Measurement of the Digital Economy
February 18, 2021 DETF-Italy virtual workshop
Chairs' Summary

Background information

1. In 2020, under the G20 Saudi Presidency, work was undertaken on indicators and definitions of the digital economy and a *[Roadmap toward a common framework for measuring the Digital Economy](#)* was established. The Roadmap outlined how the Digital Economy (DE in the following) can be conceptualized and measured.

2. To describe DE developments in G20 countries, the Roadmap recommended a range of already available indicators addressing jobs, skills and growth.[1] Additional indicators on the DE are available or being deployed at the international level addressing ICT access and usage[2]. The COVID-19 pandemic has accelerated the interest in how businesses are leveraging digitalization.

3. From a macroeconomic perspective, the Roadmap included a framework and definitions to assist with measurement of the digital economy consistent with the System of National Accounts (SNA), in proposing the estimation of Digital Supply-Use Tables (D-SUTs) and improvements in the statistical measurement of specific DE components, such as the value of data and of digital platforms.

4. In line with previous DETF G20 achievements the G20-DETF Presidency organised the workshop on "Measuring the Digital Economy" in collaboration with the Italian National Institute of Statistics – Istat and the OECD which was held virtually on February 18, 2021.

5. The workshop aimed at identifying progress and challenges along the guidelines set in the *Roadmap*. In this respect, it focused on the development of Digital Economy Satellite Accounts, including Digital Supply-Use Tables, and the underlying issues in measurement of

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[1] The main sources for these indicators include Labour Force Surveys (LFS), National Accounts, Specific ICT surveys, administrative registers (or surveys) on Education, and the OECD surveys through the Programme for International Student Assessment (PISA) and the Programme for the International Assessment of Adult Competencies (PIAAC).

[2] For a list of available indicators consistent with the pillars underlying the Framework, see the OECD [Going Digital Toolkit](#)

data value. With respect to indicators, it addressed the tracking of digital uptake in business during COVID-19 emergency.

6. In line with the priorities set by the Italian Presidency, the workshop Agenda also included two thematic sessions devoted to the measurement of Artificial Intelligence and of the Digital Gender Divide, respectively. To set the scene for the debate, two Issues notes were circulated to registered participants on Measuring AI and Measuring the Digital Gender Divide through Official Statistics.

7. Participants to the workshop included delegates nominated by G20 countries, the Netherlands and Spain, Regional Cooperation Agencies, the OECD, the European Commission and the United Nations, including UNCTAD, UNIDO, and the UNSD. Throughout the workshop, attendance stood at about 110-120 experts.

8. The Presidency registered an active participation of G20 NSOs, I.O.s and invited guests and the willingness to proceed on the path towards measuring the digital economy.

Digital Economy measurement: progress and challenges

Covid-19 and digital economy developments

9. This area was addressed by Italy, portraying the results of two large multipurpose business surveys administered during 2020. From a measurement perspective, the presentation pointed at the opportunities for monitoring digital developments offered by an integrated, multi-layered approach, which complements statistical registers with census-type surveys addressing behaviours and profiles of enterprises, and with thematic or ad-hoc Structural Business Statistics surveys. These latter were used to ascertain Covid-19 impacts on the adoption of specific technologies and on telework, as well as to monitor business response strategies to the crisis. The results of the surveys hint at a permanent shift in business attitudes towards telework and show a remarkable rise in the uptake of internal communication tools, pointing at a change in strategic behaviour associated with ICT usage intensity patterns.

10. Discussion and comments pointed at the importance of the capability to integrate information from different sources to gain insights, on the role of statistical registers and on

the leverage offered by data collected for administrative purposes to this effect, when they are made accessible to NSOs.

DE Satellite accounts, digital SUTs and the value of data

11. The USA, Japan and Canada presented preliminary results on the estimation of Digital SUTs – measuring both digital and digitally enabled products and industries – and the underlying issues and proposed ways forward. Overall, the three presentations showed progress in addressing specific items and the need for increased collaboration to improve coverage and to achieve comparable results.

12. The USA presentation, in particular, stressed the importance of improving price and volume measures for high-tech products – showing results of work done on the deflation of cloud services – and the possibility of using alternative data sources to bridge the gap in timeliness of official surveys, as well as to properly account for quality changes and new ways of delivery. The USA also presented ongoing measurement work on the value of data, which is focused on produced data as an asset and limited to current prices, while future work will address prices and stock depreciation profiles via the Perpetual Inventory Method.

13. Japan presented the work done for the estimation of a preliminary Digital SUT based on previous benchmark tables complemented by information on e-commerce transactions to the Household sector. The compilation, at this stage, is mostly based on supply-side information.[3] Japan signalled different limitations to comprehensively capture digital industries and services. These include information on labour input, on e-payments, on services by fintech companies, on by segment (product) accounts of platform companies and on current classifications and surveying for digital services. In this respect, it hinted at the inclusion of Big Data as a complementary source to cover the digital field in the future. Finally, Japan proposed a possible extension of the OECD digital SUT approach to simultaneously address the intertwined area of globalization.

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[3] Sources included the Business Census, company financial statements and other supply-side microdata. The categories identified include digitally enabling industries, digital intermediary platforms, platform-dependent firms, e-tailers and digital-only finance and insurance firms.

14. Canada presented how the array of sources available contribute to the compilation of digital SUTs and the DE satellite account and will assist in bridging some information gaps (e.g. by using VAT on remittances by non-resident firms for estimating online service imports). Also, it pointed at the need to improve recording in the business register, for instance by flagging households involved in platform-related production and corporations involved in short-term rentals, and framing non-resident units with large sales on the domestic market. The first digital SUTs is due for publication by mid 2021 and – albeit in line with the OECD framework – will require some simplifying assumptions where information is missing (proportional allocations, industry averages and the like), and will still miss an approach for non-market output and Fixed Capital Formation by industry.

15. The above presentations provided useful examples on how some issues can be addressed, hinted at areas which might require further work and also showed how different pathways are being explored at this early stage.[4] Speakers and participants agreed on the need to continue efforts for harmonization on DE components and classifications to improve comparability, on the usefulness of a structured cooperation with private sector actors to bridge data gaps and on sharing methodologies and approaches to advance in a gradual, step-by-step approach,[5] as well as to update SNA standards.

Developments in classifications and indicators

16. This area was addressed specifically by a presentation by the UNSD. Of particular relevance is the ongoing work to achieve a revision of the 2008 SNA by 2025. In the domain of digitalization, this will benefit from the country experiences mentioned above and of those

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[4] Examples of potential solutions include the use of complementary sources, including privately generated, and of specific methodologies (e.g. for deflation or depreciation). Examples of areas which are still to be fully addressed include labour allocation, more fine-grained information on economic activities and, partly, their classification, or an overarching consideration of the value of data. This last item also constitutes a notable example of how current efforts adopt complementary perspectives and represent a testbed for future action that, in turn, might require agreement on best-practices. Indeed, Canada's preliminary estimates of the value of data in its satellite account were based on a (sum of) costs approach, with refinements to include occupations and time spent on data activities. Japan, instead, adopted an impact-based approach to estimate the effect of data on companies' value added via a production function, deeming it more versatile and reproducible with respect to both cost-based and market-based (i.e. estimated willingness to pay or market price for similar products) methods.

[5] Following the presentation on *Updating the SNA to reflect the Role of Digitalization* to the Oct. 2020 ISWGA Advisory Expert Group, populating digital SUTs could usefully start from the high priority indicators, which include: (a) Output and gross value added of digital industries and their components, (b) Intermediate consumption of digital intermediary services, cloud computing services and total ICT goods and digital services, and (c) expenditures, split by nature of transactions, including estimates of digital trade.

which will be published in the coming months and will entail several novelties.[6] A similar update will be addressing the domains of globalization and of wellbeing and sustainability.

17. A core set of indicators for business and trade statistics is also being developed for the same domains and will be submitted to the UN Statistical Commission in 2022. In parallel, an update of the International Standard Industrial Classification (ISIC Rev.4) and of the Central Product Classification (CPC- v.2.1) is being finalized to include new activities and related products made possible with digitalization, such as online education, 3d printing, robotics, artificial intelligence, cloud technologies, digital intermediaries or fintech crypto assets.

Measuring the adoption of Artificial Intelligence

18. Artificial Intelligence has become a growing priority for the G20 DETF, with agreement on G20 AI principles in 2019, inclusion of an Annex on AI policies in the 2020 Ministerial Declaration, and work on AI and SMEs underway for 2021.

19. Measurement efforts in G20 countries are manifold, but still at a very preliminary stage, just as the deployment of Artificial Intelligence is still limited to a small share of business and relatively few applications.

20. Measurement issues for the case of AI include the operational implementation of definitional aspects (where to set the limits?), and current coverage is very diverse across countries/regions. In particular, AI can be addressed directly or via the usage of specific applications/technologies. Also, surveys include to a different level the areas of skills, future prospects, impacts, ways of acquisition, etc. All these aspects work together in limiting, for the time being, the international comparability of indicators.

21. To this respect the DETF workshop presented the experiences of Canada, The European Union (Eurostat) and Korea in measuring the diffusion of AI through business surveys.

22. Canada followed a gradual approach, starting with a simple Y/N question, further developed in the last wave of its ICT survey on business, distinguishing an array of individual

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[6] These include: (a) a Framework for a satellite account on the digital economy; (b) Recording of data and valuation of free assets and free services; (c) price and volume measurement of goods and services affected by digitalization; (d) crypto assets; and (e) Household production and consumption of digital products.

technologies[7] as well as reasons for using or not using AI for the specific sub-populations. The Canadian experience identified that the quality of responses varied depending on who within the enterprise responded and also identified the related need for simplifying as much as possible this potentially complex subject. As expected, adoption was concentrated in large businesses and in a few industries, while among AI users two applications only (machine learning and automatic speech recognition) were particularly common. The type of applications surveyed might undergo a review in light of these developments and following the evolution of this ever-changing technology.

23. Eurostat's approach to measuring AI adoption within the ICT usage survey in enterprises has evolved as well, from questions embedded in different modules (as for chatbots, robots, or data analytics) in 2020, to a dedicated section of the survey in 2021 where a specific definition is provided, and a broader list of applications is surveyed.[8] The dedicated section also includes a list of possible purposes for AI usage and optional modules on the ways of acquiring AI systems and on prospective usage and hindrances. While other changes might occur in the future, there is a limitation to the depth of surveying imposed by the burden on respondents within a more general vehicle, partly addressed through the *optional* modules that countries can implement.[9]

24. Korea, unlike countries in the European Statistical System and Canada, did not ask for specific applications in its survey and, instead, preferred a direct approach to the usage of AI technologies and services, covering current/prospective usage, purposes and hindrances, in a section dedicated to the introduction of new technologies.[10] Korea expects a substantial increase in the diffusion of AI following the implementation of targeted government actions, aimed also at the creation of an AI national ecosystem.

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[7] Machine learning, virtual agents, automatic speech recognition, face recognition systems and other image-analysis software, hardware with integrated AI, decision management, other.

[8] These include text mining, speech recognition, natural language generation, image recognition and processing, machine learning, robotic process automation, autonomous devices (robots, vehicles, drones).

[9] Individual EU countries included additional AI related questions in ICT surveys (France, Denmark) or expanded coverage and purpose through other Business surveys (Italy). France also provided a definition of AI for surveying explicitly referring the computerization of cognitive tasks "traditionally performed by humans". For a collection of definitions, see the Issues paper on the *Measurement of AI in Official Statistics*.

[10] It is worth noting that in Korea the main way of administering the survey was by means of face-to-face interviews, which greatly helps understanding of questions, albeit at the price of much higher costs.

25. The presentations and the ensuing discussion and comments received indicate that there is a broad recognition that AI adoption is an important topic, and that measurement needs to be improved. Uptake of AI in firms is still low everywhere, apart from large firms and some sectors of the economy. However, this is a rapidly evolving technology and measurement needs to keep up. Moreover, the international comparability of indicators on AI uptake is still quite low, partly due to known issues, such as differences between statistics based on enterprises and establishments, size thresholds, and sectoral coverage.

26. In this respect, there is a growing experience across G20 countries in measuring AI and lessons are being learned – these experiences need to be shared across countries and IOs to help make progress. On the other hand, some flexibility will be required as for what and how we can measure. Also, governments and NSOs might usefully work with the private sector and stakeholders to make progress on measurement in this area. The G20 can play an important role, in calling attention to the importance of better measurement, encouraging sharing of experiences, fostering international comparability, and encouraging cooperation between IOs.

Measuring the Digital Gender Divide

27. Available statistics across all G20 countries already address gender differences through a broad array of items: education (levels and type, including STEM, through archives or surveys), employment (type of occupations and tasks, via LFS and dedicated surveys), as well as usage of the Internet and digital skills (via ICT usage surveys).

28. Other sources could permit to explore previously neglected dimensions. In this respect, the OECD hinted at how patent data, among other administrative data, allow ascertaining women's role in inventions and distinguish their contribution to different technological developments, e.g. ICT-related patents from the other technologies. In a similar fashion, Italy showed how linked employer-employee datasets permit assessing entrepreneurship and careers, again making a distinction between digital industries and other industries. The European Commission further showed how the gender digital divide can be monitored by means of the EU composite (multi-source and decomposable) Women in Digital Index, considering individual dimensions and linking them to other characteristics (e.g. age).

29. Moving from measures of outcome to causes, UNIDO focused on the potential impacts that the digital transformation in manufacturing can have on female employment in this sector. In particular, the over-representation of women in low-skilled and routine manufacturing jobs represents a concrete risk of possible job losses mainly being focused on women. This is reinforced by women's relatively lower endowment of some digital skills and different ability to access and participate in digital means and tools, all factors the affect women's ability to participate in and benefit from the digital transformation. However, comparable studies across countries and over time in this domain are scarce, which generally reflects the paucity of data from different sources. This impinges upon the possibility to draw a comprehensive picture, as measurement requirements are not met.

30. From a policy perspective, by providing measurement tools, statistics can help shape the debate. In this respect, several participants pointed to the role of education and skills development as prerequisites and predictors of many of the outcomes (gaps) observed. From the measurement standpoint, this recalls the importance of linked data – e.g. employer-employee, or individual administrative data with education records – and underlying statistical infrastructures, including access to administrative and private sector data, and improved the dissemination of open data. Also, it calls for coordination between NSOs and with international organisations, to promote standards and move from outcome measures to the analysis of enabling and disabling factors. In this respect, the G20 was considered to play an important leadership role, that might be followed by other countries, notably also developing countries.

Concluding remarks

31. The 2020 G20 Presidency's conclusions on measurement found a strong echo in the Italian G20 DETF Presidency 2021 workshop. With respect to the Roadmap, some significant improvements were presented in the area of digital economy measurement by G20 countries which have already addressed these issues, with other countries ready to engage in this area in 2021. The presentations on this topic showed how the work is still in progress, with several data gaps to bridge, for instance on how to get detailed information on digital activities, labour input and Gross Fixed Capital Formation, and certain methodological approaches to be agreed upon at the international level, as for the case of the valuation of

data, deflation of inputs or depreciation of capital. Enhanced statistical cooperation among G20 NSOs and of these NSOs with IOs is deemed essential in this respect, as well as access to complementary data sources, including private data.

32. These recommendations apply with different nuances also to the measurement of Artificial Intelligence usage in business, where collaboration between NSOs and with IOs is essential to improve comparability, and to develop relevant indicators in general. The measurement of AI, and the quick monitoring of digital technology uptake during the Covid-19 pandemic point to the importance of the development of sound statistical infrastructures, including by means of appropriate legislation for accessing data, improvement of digital skills in NSOs, and enhanced collaboration with the private sector to explore alternative sources of data.

33. Finally, coordination and collaboration among NSOs and with IOs is important also to improve indicators used for measuring the digital economy within the four pillars in the G20 common framework. This was made particularly evident by the presentations and ensuing debate on the Digital Gender Divide, where the use of complementary sources and data linkages hint at causal relationships which, in turn, call for (a) integrated analyses and indicators that could add value to the data already available, (b) the underlying development of analytical capabilities, and (c) the exchange of experiences and methodologies.

34. The G20 DETF 2021 workshop results demonstrated that the 2020 roadmap can help ensure that measurement of the digital economy remains a priority in G20 countries and that adequate efforts are devoted to its implementation. They also hint at the potential usefulness of the roadmap for diffusing good practices in the monitoring of digital economy developments, beyond the G20 itself.