Projecting the Canadian labour force population by literacy skills using microsimulation: Redefining the supply

Samuel Vézina   Institut national de la recherche scientifique (INRS)
Alain Bélanger   Institut national de la recherche scientifique (INRS) &
International Institute for Applied Systems Analysis (IIASA)

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Plan

- LF Projection results by literacy skills
    - Microsimulation model
    - Literacy projection module
    - What-if scenarios
    - International comparisons
- How PIAAC data can shed new light on future imbalances between LF Demand and Supply?
    - Derived projections of Supply by broad skill level with AND without literacy skill level as a determinant
    - Derived projections of Demand by literacy skill level?

Our research questions

- Project the Canadian labour force population up to 2061 using *LSD-C*, a microsimulation model, and look at its ethnocultural and educational composition.

  1. How demographic components of population growth and changes in participation rates affect the size, the skills, and the composition of the future labour force?
  2. What will be the composition of the future Canadian labour force?
  3. What would be the effect on the LF size and skills of better economic integration/selection of immigrants?

A new demographic regime

- Immigration has reached historical level

- Immigration has become increasingly culturally diverse

- Older workers are replaced by more educated young cohorts

➢ Numerous policy consequences
  - Long-term sustainability of social security programs (healthcare, pension plans)
  - Political outcomes, immigration and integration policies …

A new demographic regime

- New policy tools are needed
  - Social cohesion
  - Labour market needs and changes
  - Poverty and inequalities
  - Education and language skill formation
- Microsimulation models
- Human capital and Knowledge-based economies
  - PIAAC - Survey on Adult Skills

Microsimulation

- What is it?
  - Departure from deterministic macro models
  - The individual, not the aggregate, is the unit being simulated
  - A population is therefore simulated one unit at a time
  - State transitions are determined stochastically

- Why the buzz?
  - A very significant technical improvement over multistate methodology
  - Extremely flexible in its implementation
  - Though, dependent on available data

Microsimulation

Source: Bélanger *et al.*, (2017) A Framework for the Prospective Analysis of Super-Diversity.

Main research question

- How future education and immigration levels will impact the size and the skills of the future workforce?

Focus

- Workforce: 25 to 64 years old

- Microsimulation model
  - *LSD-C* (Laboratoire de simulations démographiques - Canada)

- Projections 2011 – 2061

- Open to migration

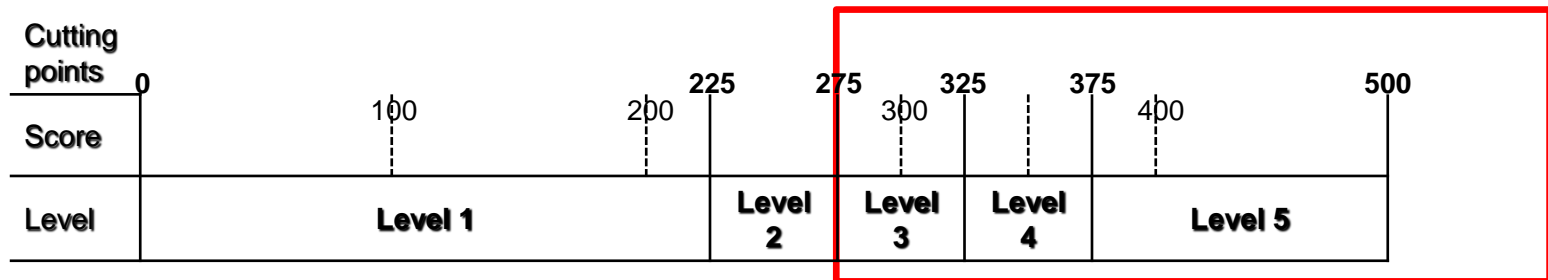- International comparisons
  - *PÖB* (Austria)

Descriptive statistics

Total population aged 25 to 64 years old, 2012

		Canada
Proportion of university graduates	Native-born	22 %
	Foreign-born	**35 %**
Proficiency in literacy skills (Mean score)	Native-born	276
	Foreign-born	**249**
Proportion economically active	Native-born	82 %
	Foreign-born	**78 %**
Population (N)	Native-born	14,205,500
	Foreign-born	4,658,600

PIAAC data analysis

- Basic Literacy Skills

| Cutting points	0		225	275	325	375		500
Score		100	200		300		400	
Level		Level 1		Level 2	Level 3	Level 4	Level 5	

- **Levels 1 and 2** correspond to low literacy skills
- **Level 3** is considered by experts as a suitable minimum level for coping with the increasing demands of the emerging knowledge society and information economy
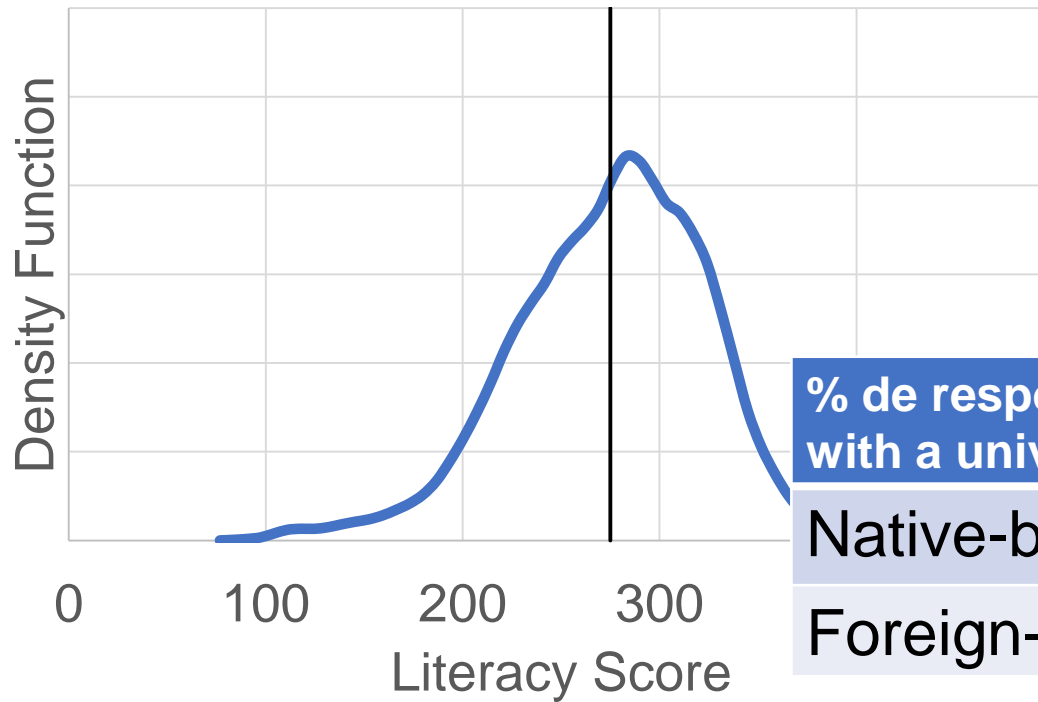- **Levels 4 and 5** correspond to high literacy skills

PIAAC data analysis
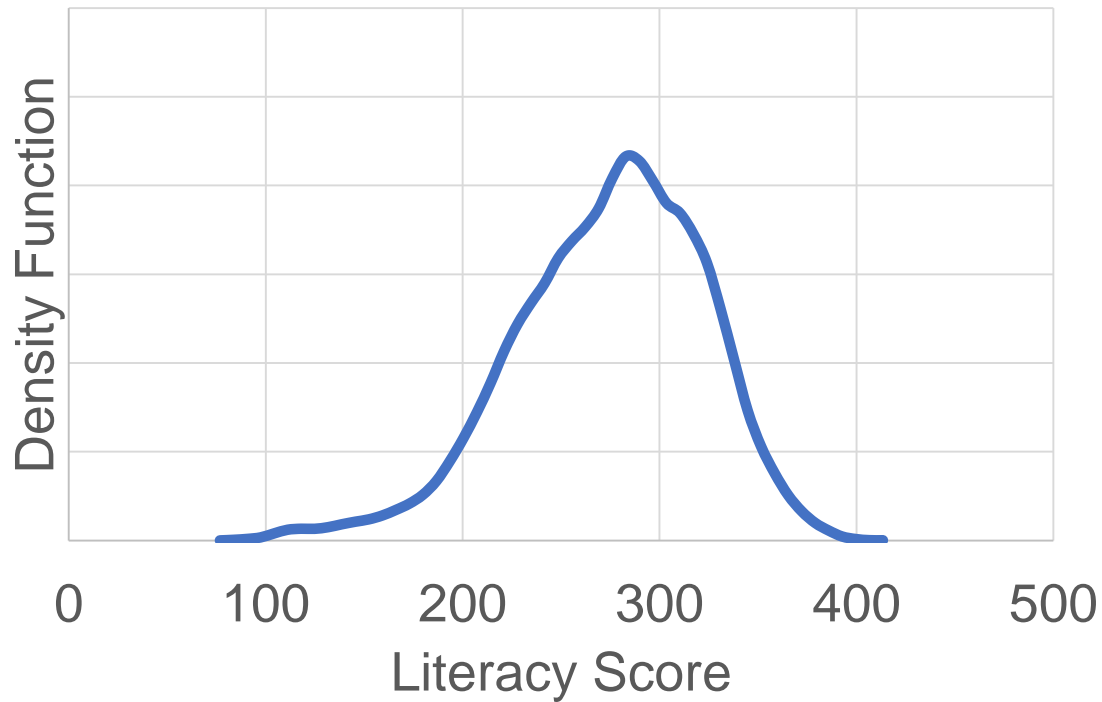
Distribution of average score, 25-64 years old, Canada, 2012

PIAAC data analysis

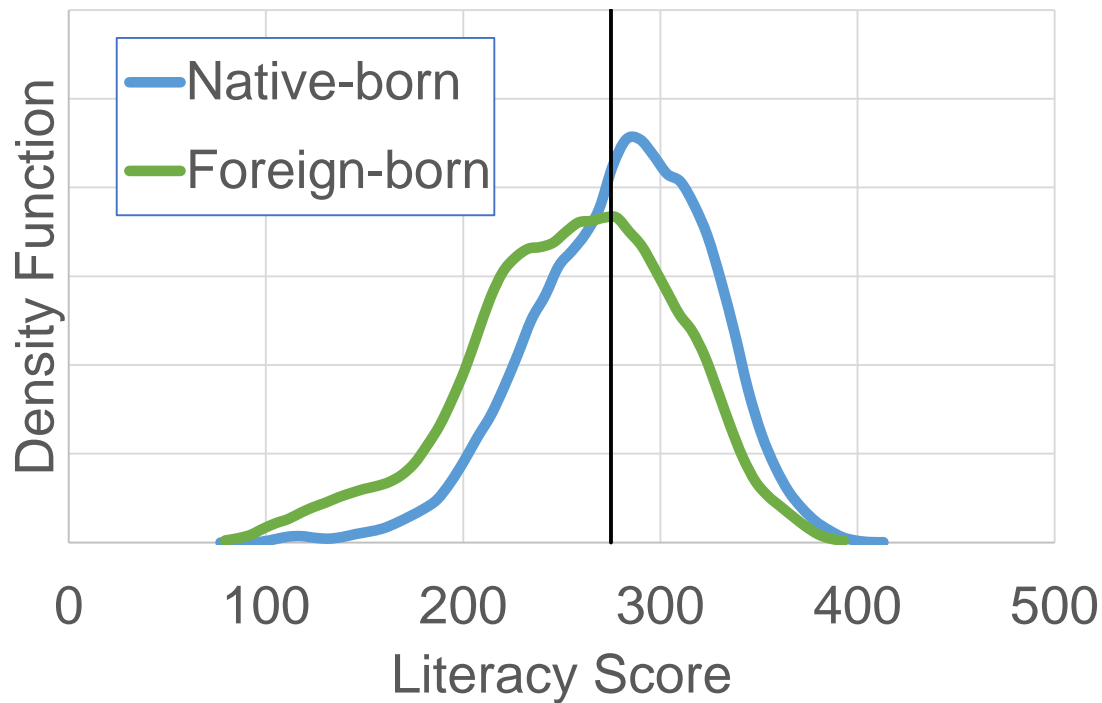Distribution of average score, 25-64 years old, Canada, 2012

% Level 3+ = 52%

Total avg. Score = 274

% de respondents (25-64 years old) with a university degree	
Native-born	25%
Foreign-born	43%

PIAAC data analysis

Distribution of average score, 25-64 years old, Canada, 2012

% Level 3+ = 52%

Total avg. Score = 274

Native-born Canadians
% Level 3+ = 56% ⬅
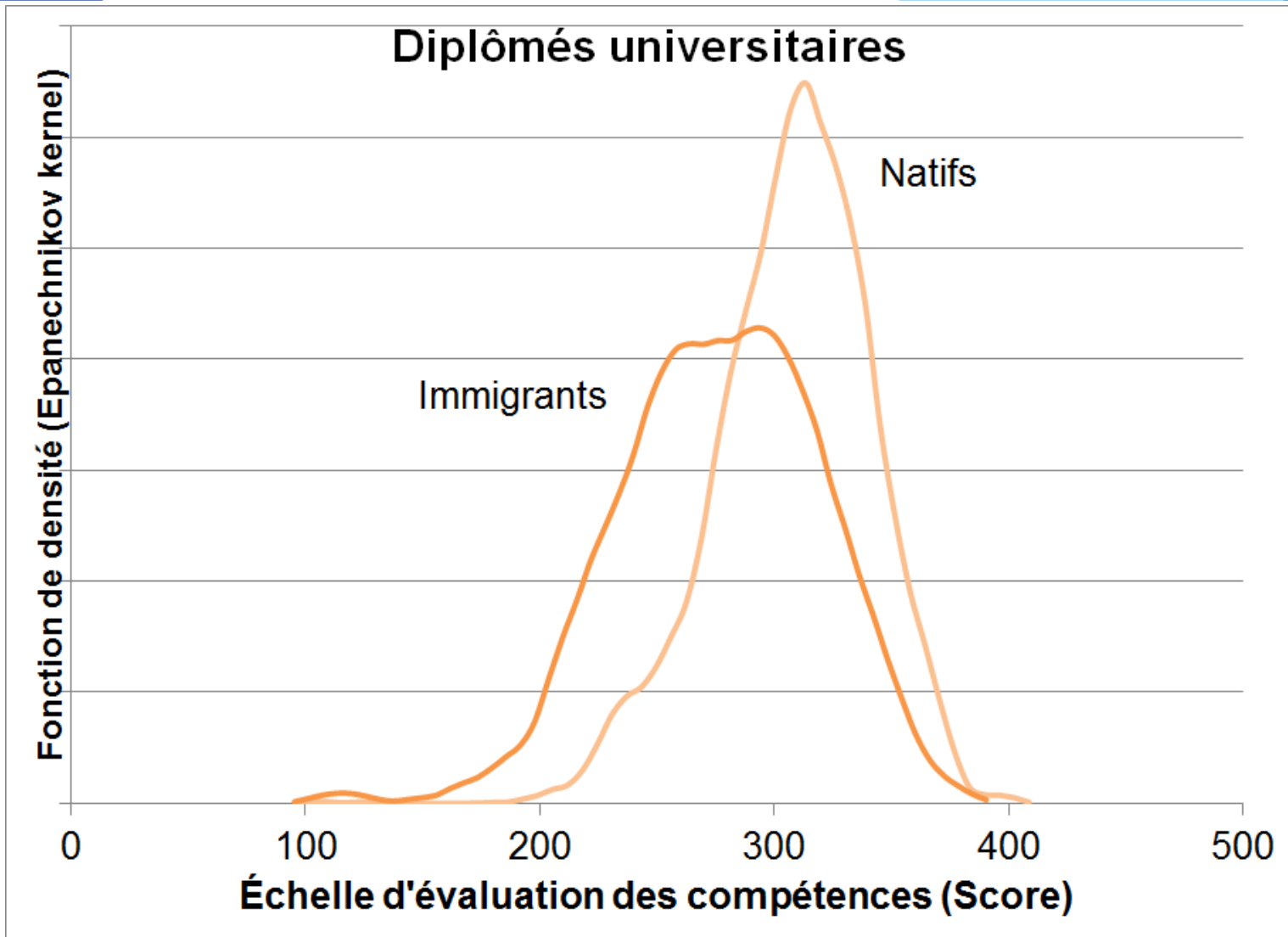Total avg. Score = 280

Foreign-born Canadians
% Level 3+ = 37% ⬅
Total avg. Score = 255

PIAAC data analysis

Diplômés universitaires

Natifs

Immigrants

Fonction de densité (Epanechnikov kernel)

Échelle d'évaluation des compétences (Score)

Modelling Literacy skills

- Regression models: Literacy Score (Dep. Variable)
- Value derived from characteristics

Native-born	Foreign-born
Sex Age Region of residence Education Language Labour force status	Sex Age Region of residence Education Language Labour force status Age at immigration Length of stay in host country Country of birth Country of highest diploma

Projection Scenario Assumptions

| Scenario	Immigration volume	Immigration composition	Education	Activity rates
REFERENCE	Official immigration volume projected by Statistics Canada	Characteristics of immigrants arrived between 2006-2010	Recent trends reflecting the observed rise of educational attainment of cohorts	Recent trends

Immigration rate

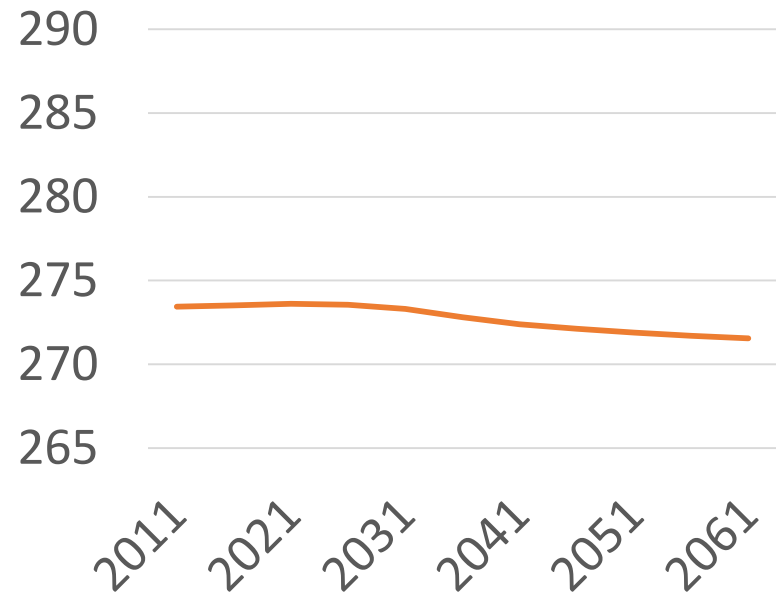Canada: 0.75% (Among the world's highest rate)

REFERENCE Scenario

Size of the workforce
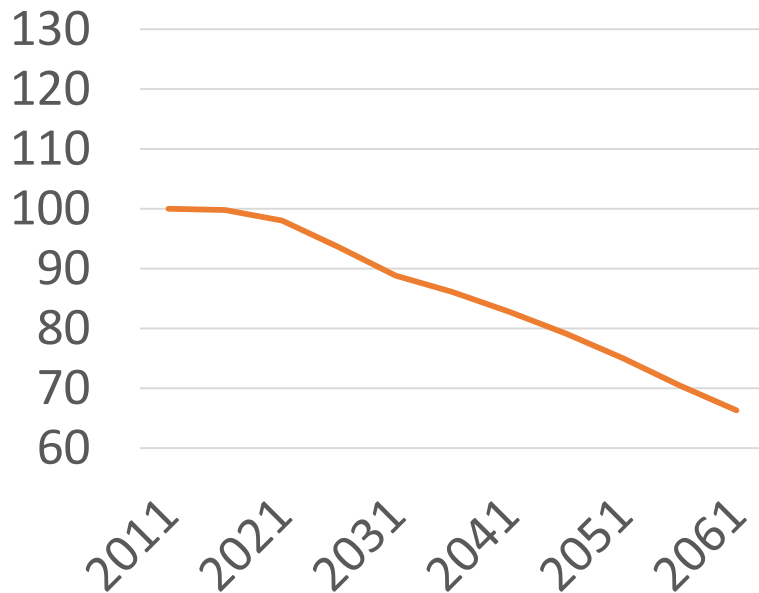**(base 100 in 2011)**
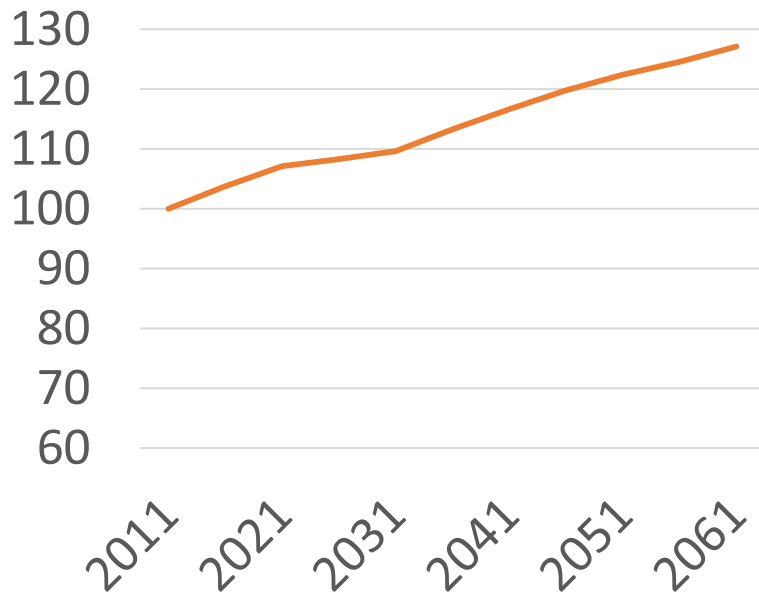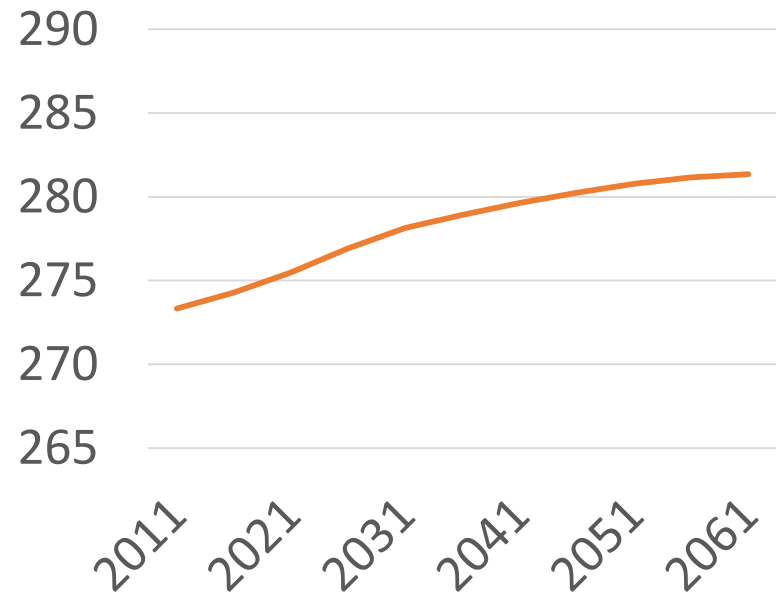

Average literacy score of the workforce

ZERO Scenario
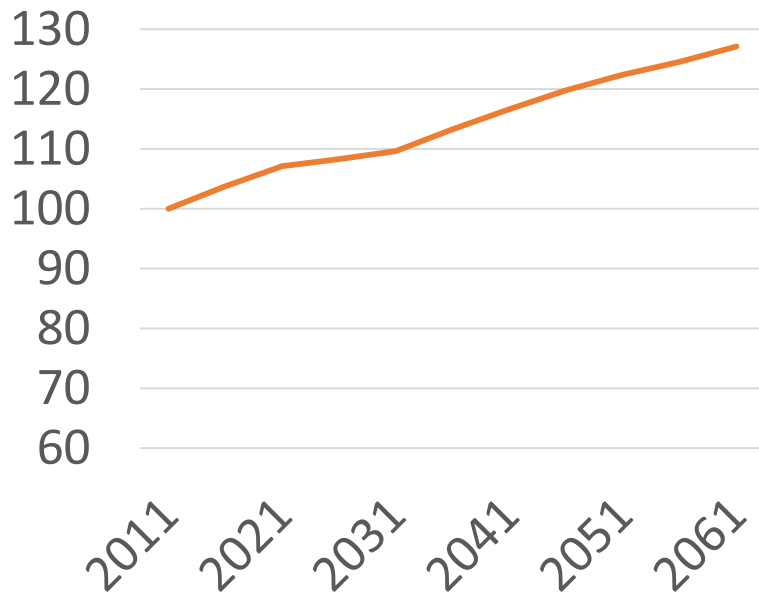
Size of the workforce
(base 100 in 2011)

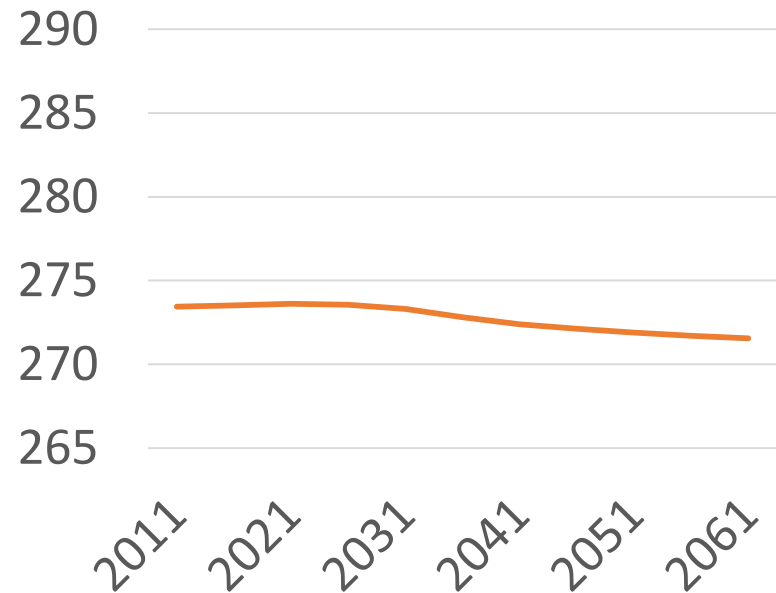## Average literacy score of the workforce

REFERENCE Scenario

Size of the workforce
(base 100 in 2011)

Average literacy score of the workforce

CHARACT Scenario

Size of the workforce
(base 100 in 2011)
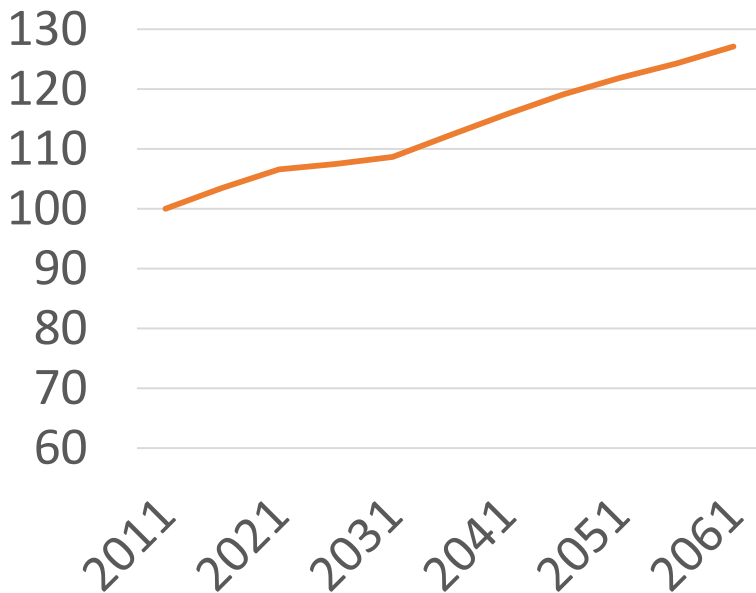
Average literacy score of the workforce
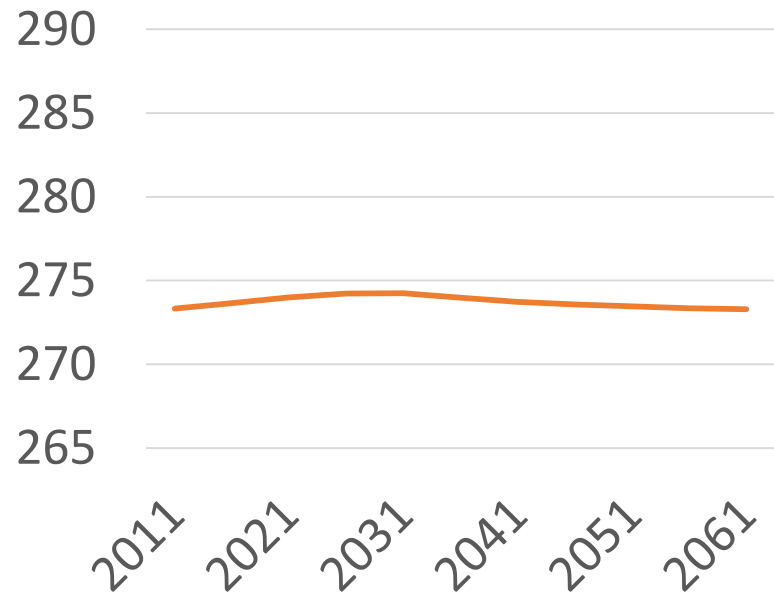
International comparisons

Austria

Projection Scenario Assumptions

Scenario	Immigration volume	Immigration composition	Education	Activity rates
COMPARABLE	Immigration rate set at 0.35%	Characteristics of immigrants arrived between 2006-2010	Educational attainment set at observed rate in 2011	Recent trends

Immigration rate
0.35% is equal to the US level.

COMPARABLE Scenario

Size of the workforce
(base 100 in 2011)
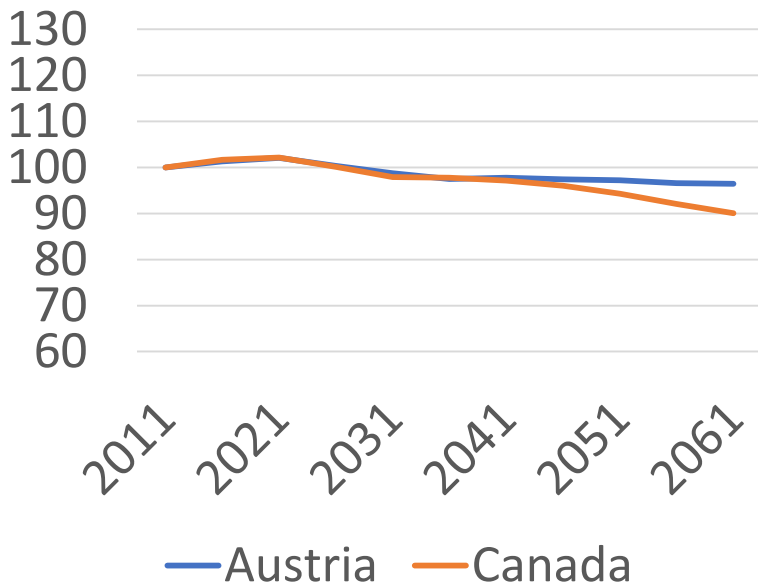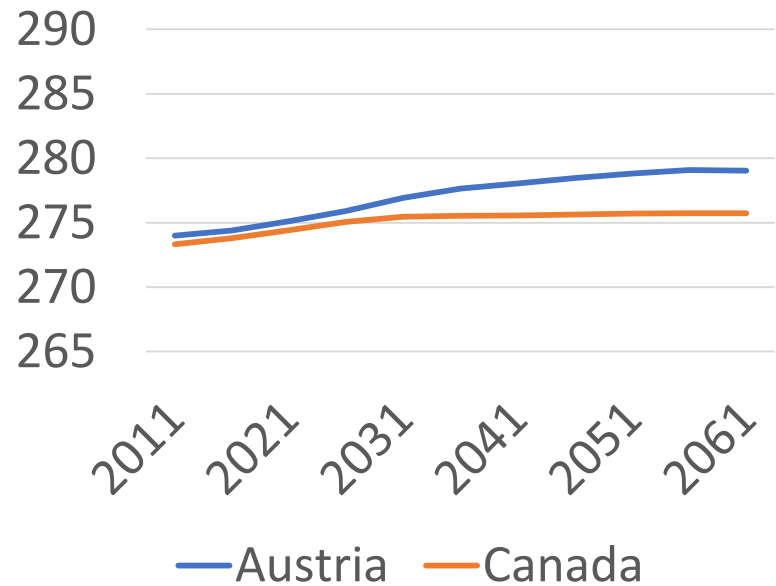
Austria — Canada

Average literacy score of the workforce

Austria — Canada

Projection Scenario Assumptions

Scenario	Immigration volume	Immigration composition	Education	Activity rates
EDUCATION	Immigration rate set at 0.35%	Characteristics of immigrants arrived between 2006-2010	**Recent trends reflecting the observed rise of educational attainment of cohorts**	Recent trends

EDUCATION Scenario

Size of the workforce
(base 100 in 2011)
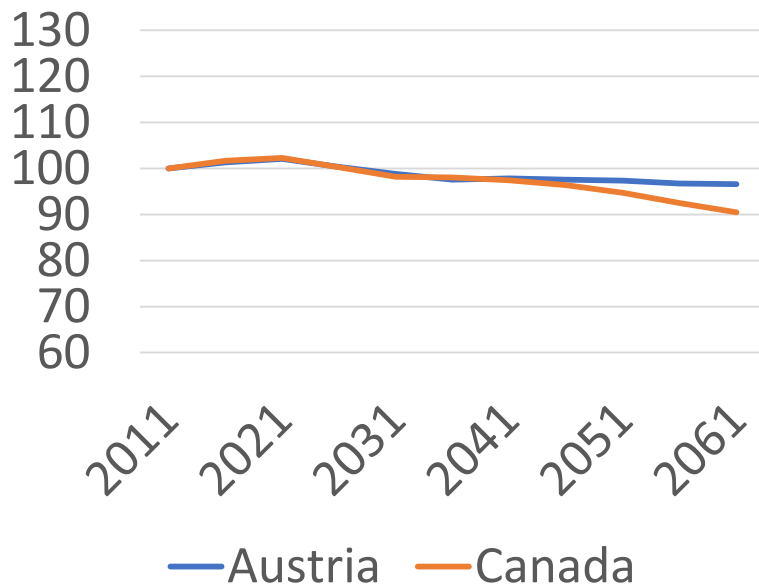
Average literacy score of the workforce
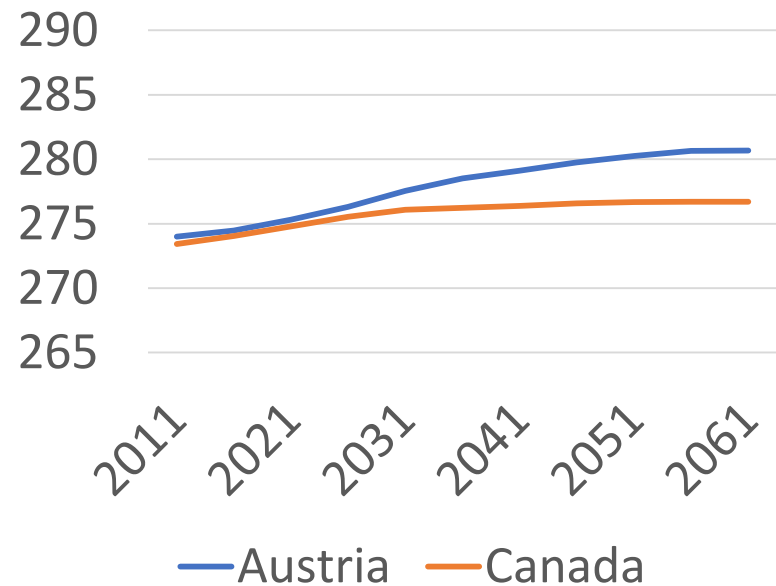
In a nutshell

- The demographic dynamic of the workforce is similar in both Austria and Canada

- Future positive growth of the workforce relies heavily on immigration intakes

- Immigration also impacts on average skills

- Education has no significant impact on the size of the future workforce

- Education impacts on average skills

- Divergent strategies in terms of future development of the workforce

Implications - Canada

Workforce aged 25 to 64 years old, 2011-2061, REFERENCE Scenario

By immigration status and country of birth

	2011	2021	2031	2041	2051	2061
Foreign-born (less developed countries)	20%	24%	29%	32%	34%	36%
Foreign-born (most developed countries)	5%	4%	4%	4%	5%	5%
Native-born	75%	72%	67%	64%	61%	59%

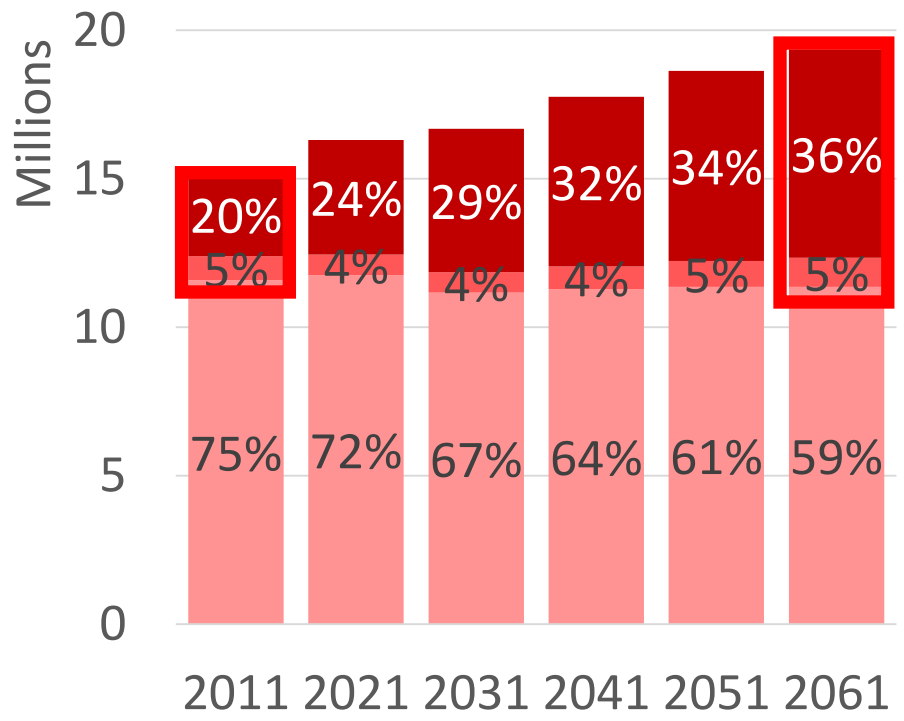■ Foreign-born (less developed countries)
■ Foreign-born (most developed countries)
■ Native-born

By education level

	2011	2021	2031	2041	2051	2061
University diploma	27%	31%	35%	36%	37%	38%
Highschool diploma and other post-secondary	63%	61%	58%	57%	56%	55%
Less than high school diploma	10%	8%	7%	7%	7%	7%
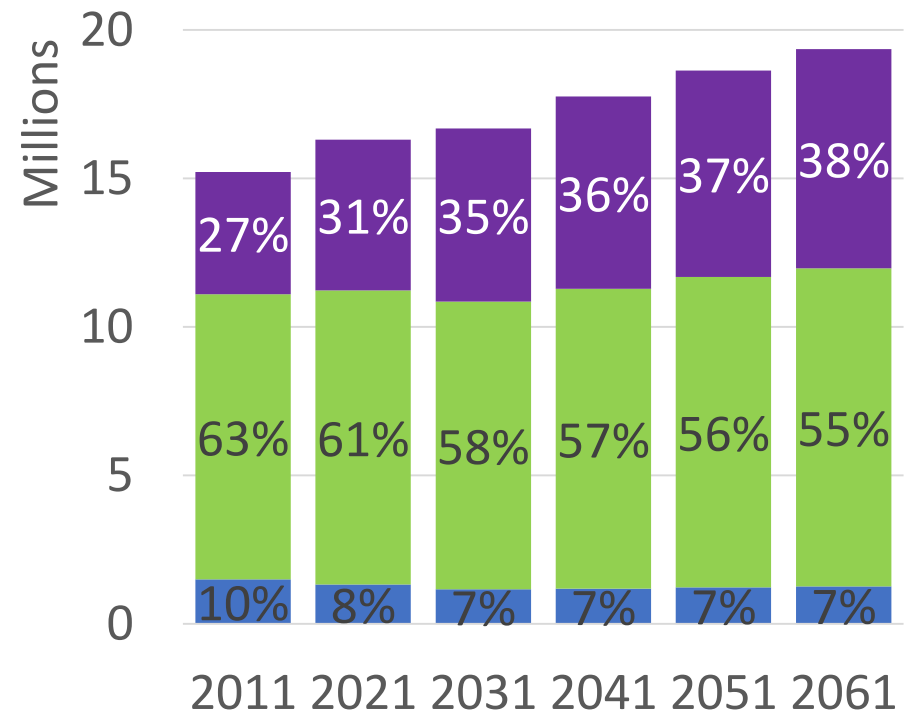
■ University diploma
■ Highschool diploma and other post-secondary
■ Less than high school diploma

Implications - Canada

Workforce aged 25 to 64 years old, 2011-2061, REFERENCE Scenario

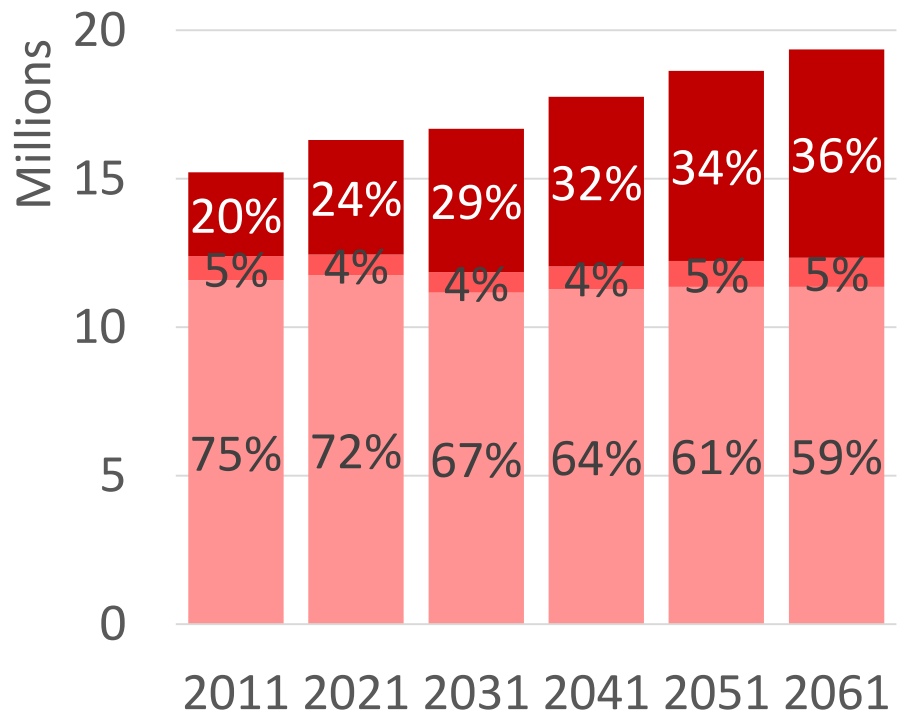**By immigration status and country of birth**

By literacy level
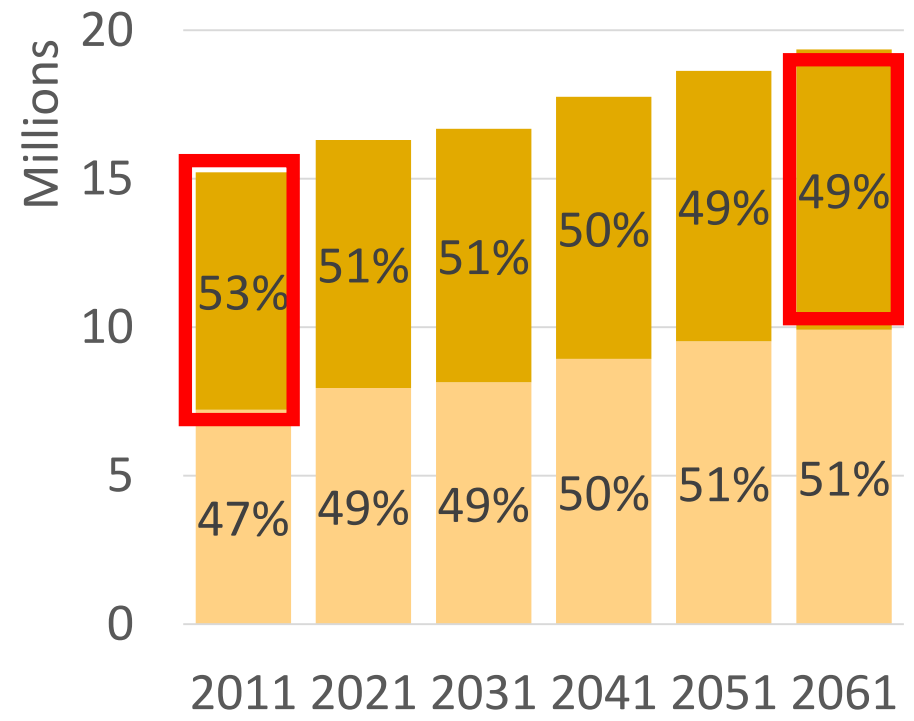
Implications - Austria

Workforce aged 25 to 64 years old, 2011-2061, REFERENCE Scenario

By immigration status and country of birth

By literacy level

Millions

Year	Foreign-born (less developed)	Foreign-born (most developed)	Native-born
2011	13%	7%	80%
2021	19%	8%	73%
2031	23%	8%	69%
2041	23%	7%	70%
2051	21%	4%	75%
2061	18%	4%	78%

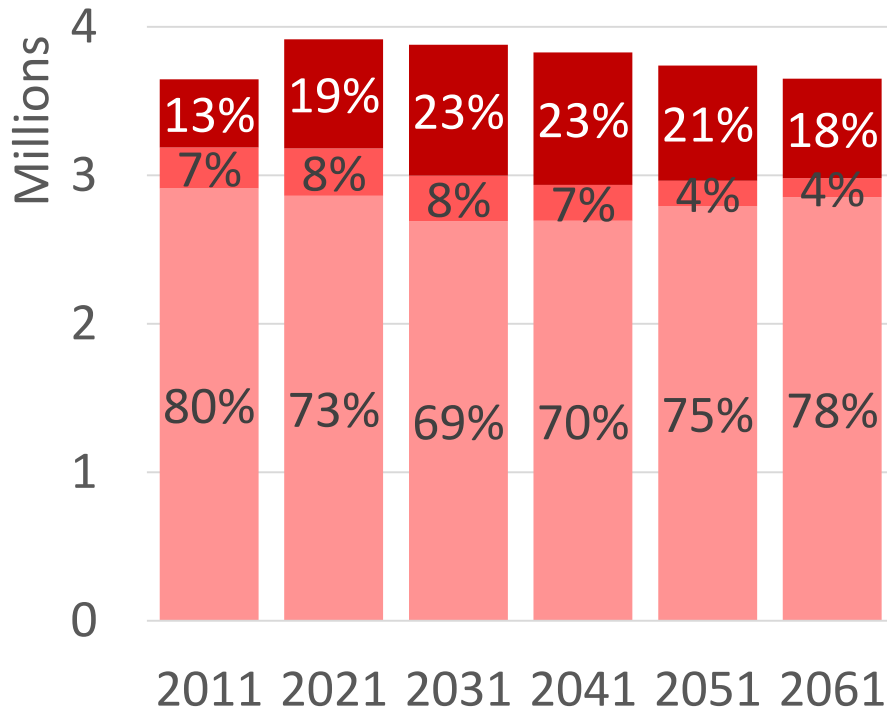| Year	Medium or high literacy	Low literacy
2011	50%	50%
2021	51%	49%
2031	52%	48%
2041	54%	46%
2051	58%	42%
2061	61%	39%

■ Foreign-born (less developed countries)
■ Foreign-born (most developed countries)
■ Native-born

■ Medium or high literacy level (Level 3 or over)
■ Low literacy level (Level 2 or below)

Our research questions
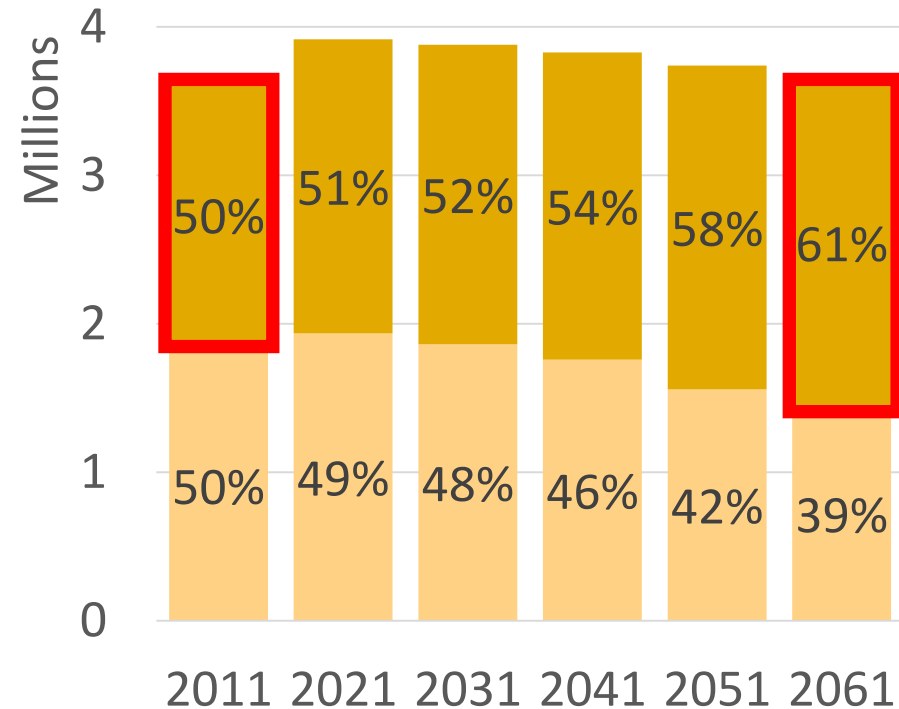
- Compare the results of the LF projections by education (supply) with the ESDC projection of LF demand by broad skill level.

    1. Is Canada really facing a labour shortage?
    2. If so, will it be for more qualified jobs or for less qualified?
    3. What are the possible consequences of these trends for the Canadian workforce?

- How can adding the literacy skill into the projection model provide new information on the question of imbalances?

New insights on LF Supply

- The broad skill levels are defined by the amount of **education** required to perform the duties of an occupation, and by the **type of work** performed .
  - Skill level M: Management occupations
  - Skill level A: Occupations require university education
  - An so on for Skill level B, C, and D

COPS – 2015 to 2024 projections

- Employment is expected to rise in each broad skill level

	Thousands		Distribution		Variation†
	2014	2024	2014	2024	2014-2024
TOTAL	**17,802,300**	**19,252,000**	**100 %**	**100 %**	**0.8 %**
Broad skill level					
Level A	3,370,500	3,840,100	19 %	20 %	1.3 %
Level B	5,920,500	6,416,700	33 %	33 %	0.8 %
Level C	4,940,800	5,219,900	28 %	27 %	0.6 %
Level D	1,959,600	2,098,900	11 %	11 %	0.7 %
Management	1,610,800	1,676,400	9 %	9 %	0.4%

† : Average Annual Growth Rate

COPS – 2015 to 2024 projections

- LF level of education should rise

|	Thousands		Distribution		Variation†
	2014	**2024**	**2014**	**2024**	**2014-2024**
TOTAL	**19,117,900**	**20,443,800**	**100 %**	**100 %**	**0.7 %**
Education level					
University	5,157,900	5,867,500	27 %	26 %	1.3 %
College	6,743,200	7,410,600	35 %	36 %	0.9 %
High School	5,244,600	5,263,500	27 %	26 %	0.0 %
Less than H.S.	1,972,200	1,902,200	10 %	9 %	-0.4%

† : Average Annual Growth Rate

University Graduates LF by Broad Skill Level
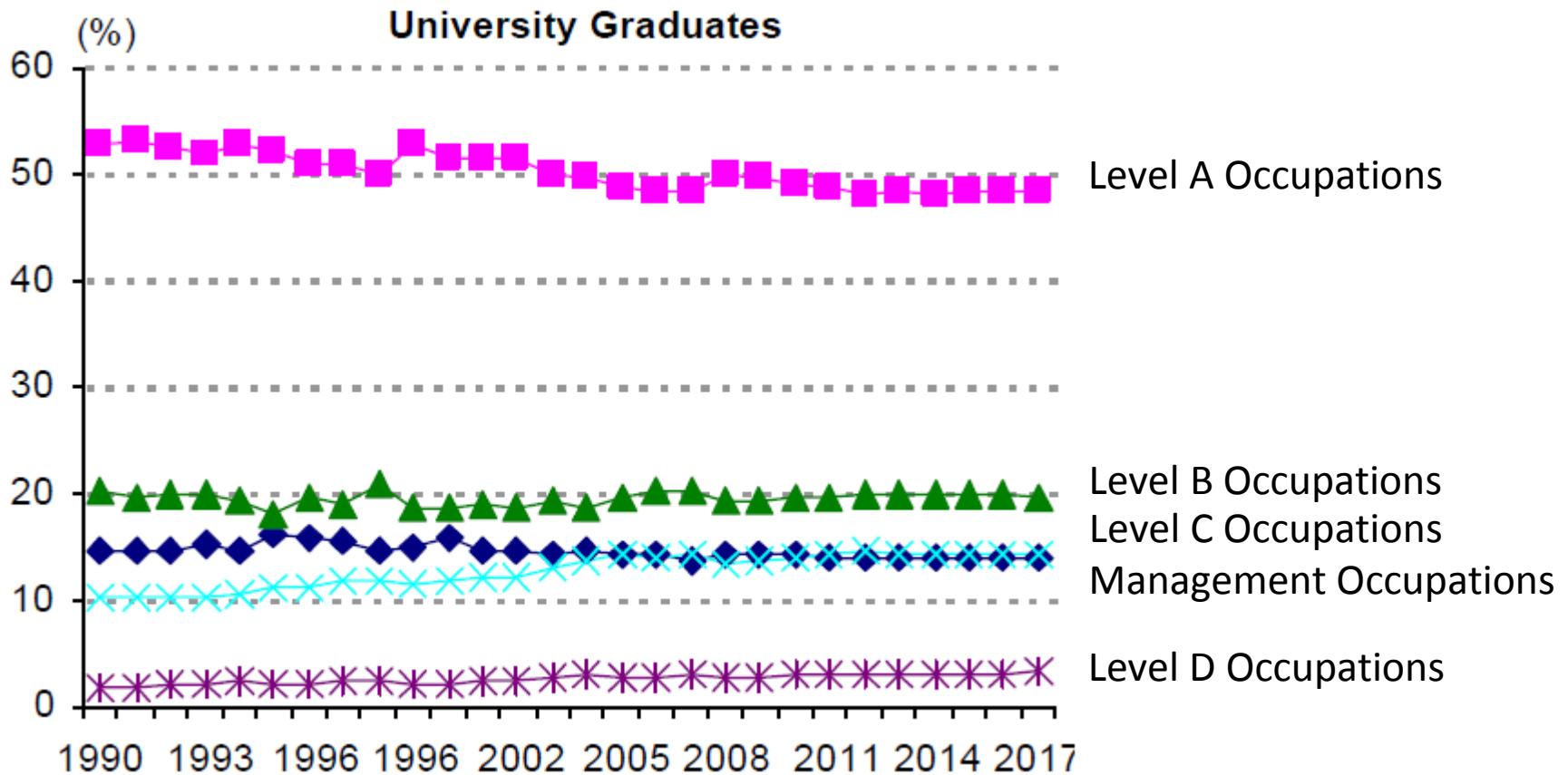
Source: HRSDC. 2008. *Looking-ahead: a 10-year outlook for the Canadian labour market (2008-2017)*. Reference scenario.

Literacy skills as a possible explanation of overqualification

Distribution of average literacy score, 25-64 years old, Canada, 2012
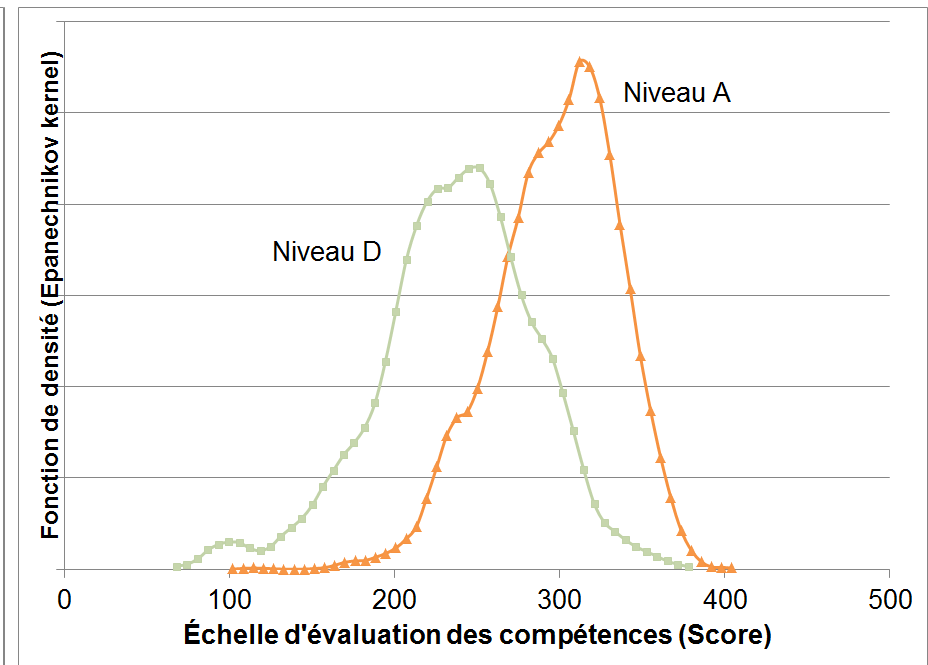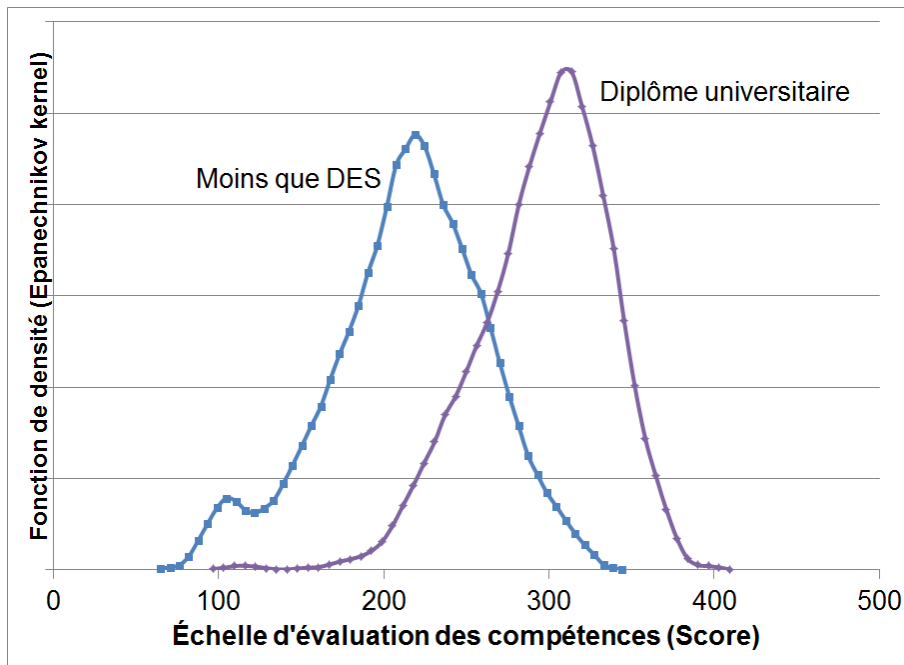
Literacy skills as a possible explanation of overqualification

- **Workers with low literacy skills** are more likely to be overqualified.

- **Language and literacy skills** explain a significant share of observed overqualification of foreign-born workers

- Even after controlling for age, sex, region of residence and field of study, **recent immigrants** are more likely to be overqualified than native-born workers

- **Workers speaking neither French or English at home** are more likely to be overqualified.

Bélanger, A., and S. Vézina. 2016. Le niveau de littératie de la population canadienne: Regard particulier sur les immigrants. *Cahiers québécois de démographie* 45(2):145-166.

New insights on LF Supply

- Derived projections of LF Supply by broad skill level
  - Use LSD-C projection results and disaggregate active population by broad skill level
    - Multinomial logit regression model stratified by sex and education with and without literacy skills as a determinant
  - Compare the results of the two sets of projections.

New insights on LF Supply

Derived projections of Supply by broad skill level

Dependent variable	Broad Skill Level (M, A, B, C, D)
Independent variables	
Socio-demographic	Age Region of residence (Big cities and provinces)
Human capital	**Literacy skills** Language
Immigration and integration	Immigration status Age at immigration Length of stay in Canada Place of birth Location of study

8 strata: Sex (2 categories) and Education (4 categories)

Discussion

- Any comments on the proposed methodology to generate the derived projections of LF by broad skill level?

- Any ideas on how we could possibly integrate PIAAC information into COPS?

- How can we enrich the public discourse on skill mismatch and LF shortages?

Thank you !

- Samuel Vézina

  samuel.vezina@ucs.inrs.ca

- Alain Bélanger

  alain.belanger@ucs.inrs.ca

  belanger@iiasa.ac.at