The relation between education and labour force participation of Aboriginal peoples: a simulation analysis using the Demosim population projection model

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Abstract

This study aims at quantifying the impact of educational attainments on the future labour force participation of Aboriginal peoples. Using Statistics Canada's Demosim population projection model, we are able to simulate alternative scenarios of educational change and resulting effects on the future labour force until 2056. About half of the observed difference in labour force participation rates between Aboriginal peoples and the Canadian born population neither belonging to an Aboriginal nor to a visible minority group can be attributed to educational differences. Following a "medium growth – recent trend" scenario, over the next four decades population growth of Aboriginal peoples would result in an 45% increase in size of its labour force if relative educational differences persist. In education scenarios which close the educational gap, this number would increase by almost 70%. At the same time, the composition of the future Aboriginal peoples' labour force would be dramatically different. While the impact of educational improvements on the future labour force is significant, the change is found to be a slow gradual process as successive young school-age cohorts have yet to enter the labour market and renew the workforce.

Keywords: Aboriginal Peoples, Education, Labour Force Participation, Microsimulation, Projection

1 Introduction

With the development of the Demosim microsimulation model, Statistics Canada has created a population projection tool capable of capturing Canada's diversity by visible minority status, Aboriginal identity, immigration status and a set of other variables, either closely linked to demographic behaviors, like education, or dependent on socio-demographic characteristics, like labour force participation (Statistics Canada 2011). Demosim explicitly models the educational differentials between the main groups of Aboriginal Peoples, the Canadian born White population, and various visible minorities. Both the ethno-cultural and the educational background feed into its labour force models. In this study we capitalize on Demosim's ability to single out the effect of education on labour force participation and create scenarios allowing to assess the extent and timeline of hypothetical improvements in education on the future labour force participation of Aboriginal peoples.

The educational attainment gap between the Aboriginal peoples and the non-Aboriginal population is subject of a growing body of literature, including historical studies (e.g. Kirkness 1999, Carr-Stewart 2001, Carr-Stewart 2006), attempts to explain underlying causes (e.g. Frenette 2011, Richards & Scott 2009, Wotherspoon & Schissel 1998), and policy analysis and recommendations (e.g. Richards 2006, Paquette & Fallon 2010, Richards & Scott 2009). Low educational attainments are partially made responsible for the relatively poor labour force participation of Aboriginal peoples in Canada (e.g. Walters et.al. 2004) and the income gap between Aboriginal peoples and the rest of Canada (Wilson et.al. 2010).

There is wide agreement, that improvements in education attainments would benefit Aboriginal youth and society as whole facilitating greater participation in the Canadian economy and improving Aboriginal peoples' community well-being and social cohesion. Or as Richards & Scott (2009, p6) put it, while "many of the Aboriginal/non-Aboriginal gaps have complex origins [...] education outcomes is probably the most important dimension of social policy to tackle." Concerning the gap in labor force participation rates, we find that about half of the gap can be attributed to education, with the remaining gap decreasing with education level. In fact, Hull (2000, 2005) has found that the gap virtually disappears for university graduates. However, Pendakur and Pendakur (2011) showed, that controlling for similar characteristics, Aboriginal people will still earn less than their Canadian majority counterparts even with the same education credentials.

From a demographic perspective, the Aboriginal population of Canada can be described as having a strong natural rate of increase, resulting from a young age structure and high fertility. In the context of an ageing society, this makes Aboriginal workers a growing segment of the labour force, especially among younger ages. Both the future size and human capital of this group will heavily depend on current educational investments. For an economic perspective of investing in

Aboriginal education, and the potential contribution of Aboriginal Canadians to labour force, employment, productivity and output growth see e.g. Sharpe & Arsenault (2010) and Sharp et.al. (2009). Literature agrees on high rates of return to investments in education and single them out as "one of the rare public policies with no equity-efficiency trade-off" (Sharpe & Arsenault 2010, p.27). Sharpe & Arsenault (2010) also calculate labour force outcomes, variations in GDP and fiscal effects resulting from a hypothesized full or partial convergence of educational attainments of Aboriginal people towards the education distribution of the non-Aboriginal population. In contrast to such stylized macro studies, Demosim accounts for the changing population composition, size and age structure and models education longitudinally. When creating convergence scenarios, we do not mechanically change the education of the whole Aboriginal population but model improvements in the education attainments of current and future school age cohorts simulating the process of population renewal. Therefore, our approach also allows an estimate of the time needed for this process to take place.

The contribution of this study is twofold. First we aim at answering the question of how an increase in educational attainment of Aboriginal peoples would impact their labour force participation. By distinguishing four Aboriginal groups, we are able to detect a variety of patterns how education is linked to labour force participation. The second question concerns the timeline of how improvements in educational attainments of today's Aboriginal youth would contribute to future labour force participation.

This study is organized as follows: The first part addresses data and modeling issues, capturing how our analysis was performed. We start this discussion by depicting current education and labour force differences between the studied Aboriginal groups and the Canadian born white population as captured in the 2006 Census. In the remainder of this part we introduce into the Demosim model and the methodologies behind its labour force and educational projections, the latter captured in more depth to provide a foundation for the education scenarios. The second part of this study then describes selected education scenarios and resulting projection results and their interpretation.

2 Data and methods

2.1 Variable categories and conventions

In this study we distinguish four groups of Aboriginal peoples identifiable in the 2006 Census and used in Demosim projections:

- Registered North American Indian (NAI)
- Non-registered NAI
- Métis
- Inuit

We contrast these groups to the Canadian born (CB) White population which is used as reference category. Concerning education, CB Whites currently closely represent the Canadian population average. Canada's visible minority population and immigrants generally have higher educational attainments. By excluding them from the reference category, this study isolates educational scenarios from these immigration effects. We distinguish three levels of education:

- Below high-school
- High-school diploma only
- Post-secondary diploma

The considered age range throughout this study is 25-64 years, sometimes broken up into 25-44 and 45-60 age groups. We have selected the 25 year age cut-off as most people have left school at this age.

All illustrations are based on Demosim projections which start from the 2006 Census. (Demosim is described in chapter 2.3) Data are adjusted for Census net under-coverage and – concerning the average labour force participation – also taking into account more recent observations from the Labour Force Survey.

The demographic assumptions for the future used in this study are identical with the Scenario-1 published in "Population Projections by Aboriginal Identity in Canada", Statistics Canada's (2011) and assumes constant Aboriginal fertility (for given individual level variables like education) and no intra-generational ethnic mobility[1]. Concerning labour force participation, we

[1] Ethnic mobility is "the phenomenon by which individuals and families change their ethnic affiliation" (Guimond, 2003). Ethnic mobility has two components: intragenerational and intergenerational (Boucher, Robitaille and Guimond, 2009). Intragenerational ethnic mobility results from a change in an individual's ethnic affiliation over time. For example, a person who reports no Aboriginal identity in one census but a Métis identity in the following census is deemed to have experienced intragenerational ethnic mobility (Boucher, Robitaille and Guimond, 2009; Guimond, 2003). Intergenerational ethnic mobility results from a change in ethnic affiliation between parents and

have chosen the "recent trend" scenario (Scenario C) published in Martel et.al. (2011) which is based on identical demographic assumptions and produces population and labour force outcomes lying in the centre of the five scenarios published. Concerning educational projections this scenario was selected as the baseline, which will be contrasted with two alternative education scenarios. Note that this study does not provide any forecasts and is strictly to be seen as what-if projection. This is an important nuance, because we expect forecasts to tell us what the future will most likely be, whereas projections instead tell us what would happen if the assumptions and scenarios chosen were to prove correct. Thus, this is a prospective exercise whose purpose is to support the planning of public policies rather than to predict the future.

2.2 Current labour force participation and education

Aboriginal peoples on average have lower educational attainments than CB White, the gaps being largest for Inuit and Registered NAI. Currently, high-school non completion rates are around 50% for registered NAI and over 60% of Inuit, compared to 16% of the CB White population age 25-64.

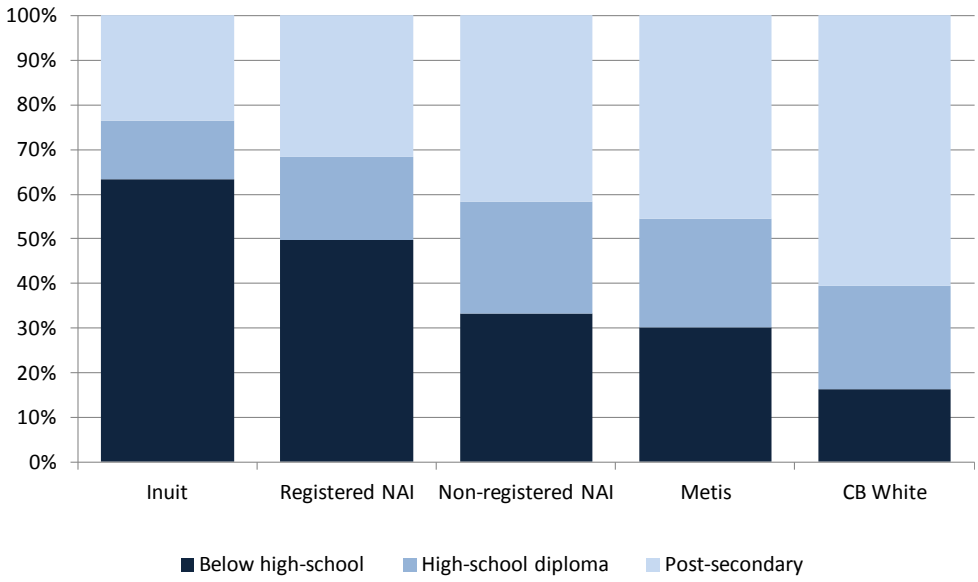

Figure 1: Education composition by population group, age 25-64, 2012 (Demosim projection)

Education attainments are closely linked to labour force participation. While Aboriginal people's labour force participation in most cases is lower also within education categories, differences are very pronounced comparing education groups within all population groups. Of the compared groups, registered NAI have the lowest overall labour force participation, the gap to CB White

their children, with the parent(s) not having the same ethnic affiliation as the child(ren). This mobility does not imply any change in ethnic group for an individual and is based on comparing the ethnic identity of an individual with that of his/her parents.

being around 20 percentage points. On the other end, for a given educational attainment, labour force participation of Métis is almost indistinguishable – for high-school graduates even slightly higher – than rates of CB Whites.

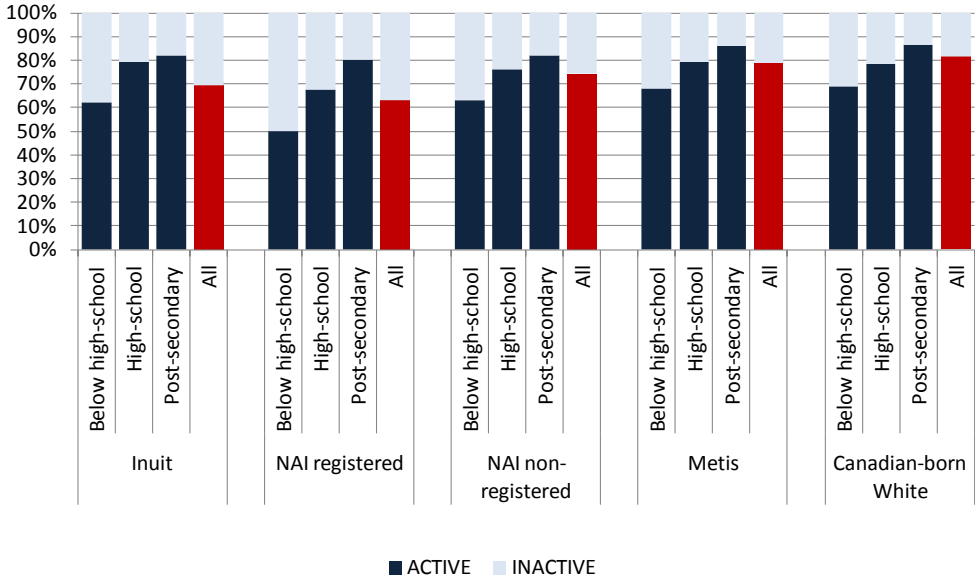

Figure 2: Labour force participation by population group and education, age 25-64, 2012 (Demosim projection)

The contribution of educational differences to the gaps in labour force participation can be calculated by standardizing the Aboriginal groups to resemble the education distribution of CB Whites.

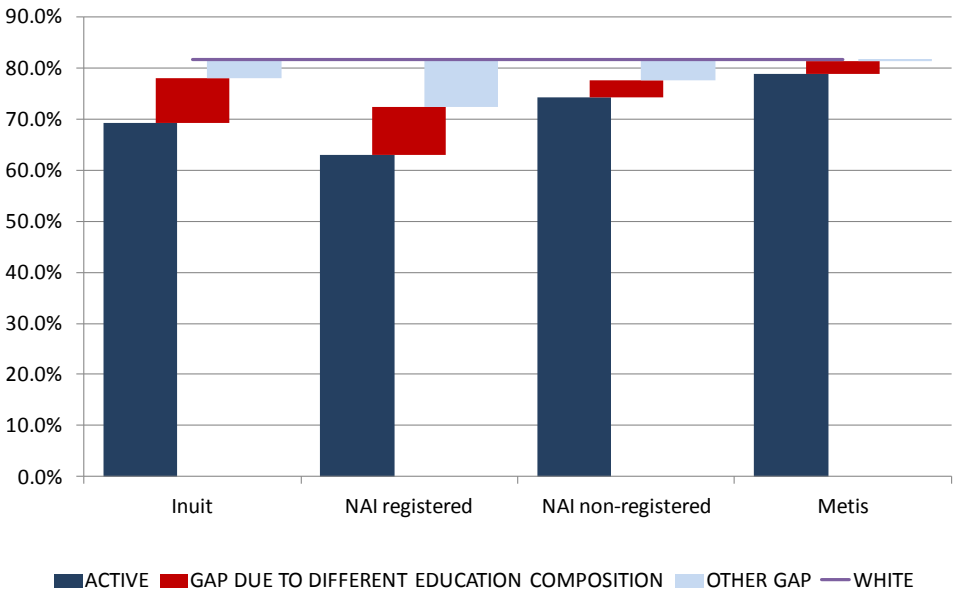

Figure 3: Labour force participation gaps between Aboriginal peoples and Canadian born White, age 25-64, 2012 (Demosim projection)

As displayed in Figure 3, the relative contribution of education differences to the gap in labour force participation is highest for Métis, followed by Inuit, registered NAI and unregistered NAI. In absolute terms, closing the educational gaps would have the biggest effect for registered NAI, theoretically moving up labour force participation by 9.5 percentage points.

2.3 The Demosim Population Projection model[2]

Demosim is a microsimulation model designed for detailed population projections. It was developed at Statistics Canada in partnership with Human Resources and Skills Development Canada (HRSDC), Aboriginal Affairs and Northern Development Canada (AANDC), Canadian Heritage (PCH), and Citizen and Immigration Canada (CIC). Using the micro-data file from the Canadian Census of Population (20% sample) as its starting point, Demosim produces dynamic population projections at the level of the provinces, territories, census metropolitan areas and selected smaller geographies. Demosim includes a number of individual characteristics going beyond the typical age - sex classification of classic population projections: visible minority group, place of birth, generation status, Aboriginal identity, highest level of educational attainment, and labour force participation, among others. It does so by simulating events such as births, deaths, migrations and changes in level of education, according to various population growth scenarios. Initially created in 2004 and on-going, the model has been used over time to

[2] The first paragraph of this description is heavily based on the presentation of Demosim on Statistics Canada's website http://www.statcan.gc.ca/microsimulation/demosim/demosim-eng.htm. For a more detailed description of the model including methods and assumptions please consult both Statistics Canada 2010 and Statistics Canada 2011.

generate projections of the Canadian population's ethno-cultural composition (Statistics Canada 2010), the Aboriginal population of Canada (Statistics Canada 2011) and the Canadian labour force (Martel et.al. 2011).

Microsimulation allows going beyond the very few characteristics (e.g. age and sex) of more traditional population projections produced by cohort-component models. In difference to such cell-based approaches which model the changes in the sizes of specific population groups (e.g. by age and sex), microsimulation simulates a large sample of individuals which together represent society. As a consequence of simulating individuals, microsimulation allows for any level of detail and the modeling of people in their family context, the latter used in Demosim to transmit characteristics like ethnicity and language over generations. (For a more detailed introduction of microsimulation in the social sciences and population projections, see e.g. Spielauer 2010 and Imhoff & Post 1998). Like for all projection models, there exists a trade-off between the additional randomness introduced by additional variables (potentially compromising the prediction power of a model), and misspecification errors caused by models that are too simplified. In the context of most microsimulation models, the list of variables in Demosim is kept short leading to aggregate projections generally similar to those obtained by traditional population projections while adding valuable detail. Within Statistics Canada, this ability makes Demosim a valuable tool for survey weighting and survey validation.

2.4 The simulation of labour force participation in Demosim[3]

Labour force participation is simulated by annually imputing an activity status to each individual living in a Canadian province. The imputation is based on participation rates constructed in two stages. First, a participation rate is selected according to the simulated individual's age, sex, highest level of education and province of residence. These participation rates are drawn from the Labour Force Survey (LFS), and assumptions are made about their future evolution.

Second, this rate is increased or decreased using a ratio to take into account other characteristics, namely immigrant status, period of immigration and membership in a visible minority group and Aboriginal identity. The ratios are calculated using participation data from the 2006 Census, and vary for each combination of age, sex and education level. Ratios are calculated for Canada as a whole, and then applied to each province, under the assumption that the gap between persons belonging to a visible minority group and the rest of the population, for example, does not vary from one province to another.

The scenario selected for this study is based on a "recent trends in participation rates" assumption. It takes the changes observed at the national level over the 10 years between 1999 and 2008 and extrapolates them for the next 10 years. Thus, for all age groups between 15 and 79

[3] This chapter is heavily based on Martel (2011)

years, a linear extrapolation of trends, mostly upward, was applied until 2018. After 2018, the rates are held constant to the end of the projection period.

While these overall trend scenarios affect all simulated individuals regardless their ethnicity, resulting in a universal upward trend of participation rates, relative differences between ethnicities as observed from 2006 census are assumed to persist over time. In the context of this study, this means that we can isolate the effect of changes in education on labour force participation. While we account for composition effects resulting from altered education, we do not alter relative differences in labour force participation between ethnic groups for given education levels.

2.5 The modeling of education in Demosim

The modeling of education follows the same general idea of applying a proportional model separating general trends from relative inter-group differences. Differing from the labour force model, which reassigns a labour force status to each individual each year, the education module explicitly simulates education progressions using a longitudinal model.

Due to data limitations, we are not able to estimate models from one single data source but rather have to find indirect ways to combine the detailed cross-sectional information of the Census with longitudinal information from a separate source. For the (longitudinal) modeling of education biographies we have identified the General Social Survey (GSS) of 2001 as the best available data source.

The following gives an overview on the modeling approach; a more detailed description is available in Spielauer (2011). In spite of the technical and computational challenges, the resulting model is highly transparent from a user's perspective, with all parameters having an easy interpretation and supporting scenario building.

As a first step we estimate six discrete time logistic event history models from GSS which constitute the basis for the modeling of education progression. These six models break down into:

- Three models for high-school graduation. Due to differences in cohort trends we distinguish between first chance graduations (i.e. those attained between ages 16-20), second chance graduations (attained between ages 21-25) and adult graduations;
- Two simultaneous models for the first post-secondary diploma, either a non-university post-secondary graduation or a BA;
- One model for obtaining a BA diploma after a non-university post-secondary graduation.

These models serve as a "standard surface" of education progression probabilities by cohort and age (respectively time since last graduation in the case of post-secondary studies) and are estimated separately by sex and place of birth. For high-school graduation we found that cohort factors can be closely approximated by a logarithmic trend; for the other models we use a piecewise-linear trend.

Our models so far do not contain factors for the separate ethno-cultural groups as such parameters cannot be estimated directly from GSS. To solve this problem we follow an indirect alignment approach. The idea is to find relative factors (log odds) for each cohort and ethno-cultural group which – when added to our models – result in an exact match of cross-sectional educational attainment calculated from our longitudinal models and the Census targets.

The procedure we follow in order to obtain relative factors and the necessary assumptions of this approach can be summarized as follows.

- We assume that cohort trends estimated from 2001 GSS data continue until the Census year 2006 and project the (unaligned) educational composition in 2006 by birth cohort, sex, and place of birth in each of our 6 longitudinal models.
- We then compare the projected educational composition of each population group with the composition found in the Census and search for alignment factors which, when introduced as additional factors (log-odds) into the logistic regression models, lead to an exact match of simulated and observed data. This 'first round' alignment is an overall alignment, not yet distinguishing the different ethno-cultural groups. For each birth cohort, sex, and place of birth we have to find a set of three alignment factors: one for high-school graduation, the second for non-university post-secondary graduation, and a third for obtaining a BA. To obtain these factors we use numerical simulation techniques. This alignment round can also be interpreted as a test of consistency between the two data sources: in the optimal case, alignment factors would be very close to zero and reflect random sampling variations in the survey rather than systematic differences. In fact, the factors found were satisfactory in this sense (Spielauer 2011)
- In a second alignment round we then search for an additional set of factors for each ethno-cultural group (again by cohort, sex and place of birth). This additional alignment leads to an exact match of the modeled educational composition with Census data for each ethno-cultural group. A necessary assumption of this step is that, for a given cohort, the relative differences between groups remain constant over the cohort's lifetime, e.g. the same group-specific log-odds apply at each year of age. A second assumption is that the age baselines are fixed over all cohorts and ethno-cultural groups (but can vary between sex and place of birth). The latter is a strong assumption, as Aboriginal peoples have different timing patterns

of educational attainments. We address this problem by limiting our analysis to age groups older than 24.

– In a third round we search for factors of inter-provincial differences for all Canadian born people. The necessary underlying assumption for this step is that there are no interaction effects between province and ethnic group, i.e. that the relative differences between groups found in the second alignment round are constant over provinces. This is an assumption found similarly in the models for labour force participation.

The logic of this approach is most easily displayed for high school graduation. For a person of given sex, place of birth, and birth cohort the probability of obtaining a high-school diploma at a given age can be expressed as a function of the log-odds estimated by logistic regression f(age, cohort):

$$p = \frac{1}{1+e^{-f(age,cohort)}}$$

The probability of having a high-school diploma in 2006 can be expressed as:

$$PROB_{2006} = 1 - \prod_{age=16}^{age\,in\,2006} (1 - \frac{1}{1+e^{-f(age,cohort)}})$$

First-round alignment forces this equation to produce a target probability $TARGET_{2006}$ by finding a correction term c:

$$TARGET_{2006} = 1 - \prod_{age=16}^{age\,in\,2006} (1 - \frac{1}{1+e^{-f(age,cohort)-c}})$$

Second round alignment forces the equation to produce a target probability $VISMINTARGET_{2006}$ for a specific ethno-cultural group by adding an additional alignment factor v:

$$VISMINTARGET_{2006} = 1 - \prod_{age=16}^{age\,in\,2006} (1 - \frac{1}{1+e^{-f(age,cohort)-c-v}})$$

The search for alignment factors follows the same idea for all types of graduation, but is technically more challenging for post-secondary studies as we have to deal with simultaneous processes. (For a more detailed discussion see Spielauer 2011).

The proportional model type is very convenient for the development of scenarios, as it allows distinguishing between assumptions concerning future overall trends for each of the distinguished graduation types and assumptions on the future evolvement of inter-group differences.

3 Scenarios

3.1 Overall trends

Similar to the labour force model, future educational trends in Demosim's baseline projection scenario are an extrapolation of past trends for a period before levelling them off. Being based on six separate graduation types, assumptions had to be made for each of them (separately by sex and Canadian versus foreign born). Concerning high-school graduation observed values[4] are used for birth cohorts up to 1986, continued by a (logarithmic) trend for another 5 years, continued by half of this trend until levelling off for birth cohorts 1995 and later. For all post-secondary graduation types, projections start for birth cohorts 1982 and later, following a linear trend until 1985, half this trend until 1990, and one fourth of the initial trend until 1995 where rates level off. These assumptions were chosen in order to level off average post-secondary graduation rates at levels already observed today for the visible minorities with the highest educational attainments (i.e. most Canadian born Asian minority groups) thereby preventing the model to converge towards universal university graduations.

Figure 4 illustrate the trends for three selected graduation types. Recent trends have become very flat already for ("first chance", i.e. age 16-21) high-school graduation, while they remained almost linear and steep for post-secondary graduations of birth cohorts 1960 and onwards. For allowing comparison with the following scenarios for Aboriginal peoples, trends are displayed in log odds[5] with the 1996+ birth cohorts of CB Whites used as reference category.

[4] Technically, "observed" data points consist of the estimated value plus the first round alignment term.

[5] Odds ratios can be interpreted like betting-quotes. A log-odds of -1 for the 1940 cohort compared to the 2000 cohort means that you would bet 1 : exp(-1) which is equivalent 2.72 : 1 that when meeting two persons representing these two cohorts and only one having graduated from high school, it is the younger one who graduated. As displayed in Figure 5, the relative differences in high-school graduation rates between CB Whites and Aboriginal groups are in about the same 3:1 range.

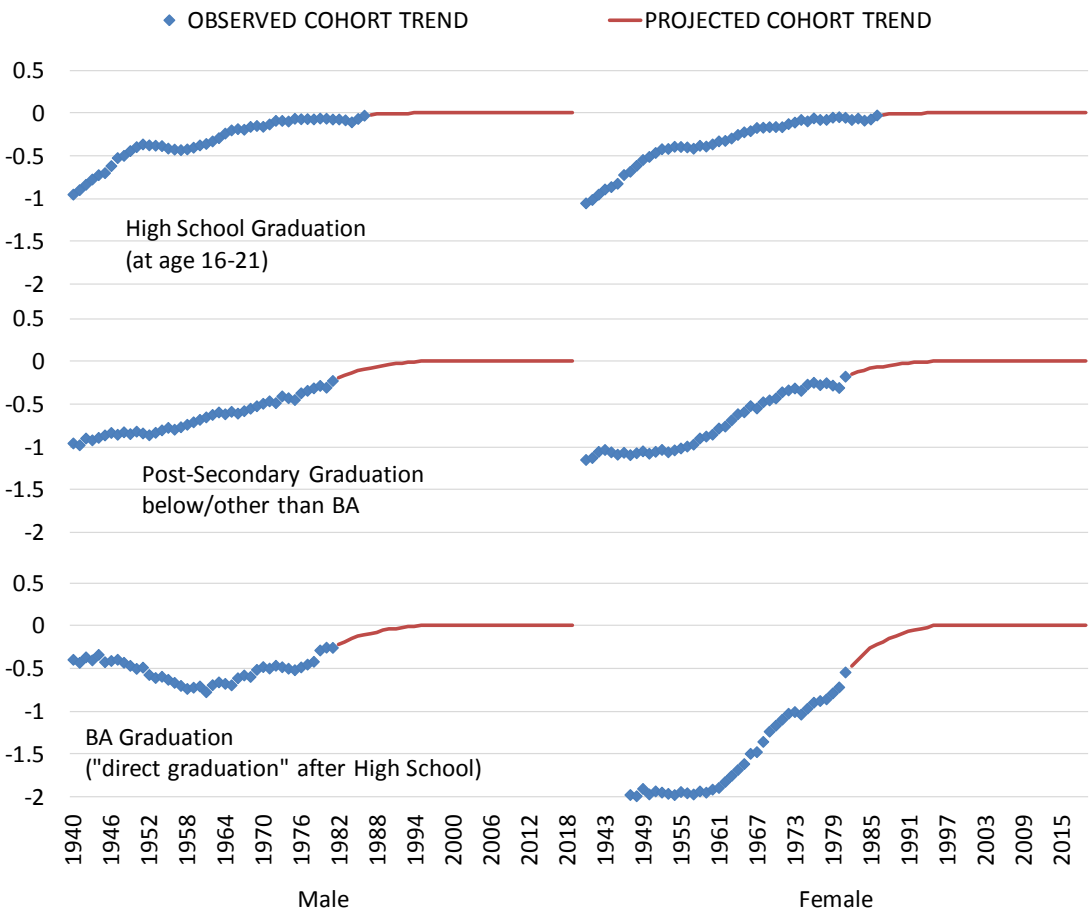

Figure 4: Cohort trends for selected graduation types
(log-odds, reference 1996+, CB Whites)

3.2 Past and projected differences in educational attainments

One of the central findings of the analysis underlying Demosim's education module are the pronounced and remarkably persistent relative differences in graduation probabilities between most of the 16 ethnicities distinguished in the model. This means that most ethnicities followed the same cohort trends while maintaining relative differences between each other (expressed as odds ratios). This is a very convenient observation when designing projection scenarios and provided the rational for Demosim's baseline education scenario which keeps relative differences constant in the future. Exceptions to this general pattern are the Black population (where the gap narrowed considerably), and both non-registered, and - to a larger extent – registered NAI for whom the gap increased, partly counterbalancing the educational expansion experienced by the rest of the population for birth cohorts 1960 and later. In contrast, the Métis and Inuit populations follow the typical pattern.

Technically this analysis comprises the second round alignment as outlined above: we searched for cohort series of relative factors which, when added to the first round alignment, make the longitudinal models match the group-specific education composition of the 2006 Census. We obtain a set of three alignment factors (high-school, post-secondary below BA, BA) per birth cohort for each of the separate ethno-cultural groups, with further breakdowns by sex. The full result of this exercise is available in the form of 168 cohort-series of alignment factors in Spielauer (2009); in this section we limit ourselves to highlighting some of the main patterns of relevance for Aboriginal peoples.

The following graphs on high-school graduations of Aboriginal groups emphasize the central findings of this analysis. All four Aboriginal groups have negative log-odds compared to the reference group of Canadian born White, i.e. lower graduation rates. The range of differences between groups shows no differences due to gender. A negative cohort trend can be found for registered NAI; in size, this group-specific trend almost exactly outbalances the general upward trend in the Non-Aboriginal population.

Figure 5 displays the log-odds as observed in the past and the three scenarios designed for the future, the scenarios will be discussed in more detail below.

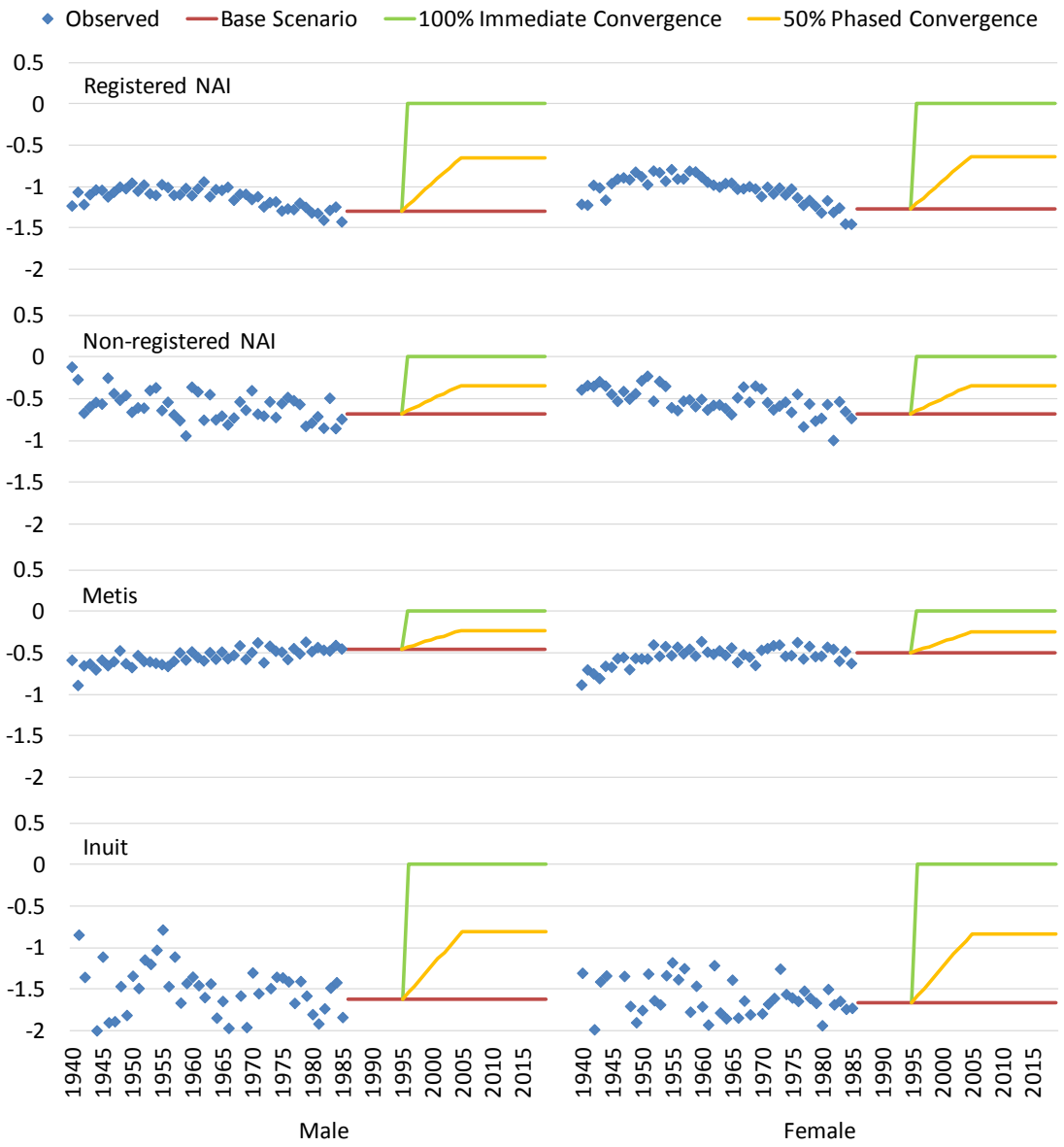

Figure 5: Relative differences (log-odds) in high-school graduation compared with CB White.[6]

Demosim differentiates two distinct post-secondary education levels; underlying models distinguish between three simultaneous respectively linked processes. Graduation from a non-university post-secondary program and 'direct' graduation from university are modeled as simultaneous processes, meaning that the probability of one event influences the probability of the other. After a non-university diploma, we start a third process of 'indirect' university graduation, i.e. obtaining a BA after having obtained another non-university diploma.

Relative factors for non-university post-secondary graduations were found to follow similar patterns but with less variation between the Aboriginal groups (not shown). In contrast, we found

[6] See Footnote 5 on Page 12 for interpretation.

very pronounced negative log-odds for university graduations. Again, there are pronounced negative trends for registered NAI, and to a lesser extent non-registered NAI. The negative trend is steepest for females, counterweighing the equally steep general trend in female in university graduations.

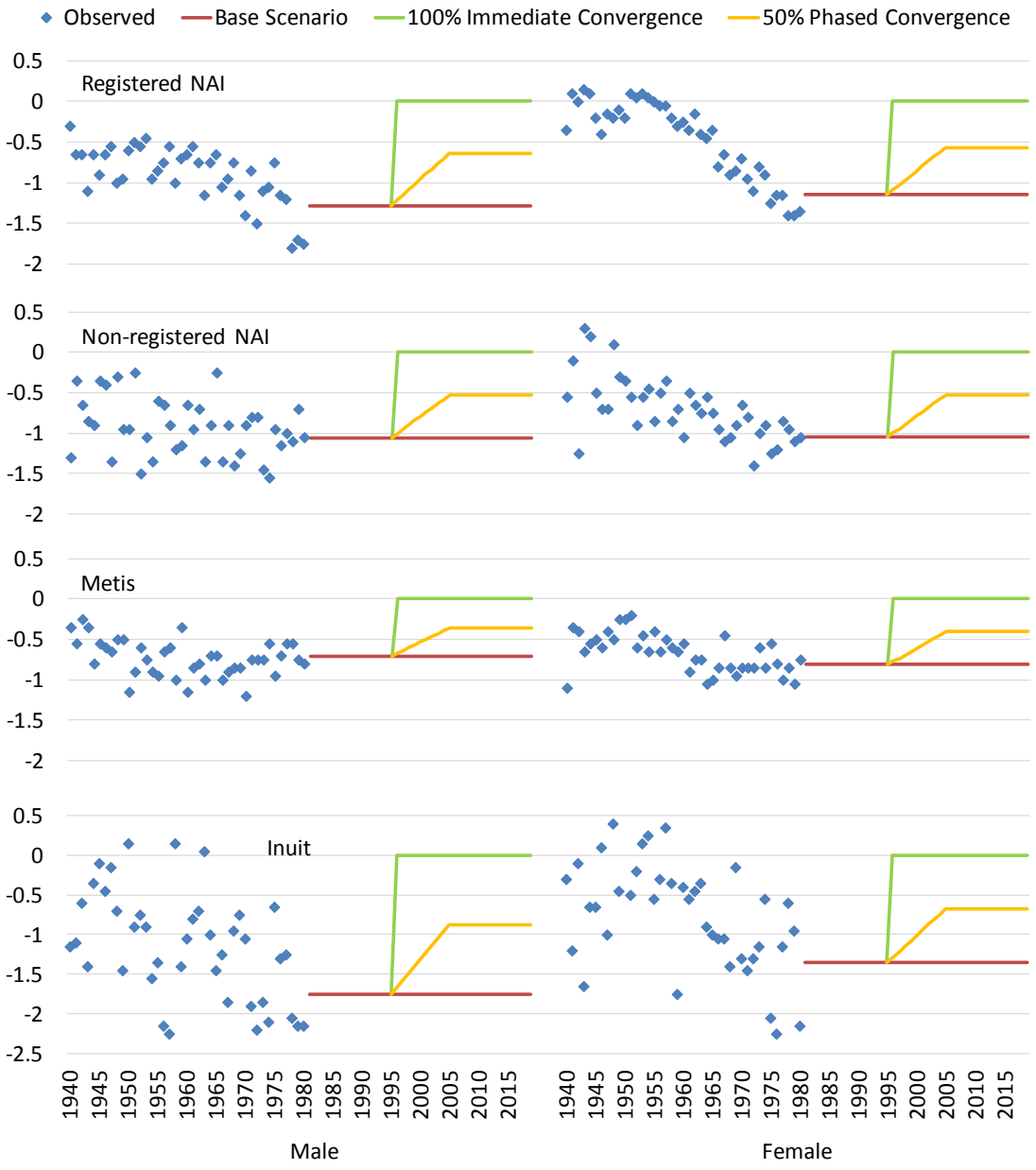

Figure 6: Relative differences (log-odds) in university graduations

Future scenarios assume constant relative differences between groups averaging the observations of the ten most recent cohorts for birth cohorts up to 1995. For cohorts born 1996 and later, we have created three scenarios:

- Base Scenario: Education progression follows the projected trends of Demosim. The relative differences between Aboriginal groups and the reference group (Canadian-born White) stay constant. This is the scenario used in all previous published projections. Note that these assumptions do break the downward trend where such a trend was observed. This leads to increases in educational attainment following the general trends for birth cohorts 1986 (1982 for post-secondary graduations) up to the 1995 birth cohorts where all processes level off.
- Immediate 100% convergence scenario: All Aboriginal people born in 1996 and after have the same education progression rates as Canadian born White. This is an extreme scenario to highlight the theoretically fastest and complete closure of the education gap.
- Phased 50% convergence scenario: Starting with people born in 1996, over 10 years, the gap between the Aboriginal and CB White populations is gradually reduced to 50%. Note that the slope of these upward trends is in range of the historic upward trends for the majority of the population. This scenario models a delayed educational expansion at the pace observed in other groups earlier.

None of the three scenarios is intended to produce a forecast of future education trends of Aboriginal peoples, but are stylized what-if settings for the study of how alternative assumptions affect the educational composition and labour force participation in the future.

4 Results

In the following we study the effect of the alternative assumptions on education trends on the evolution of future labour market participation rates of Aboriginal peoples, as well as the size and education composition of their workforce. For this analysis we have chosen a period view, drawing the timelines of change for the calendar years 2011 up to 2056. The analysis is limited to persons 25-64, the 25 year cut off selected to isolate from effects of increased school attendance on labour force participation.

4.1 Changes in education

As depicted in Figure 7, the proportion of the population 25-44 graduated from high school will stay at current levels in the baseline scenario, while there is still an upward trend for the 45-64 years age group as younger higher educated cohorts renew the population. The latter effect is not present for registered NAI who did not participate in the educational expansions for cohorts born after 1960.

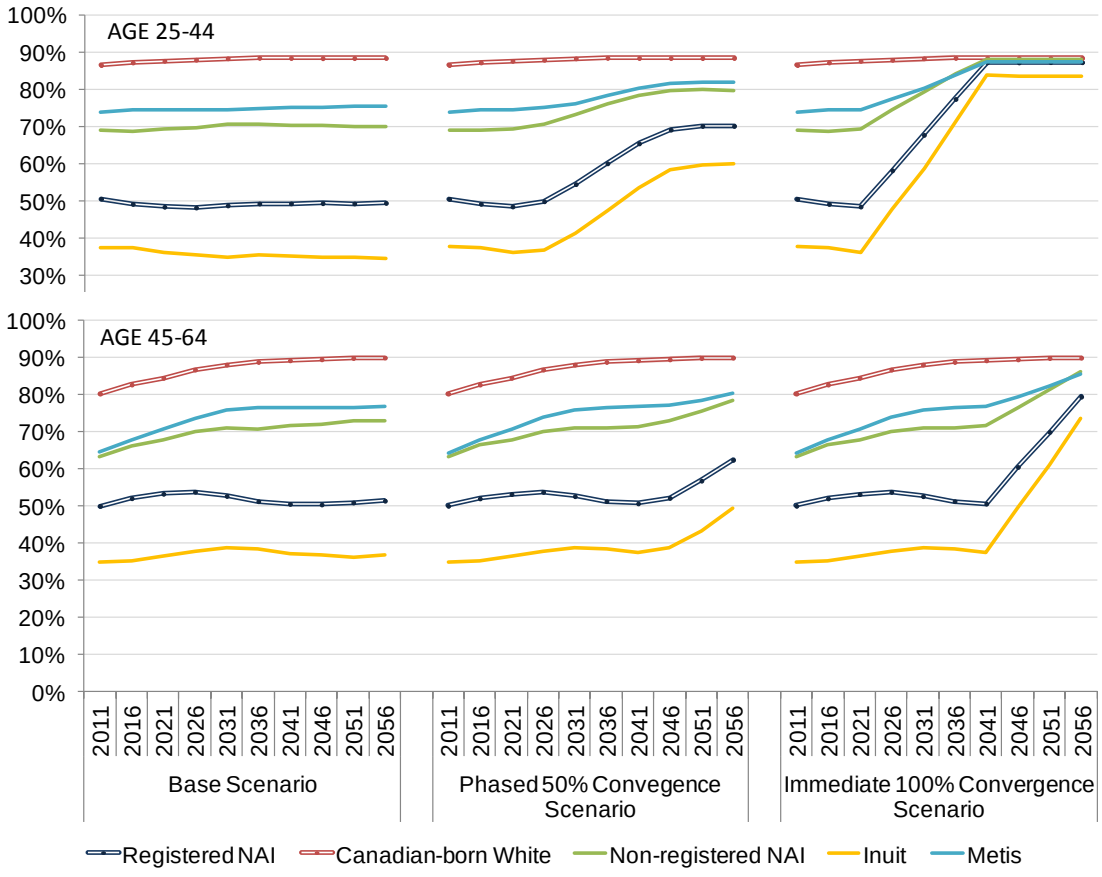

Figure 7: Proportion of population graduated from high school

For both convergence scenarios, assumed increases in education would not become visible immediately, as the school age population affected by the change still has to reach age 25 respectively 45. In the immediate convergence scenario, for the younger age group, the transition process is finished by 2041, for the older age group accordingly 20 years later. (The phased convergence scenario takes another 10 years to fully unfold.) Note that education in Demosim operates on a provincial level. This leaves the education rates of Inuit peoples staying below the average value of CB Whites, as their population is concentrated in provinces with generally lower education attainments.

Figure 8 shows the proportion of the population with post-secondary education. In contrast to high-school graduation, upward trends are also present in the baseline scenario.

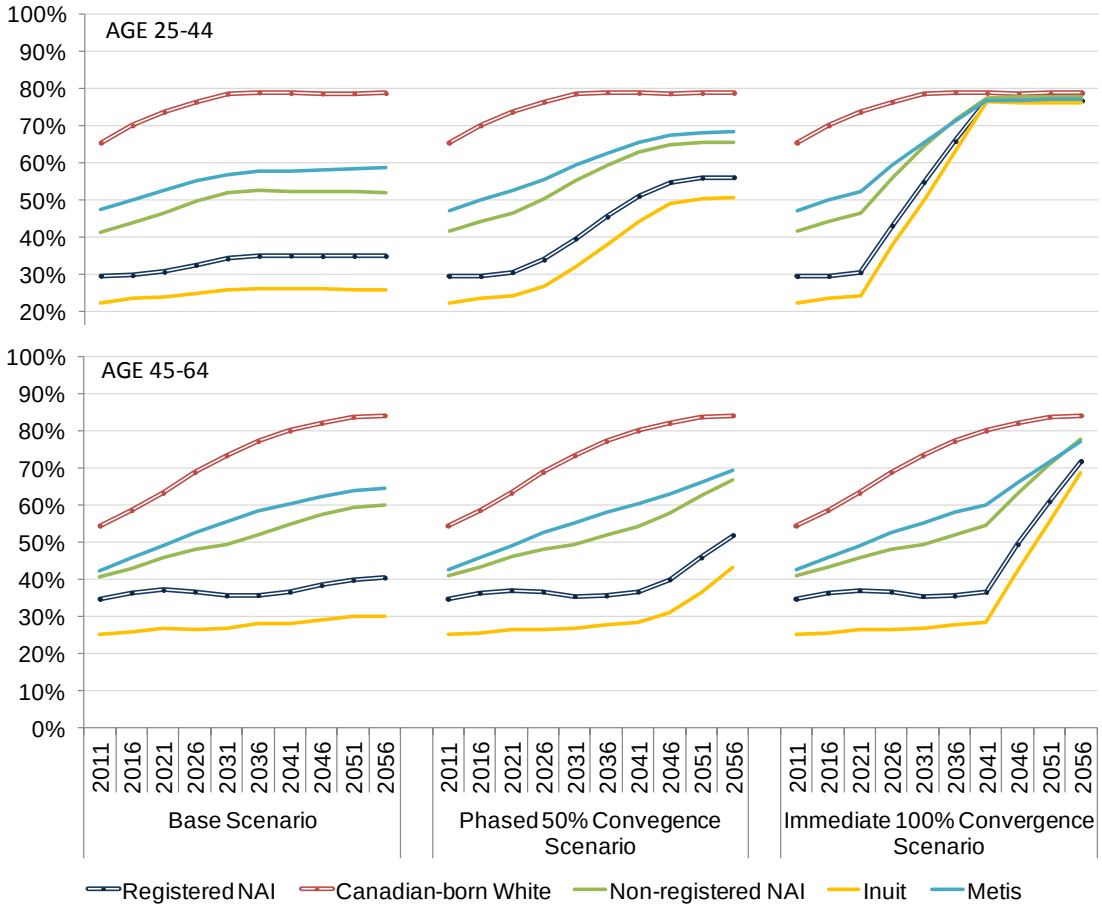

Figure 8: Proportion of population with postsecondary education

4.2 Changes in labour force participation rates

Labour force participation of CB White is projected to stay stable at around 90% for the younger age group and to increase for 45-64 year old pushing up labour force participation for the full 25-64 age range from 80 to 85%. In the base scenario, this trend is only followed by non-registered NAI and Métis while it stays flat or even slightly decreases for registered NAI and Inuit peoples. The latter mostly results from distinct demographic patterns of these groups including faster population growth in provinces with generally lower education and labour force participation and faster relative growth of age groups with lower labour force participation (below 30, above 60).

Figure 9: Labour force participation rates

The pace of increases in labour force participation rates resulting from the two alternative scenarios of educational improvements is slow with first significant increases not to be expected within 20 years in the case of the phased convergence. Immediate full convergence obviously leads to faster and more pronounced effects.

4.3 Changes of the size and educational composition of the Aboriginal peoples' workforce

The high population growth observed for Aboriginal peoples makes Aboriginal workers an over-proportionally growing sector of the labour force. In this sense, all changes in labor force participation rates are magnified by population growth in absolute terms. Education-induced increases in labor force participation also dramatically alter the education composition within the Aboriginal work force; increases therefore not only concern the number of workers but also their human capital.

In the baseline scenario, the number of Aboriginal people 25-44 active in the labor market would increase from 269,000 to 356,000 (+32%) in the next four decades. In the phased 50% convergence scenario, this increase would be 41%; in the immediate full convergence scenario 46%, which means an education-induced increase of the size of the labor force by 24,000 and 37,000 workers age 25-44 respectively. In both convergence scenarios, all increases in the size of the labor force are driven by people with post-secondary education, the number of people with lower education diminishing both relatively but also in absolute numbers. In other words: while projected improvements lead to up to 37,000 additional people age 25-44 in the workforce, the number of workers with post-secondary education would increase by up to 132,000.

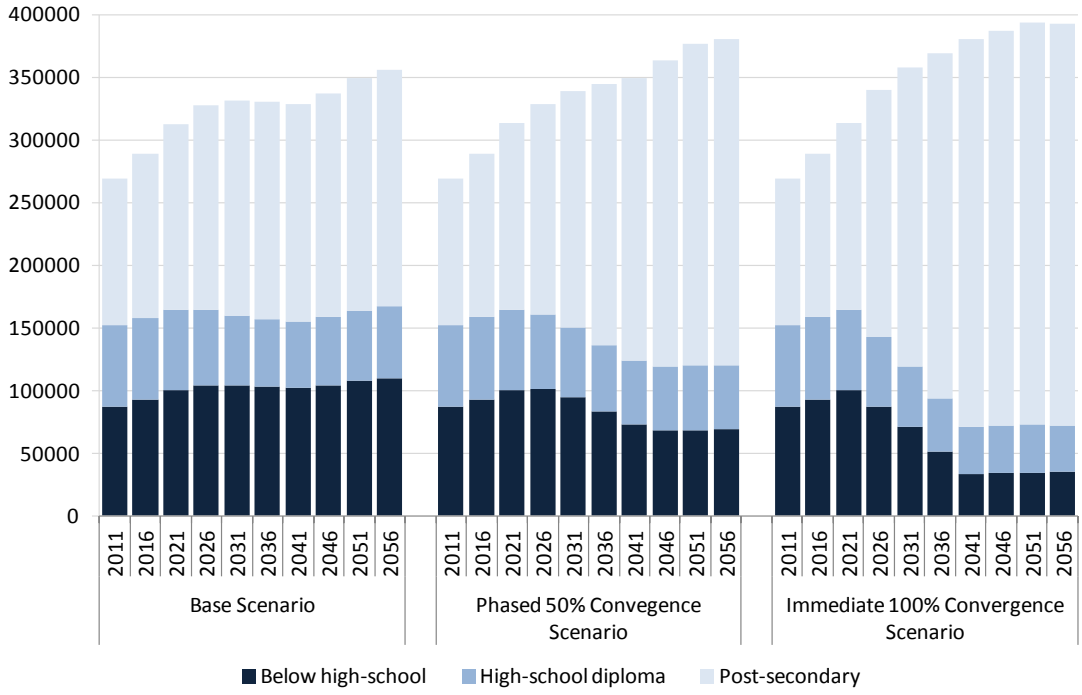

Figure 10: Aboriginal peoples' labour force by education, age 25-44

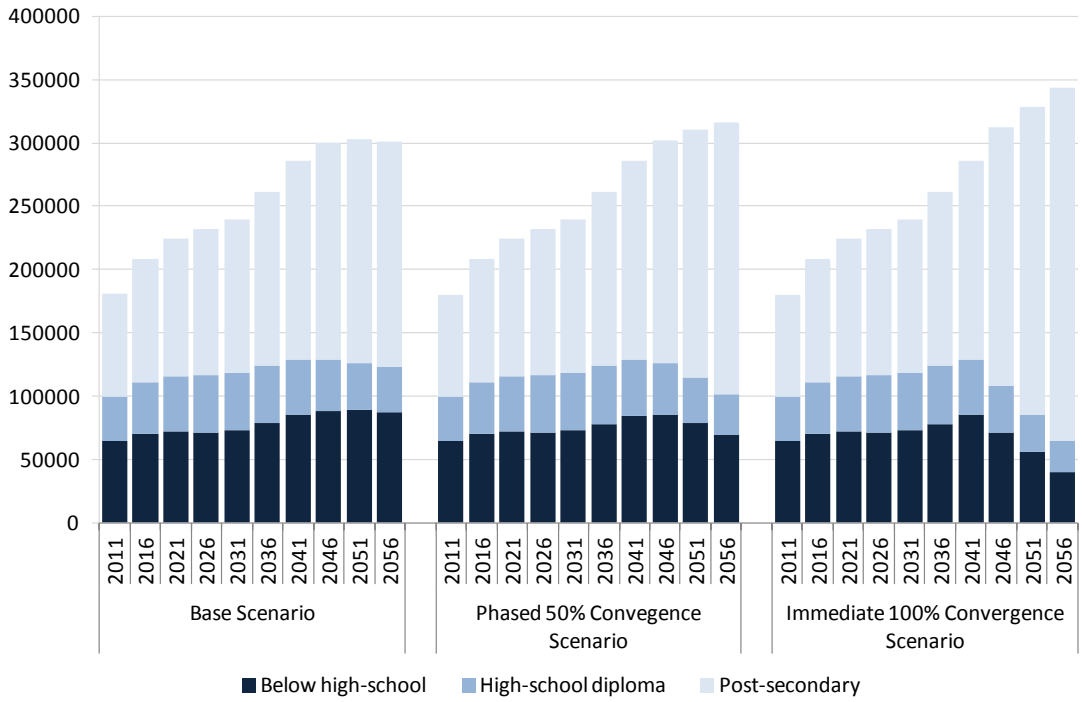

Figure 11: Aboriginal peoples' labour force by education, age 45-64

Given the slow pace of population renewal, the education-induced increase in the Aboriginal labor force of people 45-64 would start later but follows similar patterns.

For the whole age range of 25-64 year old, the baseline scenario projects an increase of the Aboriginal labour force from currently 450,000 to 657,000 people over the next four decades (+46%). In the phased 50% convergence scenario, an additional 39,000 persons would be in the workforce (+55%). In the case of immediate 100% convergence, this number of additional workers would be 80,000 (+67%).

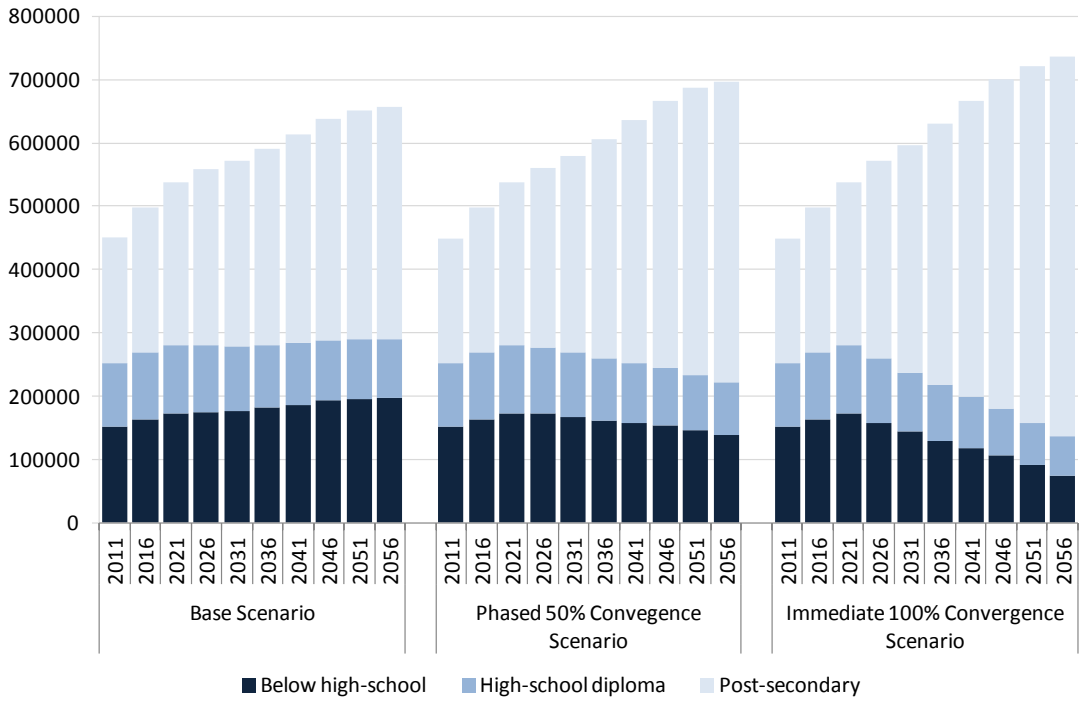

Figure 12: Aboriginal peoples' labour force by education, age 25-64

While the total number of Aboriginal people will increase substantially over the next decades, increases in education would lead to diminishing numbers of people in the lower education categories. Comparing the Aboriginal workforce as projected by the three scenarios for 2056, we find considerable differences concerning its education composition. While a phased 50% convergence would increase the overall size of the Aboriginal workforce by 39,000 people, the number of participants with post-secondary education would increase by 107,000. In the immediate 100% convergence scenario, the number of Aboriginal workers with post-secondary education in the 2056 labor force would be 600,000, which are 234,000 more people than in the base scenario.

5 Summary and Conclusions

This study aimed at quantifying the impact of educational attainments on the future labour force participation of Aboriginal peoples. Using Statistics Canada's Demosim population projection model, we were able to simulate alternative scenarios of educational change and resulting effects on the future labour force until 2056.

While about half of the observed difference in labour force participation rates between Aboriginal and Canadian born White peoples can be attributed to educational differences, patterns are very different for different groups. The contribution of education differences to the gap in labour force participation is highest for Métis, followed by Inuit, registered NAI and

unregistered NAI. In absolute terms, closing the educational gaps would have the biggest effect for registered NAI, theoretically moving up labour force participation by 9.5 percentage points.

Following a "medium growth – recent trend" scenario, over the next four decades population growth of Aboriginal peoples would result in an 45% increase in size of its labour force if relative educational differences persist. In education scenarios which close the educational gap, this number would increase to almost 70%. In absolute terms, this means up to 80.000 additional workers.

At the same time, the composition of the future Aboriginal peoples' labour force would be dramatically different with up to 234,000 additional people in the Aboriginal labor force having post-secondary education.

Besides this huge impact of potential educational improvements on the future labour force, the changes are a slow gradual process as successive young school-age cohorts yet have to enter the labour market and renew the workforce.

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