Measuring National Transfer Accounts from an intra-country perspective: A first release for Canadian provinces

Marcel Mérette & Julien Navaux

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Issue

- NTA accounts are constructed on a country basis
- Population aging and welfare state can be heterogeneous within a country
- This is particularly true for federal countries, such as Canada, where Provinces are in charge of Education, health expenditures, and social services
- Results that are valid at the country level could differ at the subnational level
### 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**: 0.3%
- **British Columbia**: 6.4%
Issue

Public transfers flows in 2015, % GDP

- **Atlantics**
  - Public transfer inflows: 50%
  - Taxes: 30%

- **Québec**
  - Public transfer inflows: 40%
  - Taxes: 35%

- **Ontario**
  - Public transfer inflows: 30%
  - Taxes: 30%

- **Prairies**
  - Public transfer inflows: 25%
  - Taxes: 30%

- **British-Columbia**
  - Public transfer inflows: 25%
  - Taxes: 30%
Contributions

- Suggesting a new NTA methodology for sub-national accounts at the provincial level
- Building a new database for five Canadian regions between 1998 and 2013

Atlantic provinces
Québec
Ontario
Prairies
British Columbia
Contributions

- Longitudinal NTA for few countries:
  - Taiwan: 1985-2005 (Lai and Tung, 2015)
  - Australia: 1981-2010 (Rice, Temple & McDonald, 2017)
  - And many others: Mexico, Korea, Spain, UK

- Intra-country analysis:
Outline

- Subnational NTA equation
- Macro-aggregates and age profiles
- Who pays for the consumption of young and old in Canadian provinces?
- Conclusion
Subnational NTA equation

The lifecycle deficit and the age reallocation system

In each province, at each age $a$:

$$C(a) - YL(a) = TG + TF + TGP + TFP + [YA(a) - S(a)]$$
Macro-aggregates and age profiles

Age profiles
Macro-aggregates

- Two steps:
  1. Gretchen’s table
     
     **Table 1. Macro-aggregates for the Atlantics in 2015 (dollars x 1 000 000)**

     |       | CF  | SF  | -T  | YL  | YAF |
     |-------|-----|-----|-----|-----|-----|
     | private | 63 492 | 3 625 |     | 70 179 | 9 119 |
     | public  | 34 271 | -544 |     |       | -332 |
     | total   | 97 763 | 3 081 | -21878 | 70 179 | 8 787 |

     ![Diagram](image)

  2. Subdivide aggregates of table 1
1. Start with GDP by expenditure and income approaches, identifying private and public components.

<table>
<thead>
<tr>
<th></th>
<th>Final Consumption Expenditures</th>
<th>Gross Capital Formation</th>
<th>Net Exports</th>
<th>Compensation of Employees (CoE)</th>
<th>Gross Operating Surplus (GOS)</th>
<th>Gross Mixed Income (GMI)</th>
<th>ITLS</th>
</tr>
</thead>
<tbody>
<tr>
<td>private</td>
<td>72 778</td>
<td>22 770</td>
<td>PRO -12 764</td>
<td>57 074</td>
<td>21 029</td>
<td>13 592</td>
<td></td>
</tr>
<tr>
<td>public</td>
<td>34 271</td>
<td>5 301</td>
<td>RDM -12 805</td>
<td>57 074</td>
<td>25 904</td>
<td>13 592</td>
<td>13 003</td>
</tr>
<tr>
<td>total</td>
<td>107 049</td>
<td>28 071</td>
<td>PRO -12 764</td>
<td>57 074</td>
<td>25 904</td>
<td>13 592</td>
<td>13 003</td>
</tr>
</tbody>
</table>

2. Adjust for statistical discrepancies (SD) in GDP by approach. Note that this step does not balance.

<table>
<thead>
<tr>
<th>Income SD</th>
<th>-CoE % Expend SD</th>
<th>-GOS % Expend SD</th>
<th>-GMI % Expend SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>private</td>
<td>12.00</td>
<td>-6.49</td>
<td>-2.31</td>
</tr>
<tr>
<td>public</td>
<td>-1.20</td>
<td>-1.20</td>
<td>-1.20</td>
</tr>
<tr>
<td>total</td>
<td>-12.764</td>
<td>-6.49</td>
<td>-2.31</td>
</tr>
</tbody>
</table>

3. Go from domestic to national basis by including net Rest-of-World (ROW) Amounts

<table>
<thead>
<tr>
<th>net Primary Inc from ROW</th>
<th>+net CoE from ROW</th>
<th>+net Property Inc from ROW</th>
</tr>
</thead>
<tbody>
<tr>
<td>private</td>
<td></td>
<td></td>
</tr>
<tr>
<td>public</td>
<td></td>
<td></td>
</tr>
<tr>
<td>total</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

4. Reallocation of GMI to Labor versus Capital

<table>
<thead>
<tr>
<th>+GMI TO LABOR</th>
<th>+GMI TO CAPITAL</th>
<th>-GMI</th>
</tr>
</thead>
<tbody>
<tr>
<td>private</td>
<td>9 932</td>
<td>3 659</td>
</tr>
<tr>
<td>public</td>
<td>3 301</td>
<td>-1 229</td>
</tr>
<tr>
<td>total</td>
<td>13 233</td>
<td>-4 988</td>
</tr>
</tbody>
</table>

5. Reallocation of ITLS to consumption, labor and capital to go from "market" to "basic" prices (Worksheet)

<table>
<thead>
<tr>
<th>-C share of ITLS</th>
<th>+L share of ITLS</th>
<th>+K share of ITLS</th>
<th>-ITLS</th>
</tr>
</thead>
<tbody>
<tr>
<td>private</td>
<td>3 289</td>
<td>428</td>
<td>-13 592</td>
</tr>
<tr>
<td>public</td>
<td>3 289</td>
<td>428</td>
<td>-13 003</td>
</tr>
<tr>
<td>total</td>
<td>-941</td>
<td>-832</td>
<td>-13 003</td>
</tr>
</tbody>
</table>

6. Go from gross to net by removing Consumption of Fixed Capital (CFC) from capital share of profits.

<table>
<thead>
<tr>
<th>LESS CFC</th>
</tr>
</thead>
<tbody>
<tr>
<td>private</td>
</tr>
<tr>
<td>public</td>
</tr>
<tr>
<td>total</td>
</tr>
</tbody>
</table>

7. Take saving-related amounts out of net exports and add to investment column to separate saving from transfers.

<table>
<thead>
<tr>
<th>+saving related Am.</th>
<th>-saving related Am.</th>
</tr>
</thead>
<tbody>
<tr>
<td>private</td>
<td>-305</td>
</tr>
<tr>
<td>public</td>
<td>310</td>
</tr>
<tr>
<td>total</td>
<td>6</td>
</tr>
</tbody>
</table>

7a. Net Capital Transfers

| private | -305 |
| public  | 310  |
| total   | 6    |

7b. Net Lending/Borrowing

| private | -3 398 |
| public  | -1 229 |
| total   | -4 627 |

7c. Net non-produced non-financial assets (NPNFA)

| private | 161 |
| public  | -161 |
| total   | 0   |

8. Add columns to get highest-level NTA flow account macro controls.

<table>
<thead>
<tr>
<th>CF</th>
<th>SF</th>
<th>-T</th>
<th>YL</th>
<th>YAF</th>
</tr>
</thead>
<tbody>
<tr>
<td>private</td>
<td>63 492</td>
<td>3 625</td>
<td>70 179</td>
<td>9 119</td>
</tr>
<tr>
<td>public</td>
<td>34 271</td>
<td>-544</td>
<td>70 179</td>
<td>-332</td>
</tr>
<tr>
<td>total</td>
<td>97 763</td>
<td>3 081</td>
<td>-21878</td>
<td>8 787</td>
</tr>
</tbody>
</table>

Atlantic provinces, 2015
1. Start with GDP by expenditure and income approaches, identifying private and public components.

<table>
<thead>
<tr>
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<tr>
<td>public</td>
<td>34 271</td>
<td>5 301</td>
<td></td>
<td>4 875</td>
<td>13 592</td>
<td>13 003</td>
</tr>
<tr>
<td>total</td>
<td>107 049</td>
<td>28 071</td>
<td>PRO -12 764</td>
<td></td>
<td></td>
<td></td>
</tr>
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<td></td>
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2. Adjust for statistical discrepancies (SD) in GDP by approach. Note that this step does not balance.

\[
\begin{align*}
\text{Income SD} &= -\text{CoE % Expend SD} + -\text{GOS % Expend SD} + -\text{GMI % Expend SD} \\
\text{private} &= 12.00 -6.49 -2.31 -1.20
\end{align*}
\]

3. Go from domestic to national basis by including net Rest-of-World (ROW) Amounts

\[
\begin{align*}
+\text{net Primary Inc from ROW} &= +\text{net CoE from ROW} + +\text{net Property Inc from ROW} \\
\text{private} &= -109 -390 -442 \\
\text{public} &= -109 -390 -442 \\
\text{total} &= -327 -780 -884
\end{align*}
\]

4. Reallocate GMI to Labor versus Capital

\[
\begin{align*}
\text{private} &= +\text{GMI TO LABOR} + +\text{GMI TO CAPITAL} - -\text{GMI} \\
&= 9 932 + 3 659 - 13 592
\end{align*}
\]

5. Reallocate ITLS to consumption, labor and capital to go from "market" to "basic" prices (Worksheet)

\[
\begin{align*}
-C \text{ share of ITLS} &= +L \text{ share of ITLS} + +K \text{ share of ITLS} - -\text{ITLS} \\
\text{private} &= -9 286 + 3 289 +428 -13 003 \\
\text{public} &= -442 -332 96 -13 003 \\
\text{total} &= -941 -109 -832 -13 003
\end{align*}
\]

6. Go from gross to net by removing Consumption of Fixed Capital (CFC) from capital share of profits.

\[
\begin{align*}
\text{LESS CFC} &= \text{LESS CFC} \\
\text{private} &= -15 604 -4 765 \\
\text{public} &= -4 765 \\
\text{total} &= -20 369
\end{align*}
\]

7. Take saving-related amounts out of net exports and add to investment column to separate saving from transfers.

\[
\begin{align*}
+\text{saving related Am.} &= -\text{saving related Am.} \\
\text{private} &= 310 \\
\text{public} &= 310 \\
\text{total} &= 6
\end{align*}
\]

8. Add columns to get highest-level NTA flow account macro controls.

\[
\begin{align*}
\text{CF} + \text{SF} + -T &= \text{YL} + \text{YAF} + \text{YAG} \\
\text{private} &= 63 492 3 625 70 179 13 592 9 119 \\
\text{public} &= 34 271 544 70 179 13 592 -332 \\
\text{total} &= 97 763 3 081 218 788 70 179 8 787
\end{align*}
\]

Available at the provincial level
1. Start with GDP by expenditure and income approaches, identifying private and public components.

<table>
<thead>
<tr>
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</tr>
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</table>

2. Adjust for statistical discrepancies (SD) in GDP by approach. Note that this step does not balance.

\[
\text{Income SD} = -\text{CoE % Expend SD} + -\text{GOS % Expend SD} + -\text{GMI % Expend SD}
\]

| private | -12 00 | -6.49 | -2.31 | -1.20 |
| public  |       |      |       |       |
| total   |       |      |       |       |

3. Go from domestic to national basis by including net Rest-of-World (ROW) Amounts

\[
\text{+net Primary Inc from ROW} = \text{+net CoE from ROW} + \text{+net Property Inc from ROW}
\]

| private | -109  | -390 | -442  | -832  |
| public  |       |      |       |       |
| total   | -941  |      |       |       |

4. Reallocate GMI to Labor versus Capital

\[
\text{+GMI TO LABOR} = \text{+GMI TO CAPITAL} - -\text{GMI}
\]

| private | 9 932 | 3 659 | -13 591 |
| public  | -442  |       |         |
| total   | -941  | -109  | -832    |

5. Reallocate ITLS to consumption, labor and capital to go from "market" to "basic" prices (Worksheet)

\[
\text{-C share of ITLS} = \text{+L share of ITLS} + \text{+K share of ITLS} - -\text{ITLS}
\]

| private | 9 119 | 428  | -13 003 |
| public  | -3 398| 3 289 |         |
| total   | -3 398| 3 289 | -13 003 |

6. Go from gross to net by removing Consumption of Fixed Capital (CFC) from capital share of profits.

\[
\text{LESS CFC} = \text{LESS CFC}
\]

| private | -15 604 |         | -13 003 |
| public  | -4 765  |         |         |
| total   | -20 369 |         | -13 003 |

7. Take saving-related amounts out of net exports and add to investment column to separate saving from transfers.

\[
\text{+saving related Am.} = -\text{saving related Am.}
\]

| private | -305  | 310   | 6     | -6    |
| public  |       |       |       |       |
| total   | -305  | 310   | 6     | -6    |

8. Add columns to get highest-level NTA flow account macro controls.

\[
\text{CF} + \text{SF} + \text{-T} = \text{YL} + \text{YAF} + \text{YAG}
\]

| CF      | 63 492 | 3 625 |       | 70 179 | 9 119 |
| CG      | 34 271 | -544  |       | -332   |       |
| total   | 97 763 | 3 081 | -21878| 70 179 | 8 787 |

\[
\text{Not available at the provincial level}
\]
**Macro-aggregates**

<table>
<thead>
<tr>
<th></th>
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<th>SF</th>
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<th>YAF</th>
</tr>
</thead>
<tbody>
<tr>
<td>private</td>
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<td>3,625</td>
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<td>9,119</td>
</tr>
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<td>public</td>
<td>34,271</td>
<td>-544</td>
<td></td>
<td>70,179</td>
<td>-332</td>
</tr>
<tr>
<td>total</td>
<td>97,763</td>
<td>3,081</td>
<td>-21,878</td>
<td>70,179</td>
<td>8,787</td>
</tr>
</tbody>
</table>

- **Negative TG - ROW**: -656
- **Negative TG - Between Provinces**: -13,732
- **Negative TF**: -7,490

Shared between provinces according to the GDP

From national accounts

Residual
Macro-aggregates

Gretchen’s table is calculated for the seven Canadian “regions:”

- Canada
- Atlantic provinces
- Québec
- Ontario
- Prairies
- British Columbia
- Territories
- Canadian residents in the ROW
Age profiles

- Age profiles for territories are only available for consumption and for a few years.

- Other age profiles are obtained by scaling the per capita age profile of Canadian regions to match the aggregate values for the territories.

- The same hypothesis is applied for the ROW.
Age profiles

- Check: Are the subnational NTAs consistent with the country-based NTAs?
Who pays for the consumption of young and old in Canadian provinces?

How consumption is financed by the state, the family and individuals

d’Albis et al. (2018)

\[ C(a) = TG(a) + TGP(a) + YAG(a) - SG(a) + TF(a) + TFP(a) + YL(a) + YAF(a) - SF(a) \]
Who pays for the consumption of young and old in Canadian provinces?

Share of consumption financed by the state, the family and individuals in Canada

24 years old and less

60 years old and more

0% 20% 40% 60% 80% 100% 120%

The State The family Individuals

The State The family Individuals
Who pays for the consumption of young and old in Canadian provinces?

Share of consumption financed by the state in Canadian Provinces

24 years old and less

60 years old and more

- Atlantics
- Québec
- Ontario
- Prairies
- British-Columbia
Conclusion

- Heterogeneous population aging and ≠ welfare states in Canada
- This justifies sub-national NTAs for Canadian provinces
- Cross-sectional and longitudinal results show huge difference between Province
- Several major issues in Canada:
  - Population aging in B-C and in the Atlantics: cut on young and old
  - Population aging in the Atlantics and in Québec: High level of TG + strong aging process
  - Population aging is a burden for every province: Transfers between provinces are compromised?
- Implementation of sub-national NTAs with a longitudinal perspective may not always be possible: France for instance
Promising new accounts for the NTA project

Emotion transfers from young to old

Kylian Mbappé, 19 years old

France, 41 years old on average
Promising new accounts for the NTA project

2026: Mexico, US and Canada