



**STATISTICS**

# **Measuring Digital Economy in Macroeconomic Statistics: The Role of Data**

*JIS DATA VALUE CREATION WORKSHOP*

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Jennifer Ribarsky

Deputy Division Chief, Real Sector Division, Statistics Department, IMF

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# Outline

- Introduction and Motivation
- How does data create value?
- Data as an input for producing information and knowledge assets
- Do we see the value of data?
  - What's in business accounting?
  - What's in macroeconomic statistics- 2008 System of National Accounts?
- How can we estimate the value of data?
  - Update of the System of National Accounts: preliminary recommendations

# Motivation

## Data flows through the modern economy

Cisco says annual global Internet Protocol (IP) traffic was 1.5 zettabytes\* in 2017, projected to more than triple over the next 5 years.

- 75% of IP traffic was video in 2017.

## Market value of businesses based on data far exceeds their book value

- Data has always had a central role in business decision making, but *digital data* can be organized and structured to allow analysis for insights and decision-making at an unprecedented scope and scale

## Allows information/knowledge creation not previously possible

\* One zettabyte is 1 followed by 21 zeroes



**How does data create value?**

**Data is an Input for Producing Information and  
Knowledge Assets**

# Data transformation chain

- Organizing and processing raw data and adding context makes it suitable for use
  - To process Visa card transactions data into analytically useful data sets, 3 full-time employees + sophisticated data science software are needed to clean and organize the raw transactions data
- Value depends on the point in the data transformation chain: input data has much less value than organized, usable information and the insights and knowledge derived from the analysis of the information



Source: Mawer (2015), <https://www.svds.com/valuing-data-is-hard/>

- Returns to scale increasing at first (just 1 data point has no value), then decreasing

**Do we see it now?**

# Nielsen's acquisition of Gracenote

Nielsen is a leader in market research and ratings, with “an extensive foundation of proprietary data assets”

- In 2017, Nielsen's total revenue was USD 6.6 billion
- But balance sheet only records USD 168 million of data assets that arrived when Nielsen acquired Gracenote for USD 585 million. **Content database: 29% of acquisition value.**
- **Acquisition included a bundle of intangibles**

(IN MILLIONS)

Description	Amount	Useful Life
Customer-related intangibles .....	\$ 109	10 - 15 years
Content database .....	168	12 - 16 years
Trade names and trademarks.....	7	5 years
Computer software.....	57	7-8 years
Total.....	<u>\$ 341</u>	

# Current SNA guidance

**Own-account investment** in software, databases and research and development should be in GDP

- But costs of acquiring or “producing” data are currently **excluded** by the SNA:  
*potentially includable costs*
  - ▶ Data acquisition – the act of **digitizing** the data...
  - ▶ Data analysis
- Other costs are conceptually included, but may be missed in practice:
  - ▶ Cloud services used in producing/maintaining databases and software
  - ▶ Costs of data used to train AI software
  - ▶ New kinds of R&D enabled by digitized data

*The update of the International Standards will refine the guidance to better account for data.*

# Update of the 2008 SNA: Digitalization Task Team

- **Digitalization Task Team** will make recommendations on:
  - Definition of data and data assets.
  - Whether data is an output of a production process (determination matters for what is included in GDP) and who is the data producer.
  - Who is the economic owner of the data asset (determination matters for who is receiving the economic benefits).
  - **Valuation of data and data assets.**
  - Depreciation of data assets.

**How can we estimate the value of data in the SNA?**

## How to value data in the SNA?

**Business accounting for data assets is not so useful to us**

**3 approaches that national accounts could potentially use:**

- **Market-based:** value is determined based on the market price of comparable products on the market
- **Cost-based:** value is determined by how much it costs to produce the data.
- **Income-based:** value is determined by estimating the future cash flows that can be derived from the data

# Market-based approach

Market-based approach is conceptually preferred in the SNA, but not always feasible

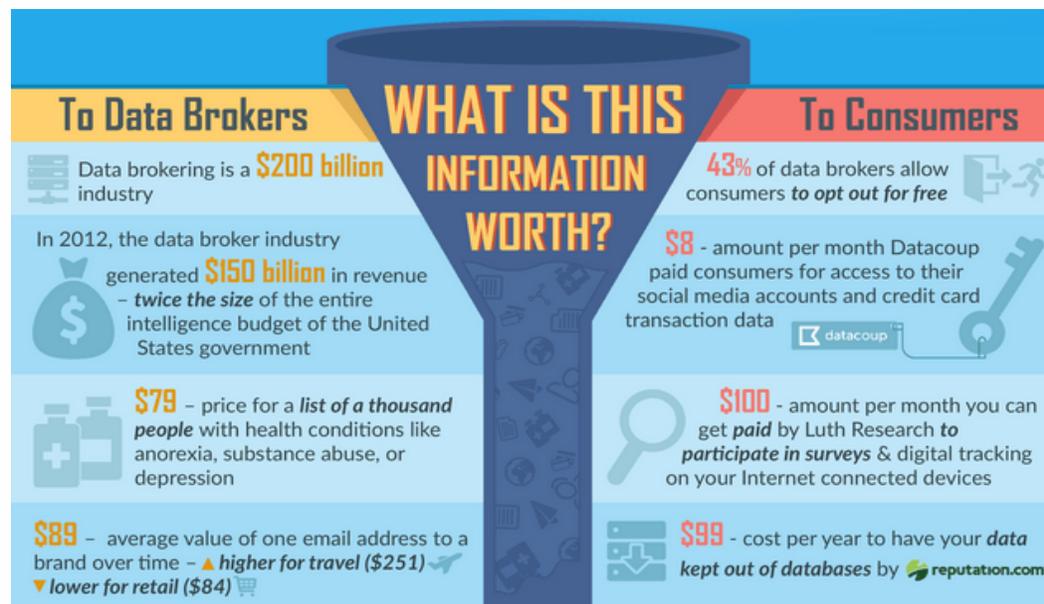
- Data may be of most value to the business that collects it and hence never sold
- Price depends on the use/user, and the use can depend on what is observed

If sold, the data has generally undergone transformation and is bundled with other services

- 3<sup>rd</sup> party data is sold after the user's data has been processed (e.g. organizing, cleaning)

How to handle repeated sales of same data?

Windfall prices for data may reflect *Other Changes in Volume of Assets or Holding Gains*, neither of which counts as production



Source: <https://www.webfx.com/blog/general/what-are-data-brokers-and-what-is-your-data-worth-infographic/>

Data brokers sell consumer profiles in large batches

A list of a thousand people with health conditions like anorexia, substance abuse, or depression was USD 0.079 per user profile.

# Income-based approach

- Although income-based valuation is an acceptable method, SNA advises caution
  - ▶ *appropriate assumptions about the **asset's life length** and **future cash flows** and the **discount factor** may be difficult to determine*
- Often hard to distinguish **cash flows** (net of associated costs) **uniquely related to the data asset** from the **cash flows related other intangibles and services**
- Income-based approach is recommended for valuing musical, literary, and photographic works— industries where there is an established system of royalty flows

*The results can be sensitive to arbitrary assumptions*

# Income approach: Value of digitized information held by U.S. Internet Publishing and Broadcasting and Web Search Portal Industry

## Net Stock in 2017 (Billions of U.S. Dollars)

	Discount factor: 8%		Discount factor: 5%		NIPA stock
	Service life assumption		Service life assumption		
	7 years	3 years	7 years	3 years	
Data-based information, portion of AD space	148.3	85.5	162.2	89.0	...
Data-based information, all AD space	285.2	164.4	311.8	171.1	...
Software, NIPA current-cost net stock of private fixed assets	...	...			644.4
Prepackaged software, NIPA current-cost net stock of private fixed assets	...	...			176.4
Custom software, NIPA current-cost net stock of private fixed assets	...	...			321.6
Own-account software, NIPA current-cost net stock of private fixed assets	...	...			146.3

Source: Reinsdorf and Ribarsky (2020) calculations using U.S. Census Bureau data for data-based information asset for U.S. Internet Publishing and Broadcasting and Web Search Portals industry; NIPA current-cost net stock data from Table 2.1, accessed 15 March 2019.

# Recommendation of Digitalization Task Team

## Preliminary recommendations:

- **Definition: Data** is information content that is produced by collecting, recording, organizing, and storing observable phenomena in a digital format, which can be accessed electronically for reference or processing.
- **Observable phenomenon** is the occurrence of a singular event or piece of information.
- **Create a new category of fixed asset** under “Computer software, **data** and databases” category
  - In practice it may not always be possible to separate the costs of database structure from that of the database content (i.e. data)
- **Valuation of data assets**
  - **Purchased data:** valued at market price
  - **“Own-account” data:** valued using cost-based approach