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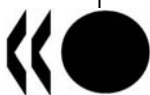
Cancels & replaces the same document of 21 October 2009

**Working Party on International Trade in Goods and Trade in Services Statistics****HIGH-TECH TRADE BY ENTERPRISE CHARACTERISTICS****16-18 November 2009, OECD Headquarters, Paris**

*Item 5.4. of the Agenda. For discussion.*

*This paper tests a new approach by linking merchandise trade to general business registers (sectoral high-tech trade). It highlights that the data shown using the “traditional” approach to calculate the trade value of the high-tech industries via correspondence tables represents relatively well the exports to third countries (Extratrade) but not so well the exports to other EU Member States (Intratrade). The analysis also showed that the “traditional” approach gives a better estimation of the values exported by high-tech industries than of the values imported by them. Therefore, calculating the trade value of high-tech industries via correspondence tables can lead to an overestimation of their trade, especially with respect to their imports.*

Contact persons: Alexander Loschky, EC/JRC [alexander.loschky@jrc.ec.europa.eu](mailto:alexander.loschky@jrc.ec.europa.eu) and Karo Nuortila, Eurostat, [karo.nuortila@ec.europa.eu](mailto:karo.nuortila@ec.europa.eu)

**JT03273909**



**EUROPEAN COMMISSION**  
DG Eurostat G5  
DG Joint Research Centre G9

## **High-tech trade by enterprise characteristics**

by

Alexander Loschky  
European Commission – Joint Research Centre  
Unit G9: Econometrics and Applied Statistics

and

Karo Nuortila  
European Commission – DG Eurostat  
Unit G5: International trade – production

Presented at the  
2<sup>nd</sup> Meeting of the Working Party on International Trade in Goods  
and Trade in Services Statistics (WPTGS)<sup>1</sup>

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<sup>1</sup> The authors would like to thank Ms Maria Gonzalez from Eurostat unit G5 for data treatment.

## Introduction

Until now two approaches existed to identify high-tech foreign trade: The product approach which uses a list of goods classified as high-tech products<sup>2</sup> and the sectoral approach which identifies the trade by the sectors classified as high-tech industries. The current nomenclature of the sectoral approach stems from an investigation done by Thomas Hatzichronoglou presented in 1997 by the OECD<sup>3</sup> and was subsequently updated in 2005<sup>4</sup> and reviewed by the EU Commission's Joint Research Centre (JRC) in 2008<sup>5</sup>. These studies used research and development (R&D) intensities to identify the high-tech sectors.

Currently, the foreign trade of the high-tech sectors can not be calculated directly, as there is no foreign trade data by industries readily available. Therefore, the foreign trade of high-tech sectors is calculated using correspondence tables from the product classification SITC to the industry classification ISIC/NACE. Obviously, this "traditional" approach can give only an approximate indication of what is traded by the high-tech sectors. The "real" trade composition of these sectors could actually be different and could also vary from country to country.

Therefore, a better way of calculating the foreign trade of high-tech sectors is needed. A feasible solution is to link merchandise trade data to the general business register (sectoral high-tech trade). The resulting data give the real trade of the high-tech industries and allow analysing their trade in a more comprehensive way.

In 2009 the EU-Commission's Joint Research Centre (JRC) and Eurostat have conducted a pilot study linking trade data with business registers data. This paper explains the methodological issues encountered, presents some first results of the "high-tech trade by enterprise characteristics", and gives some conclusions and an outlook for further research.

## Methodology

### *Basic methodology*

External trade statistics aim at describing value and volume of goods traded between countries. They do not, however, show any explicit information on the characteristics of traders. A traditional approach has been to associate traded goods into their industrial origin, i.e. to the activity sector which typically produces such goods. Because of underlying connection between production and exports, this approach is better suitable for the supply-side analysis than for demand-side analysis. However, in the globalised

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<sup>2</sup> The latest update of the OECD list of high-tech products was presented in 2008 at the 1<sup>st</sup> Meeting of the Working Party on International Trade in Goods and Trade in Services Statistics (WPTGS) of the OECD. See annex to Eberth, Florian (2008), "Increasing the Relevance of Trade Statistics: Trade by High-Tech Products".

<sup>3</sup> Hatzichronoglou, Thomas (1997), "Revision of the High-Technology Sector and Product Classification" in: OECD Science, Technology and Industry Working Papers, 1997/2.

<sup>4</sup> OECD (2005) Handbook on Economic Globalisation Indicators.

<sup>5</sup> Loschky, Alexander (2008), "Reviewing the nomenclature for high-technology trade – the sectoral approach", paper presented at the 1<sup>st</sup> Meeting of the Working Party on International Trade in Goods and Trade in Services Statistics (WPTGS) of the OECD in September 2008.

economy this approach has become questionable in some aspects. The ways how multinational enterprise groups arrange their production chains (through manufacturing themselves or sourcing whole or part of the production) and supply chains (through direct sales or acquisitions or through distribution centres), are reflected in trade statistics. Consequently, the economic analysis of interlinks between external competitiveness, production, consumption and international trade has become more complicated.

Over the last few years, Eurostat has worked together with the Member States in a project to develop external trade statistics by enterprise characteristics. These statistics are based on linking external trade micro data with business register data<sup>6</sup>. With the help of this link, traders can be related to appropriate statistical units with key characteristics, such as the activity sector or number of employees. During the project, a harmonised set of indicators was defined.<sup>7</sup> The first datasets for reference years 2005 and 2006 will be published in Comext<sup>8</sup> in last quarter of 2009.

These datasets have been defined to cover various aspects of the structure of international trade from the viewpoint of the characteristics. However, for the specific purposes of this study, data are needed for a more detailed level. In order to analyse which goods are actually traded by the high-tech industries and to compare these figures with the ones received through correspondence tables, data must be available for high-tech sectors at detailed level of products.

### ***Data collection***

In November 2008, Eurostat and the JRC requested the EU Member States to provide two datasets for reference year 2006 which would be used for this study. The data were requested for the five high-tech sectors (by ISIC Rev 3.1 / NACE Rev. 1.1):

|  |                                   |
|--|-----------------------------------|
| Medical, precision & optical instruments,    | ISIC 33 / NACE 33;                |
| Pharmaceuticals,                             | ISIC 2423 / NACE 24.41 and 24.42; |
| Radio, television & communication equipment, | ISIC 32 / NACE 32;                |
| Office, accounting & computing machinery,    | ISIC 30 / NACE 30;                |
| Aircraft & spacecraft,                       | ISIC 353 / NACE 35.3.             |

In addition, data on the activity sector “Management activities of holding companies” (ISIC / NACE 74.15) were requested for analytical purposes.<sup>9</sup>

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<sup>6</sup> Business registers are used as a tool for the preparation and co-ordination of surveys on businesses. They detect and construct the active population of statistical units (enterprises, local units and enterprise groups) from administrative units (legal units) and include information on their identification, demographic, economic and stratification characteristics, the control and ownership of units, and links with other registers. In particular, business registers can be used to link trade data to relevant statistical units, thus making trade statistics more coherent with business statistics.

<sup>7</sup> For more details of the project and indicators, please see Nuortila, Karo (2008), “External Trade by Enterprise Characteristics – Eurostat Progress Report”, paper presented at the 1<sup>st</sup> Meeting of the Working Party on International Trade in Goods and Trade in Services Statistics (WPTGS) of the OECD in September 2008.

<sup>8</sup> <http://epp.eurostat.ec.europa.eu/newxtweb/>

<sup>9</sup> ISIC/NACE 74.15 “Management activities of holding companies” includes holding companies of conglomerates.

Concerning the first dataset, the trade value and number of enterprises were requested to be broken down by the Combined Nomenclature (CN) at 8-digit level, separately for intra-and extra-EU imports and exports. For the second dataset, data were requested to be broken down by size-class of the enterprise, according to the number of employees.

### ***Data treatment***

Eventually, 16 EU Member States<sup>10</sup> and one EFTA (Norway) country provided Eurostat with requested data. As the first dataset was requested at more detailed level than any data disseminated at national level or by Eurostat, it was agreed beforehand that data would be aggregated over Member States. Furthermore, in order to ensure that no detailed data could be associated to an identifiable trader, Eurostat applied active confidentiality to the aggregated data. At the first step, data were aggregated to HS6-level<sup>11</sup>. This allowed not only to eliminate most problems with confidentiality but also to include Norwegian data to the aggregated dataset.<sup>12</sup>

After a series of testing of different suppressions options, it was decided to suppress a given NACE/Flow/HS-combination if 1) it contains at least one CN-code with three or less enterprises and 2) if this or these CN code(s) make up more than 80% of the HS6 code concerned. The share of confidential cells at the final data varied from 10.2 % for intra-EU imports to 2.6 % for extra-EU exports, in terms of value. The confidential data were aggregated to HS2 level. For the second dataset – data by size-classes – the treatment for confidentiality was done by the countries.

### **Analysis**

#### ***How good is the “traditional” approach of calculating the trade of high-tech industries?***

As said in the previous chapter, the foreign trade of high-tech industries cannot be calculated directly, as there is no foreign trade data by industries available. Therefore, the product based foreign trade data need to be converted into sectoral foreign trade data. This is done using correspondence tables from the product classification SITC to the industry classification ISIC/NACE. However, this “traditional approach” gives only an approximate indication of what is traded by the high-tech sectors. The “real” composition and the value of the goods traded by the high-tech industries could actually be different and could also vary from country to country. The “high-tech trade by enterprise characteristics” (hereafter shortly called “new” approach) presented in this paper links merchandise foreign trade data to the general business register (sectoral high-tech trade) and allows analysing various aspects. This section compares the “new” with the “traditional” approach regarding the values of the traded goods. This is to assess whether the simpler “traditional” approach gives a good approximation of the traded values. An analysis of the trade composition is offered in the following section.

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<sup>10</sup> Austria, Cyprus, the Czech Republic, Germany, Estonia, Finland, France, Hungary, Italy, Latvia, Poland, Portugal, Romania, Sweden, Slovenia, and Slovakia. Germany provided data only on intra-EU trade. Data from Romania and Norway refer to total trade, without a distinction into intra- and extra-EU trade. In this analysis, they are treated as extra-EU data.

<sup>11</sup> Harmonized Commodity Description and Coding System

<sup>12</sup> The product classification used by Norway differs from the Combined Nomenclature at the 8-digit-level. At 6-digit-level the classifications are identical.

In order to assess whether the “traditional” approach is an adequate way to calculate the value of the goods traded by the high-tech sectors, ratios between the sectoral high-tech trade and the “traditional” approach were calculated (see Tables 1 and 2).<sup>13</sup> A ratio of 1.00 means that the value of the traded goods identified via the linkage of foreign trade data with the business register is equal to the value of the “traditional” approach. A ratio of 0.50 (2.00) means that the value calculated with the new approach is half (double) the value via the “traditional” approach. It has to be underlined that this analysis is based purely on the traded values and does not give any indication on whether the composition of the goods in the two approaches is similar.

**Table 1 Ratio of the “new” sectoral data to the “traditional” data by partner (Imports)**

| ratio of sectoral trade data to traditional approach data | Activity code (NACE Rev. 1.1) |               |                               |                            |                             | Total |
|---|-------------------------------|---------------|-------------------------------|----------------------------|-----------------------------|-------|
|   | 24.41+24.42 (pharmaceutical)  | 30 (computer) | 32 (radio, TV, communication) | 33 (precision instruments) | 35.3 (air- and spacecrafts) |       |
| Extra-community trade                                     | 0.76                          | 0.30          | 0.64                          | 0.30                       | 0.87                        | 0.58  |
| Intra-community trade                                     | 0.49                          | 0.07          | 0.33                          | 0.24                       | 0.60                        | 0.33  |
| Total   | 0.54                          | 0.12          | 0.43                          | 0.26                       | 0.68                        | 0.40  |

**Table 2 Ratio of the “new” sectoral data to the “traditional” data by partner (Exports)**

| ratio of sectoral trade data to traditional approach data | Activity code (NACE Rev. 1.1) |               |                               |                            |                             | Total |
|---|-------------------------------|---------------|-------------------------------|----------------------------|-----------------------------|-------|
|   | 24.41+24.42 (pharmaceutical)  | 30 (computer) | 32 (radio, TV, communication) | 33 (precision instruments) | 35.3 (air- and spacecrafts) |       |
| Extra-community trade                                     | 0.87                          | 0.26          | 0.88                          | 0.81                       | 1.01                        | 0.85  |
| Intra-community trade                                     | 0.55                          | 0.21          | 0.54                          | 0.49                       | 0.74                        | 0.51  |
| Total   | 0.65                          | 0.22          | 0.64                          | 0.58                       | 0.85                        | 0.61  |

From Table 1 it can be seen that the ratio of the “new” sectoral import data to the “traditional” data is only 0.40, i.e. the imports of the high-tech sectors calculated via the linkage of foreign trade data with the business register represent in total only 40% of the imports calculated via the “traditional” approach. For the exports (

Table 2) the ratio is higher with 0.61 but also quite far from 1.00.

On the import side, the ratios are relatively high for only two sectors: the pharmaceutical (0.54) and the aircraft sector (0.68). On the export side however, the ratios are all well above 0.50 except for the office, accounting & computing machinery industry with a ratio of only 0.22.

When differentiating between extra-community trade (Extratrade) and intra-community trade (Intratrade) it can be observed that for Extratrade the ratios are always higher and can reach up to 0.87 on the import side and up to 1.01 on the export side. The respective values for Intratrade are 0.60 for Imports and 0.74 for exports.

<sup>13</sup>

For details on the values of both approaches see Tables 8 and 9 in the Annex.

As a conclusion it can be said that the “traditional” approach to calculate the trade value of the high-tech industries works relatively well for Extratrade but not for Intratrade and it can be observed that the “traditional” approach works better for exports than for imports.

***What is the share of high-tech products in the total trade of the high-tech industries?***

The existing approaches of calculating high-tech foreign trade do not give any indication of how much high-tech is actually traded by the high-tech industries. The new sectoral approach can answer this as it identifies the goods which are actually traded by the high-tech industries and allows calculating the share of high-tech goods (as classified by the OECD<sup>14</sup>) in the total trade of the high-tech sectors.

**Table 3 Share of high-tech goods traded by the high-tech industries**

| Share of HT goods traded by HT sectors              | Activity code (NACE Rev. 1.1) |               |                               |                            |                             | Total |
|---|-------------------------------|---------------|-------------------------------|----------------------------|-----------------------------|-------|
|   | 24.41+24.42 (pharmaceutical)  | 30 (computer) | 32 (radio, TV, communication) | 33 (precision instruments) | 35.3 (air- and spacecrafts) |       |
| Imports   | 26%                           | 48%           | 42%                           | 27%                        | 23%                         | 32%   |
| Exports   | 26%                           | 24%           | 53%                           | 33%                        | 71%                         | 46%   |
| Imports (incl. confidential codes that might be HT) | 27%                           | 51%           | 43%                           | 28%                        | 39%                         | 36%   |
| Exports (incl. confidential codes that might be HT) | 27%                           | 25%           | 54%                           | 34%                        | 72%                         | 47%   |

One expects that the share of high-tech products in the trade of high-tech industries is higher for exports than for imports. This presumption is due to several reasons: 1) High-tech industries often use low- or medium-tech goods as inputs in the production of their high-tech goods. Partially these inputs are imported. 2) Services sector, in particular wholesale and retail companies, play a major role for imports. Hence, to a large extent high-tech products are also imported by non-high-tech sectors. 3) There is an underlying connection between manufacturing and exports. Therefore, it is assumed that the manufacturers are directly exporting the goods they produce.

The data (see Table 3) confirm that the share of high-tech goods in the total trade of the high-tech sectors is higher in exports than in imports. Although this was to be expected the difference is not as pronounced as one would assume it to be. Surprisingly, one industry has even a higher share of high-tech goods in imports than in exports: the Office, accounting & computing machinery sector.

The data also demonstrate that even the exports of the high-tech industries show relatively low shares of high-tech products in their total trade. Only the Radio, television & communication equipment industry and the Aircraft & spacecraft industry show shares above 50%.

Interestingly, the applied active confidentiality<sup>15</sup> does not hamper significantly the analysis. The confidentiality procedure still allows identifying the chapters (2 digit level) of the HS<sup>16</sup> to which the confidential trade belongs. If the respective chapter includes at least one high-tech product we added all confidential trade of this chapter to the high-tech trade. The inclusion of these possible high-tech products

<sup>14</sup> Annex to Eberth, Florian (2008)

<sup>15</sup> See section on data treatment.

<sup>16</sup> Harmonized Commodity Description and Coding System

had no major impact on the shares: In none of the high-tech sectors the export share of high-tech products grew by more than 1.7 percentage points with respect to the shares without confidential trade. On the import side only the aircraft and spacecraft industry shows an elevated difference of 16 percentage points, i.e. the share of high-tech products in the total imports of the air- and spacecraft industry could be anywhere between 23% and 39%.

***What is the share of the high-tech industries in the total trade with high-tech products?***

The preceding section analysed the share of high-tech products in the total trade of the high-tech industries. In contrast to this, this section analyses the share of the high-tech sectors in the total trade with high-tech products.

**Table 4 Participation of the high-tech industries in the trade with high-tech products**

| Share of the high-tech industries in the total trade with high-tech products <sup>17</sup> | Imports | Exports |
|--|---------|---------|
| Extra-community trade  | 47%     | 76%     |
| Intra-community trade  | 20%     | 42%     |
| Total  | 29%     | 53%     |

Table 4 shows two things: 1) The share of the high-tech industries in the total trade with high-tech products is considerably higher for exports than for imports. This could be explained by the fact that high-tech industries often use low- or medium-tech goods as inputs in the production of their high-tech goods which then (in part) are exported. 2) The participation of the high-tech industries in the trade with high-tech products also depends on the trading partner. It is much higher for Extratrade than for Intratrade. This could be a sign of a high degree of division of labour within the European Union where high-tech industries trade a large quantity of unfinished goods (not classified as high-tech products) within the EU and then export the finished (high-tech) goods to third countries.

***What is the share of the small and medium enterprises (SMEs) in the foreign trade of the high-tech sectors?***

According to Commission Recommendation 2003/361/EC<sup>18</sup> small and medium and enterprises (SMEs) are defined as having less than 250 staff, a turnover smaller than 50 million Euros, and a balance sheet total of less than 43 million Euros. For the purpose of the present analysis, SMEs were defined purely on basis of staff size because the turnover and the balance sheet total are not readily available in the

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<sup>17</sup> These are average shares. The shares of the high-tech industries in the total trade with specific high-tech products can range from 0% to 100%. (For the exports of some products the share of the high-tech industries is even over 100%. This is due to confidentiality issues in the export data of certain high-tech products.) On the import side 16% of the products (product codes on HS6 level) were imported predominantly by the high-tech sectors (i.e. more than 50% of the imports of a specific product were done by the high-tech sectors.) On the export side even 42% of the products were predominantly exported by the high-tech sectors. (This does not take into account that products produced by high-tech sectors can also be traded by wholesale companies.) All results mentioned are preliminary and a thorough analysis of the data is subject to future investigation.

<sup>18</sup> Commission Recommendation of 6 May 2003 concerning the definition of micro, small and medium-sized enterprises: <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2003:124:0036:0041:EN:PDF>



business register. The SME shares presented below can therefore only be interpreted as the upper margin of the SMEs' share in the trade of high-tech industries and the real shares are surely somewhat smaller.

There are two possibilities to calculate the participation of SMEs in the trade of the high-tech sectors. One is to use the traded value; the other is to use the number of enterprises.

**Table 5 Share of SMEs in the trade of high-tech industries by value (without differentiation of Intratrade and Extratrade)**

|        |         | Share of the enterprise size class in the total trade of the high-tech sectors |               |                               |                            |                                |       |
|--------|---------|--|---------------|-------------------------------|----------------------------|--------------------------------|-------|
|        |         | Activity code (NACE Rev. 1.1)  |               |                               |                            |                                | Total |
|        |         | 24.41+24.42<br>(pharmaceutical)  | 30 (computer) | 32 (radio, TV, communication) | 33 (precision instruments) | 35.3<br>(air- and spacecrafts) |       |
| Import | <250    | 18%  | 25%           | 10%                           | 40%                        | 3%                             | 15%   |
|        | >250    | 79%  | 42%           | 80%                           | 52%                        | 90%                            | 77%   |
|        | unknown | 4%   | 33%           | 10%                           | 8%                         | 6%                             | 8%    |
| Export | <250    | 21%  | 22%           | 11%                           | 38%                        | 3%                             | 16%   |
|        | >250    | 77%  | 57%           | 81%                           | 57%                        | 93%                            | 78%   |
|        | unknown | 2%   | 21%           | 8%                            | 5%                         | 4%                             | 6%    |

Table 5 shows that in all high-tech sectors the share of SMEs (in the total trade value of the respective sector) is smaller than the share of large enterprises. The flow has no major influence on this. The share of SMEs is especially small for the aircrafts industry with only 3% (which was to be expected due to the high value of the products produced).

The share of SMEs in the trade of the high-tech sectors as a whole is 15% for imports and 16% in exports. These shares are somewhat smaller than the shares of SMEs in the total trade of the manufacturing industries as a whole (3.1 percentage points less for imports and 2.3 percentage points less for exports). However, these differences seem not to be very significant as to draw some conclusions.

The data also allow also for a country specific analysis of the SMEs' share in the trade of high-tech sectors (see Table 6). As to be expected there are country specific differences in the SMEs' participation in the external trade of the high-tech sectors. The value share of SMEs is usually relatively small in big economies (e.g. DE, FR) and in Eastern Member States (e.g. CZ, EE, HU, PL, SK). For the Eastern countries the low share is probably due to the dominance of international companies on the local market.

**Table 6 Value shares of SMEs by flow and country**

|         | Austria | Cyprus | Czech Republic | Germany | Estonia | Finland | France | Hungary | Italy | Latvia | Norway | Poland | Portugal | Romania | Sweden | Slovenia | Slovakia |
|---------|---------|--------|----------------|---------|---------|---------|--------|---------|-------|--------|--------|--------|----------|---------|--------|----------|----------|
| Imports | 20%     | 100%   | 0%             | 8%      | 17%     | 5%      | 11%    | 5%      | 33%   | 100%   | 57%    | 15%    | 20%      | 33%     | 75%    | 33%      | 10%      |
| Exports | 26%     | 100%   | 0%             | 12%     | 18%     | 5%      | 12%    | 5%      | 36%   | 100%   | 66%    | 12%    | 12%      | 39%     | 57%    | 16%      | 12%      |

For detailed country specific data on the trade by size classes please refer to Tables 10 and 11 in the Annex.



**Table 7 Share of SMEs in the trade of high-tech industries by number of enterprises (without differentiation of Intratrade and Extratrade)**

|        |         | Share of the enterprise size class in the total trade of the high-tech sectors |               |                                  |                               |                                   |       |
|--------|---------|--|---------------|----------------------------------|-------------------------------|-----------------------------------|-------|
|        |         | Activity code (NACE Rev. 1.1)  |               |                                  |                               |                                   | Total |
|        |         | 24.41+24.42<br>(pharmaceutical)  | 30 (computer) | 32 (radio, TV,<br>communication) | 33 (precision<br>instruments) | 35.3<br>(air- and<br>spacecrafts) |       |
| Import | <250    | 73%  | 87%           | 80%                              | 88%                           | 67%                               | 83%   |
|        | >250    | 24%  | 3%            | 10%                              | 5%                            | 24%                               | 9%    |
|        | unknown | 3%   | 10%           | 10%                              | 7%                            | 8%                                | 8%    |
| Export | <250    | 72%  | 88%           | 80%                              | 89%                           | 69%                               | 84%   |
|        | >250    | 25%  | 3%            | 11%                              | 5%                            | 27%                               | 10%   |
|        | unknown | 3%   | 9%            | 9%                               | 6%                            | 4%                                | 6%    |

With respect to the number of enterprises<sup>19</sup> (

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It should be noted that the firms importing and the firms exporting within a given activity sector are not necessarily the same. Also the firms trading with other EU Member States (Intratrade) and the firms trading with third countries (Extratrade) are not necessarily identical. This means that when Extratrade and Intratrade are analysed together (as above) the total number of SMEs/large firms is in fact smaller than the sum of the number of SMEs/large firms trading in Extratrade and Intratrade because some (but not all) firms are trading in both, Extratrade and Intratrade. As the number of enterprise for the combined Extra- and Intratrade is not available in the data, it is assumed for the purpose of this analysis that the share of enterprises trading within and outside the EU is the same for SMEs as for large firms. Evidence from earlier studies shows however, that SMEs usually have partners in a smaller number of countries than large firms and that their trading partners are also usually geographically closer. Considering this, the shares of SMEs in the trade of high-tech industries (by number of enterprises) shown in Table 7 are probably too small.

Table 7) the share of SMEs in the total number of enterprises trading with other countries is always higher than the share of large enterprises. The flow has no major influence on this. This together with data by value (Table 5) confirms that concentration rate is very high in external trade. Large enterprises play a dominant role while SMEs usually have only a small trade volume.

### **Conclusions and outlook for further research**

The pilot study by Eurostat and the JRC presented in this paper linked for the first time detailed foreign trade data at the product level to business register data in order to analyse the “real” trade of the high-tech industries.

The analysis of the data showed that the “traditional” approach to calculate the trade value of the high-tech industries via correspondence tables represents relatively well the exports to third countries (Extratrade) but not so well the exports to other EU Member States (Intratrade). The analysis also showed that the “traditional” approach gives a better estimation of the values exported by high-tech industries than of the values imported by them. Therefore, calculating the trade value of high-tech industries via correspondence tables can lead to an overestimation of their trade, especially with respect to their imports.

With respect to the share of high-tech goods traded by the high-tech sectors the data showed that less than 50% of the exports of the high-tech industries are high-tech goods.

Conversely, also the participation of high-tech industries in the total exports of high-tech products is in general only little higher than 50%. However, when regarding only the trade with third countries the participation of the high-tech industries in the total exports is higher than 75%. The relatively low participation in the exports of high-tech goods to other EU Member States could maybe be interpreted as a sign of a high degree of division of labour.

In all high-tech sectors the share of SMEs is smaller than the share of large enterprises. Furthermore, the shares of SMEs in the exports and in the imports of the high-tech sectors are somewhat smaller than the respective shares of SMEs in the trade of all industries.

When further differentiating these results by countries it could be observed that the value share of SMEs is usually relatively small in big economies and in Eastern Member States.

The first analyses of the data resulting from the joint pilot study by Eurostat and the JRC are encouraging and the data should be further exploited, especially with regards to a product-level analysis of the participation of high-tech industries in the trade with high-tech products and conversely of the shares of high-tech products in the trade of high-tech industries.

In addition to a in-depth analysis of the data, the data basis itself should be extended to a wider range of EU Member States and if possible to other OECD Member States and it should also include the trade of other sectors of activity like the wholesale and retail sectors (ISIC/NACE 51 and 52) in order to analyse their share in high-tech trade.

Independently from the analysis of high-tech trade, it would also be interesting to link other enterprise related data from statistics like e.g. production statistics via the business register to the foreign trade data. This could give inter alia new insights into the relation between production and trade of (high-tech) goods.

## REFERENCES

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## ANNEX

**Table 8 Ratio between the “new” and the “traditional” approach of calculating the imports of high-tech sectors**

| Imports  | Activity code (NACE Rev. 1.1) |          |           |          |          |         | Total     | high-tech sectors |
|--|-------------------------------|----------|-----------|----------|----------|---------|-----------|-------------------|
|  | 24.41+24.42                   | 30       | 32        | 33       | 35.3     | 74.15   |           |                   |
| Imports (extra+intra) in 1000 Euros (“new” approach) | 34416571                      | 6520996  | 42777622  | 10869478 | 17696709 | 1822815 | 114104191 | 112281376         |
| Number of HS6 codes                                  | 1447                          | 526      | 1438      | 2048     | 955      | 3206    | 3864      |                   |
| Imports in 1000 Euros (“traditional” approach)       | 74004065                      | 63532591 | 107254751 | 50716762 | 40867727 |         |           | 336375897         |
| Ratio new data / traditional data                    | 0.54                          | 0.12     | 0.43      | 0.26     | 0.68     |         |           | 0.40              |

**Table 9 Ratio between the “new” and the “traditional” approach of calculating the exports of high-tech sectors**

|  | Activity code (NACE Rev. 1.1) |          |           |          |          |         | Total     | high-tech sectors |
|--|-------------------------------|----------|-----------|----------|----------|---------|-----------|-------------------|
|  | 24.41+24.42                   | 30       | 32        | 33       | 35.3     | 74.15   |           |                   |
| Exports (extra+intra) in 1000 Euros (“new” approach) | 41467502                      | 6407536  | 59546327  | 22706595 | 34229851 | 1031066 | 165388878 | 164357812         |
| Number of HS6 codes                                  | 858                           | 537      | 1006      | 1647     | 683      | 2899    | 3352      |                   |
| Exports in 1000 Euros (“traditional” approach)       | 75737195                      | 42265235 | 103123784 | 52215918 | 54159760 |         |           | 327501891         |
| Ratio new data / traditional data                    | 0.65                          | 0.22     | 0.64      | 0.58     | 0.85     |         |           | 0.61              |

Table 10 Share of SMEs by country in the imports of high-tech sectors (by value)

| Reporter       | Size class | Activity code (NACE Rev. 1.1) |      |      |      |      |       | Total |        |
|----------------|------------|-------------------------------|------|------|------|------|-------|-------|--------|
|                |            | 24.41+24.42                   | 30   | 32   | 33   | 35.3 | 74.15 | w/ 74 | w/o 74 |
| Austria        | <250       | 20%                           | 100% | 11%  | 63%  | 100% | 62%   | 25%   | 20%    |
|                | >250       | 80%                           | 0%   | 89%  | 37%  | 0%   | 38%   | 75%   | 80%    |
|                | N/K        | 0%                            | 0%   | 0%   | 0%   | 0%   | 0%    | 0%    | 0%     |
| Cyprus         | <250       | 100%                          |      |      | 100% |      | 100%  | 100%  | 100%   |
|                | >250       | 0%                            |      |      | 0%   |      | 0%    | 0%    | 0%     |
|                | N/K        | 0%                            |      |      | 0%   |      | 0%    | 0%    | 0%     |
| Czech Republic | <250       | 0%                            | 0%   | 0%   | 0%   | 0%   | 86%   | 0%    | 0%     |
|                | >250       | 100%                          | 0%   | 0%   | 0%   | 57%  | 0%    | 9%    | 9%     |
|                | N/K        | 0%                            | 100% | 100% | 100% | 43%  | 14%   | 91%   | 91%    |
| Germany        | <250       | 4%                            | 10%  | 23%  | 39%  | 0%   | 51%   | 41%   | 8%     |
|                | >250       | 91%                           | 87%  | 73%  | 59%  | 100% | 21%   | 37%   | 90%    |
|                | N/K        | 5%                            | 3%   | 5%   | 2%   | 0%   | 28%   | 22%   | 2%     |
| Estonia        | <250       | 68%                           | 100% | 10%  | 87%  | 100% | 100%  | 24%   | 17%    |
|                | >250       | 0%                            | 0%   | 90%  | 13%  | 0%   | 0%    | 75%   | 82%    |
|                | N/K        | 32%                           | 0%   | 0%   | 0%   | 0%   | 0%    | 1%    | 1%     |
| Finland        | <250       | 18%                           | 100% | 2%   | 32%  | 100% | 100%  | 5%    | 5%     |
|                | >250       | 82%                           | 0%   | 98%  | 68%  | 0%   | 0%    | 95%   | 95%    |
|                | N/K        | 0%                            | 0%   | 0%   | 0%   | 0%   | 0%    | 0%    | 0%     |
| France         | <250       | 8%                            | 33%  | 11%  | 33%  | 3%   |       | 11%   | 11%    |
|                | >250       | 84%                           | 27%  | 81%  | 59%  | 84%  |       | 78%   | 78%    |
|                | N/K        | 8%                            | 41%  | 8%   | 8%   | 13%  |       | 11%   | 11%    |
| Hungary        | <250       | 5%                            | 1%   | 4%   | 59%  | 100% | 100%  | 5%    | 5%     |
|                | >250       | 94%                           | 99%  | 85%  | 41%  | 0%   | 0%    | 86%   | 86%    |
|                | N/K        | 1%                            | 0%   | 11%  | 0%   | 0%   | 0%    | 9%    | 9%     |
| Italy          | <250       | 30%                           | 100% | 32%  | 49%  | 7%   | 24%   | 32%   | 33%    |
|                | >250       | 70%                           | 0%   | 68%  | 51%  | 93%  | 76%   | 68%   | 67%    |
|                | N/K        | 0%                            | 0%   | 0%   | 0%   | 0%   | 0%    | 0%    | 0%     |
| Latvia         | <250       | 100%                          | 100% | 100% | 100% |      | 100%  | 100%  | 100%   |
|                | >250       | 0%                            | 0%   | 0%   | 0%   |      | 0%    | 0%    | 0%     |
|                | N/K        | 0%                            | 0%   | 0%   | 0%   |      | 0%    | 0%    | 0%     |
| Norway         | <250       | 100%                          |      | 100% | 35%  |      |       | 57%   | 57%    |
|                | >250       | 0%                            |      | 0%   | 63%  |      |       | 42%   | 42%    |
|                | N/K        | 0%                            |      | 0%   | 2%   |      |       | 1%    | 1%     |
| Poland         | <250       | 14%                           | 92%  | 6%   | 53%  | 11%  | 100%  | 15%   | 15%    |
|                | >250       | 86%                           | 8%   | 94%  | 47%  | 89%  | 0%    | 85%   | 85%    |
|                | N/K        | 0%                            | 0%   | 0%   | 0%   | 0%   | 0%    | 0%    | 0%     |
| Portugal       | <250       | 74%                           | 100% | 8%   | 42%  | 100% | 11%   | 20%   | 20%    |
|                | >250       | 13%                           | 0%   | 91%  | 58%  | 0%   | 89%   | 77%   | 76%    |
|                | N/K        | 12%                           | 0%   | 2%   | 0%   | 0%   | 0%    | 3%    | 3%     |
| Romania        | <250       | 66%                           | 100% | 24%  | 78%  | 27%  |       | 33%   | 33%    |
|                | >250       | 34%                           | 0%   | 76%  | 22%  | 73%  |       | 67%   | 67%    |
|                | N/K        | 0%                            | 0%   | 0%   | 0%   | 0%   |       | 0%    | 0%     |
| Sweden         | <250       | 100%                          | 88%  | 100% | 56%  | 100% | 100%  | 75%   | 75%    |
|                | >250       | 0%                            | 12%  | 0%   | 44%  | 0%   | 0%    | 25%   | 25%    |
|                | N/K        | 0%                            | 0%   | 0%   | 0%   | 0%   | 0%    | 0%    | 0%     |

| Reporter | Size class | Activity code (NACE Rev. 1.1) |      |     |     |      |       | Total |        |
|----------|------------|-------------------------------|------|-----|-----|------|-------|-------|--------|
|          |            | 24.41+24.42                   | 30   | 32  | 33  | 35.3 | 74.15 | w/ 74 | w/o 74 |
| Slovenia | <250       | 1%                            | 100% | 66% | 47% | 100% | 100%  | 46%   | 33%    |
|          | >250       | 99%                           | 0%   | 34% | 53% | 0%   | 0%    | 54%   | 67%    |
|          | N/K        | 0%                            | 0%   | 0%  | 0%  | 0%   | 0%    | 0%    | 0%     |
| Slovakia | <250       | 38%                           | 100% | 3%  | 39% | 73%  | 92%   | 23%   | 10%    |
|          | >250       | 62%                           | 0%   | 97% | 61% | 27%  | 4%    | 77%   | 90%    |
|          | N/K        | 0%                            | 0%   | 0%  | 0%  | 0%   | 5%    | 1%    | 0%     |

Table 11 Share of SMEs by country in the exports of high-tech sectors (by value)

| Reporter       | Size class | Activity code (NACE Rev. 1.1) |      |      |      |      |       | Total |        |
|----------------|------------|-------------------------------|------|------|------|------|-------|-------|--------|
|                |            | 24.41+24.42                   | 30   | 32   | 33   | 35.3 | 74.15 | w/ 74 | w/o 74 |
| Austria        | <250       | 83%                           | 100% | 79%  | 95%  | 100% | 96%   | 92%   | 90%    |
|                | >250       | 17%                           | 0%   | 21%  | 5%   | 0%   | 4%    | 8%    | 10%    |
|                | N/K        | 0%                            | 0%   | 0%   | 0%   | 0%   | 0%    | 0%    | 0%     |
| Cyprus         | <250       | 100%                          |      |      |      |      |       | 100%  | 100%   |
|                | >250       | 0%                            |      |      |      |      |       | 0%    | 0%     |
|                | N/K        | 0%                            |      |      |      |      |       | 0%    | 0%     |
| Czech Republic | <250       | 0%                            | 0%   | 0%   | 0%   | 0%   | 100%  | 0%    | 0%     |
|                | >250       | 100%                          | 0%   | 0%   | 0%   | 100% | 0%    | 17%   | 17%    |
|                | N/K        | 0%                            | 100% | 100% | 100% | 0%   | 0%    | 83%   | 83%    |
| Germany        | <250       | 69%                           | 81%  | 77%  | 88%  | 68%  | 49%   | 68%   | 83%    |
|                | >250       | 24%                           | 11%  | 14%  | 7%   | 32%  | 2%    | 7%    | 11%    |
|                | N/K        | 7%                            | 8%   | 9%   | 5%   | 0%   | 49%   | 25%   | 6%     |
| Estonia        | <250       | 100%                          | 100% | 81%  | 95%  | 100% | 100%  | 91%   | 90%    |
|                | >250       | 0%                            | 0%   | 19%  | 2%   | 0%   | 0%    | 7%    | 9%     |
|                | N/K        | 0%                            | 0%   | 0%   | 4%   | 0%   | 0%    | 1%    | 2%     |
| Finland        | <250       | 68%                           | 100% | 83%  | 92%  |      |       | 88%   | 88%    |
|                | >250       | 32%                           | 0%   | 17%  | 8%   |      |       | 12%   | 12%    |
|                | N/K        | 0%                            | 0%   | 0%   | 0%   |      |       | 0%    | 0%     |
| France         | <250       | 67%                           | 76%  | 81%  | 89%  | 60%  |       | 82%   | 82%    |
|                | >250       | 25%                           | 7%   | 11%  | 5%   | 27%  |       | 11%   | 11%    |
|                | N/K        | 8%                            | 17%  | 7%   | 6%   | 13%  |       | 8%    | 8%     |
| Hungary        | <250       | 72%                           | 82%  | 66%  | 94%  | 100% | 100%  | 80%   | 80%    |
|                | >250       | 28%                           | 18%  | 31%  | 6%   | 0%   | 0%    | 18%   | 19%    |
|                | N/K        | 0%                            | 0%   | 3%   | 0%   | 0%   | 0%    | 1%    | 1%     |
| Italy          | <250       | 80%                           | 100% | 94%  | 97%  | 80%  | 97%   | 94%   | 94%    |
|                | >250       | 20%                           | 0%   | 6%   | 3%   | 20%  | 3%    | 6%    | 6%     |
|                | N/K        | 0%                            | 0%   | 0%   | 0%   | 0%   | 0%    | 0%    | 0%     |
| Latvia         | <250       | 100%                          | 100% | 100% | 100% |      | 100%  | 100%  | 100%   |
|                | >250       | 0%                            | 0%   | 0%   | 0%   |      | 0%    | 0%    | 0%     |
|                | N/K        | 0%                            | 0%   | 0%   | 0%   |      | 0%    | 0%    | 0%     |
| Norway         | <250       | 100%                          | 100% | 100% | 97%  |      |       | 98%   | 98%    |
|                | >250       | 0%                            | 0%   | 0%   | 3%   |      |       | 2%    | 2%     |
|                | N/K        | 0%                            | 0%   | 0%   | 0%   |      |       | 0%    | 0%     |
| Poland         | <250       | 57%                           | 96%  | 79%  | 90%  | 80%  | 100%  | 83%   | 83%    |
|                | >250       | 43%                           | 4%   | 21%  | 10%  | 20%  | 0%    | 17%   | 17%    |
|                | N/K        | 0%                            | 0%   | 0%   | 0%   | 0%   | 0%    | 0%    | 0%     |



| Reporter | Size class | Activity code (NACE Rev. 1.1) |      |      |     |      |       | Total |        |
|----------|------------|-------------------------------|------|------|-----|------|-------|-------|--------|
|          |            | 24.41+24.42                   | 30   | 32   | 33  | 35.3 | 74.15 | w/ 74 | w/o 74 |
| Portugal | <250       | 85%                           | 100% | 79%  | 90% | 75%  | 76%   | 84%   | 85%    |
|          | >250       | 12%                           | 0%   | 14%  | 9%  | 25%  | 12%   | 12%   | 12%    |
|          | N/K        | 3%                            | 0%   | 7%   | 1%  | 0%   | 12%   | 4%    | 4%     |
| Romania  | <250       | 84%                           | 100% | 90%  | 94% | 72%  | 100%  | 92%   | 92%    |
|          | >250       | 16%                           | 0%   | 10%  | 6%  | 28%  | 0%    | 8%    | 8%     |
|          | N/K        | 0%                            | 0%   | 0%   | 0%  | 0%   | 0%    | 0%    | 0%     |
| Sweden   | <250       | 100%                          | 100% | 100% | 95% |      |       | 97%   | 97%    |
|          | >250       | 0%                            | 0%   | 0%   | 5%  |      |       | 3%    | 3%     |
|          | N/K        | 0%                            | 0%   | 0%   | 0%  |      |       | 0%    | 0%     |
| Slovenia | <250       | 56%                           | 100% | 93%  | 95% | 100% | 100%  | 94%   | 93%    |
|          | >250       | 44%                           | 0%   | 7%   | 5%  | 0%   | 0%    | 6%    | 7%     |
|          | N/K        | 0%                            | 0%   | 0%   | 0%  | 0%   | 0%    | 0%    | 0%     |
| Slovakia | <250       | 80%                           | 100% | 74%  | 83% | 100% | 91%   | 87%   | 83%    |
|          | >250       | 20%                           | 0%   | 26%  | 17% | 0%   | 2%    | 9%    | 17%    |
|          | N/K        | 0%                            | 0%   | 0%   | 0%  | 0%   | 8%    | 4%    | 0%     |