R for Labour Market Policies

Inter-university research centre on public services

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Gaithersburg, Maryland
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The on-going collaboration and mutual exchange between several centres of study was rendered official in 1997 by the creation of a centre of study proposing high-profile research on public services.

Crisp’s main areas of concern:
1. public service development and demand analysis;
2. analysis of economic system dynamics;
3. unbiased methodologies for quality estimation of services;
4. technology innovation

CRISP “Public Services”:
- Training and the Labour Market
- Public Health
- Environment and the Quality of Life
- Education and Learning
- Public Utilities
Labour Market Observatory of Lombardy

Lombardy region + Crisp centre of research = Labour market observatory of Lombardy

- Efficacy of employment policies
- Professional training
- Regional labour market trend
- Educational system
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- Professional training
- Regional labour market trend
- Educational system
Objective

Classify Lombardy workers careers by professional experiences succession and the associated type of contract.

Amount of data:
• 3 million of workers
• 6-year monitoring period
• 9 million of working experiences
• Personal, social and economic information available
  (official national data)
Objective

Classify Lombardy workers careers by professional experiences succession and the associated type of contract.

Amount of data:
- 3 million of workers
- 6-year monitoring period
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- Personal, social and economic information available (official national data)
Methodology part I

Less stable??

More stable??

Temporary employee contract

Temping

Permanent contract

Apprenticeship

Fixed-term contract
Methodology part I

Less stable??

Temporary employee contract
10 months

Temping
5 months

More stable??

Permanent contract
28 months

Apprenticeship
20 months

Fixed-term contract
11 months

Average Life span
Methodology part I

Multidimensional scaling

Less stable??
- Temporary employee contract
  - Score: 2.68
  - 10 months
- Temping
  - Score: 0.5
  - 5 months

More stable??
- Permanent contract
  - Score: 10.5
  - 28 months
- Apprenticeship
  - Score: 6.79
  - 20 months
- Fixed-term contract
  - Score: 2.95
  - 11 months

Average Life span
Data features

Selection criteria:
- At least 3 month of work
- Contracts opened after 01/01/04
- Censoring of contracts that enduring after 12/31/09
Data features

Selection criteria:
- At least 3 month of work
- Contracts opened after 01/01/04
- Censoring of contracts that enduring after 12/31/09
Methodology part II

Career

- Improve
- Random
- Stable
- Worsen

?
Index of stability

\[ \mu = \frac{\frac{BC}{A} + \frac{DE}{C}}{A + C + E} \]

\[ x = \frac{\min|c.w_i - c.w_j|}{\nu_{ij}} \]

\(c.w = \text{contractual weight}\)
### Index of stability

\[
\mu = \frac{\frac{BC}{A} + \frac{DE}{C}}{A + C + E}
\]

\[
x = \frac{\min|c.\ w_i - c.\ w_j|\nu_{ij}}{\text{monitoring period}}
\]

- `c.w` = contractual weight

<table>
<thead>
<tr>
<th>Cluster criterion</th>
<th>Cluster</th>
</tr>
</thead>
<tbody>
<tr>
<td>(\mu \in [-x, x]) and %\text{period} &gt; 70</td>
<td>Stable</td>
</tr>
<tr>
<td>(\mu \in [-x, x]) and %\text{period} \leq 70</td>
<td>Random</td>
</tr>
<tr>
<td>(\mu &lt; -x)</td>
<td>Worsen</td>
</tr>
<tr>
<td>(\mu &gt; x)</td>
<td>Improve</td>
</tr>
</tbody>
</table>
Methodology part II

Career

Improving
- Contract with lower weight -> Contract with higher weight
- Contract with more than 70% of working time

Stable
- Contract with higher weight -> Contract with lower weight

Worsening
- Contract with lower weight -> Contract with higher weight
- Random

Random
Methodology part II

Career
- Improve
- Stable
- Worsen
- Random

Improvement
- Improve
- Stable
- Worsen
- Random

Career
- Improve
- Stable
- Worsen
- Random

Apprenticeship
- 54%

Fixed-term contract
- 24%

Permanent contract
- 22%

Apprenticeship
- 54%

Fixed-term contract
- 24%

Permanent contract
- 22%

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Fixed-term contract
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Permanent contract
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R integration

- R algorithm
- Structure Query Language (SQL)
- Database management system
- Visual tool
  Extracting Transforming & Loading (ETL)
R integration

100.000 worker’s information pack

R algorithm

Some R packages used:
- RMySQL
- DoBy
- Reshape
- Date
- Smacof

Structure Query Language (SQL)

Database management system

Visual tool
Extracting Transforming & Loading (ETL)
## Results

<table>
<thead>
<tr>
<th>Cluster</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stable</td>
<td>1,829,811</td>
<td>66%</td>
</tr>
<tr>
<td>Improve</td>
<td>596,251</td>
<td>21%</td>
</tr>
<tr>
<td>Worsen</td>
<td>342,832</td>
<td>12%</td>
</tr>
<tr>
<td>Random</td>
<td>11,539</td>
<td>0%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>2,780,433</strong></td>
<td><strong>100%</strong></td>
</tr>
</tbody>
</table>
## Results

<table>
<thead>
<tr>
<th>Condition of stable</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Permanent</td>
<td>1.177.511</td>
<td>64%</td>
</tr>
<tr>
<td>Fixed-term</td>
<td>373.990</td>
<td>20%</td>
</tr>
<tr>
<td>Apprenticeship</td>
<td>143.519</td>
<td>8%</td>
</tr>
<tr>
<td>Temporary employee</td>
<td>86.590</td>
<td>5%</td>
</tr>
<tr>
<td>Temping</td>
<td>48.201</td>
<td>3%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>1.829.811</strong></td>
<td><strong>100%</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Condition of Worsen</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Permanent -&gt; Fixed-term</td>
<td>185.644</td>
<td>54%</td>
</tr>
<tr>
<td>Fixed-term -&gt; Temping</td>
<td>31.443</td>
<td>9%</td>
</tr>
<tr>
<td>Apprenticeship -&gt; Fixed-term</td>
<td>30.192</td>
<td>9%</td>
</tr>
<tr>
<td>Temporary employee -&gt; Permanent</td>
<td>24.163</td>
<td>7%</td>
</tr>
<tr>
<td>Permanent -&gt; Apprenticeship</td>
<td>18.455</td>
<td>5%</td>
</tr>
<tr>
<td>Fixed-term -&gt; Temporary employee</td>
<td>15.763</td>
<td>5%</td>
</tr>
<tr>
<td>Apprenticeship -&gt; Temping</td>
<td>6.897</td>
<td>2%</td>
</tr>
<tr>
<td>Temporary employee -&gt; Apprenticeship</td>
<td>4.173</td>
<td>1%</td>
</tr>
<tr>
<td>Temping -&gt; Temporary employee</td>
<td>3.128</td>
<td>1%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>342.832</strong></td>
<td><strong>100%</strong></td>
</tr>
</tbody>
</table>
Results (Correspondence Analysis)
Further information

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