4.9 The potential of survey micro-data

Why are micro-based indicators needed?

Enterprise-level information on the diffusion of digital technologies is essential to ascertain their impact on firms' business processes, performance and productivity. Such insights can help develop appropriate policies to strengthen business performance in the digital transformation. Unlike sectoral or macro statistics, firm-level data allow heterogeneity of businesses' characteristics to be accounted for.

What are the challenges?

Although National Statistical Offices (NSOs) always produce their business ICT usage statistics from micro-level information, the main objective remains aggregated indicators. In addition, statistical surveys are not designed to be reused in combination with one another and, due to *negative selection* criteria, joint samples tend to be small, skewed towards larger firms and offer limited time series for individual firms.

Confidentiality rules currently prevent micro-data from different countries from being pooled. For example, at the present time, and unlike EU survey data on innovation, anonymised EU survey data on ICT use in business are not available at the Eurostat Safe Centre. Moreover, results from individual analyses are seldom comparable across countries. Nevertheless, NSOs in several countries systematically integrate survey data with administrative sources, have started redesigning collection practices, produce new (multi-dimensional and distribution-related) statistics and indicators, or undertake micro-level analysis, including through international research projects.

To demonstrate the potential of ICT firm-level data, the OECD began an exploratory study in 2018.[1] The initial phase explored associations between variables as well as differences in adoption modes across industries or and in relation to structural aspects of enterprises.

The results provide several insights. Two main dimensions explain most of the variability in behaviour of enterprises with respect to ICT usage (from slightly above 50% in the United Kingdom and 90% or more in Italy, Poland and Sweden). The first dimension (contributing up to two-thirds of the explained variability) relates to the organisation and management of production. Its key underlying variables are the diffusion of connected computers among workers, the presence of ICT specialists, IT training of personnel and the adoption of e-business tools (enterprise resource management and customer relationship management). The second dimension is mostly composed of variables related to web-sales, including having a website with cart functionality and the possibility of tracking orders, which do not require in-house technological capability.

Enterprises have been aggregated into three clusters, which hold for all four countries:

1. "Low ICT uptake" - mostly composed of low-tech, relatively small firms;
2. "Only web oriented" - with a large presence of traditional service activities
3. "High ICT uptake"

The four countries differ in the share of enterprises and employment falling into the three clusters, but in all countries labour productivity in the "high ICT uptake cluster" was much higher than those in the other two clusters.

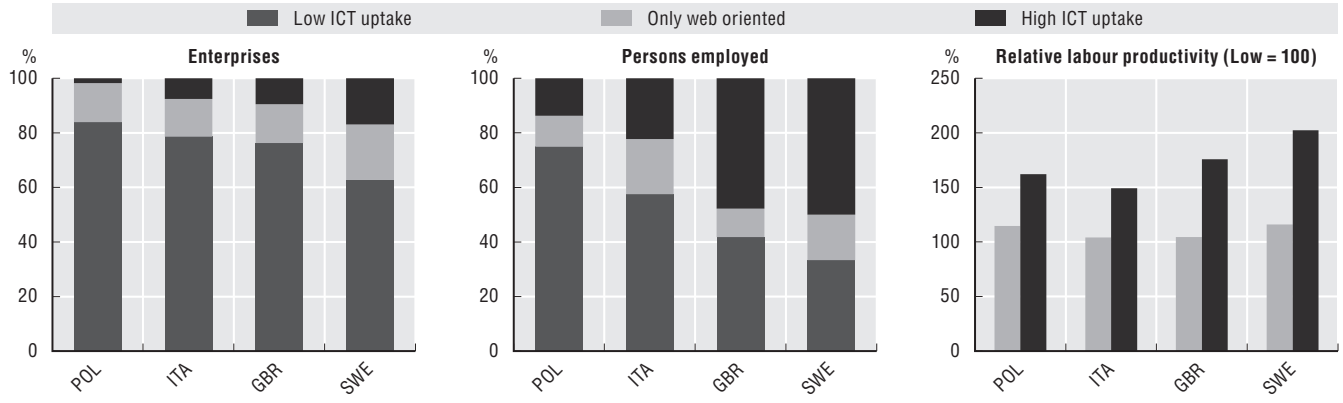
This exploratory analysis also permitted a more in-depth look at enterprise characteristics associated with ICT adoption. Finding, for instance, that while larger, more productive enterprises operating in high-tech manufacturing (HTM) and in knowledge-intensive service (KIS) activities are strongly represented in the *ICT intensive* cluster, this cluster also contains a sizeable component of smaller companies operating in other industries. Further investigation is needed to understand drivers of ICT uptake by these firms.

The Italian statistical institute (Istat) was able to enrich its analysis by adding supplementary variables obtained by linking records from the ICT survey with business archives and registers on workers' characteristics. This showed that the education of the workforce plays a similar role to the diffusion of connected computers in enterprises, and that both capital intensity of production and job tenure play a positive role in the *digital maturity* dimension.

1. Under the aegis of the OECD Working Party on Measurement and Analysis on the Digital Economy (WPMADE), a group of NSOs (from Italy, Poland, Sweden and the United Kingdom) volunteered to perform coordinated micro-data analyses on the 2017 European Community Survey on ICT Usage in Businesses micro-data. The Italian NSO (Istat) developed and distributed the common code.

Business digital maturity countries, 2017

Percentage shares and levels relative to the "low ICT uptake" cluster



Source: OECD, ICT usage by businesses micro-data exploratory project, preliminary results, November 2018. See chapter notes.

StatLink https://doi.org/10.1787/888933930155

Options for international action

The OECD has pioneered a distributed approach to empirical analysis of confidential micro-data. The Organisation provides a common framework through which experts meet and identify common research and policy questions, the indicators and the econometric modelling are agreed upon, and software routines are developed in-house, and then researchers with access to individual countries' micro-data each perform identical analysis and compile results. These are then compared and analysed by the OECD or by participating countries.

A first large-scale and pioneering OECD project based on the distributed approach exploited innovation survey data in 20 countries (OECD, 2009). The latest and ongoing OECD initiatives are the DYNEMP project (https://oe.cd/dynemp), now in its third cycle, which uses business register data to analyse employment dynamics, young businesses and allocative efficiency, and the MULTIPROD project (https://oe.cs/multiprod) on the micro drivers of aggregate productivity. The OECD has also developed a Micro-data lab, which compiles and links large-scale administrative and commercial datasets at the micro level, often requiring licensing agreements. The exploitation of large datasets, for example, on patents, trademarks, design rights, scientific publications and company information, enables analyses of emerging technologies and their links to firms' performance. Several indicators in this publication draw on those datasets.

There have been several efforts in past years to exploit the potential of firm-level survey data on ICT.[2] The ongoing OECD exercise described here shows that this approach has great potential to deliver insights into the digital transformation of businesses, and for collaborative, cutting-edge research. Indeed, a systematic and co-ordinated analysis of the type proposed might lead to the definition of information-rich synthetic indicators, as well as to useful criteria for the selection of variables in surveys. Additionally, the possibility of integrating data from different sources represents a strategic asset for a better understanding of dimensions related to ICT adoption but that cannot be included in surveys due to the need to minimise response burden.

Applying a distributed approach to the analysis of ICT use micro-data represents a pragmatic way of addressing issues of access to confidential data to provide the evidence base needed by policy makers, thereby enhancing the relevance and usability of official statistics. Exercises of this kind also contribute to building the case for the development of linked micro-data as statistical infrastructures in countries and to improved access to micro-data by researchers.

References

Eurostat (2013), ESSnet on Linking of Microdata to Analyse ICT Impact (ESSLait), 2013, https://ec.europa.eu/eurostat/cros/content/final-reporting-esslait-project_en.

Eurostat (2012), ESSnet on Linking of Microdata on ICT usage (ESSLimit), 2010–2012, ESSnet on Linking of Microdata on ICT usage (ESSLimit), 2010 – 2012.

Spiezia, V. (2011), "Are ICT Users More Innovative?:An Analysis of ICT-Enabled Innovation in OECD Firms", *OECD Journal: Economic Studies*, Vol. 2011/1, https://doi.org/10.1787/eco_studies-2011-5kg2d2hkn6vg.

2. For example, the OECD ICT-Enabled Innovation project, which linked ICT and innovation surveys for a few countries (Spiezia, 2011). Other examples are the EU funded project "ESSLimit", which linked ICT, innovation and business surveys for 15 European countries (Eurostat, 2012), and the ESSLait on Linking of Microdata to Analyse ICT Impacts (Eurostat, 2013), which also covered other variables such as exports and ICT skills.

From:

Measuring the Digital Transformation

A Roadmap for the Future

Access the complete publication at:
https://doi.org/10.1787/9789264311992-en

Please cite this chapter as:

OECD (2019), "Roadmap: The potential of survey micro-data", in *Measuring the Digital Transformation: A Roadmap for the Future*, OECD Publishing, Paris.

DOI: https://doi.org/10.1787/d3c7ce79-en

OECD