Value of Data:

There’s No Such Thing As A Free Lunch in the Digital Economy

Wendy Li, U.S. Bureau of Economic Analysis (Presenter)
Makoto Nirei, University of Tokyo
Kazufumi Yamana, Kanagawa University and Japan’s Ministry of Finance

The Sixth IMF Statistical Forum

Date: November 19, 2018
Motivation

Value of Data

Example 1: Apple: share consumer data with app developers/30% commission/Revenue: US $42.8 billion in past decade


→ Data driven business models
→ Online platform companies
Outline of the Talk

• Eight types of online platforms: 8 case studies

Definition of Online Platforms (European Commission, 2015): “an online platform is an undertaking operating in two- or multi-sided markets, which uses the internet to enable interactions between two or more distinct but interdependent groups of users so as to generate value for at least one of the groups.”

• Analyzed dimensions: business model, data flow, value creation for consumers, value creation for third parties, and how the online platform company monetize its data

• Creation of the Value of Data and Data Value Chain

• Valuation of Data

• Welfare

• Key findings and future trends
Type I: E-commerce Online Platform

1. **Data:**
   - Clickstreams, purchases, reviews, and locations
   - Over 100 million prime users

2. **Value Creation:**
   - Get access to one of the world’s largest E-commerce markets
   - Get better demand forecast
   - Logistics consulting and management services
   - Other data targeting services

3. **Value Capture:**
   - Commissions (30%), and data targeting services revenue
   - E-commerce: 10% of U.S. retail sales/Amazon: 43% market share/3rd party Sellers: 50.5% of Amazon e-commerce

4. **Value Creation:**
   - Shopping benefits such as time saving, cheaper prices, more selections, recommendations, etc.
Type II: Online Resource Sharing Platform

1. Data:
   - Clickstreams, purchases, locations, and reviews
   - Number of Listed Properties: 28.9 million
   - Number of Destinations: 137,791
   - Number of Countries: 229

2. Value Creation:
   - Pricing strategy, demand forecast, access to one of the world’s largest online travel markets, and other data targeting services
   - Help reduce the inventory of highly perishable goods or monetize underutilized rooms

3. Value Capture:
   - Commissions/shared revenues (15%), and data targeting services revenue
   - 2017 US $11.8 billion (reservation sales); over 1.5 million rooms reserved per night
   - Advertising and other revenues < 7% of total sales

4. Value Creation:
   - Time saving, discount rates, lower transaction costs, package offers, more selections, recommendations, and reviews, etc.

Consumers → Booking.com → Hotels, Owners of Private Properties, Rental Cars, and Cruises, etc. → Booking.com → Consumers
Type III: E-financial Service Online Platform

① Data:
- Clickstreams, daily consumption and lending behaviors, locations, and bank account information
- Number of Users: 870 million active users globally (mainly in China)
- More than 200 banks, 60 insurance companies, and over 700,000 stores

② Value Creation:
- Cheaper credit ranking/risk management, and data targeting services
- Help banks reach customers that previously have no credit history
- Targeting demand and credit score services to vendors such as hotels

③ Value Capture:
- Commissions and interest revenue, advertising revenue, and other data targeting service revenues
- 2017 estimated net profit from Alipay: US $1 billion (54.3% market share in China)

④ Consumers
Micro-businesses
Ant Financial
Third Party Sellers;
Banks; Institutional
Investors; Asset
Managers; Charities

④ Value Creation:
- Help consumer get cheaper loans
- Easier and flexible payment methods
- Faster solution for credit

Consumers
Micro-businesses
Ant Financial
Third Party Sellers;
Banks; Institutional
Investors; Asset
Managers; Charities

Ant Financial
Type IV: Online Social Network Service Platform

Data:
- Clickstreams, social networks, work preference, and views
- Number of Users: 500 million users and 43,000 corporate customers over 200 countries

Value Creation:
- Cheaper hiring and search costs, marketing

Value Creation:
- Job search, online courses, and networking opportunities

Value Capture:
- Commissions, targeted advertising revenue, and other data targeting service revenue
- Most revenue comes from selling access to its member data
- 2015 revenue: US $2.99 billion
- 2016 Microsoft purchased LinkedIn for US $26.4 billion
Type V: Online Auction/Matching Platform

1. **Data:**
   - Clickstreams, bidding histories, and payment histories
   - Number of Users: 175 million active users
   - Over 30 countries

2. **Value Creation:**
   - Marketing, donations, offer special sales channel; data targeting services

3. **Value Capture:**
   - Commissions, targeted ad revenue, and other data targeting services revenue
   - eBay Analytics: 5,000 data analysts

4. **Value Creation:**
   - Cheaper and more choices – new and second hand, special collections

Consumers; Businesses

eBay

Consumers; Third Party Businesses; Charities; Governments
**Value Creation:**
- Faster, cheaper, and flexible solutions
- Tap into a large group of outside experts but pay only for the best solution.

**Data:**
- Talents, ideas, and locations
- Number of Users: 1 million registered members

**Value Capture:**
- Commissions, data targeting service revenue
- Clients: ex. NASA, Eli Lilly, Harvard Medical School, and IBM, etc.
- In 2016, Wipro bought Topcoder for US $500 million
Type VII: Online Noncompetitive Crowdsourcing Platform

① Data:
- Map data, travel time, traffic information, and locations
- 100 million monthly active users
- 185 countries

② Value Creation:
- Location-based advertising and marketing (ex. billboard pricing strategy), and other data targeting services

③ Value Capture:
- Data targeting service revenue, including targeted ad revenue
- In 2013 Google bought Waze for US $1.3 billion to add social data to its mapping business.

④ Value Creation:
- Real-time traffic updates, routing, nearby cheapest fuel prices, and other location-specific alerts, etc.
**Type VIII: Online Search Platform**

1. **Data:**
   - Search terms, revealed preference, browsing behaviors, clickstreams, locations, demographics, language, etc.
   - 1 billion users/3.5 billion searches per day
   - Over 115 countries

2. **Value Creation:**
   - Google Analytics – data targeting services
   - Access to a large user base
   - Advertisers: increase ROI due to targeted ads.; Content providers: monetize their contents.

3. **Value Capture:**
   - Commissions, data targeting services revenues/over 4 million google advertisers/the world’s most popular website
   - In 2017 advertising revenue US $95.4 billion; Booking Holdings spent US $3 billion

4. **Value Creation:**
   - Free, convenient, and relevant way to get information
The Creation of the Value of Data

Sources of Data
- Users
- Third Parties

Creation of the Value of Data
- Online Platform Companies
- Data Fusion + Data Analytics + Subject Matter Experts

Monetization: Business Plans
- License Access to Data
- Data Targeting Services:
  - Credit Scores/Risk Management
  - Dynamic Pricing Strategy Services
  - Demand Forecast Services
  - Hiring Services
  - Logistics Consulting and Management Services
  - Targeted Ads
  - Others

bea | Bureau of Economic Analysis
U.S. Department of Commerce
Data Value Chain

Source: Visconti et al. (2017)
Conventional Measurement Approaches

• Cost-Based Approach
  Seriously underestimates

• Market-Based Approach
  M&A Cases: we have not found impacts
  Mispriced issue

• Income-Based Approach
  Lacks data
  Only for licensing access to data
# Estimated Value of Data Based on Data-Driven Business Model

Data: Selling, general and administrative (SG&A) expenditures (Eisfeldt and Papanikolaou, 2013)  
Methodologies: 1) Forward looking profit model for depreciation – Li and Hall (2018)  
2) Stock of data-driven business model (Hall, 1993)

<table>
<thead>
<tr>
<th>Type of Online Platform</th>
<th>Company</th>
<th>Annual Commission or Licensing Access to Data</th>
<th>Value Based on Data-driven Business Model</th>
<th>Merger &amp; Acquisition Price</th>
</tr>
</thead>
</table>
| E-commerce              | Amazon  | Commission Revenue: US $41.8 billion (2017)  
Premium Data Service Revenue: US $18 billion (2018)* | US $125 billion; Annual Growth Rate: 35% | US $125 billion; Annual Growth Rate: 35% |
| Online Resource Sharing | Booking | US $11.8 billion (2017) | US $15.7 billion; Annual Growth Rate: 40% | US $15.7 billion; Annual Growth Rate: 40% |
| E-financial Service     | Ant Financial | No public financial statement. | US $16 billion; Annual Growth Rate: 30% | US $16 billion; Annual Growth Rate: 30% |
| Competitive Crowdsourcing | Topcoder | No public financial statement. | US $48.2 billion; Annual Growth Rate: 21.8% | US $48.2 billion; Annual Growth Rate: 21.8% |
| Non-competitive Crowdsourcing | Waze | No public financial statement. | US $48.2 billion; Annual Growth Rate: 21.8% | US $48.2 billion; Annual Growth Rate: 21.8% |
| Search                  | Google  | US $95.4 billion (2017)** | US $48.2 billion; Annual Growth Rate: 21.8% | US $48.2 billion; Annual Growth Rate: 21.8% |
Discussion on Welfare

Scenario I: Identity of a consumer is disclosed
1) Privacy Breach or Identify Theft (Acquisti et al., 2016)
2) Dynamic Pricing Discrimination

Scenario II: Identity of a consumer is not revealed or used by the service provider
Data Network Effect
Decreasing returns to scale?

Creative destruction phenomenon (Li, Nirei, and Yamana, 2018)

Data sharing (Jones and Tonetti, 2018)
Conclusion

• Online platform companies are data companies and our initial estimations show that the value of data they created can be tremendous.
• Data is an asset.
• Online platform companies can vary in the degree of the vertical integration in the data value chain.
• The variation can determine how they monetize their data and how much economic benefits they can capture.
• Policy implications:
  Corporate: investment, outsourcing, and competition strategies
  Nation: trade and growth policy