Statistical Work on Digital Economy for the U.S. National Accounts

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UNSD-NBS Seminar on The Digital Economy: A Policy and Statistical Perspective

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Focus on Two Areas of Preliminary Work

- Digital Economy Satellite Account
- Treatment of Data in National Accounts

Digital Economy Satellite Account

(Barefoot, Curtis, Jolliff, Nicholson, Omohundro 2018)

Step 1: Conceptual Definition

- **Digital-enabling infrastructure**: Goods and services needed for an interconnected computer network to exist and operate
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  - Internet of Things (IoT)
  - Software
  - Structures
  - Support services

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- **Digital media**: Content that users create and access
  - Direct sale
  - Free
  - Big data

Steps 2 and 3: Identification

- **Step 2**: Identify digital goods and services
  - 200 categories of primarily digital products
    - Exclude categories that include digital and non-digital
    - Exclude structures and IoT infrastructure
    - Exclude P2P transactions
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- **Step 3**: Identify digital industries
  - Gross output: Sum of gross output for all in-scope products
  - Value-added
  - Compensation
  - Employment

  Derived from ratios of digital economy gross output to total gross output

  - Price and quantity indexes: Double deflation method

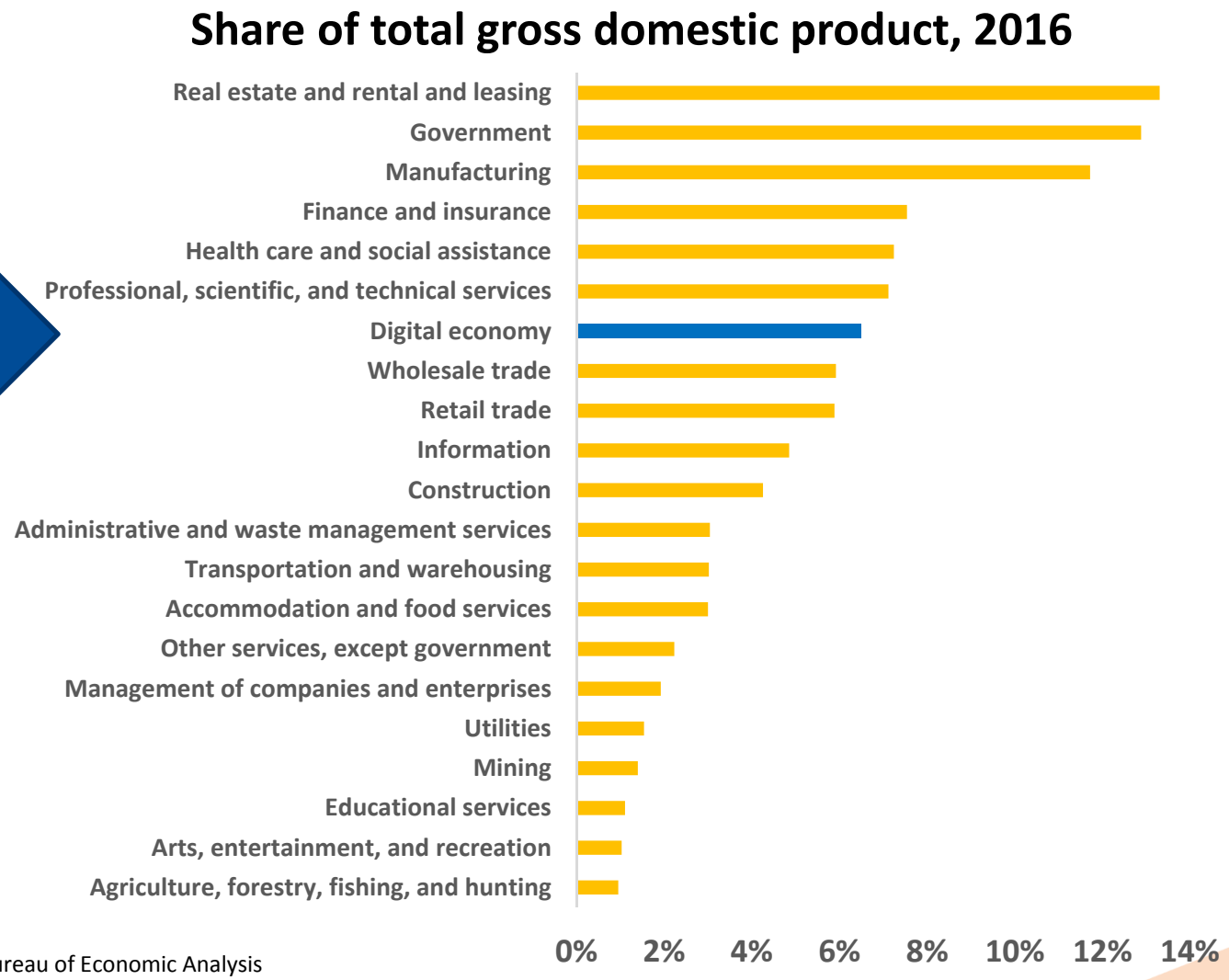
Results: Growth Rates

	Average Annual Growth	
	Total Economy	*Digital Economy*
Gross Output	1.1%	4.4%
Value-Added	1.5%	5.6%
Prices	1.5%	-0.4%
Employment	1.7%	3.7%

U.S. Bureau of Economic Analysis

Results: Share of GDP

The digital economy accounted for 6.5% ($1.21 trillion) of total U.S. GDP in 2016.



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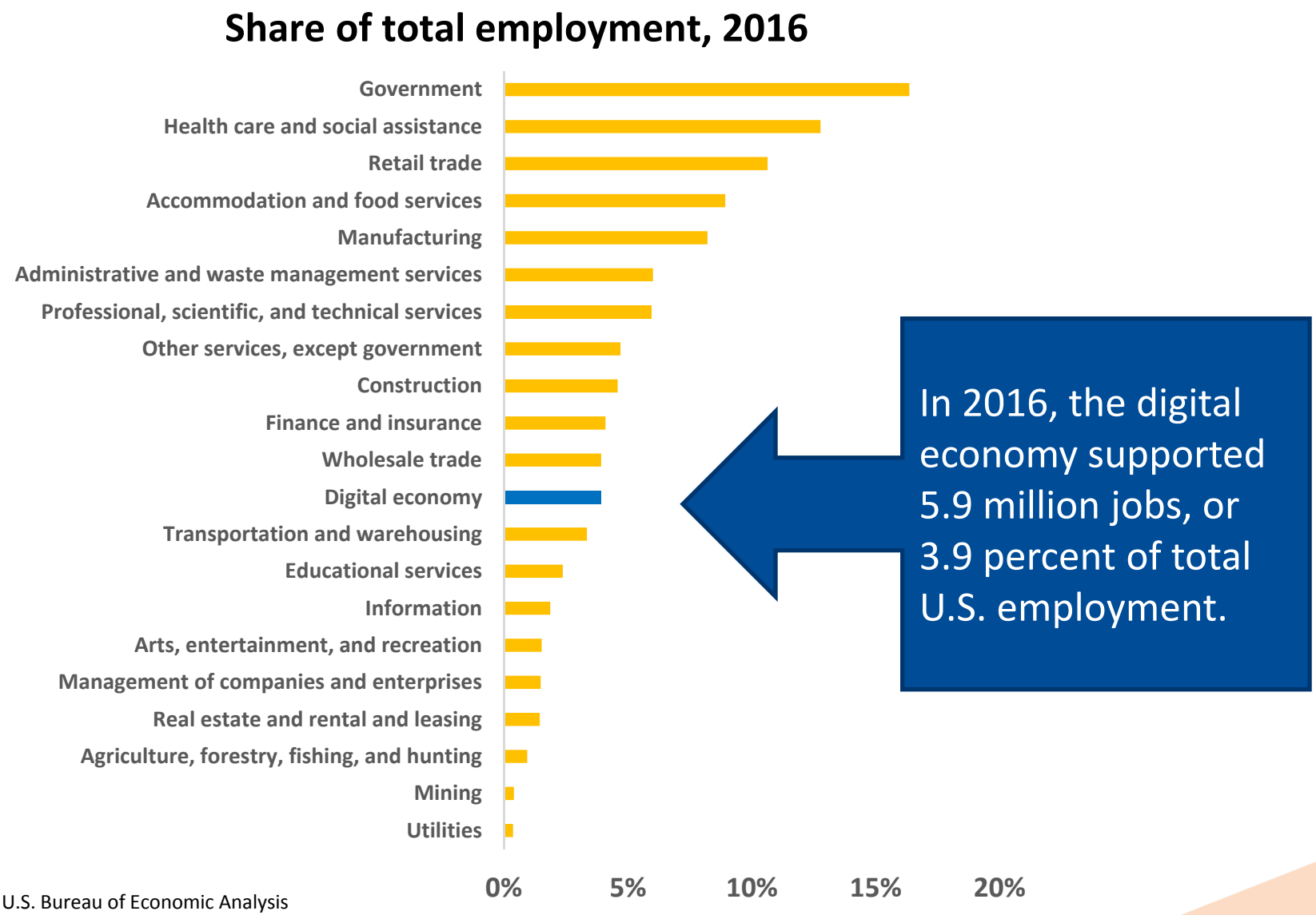
Results: Employment



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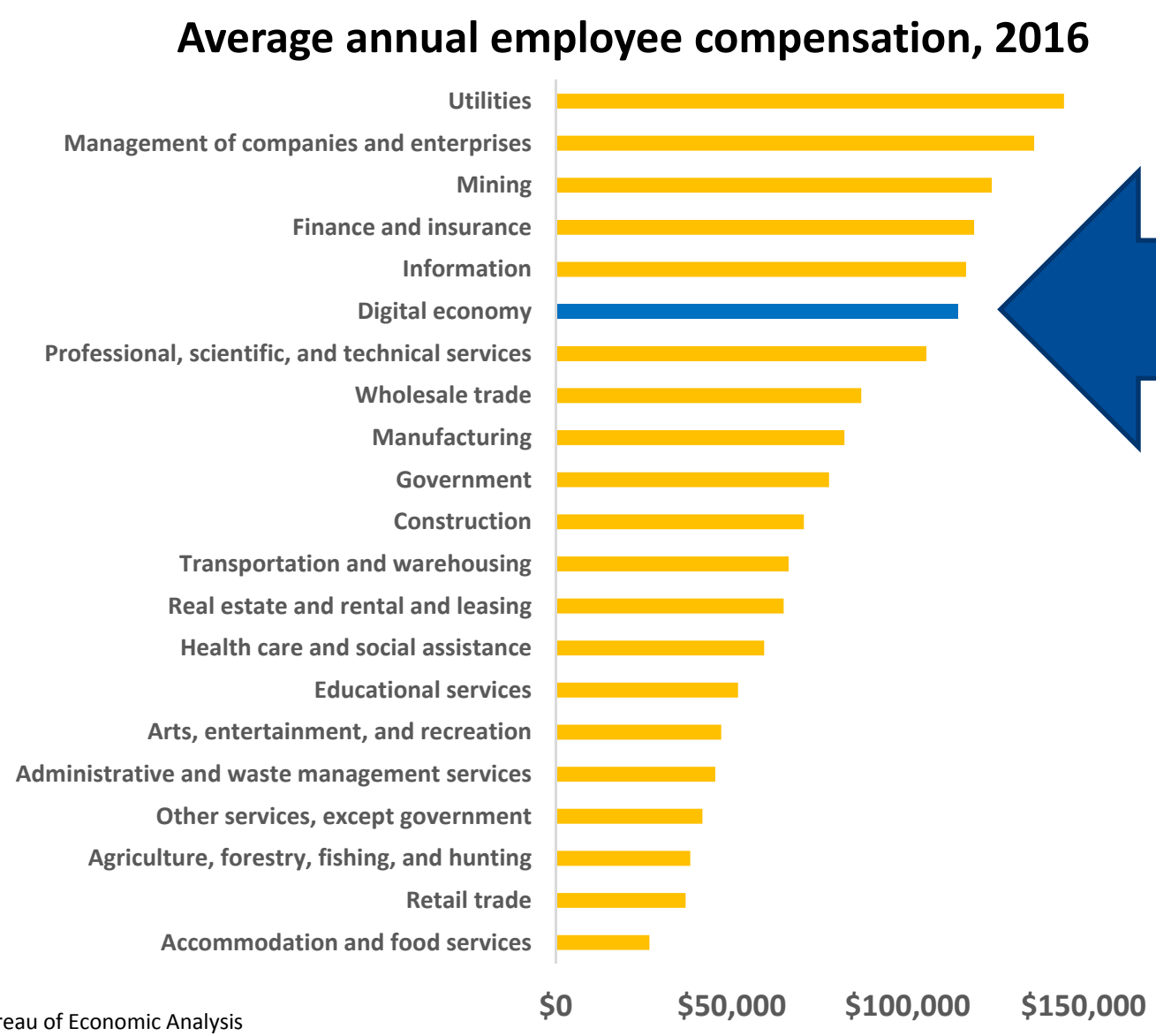
Results: Compensation of Employees



Average annual compensation per employee in the digital economy totaled $114,275 in 2016 compared to $66,498 for the total economy.

U.S. Bureau of Economic Analysis

Treatment of Data in National Accounts

SNA Recommendations on Data

- Databases are within scope of the *SNA* asset boundary
  - Exclude value of data in own-account databases
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- No guidance on data as intermediate consumption
  - May be exchanged in traditional B2B transactions
  - May be exchanged in non-traditional C2B transactions

Considerations for Data

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- Third product category for data (Mandel 2012, 2017)
  - Goods: tangible and storable
  - Services: intangible and non-storable
  - Data: intangible and storable

Roles of Data

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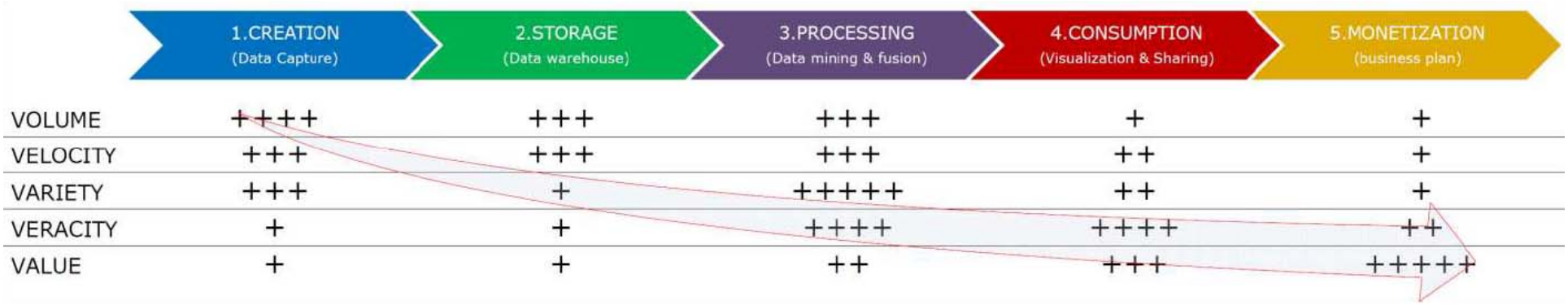
- Online platforms (Li, Nirei, Yamana 2018)
  - Summarize business models for 8 types of platforms

Data Value Chain



Source: Moro Visconti et al. 2017

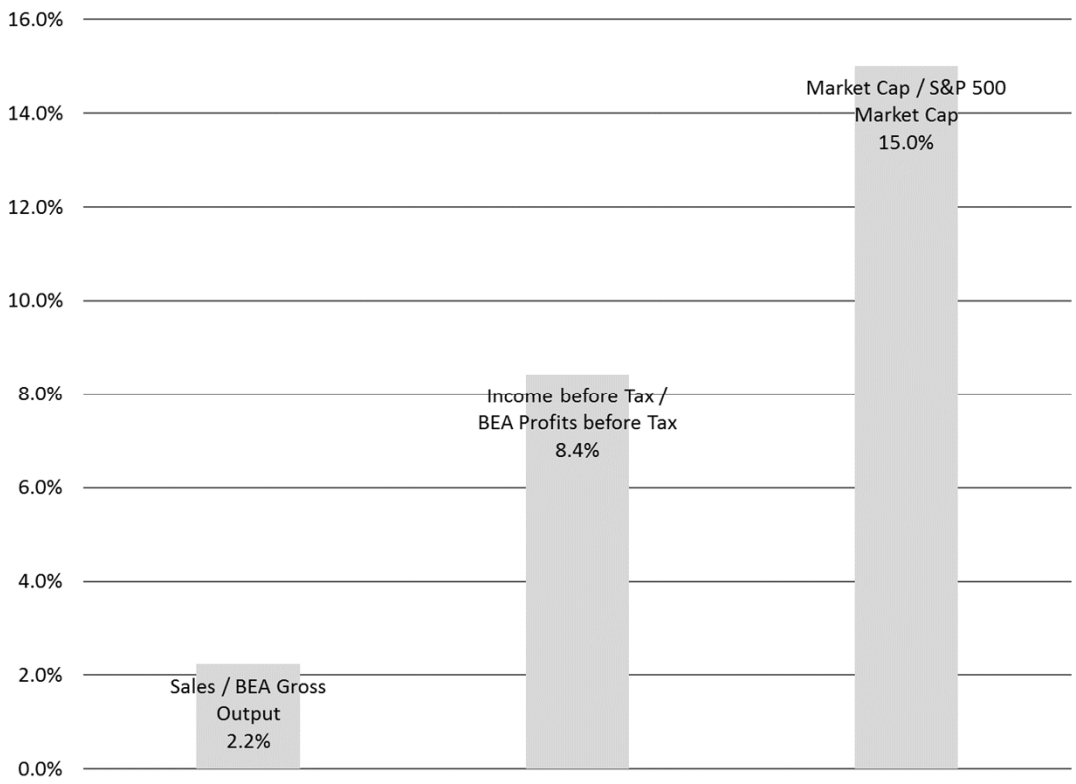
Financials for FATWINs and MAGAs

- Facebook
- Twitter
- Netflix

B2C: social media, entertainment

- Microsoft
- Amazon
- Google
- Apple

B2B: cloud computing, hardware



Source: SEC filings and YCharts

Stats Canada-BEA Collaboration on Data

- Five Questions
  - What is the role of data in a modern economy?
  - What is an appropriate typology of data?
  - What is the current state of play in valuing data in the national accounts and how are data valued by the private and public sectors?
  - What are the different methods that national statisticians could use to assign a value to data?
  - What specifically is the value of data in Canada and the United States?

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- Typology for online platforms (Li, Nirei, Yamana 2018)

References

- Ahmad, Nadim. 2004. "The Measurement of Databases in the National Accounts." Issue paper prepared for the December 2004 Meeting of the Advisory Expert Group on National Accounts.
- Ahmad, Nadim. 2005. "Follow-Up to the Measurement of Databases in the National Accounts." Issue paper prepared for the July 2005 SNA Update Issue 12.
- Ahmad, Nadim and Paul Schreyer. 2016. "Measuring GDP in a Digitalized Economy." OECD Statistics Working Paper 2016/07.
- Barefoot, Kevin, Dave Curtis, William Jolliff, Jessica R. Nicholson, and Robert Omohundro. 2018. "Defining and Measuring the Digital Economy." BEA Working Paper: https://www.bea.gov/system/files/papers/WP2018-4.pdf.
- Li, Wendy, Makoto Nirei, and Kazufumi Yamana. 2018. "Value of Data: There is no such thing as a free lunch in the digital economy." Paper prepared for the 2018 IP Statistics for Decision Makers Conference.
- Mandel, Michael. 2012. "Beyond Goods and Services: The (Unmeasured) Rise of the Data-Driven Economy." Policy Memo of the Progressive Policy Institute.
- Mandel, Michael. 2017. "The Economic Impact of Data: Why Data is not Like Oil." Paper of the Progressive Policy Institute.
- Moro Visconti, Roberto, Alberto Larocca, and Michele Marconi. 2017. "Big Data-Driven Value Chains and Digital Platforms: From value co-creation to monetization," in *Big Data Analytics*, Arun K. Somani and Ganesh Chandra Deka, eds., Chapter 16.
- Nijmeijer, Henk. 2018. "Issue Paper on Databases." Paper prepared for the Joint Eurostat-OECD Task Force on Land and Other Non-Financial Assets.