Micro-Moments Dataset (MMD)
linked micro-aggregated data on ICT usage, innovation and economic performance in enterprises

Between 2010 and 2013, Eurostat funded projects that involved linking statistical data from different sources to derive measures of the impact of ICT and innovation on business performance and productivity. 14 European countries took part: Austria, Denmark, Finland, France, Germany, Ireland, Italy, Luxembourg, the Netherlands, Norway, Poland, Slovenia, Sweden and the UK.

The variables for the linked datasets were drawn from 4 main data sources:

- a set of variables pertaining to firms' ICT usage from (1) the Survey on ICT Usage and e-Commerce in Enterprises
- a set of innovation variables from (2) the Community Innovation Survey
- a set of variables describing the economic characteristics and performance of firms, drawn largely from (3) the Business Register and (4) the Structural Business Survey.

In the case of some countries, certain economic performance variables were not found in a typical Business Register or Structural Business Survey. Instead, they were linked in from surveys on skills, international sourcing, ICT investment and innovation.

The period covered by the dataset varies from one country to another, depending mainly on the data available from the Community Innovation Survey and the Survey on ICT Usage and e-Commerce in Enterprises. The longest period is 2000-2010. For more details, see the final report on the ESSLait Metadata Repository¹.

MMD is unique in enabling studies of the economic impact of ICT at company level to be compared across a large sample of European countries. Up to now, it has only been possible to compare the adoption and impact of ICT across a range of countries at aggregated level. However, one of the effects of ICT on industry dynamics that is important for key European policies and contemporary economic research depends on investment at firm level. This policy demand calls for a micro-oriented approach in a cross-country setting. The data-linking project has developed micro-aggregated harmonized industry-level data, using a comprehensive set of metadata.

This micro-aggregated data relates ICT and innovation variables to indicators of economic characteristics and performance on a comparable basis across industry groups and countries. Consequently, data on ICT use can be combined with other aggregate economic data on productivity and growth analysis (e.g. EU KLEMS).

The methodology of the project to link data and develop indicators (depicted in Fig. 1) started with a metadata review designed to establish:

- what data are held in each national statistical institute
- the variables that should constitute the project's core dimensions.

Firm-level data drawn from the sources listed above were assembled and processed to create a set of output datasets in each project country. Being confidential, they were processed in a secure environment. The processing was designed to generate aggregates of firm-level data across one or more dimensions, such as industry group, size class or year. The process also generated certain direct project outputs, such as regression statistics.

The methodology devised to produce the linked data sets is a Distributed Micro-Data (DMD)\(^2\) approach. This refers to the process of compiling conceptually identical indicators at a relatively disaggregated industry level across multiple countries and multiple time periods. During the project, access to the multi-country datasets was confined to a subset of project participants.

The results of this microdata-linking project are based on different types of analytical work falling into one of the 2 overarching groups of project activities:

1. **Data linking**: construction of a ‘metadata warehouse’, used to weight and aggregate ICT use, structural business data and business register data from surveys in all participating countries as comparably as possible, producing DMD; the aggregation process produces estimates of complex indicators (constructed from more than one variable from a survey) and indicators depending on intersections between surveys; this metadata system is also used to generate datasets on a highly comparable basis for firm-level regression analysis within countries.

2. **Study of ICT impacts**: industry / country-level analysis of ICT impacts, using the

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large dataset produced by the distributed microdata analysis system; indicators are highly comparable, and reliable comparisons can be drawn between industries /countries and over time.

The final output of the microdata-linking project, which researchers can obtain from the Eurostat Safe Centre, is a cross-country dataset containing indicators of underlying distributions and correlations tables - the Micro-Moments Database (MMD). The MMD tables were created in several steps to ensure that:

a) harmonized cross-country and cross-industry information on ICT use at firm level would be made available;

b) national confidentiality rules would be protected. The distributed micro-data method was used for this reason. It comprises 3 steps, involving data harmonization, linking and aggregation:

1. The micro-aggregated cross-country datasets were created from linked national micro-datasets containing variables from different surveys listed above.

2. These micro-datasets were then aggregated by industry, size classes and age classes of firms to create tables of different aggregation types. The underlying population of the tables (at national level) does not usually allow individual businesses to be identified. However, this cannot be ruled out, as data were not controlled for that purpose.

3. A common protocol was used to extract micro-aggregated information from countries’ harmonised firm-level datasets. This involves the assembly of micro-data by participating NSIs, and the running of common software to retrieve the indicators and statistical moments.

To form an impression of the dataset, look at its aggregated version. This is publicly available in the section of Eurostat's website, dedicated section of the Information Society Statistics (under the heading ESSnet on Linking of Microdata to Analyse ICT Impact (ESSLait), 2013).

This version of the data does not contain all the breakdowns. Moreover, it only contains information about the 5 EU KLEMS-type groups of sectors:

1. electrical machinery, post & communication services
2. manufacturing (excluding electrical)
3. other production
4. market services (excluding post & telecommunications)
5. non-market services.
References


