LaborSim: 
An Agent-Based Microsimulation of Participation Rates in Italy

Roberto Leombruni, Matteo Richiardi, Michele Sonnessa
LABORatorio R. Revelli

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Goal

A tool to make projections of participation and employment rates in Italy in next decades, under easy-to-change scenarios and behavioural hypotheses.
menu of the presentation

- Background issues: Ageing population and low participation rates
- Crucial areas: (Demography,) retirement rules and retirement behaviour, life course perspective
- LaborSim: Design and implementation
- First results with some standard scenarios
menu of the presentation

- Background issues: Ageing population and low participation rates
- Crucial areas: (Demography,) retirement rules and retirement behaviour, life course perspective
- LaborSim: Design and implementation
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Background issues: Ageing population and low participation rates

Crucial areas: (Demography,) retirement rules and retirement behaviour, life course perspective

LaborSim: Design and implementation

First results with some standard scenarios

Italy has one of the oldest populations among Oecd countries. The *old age dependency rate* was 26% in 2000 (EU-18: 18%, USA: 14%), it is expected to rise over 60% by 2050.

At the same time, participation rates in Italy are among the lowest, particularly for women and the elderly. At Stockholm the EU fixed a target of 50% participation rate for people aged 55-64. In Italy the figures are below 30%, and have decreased during all the Nineties.
**Age distribution of Italian Population, 2003**

Source: LaborSim elaboration on Istat projections.

**Old age dependency ratio projections, 2000-2050**

Italy, EU and USA

Source: Istat for Italy, United Nations for EU and USA.

**Background issues: ageing**

1/8

2/8

3/8
Employment rates for people aged 55-64
Males - 1990-2002

Employment rates for people aged 55-64
Females - 1990-2002

background issues: participation (4/8)

background issues: participation (5/8)
Given that, in Italy...

- The population is getting older
- Older people have very low participation rates

...what should we expect?

Demographic and economic dependency ratios, 2000-2050


background issues: projections (6/8)
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Labour force growth in Italy, millions, 1970-2050


"constant" scenario
- Participation rates by five-year age groups and gender remain constant at their 2000 levels.

"average" scenario
- Constant participation rates up to ages 45-49, other age groups are projected to increase and to reach by 2030 the Oecd average in 2000.

"maximum" scenario
- Participation rates by age and gender converge by 2030 to the corresponding maximum rate observed across Oecd in 2000.

Crucial areas
Who are the main actors, where is the stage
Life course perspective

Institutional context and policies
Family structure and network
Individual characteristics

Crucial areas: intro (1/8)
a snapshot on education (1/3)

Employment rates by education, ages 50-59, year 2002 (ranking in parenthesis)

<table>
<thead>
<tr>
<th>Country</th>
<th>All (1)</th>
<th>Less than upper secondary (1)</th>
<th>Upper secondary level (1)</th>
<th>Third level (1)</th>
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</thead>
<tbody>
<tr>
<td>S</td>
<td>82.5</td>
<td>74.4</td>
<td>81.8</td>
<td>91.2</td>
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<tr>
<td>DK</td>
<td>78.5</td>
<td>66.4</td>
<td>80.3</td>
<td>88.2</td>
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<td>UK</td>
<td>71.5</td>
<td>53.6</td>
<td>76.3</td>
<td>82.5</td>
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<tr>
<td>P</td>
<td>67.8</td>
<td>52.5</td>
<td>68.9</td>
<td>80.2</td>
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<tr>
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<td>61.4</td>
<td>66.3</td>
<td>71.9</td>
<td>84.1</td>
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<tr>
<td>FIN</td>
<td>73.1</td>
<td>66.3</td>
<td>71.9</td>
<td>84.1</td>
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<td>68.5</td>
<td>55.7</td>
<td>74.1</td>
<td>83.5</td>
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<tr>
<td>E</td>
<td>54.5</td>
<td>48.3</td>
<td>64.3</td>
<td>82.6</td>
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<tr>
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<td>67.6</td>
<td>51.9</td>
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<td>56.7</td>
<td>69.2</td>
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<td>61.1</td>
<td>49.8</td>
<td>61.8</td>
<td>79.5</td>
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<tr>
<td>I</td>
<td>51.5</td>
<td>42.3</td>
<td>67.4</td>
<td>83.3</td>
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<td>L</td>
<td>56.4</td>
<td>43.3</td>
<td>59.4</td>
<td>89.1</td>
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<tr>
<td>B</td>
<td>52.8</td>
<td>40.1</td>
<td>60.6</td>
<td>73.2</td>
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<tr>
<td>Coeff of variation</td>
<td>0.142</td>
<td>0.175</td>
<td>0.116</td>
<td>0.055</td>
</tr>
</tbody>
</table>

Source: Eurostat, LFS 2002

crucial areas: education (2/8)

a snapshot on education (2/3)

Distribution of people aged 55-64, by educational attainment, year 2000

<table>
<thead>
<tr>
<th>Education</th>
<th>Den</th>
<th>NL</th>
<th>Fra</th>
<th>Id</th>
<th>Sp</th>
<th>Por</th>
<th>Aus</th>
<th>Fin</th>
<th>Ger</th>
</tr>
</thead>
<tbody>
<tr>
<td>Third level (Isced 5-7)</td>
<td>25%</td>
<td>-</td>
<td>16%</td>
<td>13%</td>
<td>4%</td>
<td>9%</td>
<td>4%</td>
<td>4%</td>
<td>25%</td>
</tr>
<tr>
<td>Second stage (Isced 3)</td>
<td>42%</td>
<td>6%</td>
<td>24%</td>
<td>17%</td>
<td>6%</td>
<td>2%</td>
<td>5%</td>
<td>3%</td>
<td>55%</td>
</tr>
<tr>
<td>Less than second stage (0-2)</td>
<td>31%</td>
<td>77%</td>
<td>62%</td>
<td>77%</td>
<td>77%</td>
<td>84%</td>
<td>92%</td>
<td>36%</td>
<td>40%</td>
</tr>
</tbody>
</table>

Source: our elaborations on ECHP, wave 7

crucial areas: education (3/8)
a snapshot on education (3/3)

Distribution of people aged 55-64, by educational attainment, 2000-2050

Source: LaborSim elaboration on Istat data

a life course perspective

- Participation choices should be viewed in a life cycle perspective: existing low employment rates can be the effect of choices made in the past.
- From a microeconomic point of view, and for forecasting purposes, the cross sectional employment rate is not a measure of interest. Cohorts are the correct unit of analysis.
- Past choices and past events matter also in presence of hysteresis: individuals may remain trapped in inactivity because of market frictions and/or because of rigidities in the legislation.
Employment rates of people aged 50-64, females, by selection events, year 2000

Source: our elaborations on ECHP, wave 7

Employment rates of people aged 50-64, males, by selection events, year 2000

Source: our elaborations on ECHP, wave 7
Employment rates of people aged 50-64, males, by selection events, year 1994-2000

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</tr>
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<tbody>
<tr>
<td>Males</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>All</td>
<td>62%</td>
<td>59%</td>
<td>59%</td>
<td>58%</td>
<td>57%</td>
<td>56%</td>
<td>58%</td>
<td>-3.4%</td>
</tr>
<tr>
<td>Excluding the never-working</td>
<td>62%</td>
<td>60%</td>
<td>60%</td>
<td>59%</td>
<td>58%</td>
<td>57%</td>
<td>59%</td>
<td>-3.4%</td>
</tr>
<tr>
<td>Excluding the pension holders</td>
<td>79%</td>
<td>81%</td>
<td>84%</td>
<td>82%</td>
<td>83%</td>
<td>81%</td>
<td>85%</td>
<td>5.6%</td>
</tr>
<tr>
<td>Females</td>
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<td></td>
</tr>
<tr>
<td>All</td>
<td>24%</td>
<td>23%</td>
<td>24%</td>
<td>25%</td>
<td>24%</td>
<td>27%</td>
<td>28%</td>
<td>3.8%</td>
</tr>
<tr>
<td>Excluding the never-working</td>
<td>36%</td>
<td>35%</td>
<td>35%</td>
<td>36%</td>
<td>35%</td>
<td>38%</td>
<td>39%</td>
<td>2.6%</td>
</tr>
<tr>
<td>Excluding the pension holders</td>
<td>50%</td>
<td>51%</td>
<td>49%</td>
<td>50%</td>
<td>49%</td>
<td>53%</td>
<td>54%</td>
<td>4.5%</td>
</tr>
</tbody>
</table>

Source: our elaborations on ECHP, wave 1-7

crucial areas: life course (8/8)

LaborSim: Design and implementation

LaborSim is a supply side model of Italian labour market. “HiFi” focuses are on demography, retirement, education and participation choices. “LoFi” focuses are on migration and unemployment. No focuses on family structure, short term and demand side dynamics.

- Key features of the model
- The layout of the simulation
- The events schedule...
- …and the events

LaborSim: intro (1/8)
**key features of LaborSim**

- It is an agent-based, discrete-time, dynamic ageing microsimulation
- Has a separated UI, to manage scenarios and simulation data analysis
- Is highly integrated with empirical data
- Implements the actual retirement rules, in a flexible way
- Implements and extends the three Istat demographic projections
- All crucial behaviours are cohort specific

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**Simulation layout**

Model:
- Individuals
- Demographer
- Central Statistical Office
- Econometrics Office

Observer:
- graphical outputs
- Datawarehouse
Events schedule

- representative sample of Italian population
- Create initial population
- simulated population
- Demographic evolution
- Education
- Retirement
- Participation and employment

First results with some standard scenarios

- Demography and migrations
- Education
- Participation rates with High/Low cohort effects
- Retirement with different behavioural hypotheses
The pyramid 50 years later

Dependency ratio with H/L immigrations

Dependency ratio (low natives scenario)
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Number of students by education level

First results: education (4/8)

Participation rate by gender, H/L cohort effects

First results: participation (5/8)
Economic dependency ratio, H/L immigrations

First results: participation (6/8)

Share of eligible and retired, people aged 55-64

First results: retirement (7/8)
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Share of retired, people 55-64, H/L delay

First results: retirement (8/8)

Retirement

late
early

0.1 0.15 0.2 0.25 0.3 0.35 0.4 0.45 0.5 0.55 0.6