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for Germany and Italy

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A TALE OF TWO BAZAAR ECONOMIES:
AN INPUT-OUTPUT ANALYSIS FOR GERMANY AND ITALY

by Emanuele Breda * and Rita Cappariello *

Abstract

This paper evaluates the extent of internationalisation of production between 1995 and 2006 for Italy and Germany. The analysis is based on a large set of indicators of international outsourcing including a new one, the direct and indirect import content of production, which also takes into account the import content of domestic inputs. In 2006 the intensity of international off-shoring was quite similar in the two countries, although slightly higher for Italian firms when only manufacturing was considered. From a dynamic point of view, between 1995 and 2000 the growth in off-shoring was substantial in both economies but stronger in Germany, which at least in manufacturing had started from a lower level. During the first years of the past decade the off-shoring intensity of the two economies stagnated, but in the last period under study (2004-06) their growth resumed at a fast pace, especially in Italy. This seems to suggest a change in strategies and a reorganisation of production in Italian firms. The new challenges posed by globalisation, by the diffusion of information and communication technologies, and by the adoption of the euro have induced the most dynamic Italian firms to rethink their organisation, including their degree of vertical specialisation.

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1. Introduction

Starting from the evidence of a sharp decline of domestic value added in manufacturing, in 2003 Sinn used the expression "bazaar economy" to define the role played by international fragmentation of production in the German economy. International relocation of production was, indeed, particularly intense in that country, especially in the second half of the 1990s, just after the integration of the neighbouring Eastern European countries.[1]

In the economic literature and debate there are mixed feelings about internationalisation. Some maintain that it destroys jobs at home and, more generally, weakens the value-added base of domestic production. Others point out that it increases the firms' competitiveness and may therefore have, on balance, a positive effect on domestic value added and employment. As a matter of fact, in Germany the "bazaar economy" argument has been widely debated. German firms moved part of their production abroad mainly to obtain labour cost reductions[2] and, in so doing, narrow their competitive disadvantages and boost their exports, reducing at the same time the share of domestically-produced value added:

[...] Although German industrial production increased by fifteen percent between 1995 and 2003, real value added of German industry increased by only 5 percent in the same period. [...] Industrial employment decreased by ten percent in the same period without new jobs having been created to offset these losses. [...] Competitiveness can no longer be measured in terms of German exports. [...] Germany is becoming a bazaar economy that sells the world economical, high-quality products that were not produced in the country (Sinn, 2003).

Other authors have different opinions about this phenomenon: Belke *et al.* (2007) argue that traditional measures of trade openness usually overstate the actual degree of openness and, since both gross value of exports and value added in export production increased between 1997 and 2001, German firms actually gained from internationalisation. Danninger and Joutz (2007) show that German export market share has increased since 2000 not only because of international outsourcing, but also thanks to trade relationships with fast growing countries.

All the studies that evaluate the consequences of internationalisation using data at industry level rely on a large and quite differentiated set of indicators of international outsourcing. Thus, it does not exist a unique and univocally accepted measure of this phenomenon at an aggregate macro level.

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[1]   International relocation of production takes place by means of two main firm activities: international outsourcing and off-shoring. In the first one, firms give up stages of their intermediate production chains and purchase parts and components from foreign suppliers. In the second one, domestic firms set up plants abroad to produce intermediate products by themselves. Since in both phenomena some macroeconomic implications are similar, in our paper both concepts are included and the two definitions are used interchangeably.

[2]   Of course shipping costs play a role too, even if not always in an obvious way. According to Baldwin and Venables (2010) shipping costs changes may affect the relocation strategies of production stages between high and low labour cost countries in a non-linear fashion because of the technological relationship between stages of production.

Feenstra and Hanson (1996) estimate the share of imported inputs on total purchases of intermediate products in order to measure the increase of international outsourcing between 1972 and 1990 for the United States. Hummels *et al.* (1998, 2001) find an increase in outsourcing for some OECD countries during the 1980s by measuring the import content of exports. A broader indicator, which considers both direct and indirect import content of exports, is calculated by Chen *et al.* (2005) to measure the same phenomenon for a group of OECD countries. In Egger and Egger (2003) a measure of direct import content of production is used to calculate the average annual change of international outsourcing between 1990 and 1997 for a number of European countries.[3]

Almost all the indicators used in these studies are calculated by using information on intermediate imported inputs from input-output tables, which allow to split the output of each sector into two parts, the first consisting of inputs to the other sectors, the second consisting of goods which satisfy the final demand. These indicators provide a quite exhaustive measure of the phenomenon, since they do not make a distinction between the different channels of internationalisation chosen by the firms, including both types of intermediate inputs: parts and components, and goods produced by subcontractors or affiliates abroad.[4] Moreover, the use of indicators based on input-output tables allow to avoid an arbitrary dichotomy between intermediate inputs and other categories of goods, which is very common in trade statistics. Alternatively, the amount of intermediate imported inputs is inferred from trade data assuming that the share of imported intermediate goods and services on total inputs is the same in every industry of the economy. This methodology is used in Feenstra and Hanson (1996) and employed in many other studies (Amiti and Wei 2005a and 2005b).

In this paper we utilise the input-output tables of imported products compiled by the national statistical institutes, which are available up to 2006 for Germany and Italy.[5] This allows us to outline the pattern of fragmentation of production for two of the main economies in the Euro area also for more recent years without resorting to the restrictive

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[3]   Among the studies which evaluate at sectoral level the impact of outsourcing on productivity and employment, and which use this kind of indicators, Amiti and Wei (2005a and 2005b) find a positive effect of off-shoring on productivity and job growth respectively for the UK and the US, especially for services. For Egger and Egger (2006) the relation between off-shoring and productivity for the manufacturing industry in twelve EU countries is positive only in the long run. Other studies based on survey data utilised *ad hoc* criteria to identify internationalised firms. Bugamelli *et al.* (2008) find a positive correlation between value-added (or labour productivity) growth and internationalisation using a panel of Italian manufacturing firms for the 2000-06 period, only when a very broad definition of outsourcing is adopted. Barba Navaretti and Castellani (2004) do not find any evidence of negative effects of international outsourcing and FDI on the domestic employment level for a sample of Italian firms. With regard to the impact of internationalisation on the skill structure of employment, Diehl (1999) and Jäckle (2006) find evidence that outsourcing abroad raised the domestic skill intensity, whereas the opposite effect is found for German and Austrian multinational enterprises by Marin (2004, 2006).

[4]   Moreover, these measurements do not account for international outsourcing to foreign subsidiaries of the whole production and distribution processes (export platforms), as this case neither implies flows of goods and services across home country borders, nor a change in the import content of domestic production.

[5]   Size and structure of the German and the Italian economy are quite similar. This makes it reasonable to compare the international outsourcing levels between the two countries. By contrast, a comparison with smaller economies appears less appropriate because of their higher trade openness (OECD, 2007).

'import proportionality assumption' of Feenstra and Hanson.[6] Although other studies have analysed the development of international outsourcing in the Italian economy by using the same data (Bracci 2006, Falzoni and Tajoli 2007, Daveri and Jona-Lasinio 2008), none of these studies focuses on methodological issues regarding the different indicators utilised to proxy international outsourcing and their meaning, or on a cross-country comparison.[7] Moreover, we propose the direct and indirect import content of domestic production as a new indicator for international outsourcing. Since this indicator also takes into account the value of inputs which are indirectly used in the production of domestic goods, we believe that this measure can be more useful than other standard indicators for a synthetic evaluation of the macroeconomic consequences of international outsourcing.

Our analysis confirms that the development of international outsourcing was substantial in both countries, with a steady growth between 1995 and 2000, a stagnation (or slight reduction) in the early years of the past decade and a fast growth in the last years analysed. Therefore, the marked increase in international outsourcing observed between 1995 and 2000[8] was not just biased by the exceptional cyclical peak reached by international trade in 2000, and reflected instead a trend towards more internationally integrated production processes. Moreover, the evidence of a higher increase in international outsourcing for Germany with respect to Italy, provided by all the indicators, is due to both a stronger growth of internationalisation within sectors and a more marked shift of the German economy towards more fragmented international sectors.

Our comparison by a large set of outsourcing indices, each of which captures a different aspect of the phenomenon, provides evidence that in 2006, the last year in our analysis, the level of international outsourcing is comparable between the two countries. Considering manufacturing sectors only, Italian firms seem to be even more internationalised than German firms: in 2006 the import content of production amounted to 30.4 per cent in Italy and to 28.2 per cent in Germany, despite the higher share of low-tech sectors, which are the least internationally fragmented, in the first country.

The paper is organised as follows: in the next section we present some indicators commonly used in literature to measure the international fragmentation of production and propose our indicator measuring the direct and indirect import content of production. By considering their definition and construction, we evaluate their respective ability to capture different aspects of the phenomenon. In section 3, the evolution of international outsourcing from 1995 to 2006 for Italy and Germany is analysed at aggregate and industry level. A comparison of the indices and a shift-share analysis to decompose the

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[6]   As for the Italian economy, Daveri and Jona-Lasinio (2008) show that quantifying intermediate imported inputs according to the Feenstra-Hanson methodology rather than using direct data on intermediate imported inputs leads to a significant downward bias of the most common indicators for international outsourcing, i.e. the ratio between intermediate imported inputs and total inputs.

[7]   In these studies only the two main indicators for international outsourcing are constructed, both based on the ratio between intermediate imported inputs and total inputs. Bracci (2006) shows the sectoral development of internationalisation in Italy between 1995 and 2003. Falzoni and Tajoli (2007) use the same data and indicators to verify the relationship between outsourcing and employment, in terms of level and skill composition. Adopting the same approach, Daveri and Jona-Lasinio (2008) are interested in studying the link between outsourcing and productivity.

[8]   See Breda *et al.* (2009).

variance of the indices into different components are presented in section 4 to provide some hints on international outsourcing patterns in different sectors. Finally, section 5 resumes the main results.

2. Concepts and indicators

Many measures of international outsourcing have been used in literature. We begin by discussing definitions and properties of the set of indicators that we use in the measurement of the phenomenon for Italy and Germany.

The first group of indicators focuses on the share of imported inputs on total inputs. Because of its design, this class of measures provides information on the firms' strategies regarding the acquisition of intermediate inputs in external and/or domestic markets. This group of indicators therefore provides a direct measure of the industries' international activity, i.e. firms' international outsourcing net of the degree of 'vertical integration' which characterises the production process in each industry (the share of physical inputs, regardless of their origin, on total production). Feenstra and Hanson (1996) use this index to measure international outsourcing in the US manufacturing sector from 1972 to 1990. The same approach is adopted by the European Economic Advisory Group (2005) to measure outsourcing in a set of European countries from 1995 to 2000. In the same vein, Feenstra and Hanson (1996, 1999) propose two slightly different indicators for international outsourcing to evaluate its effects on US wages: a *broad index*, the ratio between imported inputs from all sectors with respect to total (domestic and imported) inputs employed in each industry[9], and a *narrow index*, which restricts the scope to those inputs that are purchased from the same industry as the one in which the good is being produced, i.e. the standard intra-industry trade measure. These indices are used by Bracci (2006), Falzoni and Tajoli (2007) and Daveri and Jona-Lasinio (2008) to measure the increase of international outsourcing for the Italian manufacturing sector between 1995 and 2003.

Here we present the general formula to calculate the *broad* index:

$$IITI\_broad = \sum_{i=1}^{n}\left[\left(\sum_{j=1}^{J}\frac{m_{ji}}{m_{ji}+d_{ji}}\right)\left(\frac{m_i+d_i}{M+D}\right)\right] \qquad (1)$$

with m_{ji} and d_{ji} corresponding respectively to imported and domestically-produced inputs from industry $j=1,...,J$ used to produce output in industry $i=1,..,n$; m_i and d_i corresponding to total inputs of industry i; M and D to total inputs of the economy. The term in the first brackets represents the share of imported inputs on total inputs in sector i, whereas the *IITI* formula refers to the whole economy.

The formula to calculate the *narrow* index is:

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[9]   As already written, Feenstra and Hanson (1999) derive data on imported inputs for each industry by assuming that any manufacturing employs imported inputs in the same proportion, whereas most of the quoted studies are based on input-output tables.

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$$IITI\_narrow = \sum_{i=1}^{n}\left[\left(\frac{m_{ii}}{m_{ii}+d_{ii}}\right)\left(\frac{m_{ii}+d_{ii}}{M+D}\right)\right] \qquad (2)$$

with m_{ii} and d_{ii} corresponding respectively to imported and domestically-produced intra-industry inputs; $m_{ii}+d_{ii}$ to total intra-industry inputs of industry i; M and D to total intra-industry inputs of the whole economy.

The second class of indices considers the import content of domestic production by measuring the imported intermediate inputs as a share of gross production. Unlike *IITI* indices, this group of indicators does not focus on the firms' choice between domestic and external input markets, but intends to capture the firms' substitution of domestic production with production phases abroad. Since this measure of international outsourcing is sensitive to the degree of vertical integration, this class of indices is useful to evaluate the effects of international outsourcing on macroeconomic variables (employment, labour intensity skills, value added), but it is less reliable for comparing indices across industries. This measure was first introduced by Egger and Egger (2003) to calculate the average annual change of international outsourcing in the nineties for 11 European countries. The index can be expressed in the following way:

$$ICP = \sum_{i=1}^{n}\left[\frac{\sum_{j=1}^{J}m_{ji}}{y_i}\cdot\frac{y_i}{Y}\right] \qquad (3)$$

with y_i representing the gross output of industry i and Y the country gross output. The expression (3) shows that the aggregate *ICP*, expressed as a share of total output, is the output-weighted sum of each industry's import content.

Starting from this index, we propose a different indicator including also the value of inputs which are indirectly used in the production of goods. We believe that this measure is more useful from a macroeconomic point of view. An imported input can indeed be used in a sector whose output is in turn employed in another sector, and then possibly in a third sector and so on, until it is eventually included in a final good. In this case the measure of the import content of production would include both *directly* and *indirectly* imported inputs, the latter being defined as those already contained in domestic inputs.

The measure for the direct and indirect import content is the following one:

$$DIICP = \sum_{i=1}^{n}\left[\frac{\sum_{j=1}^{J}\left(m_{ji}+\sum_{k=1}^{K}{}_{m}a_{kj}d_{ji}\right)}{y_i}\cdot\frac{y_i}{Y}\right] \qquad (4)$$

;

where $0 \leq {}_m a_{kj} \leq 1$ is a multiplicative coefficient of the imported input from sector k that is embodied in the domestic production of sector j, and subsequently used as an input in industry i (d_{ji}).[10]

Finally, a third class of proxies for vertical specialisation is the import content of exports. This measure was originally proposed by Hummels *et al.* (2001) to capture the phenomenon of goods and services produced in multiple stages across different countries, with each country carrying out some stages of the production sequence and then exporting the good-in-process to the next country. In this measure not only they include the value of imports directly contained in the exports, but also the value of inputs which are indirectly used in the production of the exported good, i.e. imported inputs embodied in domestic inputs. The index of vertical specialisation is a reliable proxy for measuring 'globalisation': it is indeed able to capture the production chains that link different countries, be they producers in intermediate stages or exporters of final goods. Chen *et al.* (2005) use this index to calculate vertical specialisation for a series of OECD countries by using the latest input-output tables available for each of them. Two ECB studies (2005a and 2005b) adopted this approach in the debate on the structural changes of European economies. The same indicator is used in Breda *et al.* (2009) to estimate the pattern of international outsourcing for a set of European countries between 1995 and 2000. The following formulas describe the calculations to obtain the direct import content of exports (*ICE*) and the direct and indirect import content of exports (*DIICE*):

$$ICE = \sum_{i=1}^{n} \left[\frac{\sum_{j=1}^{J} m_{ji}}{y_i} \cdot \frac{x_i}{X} \right] \tag{5}$$

and

$$DIICE = \sum_{i=1}^{n} \left[\frac{\sum_{j=1}^{J} \left(m_{ji} + \sum_{k=1}^{K} {}_m a_{kj} d_{ji} \right)}{y_i} \cdot \frac{x_i}{X} \right] \tag{6}$$

with x_i the exports of industry $i=1, .., n$ and X the country total export. Examining (5) and (6), it can be noticed that *ICE* and *DIICE* are respectively the export share-weighted average of each industry's *ICP* and *DIICP*. Since export-intensive industries are more exposed to international competition and generally characterised by a higher degree of international fragmentation of production, we expect to find higher values for the aggregate indicators based on exports than for the ones based on production.

As the theoretical definitions show, the *IITI* index should result in higher values than the *ICP* and *DIICP* indices, since the value of total inputs is always smaller than the value of total production or gross output. The relationship between the *IITI* and the *ICE-DIICE* indicators is less straightforward.

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[10]   See also the definition (A4) in the Appendix.

Finally, an index of international outsourcing made popular by some recent studies on the German economy is the share of domestic value added on production:

$$VAP = \sum_{i=1}^{n} \left[\frac{v_i}{y_i} \cdot \frac{y_i}{Y} \right] \tag{7}$$

with v_i as value added of industry $i=1, .., n$. Unlike the other indicators considered above, this one decreases as the degree of international outsourcing increases. The well-known definition of the German economy as a "bazaar economy" proposed by Sinn (2003) is due to the large fall of this index for the German manufacturing industry after 1995. However, whereas the *IITI*, *ICP* and *ICE* groups of indices are designed as direct measures of international outsourcing, the ability of the *VAP* index to capture industries' international activity is less straightforward. Nevertheless, the time pattern of the *VAP* index may be useful to detect changes in the degree of industries' international outsourcing.

3. International outsourcing in Italy and Germany

3.1 The extent of internationalisation

The indicators presented in section 2 have been constructed on the basis of two sets of annual input-output tables released respectively by Eurostat and Istat; each set contains information on domestically-produced inputs and imported inputs.[11] All the indices we present are calculated by considering the total purchase of non-energy products and market services, excluding energy products so as to avoid the influence of their highly volatile prices on our results.

In our analysis, international outsourcing in Italy and Germany is evaluated for the years 1995, 2000 and 2006, and the dynamics between 1995 and 2006 is analysed by considering the two sub-periods. Table 1 and Table 2 report the values of international outsourcing indices in 1995, 2000 and 2006, respectively for Italy and Germany, at different levels of industry aggregation, i.e. the whole economy, total manufacturing, manufacturing divided into low, medium and high-tech industries[12] and market services industries[13]. The development of the *IITI* and the *ICP* indices for Italy and Germany is

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[11]   For Italy, see Istat (2006) and, for Germany, Eurostat (2008) .

[12]   This classification is an adaptation to 2-digit NACE codes of the classification by technological intensity adopted in Anderton (1999) and ECB (2005c). Low-tech products are: Food, beverages and tobacco; Textile products and clothing; Leather and leather products; Wood and wood products; Paper and paper products, printing and publishing; Non-metallic mineral products; Basic metals and metal products; Furniture and other manufactures. Medium-tech products are: Chemical products and man-made fibres; Rubber and plastic products; Mechanical machinery and equipment; Transport equipment. High-tech products are: Electrical equipment and precision instruments.

[13]   We define as "market services": transportation, trade, financial, renting and business services. Although other services (education, personal and health services etc.) also include a market component, we consider these sectors as scarcely involved in international fragmentation and trade.

additionally illustrated for the whole economy, manufacturing and services in three figures (figure 1, figure 2 and figure 3).[14]

In 2006 the level of international outsourcing between the two countries appears to be comparable: as expected, international outsourcing is significantly less intense in the market services industry than in manufacturing sectors, mainly because of different production technologies (in the service sector labour inputs are usually more intensively used than physical inputs) and of weaker international competition.[15]

Overall, the indicators of international outsourcing for Germany present higher levels if compared to Italy, but this is entirely due to a higher internationalisation in market services, which reflects a more intensive use of imported inputs in the German financial and banking sector. By contrast, for Italy almost all the indicators show a higher degree of international fragmentation in manufacturing, although the values for the two countries stand in a very narrow range. Therefore, at least from a static point of view, the "bazaar" label seems to be appropriate also for the Italian manufacturing sector. Indeed, in an international comparison based on the ratio of imported intermediate inputs to total intermediate inputs in 2003, Italy and Germany, together with the UK, resulted as the most internationalised countries among the largest OECD economies.[16]

Within the manufacturing sector, the highest values of international outsourcing are found in high-tech industries (notably office machines) and in medium-tech ones. In 2006, for every hundred euros of goods produced in high-technology sectors, the direct content of imported inputs in production (*ICP*) was around 26 euros in Italy and 22 euros in Germany, whereas the direct and indirect import content (*DIICP*) was 33 and 29 euros, respectively. Thus, the higher degree of international outsourcing in high and medium-tech industries largely compensates for Italy's more "traditional" specialisation, i.e. the higher relative weight of low-tech sectors - which are the least internationalised ones - with respect to Germany.

To analyse the dynamics of these indices, tables 3 and 4 present the yearly average percentage changes of international outsourcing in Italy and Germany in the two periods.

The results for Germany are clear-cut. Between 1995 and 2006 almost all indices showed a large increase in international fragmentation for all levels of industry aggregation. The increase in international outsourcing activities was much stronger in high-tech industries than in low-tech ones.

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[14]   For Germany the graphs do not include the period between 1996 and 1999, since data for these years are not available.

[15]   Feenstra (1998) provides an interesting complementary explanation of the lower level of international fragmentation in the services industry with respect to manufacturing, which is based on the different ways in which goods trade and services trade are statistically measured. Every time an intermediate good crosses the border, the entire value of this good is counted in import or export statistics, whereas in intermediate services only the value-added is registered. The indicators of international fragmentation for manufacturing (and other merchandise) are therefore upward-biased because of the double-counting of value-added at numerators, and are magnified by the number of cross-border transactions. Chen *et al.* (2005) try to assess the quantitative importance of such double-counting in manufacturing data by estimating homogenous indicators for vertical specialisation in manufacturing and services.

[16]   See OECD (2007, p. 36, figure 2.12).

Also in the case of Italy all the indicators for the whole economy show an increase in the level of outsourcing between 1995 and 2006 (table 3, third part). However, the growth in the indicators is slower than for Germany, reflecting both a slower growth of internationalisation in Italian manufacturing firms, which were characterised by a higher level of outsourcing with respect to the German ones in 1995, and the increasing relative importance of market services industries, which are structurally characterised by a lower intensity of imported inputs.

Moreover, if one looks at total export market shares, a different pattern emerges in the two countries: while Italian exports lose shares during the entire period (1995-2006) and in both sub-periods (1995-2000 and 2000-2006), German exports show much more resilience, especially if the share at constant prices is considered (figure 4).[17] During a period marked by the entrance of large developing countries in the world trade market (China and India are the most relevant and obvious examples), it is quite a matter of course for developed countries to lose export market shares. Italy is no exception, while Germany, especially in the second sub-period, actually increased its share. The growing internationalisation of production has had a twofold impact on this development: on the one hand, it has increased the competitiveness of German manufactured goods (especially by means of a reduction in labour costs), on the other hand it has inflated German trade exchanges, which include both exports of final goods and intermediate goods sent abroad for processing.

3.2 A look at manufacturing industries

In order to get a more detailed picture we analyse outsourcing at disaggregated industry level. Figures 5 and 6 show the development of some of the indices proposed for international outsourcing in manufacturing between 1995 and 2006, respectively for Italy and Germany.

The intensity of offshoring is fairly different across industries. In 2006 in Italy chemical and electrical equipment industries have an outsourcing intensity which reaches about 60 and 40 per cent respectively, as measured by the *IITI_broad* index (figure 5a), while in machinery, the most significant industry for the Italian manufacturing, outsourcing intensity is as much as half (about 20 per cent). The *ICP* indicator confirms both the ranking among industries and their development in the 11-year period (figure 5c). On the contrary, if one looks at the *narrow* outsourcing indicator (figure 5b), which takes into account intra-industry trade only, a quite different picture emerges: chemical and electrical equipment industries remain the most internationally integrated ones, but the mechanical industry appears to be rather internationally integrated too, since about 50 per cent of all its intra-industry inputs are imported from abroad: this fact implies that the

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[17]   The evolution of the market shares at constant prices and exchange rates can be partly biased by statistical problems in the measurement of export unit values. In particular, Italian export unit values systematically overestimate the dynamics of the corresponding export prices, while the opposite seems to be true for German export unit values. However, considering the exports' market shares at current prices and exchange rates (that do not suffer from the above-mentioned measurement problems and seem more appropriate for analysing medium-long periods of time), we see that between 1995 and 2006 Italy lost almost one quarter of its market share, Germany only less than one tenth.

extra-industry inputs of mechanical products are almost completely domestic, thus suggesting a possible specialisation of the sector in high-quality products.

In Germany, the ranking of industries by intensity of international outsourcing seems to be even more dependent on the indicator used. When the *IITI_broad* and the *IITI_narrow* indices are used (figures 6a and 6b), chemicals, as well as metal and electrical equipment industries show the highest levels of outsourcing intensity, while transport equipment appears more internationalised when imported inputs on production (*ICP* index) are analysed; this holds particularly if both direct and indirect import contents are considered, suggesting the idea that German transport equipment firms outsource abroad the production of lower-quality parts and/or final products, and retain in Germany only the higher-quality production phases. Also "Textile products and clothing" and "leather and leather products" show a very high level of international outsourcing, but their relative weight on Germany's total manufacturing production is almost nil.

Considering the contribution to the overall increase of outsourcing in manufacturing in the 11-year period, for Germany the rise is explained by metals, electrical equipment and chemical products; in Italy, the growth of international outsourcing has been driven by metals, chemicals and some traditional industries, in particular "textile products and clothing".

Despite the differences in the extent of international outsourcing, in both countries the outsourcing intensity in almost all industries was higher in 2006 than in 1995. A notable exception for Italy, among the relatively more important industries for the economy, is the electrical equipment industry, where outsourcing slightly decreased from its 1995 level. As the size of this sector has shrunk in Italy, this phenomenon may signal an increasing specialisation in niche products, which would allow Italian firms to exert some monopolistic power and to use a larger share of high-quality domestic inputs.[18] Finally, we observe that for transport equipment all indicators but narrow outsourcing show an increase in the internationalisation of both countries.[19]

4. A shift and share analysis

Although all these indices are mainly focused on international outsourcing, there are also other forces driving their evolution. For example, an index can rise if a highly vertically-specialised sector increases its share with respect to the production of the whole economy, and this even if the outsourcing activity of the sector did not change at all or even declined. By using a shift and share approach, the variance of the indices across sectors has been broken down in two parts: the change of intensity in industries'

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[18]   For example, the electrical equipment sector includes lighting equipment, a market segment in which Italian firms are firmly established, above all thanks to their high-quality design.

[19]   This phenomenon could be explained, at least partly, by a sizeable reduction of the relative price of imported parts and components produced in the same sector (i.e. transport equipment) with respect to the other inputs used; this reduction, obtained by outsourcing to lower-cost countries, could (more than) offset the effect of the rising share in volume terms of parts and components on total inputs.

international outsourcing (the *within* component IO_i) and the relative change of the economy's structure (the *between* component θ_i)[20], according to the following formula:

$$\Delta INDEX_z = \sum_{i=1}^{n} \overline{\theta}_i \Delta IO_i + \sum_{i=1}^{n} \Delta \theta_i \overline{IO}_i \qquad (8)$$

with $INDEX_z$ as the value of the index z ($z=$ *IITI_broad, IITI_narrow, ICP, DIICP, ICE, DIICE* and *VAP*) and Δ indicating absolute changes. By using a bar for the statistical mean of the value in the 1995-2006 period, one component is kept constant in order to isolate the variation of the other component, which is allowed to adjust. Therefore, $\sum_{i=1}^{n} \overline{\theta}_i \Delta IO_i$ captures the change in international outsourcing only, while $\sum_{i=1}^{n} \Delta \theta_i \overline{IO}_i$ captures structural changes only.

The results are presented in tables 5 and 6. The *total* rows depict the overall change in the index, i.e. the sum of the *within* and the *between* components. The *within* rows show the actual variation of outsourcing intensity in each sector.

For Italy, the shift and share analysis seems to confirm an increase in international fragmentation for both the whole economy and the manufacturing sector. This rise is at least partially counterbalanced by a shift towards less internationally-integrated industries. For Germany, both components moved in the same direction, showing a clear increase in the level of outsourcing. Therefore, the different dynamics in the two countries are partially explained by quite diverging changes in specialisation. At an aggregate level, the firms' propensity to use imported inputs grew within each sector in both countries, even if at a faster pace in Germany than in Italy; moreover, the shift in the economic structure towards more internationalised sectors was larger in Germany than in Italy. The two different dynamics of internationalisation and the quite diverging specialisation patterns could be signalling a discrepancy in the "success rate" of outsourcing policies between the two countries. This holds for the manufacturing sectors, and even more for the two whole economies.

Our results are consistent with national accounts data: in Italy, the value added share of market services increased from 46.6 to 48.7 per cent between 1995 and 2000, and reached 50.0 per cent in 2006. Symmetrically, the value added share of the manufacturing sector decreased along the same period, even if at a slower pace in the very last years under study. The pattern observed in Germany is partly different: between 1995 and 2000 the value added share of market services increased at quite a slow pace (from 44.4 to 45.7 per cent) and then accelerated, reaching 47.4 per cent in 2006. In a context characterised by a sizeable reduction in the construction value added share after the peak reached in the

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[20] The structural component differs with respect to the various indices. For example, in the case of the *ICP* index, the structural component is the share of the output of industry *i* to the economy wide output, whereas for the *IITI* index it is the share of the total inputs of sector *i* to economy wide total inputs. The within component, instead, captures the variation of the sector's international outsourcing activity focusing on the imported inputs.

early nineties as an effect of the reunification, the relative weight of industry decreased between 1995 and 2003, but quickly recovered in 2004-06, returning to the levels of the mid-nineties.

5. Conclusions

The growth of international trade in intermediate goods reflects, at least in part, the firms' choice to relocate their production abroad in order to exploit advantages related to labour costs or to other production costs. In 2006, the last year of our analysis, the direct and indirect import content of production of goods and services, which is our indicator of international outsourcing, was equal to 16.5 per cent for both the Italian and the German economies (excluding energy products). The import content of exports was slightly higher in Italy than in Germany, due to a different sectoral composition of exports: on this basis, and from a static point of view, we could consider Italy as a "bazaar economy" too.

Considering the manufacturing sectors only, Italian firms seem to be even more internationalised than German firms: in 2006 the direct and indirect import content of production amounted to 32.4 per cent in Italy and to 30.0 per cent in Germany, despite the higher share of low-tech sectors in the first country, which are apparently the least internationally fragmented.

Even if at the end of the period the internationalisation levels were very similar in the two countries, the dynamic patterns that had led to these levels were different: in the whole 11-year period, German firms, which started from a lower level of internationalisation, experienced a much stronger growth than Italian firms; it is also worth noting that, for Italy, this weaker pattern is partly explained by a more pronounced structural shift of production towards the service sectors, which are much less internationalised than manufacturing. Moreover, while Italy experienced a slight acceleration in the second sub-period (2000-06)[21], in Germany the dynamics was more pronounced between 1995 and 2000, and then slowed down decidedly between 2000 and 2006. This pattern seems to be related to the Italian lira's and Spanish peseta's crises of 1992 and 1995, which had hampered the price competitiveness of German products and triggered a significant change in German firms' strategies.

As it was the case for the whole economy, between 1995 and 2006 German manufacturing firms experienced a stronger growth in almost all the indicators we present, and the rise in international fragmentation was particularly large in high-tech sectors, while in Italy the phenomenon was significant for both low and medium-tech industries. This structural change contributed to the positive performance of Germany's export market share in that decade by boosting the price competitiveness of German goods.

On the contrary, Italian firms increased their degree of internationalisation of production at a slower pace, at least until the first half of the last decade: as a matter of fact, the slight acceleration we observe in the average of the second sub-period is the result

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[21]   Evidence of such slight acceleration comes from almost all the indicators we use, i.e. ICP, DIICP, DIICE and IITI.

of a stagnation between 2000 and 2004 and of a substantial increase in the last two years (2005-06; see Figure 1). This seems to signal a change in strategies and a reorganisation of production in Italian firms, or at least in a significant part of them. This hypothesis is fully consistent with the results of Brandolini and Bugamelli (2009), which explain the interruption of the fall of total factor productivity observed for the Italian economy in the middle of the past decade with the firms' reorganisation of production processes. As a matter of fact, the new challenges posed by increased competition from low-wage countries (or more generally by globalisation), by the diffusion of information and communication technologies and by the adoption of the euro (which, among other consequences, brought about the end of the competitive devaluations of the lira) induced the most dynamic Italian firms to rethink their organisation, including their degree of vertical specialisation.

When this process was still in course, the world economy was violently hit by the 2008-09 crisis; however, according to the Banca d'Italia's *Survey of industrial and service firms*, the fall of sales revenues during the crisis was slower for the firms which had significantly changed their strategies in the previous years.[22] Of course, these developments need to be analysed in future research.

Even if input-output tables for the most recent years are not yet available, these levels and structures of international division of labour for Germany and Italy should be close to the ones existing at the beginning of the 2008-09 international crisis, which particularly hit international trade in intermediate goods. As a matter of fact, the multiplicative effect of the "global supply chain" helps explaining the depth of the world trade collapse during the crisis.[23] However, in the aftermath of the crisis, the diffusion of international outsourcing might become more intense, because firms in the developed countries need to both increase their cost competitiveness further and, presumably, establish new export platforms near or into the markets that are recovering from the crisis at a faster pace, like, for example, China, India, the Far East and Brazil.

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[22]   See Banca d'Italia (2010, p. 112).
[23]   See, for example, Bems *et al.* (2009) and Robertson (2009); but, for an almost opposite point of view, see also Altomonte and Ottaviano (2009).

Appendix: Matrix algebra

In this section we present a more compact notation for the indices utilised in the paper by recasting them in matrix form.

For the *IITI_broad* index we use

$$IITI\_broad = u' \, {}_mA \, Y \, [u'({}_mA + {}_dA) \, Y]^{-1} \qquad (A1)$$

with each element ${}_ma_{ij}$ of the *n*-dimensional square matrix ${}_mA$ representing the imported inputs from industry *i* utilised for the production of industry *j*, each element ${}_da_{ij}$ of the *n*-dimensional square matrix ${}_dA$ representing the domestically produced input from industry *i* for the production of industry *j*, *Y* is the *n*-vector of gross output, *u* is a *nx1* vector of *1*'s and *n* the number of industries.

The *IITI_narrow* index is calculated as

$$IITI\_narrow = u' \, ({}_mA * I)Y \, \{u'[({}_mA + {}_dA) * I]Y\}^{-1} \qquad (A2)$$

where $({}_mA * I)$ is the diagonal import matrix ${}_mA$ and $[({}_mA + {}_dA) * I]$ the diagonal matrix of the total input matrix $({}_mA + {}_dA)$.

The expression for ICP index, as defined in (3), can be written as:

$$ICP = u' \, {}_mA \, Y \, [u' \, Y]^{-1} \qquad (A3)$$

where each element ${}_ma_{ij}$ of the *n*-dimensional square matrix ${}_mA$ represents the imported inputs from industry *i* utilised for the production of industry *j*, *Y* is the *n*-vector of gross output, *u* is a *nx1* vector of *1*'s and *n* the number of industries.

The expression for *DIICP* index, as defined in (4), is a bit more complicated since it includes the inverse of the Leontief matrix, $(I - {}_dA)^{-1}$, which allows us to capture the imported inputs embodied in the domestic output:

$$DIICP = [u' \, {}_mA \, (I - {}_dA)^{-1} \, Y] \, [u'Y]^{-1} \qquad (A4)$$

with each element ${}_da_{ij}$ of the *n*-dimesional square matrix ${}_dA$ representing the domestically produced input from industry *i* for the production of industry *j* and *I* is a *nxn* identity matrix.

The matrix notation for the *ICE* and the *DIICE* indices, as defined in (5) and in (6), are then:

$$ICE = u' \, {}_mA \, Y \, [u' \, X]^{-1} \qquad (A5)$$

and

1:

$$DIICE=[u'\,_mA\,(I-_dA)^{-1}\,Y]\,[u'X]^{-1} \tag{A6}$$

where X is the n-vector of exports.

Finally, the matrix notation for the VAP index, as defined in (6), is:

$$ICP=u'\,V\,[u'\,V]^{-1} \tag{A7}$$

with V as the n-vector of value added.

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References

Altomonte, C. */ Ottaviano*, G.I.P. (2009) "Resilient to the crisis? Global supply chains and trade flows", in R. Baldwin (ed.) *The Great Trade Collapse*, VOX – CEPR.

Amiti, M. / *Wei*, S.-J. (2005a): "Service Outsourcing, Productivity and Employment", IMF working paper 238.

Amiti, M. / *Wei*, S.-J. (2005b): "Fear of Outsourcing: Is It Justified?", *Economic Policy*, April, 308-348.

Anderton, R. (1999): "Innovation, product quality, variety, and trade performance: an empirical analysis of Germany and the UK", *Oxford Economic Papers* 51, 152-167.

Baldwin, R. / *Venables*, A.J. (2010) "Relocating the value chain: off-shoring and agglomeration in the global economy", paper presented at the European Research Workshop in International Trade, Rome, June 2010.

Banca d'Italia (2010): *Relazione annuale sul 2009*, Rome.

Barba Navaretti, G. / *Castellani*, D. (2004): "Investments Abroad and Performance at Home: Evidence from Italian Multinationals", CEPR Working Paper 4284.

Belke, A. / *Mattes*, A. / *Wang*, L. (2007): "The *bazaar* economy hypothesis revisited. A new measure for Germany's international openness", Hohenheimer Diskussionbeiträge 285.

Bems, R. */ Johnson*, R.C. */ Yi*, K.-M. (2009) "The collapse of global trade: Update on the role of global linkages", in R. Baldwin (ed.) *The Great Trade Collapse*, VOX – CEPR.

Bracci, L. (2006): "Una misura della localizzazione internazionale", in ICE *Rapporto sul commercio estero*, Rome.

Brandolini, A. */ Bugamelli*, M. (eds.) (2009): "Rapporto sulle tendenze nel sistema produttivo italiano", *Questioni di economia e finanza* 45, Banca d'Italia.

Breda, E. / *Cappariello*, R. / *Zizza*, R. (2009): "Vertical specialisation in Europe: Evidence from the import content of exports", in L. Lambertini (ed.) *Firms' Objectives and Internal Organisation in a Global Economy: Positive and Normative Analysis*, Palgrave MacMillan, 2009.

Bugamelli, M. / *Cingano*, F. / *D'Aurizio*, L. / *Lagna*, F. (2008): "Il sistema produttivo italiano: *creative destruction* o *plain destruction*?", Banca d'Italia, mimeo.

Chen, H. / *Kondratowicz*, M. / *Yi*, K.M. (2005): "Vertical specialization and three facts about U.S. international trade", *The North American Journal of Economics and Finance*, 16, 35-59.

Danninger, F. / *Joutz*, S. (2007): "What explains Germany's rebounding export market share?", IMF Working paper 07/24.

Daveri, F. / *Jona-Lasinio*, C. (2008): "Off-shoring and productivity growth in the Italian manufacturing industry", CESifo Economic Studies 54, 3.

Diehl, M. (1999): "The Impact of International Outsourcing on the Skill Structure of Employment: Empirical Evidence from German Manufacturing Industries", Kiel working papers 946.

ECB (2005a): "Import content of euro area exports", mimeo.

ECB (2005b): "Measure of the export impulse to euro area growth: should we look at net trade or exports?", mimeo.

ECB (2005c): "Competitiveness and the export performance of the euro area", *Occasional paper series* 30, June.

Egger, H. / *Egger*, P. (2003): "On market concentration and international outsourcing", *Applied Economics Quarterly*, 49, 49-64.

Egger, H. / *Egger*, P. (2006): "International Outsourcing and the Productivity of Low-Skilled Labor in the EU," *Economic Inquiry*, Oxford University Press, 44(1), 98-108.

European Economic Advisory Group (2005): "Outsourcing" edited by CESifo, Report on the European Economy. Chapter 2.

Eurostat (2008): "Eurostat Manual of Supply, Use and Input-Output Tables", *Methodologies and Working papers*.

Falzoni, A.M. / *Tajoli*, L. (2007): "Does outsourcing abroad intermediates and jobs affect the domestic labour market? The case of Italy", paper presented at the IX European Trade Study Group Conference, Athens, September 2007.

Feenstra, R.C. (1998): "Integration of Trade and Disintegration of Production in the Global Economy", *Journal of Economic Perspectives*, 12, 31-50.

Feenstra, R.C. / Hanson, G.H. (1996): "Globalization, outsourcing, and wage inequality", *AEA papers and proceedings*, 86, 240-245.

Feenstra, R.C. / Hanson, G.H. (1999): "The impact of outsourcing and high-technology capital on wages: estimates for the United States, 1979-1990", *Quarterly Journal of Economics* 114, 907-940.

Hummels, D. / *Ishii*, J. / *Yi*, K. (2001): "The nature and growth of vertical specialization in world trade", *Journal of International Economics*, 54, 75-96.

Hummels, D. / *Rapoport*, D. / *Yi*, K. (1998): "Vertical specialization and the changing nature of world trade", *FRBNY Economic Policy Review*, June, 79-98.

Istat (2006): "Il nuovo sistema input-output", February, mimeo.

Jäckle, R. (2006): "The Impact of FDI on the Skill Structure in German Manufacturing", *Applied Economics Quarterly*, 52, Supplement.

Marin, D. (2004): "'A Nation of Poets and Thinkers' - Less So with Eastern Enlargement? Austria and Germany", CEPR Discussion Paper 3526.

Marin, D. (2006): "A New International Division of Labor in Europe: Outsourcing and Offshoring to Eastern Europe", *Journal of the European Economic Association*, 4, 2-3, 612-622.

OECD (2007): *Staying competitive in the global economy: moving up the value chain.*

Robertson, R. (2009) "Mexico and the great trade collapse", in R. Baldwin (ed.) *The Great Trade Collapse*, VOX – CEPR.

Sinn, H.W. (2003): "Bazaar Economy", Ifo-Viewpoint, 50.

Table 1. Measures of international outsourcing in Italy

Sectors	Import content of production		Import content of exports		Imported inputs on Total inputs (IITI)	Narrow index	Value added on production
	Only direct content (ICP)	Direct and indirect content (DIICP)	Only direct content (ICE)	Direct and indirect content (DIICE)			
				1995			
Total	**8.5**	**15.1**	**14.9**	**23.7**	**16.7**	**27.9**	**44.8**
of which: Manufacturing	16.9	26.0	17.6	27.1	25.6	37.8	30.1
Low-tech	*14.4*	*23.2*	*15.2*	*24.4*	*21.9*	*28.5*	*30.4*
Medium-tech	*19.7*	*29.9*	*17.9*	*28.4*	*29.2*	*53.3*	*28.7*
High-tech	*24.7*	*32.3*	*27.2*	*34.3*	*38.7*	*60.9*	*33.4*
of which: Market services	2.6	6.7	3.3	8.7	6.9	6.6	57.5
				2000			
Total	**8.9**	**15.6**	**16.8**	**25.4**	**16.9**	**29.7**	**42.9**
of which: Manufacturing	18.3	27.4	19.7	29.1	27.5	42.2	28.9
Low-tech	*15.1*	*24.0*	*16.6*	*26.0*	*22.8*	*30.7*	*29.2*
Medium-tech	*21.5*	*31.4*	*20.2*	*30.3*	*31.4*	*57.1*	*27.3*
High-tech	*27.8*	*34.5*	*30.1*	*36.1*	*43.2*	*72.0*	*32.4*
of which: Market services	2.9	7.6	3.6	9.2	6.9	6.9	53.7
				2006			
Total	**9.6**	**16.5**	**18.8**	**27.9**	**18.2**	**32.0**	**42.2**
of which: Manufacturing	21.0	30.4	22.5	32.4	31.1	47.5	27.2
Low-tech	*18.2*	*27.3*	*20.8*	*30.2*	*27.2*	*37.9*	*27.6*
Medium-tech	*24.5*	*35.1*	*23.3*	*34.1*	*35.1*	*61.7*	*25.1*
High-tech	*25.7*	*33.2*	*26.0*	*33.2*	*41.0*	*64.2*	*33.5*
of which: Market services	3.1	8.0	4.3	10.3	7.2	8.3	52.2

Source: our calculations on Istat data.

Table 2. Measures of international outsourcing in Germany

Sectors	Import content of production		Import content of exports		Imported inputs on Total inputs (IITI)	Narrow index	Value added on production
	Only direct content (ICP)	Direct and indirect content (DIICP)	Only direct content (ICE)	Direct and indirect content (DIICE)			
1995							
Total	**7.5**	**11.3**	**14.1**	**19.9**	**16.8**	**25.5**	**51.4**
of which: Manufacturing	14.1	20.4	15.6	22.1	23.6	33.6	36.2
Low-tech	*13.2*	*19.1*	*16.4*	*22.5*	*21.9*	*30.2*	*34.8*
Medium-tech	*15.2*	*22.0*	*15.4*	*22.3*	*25.3*	*37.0*	*36.6*
High-tech	*13.8*	*19.7*	*14.4*	*20.2*	*23.8*	*34.4*	*39.8*
of which: Market services	2.7	4.5	7.0	9.1	8.6	9.6	64.3
2000							
Total	**9.8**	**14.8**	**17.2**	**24.2**	**20.2**	**31.3**	**47.1**
of which: Manufacturing	17.5	25.1	19.3	27.3	27.6	40.6	32.5
Low-tech	*15.3*	*21.7*	*19.2*	*25.7*	*25.2*	*37.8*	*34.1*
Medium-tech	*19.1*	*28.0*	*19.4*	*28.2*	*28.7*	*41.1*	*29.5*
High-tech	*18.6*	*25.6*	*19.5*	*26.3*	*30.6*	*44.8*	*37.3*
of which: Market services	4.2	7.0	7.6	10.6	11.4	15.3	59.1
2006							
Total	**11.1**	**16.5**	**18.9**	**26.4**	**22.7**	**33.1**	**46.1**
of which: Manufacturing	19.8	28.2	21.4	30.0	30.9	41.5	31.0
Low-tech	*18.3*	*25.5*	*22.5*	*29.6*	*29.5*	*42.7*	*31.1*
Medium-tech	*20.4*	*30.2*	*20.5*	*30.2*	*30.9*	*39.1*	*29.6*
High-tech	*21.6*	*28.9*	*23.0*	*30.0*	*35.2*	*47.7*	*36.1*
of which: Market services	4.5	7.3	8.5	11.6	12.5	16.7	59.0

Source: our calculations on Eurostat data.

Table 3. Development of international outsourcing in Italy

Sectors	Import content of production		Import content of exports		Imported inputs on Total inputs (IITI)	Narrow index	Value added on production
	Only direct content (ICP)	Direct and indirect content (DIICP)	Only direct content (ICE)	Direct and indirect content (DIICE)			
Average percentage variation 1995-2000							
Total	**0.9**	**0.7**	**2.4**	**1.4**	**0.2**	**1.2**	**-0.8**
of which: Manufacturing	1.6	1.0	2.3	1.4	1.4	2.2	-0.9
Low-tech	*1.0*	*0.7*	*1.8*	*1.3*	*0.8*	*1.5*	*-0.8*
Medium-tech	*1.7*	*1.0*	*2.5*	*1.4*	*1.4*	*1.4*	*-1.0*
High-tech	*2.4*	*1.3*	*2.1*	*1.0*	*2.2*	*3.4*	*-0.6*
of which: Market services	2.1	2.4	1.7	1.1	0.1	1.1	-1.4
Average percentage variation 2000-2006							
Total	**1.2**	**1.0**	**2.0**	**1.5**	**1.2**	**1.2**	**-0.3**
of which: Manufacturing	2.3	1.8	2.2	1.8	2.1	2.0	-1.0
Low-tech	*3.1*	*2.2*	*3.8*	*2.5*	*3.0*	*3.6*	*-1.0*
Medium-tech	*2.2*	*1.8*	*2.4*	*2.0*	*1.9*	*1.3*	*-1.4*
High-tech	*-1.3*	*-0.6*	*-2.4*	*-1.4*	*-0.9*	*-1.9*	*0.5*
of which: Market services	0.9	1.0	3.1	1.8	0.6	3.1	-0.5
Average percentage variation 1995-2006							
Total	**1.1**	**0.8**	**2.1**	**1.5**	**0.8**	**1.2**	**-0.5**
of which: Manufacturing	2.0	1.4	2.3	1.6	1.8	2.1	-0.9
Low-tech	*2.1*	*1.5*	*2.9*	*2.0*	*2.0*	*2.6*	*-0.9*
Medium-tech	*2.0*	*1.5*	*2.4*	*1.7*	*1.7*	*1.3*	*-1.2*
High-tech	*0.4*	*0.3*	*-0.4*	*-0.3*	*0.5*	*0.5*	*0.0*
of which: Market services	1.4	1.6	2.5	1.5	0.4	2.2	-0.9

Source: our calculations on Istat data.

Table 4. Development of international outsourcing in Germany

Sectors	Import content of production		Import content of exports		Imported inputs on Total inputs (IITI)	Narrow index	Value added on production
	Only direct content (ICP)	Direct and indirect content (DIICP)	Only direct content (ICE)	Direct and indirect content (DIICE)			
Average percentage variation 1995-2000							
Total	**5.6**	**5.5**	**4.0**	**4.1**	**3.8**	**4.2**	**-1.7**
of which: Manufacturing	4.4	4.3	4.4	4.3	3.2	3.8	-2.1
Low-tech	*3.0*	*2.6*	*3.1*	*2.6*	*2.8*	*4.6*	*-0.4*
Medium-tech	*4.7*	*5.0*	*4.6*	*4.9*	*2.5*	*2.2*	*-4.2*
High-tech	*6.1*	*5.4*	*6.3*	*5.4*	*5.1*	*5.5*	*-1.3*
of which: Market services	9.2	9.2	1.7	3.2	5.9	9.8	-1.7
Average percentage variation 2000-2006							
Total	**2.1**	**1.8**	**1.6**	**1.5**	**2.0**	**0.9**	**-0.3**
of which: Manufacturing	2.1	1.9	1.7	1.6	1.9	0.4	-0.8
Low-tech	*3.1*	*2.7*	*2.7*	*2.4*	*2.7*	*2.1*	*-1.5*
Medium-tech	*1.1*	*1.3*	*1.0*	*1.1*	*1.2*	*-0.8*	*0.0*
High-tech	*2.5*	*2.0*	*2.9*	*2.2*	*2.3*	*1.0*	*-0.5*
of which: Market services	1.3	0.7	1.9	1.4	1.5	1.5	0.0
Average percentage variation 1995-2006							
Total	**3.7**	**3.5**	**2.7**	**2.6**	**2.8**	**2.4**	**-1.0**
of which: Manufacturing	3.1	3.0	2.9	2.8	2.5	1.9	-1.4
Low-tech	*3.0*	*2.7*	*2.9*	*2.5*	*2.7*	*3.2*	*-1.0*
Medium-tech	*2.7*	*2.9*	*2.6*	*2.8*	*1.8*	*0.5*	*-1.9*
High-tech	*4.1*	*3.5*	*4.4*	*3.6*	*3.6*	*3.0*	*-0.9*
of which: Market services	4.8	4.5	1.8	2.2	3.5	5.2	-0.8

Source: our calculations on Eurostat data.

Table 5. Outsourcing and sectoral changes in Italy (1995-2006)

| Sectors	Import content of production		Import content of exports		Imported inputs on Total inputs (IITI)	Narrow index	Value added on production
	Only direct content (ICP)	Direct and indirect content (DIICP)	Only direct content (ICE)	Direct and indirect content (DIICE)			
	Total						
Within	1.86	2.51	3.96	4.34	2.85	5.56	-4.23
Between	-0.81	-1.06	-0.06	-0.16	-1.38	-1.54	1.77
Total	**1.05**	**1.45**	**3.90**	**4.18**	**1.47**	**4.02**	**-2.59**
	Manufacturing						
Within	4.28	4.45	4.69	4.96	5.58	8.29	-3.14
Between	-0.23	-0.12	0.26	0.29	-0.15	1.45	0.18
Total	**4.05**	**4.42**	**4.95**	**5.24**	**5.43**	**9.74**	**-2.97**
	Market services						
Within	0.38	1.40	0.93	1.82	0.09	1.00	-6.21
Between	0.06	-0.09	0.08	-0.29	0.18	0.76	0.90
Total	**0.44**	**1.30**	**1.02**	**1.53**	**0.28**	**1.75**	**-5.31**

Source: our calculations on Istat data.

**Table 6. Outsourcing and sectoral changes in Germany (1995-2006)**

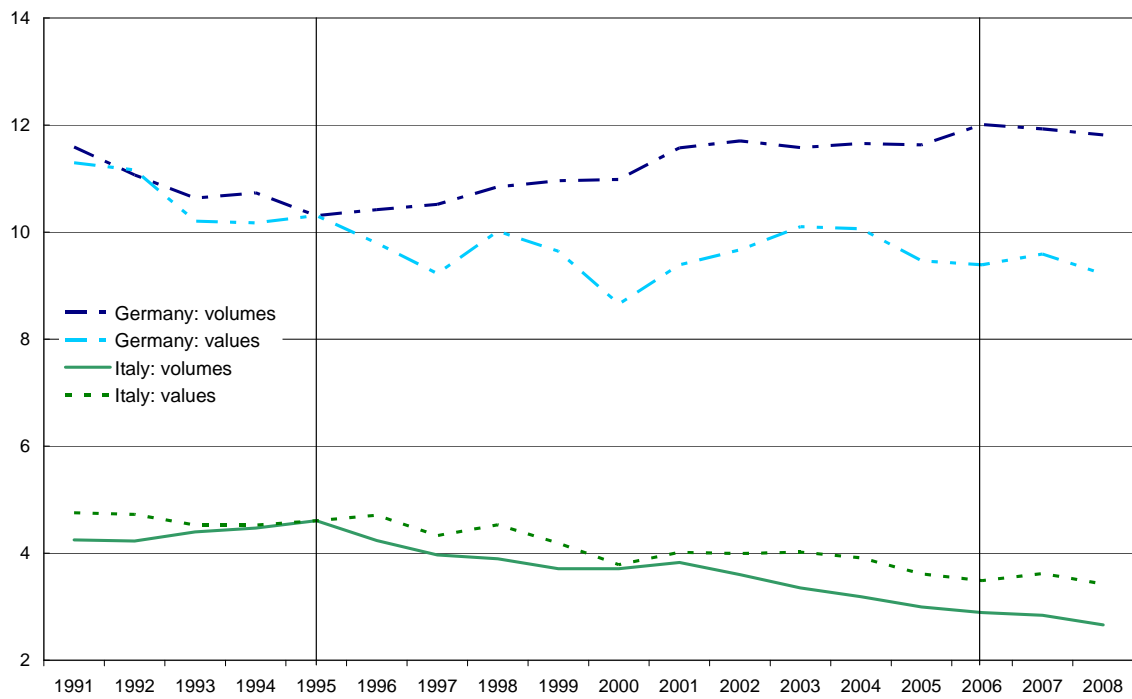| Sectors	Import content of production		Import content of exports		Imported inputs on Total inputs (IITI)	Narrow index	Value added on production
	Only direct content (ICP)	Direct and indirect content (DIICP)	Only direct content (ICE)	Direct and indirect content (DIICE)			
	Total						
Within	3.05	4.43	4.81	6.58	4.89	5.99	-4.77
Between	0.60	0.76	0.02	-0.03	1.08	1.51	-0.53
Total	**3.65**	**5.19**	**4.83**	**6.56**	**5.97**	**7.50**	**-5.30**
	Manufacturing						
Within	5.11	6.94	5.73	7.66	4.33	6.69	-4.72
Between	0.59	0.94	0.12	0.23	1.02	1.35	-0.43
Total	**5.70**	**7.89**	**5.85**	**7.89**	**5.35**	**8.04**	**-5.15**
	Market services						
Within	1.48	2.40	0.59	1.67	2.54	4.71	-0.80
Between	0.33	0.37	0.91	0.82	1.37	2.40	-4.54
Total	**1.81**	**2.80**	**1.50**	**2.49**	**3.90**	**7.11**	**-5.34**

Source: our calculations on Eurostat data.

Figure 1 International outsourcing
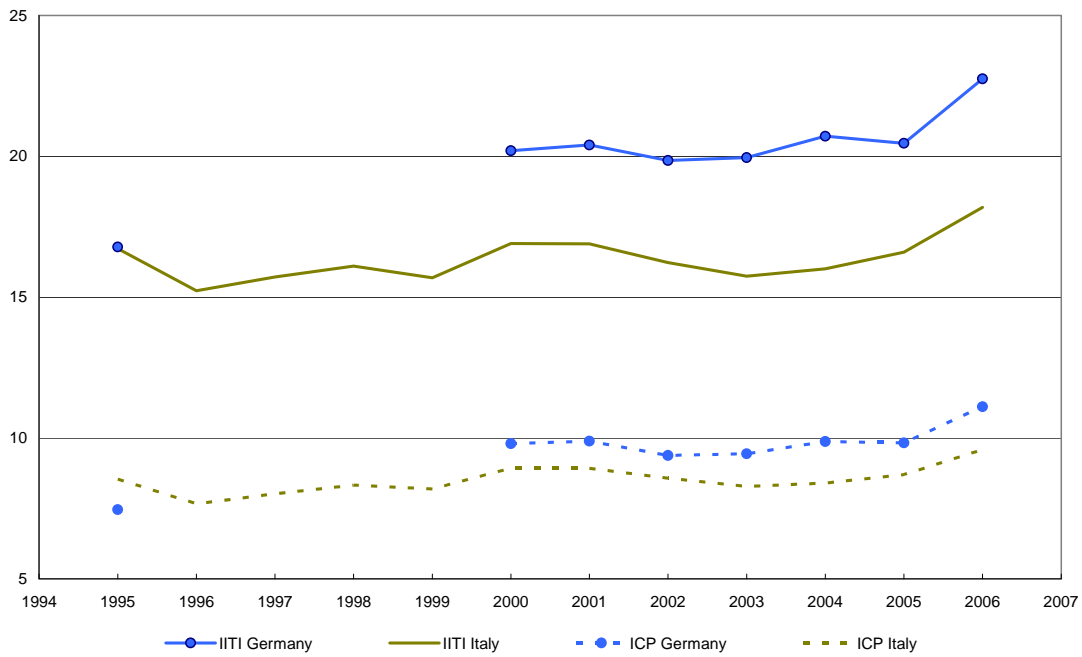
Figure 2 International outsourcing in manufacturing
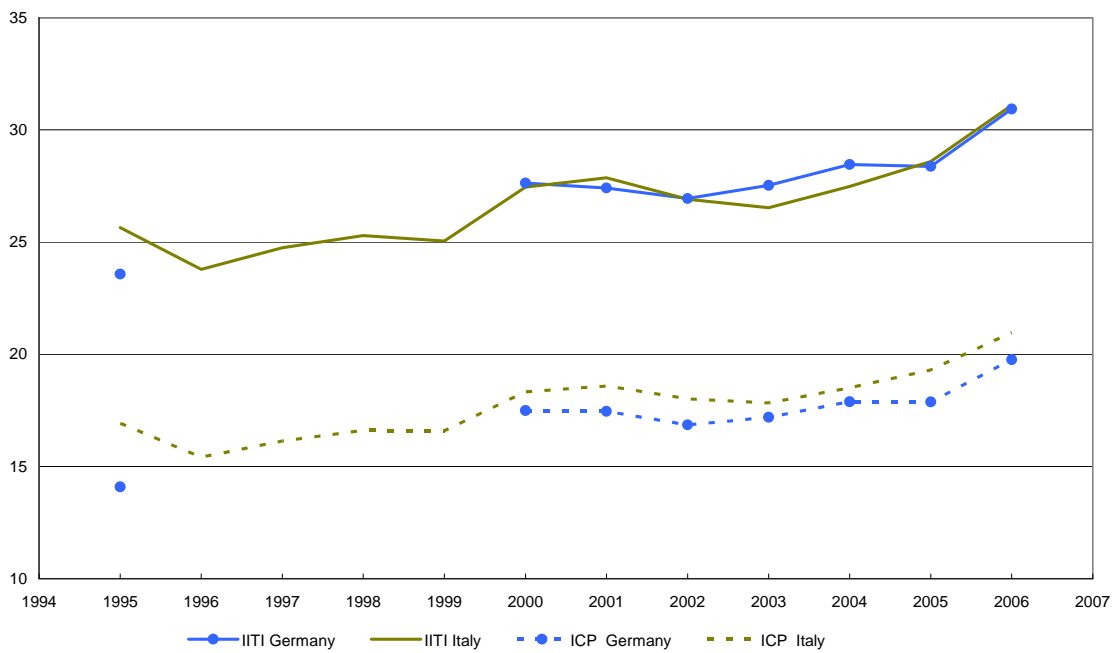
Figure 3 International outsourcing in services

IITI Germany — IITI Italy — CPI Germany — CPI Italy
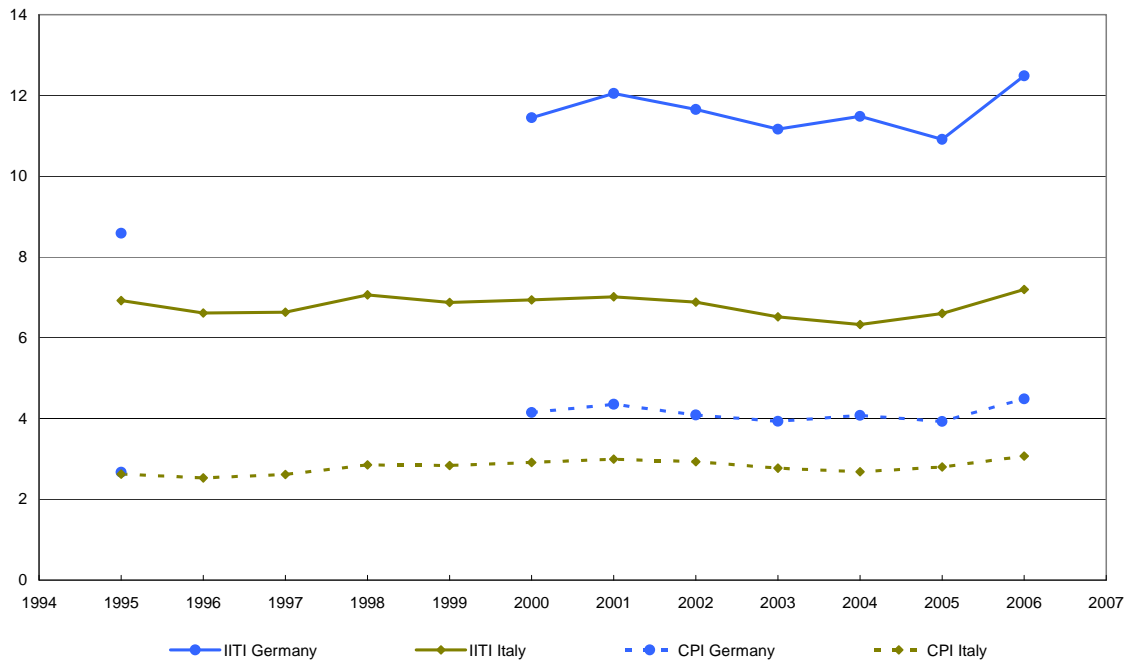
Figure 4 Export market shares of Germany and Italy
(as percentages of the world exports of goods)

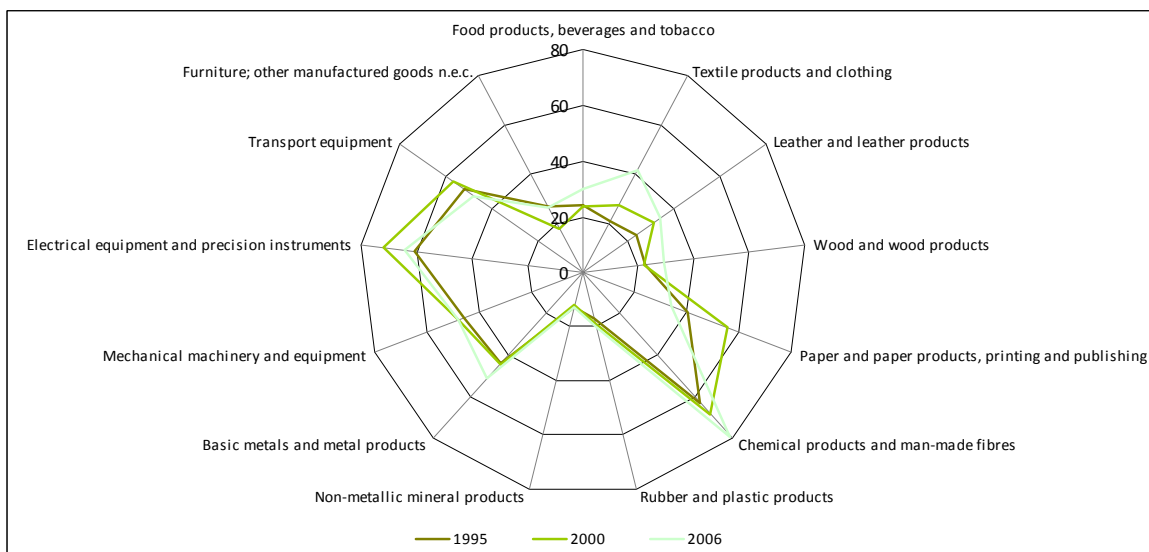Germany: volumes
Germany: values
Italy: volumes
Italy: values

Source: calculations on IMF and Istat data.

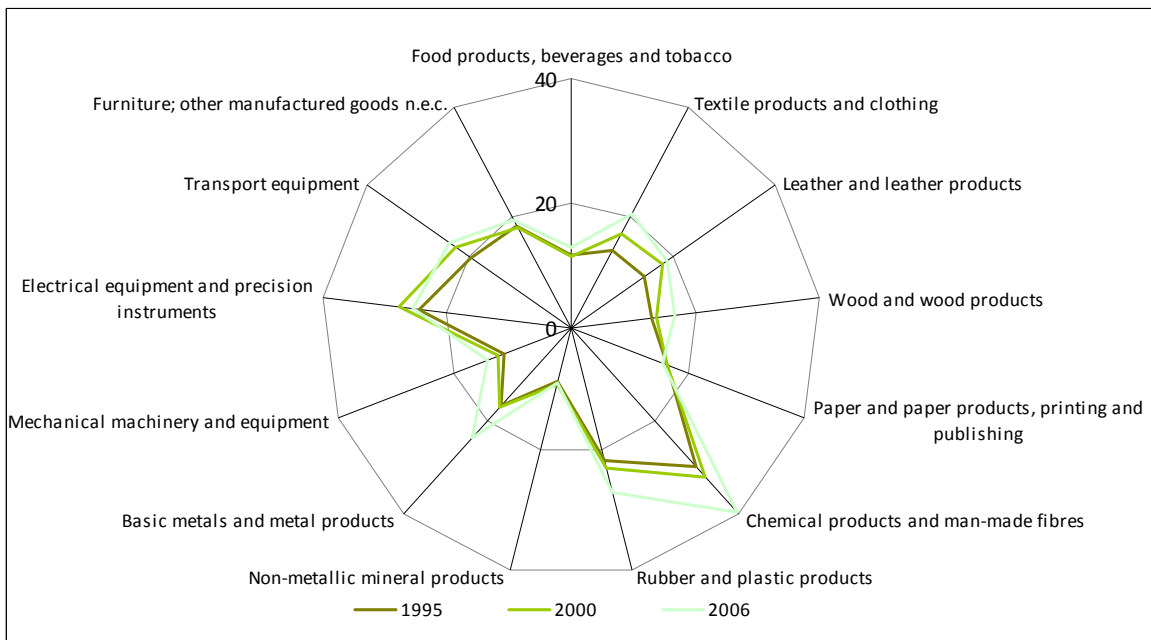**Figure 5 Sectoral development of** *IITI_broad (a)*, *IITI_narrow (b)*, *ICP (c)* **and** *DIICP* **(d) in Italy**

a.
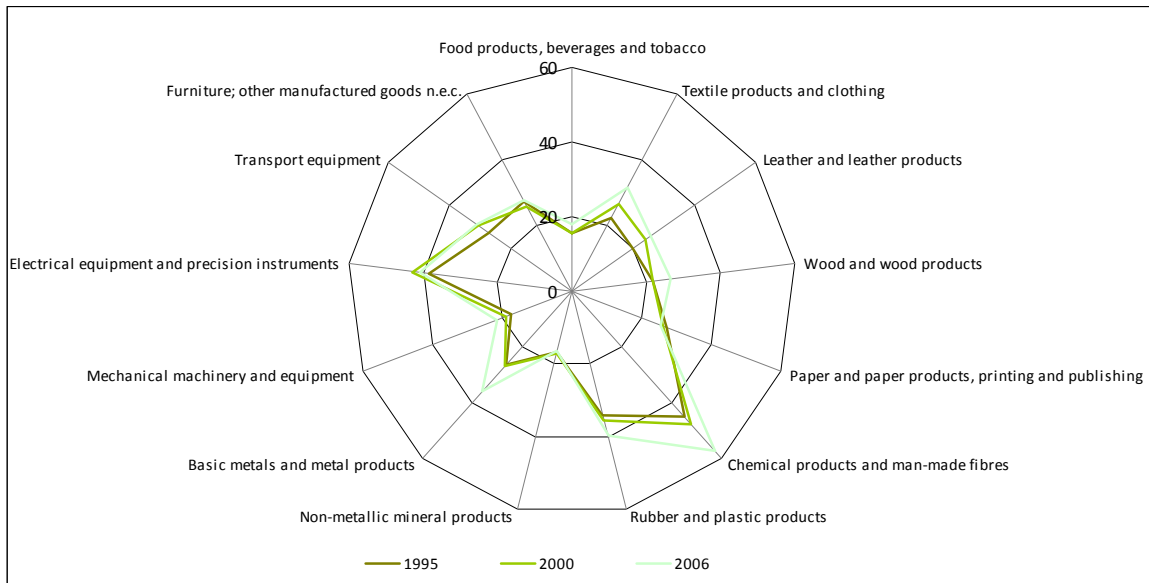
b.
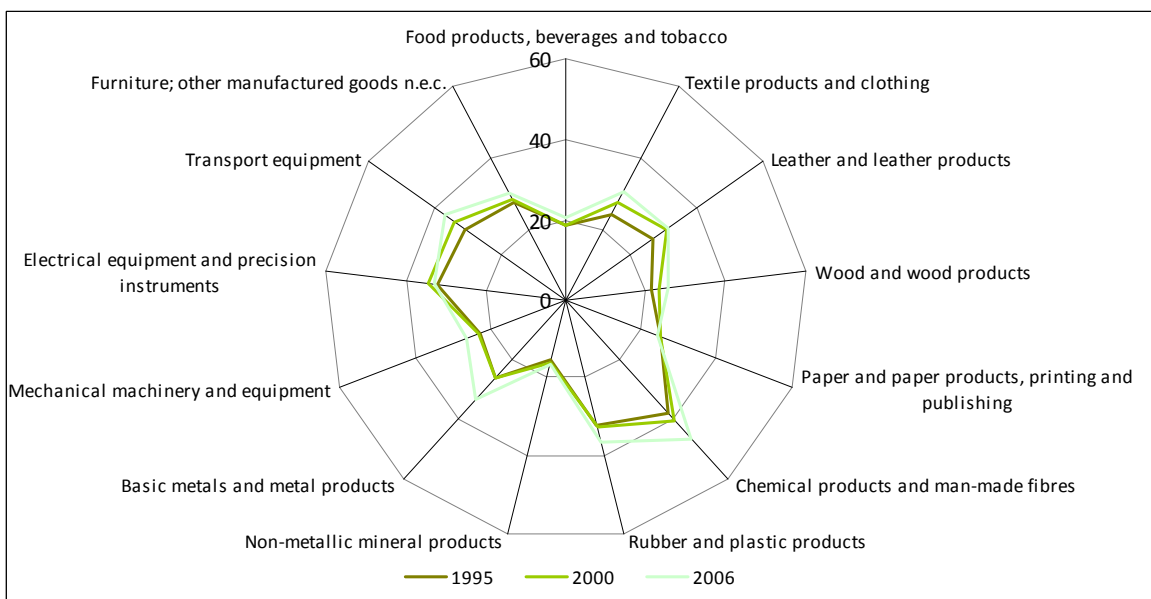
c.
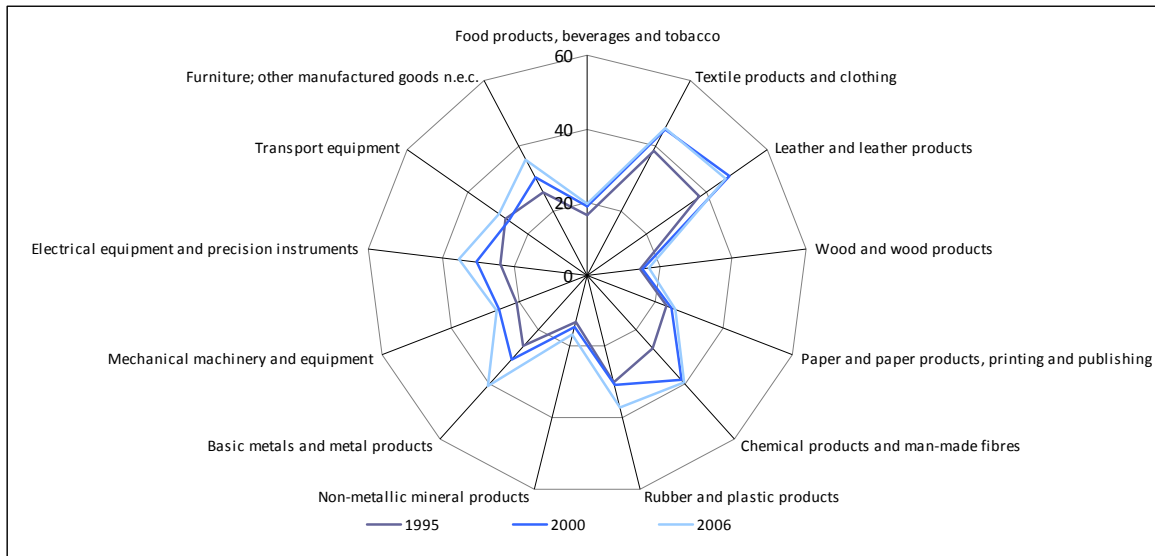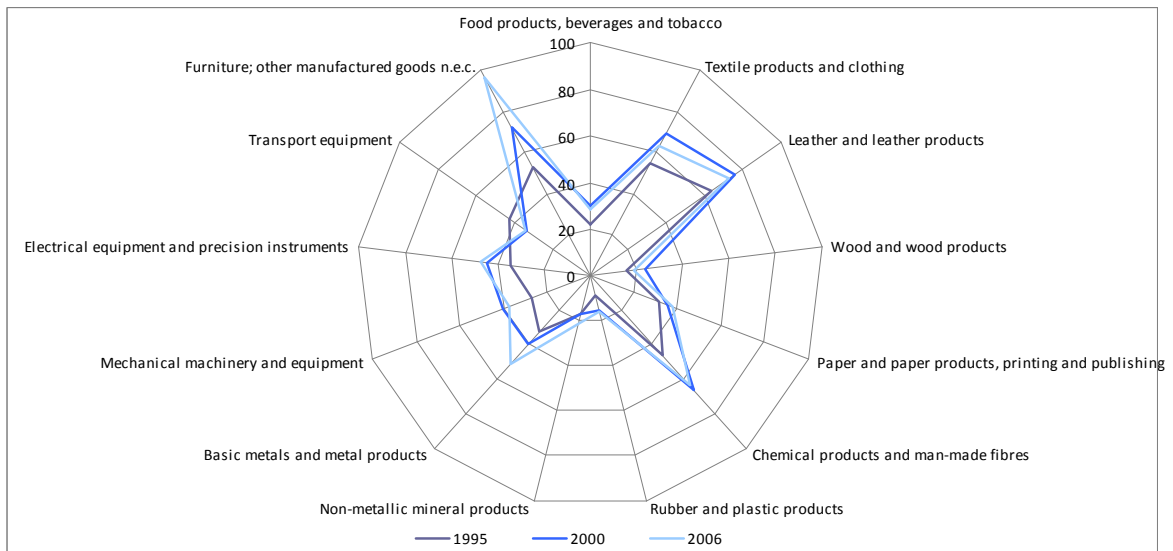

d.

Figure 6 Sectoral development of *IITI_broad (a)*, *IITI_narrow (b)*, *ICP (c)* and *DIICP (d)* in Germany

a.

b.

c.

Food products, beverages and tobacco

Furniture; other manufactured goods n.e.c.

Textile products and clothing

Transport equipment

Leather and leather products

Electrical equipment and precision instruments

Wood and wood products

Mechanical machinery and equipment

Paper and paper products, printing and publishing

Basic metals and metal products

Chemical products and man-made fibres

Non-metallic mineral products

Rubber and plastic products

40

20

0

—— 1995   —— 2000   —— 2006

d.

Food products, beverages and tobacco

Furniture; other manufactured goods n.e.c.

Textile products and clothing

Transport equipment

Leather and leather products

Electrical equipment and precision instruments

Wood and wood products

Mechanical machinery and equipment

Paper and paper products, printing and publishing

Basic metals and metal products

Chemical products and man-made fibres

Non-metallic mineral products

Rubber and plastic products

60

40

20

0

—— 1995   —— 2000   —— 2006

33