Toward a Digital Economy Satellite Account

Erich H. Strassner
United Nations Economic Commission for Europe
Group of Experts on National Accounts: Measuring Global Production
10-12 April 2019
Geneva, Switzerland
Multiyear effort to better measure the digital economy:

- Define the digital economy and capture its contribution to economic growth
- Improve measures of high-tech goods and services
- Estimate the contribution of “free services”
Toward a Digital Economy Satellite Account – continued

• Consistent with the OECD Informal Advisory Group on “Measuring GDP in a Digitalized Economy”

• The 2019 effort is focused on a “refresh” of BEA’s 2018 report, with an emphasis on cloud computing and online platforms

• Efforts are partially funded by the National Telecommunications and Information Administration, U.S. Department of Commerce
Digital-enabling infrastructure is the basic physical materials and organizational arrangements that support the existence and use of computer networks, which are the foundation of the digital economy.

Digital-enabling infrastructure includes:

- Computer hardware
- Software
- Telecommunications equipment and services
- Structures
- The Internet of Things (IoT)
- Support services
E-commerce is the broad term used to describe all transactions involving the purchase and/or sale of goods and services that occur over computer networks.

E-commerce includes:

- Business to business (B2B) e-commerce, including manufacturing and wholesale e-commerce;
- Business to consumer (B2C) e-commerce, including retail;
- Peer-to-peer (P2P) transactions, or what is sometimes referred to as the ‘sharing’ or ‘on-demand’ economy, which involve the exchange of goods and services between consumers facilitated through a digital intermediary.
**Digital media** consists of content that is created, accessed, stored, or viewed on digital devices.

**Digital media** includes:

- Direct-sale digital media sold to consumers in exchange for a fee, either on an item-by-item basis or through a subscription service
- Free digital media—usually supported by advertising or marketing revenue
- Big data that companies collect during their operations and sell to other firms—this could include data on consumer behavior or preferences
Digital Economy Estimates Include:

1. **Digital-enabling infrastructure**
   - Hardware
   - Software
   - Telecommunications equipment and services
   - Structures
   - The Internet of Things (IoT)
   - Support services

2. **E-commerce**
   - Business-to-business
   - Business-to-consumer
   - Peer-to-peer

3. **Digital media**
   - Direct sale
   - Free
   - Big data

- Total economy
- Digital economy
- Hardware
- E-commerce and digital media
- Support services
- Software
- Telecommunications

Percent change

U.S. Bureau of Economic Analysis
Components of the Digital Economy:

- Support services
- Telecommunications
- Software
- E-commerce and digital media
- Hardware

Percent

2017  2007  1997

U.S. Bureau of Economic Analysis
Contributions to GDP Growth

- The digital economy’s contribution to GDP was 0.55% of total 2.2% growth in 2017.
- The digital economy has made only positive contributions to GDP growth over the past 20 years.
The digital economy share of the total economy has grown from 5.9% in 1997 to 6.9% in 2017.

The U.S. digital economy is similar to size as the professional, scientific, and technical services industry and the wholesale trade industry.
Employment and Compensation

- The digital economy supported 5.1 million jobs or 3.3% of total employment.

- Average annual compensation per employee in the digital economy totaled $132,233 compared to $68,506 for the total economy.
Improved Measures of High Tech Goods and Services: Prices

Software: prepackaged, custom, and own-account
  – More appropriate PPI
  – Productivity adjustment to input-cost based indexes

Medical equipment
  – New quality-adjusted price index for electromedical equipment

Communications equipment
  – New and revised quality-adjusted prices (including smartphones) from the Federal Reserve Board
Improved Private Fixed Investment Prices
Fisher Price Indexes

Index Levels (2002=100)

- Prepackaged software
- Custom/own account software
- Communication equipment
- Electromedical equipment

U.S. Bureau of Economic Analysis
Identified additional computer hardware and packaged software investment, as part of the 2012 benchmarking process

- New software investment identified based on detailed receipt lines for “application services provisioning”

- Reallocated selected imports to final demand that impacted servers and storage devices based on a supply chain analysis of “Other, other automatic data processing machinery”
NIPA Private Fixed Investment in ICT Equipment

Current Dollar Investment in Communication and Computers & Peripheral Equipment

Billions

$237.17

$181.45

PFI IT equipment, published

PFI IT equipment, revised

U.S. Bureau of Economic Analysis
Treatment of Data in National Accounts

**SNA recommendations**

- Databases are within scope of the *SNA* asset boundary
  - Exclude value of data in own-account databases
  - Include value of data in market purchases of databases
- No guidance on data as intermediate consumption

**Considerations for data**

- Ownership may depend on institutional factors
- Non-rival and non-scarce resource
- Features of both goods and services
Treatment of Data in National Accounts

• Some sources of data
  – Monetary transactions: traditional purchases
  – Barter transactions: online interactions
  – Government surveys and other required paperwork

• Some uses of data
  – Digital transformation: new products and improved products
  – Artificial intelligence: output = f(capital, labor, data)
  – Internet of Things: “smart” devices
  – Advertising: households exchange data for free content
Experimental Methodologies to Track “Free” Content

Data as household production

– Household production is outside the SNA production boundary
– Is user-generated content outside the SNA production boundary?

Data as a barter transaction

– Advertising-supported media (digital, print, and audiovisual content)
– Marketing-supported information (digital, print, and audiovisual content)
– Sales-supported shopping experiences
### Impact of Tracking “Free” Content

<table>
<thead>
<tr>
<th>Results by Category:</th>
<th>User-generated Content</th>
<th>Digital Content</th>
<th>Audiovisual Content</th>
<th>Print Content</th>
<th>Shopping Experiences</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal GDP in 2016</td>
<td>51B</td>
<td>159B</td>
<td>236B</td>
<td>59B</td>
<td>524B</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>2005-2017</th>
<th>0.04%</th>
<th>0.11%</th>
<th>0.06%</th>
<th>-0.04%</th>
<th>0.03%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Real GDP growth</td>
<td>1995-2005</td>
<td>0.01%</td>
<td>0.11%</td>
<td>0.06%</td>
<td>0.01%</td>
<td>0.06%</td>
</tr>
<tr>
<td>percentage points per year</td>
<td>1929-1995</td>
<td>-</td>
<td>-</td>
<td>0.03%</td>
<td>0.02%</td>
<td>-0.03%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>2005-2016</th>
<th>-</th>
<th>0.12%</th>
<th>0.02%</th>
<th>-0.04%</th>
<th>0.08%</th>
</tr>
</thead>
<tbody>
<tr>
<td>TFP growth</td>
<td>1995-2005</td>
<td>-</td>
<td>0.04%</td>
<td>0.04%</td>
<td>0.04%</td>
<td>0.12%</td>
</tr>
<tr>
<td>percentage points per year</td>
<td>1947-1995</td>
<td>-</td>
<td>-</td>
<td>0.01%</td>
<td>0.04%</td>
<td>-0.03%</td>
</tr>
</tbody>
</table>
Conclusion and Next Steps

By Fall 2019, BEA plans for an update of the Digital Economy Satellite Account with break outs for cloud computing and online platforms

- A first step is profiling MNE data collections for cloud and digital intermediaries

Next steps are many and include updating the satellite account to reflect guidance of the OECD Advisory Group on Measuring GDP in a Digitalized Economy

- Further considerations on the treatment of data, free services
- There is also a need to rethink the statistical infrastructure to support measurement of the digital economy