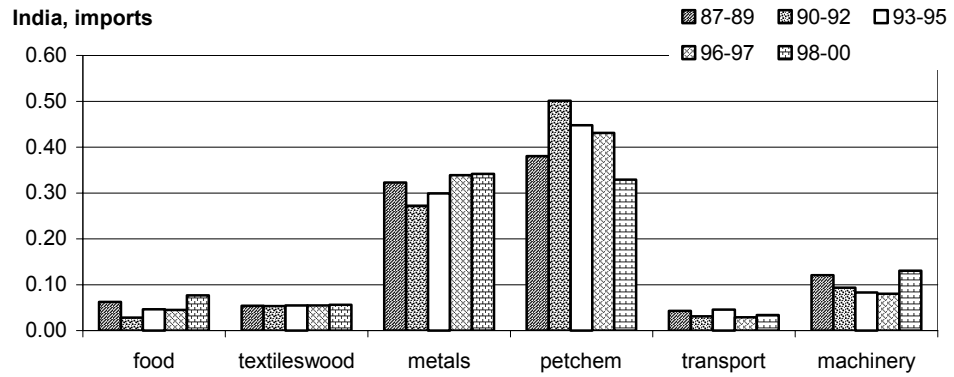
Figure A5 (contd.)







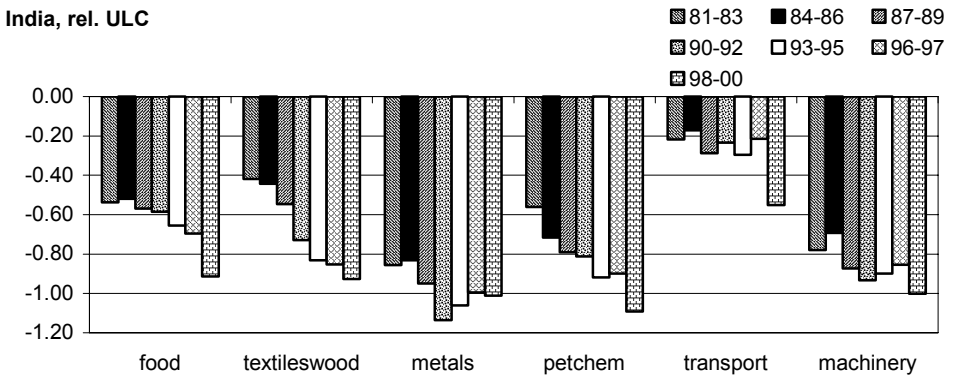
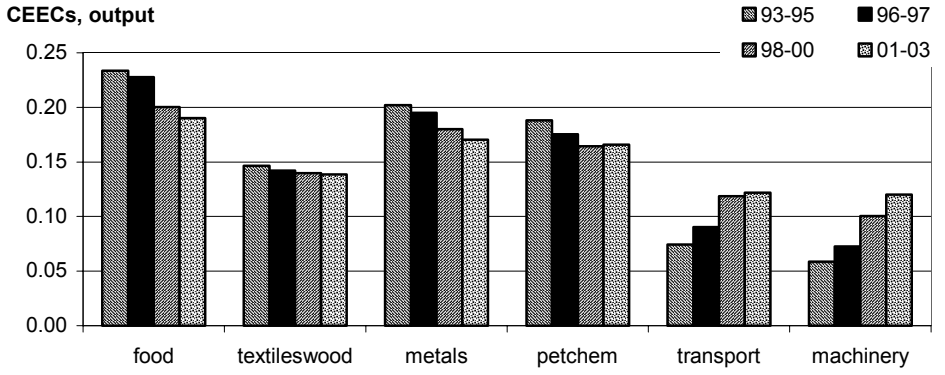
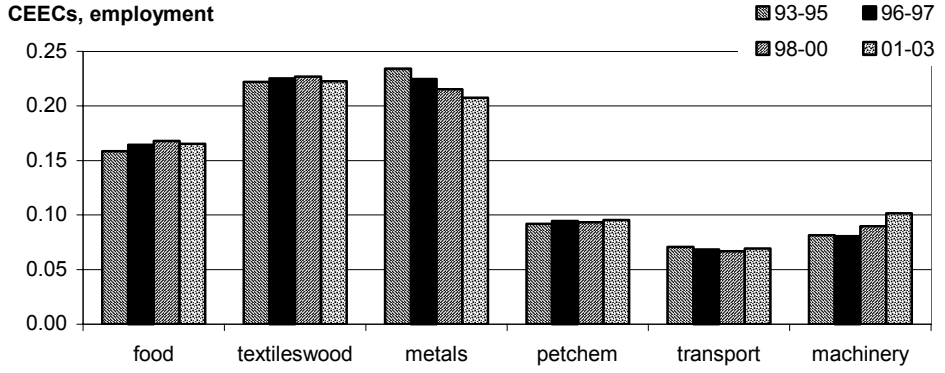
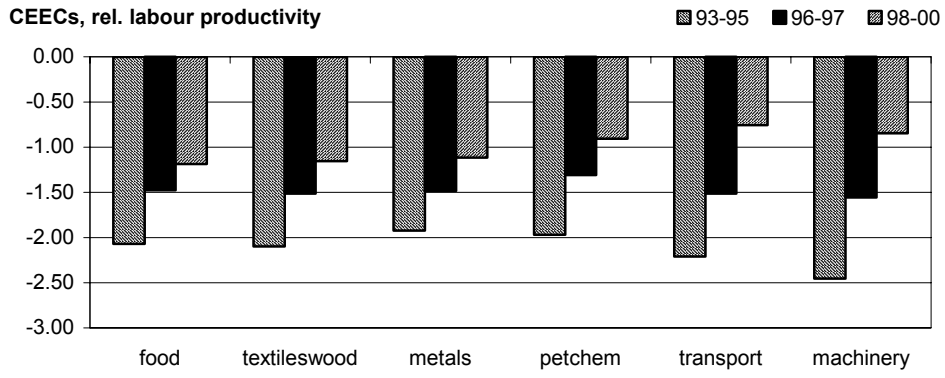


Figure A6

Industrial structure in CEECs, 1993-2000







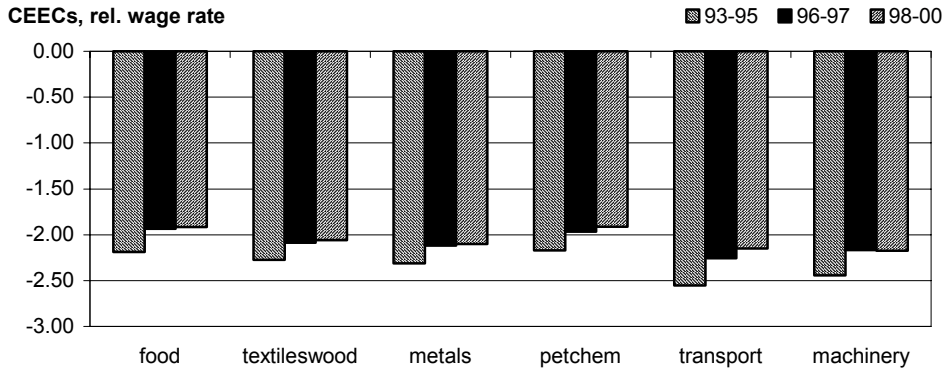


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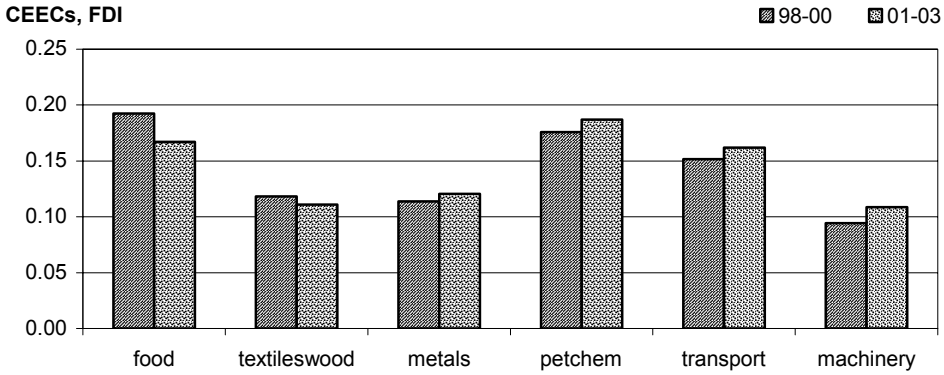
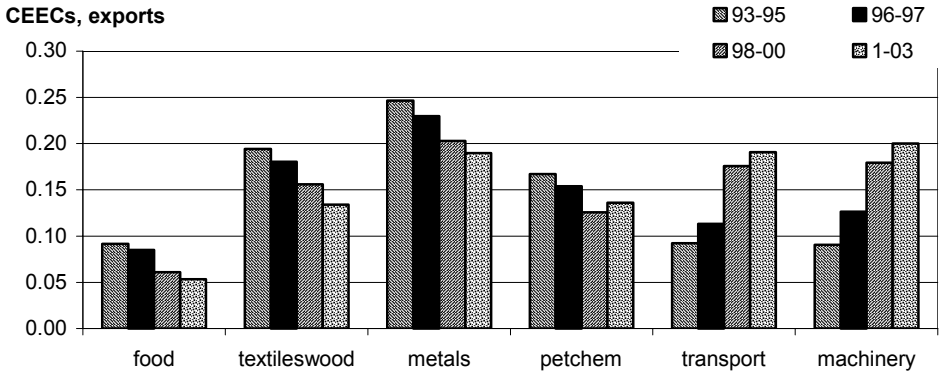
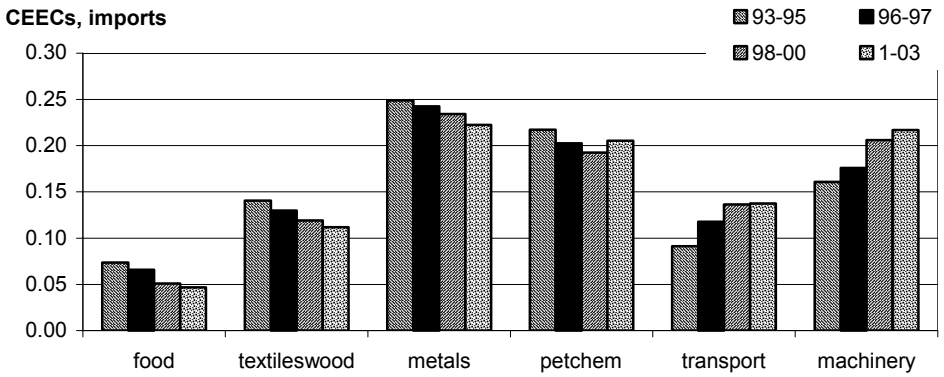
Figure A6 (contd.)







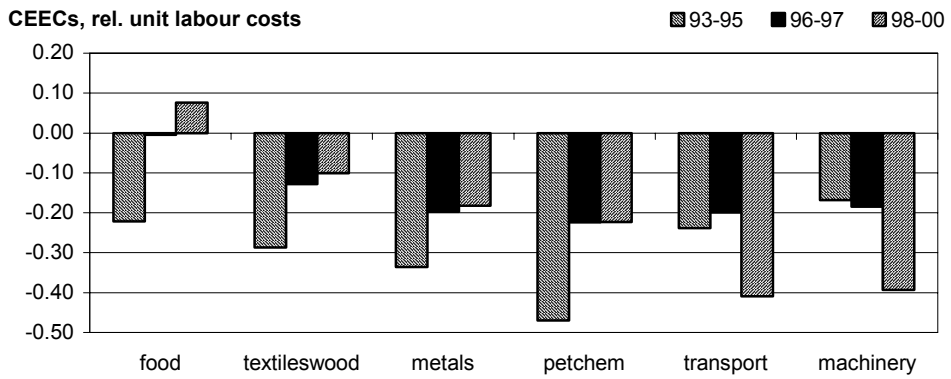


Figure A7

Industrial specialization patterns in advanced OECD countries, 1981-2000

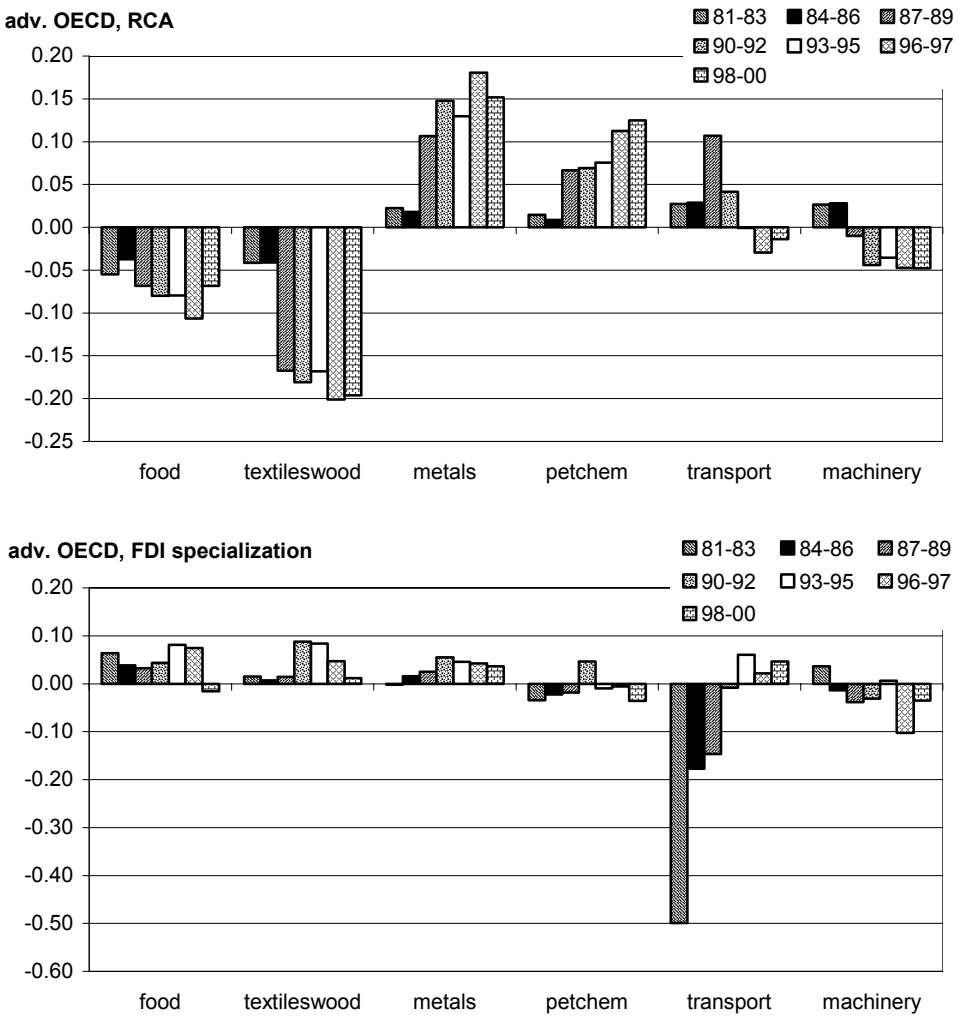


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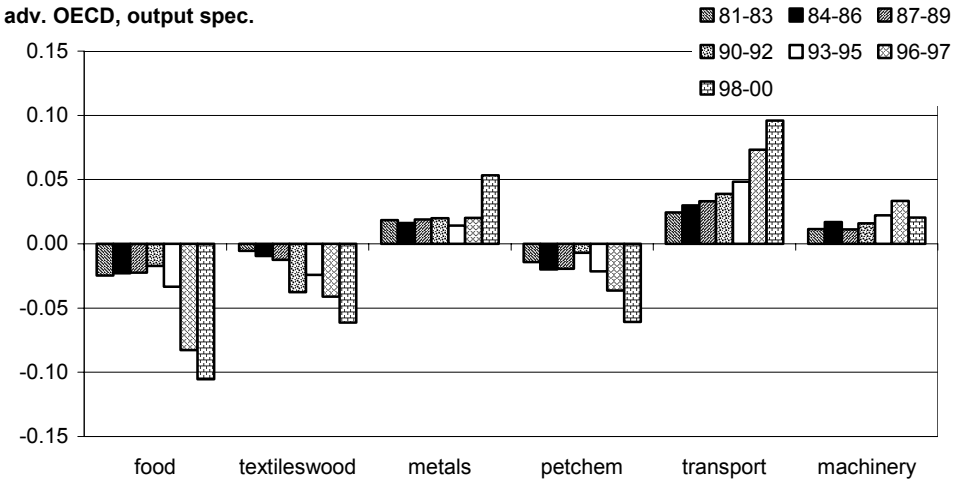
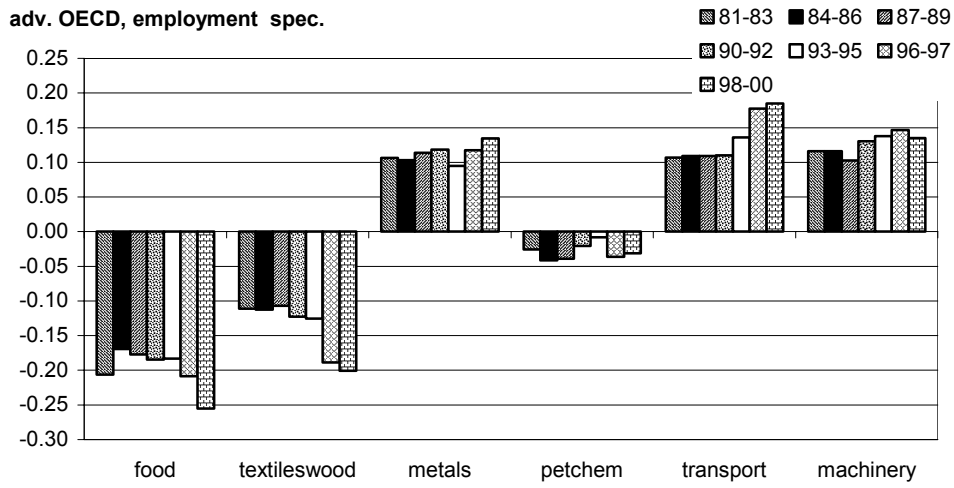
Figure A7 (contd.)





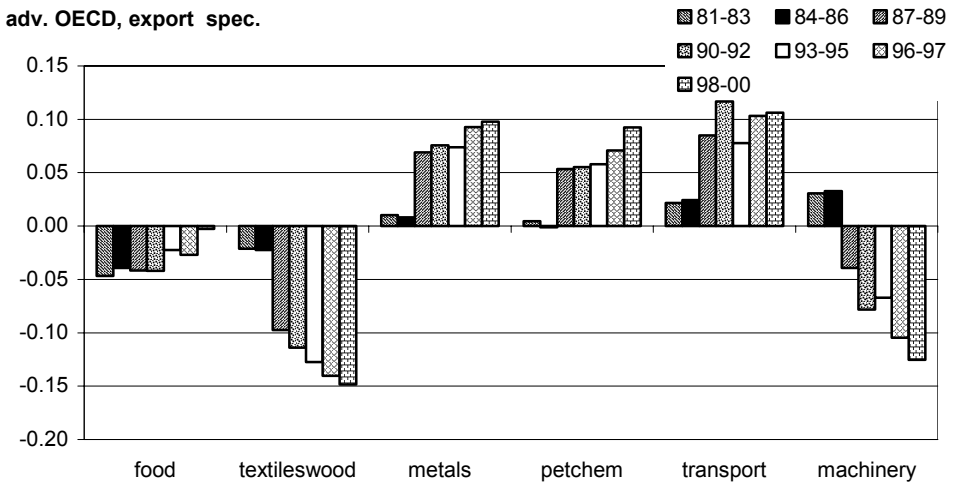


Figure A8

Industrial specialization patterns in catching-up OECD countries, 1981-2000

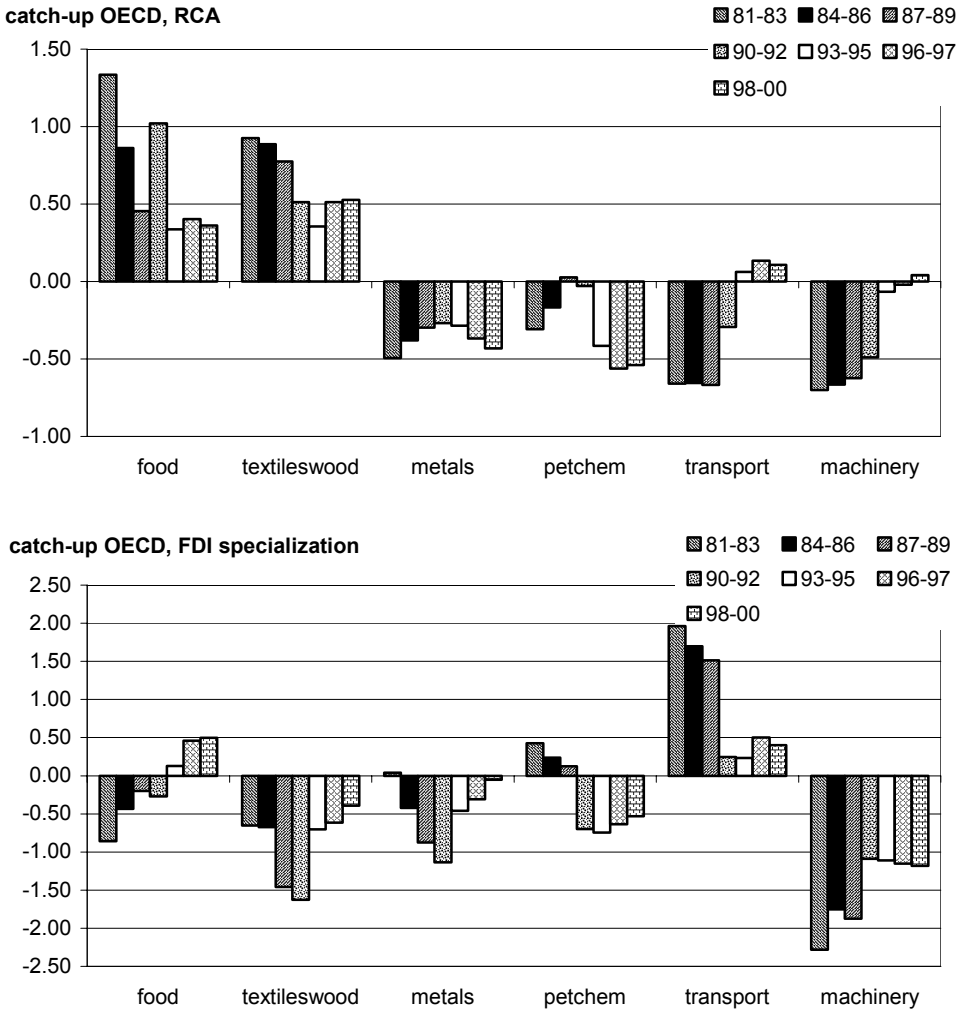


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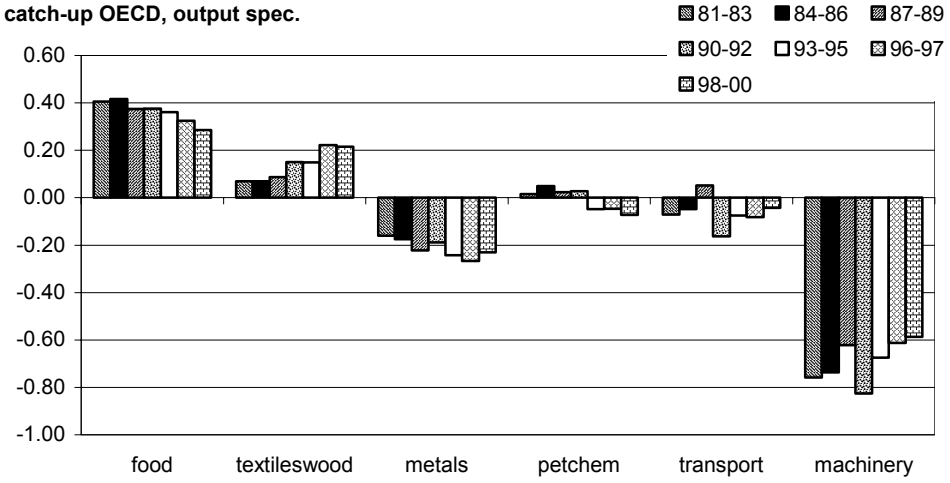
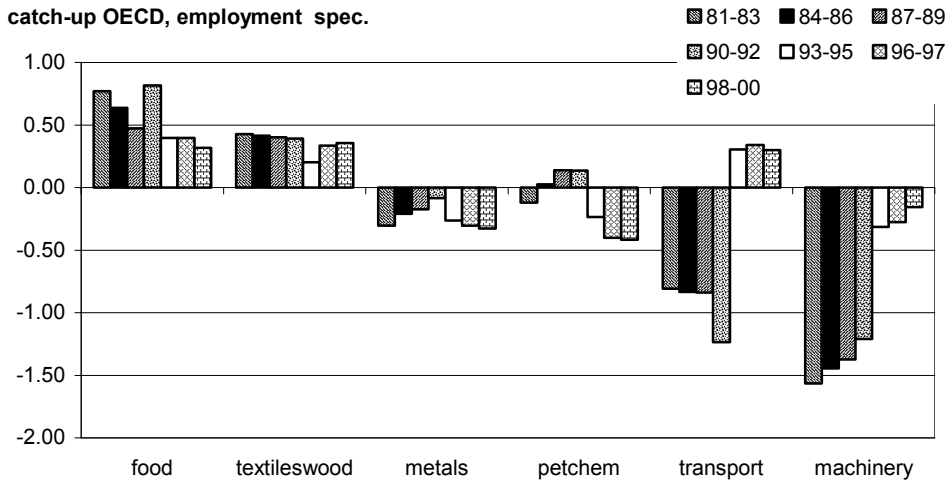
Figure A8 (contd.)





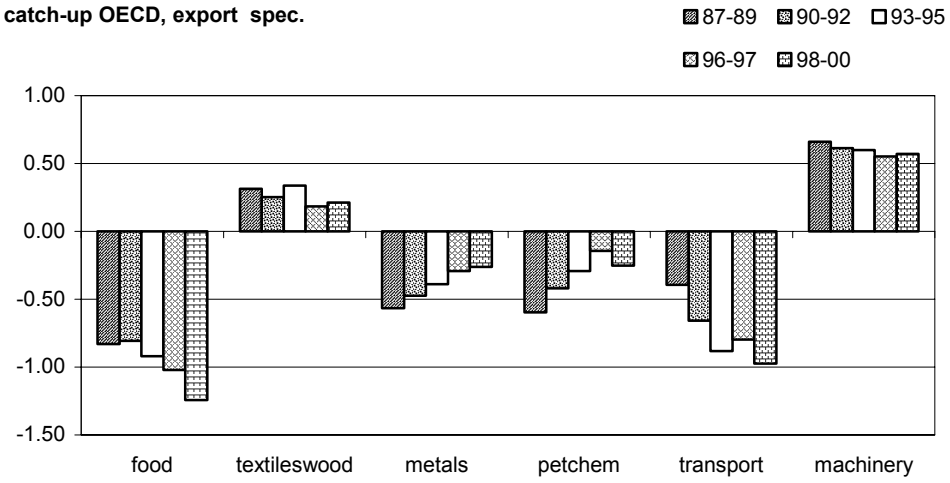


Figure A9

Industrial specialization patterns in the four Asian Tigers, 1981-2000

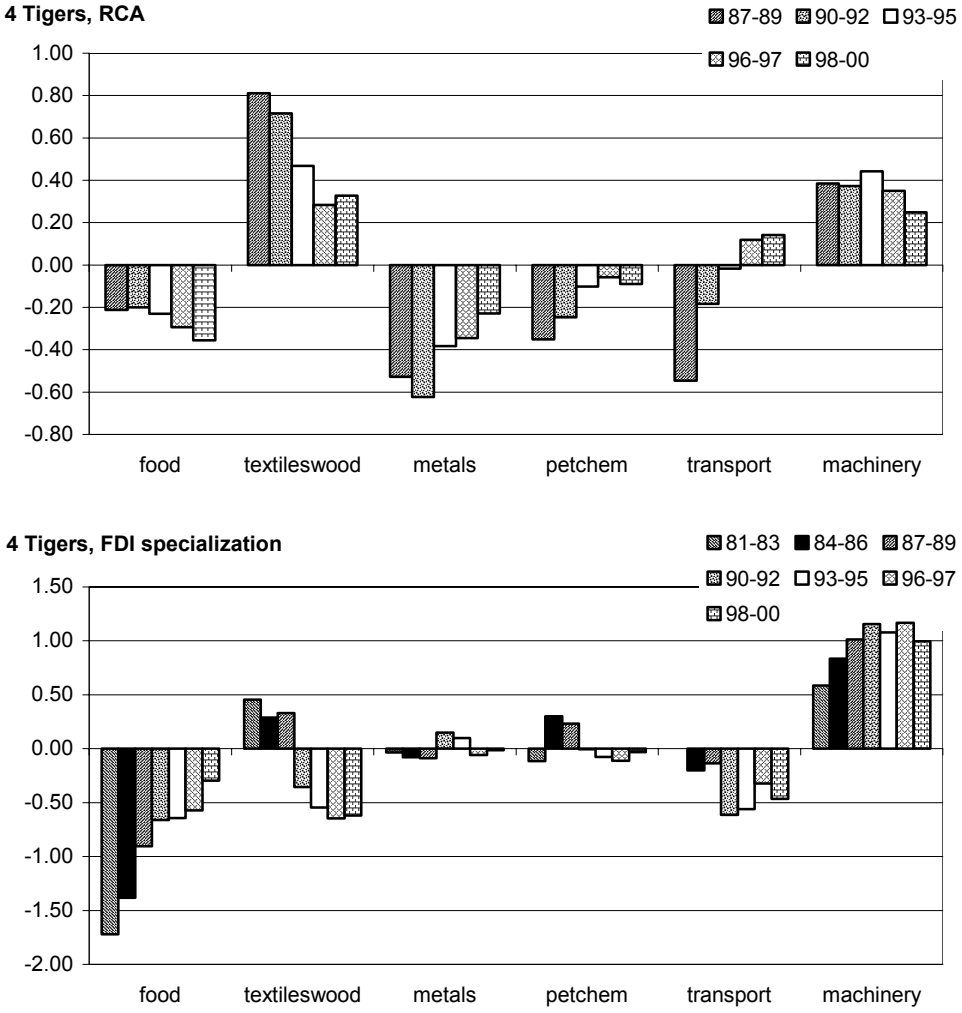


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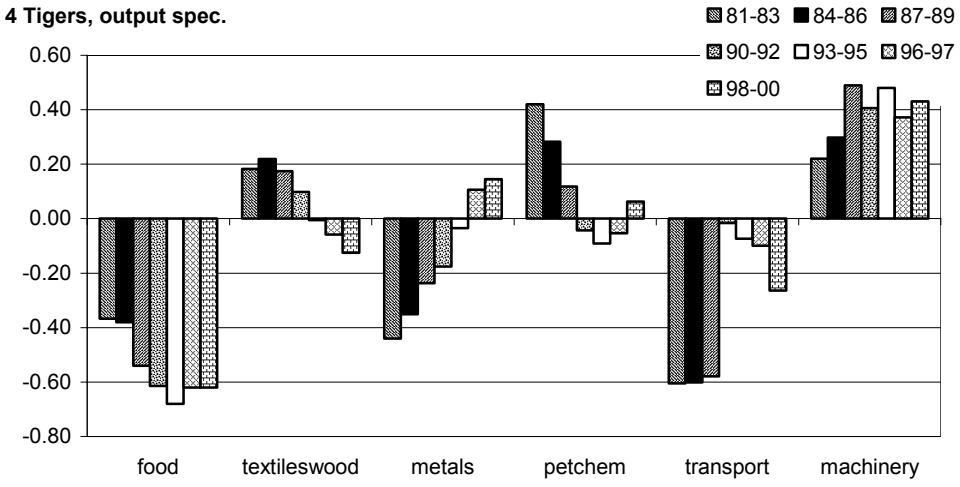
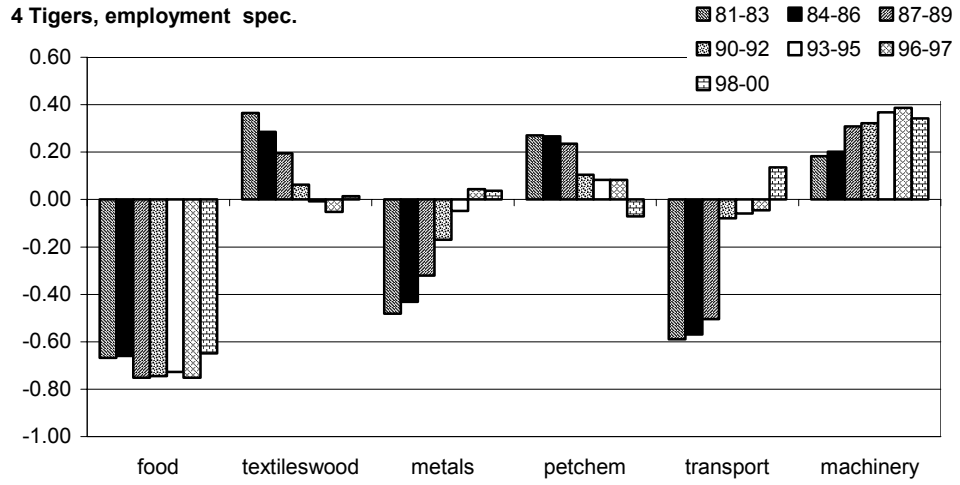
Figure A9 (contd.)





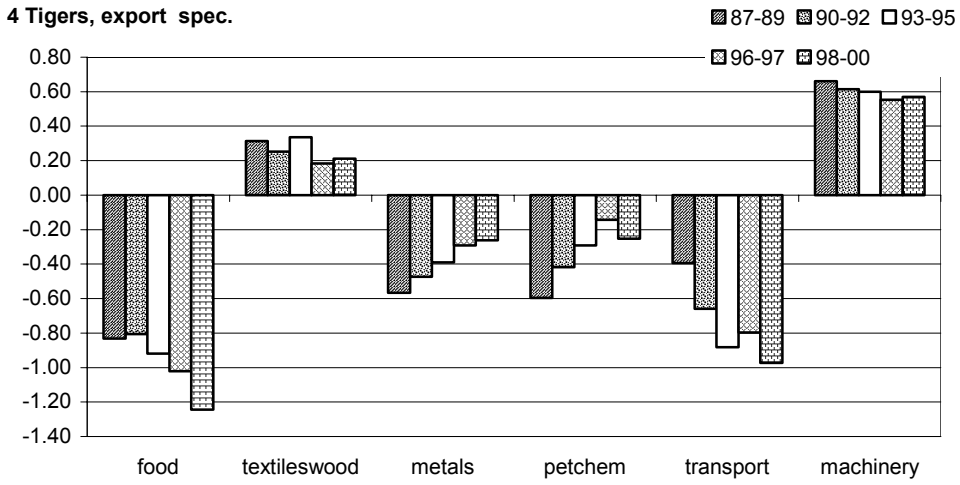


Figure A10

Industrial specialization patterns in East Asia, 1981-2000

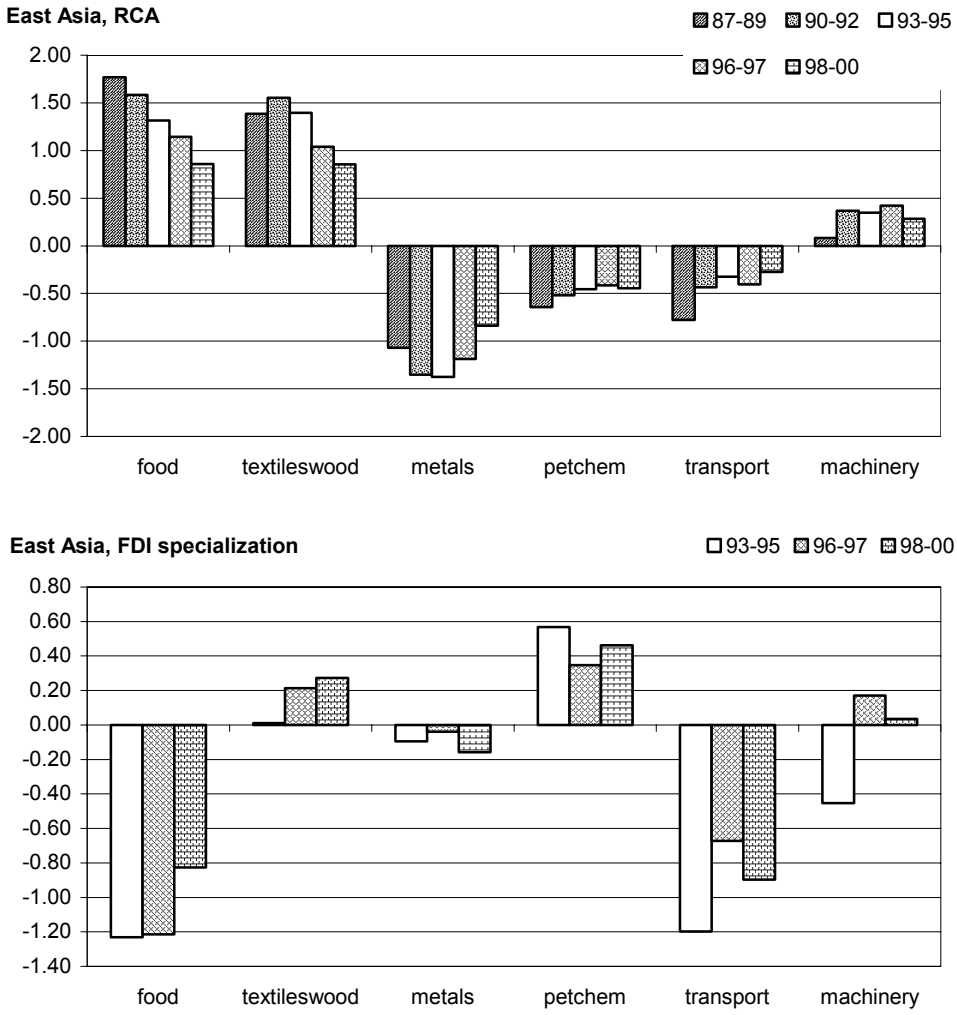


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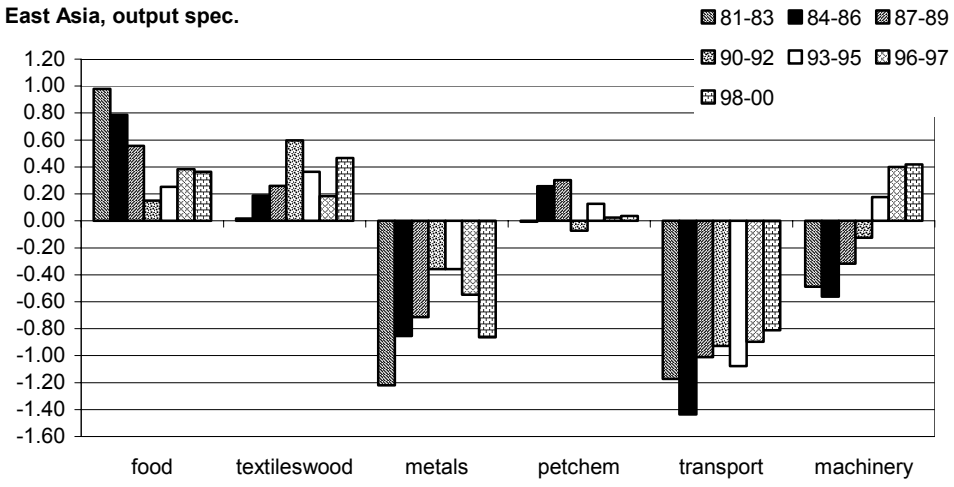
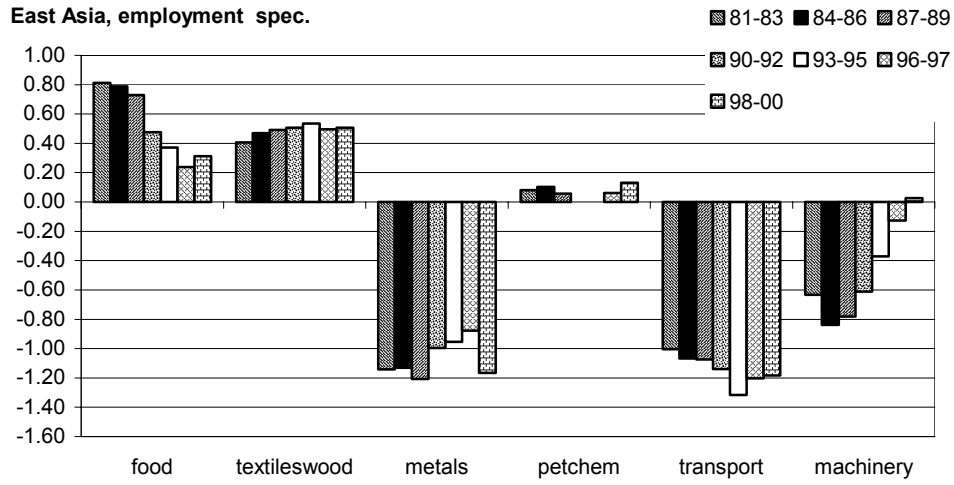
Figure A10 (contd.)





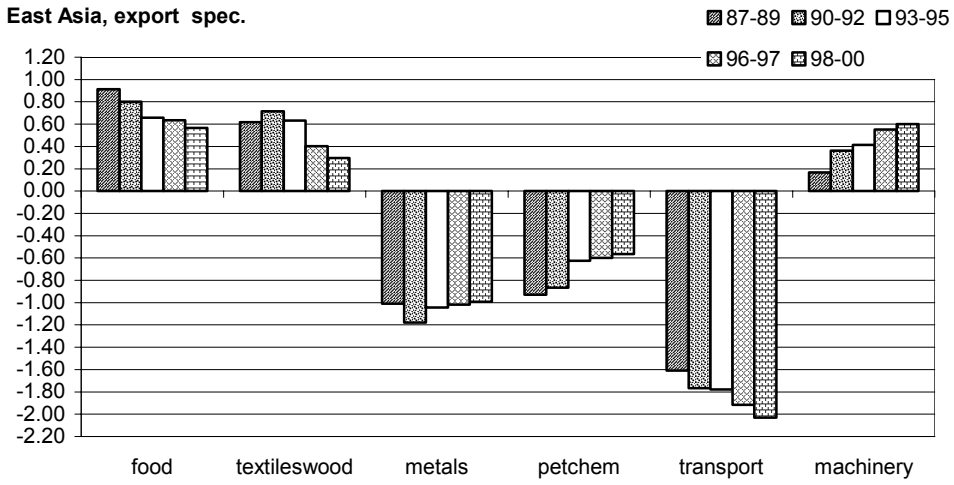


Figure A11

Industrial specialization patterns in India, 1981-2000

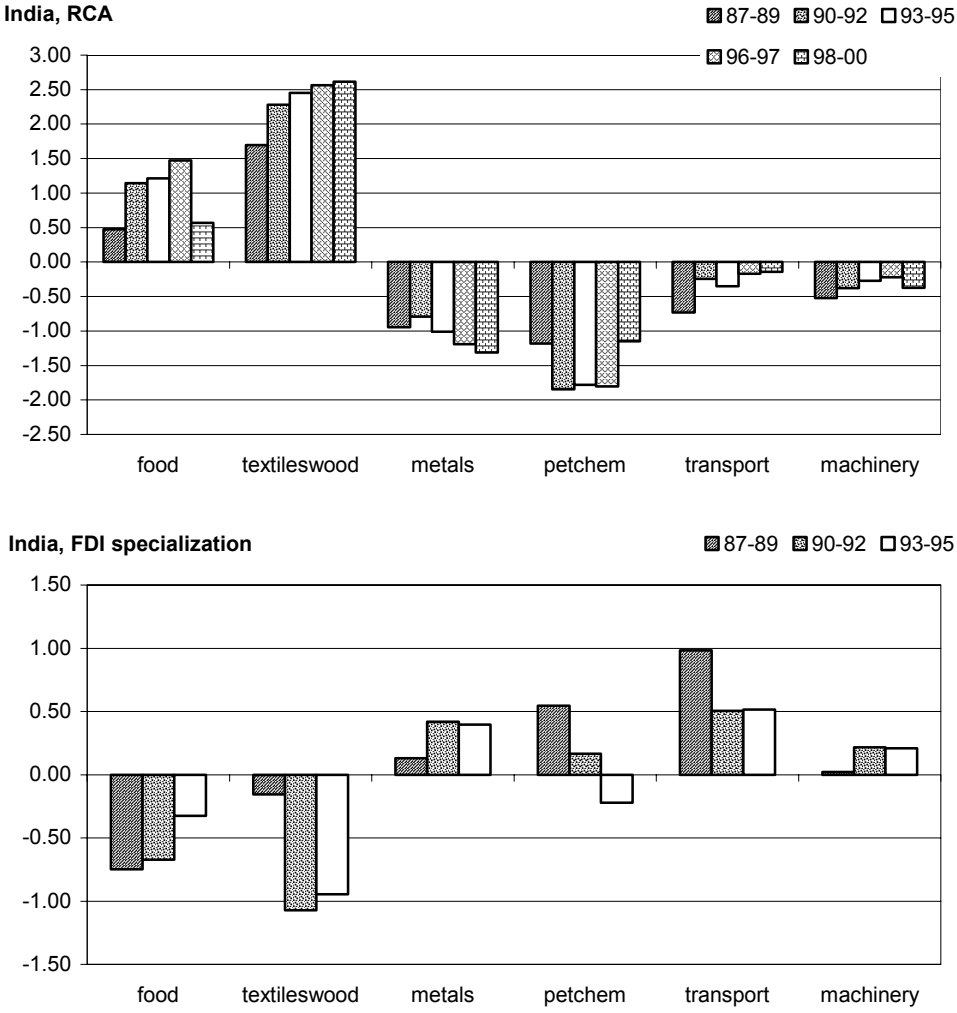


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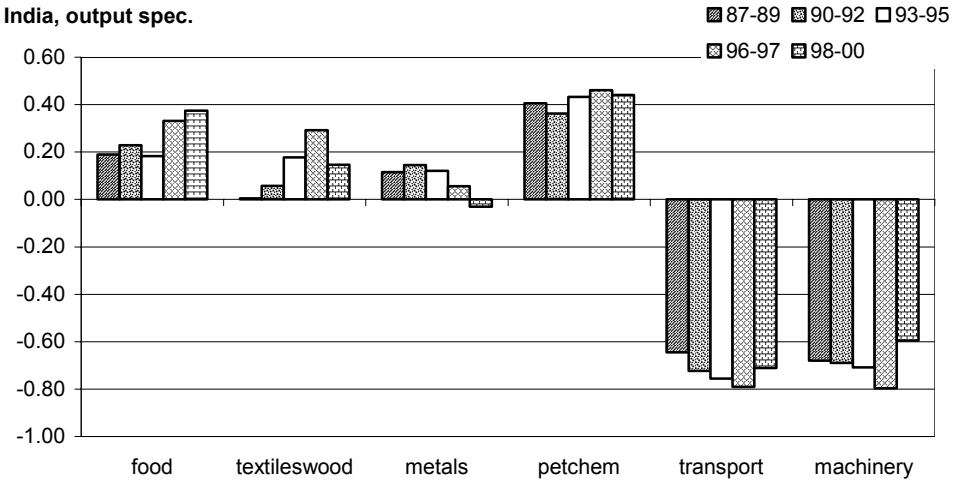
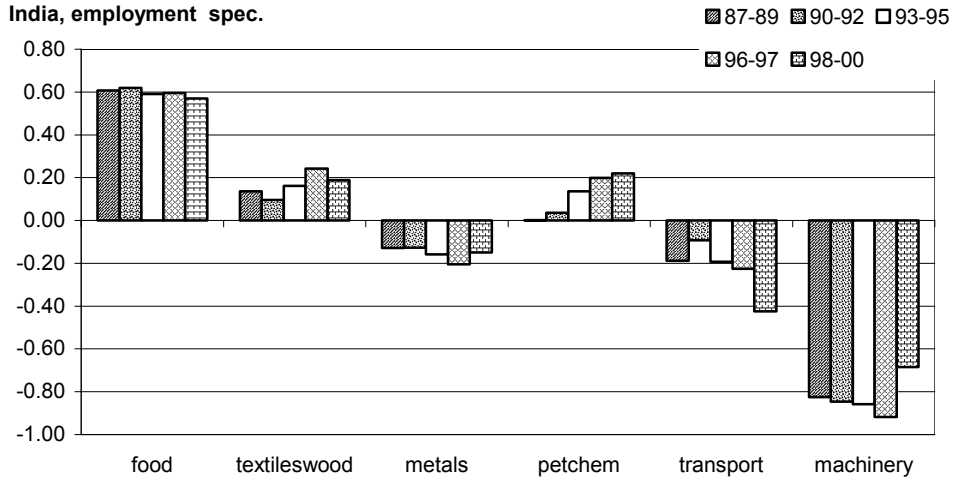
Figure A11 (contd.)





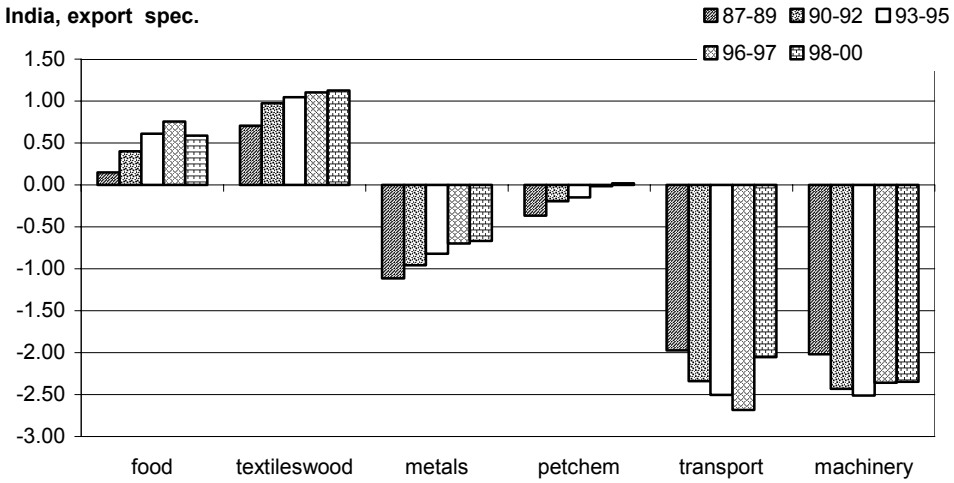


Figure A12

Industrial specialization patterns in CEECs, 1993-2000

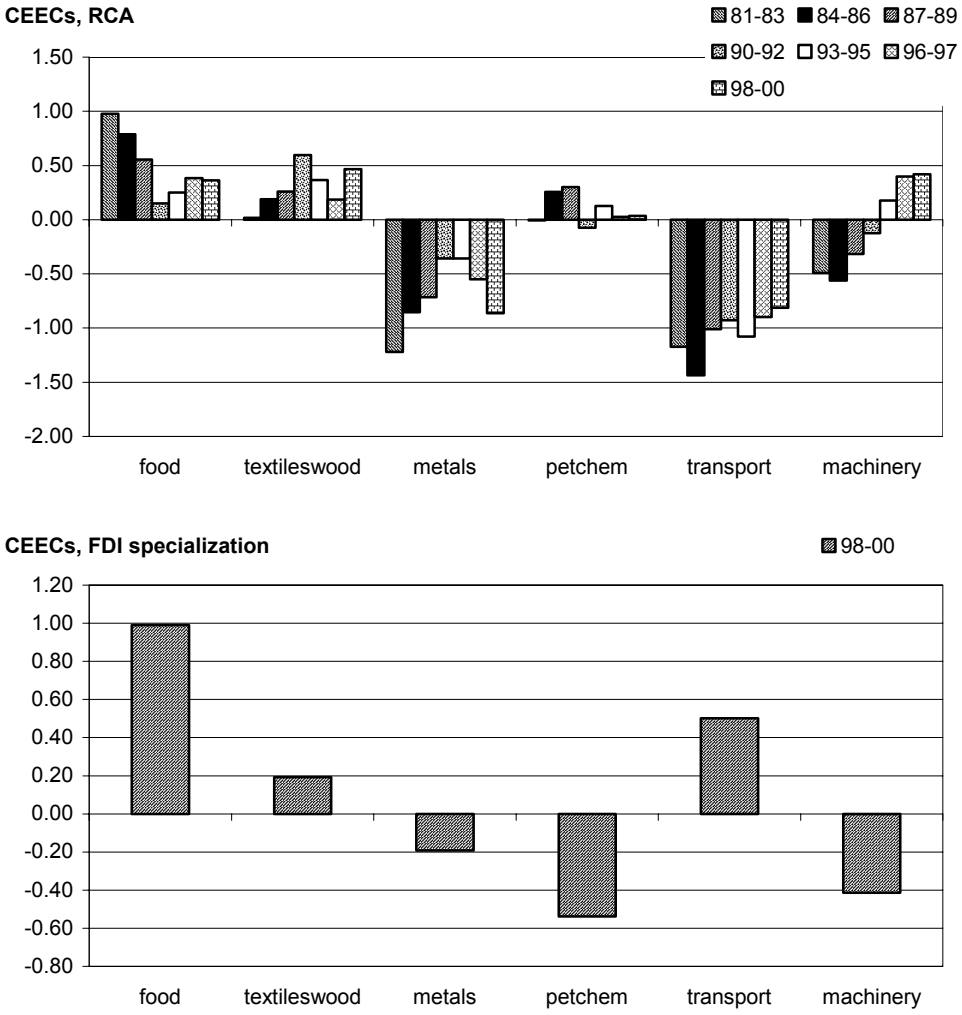


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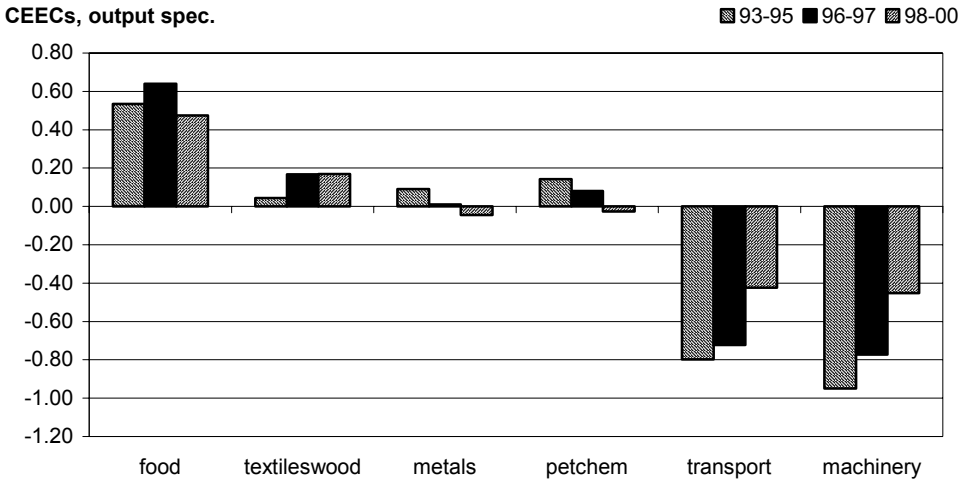
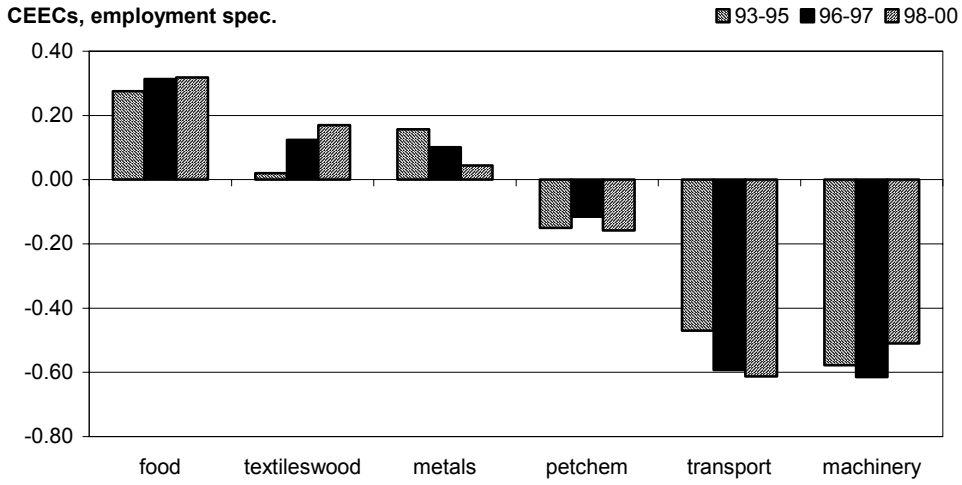
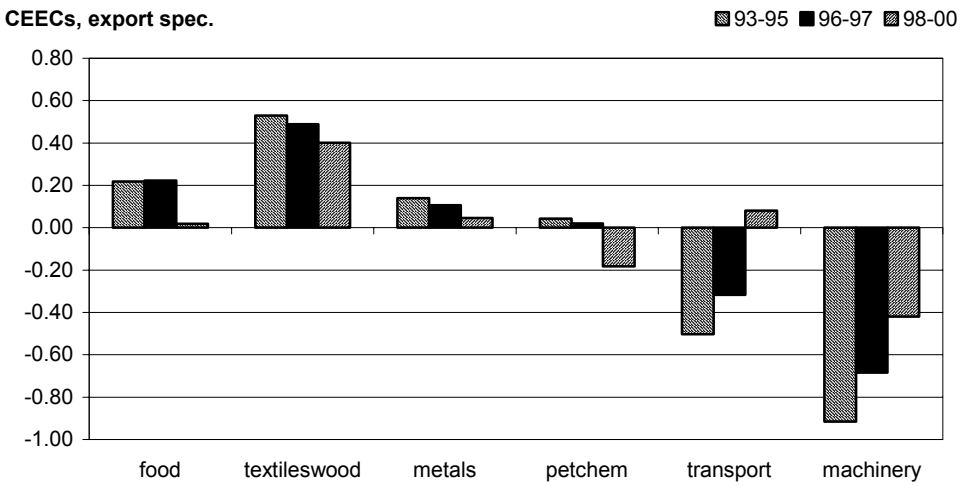
Figure A12 (contd.)







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