Measuring the Sharing Economy of the UK
Michael Hardie, Office for National Statistics
Introduction

• There are many challenges to measuring the sharing economy.
  o No internationally-agreed definition, and no official conceptual framework.
  o Identifying businesses
  o A business might not be solely in the sharing economy

• ONS has published three papers:
  • The feasibility of measuring the sharing economy, April 2016
  • The feasibility of measuring the sharing economy: progress update, October 2016
  • The feasibility of measuring the sharing economy: November 2017 progress update, November 2017

• All of the statistics presented are experimental, and ONS is working towards producing standalone statistics on the sharing economy.
Outline

• ONS definition of the Sharing Economy
• Decision tree for classifying businesses
• Descriptive Statistics (business and social)
• Data Science
• Future work
ONS’s Definition of the Sharing Economy

• “the sharing of under-used assets through completing peer-to-peer transactions that are only viable through digital intermediation, allowing parties to benefit from usage outside of the primary use of that asset.”
Sharing Economy Decision Tree

Does the business...

- Have a website or an app?
  - Yes
    - Depend on its website/app to carry its business?
      - Yes
        - Allow the matching of individuals with individuals?
          - Yes
            - Allow temporary access to goods or services provided by another individual?
              - Yes
                - Allow mostly transactions without transfer of ownership?
                  - Yes
                    - Likely to be in the sharing economy
                  - No
                    - Not likely to be in the sharing economy
              - No
          - No
    - No
  - No
Sharing Economy data sources

- 81 Sharing Economy businesses were sent Annual Business Survey and E-commerce Survey questionnaires. These businesses have been verified using the decision tree, and are used for both the descriptive statistics and data science analysis.

- Questions were added to the Internet Access Survey on accommodation and transport sharing economy participation.

- We are also developing our Living Costs and Food Survey, Labour Force Survey and a Time-Use Survey over the forthcoming year.
E-Commerce Survey Results

- Website
- Social network
- Business blog or microblog
- Description of goods or services
- Links to social media profiles on their website
- Multimedia content sharing website
- Online ordering
- Customisation of goods or services online
- Order tracking*

- Percentage of businesses that answered 'yes' in the sharing economy
- Percentage of businesses that answered 'no' in the sharing economy
- Percentage of businesses that answered 'yes' that are not in the sharing economy
- Percentage of businesses that answered 'no' that are not in the sharing economy
Annual Business Survey results

Medians and Inter-Quartile Ranges

- **SE** – Sharing economy businesses
- **NSE** – Non sharing economy businesses

- **Turnover**
- **Purchases**
- **Employment costs**
- **Advertisement and Marketing**
Internet Access Survey Results

Use of the internet to arrange accommodation or transport from another individual, by age group, 2017, Great Britain

Source: Office for National Statistics
Data Science Analysis

• The ONS has previously used data science techniques to attempt to predict which businesses on the UK Inter-Departmental Business Register (IDBR) are likely to be within the sharing economy.
  - Using variables such as turnover, employment, birth date, and industrial classification.
  - Using Support Vector Machine and Random Forest models.

• Further experimental analysis has been undertaken using ABS and E-Commerce surveys.
  - To determine if the variables allow for the differentiation between sharing and non-sharing economy businesses.
Data Science Analysis

• K-means cluster analysis compares the characteristics of multiple entities, resulting in similar entities being clustered together and dissimilar entities being clustered apart.

• 11 Annual Business Survey and 10 E-commerce variables were used in the analysis

• Businesses were grouped into 6 clusters based on their characteristics
Data science results

Table 1: Results of clustering ABS data into six groups

<table>
<thead>
<tr>
<th>Group</th>
<th>One</th>
<th>Two</th>
<th>Three</th>
<th>Four</th>
<th>Five</th>
<th>Six</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proportion of sharing economy businesses</td>
<td>1.2%</td>
<td>7.4%</td>
<td>88.9%</td>
<td>1.2%</td>
<td>1.2%</td>
<td>0%</td>
<td>100%</td>
</tr>
<tr>
<td>Proportion of non-sharing economy businesses</td>
<td>0%</td>
<td>5.7%</td>
<td>82.9%</td>
<td>4.3%</td>
<td>0.0%</td>
<td>7.1%</td>
<td>100%</td>
</tr>
</tbody>
</table>

Table 2: Results of clustering Group Three of the ABS data into six groups

<table>
<thead>
<tr>
<th>Group</th>
<th>One</th>
<th>Two</th>
<th>Three</th>
<th>Four</th>
<th>Five</th>
<th>Six</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proportion of sharing economy businesses</td>
<td>0%</td>
<td>6.1%</td>
<td>12.2%</td>
<td>81.7%</td>
<td>0%</td>
<td>0%</td>
<td>100%</td>
</tr>
<tr>
<td>Proportion of non-sharing economy businesses</td>
<td>1.7%</td>
<td>15.5%</td>
<td>5.2%</td>
<td>74.1%</td>
<td>1.7%</td>
<td>1.7%</td>
<td>100%</td>
</tr>
</tbody>
</table>
### Data science results

**Table 3: Results of clustering E-Commerce data into six groups**

<table>
<thead>
<tr>
<th>Group</th>
<th>One</th>
<th>Two</th>
<th>Three</th>
<th>Four</th>
<th>Five</th>
<th>Six</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proportion of sharing economy businesses</td>
<td>14.8%</td>
<td>48.1%</td>
<td>18.5%</td>
<td>11.1%</td>
<td>2.5%</td>
<td>4.9%</td>
<td>100%</td>
</tr>
<tr>
<td>Proportion of non-sharing economy businesses</td>
<td>8.6%</td>
<td>8.6%</td>
<td>15.7%</td>
<td>21.4%</td>
<td>44.3%</td>
<td>1.4%</td>
<td>100%</td>
</tr>
</tbody>
</table>

**Table 4: Results of clustering ABS and E-Commerce variables together into six groups**

<table>
<thead>
<tr>
<th>Group</th>
<th>One</th>
<th>Two</th>
<th>Three</th>
<th>Four</th>
<th>Five</th>
<th>Six</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proportion of sharing economy businesses</td>
<td>7.4%</td>
<td>1.2%</td>
<td>3.7%</td>
<td>69.1%</td>
<td>17.3%</td>
<td>1.2%</td>
<td>100%</td>
</tr>
<tr>
<td>Proportion of non-sharing economy businesses</td>
<td>20%</td>
<td>0%</td>
<td>4.3%</td>
<td>18.6%</td>
<td>15.7%</td>
<td>41.4%</td>
<td>100%</td>
</tr>
</tbody>
</table>
Future Work

• Improving data collection of sharing economy businesses (adding new questions to e-commerce) which will refine our data science analysis
• Adding sharing economy questions to household surveys
• Exploring administrative data (HMRC self-assessment)
• Web-scrapping and web-crawling
• Continuing to engage with other NSIs, sharing economy organisations, international organisations and researchers.
Thank you for listening...

Michael Hardie, michael.hardie@ons.gov.uk

Pauline Beck, pauline.beck@ons.gov.uk

Sharing Economy Inbox, sharing.economy@ons.gov.uk