Training: New to NTA

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Mexico City, Mexico
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Outline

1 Preliminaries
2 NTA motivation and goals
3 NTA features and organization
4 Data and basic methods
5 Steps to complete NTA
6 Extensions to “Basic” NTA
7 Lab exercise
1 Preliminaries

• Training objectives for the week
  – Understand NTA project and estimates
  – Get started on macro controls and age profiles
  – Chance to ask questions

• Introductions
  – Who are you? What are your NTA objectives?
  – Your data: What you have, what you need to find
    • Population counts
    • National accounts
    • Household surveys and administrative records
1 Preliminaries

• Does everyone have access to the NTA wiki? (www.ntaccounts.org)

• Resources to learn more on the NTA wiki
  – NTA “course”
  – Link to NTA manual
  – Link to 2012 comparative volume
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7 Lab exercise
2 NTA motivation and goals

• Measuring the generational economy
  – How we produce, consume, share, and save resources by age
  – Research network of teams in more than 60 (?) countries

• Motivating questions
  – How do changes in population age structure impact economies and economic growth?
  – How does the economic life vary by age?
  – How does the intergenerational economic system affect the economy and prospects for growth?
NTA example – Economic lifecycle

United States, 2011

Per Capita Flow by Age, US$ (1000s)

Age

Labor Income

Consumption

Old-age lifecycle deficit

Working-age lifecycle surplus

Young-age lifecycle deficit
NTA example – Reallocations

![Graph showing units of average labor income 30-49 against age with different categories of transfers: Public, Asset-based, and Private Transfers. The graph illustrates changes in income distribution across different age groups.]
Example of change over time (US total consumption)

In units of average labor income, ages 30-49

- 1960
- 1985
- 2015

- Private Other
- Public Other
- Owned Housing
- Public Health
- Private Health
- Private Education
- Public Education
- Health
- Education
2 NTA motivation and goals

• What do we learn from NTA?
  – Are support systems sustainable?
  – Does the generational economy impact growth?
  – Changing age patterns?

• Example: demographic dividends
  – First DD: Age structures favorable to production
  – Second DD: Age structures favorable to capital
    • Older populations have more assets, on average
    • Fertility decline can mean greater HK investment per child
3 NTA features and organization

• What is an age profile?
  – A schedule of age-specific average flow amounts
  – Based on a flow measure or proxy indicator from
    • A household survey
    • A government report
    • Other NTA age profiles
    • NTA assumptions
  – Smoothed over age
  – Adjusted up or down so that aggregate flow matches an aggregate estimate from national accounts
3 NTA features and organization

• NTA age profiles disaggregate national accounts’ current account by age
  – Will eventually include asset revaluation and wealth accounts

• NTA is generally consistent with the System of National Accounts (SNA) except:
  – SNA tracks by sector (corporate, government, household) but NTA is always from the individual perspective
    • Government, corporate, and household flows imputed to the individuals who “own” those institutions
  – SNA does not include intra-household transfers, that is an innovation of NTA
  – Some changes in SNA aggregates
The flow account identity

• Inflows
  – Labor income
  – Asset income
  – Transfer inflows

\[
Y^l(a) + Y^a(a) + \tau^+(a) = C(a) + S(a) + \tau^-(a)
\]

Inflows

• Outflows
  – Consumption
  – Saving
  – Transfer outflows

\[
C(a) - Y^l(a) = Y^a(a) - S(a) + \tau^+(a) - \tau^-(a)
\]

Lifecycle Deficit

Asset-based Reallocations

Net Transfers

Age Reallocations
3 NTA features and organization

- Reallocations are classified by economic form and mediating institution

<table>
<thead>
<tr>
<th>A Classification of NTA Reallocations.</th>
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<tbody>
<tr>
<td></td>
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<tr>
<td><strong>Asset-based Age Reallocations</strong></td>
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<tr>
<td><strong>Capital and Other Non-Financial Assets</strong></td>
</tr>
<tr>
<td>Public</td>
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Source: Mason, Lee et al. (forthcoming); adapted from Lee (1994).
3 NTA features and organization

- Asset-based reallocations allow for inter-temporal exchange
  - Save now, spend later
  - Go into debt and spend now, repay later
  - Invest now, spend flow of returns in future

- Transfers involve no explicit quid pro quo
  - May involve implicit obligation, e.g., transfers between children and parents
  - Transfers must balance (inflows = outflows) but may also include net transfers to or from Rest-of-World
<table>
<thead>
<tr>
<th>Consumption</th>
<th>Labor Income</th>
<th>Life Cycle Deficit (LCD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Labor Income</td>
<td>Transfers (T)</td>
<td>Reallocations (R)</td>
</tr>
<tr>
<td>Transfers (T) + Asset-Based Reallocations (RA)</td>
<td>Life Cycle Deficit (LCD) =</td>
<td></td>
</tr>
</tbody>
</table>

\[
\text{Consumption} - \text{Labor Income} = \text{Transfers (T)} + \text{Asset Income (YA)} - \text{Net Saving (S)}
\]

\[
\begin{align*}
\text{Private (CF)} & - \text{Public (CG)} = \text{Labor Earnings (YLE)} + \text{Self-Emp Income (YLS)} \\
\text{Self-Emp Income (YLS)} & = \text{Private (TF)} + \text{Public (TG)} + \text{Private (YAF)} + \text{Public (YAG)} - \text{Private (SF)} - \text{Public (SG)}
\end{align*}
\]

\[
\begin{align*}
\text{Private (YAF)} & - \text{Private (SF)} + \text{Private (CF)} - \text{Public (CG)} = \text{Private (TF)} + \text{Public (TG)} + \text{Private (YAF)} + \text{Public (YAG)} - \text{Private (SF)} - \text{Public (SG)}
\end{align*}
\]

**Health**
- Health (CFH)
- Health (CGH)
- IntraHH (TFW)
- Health (TGH)
- InterHH (TFB)
- Edu (TGE)
- Other In-Kind (TGXI)
- Business and Non-Profits (YKFB)

**Edu**
- Edu (CFE)
- Edu (CGE)
- IntraHH (TFW)
- Edu (TGE)
- Other In-Kind (TGXI)
- Owner-Occupied Housing (YKFH)

**Other**
- Other (CFX)
- Other (CGX)
- IntraHH (TFW)
- IntraHH (TFW)
- Other In-Kind (TGXI)
- Other Cash (TGXC)

**Transfers** have inflows and outflows.
Also collect a full set of tax profiles.
4 Data and basic methods

- Data: Population, national accounts, household surveys, administrative data

1. Population estimates
   - Single year of age to 90+
   - Evaluated for quality
   - Can use UN World Population Prospects if problems with national estimates
   - Significant non-household population?
4 Data and basic methods

2. National accounts data (in SNA format)
   - List of main SNA tables given in the manual, need tables by sector
   - Which government agencies produce your accounts? How do they publish the results? What is available in international databases?
   - Will probably also need:
     – Government expenditure records
     – Entries for your country in the International Monetary Fund’s Government Finance Statistics (GFS) publications
4 Data and basic methods

3. Household surveys
   - Income and expenditure surveys give direct measures or indicators of relative age patterns
   - May need to supplement with specialized surveys (older people, institutionalized population)

4. Administrative data
   - Government reports on public program participation by age
   - May give monetary flows
   - May only have participation indicators
• Necessary features of household surveys and administrative records:
  – Nationally representative
  – Designated household head/householder
  – Sufficient sample size
  – Household roster by age, sex, work/school status
  – Includes necessary indicators
    • Income by source (including work, government benefits, gifts, interest and dividend income, etc.)
    • Expenditure by type (amounts paid for consumption, taxes, gifts, etc.)
How to calculate an age profile

1. Calculate the macro control from national accounts
2. Identify a measure or proxy indicator for the flow
   1. From household survey
      - Use individual-level data if available
      - Otherwise allocate household amount to individuals in the household
   2. From administrative records
   3. On \textit{a priori} grounds (i.e., assumed or calculated from other age profiles)
3. Calculate single-year age group averages
   - May have to adjust for any missing populations (i.e. persons not represented in survey or administrative records)
4. Smooth
   - Evaluate to ensure that no real variation has been eliminated
5. Adjust to controls
   - Evaluate adjustment factor to test the validity of the age shape
• Smoothing

  • Friedman’s supersmooother is preferred method, R “supsmu” or Stata ado file for “supsmooth”
  • Reduces noise from sampling
  • Smooth lowest-level components only
  • Beware of eliminating “real” features of the age pattern
    – Peaks/valleys, elbows, zeros
  • False negative values should be replaced with zeros
  • Details and examples in manual appendix
4 Data and basic methods

- Macro control adjustments

\[
\begin{align*}
\alpha: & \quad \text{age } \alpha, \text{ single years ranging from } 0 \text{ to } \omega \\
N(\alpha): & \quad \text{population count, age } \alpha \\
X: & \quad \text{macro control (i.e. national total, all ages combined)} \\
x(\alpha): & \quad \text{per capita age pattern, age } \alpha \\
\tilde{x}(\alpha): & \quad \text{per capita NTA age profile, age } \alpha \\
\tilde{X}(\alpha): & \quad \text{aggregate NTA age profile, age } \alpha \\
\end{align*}
\]

Scale Factor Calculation:

\[
\theta = \frac{X}{\sum_{\alpha=0}^{\omega} x(\alpha)N(\alpha)}
\]

Apply Scale Factor:

\[
\tilde{x}(\alpha) = \theta x(\alpha)
\]

\[
\tilde{X}(\alpha) = \tilde{x}(\alpha)N(\alpha)
\]
5 Steps to complete NTA

Gather Data
- Identify available surveys, administrative records, national accounts, and population data
- Choose base year in which all necessary data are available
- Obtain data permissions and copies of datasets
- Evaluate data quality, coverage, usability

Lifecycle Accounts
- Calculate macro controls for components of consumption and labor income (some teams prefer to calculate all macro controls at this stage)
- Estimate age patterns from administrative and survey data
- Smooth, adjust to controls, and evaluate
5 Steps to complete NTA

Public Age Reallocation
- Calculate macro controls for public reallocations (taxes, transfers, asset income, and saving)
- Estimate age shapes for these variables from administrative and survey data
- Smooth, adjust to controls, and evaluate

Private Age Reallocation
- Calculate macro controls for private reallocations (transfers, asset income, and saving)
- Estimate age shapes for inter-household transfers, asset income, and saving from survey data
- Smooth, adjust to controls, and evaluate
- Estimate components of intra-household transfers from already estimated profiles and sharing algorithm
- Smooth, adjust to modified controls, and evaluate
- Estimate private saving as the balancing item
5 Steps to complete NTA

• Review and evaluate all estimates
  – See manual for list of checks
• Document estimates on the wiki
• Upload data and documentation in the wiki database
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6 Extensions to “basic” NTA

• Further disaggregate NTA age profiles by other characteristics
  – Socioeconomic status
  – Gender
  – Geography (region, urban-rural, etc.)

• National Time Transfer Accounts

• Wealth accounts

• Bequests

• Policy-relevant analyses and indicators
7 Lab exercise

• Macro control spreadsheet
  – Old template but still does a good job at giving the general methods
  – Example data are provided, unfortunately the OECD’s online national accounts portal is completely different now, so you can’t just download in the same format

• Stata code example to create a few age profiles using US data