The DEMOSIM Model and the future of ethnic diversity in Canada

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DEMOSIM and the future of ethnic diversity in Canada

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Why use microsimulation for the projection of diversity
Why use microsimulation?

Increasing diversity

Population renewal through immigration occurs at a relatively rapid pace in countries with high immigration and low fertility.

The ethnocultural characteristics of the populations of these countries are destined to change substantially and permanently. Coleman (2006) described this phenomenon as the third demographic transition.

Canada today is characterized by this dynamic leading to greater ethnocultural diversity within the population.

Why use microsimulation?

The need for microsimulation

Traditional projection models separate the population into groups for each combination of variables of interest. Groups can be handled as cells of a matrix. Matrix mathematics are an effective tool to manipulate multidimensional quantities.

These models have limitations for projecting large number of characteristics; this is because the size of the matrix expands exponentially as the number of characteristics increase. This poses a problem for projecting the multiple facets of ethnocultural diversity.
Microsimulation enables the projection of a large number of events and characteristics by simulating the destiny of individuals.

Microsimulation also enables integration of multiple data sources. Probabilities of events experienced by individuals can be computed from a variety of data sources using a variety of models. The probabilities are translated into waiting times so that all events can be simulated simultaneously (with the use of random draws).

Why use microsimulation?

Demosim: A simple example

- E1: person’s birthday
- E2: person gives birth to a child (depends on E1)
- E3: person moves (depends on E2)
Why use microsimulation?

Examples of simulated events

- Immigration
- Emigration
- Mortality
- Fertility
- Internal migration
- Change of education level
- Participation to labour force
- Marital status
- Language mobility
- Religious mobility
- Ethnic mobility
- Registration to Indian Register
- Acquisition of Canadian citizenship
- Departure of children from parental home
- Families and households
Why use microsimulation?

The development of Demosim

Demosim was developed in 2004 in partnership with ESDC, IRCC, PCH and INAC to respond to needs for very detailed projections:

- Multiculturalism program
- Employment Equity Act (Labour program)
- Evaluation of immigration policies
- Programs for Aboriginal populations
Why use microsimulation?

Uses

- Immigration and Diversity: Population Projections for Canada and its Regions
- Projections of the Aboriginal Population and Households in Canada
- Language Projections for Canada
- Projections of the Indian Register Population
- Projections of the labour force (upcoming)
- Analytical papers
- Validation
Future ethnocultural diversity

A series of stylized facts highlighting findings from Demosim
In 2006, 37 percent of the population was composed of first or second generation immigrants. Simulations showed that starting from zero percent in 2006, it would take between 41 and 55 years to reach the same proportion (proportion of post-2006 new immigrants and first-generation descendants of new immigrants).

Societies may have to adapt quickly to new realities when diversification is not gradual enough to stretch over several generations, as populations observe sizable changes over their lifetime.

Ethnocultural diversity is likely to increase rapidly within the Canadian-born population, notably within the second generation immigrants (Canadian-born children of immigrants).

In fact, regardless of future levels and sources of immigration, ethnocultural diversity will grow in Canada as a result of the fertility of immigrants already settled in the country and the transmission of some of their characteristics to their Canadian-born children.

Findings from Demosim

Diversity in the second generation

- Proportion of the working-age population belonging to a visible minority group in 2011: 19.6%
- Projected proportion of the working-age population belonging to a visible minority group in 2036 (reference scenario): 38.3%

The contribution of immigration to the growth and diversification of the country is very uneven geographically.

Immigrants tend to settle mainly in the country’s largest cities and rarely migrate towards smaller cities after arrival.

**Big cities versus less populated areas are likely to experience very distinct dynamics of demographic growth** (infrastructure, housing, transportation, public services, etc.).

Less populated areas could see their demographic weights decrease.

**Findings from Demosim**

### Uneven contribution

**Proportion of immigrants in various regions of the countries in 2016 (Census) and 2036 (projected)**

The rejuvenating effect of immigration on the age structure of the Canadian population is due to immigrant’s fertility, that is, to the fact that they have children in Canada. Despite the relatively young age structure of immigrants at arrival, the sole presence of immigrants in the country (isolated from their fertility) contributes in fact to ageing of the population.

Simulations show that the specific demographic behaviours of immigrants in terms of fertility, mortality and emigration have little impact on the age structure of the population, in part because they act in opposite directions.

Findings from Demosim

A more religiously diverse Canada

Immigration will likely contribute to an increase in the proportion of people with a non-Christian religion.

Non-Christian religions should see the most rapid increase between 2011 and 2036, their population doubling in almost all scenarios. The proportion of Canadians who reported a non-Christian religion increased from 3% to 9% between 1981 and 2011, and is projected to reach between 13% and 16% in 2036.

The trend toward persons reporting no religious affiliation is also likely to contribute to the development of a more religiously diverse Canada in 2036.
What’s next?

And how should we project diversity in the future?
What’s next?

Current work and next steps

Current work
• Rebasing of Demosim based on 2016 Census
• Projections of the Aboriginal population (2016-2041)

Next steps
• Determination of content
• Upcoming consultations for determination of content (January-February 2019)
Thank you!

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