Measuring the Digital Economy in Australia
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Definition and Background

- Digital economy can be defined as economic activities enabled by digital technologies, such as advanced computer hardware and networks, smartphones and artificial intelligence.

- Why measure the digital economy?
  - The emergence of better quality products and improvements
  - Rapid growth
  - A notable contributor to the overall economy
  - Current ABS publications do not focus on the economic performance of the digital economy
Follow the BEA approach, as outlined in Barefoot et al. (2018)

The ABS estimation of the digital economy involves three major steps:

- Define the digital economy for the account.
  * Digital-enabling infrastructure
  * E-commerce
  * Digital media

- Identify the Supply-use (SU) products and services according to the definition for the digital economy.
  * ‘Exclusively’ or ‘primarily’ digital products (some exceptions).

- Identify the production of the ‘digital’ products with the SU table, and estimate the associated output and value added.
  * Assumptions
## Methodology: ‘Digital’ Products and Services

<table>
<thead>
<tr>
<th>Digital Sectors</th>
<th>SUPC</th>
<th>Product Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Digital media</td>
<td>56005</td>
<td>Radio and TV broadcasting services</td>
</tr>
<tr>
<td></td>
<td>56010</td>
<td>Cable (Pay TV) and other subscription broadcasting services</td>
</tr>
<tr>
<td></td>
<td>57005</td>
<td>Internet publishing and broadcasting</td>
</tr>
<tr>
<td></td>
<td>57010</td>
<td>Internet publishing advertising sales</td>
</tr>
<tr>
<td>E-commerce - Wholesale</td>
<td>33005</td>
<td>Wholesale margin</td>
</tr>
<tr>
<td></td>
<td>33010</td>
<td>Other wholesale trade</td>
</tr>
<tr>
<td>E-commerce - Retail</td>
<td>39005</td>
<td>Retail margin</td>
</tr>
<tr>
<td></td>
<td>39010</td>
<td>Other retail trade</td>
</tr>
<tr>
<td>Infrastructure - Hardware</td>
<td>16015</td>
<td>Recorded media reproduction</td>
</tr>
<tr>
<td></td>
<td>24005</td>
<td>Photographic goods (incl. optical fibres) and ophthalmic equipment (excl. spectacles)</td>
</tr>
<tr>
<td></td>
<td>24025</td>
<td>Computer hardware and peripherals (incl. photocopiers and parts)</td>
</tr>
<tr>
<td></td>
<td>24035</td>
<td>Vending, video, monetary, office and other electronic hardware nec.</td>
</tr>
<tr>
<td>Infrastructure - Software</td>
<td>54010</td>
<td>Software publishing</td>
</tr>
<tr>
<td></td>
<td>54020</td>
<td>Copyright leasing</td>
</tr>
<tr>
<td>Infrastructure - Support services</td>
<td>57020</td>
<td>Data processing and information storage services</td>
</tr>
<tr>
<td></td>
<td>70005</td>
<td>Computer consultancy, systems design and related services</td>
</tr>
<tr>
<td></td>
<td>94010</td>
<td>Machinery and equipment repair and maintenance services</td>
</tr>
<tr>
<td>Infrastructure – Telecommunications</td>
<td>24030</td>
<td>Telecommunication and audio visual equipment</td>
</tr>
<tr>
<td></td>
<td>24040</td>
<td>Electric lights (incl. torches); cables and batteries (excl. automotive)</td>
</tr>
<tr>
<td></td>
<td>57015</td>
<td>Internet services</td>
</tr>
<tr>
<td></td>
<td>58005</td>
<td>Telecommunication services (excluding equipment)</td>
</tr>
</tbody>
</table>
Methodology: Assumptions

- The intermediate consumption to output ratio in the ‘digital’ industry is identical to that in the total industry.

- The digital and non-digital split of retail and wholesale margin is identical across all industries.
Methodology: Current Price Estimation

Supply-use Industry (SUIC) View

- **Industry Output**
  - SUPC1 (Digital product)
  - SUPC2 (Digital product)
  - SUPC3
  - SUPC4

  Industry total output (sum of "digital & non-digital output")

- **Industry Intermediate Consumption**
  - SUPC1
  - SUPC2
  - SUPC3

  Industry total intermediate consumption

- **Industry Value Added**

“Digital” Component of SUIC

- **Industry “digital” output**
  - SUPC1
  - SUPC2

  Industry total “digital” output (sum of the “digital” SUPC’s)

Industry Intermediate Consumption for the production of digital output
= Industry total “digital” output – Industry “digital” value added

Industry intermediate consumption split to SUPC proportionally

- **Industry “Digital” Value Added**
  = Industry value added * Industry total “digital” output / Industry total output

A ‘digital’ sector is the summation of the relevant digital components across SUIC’s
Volume Estimation – Double Deflation

Digital sector output current price ($P_tQ_t$)
- SUPC1
- SUPC2

Deflate with...

Implicit price deflator for output ($P_t’/P_{t-1}$)
- SUPC1
- SUPC2

Digital sector output constant price ($P_{t-1}Q_t$)
- SUPC1
- SUPC2

Sector total digital output constant price

Digital sector intermediate consumption current price ($P_tQ_t$)
- SUPC1
- SUPC2

Deflate with...

Implicit price deflator for intermediate consumption ($P_t’/P_{t-1}$)
- SUPC1
- SUPC2

Digital sector intermediate consumption constant price ($P_{t-1}Q_t$)
- SUPC1
- SUPC2

Sector total intermediate consumption constant price

Digital sector value added constant price

Sector total digital output constant price

Sector total intermediate consumption constant price
Estimating Sector Value Added Volume (also applies to sector output)

Digital economy value added growth is the Tornqvist aggregation of the underlying sectors.
Data Sources

• ABS Supply-use table, 2011-12 to 2015-16.
• ABS Input-output table, 2011-12 to 2015-16.
• NAB Online Retail Sales Index (NORSI), 2010 to 2016.
• Experimental Estimates of Online Retail Turnover (Appendix), 2014 to 2018, ABS Cat no. 8501.0 – Retail Trade, Australia.
• Summary of IT Use and Innovation in Australian Business, 2005-06 to 2015-16, ABS Cat no. 8166.0.
• Economic Activities Survey (EAS) industry clearance documentation, 2006-07 to 2015-16.
Preliminary Results

Australia

Digital Economy Value Added ($m) and Share in Aggregate Value Added (%)

<table>
<thead>
<tr>
<th>Year</th>
<th>Value added</th>
<th>Share of aggregate value added</th>
</tr>
</thead>
<tbody>
<tr>
<td>2011-12</td>
<td>80000</td>
<td>2%</td>
</tr>
<tr>
<td>2012-13</td>
<td>90000</td>
<td>3%</td>
</tr>
<tr>
<td>2013-14</td>
<td>100000</td>
<td>4%</td>
</tr>
<tr>
<td>2014-15</td>
<td>110000</td>
<td>5%</td>
</tr>
<tr>
<td>2015-16</td>
<td>120000</td>
<td>6%</td>
</tr>
</tbody>
</table>

U.S.

Chart 5. Digital Economy Current-dollar Value Added (billions) and Share of Total Current-dollar Gross Domestic Product (percentage)

- Value added
- Share of total gross domestic product

U.S. Bureau of Economic Analysis
Note: the digital economy’s share has not been removed from the industries for which it is partially embedded, therefore the shares add to more than 100% of GDP.
Preliminary Results

**Industry Contribution to Real Aggregate Value Added Growth in Australia (%)**, 2012-13 to 2015-16.

- Total economy
- Mining
- Digital Economy
- Health
- Finance
- Rental / Hiring
- Public Admin
- Dwellings
- Education
- Retail
- Administrative
- Construction
- Transport
- Professional / Scientific
- Accommodation
- Wholesale
- Arts / Rec.
- Other Services
- Utilities
- Information / Media
- Agriculture
- Manufacturing

**Industry Contribution to Real Aggregate Value Added Growth in Australia (%)**, 2012-13 to 2015-16, Digital Economy Embedded

- Total economy
- Mining
- Digital Economy
- Health
- Finance
- Rental / Hiring
- Professional / Scientific
- Retail
- Information / Media
- Public Admin
- Dwellings
- Education
- Wholesale
- Construction
- Administrative
- Transport
- Accommodation
- Arts / Rec.
- Other Services
- Utilities
- Agriculture
- Manufacturing
### Preliminary Results

#### Australia

<table>
<thead>
<tr>
<th>Component</th>
<th>Average Annual Value Added Growth by Digital Sector (%)</th>
<th>2012-13 to 2015-16</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total economy</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Digital economy</td>
<td></td>
<td></td>
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<tr>
<td>Hardware</td>
<td></td>
<td></td>
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<tr>
<td>E-commerce - Retail</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Telecommunications</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Software</td>
<td></td>
<td></td>
</tr>
<tr>
<td>E-commerce - Wholesale</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Support services</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Digital media</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### U.S.


- **Total economy**
- **Digital economy**
- **Hardware**
- **E-Commerce & Digital Media**
- **Support Services**
- **Software**
- **Telecommunications**

U.S. Bureau of Economic Analysis
Preliminary Results

**Share in Digital Economy Value Added 2015-16 (%)**

- Support services
- Telecommunications
- E-commerce - Wholesale
- Digital media
- Software
- E-commerce - Retail
- Hardware

**Contribution to Average Annual Value Added Growth in the Digital Economy (%), 2012-13 to 2015-16**

- Digital economy
- Telecommunications
- Support services
- E-commerce - Wholesale
- E-commerce - Retail
- Hardware
- Software
- Digital media

**Chart 6. Components of the Digital Economy: Current-dollar Value Added Share of Total, 2016**

- Support Services
- Telecommunications
- Software
- E-Commerce & Digital Media
- Hardware

U.S. Bureau of Economic Analysis
Way Forward

- Extend the historical time series for the digital economy back to mid 2000’s; update with the latest Supply-use data.
- ABS information paper defining and measuring the digital economy in Australia.
- Improve coverage of digital goods and services in product classifications
Questions for Discussion

• Is the definition and approach for measuring the Australian digital economy appropriate?

• Are the preliminary results plausible?

• Would a publication under the BEA approach meet user needs?