

METHODS – APPROACHES – DEVELOPMENTS

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The catchword

Multifunctional consumer price statistics – European and German trends in price statistics

Increasing needs of data users

The monthly consumer price index is the most prominent product of consumer price statistics. The index is for instance used for the calculation of inflation rates and reflects the trends in consumer prices over time. In addition, there are indices that are used to compare consumer prices over space. These are especially the so-called purchasing power parities which are designed to measure differences between the price levels of individual nations both at the European and the international level. In some European countries, prices are also compared within the country and average absolute prices are published for certain types of products. As in Germany, however, the statistics designed for comparisons of consumer prices over time and space are more or less unlinked in most countries. The associated indices are calculated in separate production processes.

However, users increasingly request a coherent and complete system of consumer price statistics. Price statistics are not only to shed light on the phenomenon of rising prices from various perspectives. Absolute prices, regional aspects, and the causes and implications of inflation are to be considered to a greater extent, too. Thus, for instance, the Directorate-General for Health and Consumers of the European Commission requires data on absolute prices that are on average paid for certain consumer goods in the European countries. The relevant information is intended to form an integral part of the Consumer Markets Scoreboard designed to monitor the functioning of the internal market¹. At the same time, the publication programme for purchasing power parities is to be extended to provide more detailed results at the type of product level. As regards Germany, the Statistical Advisory Committee has emphasised the need for price comparisons over space within the country, which would for instance be important for computing real incomes at the regional level.

Eurostat seeks an integration of consumer price statistics

Against the background of tight resources, the question arises how official statistics could fulfil, as efficiently as possible, the user requests for a coherent and rather complete system of consumer price statistics. From the perspective of the main users, i.e. the European Central Bank and the Deutsche Bundesbank, economising at the expense of the quality of the consumer price index would be out of the question. On the contrary, there are even many additional requirements regarding inflation measurement.

In the opinion of Eurostat, the Statistical Office of the European Communities, a possible way of handling increasing requirements could be to adjust the data of consumer price statistics in a way to make them usable for multiple purposes. As data have so far been collected in a largely separate manner for the individual statistics, it could be useful for both an efficient employment of resources and the production of coherent results to create a common price data pool for various evaluation purposes.

The ideal basis would be a common data set including prices of a large number of concrete products in a detailed regional breakdown. This data set could be used for consumer price index compilation, regional and international price comparisons, and the calculation of average prices. The product descriptions would then be harmonised in all statistics so that the information provided by the different statistics would be coherent, too.

¹ Cf. http://ec.europa.eu/consumers/strategy/facts_en.htm.

However, there are differences in the objectives pursued in the individual domains of consumer price statistics. Comparability over time is of utmost importance in relation to the consumer price index. National representativeness, which also plays a major role in this index, is ensured by rather broad definitions of products in Germany. Hence price collectors have the opportunity to consider the local conditions in shops when selecting representative products.

As far as purchasing power parities are concerned, however, the focus is on international comparability. The latter is achieved through common and narrow definitions of typical products. Regarding national representativeness, compromises have to be made in respect of purchasing power parities.

Homogeneity of the defined groups of products is important in calculating average absolute prices so that the latter will be of relevance and can be adequately interpreted. At the same time, the number of individual prices monitored must be sufficient and adequate coverage of the national markets be ensured. As for regional price comparisons within a country, a sufficient number of comparable price observations must be available per region.

It will hardly be possible to achieve all objectives and fulfil all associated requirements by using a single common data set. For this reason, a complete integration cannot be the overall goal. However, there are overlaps in the price observations made for the individual price statistics which could be used for achieving synergy effects in the German system of official price statistics, too.

First feasibility studies in Germany

In Germany, a first step towards integration could be to select, after the completion of field work, price observations for the purposes of the consumer price index and to use these observations for the calculation of purchasing power parities, too (ex post selection).

In the context of pilot projects, a potential ex post selection was already studied for the calculation of regional price differences within Germany² and the computation of national average absolute prices³. As the results show, a multiple use of the data of consumer price statistics can be useful in some areas. In a next step, a planned European project will examine - for a larger number of products - whether the data of consumer price statistics can be used for computing international purchasing power parities. For the time being, this will not entail any changes in the survey processes regarding the consumer price index.

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² Cf. Behrmann, T., S. Deml, S. Linz (2009): *Verwendung von Einzeldaten aus der Verbraucherpreisstatistik für regionale Preisvergleiche*. RatSWD Research Notes No. 36. http://www.ratswd.de/download/RatSWD_RN_2009/RatSWD_RN_36.pdf.

³ Cf. Linz, S. (2009): *Is the Harmonised Consumer Price Index data set useful for the calculation of national average absolute prices?* Paper for the Eurostat Conference on Reviewing the business architecture of consumer price statistics, Luxembourg, 15 - 16 October 2009.

http://epp.eurostat.ec.europa.eu/portal/page/portal/conferences/documents/consumer_price_statistics_documents/Stefan_Linz_aper.pdf.

Methods of federal statistics – Further development

New web portal on international statistics

Additional benefit for users

A large number of sources must often be researched to meet the demand for official international data. Thus, for instance, the database of the International Labour Organization (ILO) contains detailed labour market data, while the website of the International Monetary Fund (IMF) provides further economic figures and the United Nations Educational, Scientific and Cultural Organization (UNESCO) education indicators. Since October 2009, however, the Federal Statistical Office has given access to combined information of this kind through a new web portal.

A major component of this new range of information is a set of about 40 key indicators for more than 180 countries worldwide. The selection of indicators provides a quick statistical overview of each of the countries. In addition, the individual indicators can be used for comparisons between all countries. A country's ranking at the international level, for instance, in terms of population, ratio of physicians, economic growth and CO₂ emissions can be easily determined in this way. Each indicator comes with a definition and its source.

The new website content also includes figures from less familiar sources, such as the International Telecommunication Union (ITU) or the World Intellectual Property Organization (WIPO). In addition to combining a wide range of data, the new web portal contains basic information on more than 30 official providers of international statistics. Also, it provides links to a large number of databases and national statistical offices. This makes the new web portal a good basis for starting profound research.

The new web portal offers both data by country, topic and institution and up-to-date information on new publications, database updates and other developments in international statistics. Furthermore detailed statistical profiles of the 20 major industrialised and newly industrialising countries are available for download. In addition, the total of international tables of the Statistical Yearbook may be downloaded, too.

Technical implementation

The new portal is embedded in the existing website of the Federal Statistical Office. A software called Government Site Builder (GSB) is used for editing purposes. The members of the editing staff use the software to put current notes, links to statistical sources and other information on the internet. However, a large part of the process of information provision is automated: The 40 key indicators for the 180 countries are constantly kept up to date. They are regularly extracted from various databases, are standardised and finally imported to form part of the new website content.

Some technical challenges had to be met before the data flow process could be implemented. A special problem was due to the different formats and structures of the raw data sets offered by the different providers. For this reason, a separate import specification was created for each data source in the MS Access software used to control the process. An 'assistant' programmed in Visual Basics for Applications (VBA) now guides the operators through the process of importing data from different sources.

An automated checking system is in place to examine the data flow during the importing procedure. The information obtained is converted into a uniform storage format. By separating redundant and specific variables, the data are standardised in the same operational step. The whole process is recorded to provide operators with information about the extent and quality of the automated data import procedure. The data obtained in this way can be used for several purposes, although they require different processing for each use.

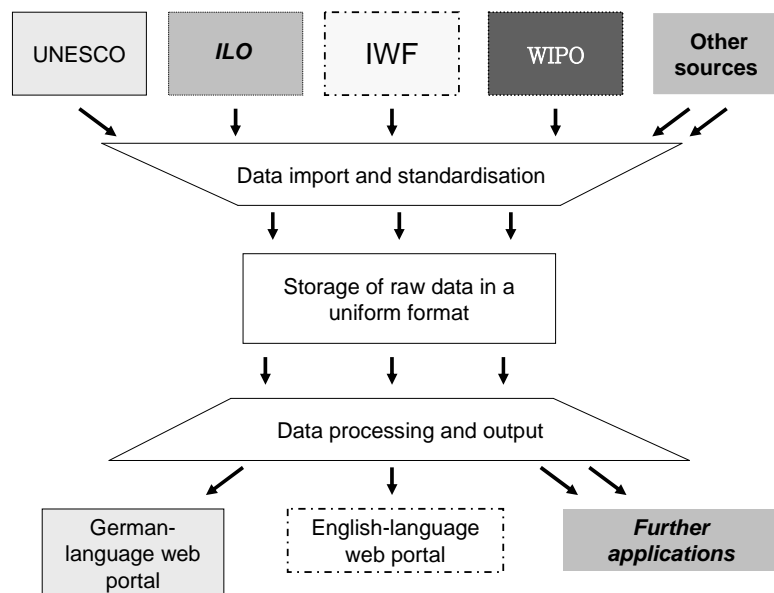
For internet purposes, additional information is added to the raw data in the context of a specially programmed procedure. This information includes, for instance, specific formatting instructions for web presentation (e.g. position and structure of tables), action commands (above all internal links) and metadata such as the German designations of indicators. All this information is combined in XML text files which can be interpreted and published on the internet by means of the GSB.

Further applications of the new database system

The database solution chosen to feed the website content has been designed to rather easily facilitate further applications. This open concept is based, among other things, on a high degree of data standardisation. Thus, for instance, only a relatively small intervention in the system is required in order to store, in addition to the metadata information in German, foreign-language indicator designations and number formats in XML files designed for GSB publication. An English version of the website content has been in place since April 2010.

Furthermore, the Federal Statistical Office's service team providing information on international statistics has increasingly used the new database system as a tool in its work. On the one hand, the new webpage has made the search for information easier and, on the other, the service team now has access to an application which outputs the raw data of the database in the user-friendly Excel or PDF format. In the medium term, this solution will be expanded by creating interfaces to other programs used at the Federal Statistical Office (e.g. SAS). Also, long-term series of international key indicators will be imported for internal purposes.

Another possible application is the semi-automated compilation of publications for which data have so far been collected without any technical support. This, for instance, refers to the tables of the international section of the Statistical Yearbook. Currently, first test runs are carried out for a database-assisted production of these tables. Also, the new database system is intended to be used for the compilation of detailed statistical country profiles, which will be made available as PDF downloads.



Internet address

The new website content can be accessed at www.destatis.de → [Internationale Daten/Internationale Statistiken](#).

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Calculating raw material equivalents for imports

In 2002, the German Federal Government introduced the vision of a national sustainability strategy in “Prospects for Germany”. To allow measuring the effectiveness of that strategy, 21 indicators were selected and most of them were given clear targets. The target developed under the keyword of “intergeneration equity” is a more economical and efficient use of resources. The indicator of “raw material productivity” is one of the measurement tools. Raw material productivity is obtained by the ratio between the gross domestic product and materials used. The target is to double it by 2020 compared with 1994.

So far, the volume of materials used has been measured as the weight of raw materials withdrawn in the domestic territory and of the imported goods (raw materials as well as semi-finished and finished products). However, in terms of weight, the imported materials generally represent only part of the raw materials used for their production (ores, energy sources, etc.). Consequently, measuring raw material input by means of those values gives an incomplete picture of the weight relations. The existing raw material indicator would show an increasing productivity if, for example, raw materials withdrawn within the economic territory were replaced by imported semi-finished and finished products. Also, shifting imports from raw materials to products at a higher level of processing (for instance, from iron ore to pig iron or steel) would result in a (supposed) progress in productivity.

Within the scope of a research project, possible methodological improvements of the raw material indicator were studied to remedy that shortcoming. For that purpose, the entire raw material input used for the production of imported goods was determined. The quantities of imported goods were converted to so-called raw material equivalents. Those do not refer to the actual weight of the goods but to the direct and indirect raw material input, i.e. the weight of all raw materials used across the entire production chain to produce the imported goods.

Calculating imports in raw material equivalents

The methodological approach¹ applied to calculate raw material equivalents is based on a multi-stage procedure connecting the input-output analysis with results of process chain analyses (see chart). Every step is performed separately for each of the 56 types or groups of raw materials, so that the figures can be added up across all raw materials and all economic activities. Hence the results are equally suited for economic productivity studies and analyses at the raw materials level (e.g. balances of specific metals).

German imports comprise both goods at a low level of processing (raw materials, base materials, selected semi-finished products) and those at a high level of processing, i.e. those involving a long chain of intermediate consumption (especially finished products and some semi-finished products). The process chain analysis is applied to the group of imported goods which are at a low level of processing. That analysis uses direct information on the relevant raw material input used abroad for the production of specific imported goods in the form of so-called import coefficients (expressed in tonnes of raw material per tonne of product)². It is integrated in the calculations through detailed physical material flow tables. Material flow tables use physical (non-monetary) units to show the volume and use of raw materials up to the first stage of processing them into base materials (first products made of the raw materials – such as pig iron or primary aluminium) or semi-finished products.

1 The project was carried out by the Federal Statistical Office, with financial support provided by the Federal Environment Agency. For details see project report: Buyny, S., Klink, S. and Lauber, U.: Verbesserung von Rohstoffproduktivität und Ressourcenschonung – Weiterentwicklung des direkten Materialinputindikators, Wiesbaden 2009. Published as an online publication at www.destatis.de (path: Umwelt – Umweltökonomische Gesamtrechnungen – Publikationen - Energie, Rohstoffe, Emissionen).

2 The import coefficients were determined within the scope of an external project by IFEU-Institut on the basis of the process chain analysis. For details see project report: Institut für Energie und Umwelt im Auftrag des Statistischen Bundesamtes: „Ermittlung und Bereitstellung von Koeffizienten zum Rohstoffeinsatz bei Importgütern“, Heidelberg 2007, published as an online publication at www.destatis.de (path: Umwelt - Umweltökonomische Gesamtrechnungen - Publikationen - Energie, Rohstoffe, Emissionen).

For goods at a high level of processing, however, raw material input is obtained by means of the input-output approach. That approach uses the information on domestic production-related interrelationships that is contained in the input-output tables. The starting point of the input-output approach is the existing monetary input-output tables, which are compiled as part of national accounting. To determine the raw material equivalents of imported semi-finished and finished products, an extended mixed physical-monetary input-output analysis¹ is carried out for every type of raw material. That analysis combines the results of the material flow table calculation (in tonnes) with the input-output approach (in euros).

Although the simple use of the input-output tables takes account of economic interrelationships, its results do not necessarily reflect the actual raw material input abroad. The approach is based on the assumption that foreign production processes are subject to the same conditions and comparable prices as the German processes. However, this can be assumed only for part of the products from specific countries. Consequently, the results of the input-output calculations may be interpreted as the volume of raw materials saved in Germany through imports.

To correct that situation, the above import coefficients are integrated into the calculations for selected goods generally not produced in Germany. This requires calculations at a much more detailed level of breakdown than that of the input-output tables (71 homogeneous branches). For that purpose, so-called product matrices are used. They provide detailed information on the use structures of goods in the economy and serve as a basis for the input-output tables. At that level, the coefficients obtained in an external project are linked to the import data in tonnes for the selected goods (unless they have already been included in the material flow tables) and are integrated into the calculation. The result again is the indirect input of raw materials in imports – but this time the result has been corrected with regard to the raw material input for the selected goods.

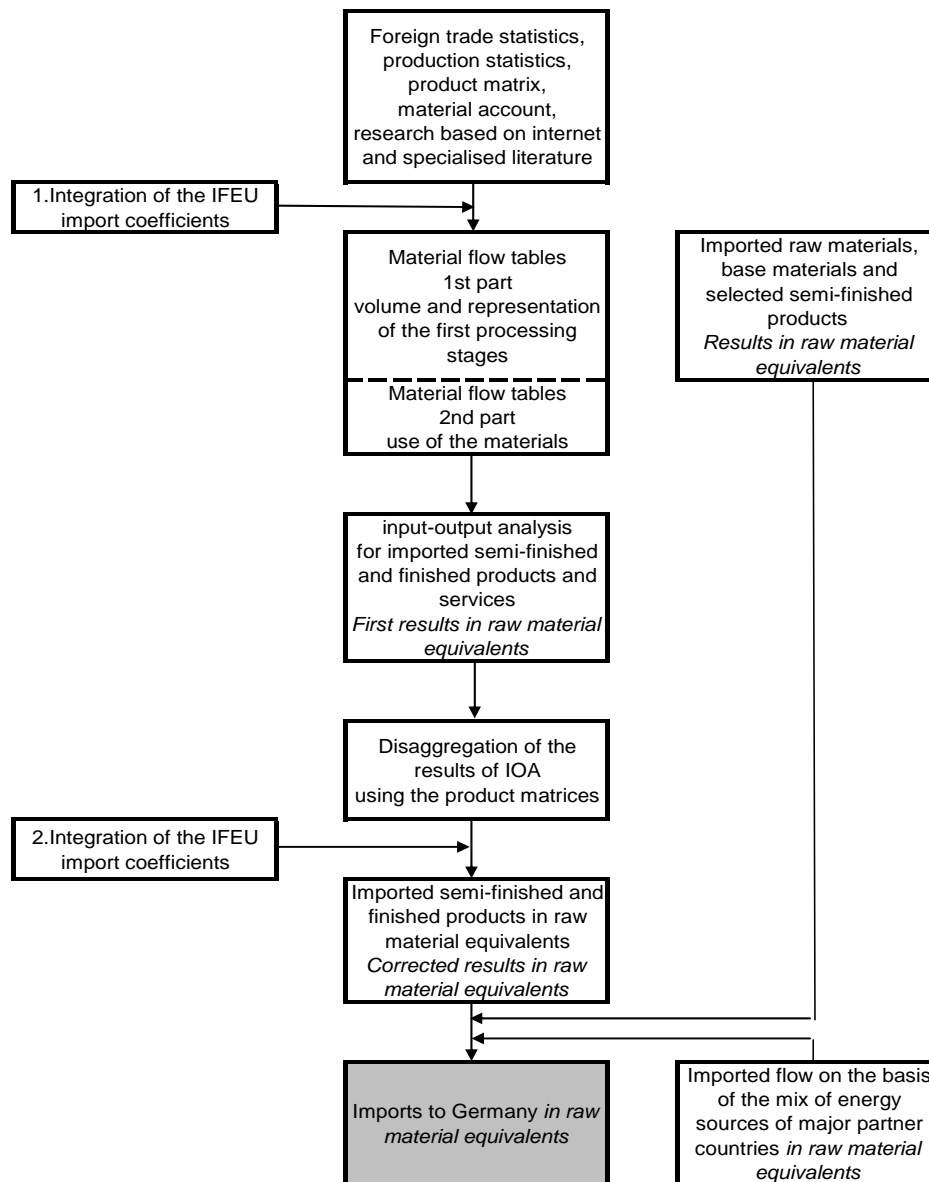
So the import coefficients are used at two points in the calculations. First, they are a major element in compiling the material flow tables for the raw materials or base materials. Second, they are an additional element for the input-output analysis. Here, the physical data on the import coefficients for individual products replace the monetary data from the product matrices (e.g. for cotton fabric, coffee and rice).

What is finally obtained is the imports to Germany in raw material equivalents as a sum total of the results of various ways of calculation:

- the raw material equivalents of the imported raw materials, base materials and selected semi-finished products from the compiled material flow tables with the integrated import coefficients (just under 50% of the results),
- the raw material equivalents of the imported semi-finished and finished products from the mixed input-output analysis with the integrated import coefficients (just under 50% of the results),
- the raw material equivalents of the imported services from a mixed input-output analysis (under 1% of the results), and
- the raw material equivalents of the imported flow on the basis of the mix of energy sources of the major partner countries from which Germany receives electricity (under 1% of the results).

1 In part also referred to as hybrid analysis in the literature.

Chart: Calculation of imports in raw material equivalents



The project results allow performing detailed analyses of direct and indirect raw material input. In addition, there are currently discussions at the expert and political levels on whether the calculations in raw material equivalents should be supplementary to, or possibly replacing the raw material indicator of the national sustainability strategy. In our opinion, relevant decisions cannot be based on scientific arguments alone but have to be taken by political decision-makers on the basis of the goals to be achieved.

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Geo-referencing in agricultural statistics

The geo-references of agricultural and forestry holdings will for the first time be determined for the 2010 census of agriculture by official agricultural statistics.

Geo-referencing

The term “geo-referencing“ may be used to describe the assigning of geo-coordinates to agricultural and forestry holdings. Generally, geo-referencing means adding a spatial reference to a data record – in agricultural statistics that would be the data record of an agricultural or forestry holding. A direct spatial reference describes the location of the holding by means of two or three-dimensional coordinates. An address may also be used to specify the spatial position but is an indirect spatial reference and much less precise than a set of geo-coordinates¹.

Usually, the locations of the holdings covered by agricultural statistics are known² (“address of the holding’s location“) and stored in the register of agricultural holdings³. Geo-referencing aims to convert the indirect spatial reference, i.e. the address of the holding’s location, into a direct spatial reference, that means (geographic) coordinates have to be assigned to each address.

Assigning sets of geo-coordinates

Based on the addresses of the holdings’ locations as stored in the register of agricultural holdings and a stock of data containing addresses and their coordinates (“geo data“), coordinates can be assigned to the addresses of the holdings’ locations by means of a matching procedure. However, various problems may arise when addresses are being matched. On the one hand, the hit rate in address matching is reduced by differences in the spelling of addresses (e.g. use of abbreviations, special characters or differing notations for umlauts) and the currentness of the addresses contained in the data stocks. On the other, there may be problems with the register setup, for instance if the register fields relevant for matching data are not maintained, if they are empty or contain mistakes (transposed digits, typos, etc.). This also leads to a lower hit rate. To reduce the impact of these sources of error, the data have to be thoroughly edited before addresses are matched.

For that purpose, the address data of the register and of the geo data stock were harmonised in a first step, i.e. to standardise the spelling of the various addresses they were taken from a reference data file. The set of reference data used was the datafactory streetcode, a comprehensive and up-to-date list of the roughly 1.2 million streets in Germany, which is sold by the postal services operator Deutsche Post and updated at quarterly intervals.

After the spelling of the addresses had been standardised, the addresses of the holdings’ locations from the register of agricultural holdings were checked formally and corrected where necessary. It was for instance checked whether the post code and the city contained in the address of the holding’s location was in conformity with the Official Municipality Code of the holding and whether the street quoted in the address actually exists in that city.

Then the addresses of the holdings’ locations and the address data from the stock of house coordinates were linked with each other in several runs of a matching procedure using varying combinations of address elements. Whenever pairs of addresses could not be found in the process or several addresses from the house coordinates were eligible, this was recorded and these cases had to be dealt with one by one.

1 For explanations and definitions see www.geoinformatik.uni-rostock.de, www.wikipedia.de (both accessed on 1 December 2009).

2 The holding’s location is the plot of land on which the (main) farm buildings of a holding are situated. If the holding does not have any agricultural buildings, the piece of real estate from which the holding is managed is regarded as its location.

3 The register of agricultural holdings is kept for the purposes of agricultural statistics and used, for instance, for mailing survey documents, defining groups of respondents and assigning administrative data to survey data.

Based on specifications provided by the Federal Statistical Office, the Staatsbetrieb Sächsische Informatikdienste developed a specific program to carry out the steps described above.

Benefits and shortcomings of geo-referencing

On the one hand, geo-referencing the register of agricultural holdings has many advantages. For instance, new and standardised address fields, address spelling and rules for maintaining addresses were introduced in the course of address verification and enhancement. This has improved the quality of the addresses of the holdings' locations stored in the register. The geo-coordinates of the holdings also open up new ways of evaluating and presenting the results of agricultural structure surveys. The advantage of using the coordinates of the statistical units considered is that these units are precisely localised. Neither changes of administrative borders nor the size of administrative units have any impact on that localisation. The geo-coordinates also make it possible to evaluate the data with a view to what is needed – for instance presenting the location of agricultural holdings in certain nature areas – and to consider spatial data (in particular of soil and climate), which play an important part especially in agriculture. That makes it much easier to assess the regional effects of agricultural and environmental policy measures on agricultural production and on the agri-environment.

On the other hand, a considerable amount of preparatory work had to be done to include geo-references into the register of agricultural holdings, for example conceptual work, programming work to adapt the register and develop the above program. In the course of geo-referencing, it turned out that much effort was needed to deal with unclear address assignments when overlaying the addresses of the holdings' locations with the house coordinates and to determine geo-coordinates in cases where such data were not available. These tasks and the work which had to be done to keep the geo references in the register of agricultural holdings up to date increased the effort of maintaining the register of agricultural holdings considerably in some respects.

Outlook

In accordance with the Agricultural Statistics Act¹, the survey data of the 2010 census of agriculture may be assigned to square territorial units of at least 100 hectares (= 1 km²). Therefore, presenting the data by means of geographical grids or in raster maps² would be a good option. As the minimum size of the grid cells is fixed, the possibility of allocating data to a specific point in space is ruled out and the spatial aggregation of the data is ensured. To guarantee statistical confidentiality, further measures may have to be taken before publication so that no individual data are disclosed. It is planned to develop an appropriate release concept for the survey data of the 2010 census of agriculture so that it will be possible to make graphic representations available to the public in 2012 at the latest.

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1 Agricultural Statistics Act (AgrStatG) as published on 17 December 2009 (Federal Law Gazette I p. 3886).

2 See Szibalski, M.: "Karten in der amtlichen Statistik" in WiSta 3/2006, p. 205 ff.

Events

Scrutinising statistics – Berlin Information Point holds background briefings for users in the capital city

The communication with users is an essential pillar for the dissemination of statistical information. Direct communication enables a valuable exchange of specialist statistical knowledge and gives an insight into whether statistics are accepted by the public at large. It also helps to find out the actual value of the data provided.

In this context, and in co-operation with statistical experts from the Federal Statistical Office, the Berlin Information Point holds background briefings on selected subjects and cross-cutting issues of official statistics for users in the capital city. Apart from offering an opportunity for the presentation of new data and trends, these events are well attended forums for subject-related and methodological discussions with guests from the political, economic and scientific communities. The background briefings usually take place immediately after press conferences of the Federal Statistical Office so that the audience receives first-hand and highly topical information.

The first background briefing was held on the 2007 gross domestic product, together with the then President, Walter Rademacher, and expert colleagues from the national accounts department. It took place on the premises of the German Chamber of Industry and Commerce (DIHK) on 16 January 2008. More than 50 representatives of politics, business, associations, science and research attended the nearly three-hour event and discussed the recent economic development in Germany and the Euro area.

The series of events was continued in November 2008 with a conference on the Data Report 2008, which was organised in co-operation with the Social Science Research Center Berlin (WZB) and the GESIS Institute Mannheim, and a background briefing on the 2008 gross domestic product. Both events were hosted at the Berlin Information Point, the Federal Statistical Office's branch office in the capital city. Other events included an expert discussion on the Statistical Yearbook 2009, which focused on the "economic development and foreign trade of Germany and major partner countries during the economic crisis", and the presentation of results of the 12th co-ordinated population projection by statisticians from the Office's population statistics unit. Thus far, the last background briefing was held on 14 January 2010 and – following the by now established tradition – dealt with the 2009 gross domestic product. During the event, papers were presented on the general economic trend, on the impact of the international financial crisis on public finance in 2009, and on labour market trends in Germany in 2009.

By now, these background briefings have become a series of lectures at the Berlin Information Point that are received with great interest. The next background briefing will be held when the Statistical Yearbook is published at the end of September 2010. It will focus on "20 years of German unity". In this context, Destatis is going to publish a special publication presenting selected aspects of the economy, life and the process of growing together in reunited Germany.

For detailed information on our background briefings and other public relations activities please contact the Berlin Information Point of the Federal Statistical Office.

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