The FIT Labour Supply Model for Germany

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Introduction - About Fraunhofer FIT

- Established research group in development of microsimulation models
- Major clients: German federal ministries
- Among these projects:
  - Long-term (~20 years) labour supply projections for the German Federal Ministry of Education and Research (2007) and the former Bund-Länder Commission for Educational Planning and Research (2001)
  - Since 2008 in cooperation with:
    - Federal Institute for Vocational Education and Training (BIBB)
    - Institute for Employment Research (IAB)
    - Institute of Economic Structures Research (GWS)
Main data sources (Labour Supply)

- Education statistics (FSO - Federal Statistical Office), yearly
- Projections of future stocks in the educational system (KMK - Standing Conference of the Ministers of Education and Cultural Affairs of the Länder in the Federal Republic), every 3-5 years
- Population projections (FSO), every 3-5 years
  - Population, births, deaths and net migration
- German Microcensus (MC), yearly, 1% subsample
  - Labour force participation rates
  - Qualification and occupational structure
  - Adjusted to national accounts (NA) and education statistics
Levels of aggregation

- Age, Gender
- 4 skill levels (ISCED)
- Initial vocational qualification by specialisation recoded from MC 05-08

Results:
- Remaining labour force not in education
- New labour force supply from educational system
- New labour force supply from migration
Fraunhofer FIT Model

Labour force not in education

Net outflows from educational system
Labour Supply: Forecasting method

- Starting point: Basic balancing equation where $t$ is the end of the year
  
  \[ p_t = p_{t-1} + b_{t-1} - d_{t-1} + i_t - e_t \]
  
  with $b_{t-1} - d_{t-1} = n_{t-1}$ (natural increase) and $i_t - e_t = nm_{t}$ (net migration)

- Forecasting population by age, sex, qualification: not in education (pne):
  
  \[ p_{ne,t,a,s,q} = p_{ne,t-1,a-1,s,q} + n_{i,t-1,a-1,s,q} + nm_{g,t,a,s,q} + ned_{u,t,a,s,q} \]

- Total population in $t$:
  
  \[ p_{t,a,s,q} = p_{ne,t-1,a-1,s,q} + pie_{t-1,a-1,s,q} \]

- Labour force supply:
  
  \[ lfs_{t,a,s,q} = p_{ne,t,a,s,q} * lfr_{ne,t,a,s,q} + pie_{t,a,s,q} * lfr_{e,t,a,s,q} \]

- But: How are $nm_{g,t,a,s,q}$ and $ned_{u,t,a,s,q}$ determined?
German Educational System - Transition model to describe stocks and flows

- **Starting point**: Stocks in educational institutions
- **Main Problems**:
  - Availability and consistency of data (MC vs. FSO and NA)
  - Use of adjustment algorithms
- **Basic method**:
  - \[ \text{stock}_t = \text{stock}_{t-1} + \text{entrants}_t - \text{graduates}_t \]
  - **Stocks at the end of one year are equal to Stocks at the beginning of the following year**
- Available information on transitions from GSOEP, FSO-Data on education, ...
- ... are not consistent: Again use of adjustment algorithms to determine most likely transition structure
- **Result**: Transition matrix of the educational system
German Educational System - Accounts

Year \( t + 1 \)

Year \( t + 2 \)

IAB accounting scheme (BGR)

Colsum \( j \) in year \( t \) = Rowsum \( j \) in year \( t + 1 \)
German Educational System – Accounts

- Focus on transition into/out of labour market
  - On main diagonal: „Stayer“
  - Off the main diagonal: Transitions
  - First three rows: Secondary education

<table>
<thead>
<tr>
<th></th>
<th>Education</th>
<th>Germany</th>
<th>Labour Market</th>
<th>Year 2000</th>
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<td>BVM</td>
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Zugänge | 97.2  | 83.8 | 164.9 | 622.9 | 36.1 | 47.7 | 98.0 | 98.9 | 216.1 | 2400.4 | 245.8 | 3170.3 | 2634.7 | T JA = 67945.7
JE      | 97.2  | 98.6 | 401.5 | 1702.0| 113.0| 98.2 | 218.3| 456.4| 1321.4| 3808.8 | 245.8 | 3664.6 | 22014.6| 1533.8| T JE = 67231.0

Source: IAB Bildungsdatenrechnung
Example: Stocks and Transistions (BVM= vocational preparation scheme)

- Entrants in BVM

\[
\text{zugbvm := uhsabvm + umbabvm + uhshbvm} \\
\text{  + ubgjbvm + ubfshbvm + ublbvm + usdgbvm} \\
\text{  + ufshbvm + ufosbvm + ufgybvm + ufhsbvm + uwhsbvm} \\
\text{  + uwpfbvm + uambvm + uzuwbvm;}
\]

\[
\text{bvm1 := zugbvm;}
\text{bvm2 := ugbvm2 * bvm1(t-1)/100;}
\text{bvm := bvm1 + bvm2;}
\]

- Abgänger insgesamt

\[
\text{abgbvm := (1-ugbvm2/100)*bvm1(t-1) + bvm2(t-1);}
\]

\[
\text{ubvmbgj := ugbvmbgj*abgbvm/100;}
\text{ubvmbfs := ugbvmbfs*abgbvm/100;}
\text{ubvmbfl := ugbvmbfl*abgbvm/100;}
\text{ubvmsdg := ugbvmsdg*abgbvm/100;}
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\text{ubvmfhs := ugbvmfhs*abgbvm/100;}
\text{ubvmwhs := ugbvmwhs*abgbvm/100;}
\text{ubvmpwpf := ugbvmpwpf*abgbvm/100;}
\text{ubvmmam := ugbvmmam*abgbvm/100;}
\text{ubvmaut := ugbvmaut*abgbvm/100;}
\]

- Forecast BVM

- Exits in other accounts including labour market with transition rates „uqxxxyyy“

xxx = source
yyy = target
Pitfalls

- Curtailment of schooling at the Gymnasium from nine to eight years
- Suspension of compulsory military service

→ Additional school leavers and inflows in tertiary education

Source: FSO
Selected Results for Germany

Results from QUBE 2010

- Tertiary sector: master craftsman, technician, higher ed.
- Supply
- Demand
- Not completed VET

Supply
Demand
Completed VET

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Thank you

www.qube-projekt.de/