Statistical Journal of the IAOS 36 (2020) 647–655
DOI 10.3233/SJI-200666
IOS Press

Measuring the digital economy in the United States

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Abstract. The United States' Bureau of Economic Analysis (BEA) has recently published statistics exploring the size and growth of the digital economy in response to the interests of the data user community and the international statistical community. BEA independently developed preliminary digital economy statistics but has relied on consultation with other statistical organizations and participation in numerous international working groups aimed at advancing coordinated and internationally comparable digital economy measurement. This report describes BEA's digital economy measurement efforts to date including initial work towards a digital economy satellite account and related research on quantifying the value of "free" digital media the treatment and measurement of data. This report also discusses BEA's efforts to improve price measures for high-tech goods and services, notably internet and wireless services, cloud services, and ride-hailing services. Lastly, the report provides an overview of BEA's measurement work related to digital services international trade.

Keywords: Digital economy measurement, free digital media, high-tech prices, data measurement, internet and wireless services, cloud services, ride-hailing services, international trade in digital services

1. Introduction

Over the past several years, there has been increased interest in measuring the digital economy. While there is no widely adopted official definition of what the digital economy encompasses, there is broad agreement that innovations through digital technology have changed many aspects of life and the economy. Production, consumption, investment, international trade, and the way we conduct financial transactions have all been impacted by technology. The way we do our jobs and carry out our daily activities continue to shift toward increased automation and use of high-tech equipment. The services industry has been transformed with the introduction of peer-to-peer matching services like ride hailing.

The United States' Bureau of Economic Analysis (BEA) has recently published statistics exploring the size and growth of the digital economy in response to the interests of the data user community and the international statistical community. BEA independently developed preliminary digital economy statistics but has relied on consultation with other statistical organizations and participation in numerous international working groups aimed at advancing coordinated and internationally comparable digital economy measurement.

This report describes some of these efforts and provides resources for more in depth exploration of the estimates and methods employed by BEA.

2. Toward a digital economy satellite account

Satellite accounts are supplementary statistics that allow analysis of a particular aspect of the economy, such as spending on travel and tourism or on arts and culture. The methods used to produce satellite accounts are consistent with those used for core economic accounts.

Conceptually, a digital economy satellite account should include all goods and services related to the

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digital economy. However, BEA's earliest published measures were based on goods and services that are primarily digital. Some goods and services categories include a mix of both digital and non-digital goods and services. BEA has been exploring data and methods to overcome the challenges of measuring "partially digital" goods and services to expand the coverage of the digital economy measures. The latest set of BEA digital economy estimates published in August 2020 introduce expanded coverage of the digital economy by including comprehensive estimates of retail and wholesale e-commerce activity and an estimate of cloud services.

2.1. Experimental digital economy estimates

In March 2018, BEA published preliminary estimates of U.S. digital economy gross output, value added, employment, and compensation for the period 2005 to 2016 [1]. In April 2019, BEA published updated digital economy estimates with revised underlying data [2]. BEA has also separately published research on estimating the value of "free" digital media and the measurement and treatment of data stocks and flows in national accounts.

The March 2018 and April 2019 estimates are BEA's initial efforts to lay the foundation for a digital economy satellite account and are the first set of estimates within the framework of the national accounts. Conceptually, a digital economy satellite account should include all goods and services related to the digital economy. Including some aspects of the digital economy will require additional data and research. The BEA measures will continue to evolve as new data and methodologies are used to estimate the value of "partially" digital goods and services and to expand the coverage of the digital economy measures.

Since the initial publication of BEA's digital economy statistics in March 2018, other organizations have published their own estimates of the digital economy's economic impact and guidance on how to consistently and accurately develop these measures. Statistics Canada released their first set of digital economy estimates in May 2019. The digital economy estimates for Canada align closely with BEA's initial estimates. BEA and Statistics Canada continue to collaborate and consult with each other throughout the process of creating these measures. Both BEA and Statistics Canada also continue to work to employ the latest guidance from the Organisation for Economic Cooperation and Development (OECD) on measuring GDP in a digitalized economy which both the United States and Canada are actively involved in developing [3,4].

To further promote comparability across estimates, BEA revised the publication structure for the digital economy estimates in August 2020. The overall scope, or definition, of the digital economy has not changed from the March 2018 report. However, BEA is continuing to expand the coverage of the digital economy estimates to include additional components or to more comprehensively cover components previously estimated.

The updated estimates continue to show the relatively strong growth of the digital economy. Digital economy real value added grew at an average annual rate of 6.8 percent per year from 2006 to 2018 compared to 1.7 percent growth in the overall economy [5]. The faster growth rate of the digital economy helped the digital economy share of the total economy grow from 7.3 percent ($839.0 billion) in 2005 to 9.0 percent ($1,849.2 billion) in 2018.

2.1.1. Methodology

BEA constructed the estimates within a supply-use framework following the same methodology developed for the initial estimates published in the March 2018 report. For that report, BEA first developed a conceptual definition of the digital economy. BEA's ICT sector served as a starting point for the definition of the digital economy. The BEA ICT sector consists of computer and electronic product manufacturing (excluding navigational, measuring, electromedical, and control instruments manufacturing); software publishing; broadcasting and telecommunications; data processing, hosting and related services; internet publishing and broadcasting and web search portals; and computer systems design and related services. BEA's definition is generally consistent with the internationally accepted definition of the ICT sector used and developed by the statistical offices of the OECD and United Nations. While not all ICT goods and services are fully in scope, the ICT sector and the digital economy largely overlap. The BEA estimates include BEA's entire ICT sector as well as additional goods and services determined to be in scope for the digital economy.

Using existing detailed data from the supply-use tables (SUTs), BEA identified goods and services for inclusion in the digital economy estimates. BEA's SUTs include about 5,000 categories of goods and services classified using a commodity framework based on the North American Industry Classification System (NAICS). The U.S. statistical system does not currently have a separate classification system for commodities, which are groups of similar products defined by the characteristics of the product (commodity) itself rather

Table 1
Description of the infrastructure component of the BEA digital economy measures

Infrastructure sub-component	Sub-component description	Status of inclusion
Hardware	The manufactured physical elements that constitute a computer system including, but not limited to, monitors, hard drives, and semiconductors. Also includes communications products and audio and visual equipment products.	Included almost comprehensively
Software	The programs and other operating information used by devices such as personal computers and commercial servers, including both commercial software and software developed in-house by firms for their own use.	Included almost comprehensively
Structures	The construction of buildings intended for the creation of digital economy goods or the provision of digital economy services. The structures category also includes buildings that provide support services to digital products. This includes the construction of data centers, semiconductor fabrication plants, the installations of fiber optic cables, switches, repeaters, etc.	Not yet included; part of ongoing work

than by the production process. At present, BEA uses its own commodity classification system to assign each commodity the code of the industry in which the commodity is the primary product. The foundation for this commodity classification system is the six-digit NAICS code.

Because of the limitations of available data, BEA's initial estimates from March 2018 and April 2019 included only goods and services that are "primarily" digital. Some BEA goods and services categories contain a mix of both digital and nondigital products. For example, the goods category "electronic toys and games, including home video games (excluding cartridges, disks, and tapes)" includes both digital video games and nondigital electronic toys. The latest estimates include items on a partial basis for the first time meaning that only the in-scope portion of an item's value is included in the estimates. The partial inclusion of additional retail and wholesale e-commerce items expands the coverage of the BEA digital economy estimates. Additional data and research are needed to include additional partially digital items in the estimates.

BEA relied on analyst expertise and outside research to select over 250 goods and services categories for inclusion in the digital economy. The appendix of the August 2020 BEA working paper "New Digital Economy Estimates" lists all the goods and services included in the estimates.

2.1.2. Infrastructure

Infrastructure is comprised of the basic physical materials and organizational arrangements that support the existence and use of computer networks and the digital economy; primarily ICT goods and services. Table 1 describes the sub-components included in infrastructure and indicates BEA's coverage of the sub-component in the current digital economy estimates.

For structures, BEA does not currently have data available to separate digital economy-related construction activity from all other construction.

2.1.3. E-commerce

E-commerce is the remote sale of products, or goods and services, over computer networks by methods specifically designed for the purpose of receiving or placing orders. Products purchased through e-commerce are also referred to as "digitally ordered."

In previous BEA estimates of the digital economy there was limited coverage of e-commerce. E-commerce output is generally measured as the wholesale or retail trade margin on digitally ordered goods and services sold over the internet or through some other electronic market. The margin is equal to total revenue earned from online sales less the producer cost of the goods and services. The estimates included the margins for both business-to-business (B2B) wholesale and business-to-consumer (B2C) retail transactions from electronic market establishments. BEA also included some non-margin output in the form of fees for brokers that connect buyers and sellers.

In the August 2020 estimates, BEA used survey data from the U.S. Census Bureau to expand e-commerce coverage by including values of both B2C and B2B e-commerce across the entire U.S. economy (Table 2). BEA used data from the U.S. Census Bureau's Annual Retail Trade Survey (ARTS) to expand the coverage of B2C e-commerce in the digital economy estimates by including retail e-commerce across all types of outlets, or stores, in the economy. For B2B e-commerce, BEA used data from the U.S. Census Bureau's Annual Wholesale Trade Survey (AWTS).

2.1.4. Priced digital services

Priced digital services relate to computing and communication and are performed for a fee charged to the consumer. Additionally, this category includes services that support the digital economy such as computer repair services and digital consulting services.

Table 3 describes how priced digital services are captured in the BEA digital economy estimates. BEA has

Table 2
Description of the e-commerce component of the BEA digital economy measures

E-commerce sub-component	Sub-component description	Status of inclusion
Business-to-business (B2B) e-commerce	Purchasing of goods and services between businesses using the internet or other electronic means. Manufacturers, wholesalers, and other industries engage in both interfirm and intrafirm e-commerce to produce goods and services for final consumption.	Included almost comprehensively
Business-to-consumer (B2C) e-commerce	The sale of goods and services by businesses to consumers, or retail e-commerce, using the internet or other electronic means.	Included almost comprehensively

Table 3
Description of the priced digital services component of the BEA digital economy measures

Priced digital services sub-components	Sub-component description	Status of inclusion
Cloud services, priced	Computing services based on a set of computing resources that can be accessed in a flexible, elastic, on-demand way with low management effort. Remote and distributed hosting, storage, computing, and security services.	Included almost comprehensively; Estimate is derived using additional source data including the Economic Census and Statista's Technology Market Outlook.
Digital intermediary services, priced	The service of providing information on and successfully matching two independent parties to a transaction via a digital platform in return for an explicit fee. The output of these platforms typically consists of the fees paid by the producer and/or the consumer of the product being intermediated.	Not separately identified; part of ongoing work
All other priced digital services	All other purchased digital services (excluding cloud computing and digital intermediation services).	Included almost comprehensively

ongoing research efforts to estimate the value of digital intermediary services. These efforts are described later in this paper.

2.1.5. Calculating results

BEA estimated nominal value added, output, compensation, and employment by industry for the digital economy. After identifying the goods and services included in the digital economy, BEA identified the industries that produce the goods and services using the supply table. Digital economy gross output by industry represents the total value of in-scope gross output produced by each industry across all digital economy goods and services. Value added for the digital economy is derived from the relationship between the industry output for the digital economy and total industry output. This means the ratio of intermediate consumption associated with the industry output for the digital economy is assumed to be the same as the ratio of total industry intermediate consumption to total industry output. Compensation and employment for the digital economy are derived through the same procedure as value added. Specifically, the ratio of an industry's digital economy output to total output is applied to total employment and compensation for the industry.

BEA prepared price and quantity indexes for digital economy gross output and value added in three steps. First, gross output indexes were derived by deflating each digital good and service produced by an industry that is included as part of its gross output from the supply table. Second, BEA derived indexes for intermediate inputs by deflating all commodities from the use table that are consumed by the industry as intermediate inputs in the production of digital goods and services. Domestic and international sources of intermediate inputs were deflated separately by using the import proportionality, or comparability, assumption. Third, BEA calculated indexes for value added by industry using the double-deflation method in which real value added is computed as the difference between real gross output and real intermediate inputs within a Fisher index-number framework.

2.2. "Free" digital media

A growing development in the digital economy is the provision of "free" digital media that is supported by advertising and marketing. The concept of advertising- or marketing-supported media content is not new, but the contribution of digitalization has generated a proliferation of professional and amateur content through online platforms such as social media and streaming services in addition to more traditional outlets such as newspapers.

In the past, households were subject to advertising and marketing messages in exchange for non-digital content provided through outlets such as television and radio – all households had to do was consent to messages by either watching them or otherwise occupying their time during the break in content. A household's contribution to the exchange was limited to paying attention or tolerating the break in content. With digitalization, households are still subject to advertising and market messages, but now the exchange for content takes place online and generally requires households – either knowingly or unknowingly – to submit personal data that can be used to design messages that more effectively target specific households and match specific preferences and needs. A household's contribution to the exchange is expanded by the submission of personal data.

The current treatment of "free" media in national accounts is to treat advertising and marketing expenditures as intermediate inputs into production. In the case of advertising, a transaction is recognized between media content providers and advertising firms, but no transaction is recognized between households and media content providers or advertising firms. In the case of marketing, the function takes place entirely in-house, and no transaction is recognized between households and the marketing firms. In each case, values of final products sold to households reflect the costs of advertising or marketing.

The current treatment for "free" media in national accounts was sufficient in the past when a household's only contribution to the exchange was their mere consent for viewing or avoiding messages. However, with households now contributing personal data to the exchange, interest has surfaced to better understand and measure the household's role. The most likely treatment is some sort of barter transaction between the media content provider and households.

One option is to recognize "free" media content in exchange for households' attention services for advertising and marketing messages. In this case, the transaction could be valued by the content provider's cost of producing the content. Another option is to recognize capital services that underlie the "free" media content in exchange for households' personal data [6]. In this case, the transaction could be valued by the content provider's cost of producing the capital services. Each of these options results in an increase in value-added for the household sector – production of attention services with the first option and production of own-account services with the second option. For the U.S. economy, Nakamura et al. find that the explosion in "free" digital content is partially offset by the decrease in "free" print content, resulting in a modest average annual increase in real GDP of 0.1 percentage point for the period 2005 to 2015 [7].

2.3. Measurement and treatment of data

Consistent with international guidelines, the U.S. national accounts do not currently include stocks and flows of data as an asset. The U.S. accounts include purchased software and own-account software as categories of intellectual property products, and those measures include databases to the extent that databases are a type of software. The value of the information content – i.e., the embedded *data* – is included in the market price of purchased databases. However, the value of the information content is excluded from the measured value of own-account databases – only the cost of preparing own-account data in a format that conforms to the database is included, not the cost of acquiring or producing own-account data.

Recent global conversations among national accountants have focused on the treatment of data as an asset in response to the rapid increase in the collection and use of data among businesses, governments, non-profits, and households. Anecdotal evidence on the value of data as a business asset or commodity is abundant in popular media articles and other outlets. At the end of 2018, two of the largest global data firms – Google and Facebook – had a combined market capitalization of $1.1 trillion and net income before tax of $60.3 billion. The two firms amounted to 5.3 percent of the market capitalization of all S&P 500 firms and 3.6 percent of U.S. domestic corporate profits before tax.

The international statistical community is beginning to make a distinction between *data* and *observations*. *Observations* are naturally occurring and take no effort to create – they do not result from a production process and they may be either digitalized or non-digitalized. In contrast, *data* result when observations have been collected, recorded, organized, and stored in a digital format, yielding information content that can be accessed electronically for reference or processing. The outside temperature, for example, is an observation until it is collected, recorded, organized, and stored in a database for easy access and use for modeling and other analytic purposes.

Data that can be used in production over multiple periods generally appear to fit the asset boundary of national accounts as a fixed asset because they result

from a production process, they are subject to economic ownership, and they provide benefits to their economic owner.

Purchased data products – those that have been sold or licensed – are presumably already reflected in national accounts because they result from market transactions. However, most data products are not transacted in active markets; they are built and maintained in-house. The most likely treatment for own-account data in national accounts is to expand the scope of own-account databases to include the cost of acquiring or producing the embedded data. The most likely valuation method for own-account data is a sum of costs, which could include the cost of collecting, recording, organizing, and storing own-account data.

Under international standards, a sum of costs valuation method includes labor costs, economic depreciation, intermediate consumption, other taxes less subsidies on production, and a net return to fixed capital. When measured correctly, these components should result in a value that is comparable to a market value. In practice, statistical compilers generally estimate own-account measures based on labor costs for relevant occupations plus a markup for the other components. Identifying relevant occupations for data as an asset may be less straight forward than identifying relevant occupations for software and databases because data activities are presumably spread over a broad range of occupations. BEA is currently developing a methodology based on unsupervised machine learning as one way to identify data activities based on the task content of occupations. Very preliminary findings suggest that wage spending alone by private U.S. businesses on just data collection increased from $50 billion in 2005 to $75 billion in 2018—an average annual increase of 3.8 percent. However, of the spending amounts estimated, a sizable portion – about 30 percent – is related to R&D activity that may already be included as capital formation in the U.S. National Income and Product Accounts.

2.4. International cooperation and alignment

In 2017 the OECD Working Party on National Accounts (WPNA) formed the Informal Advisory Group on Measuring GDP in the Digital Economy (the advisory group). Under the leadership of Erich Strassner, Associate Director for National Economic Accounts at BEA, the advisory group has defined a framework and template for Digital SUTs that will help countries develop internationally comparable statistics on the digital economy [8]. The Digital SUTs will allow for the consistent and systematic capture of information on the most important aspects of the digital economy. This type of information is defined as a key priority by the OECD Committee on Statistics and Statistical Policy and in the *System of National Accounts* research agenda.

In December 2019, the OECD invited all members of the WPNA to provide estimates, where possible, for the high priority indicators identified within the Digital SUTs. The OECD is looking to make progress on developing methodologies and obtain feedback for populating the Digital SUTs, even when the methods are experimental or produce incomplete statistics. BEA is currently working to determine the extent to which official national statistics can be used to populate the tables. This work is ongoing.

In addition to work on the Digital SUTs, BEA will continue work to advance the digital economy estimates by expanding coverage and improving international comparability.

3. Related research efforts

3.1. Prices

BEA has embarked on several initiatives with external partners to leverage alternative data sources to improve the measurement of high-tech goods and services prices. So far, new deflators for software and medical equipment were developed and introduced in the 2018 Comprehensive Update of the National Income and Product Accounts. Improved price indexes for smartphones and feature phones were similarly implemented in the 2019 annual update. Research continues in three important areas: internet and wireless services, cloud computing and ride hailing.

3.1.1. Internet and wireless services

BEA, in collaboration with outside partners, conducted research to develop a methodology to disentangle purchases of phones and wireless services when they are bundled together as part of a long-term service contract. Getting the allocation right is especially important for real personal consumption expenditures (PCE) because the price deflators for phones and wireless services exhibit very different trends. The adjusted estimates suggest that real PCE spending currently captured in the category Cellular Phone Services increased 4 percentage points faster than is reflected in published data.

The current effort is to improve the deflators for internet and wireless services. To that end, BEA has obtained survey data that can potentially be used to construct price indexes for these types of services; the data contain information on households' annual payments to wireless and internet providers and features of the plans, including features of the phones that are potentially bundled with the services.

3.1.2. Cloud services

Cloud services – the practice of using a network of remote servers hosted on the Internet to store, manage, and process data – allows small business computing capabilities without the expense associated with purchasing a local server or a personal computer. BEA has contracted with 451 Research, an organization that tracks the cloud services sector, to provide a set of price indexes for cloud services. BEA is exploring using the 451 Research indexes for deflating spending on cloud services in the national accounts. BEA has also contracted with an academic expert to provide an assessment of the potential usefulness and limitations of the resulting indexes.

Expert analysis of the 451 research price indexes suggests that the price deflators currently used in the national accounts are problematic: they likely overstate inflation for this sector and understate the growth of real output [9]. Based on these findings as well as those of other external research, BEA is currently considering implementing these new deflators in the national accounts.

3.1.3. Ride-hailing services

The rapid growth in platform-enabled services has raised questions about the ability of standard data sources and methods to keep up with the rapid changes in this sector. For nominal spending, the concern is that new providers of these services may be missed from the establishment surveys typically used to collect revenue data. There is a similar issue for price indexes. At the same time, the digital revolution has brought novel data sources that could supplement the data underlying the national accounts.

BEA has obtained ride-level data for ride-hailing and taxi services in New York City as a case study for these issues. In a pilot project, preliminary results suggest that price indexes constructed under different assumptions can show very different patterns. Specifically, if one excludes ride-hailing from the sample, the resulting price index shows appreciably faster growth than an index that includes it. Moreover, there is a potential substitution bias problem: indexes that treat ride-hailing and taxi services as the same service show slower price increases than those that treat them as different services. In particular, the now-common practice of dynamic pricing raises challenges to standard price index techniques and suggests new methods will be required for ride-hailing services as well as other platform-enabled services.

To complete this research on ride-hailing, BEA has purchased data for three additional cities (Washington, D.C., Los Angeles, and Chicago). At the same time, BEA is exploring alternative data sources for other types of platform-enabled services such as Airbnb.

3.2. Digital services international trade

Research on digital trade at BEA is ongoing and has focused on three main areas: coordination with international working groups, expansion of existing survey instruments, and research on survey coverage of digital economy firms. BEA has been actively engaged in multilateral efforts, along with other national statistical offices, the OECD, the World Trade Organization, and the International Monetary Fund under the auspices of the OECD Working Party for Trade in Goods and Services, to define a conceptual framework for the measurement of digital trade. New international guidance has defined digital trade as trade that involves digital ordering or digital delivery. That is, the concept of digital trade is defined based on the nature of the transaction rather than the nature of the product itself.

A digitally ordered transaction is one that is conducted remotely over computer networks by methods specifically designed for the purpose of receiving or placing orders. Digital ordering is also known as e-commerce, and it may involve orders of goods or services. Digital delivery involves services provided remotely, in an electronic format, using computer networks specifically designed for the purpose of delivering the service. The concept of digitally delivered services broadly aligns with the concept of ICT-enabled services, with some key differences in covered products and methods of delivery. For example, transactions via phone are covered by the concept of ICT-enabled services but are not considered to be digitally delivered. Digital ordering and digital delivery are not mutually exclusive; many, but not all, digitally ordered services are also digitally delivered [10].

With emerging digital trade measurement guidelines in focus, BEA has initiated the collection of new detail in its International Trade in Services Surveys that

will enable statistics on digitally delivered services to be compiled. BEA added the new questions to its benchmark (BE-120) and quarterly (BE-125) surveys of transactions in selected services and intellectual property. Similar questions are also planned for inclusion in the upcoming Benchmark Survey of Financial Services Transactions Between U.S. Financial Services Providers and Foreign Persons (BE-180).

The new detail requested that survey respondents identify the proportion of their services exports that were performed remotely (from their domestic U.S. office) for a foreign customer located outside of the United States via the Internet, email, text, or phone; likewise, respondents were asked to identify the proportion of their purchased services that were performed remotely by the foreign seller. The new questions, which ask about "remotely provided services", were specifically aimed at measuring trade in services by mode of supply as defined in the General Agreement on Tariffs and Trade [11]. Although digitally delivered services exclude those services delivered by phone, fax, physical mail, and manually typed emails or texts, it is expected that such transactions compose a small part of remotely performed services, so the new measures should be a good proxy for digitally delivered services.

In addition to new details on international trade in services, BEA has also added new questions to some of its surveys of U.S. multinational enterprises to assist in measuring those firms' digital economy activities; BEA collects information on the activities of U.S. MNEs on the benchmark (BE-10) and annual (BE-11) surveys of U.S. direct investment abroad. New questions ask respondents to separately identify sales that were digitally ordered or digitally delivered as well as those that are derived from the operation of digital intermediary platforms, provision of cloud computing services, or advertising sales, which includes placement in digital media.

Finally, BEA continues to evaluate its mailing lists to ensure that its survey coverage adequately captures newly emerging and rapidly growing digital firms. Research will be ongoing to study how firms engaged in digital trade structure their activities to serve foreign markets, including whether they serve international markets from the United States or via foreign affiliates located in regional headquarters or in the local markets that they serve.

4. Conclusion and way forward

There are many other emerging technologies that are creating a profound impact on the production and consumption of goods and services around the world. The use of digital inputs to produce products, artificial intelligence, cryptocurrencies, and 3-D printing are just a few of these emergent technologies. The U.S. statistical system, including BEA, is continuously working to modernize national statistics and conduct research to capture the penetration and impact of these technologies.

Moving forward, BEA will continue efforts to produce digital economy estimates on a regular basis. Through this effort, BEA hopes to identify novel datasets to continue to expand the coverage of the estimates toward the development of a full satellite account. Focused research on aspects of the digital economy such as free digital media, cloud computing, and international trade in services will help BEA to accurately measure today's changing economy. BEA regularly engages with the international community on how to best measure and record digital economic activity. This work is consistent with BEA's strategy to produce statistics that are timely, accurate, and relevant to the public.

Conflict of interest

The authors would like to thank the following individuals at BEA that contributed to the content of this report: Ana M. Aizcorbe, Senior Research Economist; Jennifer Bruner, Economist in the International Economic Accounts Directorate; and Dylan Rassier, Chief of the National Economic Accounts Research Group.

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