Estimating Canada's Future Immigration
Requirements: An Optimal Immigration Approach

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CONFERENCE ON THE ECONOMICS OF MIGRATION
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Prepared by

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Introduction

Immigration has long been a source and facilitator of sustainable economic growth for Canada. It has also been a significant area of controversy. Recently, the federal government has made a number of changes to immigration policy. In an analysis of these changes by the Maytree Foundation (Shaping the Future: Canada’s Rapidly Changing Immigration Policies, Naomi Alboim and Karen Cohl, October 2012) the authors suggest a number of principles upon which immigration policy should be based. Two of these principles are:

- Immigration policy should be based primarily on long-term social and economic objectives and a commitment to citizenship
- Immigration policy should be evidence-based, comprehensive, fair and respectful of human rights

The current paper describes an approach for determining immigration requirements that is evidence based with a focus on meeting Canada’s long-term economic objectives.

The approach adopted has been shaped largely by our work done at the Centre for Spatial Economics (CSE) and Stokes Economic Consulting to produce future economic and occupation labour market scenarios for Canada, the provinces and provincial sub-regions. To undertake these scenarios it is necessary to incorporate information about future immigration – and the other components of migration. Almost all government and private forecasters incorporate this information as an assumption – an “input” – that goes into the economic models employed to produce economic and occupation outlooks rather than an “output” of the models. These immigration assumptions are usually based on recent trends in immigration or targets suggested by governments. They normally do not represent the “need” for immigration.

The difficulty with this latter approach is that the immigration assumption can end up determining economic growth rather than responding to it. Analysts, for example, can create stronger economic growth simply by adding more and more immigration to the economy. Another difficulty with this approach is seen in the pronouncements of many labour market analysts regarding significant future workforce shortages. These shortages are usually “conditional” on the immigration assumptions. If the analysts add more immigration these shortages would be largely eliminated. These difficulties as well as the fact that the federal government does adjust immigration in response to changes in labour market conditions – immigration is not an exogenous variable – led us to the conclusion that immigration must be an output of our economic models rather than an input.

To implement an evidence-based approach and the reality that the federal government adjusts immigration to meet labour market needs, we have adopted the concept of an “optimal” level of immigration to estimate future immigration requirements. The optimal level of immigration
is one that facilitates economic growth and minimizes the costs of the excess demand for and supply of workers. Operationally, the level of immigration is chosen to keep the unemployment rate near the rate required to allow the labour market to function properly. Optimal immigration is determined for each of Canada’s provinces separately, which, in turn, determines the optimal level for Canada as a whole. Non-economic immigration such as humanitarian and family class immigration continues to play a role in immigration in the approach, but the overriding objective is to meet labour market needs.

The remainder of this paper describes the concept of optimal immigration, the method we use to estimate optimal immigration, and some results that we have obtained using this approach.

**Optimal Immigration**

The method used to determine the required – “optimal” – amount of immigration adopts as its operational objective the need to adjust immigration to keep unemployment rates generally in line with “normal” unemployment rates. This objective is chosen in an effort to minimize the costs of the excess demand for and supply of workers as well as to facilitate economic growth. High unemployment imposes costs on the economy through a waste of human resources, increased government expenditures on unemployment insurance payments and social assistance, and adverse social and psychological impacts on households. Very low unemployment associated with the excess demand for workers leads to restrictions on economic growth and the costs of higher inflation. The failure to provide sufficient workers to facilitate economic growth puts a constraint on the economy’s ability to raise living standards.

Normal unemployment rates are defined in the approach as those rates that recognize the amount of unemployment in the economy that represents (1) frictional unemployment, which represents normal turnover in the labour market; (2) seasonal unemployment, and (3) structural unemployment associated with a mismatch of required skills and those of the unemployed. The latter type of situation is found in the case of job vacancies being unfilled. It is important to have some excess labour force over employment for the proper functioning of labour markets because of these types of unemployment. The normal rates are estimated historically based on an historical analysis of trends in unemployment rates. They are extended into the future based on analysis of what led to their trends in the past and expectations regarding the future values of the three types of unemployment mentioned above.

The approach adopted to estimate immigration requirements focuses on the trend amount of immigration rather than year-to-year changes in immigration. It is recognized that it is not politically or technically possible to balance labour markets on a year-to-year basis using immigration. Temporary foreign workers, as is the currently the case, can be used to assist in reducing labour market gaps over economic cycles. The focus on trend immigration leads to identification of temporary labour market gaps across the country that will need to be filled by
temporary workers – changes in non-permanent residents. The idea of optimal immigration employed here recognizes that there will always be economic cycles where more or less workers will be required and that immigration cannot be expected to eliminate cyclical labour market gaps – it can only deal with trends.

An important underlying assumption in the definition of optimal immigration is that Canada is generally able to obtain immigrants either with the required skills or these immigrants can be trained to possess skills consistent with labour market needs and that they will be accepted as suitable workers by employers. In addition, the approach does not assume that the labour force participation rate of immigrants is 100 percent – although immigration participation rates are higher than those of the domestic population, at least in the short term. Immigration includes persons less than 15 years of age and humanitarian and family class immigrants. If immigration were restricted to people who would be working, there would be a substantial reduction in the number of immigrants required – in the example determination of immigration provided below the recent age-sex distribution of immigrants is employed.

**Immigration Determination Procedure**

The procedure that is adopted to determine immigration uses a set of multi-sector macroeconomic models, one for each province and one that aggregates up the provincial information to that for Canada as whole. These models include sectors that model employment, labour force, and the various components of migration. Assumptions about the key drivers of the economic outlook such as rest of world growth, commodity prices, major industrial projects, and government policy are fed into the provincial models to produce the outlook for economic growth, employment, labour force and the components of migration. The required level of immigration is one of the migration components.

The focus on trend immigration requires that the period of analysis be long enough to identify trends in labour demand and supply. While the demand for workers may be exceeding supply at a point in time, the situation may reflect a temporary boom in the economy that will be reversed in the next few years. Targeting immigration for the short term can lead to an excess supply of workers when the boom is over. Similarly, dramatically reducing immigration in a recession could lead to worker shortages in the recovery phase of the economic cycle. Over the next 10 years the aging of the workforce is expected to lead to reductions in the labour force. It is important to look out farther than a couple of years to ensure that there will sufficient immigration to offset these reductions.

The required immigration is determined as part of the migration component of the C4SE modelling system. This component includes immigration, emigration, the change in non-permanent residents, and net inter-provincial in-migration. The emigration variable includes
what Statistics Canada calls emigration adjusted for net temporary emigrants and returning emigrants.

Immigration is set in the modelling system based on what is called the immigration reaction function of the federal government. The concept of such a function is similar in nature to that of a Central Bank Reaction function that sets interest rates to meet inflation and unemployment targets for the Canadian economy. In the C S E modeling system used to estimate future immigration requirements the systems Central Bank and immigration reaction functions work together to achieve these targets.

The immigration reaction function determines the level and distribution of immigration across the provinces. There are two types of immigration recognized in this function. One part focuses on economic immigration and the other part on non-economic immigration – such as humanitarian and family class immigration. The overriding concern in the function is achieving an optimal level of immigration as defined above – economic concerns may reduce non-economic immigration. These two parts are related, nevertheless, as non-economic immigrants also enter the labour market and can assist in achieving an optimal level of immigration.

The level of non-economic immigration in the immigration reaction function is estimated as a proportion of Canada’s population. This proportion is set based on historical averages or in line with recent announcements in federal government policy regarding such immigration. The other part of the reaction function which determines the level of immigration, then sets immigration as a proportion of the population based on Canada’s unemployment rate gap as defined above. Immigration on a per capita basis increases when the unemployment gap is negative and vice-versa. The reaction function builds in lags between when the unemployment rate gap changes and when immigration changes to reflect the administrative lags associated with the immigration process.

The equation used as the starting point to set immigration at the Canada (CA) level is shown below:

\[
DIMMIGCA = DPCA[-1]*(NEP-COEFF*(MAVG(3:URCA[-1]-URNCA[-1])/100)+zdimmigca)
\]

where DIMMIGCA is immigration, DPCA is population, NEP is the proportion of population that represents non-economic immigrants, URCA is the unemployment rate, URNCA is the normal unemployment rate and zdimmigca is an adjustment used to tune the forecast when more or less immigration is required to achieve optimal immigration. The term [-1] refers to last year’s value for the variable, MAVG is a moving average function. COEFF is an estimated coefficient linking the immigration rate the unemployment rate gap.
The other part of the immigration reaction function is concerned with the distribution of the immigrants across the provinces. This distribution is determined in each of the provincial models through changes in the underlying share of immigration going to a province and adjustments by the federal government to this share to meet local optimal immigration levels. The underlying share of immigration is driven by the province’s share of employment in the country as a whole – it is demand driven. The model analysts act as the federal government, intervening in the models to adjust the immigration shares to achieve optimal immigration.

The equation shown below is starting point used in the individual provincial models to set immigration – BC is used an example:

\[ \text{DLOG}(\text{DIMMIGBC}/\text{DIMMIGCA}) = \text{MAVG}(3: \text{DLOG}(\text{EBC[-1]}/\text{ECA[-1]}))+\text{ZDIMMIGBC}) \]

where DLOG is the change in log function, DIMMIGBC is immigration to BC, EBC is employment in BC, ECA is employment in Canada as a whole, and ZDIMMIGBC is an adjustment used by model analysts to achieve optimal immigration.

The determination of optimal immigration and its distribution involves an iterative process. The process starts with an initial level of immigration at the Canada level and starting values for provincial immigration shares – these values are not assumed to be optimal. They are then passed to the provincial models which determine economic growth, labour demand and supply, inter-provincial migration, and so on for each province. These variables then cause changes in the Canadian immigration level through changes in the Canada unemployment rate gap. The results are again fed into the provincial models to determine the allocation of the immigration and new provincial economic conditions. This process continues until immigration across the provinces and for Canada as a whole is stabilized. At all times model analysts are intervening in the model solutions to achieve optimal immigration for the provinces.

Emigration is determined in the modelling system as a proportion of the population. This proportion is set based on its recent values. Rising or falling population over time will increase or reduce emigration. No attempt is made to model any cyclical changes in emigration. The change in non-permanent residents is set at zero in the models in the medium to long term to allow for the identification of labour market gaps that will require temporary residents to adjust.

Net inter-provincial in-migration is determined on a per capita basis by changes in labour market conditions across the provinces. The latter includes employment growth in a province relative to that in the rest of the provinces and the unemployment rate gap in the province (actual minus normal unemployment rate) relative to the weighted average of these gaps in the other provinces. If a province has faster employment growth than the rest of the provinces and/or its unemployment rate gap is lower than the other provinces then its net inter-
provincial in-migration will rise and vice-versa. Trends in non-labour market net inter-provincial in-migration are captured by constant terms in the equation that are proportional to a province’s population. The latter terms are set as inputs to the modelling system.

The equations for net interprovincial in-migration are similar to that shown below for British Columbia (BC):

\[
DNIPMBC = DPBC[-1] \times (COEFF0 - COEFF1 \times (MAVG(2:URBC-URNBC-(URCABC-URNCABC)))
+ COEFF2 \times (MAVG(2:PCH(EBC)-PCH(ECA-EBC))) + ZDNIPMBC)
\]

where DNIPMBC is net interprovincial in-migration, URCABC is the rest of Canada unemployment rate, URNCABC is the rest of Canada normal unemployment rate, PCH is a percentage change function, and ZDNIPMBC is an adjustment used to tune the forecast. COEFF0, COEFF1 and COEFF2 are estimated coefficients.

It should be noted that inter-provincial migration serves as a means to clear labour market imbalances by moving people to areas needing workers from those areas with an excess supply of workers and vice-versa, thereby taking pressure off the need to increase or reduce immigration. Inter-provincial migration, nevertheless, is unable to deal with generally rising or falling levels of worker requirements for the country as a whole. Immigration must be used to assist with the latter situations.

The key drivers of migration in the immigration estimation procedure are found in the labour market. Labour requirements are driven by economic growth and labour productivity. The supply of workers is driven by population growth and age distribution along with economic factors such as wages and social attitudes towards work.

The models determine employment by the outlook for economic growth as measured by growth in Gross Domestic Product adjusted for inflation – real GDP. Rising or falling GDP increases or reduces employment. Changes in labour productivity – amount of GDP divided by the amount of GDP that can be produced per worker – change the number of workers required. Productivity growth is driven by changes in technology and the cost of hiring workers. As the cost of labour rises relative to the cost of capital, employers hire fewer workers and try to adopt technologies that reduce the use of them – they substitute capital for labour – thereby increasing labour productivity. Other things being the same, stronger economic growth and weaker productivity growth increase the demand for immigration and vice-versa.

The supply of workers generally rises with increases in the size of the population. The age distribution of the population, nevertheless, has an important impact on the supply of workers. As the working-age population ages, the proportion of the population of working age that is in the labour force – the labour force participation rate – falls as people retire. This situation
leads to a reduction in the number of workers available, other things being the same. In contrast, an increase in the number of young people in the population leads to an increase in the number of new labour force entrants – people leaving school to enter the labour force. If the number of new entrants is greater than the number workers dying or retiring, then the size of the labour force increases, otherwise it decreases. This latter situation characterizes the present state of the Canadian economy and is expected to continue to do so in the near future.

When the number of workers available from domestic sources is insufficient to meet the number of workers required, migration must fill the gap. If inter-provincial migration is unable to satisfy the labour market imbalances, then immigration and changes in non-permanent residents – in the short term – is left to deal with these imbalances.

**An Example Immigration Requirements Outlook**

This section presents some results of the use of the system described above. The example refers to the WorkforceOutlooks.ca Spring 2013 immigration requirements outlook. The example focuses on the outlook for Canada as a whole. The provincial information is not presented here as there is too much detail. The complete outlook for immigration requirements can be downloaded from [http://www.workforceoutlooks.ca](http://www.workforceoutlooks.ca).

In the Spring outlook the economic and demographic outlook for the provinces results in a significant increase in the amount of immigration required over the next 10 years. Immigration rises from almost 260 thousand in 2012 to over 360 thousand in 2022 – see Table 1 and Figure 1. Net immigration increases to over 300 thousand, which is lower than immigration because of emigration. These levels are 100 thousand higher than those observed over the past decade.

The immigration outlook and the key drivers behind it are shown in Table 1. The first set of drivers refers to their growth rates or, in the case of unemployment rates, the level measured in percent. The remaining variables are measured in thousands. It should be noted that the change in non-permanent residents goes to zero in the outlook as the focus is on immigration as mentioned above.

Economic growth and the associated employment needs are key drivers of immigration requirements. The average rate of growth in real GDP for Canada as a whole over the next 10 years is 2.0 percent. In the short to medium term, growth is weakened by a slow recovery in Canada’s major trading partner economies. In the long term, growth remains slower than that observed in the last decade as Canada’s potential growth is lower. The latter is partly a result of the aging of the population.
Employment growth averages just below 1.0 percent with labour productivity expected to average over 1.0 percent per year. The increase in productivity growth in the long run is a result of a tightening of Canada’s labour market, causing wages to rise faster than capital costs. As a result, firms substitute capital for labour.

Labour force growth falls below employment growth as the economy recovers from the recent recession and the aging of the population causes labour force participation rates to decline. The participation rates fall continuously over the period as the workforce ages. As a result, the unemployment rate falls from over 7.0 percent in 2013 to about 6.0 percent in 2022.

Figure 2 shows the actual and normal unemployment for Canada as a whole – these rates are weighted averages of the rates for the provinces. As can be seen from Figure 2, the actual rate rose well above its normal level in 2009 and trends down thereafter. In line with the objective of optimal immigration, immigration is set to assist in the movement of the actual rate towards the normal rate.
The role that immigration plays in adjusting the labour force to keep unemployment rates near their normal levels is shown in Table 1 and Figure 3. The table and figure show the components of labour force change over the period. These components include new entrants, retirements and deaths, net immigration, and other net in-mobility to the workforce. New entrants represent young people entering the labour force normally after school; retirements and deaths, people leaving the workforce; and net other in-mobility, other reasons for entering or leaving the labour force. Other in-mobility refers to changes in labour force participation through changes in wages, increased or reduced availability of work, and social factors such as more and more women entering the labour force.

The number of young people entering the labour force falls slightly over the period, while the number of older people leaving the labour force through retirements and deaths increases. New entrants fall from around 350 thousand in 2013 to 336 thousand in 2017 and then rise to 345 thousand in 2022. Retirements and deaths rise from near 400 thousand in 2013 to almost 450 thousand in 2022, as a result of an aging population. The inability of new entrants to fully offset deaths and retirements requires increases in net immigration and other net in-mobility.

The population growth components shown in Table 1 indicate that the domestic source of population growth – natural rate of growth (births minus deaths) – is slowing and the migration source is increasing. Without immigration, almost all provinces on Canada’s east coast will start to see their population decline in the next 10 years.
The outlook for immigration requirements for the provinces is shown in Table 2, measured in thousands of persons. The time pattern of immigration differs across the provinces reflecting differences in their economic cycles and labour market requirements. Nevertheless, the outlook and the reasons behind it are similar across the country.

In the Atlantic Provinces, immigration generally trends upward throughout the outlook period with the exception of Prince Edward Island, as its immigration levels out at around 1.7 thousand after 2018. This result is in direct response to the tightness of their labour markets. Ontario, Quebec and Alberta are also expected to see significant growth in immigration in the medium term, but growth slows in the long term as their unemployment rates are expected to be in relatively close proximity to their normal rates.

In Manitoba, immigration increases in the medium term in order to meet labour requirements, as net inter-provincial migration continues to be an outflow for the province. In the medium term, Saskatchewan’s immigration recedes from a historic high as employment growth weakens. The largest increase in immigration over the forecast is in British Columbia. This increase is required to offset increasing retirements, sharp decline in new entrants and large outflows in the long term due to negative net inter-provincial migration.
Figure 3
Canadian Components of Labour Force Change (000s)
2013-2022

Table 2
Immigration, Canada and the Provinces (000s)
2013-2022

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Inter-provincial migration plays an important role in facilitating labour market adjustments across the provinces and, therefore, changes the requirements for immigration and non-permanent residents – temporary foreign workers. Table 3 shows the outlook for net inter-provincial in-migration measured in thousands of persons.

The outlook for inter-provincial migration, similar to immigration, also reflects the timing and magnitude of economic cycles across the provinces as well as differences in the demographic characteristics of their populations. In Newfoundland and Labrador, for example, a number of major projects scheduled for construction cause a significant increase in inter-provincial immigration in the short to medium term. When the projects are completed later in the period, people again leave the province. Nova Scotia and New Brunswick show strong increases in net inter-provincial migration as they both go from an outflow in 2012 to an inflow of around 2 thousand people in 2022.

Table 3
Net Inter-Provincial In-Migration, By Province (000s)
2013-2022

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Quebec also shows continued net inter-provincial migration growth over the outlook period. It is expected to see an outflow of 2.8 thousand people in 2013 turn into an inflow of almost 5 thousand by 2022, as the province’s economy picks up steam in the long term. In the next two years, Ontario sees an increase in the outflow of people because of its relatively weak economic performance. This outflow ends up in the Western provinces that demonstrate much stronger economic performance and labour market requirements. In the middle of the period, net inter-provincial in-migration becomes positive for Ontario, as its economic activity increases. Later in the outlook period, the outflow from Ontario resumes as Alberta is a major draw of workers again, with their economy outperforming the rest of the country.

This outlook suggests that shortages of workers in the east, caused by population aging and the associated retirements from the workforce, reduces the historic supply of inter-provincial
migration to the west, as workers from eastern provinces are either staying there or coming back to fill job openings left by retirees. In the case of Quebec, a province that has not seen positive net inter-provincial in-migration for decades, immigration alone will not be able to meet the provinces labour market requirements. As a result, Quebec’s net inter-provincial migration is expected to increase from -2.8 thousand in 2013 to almost 5 thousand in 2022.

Table 4 shows net labour force immigration for Canada as a whole by Skill Type (NOC) for the period. These occupation groups refer to the general education and training requirements for the occupations. As can be seen from the table, the number net immigrants associated with university, colleges, or apprenticeship, which are referred to as skilled workers, account for over half of the net immigrants. University trained workers account for 23 percent and college or apprenticeship trained workers account for 30 percent. The remaining net immigrants are referred to as unskilled workers.

<table>
<thead>
<tr>
<th>Table 4</th>
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<tbody>
<tr>
<td>Labour Force Net Immigration, Distribution By Skill Type, Canada (%)</td>
</tr>
<tr>
<td>2013-2022</td>
</tr>
</tbody>
</table>

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</tr>
</thead>
<tbody>
<tr>
<td>Managerial Usually Requiring a University Education</td>
<td>5.0</td>
<td>4.9</td>
<td>5.1</td>
<td>4.5</td>
<td>4.3</td>
<td>4.1</td>
<td>4.1</td>
<td>4.1</td>
<td>4.2</td>
<td>4.4</td>
</tr>
<tr>
<td>Professional Usually Requiring a University Education</td>
<td>18.4</td>
<td>18.4</td>
<td>18.4</td>
<td>18.7</td>
<td>18.9</td>
<td>19.0</td>
<td>19.1</td>
<td>19.0</td>
<td>19.0</td>
<td>19.0</td>
</tr>
<tr>
<td>Technical and Skilled Usually Requiring College or Apprenticeship Training</td>
<td>31.1</td>
<td>31.1</td>
<td>30.9</td>
<td>30.7</td>
<td>30.6</td>
<td>30.4</td>
<td>30.5</td>
<td>30.6</td>
<td>30.8</td>
<td>30.8</td>
</tr>
<tr>
<td>Intermediate, Clerical and Operator Usually Requiring Secondary School and/or Occupation Specific Training</td>
<td>32.3</td>
<td>32.3</td>
<td>32.3</td>
<td>32.7</td>
<td>32.8</td>
<td>33.0</td>
<td>33.0</td>
<td>32.8</td>
<td>32.7</td>
<td>32.5</td>
</tr>
<tr>
<td>Elemental and Labouring Usually Providing On the Job Training</td>
<td>13.2</td>
<td>13.3</td>
<td>13.3</td>
<td>13.4</td>
<td>13.4</td>
<td>13.5</td>
<td>13.4</td>
<td>13.4</td>
<td>13.4</td>
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