

Toward a Digital Economy Satellite Account



Erich H. Strassner

United Nations Economic Commission for Europe
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Toward a Digital Economy Satellite Account



- 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



Toward a Digital Economy Satellite Account – continued

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

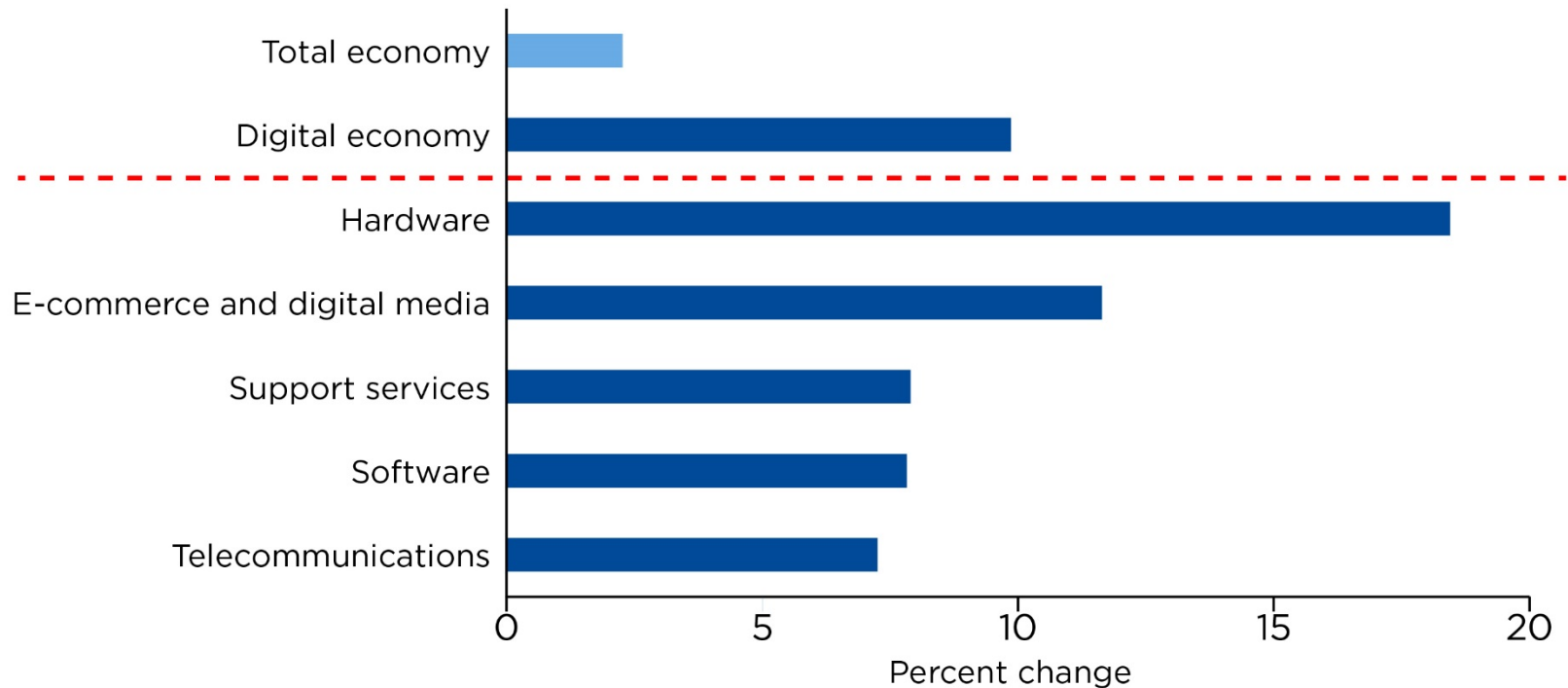
- Business-to-business
- Business-to-consumer
- ~~Peer-to-peer~~

3. Digital media

- Direct sale
- ~~Free~~
- ~~Big data~~

Components of the Digital Economy

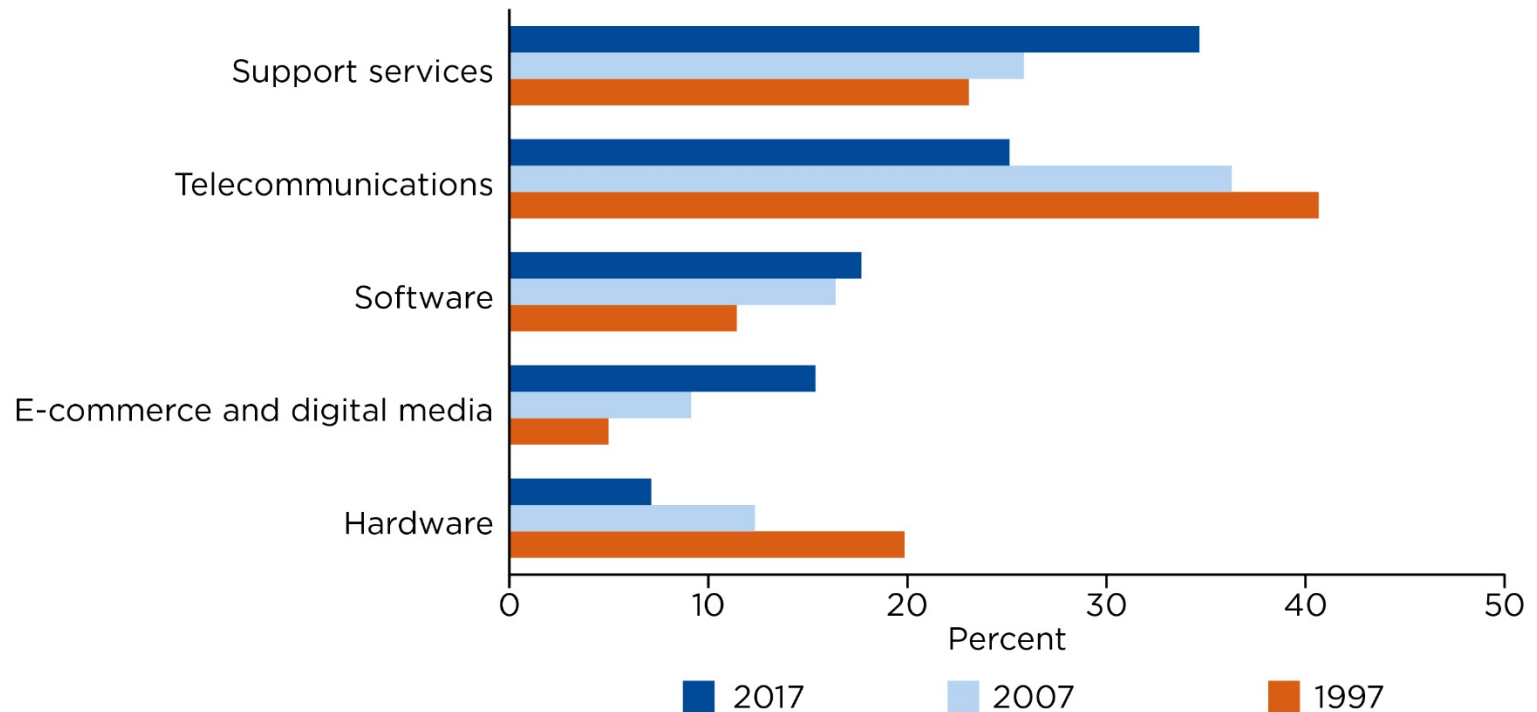
Components of the Digital Economy: Real Value-Added Average Annual Growth, 1998-2017



U.S. Bureau of Economic Analysis

Components of the Digital Economy

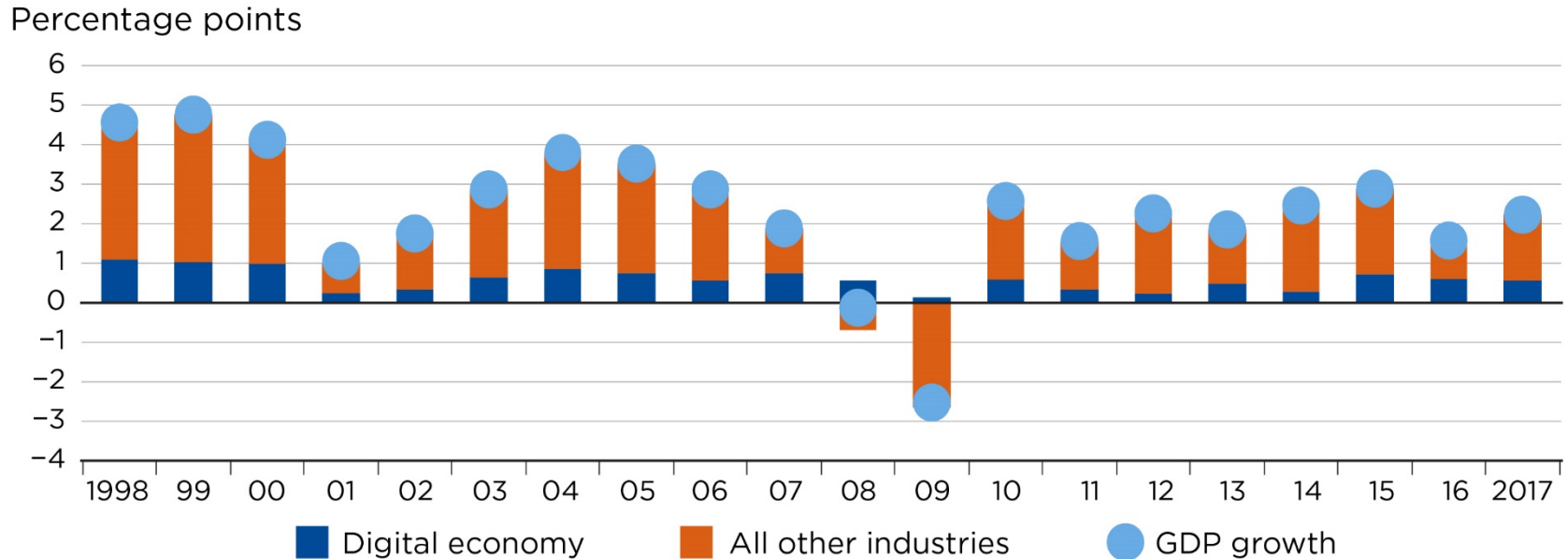
Components of the Digital Economy: Current-Dollar Value-Added Share of Total, 1997, 2007, and 2017



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Contributions to GDP Growth

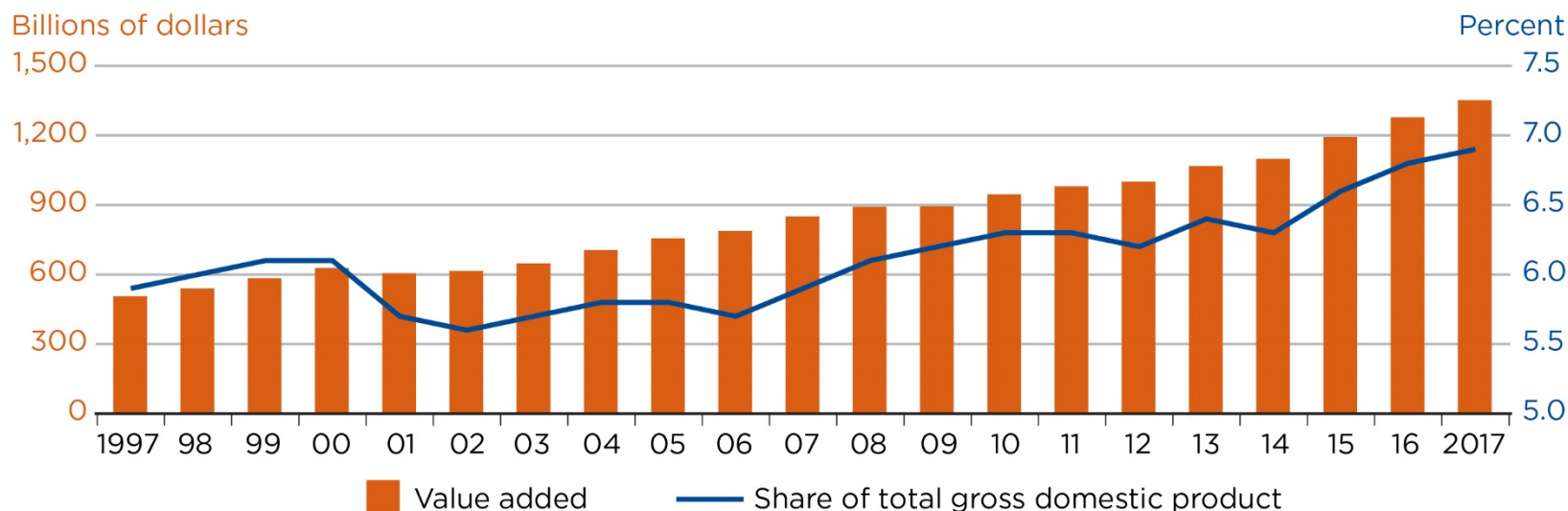
Contribution to Real Value Added



U.S. Bureau of Economic Analysis

- 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.

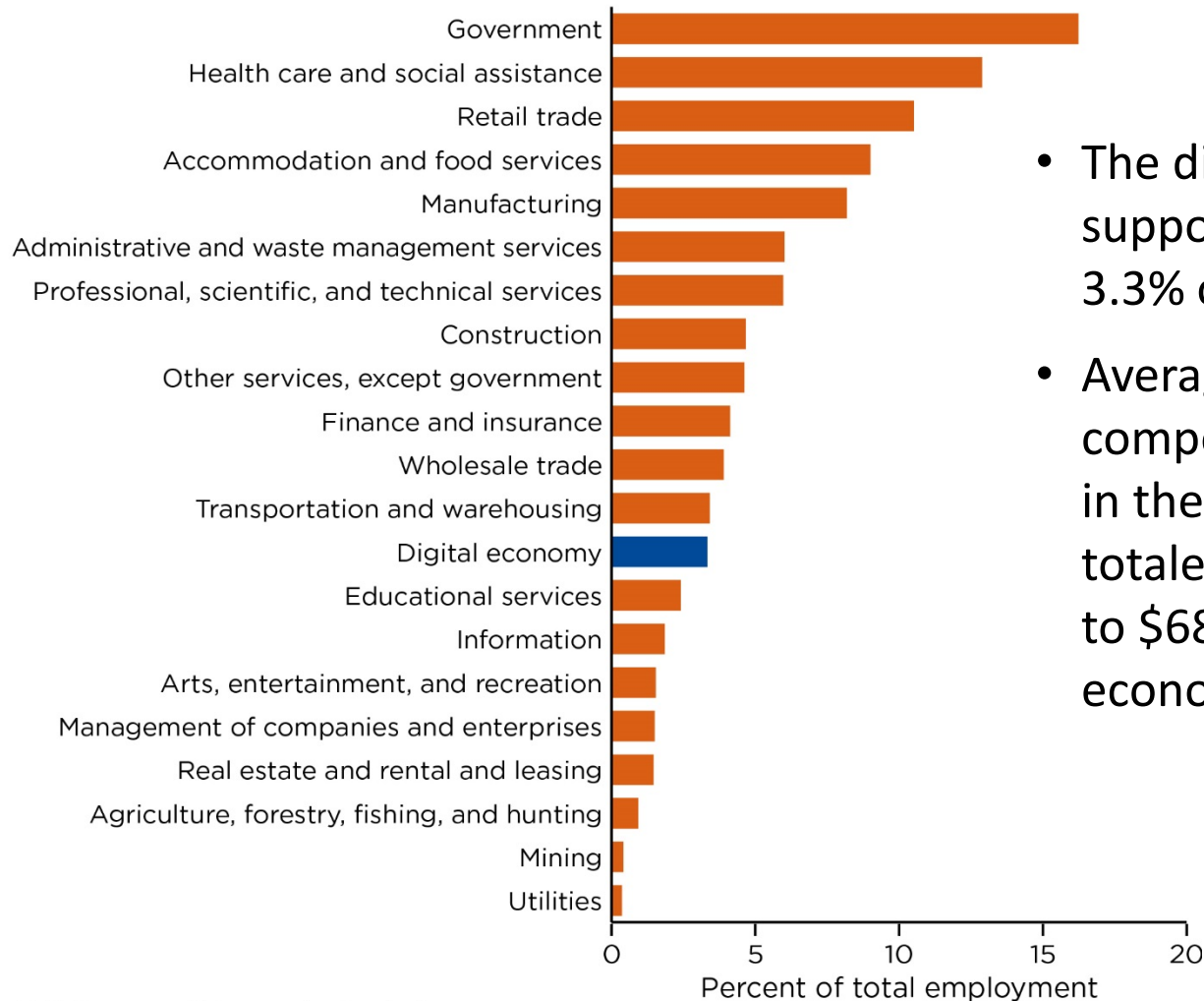
Digital Economy Current-Dollar Value Added and Share of Total Current-Dollar Gross Domestic Product



U.S. Bureau of Economic Analysis

- 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 in size to the professional, scientific, and technical services industry and the wholesale trade industry.

Digital Economy and Industry Share of Total Employment, 2017



- 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

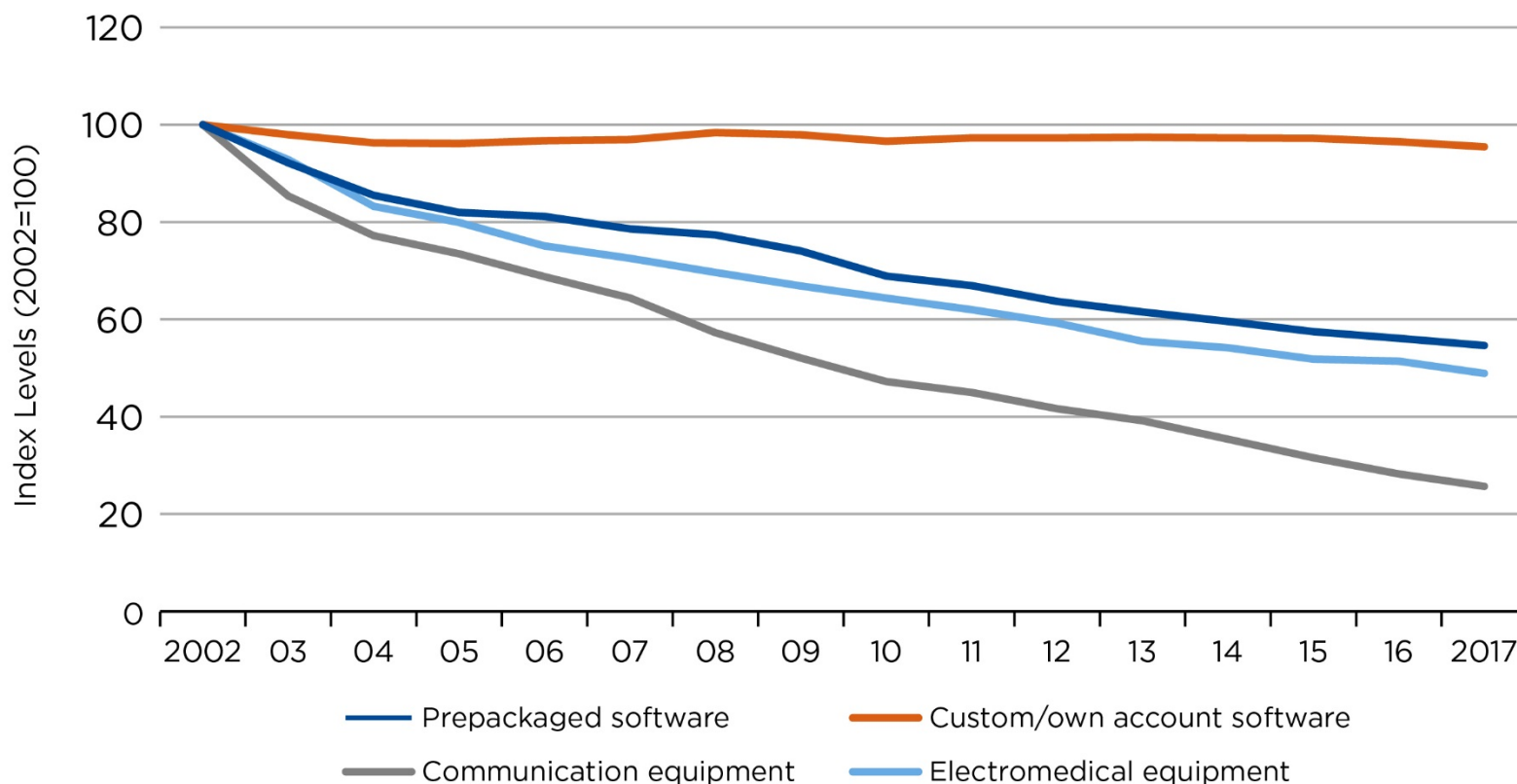
- New and revised quality-adjusted prices (including smartphones) from the Federal Reserve Board

Improved Price Indexes, 2018

Comprehensive Update



Improved Private Fixed Investment Prices Fisher Price Indexes



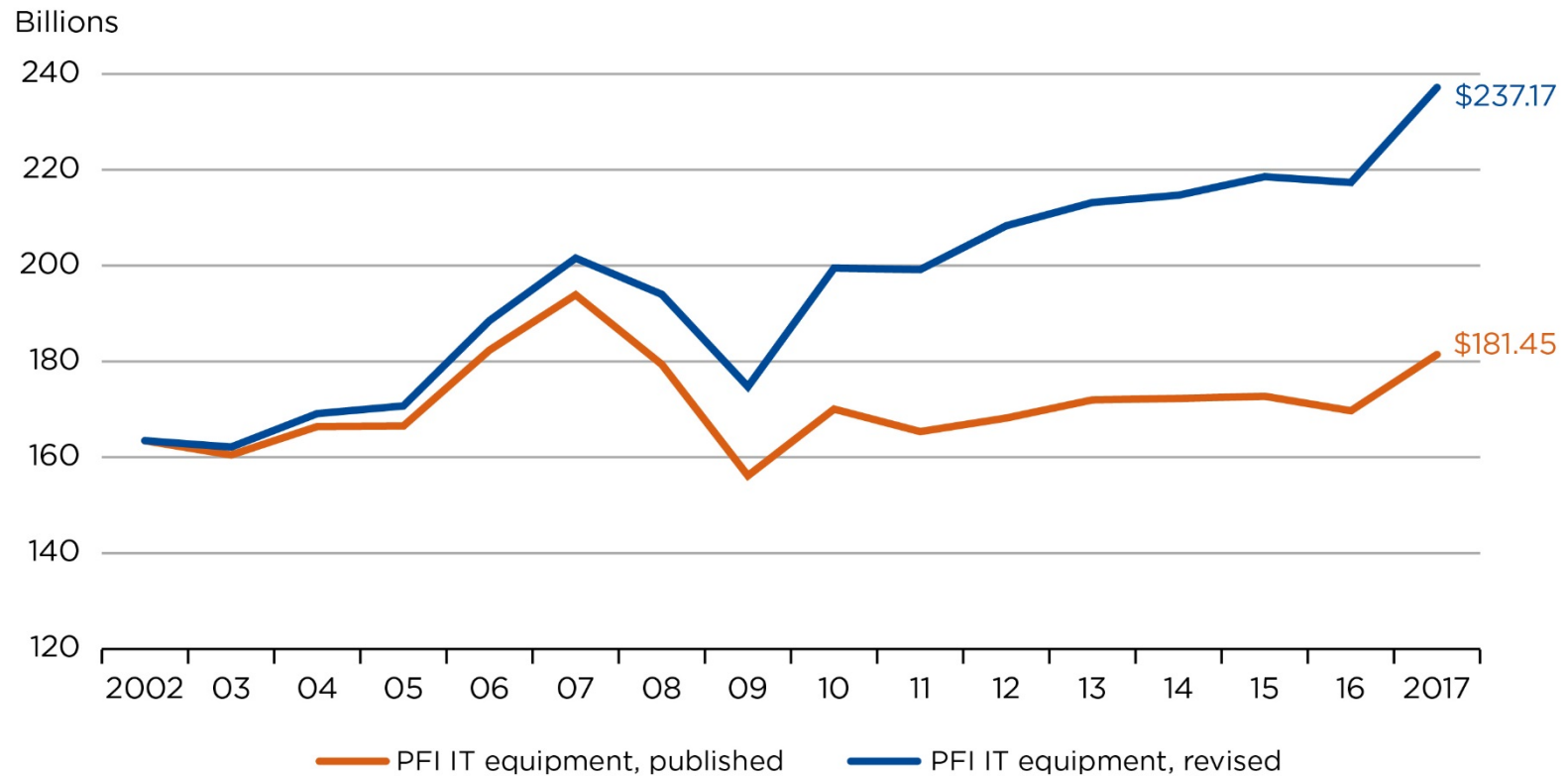
U.S. Bureau of Economic Analysis

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



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
- } Domestic Production
Imports

- Some uses of data

- Digital transformation: new products and improved products
 - Artificial intelligence: $\text{output} = f(\text{capital}, \text{labor}, \text{data})$
 - Internet of Things: “smart” devices
 - Advertising: households exchange data for free content
- } Final Consumption
Intermediate Consumption
Capital Formation
Exports



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

Results by Category:		User-generated Content	Digital Content	Audiovisual Content	Print Content	Shopping Experiences
Nominal GDP in 2016		51B	159B	236B	59B	524B
Real GDP growth percentage points per year	2005-2017	0.04%	0.11%	0.06%	-0.04%	0.03%
	1995-2005	0.01%	0.11%	0.06%	0.01%	0.06%
	1929-1995	-	-	0.03%	0.02%	-0.03%
TFP growth percentage points per year	2005-2016	-	0.12%	0.02%	-0.04%	0.08%
	1995-2005	-	0.04%	0.04%	0.04%	0.12%
	1947-1995	-	-	0.01%	0.04%	-0.03%

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