Applying the Economic Support Ratio to Canadian provinces between 1998 and 2060

Marcel Mérette & Julien Navaux

July 24, 2018
### Issue

#### Share of people aged 65+ in provinces

<table>
<thead>
<tr>
<th>Year</th>
<th>Canada</th>
<th>Atlantics</th>
<th>Québec</th>
<th>Ontario</th>
<th>Prairies</th>
<th>British Columbia</th>
</tr>
</thead>
<tbody>
<tr>
<td>1998</td>
<td>12%</td>
<td>13%</td>
<td>12%</td>
<td>12%</td>
<td>12%</td>
<td>13%</td>
</tr>
<tr>
<td>2018</td>
<td>17%</td>
<td>21%</td>
<td>19%</td>
<td>17%</td>
<td>14%</td>
<td>19%</td>
</tr>
<tr>
<td>2038</td>
<td>24%</td>
<td>31%</td>
<td>25%</td>
<td>24%</td>
<td>19%</td>
<td>25%</td>
</tr>
</tbody>
</table>

#### Distribution of the 37 millions people in Canada, 2018

- Atlantic: 13.2%
- Québec: 38.4%
- Ontario: 22.9%
- Prairies: 22.9%
- British Columbia: 6.4%
Contributions

- Suggesting a new dependency ratio called the “NTA economic support ratio” for Canada

- National Transfer Accounts (NTA) for Canadian provinces between 1998 and 2013:
  - Longitudinal NTA for few countries:
    - Taiwan: 1985-2005 (Lai & Tung, 2015)
    - Australia: 1981-2010 (Rice, Temple & McDonald, 2017)
  - Intra-country analysis:
Outline

- An overview of dependency ratios
- NTA for Canada and provinces: Methodology and data
- Dependency ratios for Canada and provinces
  - Inverted demographic support ratio
  - NTA economic support ratios
- Conclusion
An overview of dependency ratios

- Inverted demographic support ratio:
  Ballod (1913); Notestein et al. (1944)

\[
IDS\text{SR} = \frac{\sum_{20}^{64} Pop_a}{\sum_{0}^{19} Pop_a + \sum_{65}^{90+} Pop_a}
\]

With \(Pop_a\) = Number of residents at age \(a\)
An overview of dependency ratios

- Number of workers/Number of non-workers: International Labour Organisation (2011); Lutz, Butz & KC (2014)

\[
\frac{\text{WORK}_a}{\text{NON} - \text{WORK}_a}
\]

With \(\text{WORK}_a = \) Number of workers (full-time equivalent)
With \(\text{NON} - \text{WORK}_a = \) Number of non-workers
An overview of dependency ratios

- The NTA economic support ratio (1)
  Lee & Mason (2012); Lee (2014); Sanderson & Scherbov (2015)

\[
\frac{YL}{C} = \frac{\sum_{0}^{90+} y_{l_a} \cdot Pop_{a}}{\sum_{0}^{90+} c_{a} \cdot Pop_{a}}
\]

With \( y_{l_a} \) = per capita labour income at age \( a \)
With \( c_{a} \) = per capita total consumption (private and public) at age \( a \)
An overview of dependency ratios

- The NTA economic support ratio (2)
  Lee & Mason (2013)

\[
\frac{YL + ABR}{C} = \frac{\sum_{0}^{90+} yl_a \cdot Pop_a + \sum_{0}^{90+} abr_a \cdot Pop_a}{\sum_{0}^{90+} c_a \cdot Pop_a}
\]

\(yl_a\) = per capita labour income at age \(a\)
\(c_a\) = per capita total consumption (private and public) at age \(a\)
\(abr_a\) = asset based reallocation (private and public) at age \(a\)

\(abr_a = Asset\ income - Saving\)
NTA for Canada and Provinces: Methodology and data

The life cycle deficit and the age reallocation system

In each province, at each age \( a \):

\[
C(a) - YL(a) = TG + TF + TGP + TFP + [YA(a) - S(a)]
\]
NTA for Canada and Provinces: Methodology and data

- Atlantic provinces
- Québec
- Ontario
- Prairies
- British Columbia

- 37 variables
- 5 regions
- 16 years (1998-2013)
Macro-aggregates and age profiles

Age profiles:

- Public education - Postsecondary: 1999/00 - 2014/15
- Public education - Elementary and secondary: 2002/03 - 2014/15
- Public health: 1998
- Private consumption: 1998
- Private transfers within households: 1998
- Imputed rents: 1998
- Survey of Household Spending (SHS): 2013
- Canadian Income Survey (CIS)
- Canadian Institute for Health Information

Labour income: 1976
Private asset income: 1976
Public transfers in cash: 1976
Private transfers between households: 1976
Canadian Income Survey (CIS)
Statistics Canada

Macro-aggregates: 1981

Timeline:
- 1976
- 1980
- 1990
- 2000
- 2010
- 2014
Dependency ratios for Canada and provinces
Inverted demographic support ratio

![Graph showing the inverted demographic support ratio from 1998 to 2063 for different regions: Canada, Atlantic provinces, Québec, Ontario, Prairies, and British Columbia. The graph indicates a decrease in the ratio over time for all regions, with specific points labeled for years and regions.]
NTA economic support ratio \( \frac{y}{c} \)

### NTA Forecasts

- **Canada**
- **Atlantic**
- **Québec**
- **Ontario**
- **Prairies**
- **British Columbia**

<table>
<thead>
<tr>
<th>Year</th>
<th>Canada</th>
<th>Atlantic</th>
<th>Québec</th>
<th>Ontario</th>
<th>Prairies</th>
<th>British Columbia</th>
</tr>
</thead>
<tbody>
<tr>
<td>1998</td>
<td>1.03</td>
<td>0.88</td>
<td>0.93</td>
<td>0.90</td>
<td>0.87</td>
<td>0.76</td>
</tr>
<tr>
<td>2003</td>
<td>0.93</td>
<td>0.88</td>
<td>0.93</td>
<td>0.90</td>
<td>0.87</td>
<td>0.76</td>
</tr>
<tr>
<td>2008</td>
<td>0.90</td>
<td>0.88</td>
<td>0.93</td>
<td>0.90</td>
<td>0.87</td>
<td>0.76</td>
</tr>
<tr>
<td>2013</td>
<td>0.90</td>
<td>0.88</td>
<td>0.93</td>
<td>0.90</td>
<td>0.87</td>
<td>0.76</td>
</tr>
<tr>
<td>2018</td>
<td>0.87</td>
<td>0.87</td>
<td>0.90</td>
<td>0.90</td>
<td>0.87</td>
<td>0.76</td>
</tr>
<tr>
<td>2023</td>
<td>0.87</td>
<td>0.87</td>
<td>0.90</td>
<td>0.90</td>
<td>0.87</td>
<td>0.76</td>
</tr>
<tr>
<td>2028</td>
<td>0.87</td>
<td>0.87</td>
<td>0.90</td>
<td>0.90</td>
<td>0.87</td>
<td>0.76</td>
</tr>
<tr>
<td>2033</td>
<td>0.87</td>
<td>0.87</td>
<td>0.90</td>
<td>0.90</td>
<td>0.87</td>
<td>0.76</td>
</tr>
<tr>
<td>2038</td>
<td>0.87</td>
<td>0.87</td>
<td>0.90</td>
<td>0.90</td>
<td>0.87</td>
<td>0.76</td>
</tr>
<tr>
<td>2043</td>
<td>0.87</td>
<td>0.87</td>
<td>0.90</td>
<td>0.90</td>
<td>0.87</td>
<td>0.76</td>
</tr>
<tr>
<td>2048</td>
<td>0.87</td>
<td>0.87</td>
<td>0.90</td>
<td>0.90</td>
<td>0.87</td>
<td>0.76</td>
</tr>
<tr>
<td>2053</td>
<td>0.87</td>
<td>0.87</td>
<td>0.90</td>
<td>0.90</td>
<td>0.87</td>
<td>0.76</td>
</tr>
<tr>
<td>2058</td>
<td>0.87</td>
<td>0.87</td>
<td>0.90</td>
<td>0.90</td>
<td>0.87</td>
<td>0.76</td>
</tr>
<tr>
<td>2063</td>
<td>0.87</td>
<td>0.87</td>
<td>0.90</td>
<td>0.90</td>
<td>0.87</td>
<td>0.76</td>
</tr>
</tbody>
</table>
NTA economic support ratio $\frac{y_t + \text{abr}}{c}$

- Graph showing NTA forecasts from 1998 to 2063 for Canada, Atlantics, Québec, Ontario, Prairies, and British Columbia.

- The graph indicates projections for various regions with different trends and values over time.

- Specific values are marked at intervals from 1998 to 2063, showing changes in economic support ratios.
C and YL+YA-S are relative to per capita YL+YA-S at age 30-49