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# Recent Trends in Over-education by Immigration Status

by Feng Hou, Yao Lu and Christoph Schimmele

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# Recent Trends in Over-education by Immigration Status

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## Abstract

The rapidly growing supply of university-educated workers from both immigration and domestic educational institutions, coupled with relatively slack demand for educated labour, has raised concerns about skill use in the Canadian economy. This study uses census data from 2001 to 2016 to compare trends in over-education among recent immigrants and Canadian-born youth. The study showed that only about one-half of the growth in university-educated workers over this 15-year period was matched with growth in jobs requiring a university education. University-educated recent immigrants became more concentrated in jobs requiring less than a university education. In comparison, Canadian-born youth with a university degree became less likely to work in jobs requiring high school or less education.

## Executive summary

The educational attainment of the Canadian population has been rising rapidly in recent decades. There is concern that educational expansion has outpaced demand, leading to an increased prevalence of over-education. Over-education is defined as educational qualification that exceeds what is required to adequately perform the job.

This study uses census data to document the rising supply of university-educated workers by immigration status from 2001 to 2016. It further examines trends in over-education among university-educated workers who are recent immigrants (those who arrived in Canada 1 to 10 years before the census) and those who are Canadian-born youth (aged 25 to 34). For each population group, this study examines the extent to which the observed trend in over-education status is associated with changes in demographic characteristics and supply and demand factors.

Over this 15-year period, the number of university-educated workers aged 25 to 64 in Canada increased by 1.7 million, of which 911,000 were Canadian-born. But the number of jobs requiring a university education grew only by 857,000 among all workers with a university degree. The type of employment growth among university-educated workers varied considerably by immigration status. Among the Canadian-born, about 60% of employment growth was concentrated in high-skilled jobs. Among recent immigrants, the majority of employment growth was in low-skilled and medium-skilled jobs. Overall, university-educated immigrants accounted for 70% of the growth in low-skilled employment, but only 38% of the growth in high-skilled employment.

These differential employment growth patterns led to divergent shifts in occupational standing by immigration status. Among Canadian-born youth with a university degree, a slight increase in the education–occupation match rate was accompanied by a decrease in over-education and an increase in marginal over-education. The rising supply and weakened demand for educated labour did not deter progress in occupational standing for this group.

In contrast, recent immigrants experienced a clear occupational downgrading, observed as a substantial decline in the education–occupation match rate and corresponding increases in the rates of over-education and marginal over-education. Rising own-group share in the total labour force (the supply measure used in this study) and weakened demand were associated with the downgrading in occupational standing from 2001 to 2016 among recent immigrants.

This study shows that the growth in employment requiring a university education from 2001 to 2016 lagged behind the rising supply of university-educated workers in Canada. Increasingly more university-educated recent immigrants have been employed in jobs requiring less than a university education.

# 1 Introduction

The educational attainment of the Canadian population has been rising rapidly in recent decades. From 2001 to 2016, the annual number of graduates with a bachelor's degree or higher from a Canadian postsecondary institution grew from 164,000 to 267,000 (Statistics Canada n.d.b). Over the 2000s, the annual inflow of immigrants with a university degree ranged from 78,000 to 103,000 (CIC 2011).<sup>1</sup> The rising supply of university graduates<sup>2</sup> from both the Canadian education system and immigration increased the share of the Canadian population aged 25 to 64 years old with a university degree from 20.6% in 2001 to 30.6% in 2016.<sup>3</sup>

There is concern that educational expansion may have outpaced its demand, leading to an increased prevalence of over-education. Over-education is defined as educational qualification that exceeds what is required to adequately perform the job (Davia, McGuinness, and O'Connell 2017; Groot and Maassen van den Brink 2000). Since the 2000s, labour productivity and top-end employment growth have stalled, stemming from a cooling off in knowledge-based industries and a boom in resource-based industries (Beaudry, Green, and Sand 2016; Green and Sand 2015; Hasanzadeh and Khan 2017). The Canadian economy has undergone a structural change, shifting from manufacturing to resource-based industries (Brown 2014; Baldwin and Willox 2016; Tang 2017). The natural resource boom has also stimulated growth in the construction and transportation industries. These sectors generally have limited demand for university-educated workers (Tang 2017).

Compared with established workers, new entrants to the labour market are presumably more sensitive to recent shifts in the supply and demand related to university-educated workers. Among new entrants, recent immigrants would likely be more sensitive to these shifts than otherwise similar Canadian-born youth because of the disadvantages immigrants often encounter in labour markets, such as the limited transferability of foreign-acquired human capital, the uncertainties Canadian employers have about foreign qualifications and work experience, and possible discrimination (Banerjee, Verma, and Zhang 2018; Boyd 2013; Girard and Smith 2013; Wald and Fang 2008). Because of the large and growing size of the immigrant population, the trend in over-education among university-educated immigrants could influence the general trend in Canada.

This study first documents the rise in the supply of university-educated workers by immigration status from 2001 to 2016 using census data. It then examines trends in over-education among university-educated workers for recent immigrants (those who arrived in Canada 1 to 10 years before the census) and Canadian-born youth (those aged 25 to 34). For each population group, this study examines the extent to which the observed trend in over-education status is associated with changes in demographic characteristics and supply and demand factors.

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1. There were data quality issues with educational variables in the Immigration Landing File since 2011, so the number of immigrants with a university degree was not reported here after 2010.
  2. This study uses "with a university education" and "with a university degree" to identify any individual with a bachelor's degree or higher and refers to these individuals as "university graduates" and "individuals with a university degree." However, some Canadian colleges also grant bachelor's degrees.
  3. Calculated from Statistics Canada n.d.a.

## 2 Why immigration status matters in the prevalence and trends of over-education

Over-education typically refers to educational qualifications that exceed what is required to adequately perform the job (Chen, Smith, and Mustard 2010; Friedland and Price 2003). In part, over-education occurs because the large and increasing number of university graduates exacerbates competition for skilled jobs and increases the difficulty of distinguishing between people based on education (Smith 1986).

Over-education has negative consequences for both individual workers and a country's economy. Many studies show that overeducated workers tend to have lower earnings and more precarious working conditions than workers with an education–occupation match (e.g., Chiswick and Miller 2009; Fleming and Kler 2008; Nordin, Persson, and Rooth 2010). In addition to economic penalties, over-education incurs psychological costs in terms of job satisfaction, quality of life and health status (Bracke, Pattyn, and von dem Knesebeck 2013; Frank and Hou 2018). Over-education leads to inefficient use of human capital and lost productivity (Davia, McGuinness, and O'Connell 2017).

Both immigrants and individuals born in a particular country experience over-education, but the prevalence is generally higher among immigrants in developed countries with large immigrant inflows (Chiswick and Miller 2009; Galarneau and Morissette 2008; Green, Kler, and Leeves 2007; Uppal and LaRochelle-Côté 2014). The pervasiveness of over-education in immigrant populations is consistent with theories about how human capital is not perfectly transferable across countries (Chiswick and Miller 2009; Friedberg 2000). The quality of education may be inferior in some origin countries, or the occupation may require specific licensure in the receiving country. Even when education obtained abroad is relevant in the receiving country, immigrants often require additional skills to transfer it (Chiswick and Miller 2002; Ferrer, Green, and Riddell 2006).

Most studies on over-education focus on individual characteristics, but structural factors such as supply and demand can also play a critical role. Comparing 13 European countries, Di Pietro (2002) observed a correlation between the absolute share of educated workers in a population and differences in self-assessed over-education. Other European studies have not found that the absolute share of skilled workers has an independent effect on over-education. Instead, these studies conclude that structural differences in supply relative to demand drive the differences in over-education between countries (Croce and Ghignoni 2012; Davia, McGuinness, and O'Connell 2017; Verhaest and van der Velden 2013). Comparing Canada with the United States in 2016, Lu and Hou (2018) found that the over-education gap between immigrants and the native-born was far larger in Canada, at almost 19 percentage points between recent immigrants (less than 10 years of residence) and the Canadian-born. Meanwhile, the corresponding recent gap between immigrants and the native-born in the United States was only 3 percentage points. The larger inflow of university-educated immigrants into Canada relative to weaker demand for skilled labour in the economy appears to be one of the principal factors for this cross-country difference in immigrant over-education.

The evolution of Canada's industrial structure over the last two decades appears not to have generated enough demand for the rapidly growing supply of university-educated immigrants and Canadian-born individuals. Although assertions about looming skill shortages are commonplace, such shortages are likely confined to particular sectors and regions (Cappelli 2015; McQuillan 2013). In 2016/2017, two-thirds of job vacancies in Canada required no more than a high school education, but one-half of the unemployed had some postsecondary education (Drolet 2017). The Office of the Parliamentary Budget Officer reported that the incidence of over-education among Canadians aged 25 to 34 with a university degree increased from 32% in 1991 to 40% in 2014 because of slack demand in labour markets (OPBO 2015).



The recent imbalance between supply and demand regarding university-educated workers may have different effects among different population groups. New labour market entrants, such as Canadian-born youth and recent immigrants, may be more sensitive to slack demand since current macroeconomic conditions make it more difficult to find an education–occupation match than to keep an existing match (Verhaest and van der Velden 2013). Among new labour market entrants, recent immigrants with a university degree are likely to fare much worse than young Canadian graduates for the following two reasons.

First, for all the barriers they face in the labour market, recent immigrants are generally in a lower position when demand is weak and they have to compete with the native-born (Kogan 2004). Compared with Canadian-born workers, over recent decades, recent immigrants with a university degree experienced much more deterioration in labour market outcomes than recent immigrants with lower levels of education (Picot, Hou, and Qiu 2016). By the 2000s, university-educated immigrants tended to have average earnings no higher than the Canadian-born with high-school diplomas (Bonikowska, Hou, and Picot 2011). Therefore, it seems that university-educated immigrants benefit less from new demand for skilled workers than Canadian-born graduates.

Second, as Card (2009, 2) states, in circumstances where university-educated immigrants are imperfect substitutes for their native-born counterparts, “the competitive effects of additional immigrant inflows are concentrated among immigrants themselves.” Using three decades of group-level data from 1982 to 2010, a Canadian study found that a 10% increase in the cohort size of immigrants entering during the same time is associated with a 0.8% decline in entry earnings among immigrant men in that cohort and a 0.3% decline in entry earnings among immigrant women in that cohort (Hou and Picot 2014). While the increased supply of university-educated immigrants intensifies competition among immigrants, it has little effect on the university-educated native-born (Dustmann and Preston 2012; Manacorda, Manning, and Wadsworth 2012; Ottaviano and Peri 2012).

In addition to shifts in the supply and demand balance, demographic changes could also affect different population groups in various ways. For Canadian-born youth, the large expansion in educational attainment and professional occupations among women may help reduce over-education since Canadian-born women tend to have a lower over-education rate than men (Uppal and LaRochelle-Côté 2014). Meanwhile, the rising share of visible minorities may increase over-education. Among recent immigrants, changes in source regions, official language ability and years since immigration are key factors affecting the trend of their labour market outcomes (Hou 2013; Picot and Sweetman 2012).

This paper examines possible divergent trends in over-education among individuals in different population groups with a university degree, and how the trend in each group is associated with changes in demographic characteristics and supply and demand factors. Recent immigrants are expected to experience a larger increase in over-education than Canadian-born youth. Furthermore, shifts in supply and demand are expected to influence trends more notably among recent immigrants than among Canadian-born youth.

## 3 Data, measures and methods

### 3.1 Data

The data used are from Canada's 2001, 2006 and 2016 censuses of population and the 2011 National Household Survey microdata files. The study sample is restricted to individuals who hold at least a bachelor's degree and worked in the reference week before the census or survey date. The study also excludes new immigrants who arrived during the census or survey year because most of these individuals were in the Canadian labour market for only a very short period of time. After these restrictions, the sample sizes of recent immigrants range from 56,900 in 2001 to 146,500 in 2016. The sample sizes of Canadian-born youth range from 122,000 in 2001 to 217,400 in 2016.

### 3.2 Measures

The outcome variable has three categories: over-education, marginal over-education, and education–occupation match. Over-education was defined as when individuals with university education (i.e., at least a bachelor's degree) worked in occupations that required a high school diploma or less. Marginal over-education refers to situations when individuals with university education worked in occupations that required some postsecondary education, but not a bachelor's degree. Education–occupation match occurred when individuals with university education had occupations that required a university degree.

Distinguishing marginal over-education from over-education and education–occupation match is important. As the results presented below will show, both Canadian-born youth and recent immigrants experienced an increase in the rate of marginal over-education from 2001 to 2016. However, this increase corresponds mostly with a decline in the education–occupation match rate among recent immigrants and with a decline in over-education rate among Canadian-born workers. Therefore, combining marginal over-education with either over-education or education–occupation match would mask the dynamic shifts in occupational distribution by immigration status.

An occupation's educational requirement is based on the educational level assigned by Employment and Social Development Canada for around 500 occupational groups in the four-digit National Occupational Classification (NOC) (Government of Canada n.d.). The NOC occupational skill level is defined primarily by the amount and type of education and training required to enter and perform the duties of an occupation. Four skill levels are identified in the NOC: level A, university degree (bachelor's, master's or PhD); level B, some postsecondary education; level C, high school graduation or some job-specific training; level D, some secondary or elementary education and on-the-job training. The NOC does not assign specific educational levels to management occupations. For the purpose of this study, senior management occupations and specialized middle management occupations were treated as skill level A; skill level B was applied to middle management occupations in retail and wholesale trade and customer services, and to middle management occupations in trades, transportation, production and utilities. To simplify the analysis, the educational requirements of occupations were grouped into three categories: university education, some postsecondary education, and high school education or less.

This study derived variables for local labour markets to capture temporal changes in university graduate supply and demand. The local labour markets are based on 76 economic regions (ERs) (Statistics Canada 2016). An ER is a standard geographical area consisting of counties or regional districts within the influence zone of a major urban centre or metropolitan area. The supply factor is measured as the share of university-educated individuals from a population group

(e.g., recent immigrants) in the total labour force aged 25 to 64 in an ER.<sup>4</sup> The demand factor is measured by the share of workers in knowledge-based industries among Canadian-born workers in an ER. Knowledge-based industries are defined by the industry's research and development activities and the educational attainment of its workforce. They include 22 four-digit industries from the North American Industry Classification System, covering engineering and science-based manufacturers, telecommunications, data processing, computer systems design, and consulting services (E.W. Clendenning and Associates 2000). Canadian-born workers are used to calculate the demand factors because their conditions are less sensitive to the supply of immigrant workers, and thus better capture macroeconomic needs.

Several individual demographic characteristics are included as control variables: age, gender (male = 0, female = 1), graduate degree (bachelor's degree = 0, professional degree, master's and doctorate = 1), field of study, marital status (married; divorced, separated or widowed; never married). Field of study contains 12 categories: education, fine arts, humanities, social science, commerce, agriculture, engineering, applied science, health, mathematics, computer science and other. The model for immigrants also includes years since immigration, the ability to speak English or French, foreign education, and source region. Foreign education is an indicator of whether immigrants received their highest degree outside of Canada. For the 2001 Census, this variable is derived from age at immigration and years of schooling (foreign-educated if years of schooling plus 6 are less than age at immigration). For later years, this variable is based on self-reported country of the institution from which the highest degree was obtained. Source regions are classified into 13 categories: North America, Caribbean, Central and South America, Northern Europe, Western Europe, Southern Europe, Eastern Europe, Africa, South Asia, Southeast Asia, East Asia, West Asia, and other. The model for Canadian-born youth includes visible minority status: White, Asian, Black, Latino and other.

### 3.3 Methods

To provide a broad picture of the supply and demand related to university-educated workers of prime working ages (ages 25 to 64), descriptive statistics are produced to show changes in the estimated supply of university-educated population and changes in the number of workers by the educational level required for their occupations. These descriptive statistics are produced separately for recent immigrants and Canadian-born youth (aged 25 to 34), as well as for long-term immigrants (in Canada over 10 years) and the Canadian-born aged 35 to 64. The analysis also examines the distribution of over-education, marginal over-education and education–occupation match by immigration status for all university-educated workers.

To examine the extent to which the observed changes in the occupational distribution among recent immigrants and Canadian-born youth are associated with changes in demographics and supply and demand factors, group-specific multinomial regression models are run by pooling the four census and NHS datasets. For university-educated workers in each population group, three sequential models are constructed. The outcome variable is the three-category education–occupation match status: over-education, marginal over-education and education–occupation match. The first model contains dummy variables representing periods (i.e., 2001, 2006, 2011 and 2016) and demographic variables. The second model adds the demand factor and fixed effects of ERs. Additionally, the third model includes the supply factor. The changes in estimated occupational distribution from these models are compared with the observed unadjusted changes to gauge the effects of each set of explanatory variables.

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4. Alternatively, the supply of university-educated Canadian-born youth was also added to the model for recent immigrants, and the supply of university-educated recent immigrants was added to the model for university-educated Canadian-born youth. In each case, the added variable was not positively associated with over-education.

## 4 Results

### 4.1 Large increase in the supply of university-educated individuals

Table 1 presents the estimated numbers of individuals aged 25 to 64 with a university degree by immigration status from 2001 to 2016. The supply of university-educated individuals in Canada expanded rapidly over these 15 years. From 2001 to 2016, the number of individuals aged 25 to 64 with a university degree increased by 66.1% for all groups combined, compared with a 3.2% increase in the population without a university degree among the same age range. About 47.5% of the increase in the number of university-educated individuals was driven by immigrants, while the other 52.5% was accounted for by the Canadian-born.

**Table 1**  
**Estimated population aged 25 to 64 with at least a bachelor's degree, 2001 to 2016**

	Total	Recent immigrants	Long-term immigrants number	Canadian-born aged 25 to 34	Canadian-born aged 35 to 64
<b>Population with a university degree</b>					
2001	3,131,700	414,300	505,500	722,100	1,489,800
2006	3,883,100	597,300	664,900	800,900	1,820,000
2011	4,622,800	662,900	907,300	933,800	2,118,800
2016	5,201,300	795,600	1,107,900	1,015,800	2,282,000
			percent		
Growth from 2001 to 2016	66.1	92.0	119.2	40.7	53.2
<b>Individuals with a university degree within each population group</b>					
2001	19.5	33.8	21.5	22.9	15.9
2006	22.7	46.6	24.5	25.7	18.2
2011	25.5	49.0	29.6	28.3	20.4
2016	28.0	49.9	34.2	29.9	22.1

**Note:** The estimated population numbers are rounded to the nearest 100.

**Sources:** Statistics Canada, 2001, 2006 and 2016 censuses and 2011 National Household Survey.

Since the growth of university-educated adults far outpaced the growth of their less-educated peers, the share of university-educated individuals in the adult population increased for each population group. In fact, 49.9% of recent immigrants had at least a bachelor's degree in 2016, compared with 33.8% of recent immigrants in 2001. The share of university-educated individuals also increased from 22.9% in 2001 to 29.9% in 2016 among Canadian-born youth, and from 15.9% in 2001 to 22.1% in 2016 among the Canadian-born aged 35 to 64. While recent immigrants were more highly educated than the Canadian-born throughout the study period, the educational attainment among the Canadian-born also increased substantially.

### 4.2 Trends in education–occupation match by immigration status

Table 2 presents the distribution of university-educated workers by the educational level required for their occupations. The number of university-educated workers increased from 2.6 million in 2001 to 4.3 million in 2016. Canadian-born workers accounted for about 54% (or 911,000 people) of this growth, and immigrants accounted for 46% (788,000 people). However, the total number of university-educated workers with high-skilled jobs grew by only 857,000. Thus, only about one-half of the growth in university-educated labour was absorbed into jobs requiring a university degree.

Immigration status mattered greatly in the growth of different job types. For both young and mature Canadian-born workers with a university degree, employment growth from 2001 to 2016 was about 60% in high-skilled jobs, 29% in medium-skilled jobs and 11% in low-skilled jobs. In comparison, among recent immigrants with a university degree, employment growth from 2001 to 2016 was only

30% in high-skilled jobs, 33% in medium-skilled jobs and 37% in low-skilled jobs. Long-term immigrants fared better, among whom 46% of the employment growth was in high-skilled jobs. Overall, the majority of growth in low-skilled employment among university-educated workers from 2001 to 2016 was attributable to immigrants. Indeed, immigrants accounted for 70% of the growth in low-skilled employment, 48% of the growth in medium-skilled employment and 38% of the growth in high-skilled employment among workers with a university degree.

In terms of percentage distribution, the education–occupation match rate among all workers with a university degree decreased by 4 percentage points from 60.3% in 2001 to 56.4% in 2016. The over-education rate rose slightly from 17.0% in 2001 to 17.8% in 2016, while the rate of marginal over-education increased from 22.8% in 2001 to 25.8% in 2016.

Against the national trend, the education–occupation match rate among Canadian-born youth increased continuously from 2001 to 2011, then declined in 2016 to slightly higher than the 2001 level. A decline in the over-education rate from 2001 to 2011 and a slight increase in 2016 to 2 percentage points below the 2001 level were associated with the rise in the education–occupation match rate. Over the entire period from 2001 to 2016, the general trend for Canadian-born youth with a university degree was an upgrading in occupational standing: a decline in over-education, an increase in marginal over-education and a slight increase in education–occupation match.

In contrast, the education–occupation match rate declined more substantially among immigrants: about 6.7 percentage points among long-term immigrants and 8.0 percentage points among recent immigrants. Accompanying these declines were increases in the share of over-education and marginal over-education among these immigrant groups. In 2016, only 37.7% of recent immigrants with a university degree had jobs requiring a university education, compared with 59.0% of Canadian-born youth. Conversely, 34.6% of recent immigrants with a university degree worked in jobs requiring no more than high school education, while only 16.0% of Canadian-born youth were in the same situation.

**Table 2**  
**Occupational distribution by required educational level among workers with at least a bachelor's degree, aged 25 to 64, 2001 to 2016**

	All	Recent immigrants	Long-term immigrants	Canadian-born workers aged 25 to 34	Canadian-born workers aged 35 to 64
			number		
<b>Occupational distribution</b>					
<b>2001</b>					
Over-education	447,300	98,200	78,500	115,200	155,400
Marginal over-education	600,400	66,400	98,800	148,700	286,500
Education–occupation match	1,587,900	138,600	246,600	373,200	829,500
Total	2,635,600	303,200	423,900	637,100	1,271,400
<b>2006</b>					
Over-education	615,500	162,600	118,500	126,900	207,500
Marginal over-education	728,200	99,800	126,600	154,100	347,700
Education–occupation match	1,886,300	188,000	301,800	422,400	974,100
Total	3,230,000	450,400	546,900	703,400	1,529,300
<b>2011</b>					
Over-education	636,500	154,400	150,200	120,900	210,900
Marginal over-education	973,800	137,600	197,600	199,900	438,700
Education–occupation match	2,218,100	204,000	391,500	499,700	1,122,900
Total	3,828,400	495,900	739,300	820,500	1,772,500
<b>2016</b>					
Over-education	772,300	208,600	194,400	143,600	225,700
Marginal over-education	1,117,600	167,000	248,400	224,900	477,300
Education–occupation match	2,444,900	226,800	469,800	530,300	1,217,900
Total	4,334,800	602,500	912,600	898,900	1,920,900
			percent		
<b>Occupational distribution shares</b>					
<b>2001</b>					
Over-education	17.0	32.4	18.5	18.1	12.2
Marginal over-education	22.8	21.9	23.3	23.4	22.5
Education–occupation match	60.3	45.7	58.2	58.6	65.2
<b>2006</b>					
Over-education	19.1	36.1	21.7	18.0	13.6
Marginal over-education	22.5	22.2	23.2	21.9	22.7
Education–occupation match	58.4	41.7	55.2	60.1	63.7
<b>2011</b>					
Over-education	16.6	31.1	20.3	14.7	11.9
Marginal over-education	25.4	27.7	26.7	24.4	24.8
Education–occupation match	57.9	41.1	53.0	60.9	63.4
<b>2016</b>					
Over-education	17.8	34.6	21.3	16.0	11.8
Marginal over-education	25.8	27.7	27.2	25.0	24.9
Education–occupation match	56.4	37.7	51.5	59.0	63.4

**Notes:** The estimated numbers of workers are rounded to the nearest 100. Percentages for worker categories may not add up to 100.0% because of rounding.

**Sources:** Statistics Canada, 2001, 2006 and 2016 censuses and 2011 National Household Survey.

### 4.3 Accounting for the trends among recent immigrants and Canadian-born youth

This section examines how the observed trends in education–occupation status are associated with changes in demographic characteristics and supply and demand factors for recent immigrants and Canadian-born youth. Table 3 shows changes in the selected explanatory variables. Tables 4 and 5 present the predicted occupational distribution from three multinomial regression models for each group.

Table 3 shows that some demographic changes, such as an increase in the share of individuals who speak an official language, an increase in the share of receiving the highest degree in Canada, and an increase in the average number of years since immigration, would decrease the rate of over-education for recent immigrants with a university degree. These factors are negatively associated with over-education in the multivariate model for recent immigrants (see Appendix Table 1). Conversely, other demographic changes would increase the rate of over-education: the large increase in the share of immigrant women; increased shares of immigrants from Africa, South Asia and Southeast Asia; and decreased shares of immigrants from Eastern Europe and East Asia. Among recent immigrants, women tended to have a higher level of over-education than men (Appendix Table 1). Recent immigrants from Africa, South Asia and Southeast Asia were more likely to experience over-education than those from Eastern Europe and East Asia.

Across the local labour markets (ERs) where recent immigrants lived, the share of workers in knowledge-based industries among the Canadian-born decreased from 10.4% to 8.2%. This change suggests a general decrease in the demand for university-educated workers. Meanwhile, the share of recent immigrants in the total labour force with a university degree increased from 5.3% in 2001 to 6.5% in 2016.

Using multinomial regression results, the estimates in Table 4 for recent immigrants show that controlling for demographic changes tended to slightly increase the education–occupation match rate and decrease the rate of over-education in 2016. These results suggest that demographic changes partially accounted for the rise in over-education and the decrease in education–occupation match among recent immigrants from 2001 to 2016. Adding the selected supply and demand factors into the model reduced a large portion of the differences in occupational distribution over the study period. In the final model, the odds of over-education instead of education–occupation match were no longer significantly different between 2001 and 2016.

**Table 3**  
**Changes in demographics and demand and supply factors among workers with a university degree, 2001 and 2016**

	Recent immigrant workers		Canadian-born workers aged 25 to 34	
	2001	2016	2001	2016
		number		
Age	38.34	39.08	29.48	29.51
		proportion		
Female	0.426	0.483	0.559	0.604
Graduate degree	0.343	0.352	0.146	0.190
Married or common-law	0.792	0.811	0.588	0.577
Separated, divorced or widowed	0.056	0.053	0.023	0.014
White	...	...	0.930	0.841
Black	...	...	0.010	0.016
Latino	...	...	0.001	0.003
Asian	...	...	0.045	0.106
Other groups	...	...	0.014	0.035
Ability to speak an official language	0.383	0.501	...	...
Years since immigration	5.512	6.004	...	...
Highest degree received abroad	0.869	0.813	...	...
United States	0.029	0.025	...	...
Central America	0.013	0.017	...	...
Caribbean	0.016	0.018	...	...
South America	0.024	0.048	...	...
Northern Europe	0.027	0.029	...	...
Western Europe	0.033	0.040	...	...
Southern Europe	0.040	0.011	...	...
Eastern Europe	0.141	0.066	...	...
Africa	0.084	0.118	...	...
South Asia	0.171	0.224	...	...
Southeast Asia	0.115	0.176	...	...
East Asia	0.231	0.138	...	...
West Asia	0.070	0.084	...	...
Oceania and other	0.005	0.006	...	...
Share of workers in knowledge-based industries among the Canadian-born	0.104	0.082	0.082	0.071
Share of university-educated recent immigrants in the workforce	0.053	0.065	...	...
Share of university-educated Canadian-born aged 25 to 34 in the workforce	...	...	0.050	0.071

... not applicable

**Sources:** Statistics Canada, 2001 and 2016 censuses.



**Table 4**  
**Observed and adjusted changes in occupational distribution by required educational level among recent immigrant workers with at least a bachelor's degree, 2001 to 2016**

	Observed	Adjusted for		
		Demographics	Demographics and demand	Demographics, demand and supply
percent				
<b>2001</b>				
Over-education	32.4 ***	32.7 ***	32.8 ***	33.9
Marginal over-education	21.9 ***	21.5 ***	22.8 ***	23.6 ***
Education–occupation match	45.7	45.8	44.4	42.4
<b>2006</b>				
Over-education	36.1 ***	36.9	37.1	36.9
Marginal over-education	22.2 ***	21.8 ***	21.6 ***	21.5 ***
Education–occupation match	41.7	41.2	41.4	41.5
<b>2011</b>				
Over-education	31.1 ***	30.9 ***	30.9 ***	31.0 ***
Marginal over-education	27.7 ***	27.6 ***	27.5 **	27.5 *
Education–occupation match	41.1	41.4	41.6	41.4
<b>2016</b>				
Over-education	34.6	33.8	33.7	33.2
Marginal over-education	27.7	28.2	28.0	27.6
Education–occupation match	37.7	38.0	38.3	39.1

\* significantly different from reference category ( $p < 0.05$ )

\*\* significantly different from reference category ( $p < 0.01$ )

\*\*\* significantly different from reference category ( $p < 0.001$ )

**Notes:** The odds of over-education or marginal over-education relative to education–occupation match are significantly different from those odds in 2016. Percentages for observed and adjusted distributions may not add up to 100.0% because of rounding.

**Sources:** Statistics Canada, 2001, 2006 and 2016 censuses and 2011 National Household Survey.

In the multinomial models, the supply of recent immigrants was positively and significantly associated with over-education and marginal over-education (Appendix Table 1). The share of workers in knowledge-based industries was negatively associated with over-education and marginal over-education, although the association was statistically significant only for marginal over-education.

To summarize the effects of the three sets of explanatory variables, a dissimilarity index between the 2001 and 2016 occupational distributions was calculated for the observed results and the estimated results from the three models.<sup>5</sup> A dissimilarity index can range from 0 to 100, with a higher value indicating a greater difference (change). The dissimilarity index between the 2001 and 2016 occupational distribution for recent immigrants with a university degree was 8.0. It reduced to 7.8 when controlling for changes in demographic factors, to 6.1 when adding the selected demand factors to the model, and to 4.0 when adding the supply factor to the model. Thus, about one half of the change in occupational distribution among recent immigrants was accounted for by the selected explanatory variables, with the combined effects of supply and demand changes playing a much larger role than demographic changes.

For Canadian-born youth with a university degree, increased shares of women and individuals with a graduate degree tended to reduce the rate of over-education (Table 3). While women

5. The dissimilarity index is calculated as  $0.5 * \sum |O_i - O_j|$ .  $O_i$  refers to the rates of over-education, marginal over-education and education–occupation match in 2001, while  $O_j$  refers to the corresponding rates in 2016. For instance, for the observed results, the index is calculated as  $0.5 * \{|37.7 - 45.7| + |27.7 - 21.9| + |34.6 - 32.4|\} = 0.5 * (8.0 + 5.8 + 2.2) = 8.0$  (see Table 4 for the observed rates for recent immigrants in 2001 and 2016).

tended to have a higher rate of over-education than men among immigrants, the pattern was the opposite among Canadian-born youth, as shown in the multinomial model for Canadian-born youth (Appendix Table 1). However, visible minorities had a higher rate of over-education among Canadian-born youth: a decrease in the share of White Canadians and an increase in the share of Black and Asian Canadians tended to increase the rate of over-education. Across the local labour markets where Canadian-born youth lived, the share of workers in knowledge-based industries among the Canadian-born decreased from 8.2% in 2001 to 7.1% in 2016. In terms of supply, the share of Canadian-born youth with a university degree in the total labour force increased from 5.0% in 2001 to 7.1% in 2016 (Table 3).

The dissimilarity index between the 2001 and 2016 occupational distribution for Canadian-born youth was small, at 2.1 in the observed results. The index increased slightly to 2.4 when controlling for demographic changes (calculated from the estimate in Table 5). The dissimilarity index increased to 3.4 when controlling for the demand factor and changed to 2.9 when adding the supply factor to the model. Among the supply and demand factors, the share of workers in knowledge-based industries among the Canadian-born was the only factor negatively and significantly associated with over-education in the model for Canadian-born youth (Appendix Table 1). These results suggest that changes in demand are relatively important to the change in occupational structure among Canadian-born youth.

**Table 5**  
**Observed and adjusted changes in occupational distribution by required educational level among young Canadian-born workers with at least a bachelor's degree, 2001 to 2016**

	Observed	Adjusted for		
		Demographics	Demographics and demand	Demographics, demand and supply
percent				
<b>2001</b>				
Over-education	18.1 ***	18.0 ***	18.7 ***	18.5 ***
Marginal over-education	23.3 ***	23.2 ***	23.6	23.7
Education–occupation match	58.6	58.8	57.7	57.8
<b>2006</b>				
Over-education	18.0 ***	17.8 ***	17.5 ***	17.3 *
Marginal over-education	21.9 ***	21.7 ***	21.3 ***	21.9 ***
Education–occupation match	60.0	60.5	61.2	60.8
<b>2011</b>				
Over-education	14.7 ***	14.8 ***	14.6 ***	14.7 ***
Marginal over-education	24.4 ***	24.6 **	24.6 *	24.5
Education–occupation match	60.9	60.6	60.8	60.8
<b>2016</b>				
Over-education	16.0	15.6	15.3	15.6
Marginal over-education	25.0	24.7	24.7	24.3
Education–occupation match	59.0	59.7	60.0	60.1

\* significantly different from reference category ( $p < 0.05$ )

\*\* significantly different from reference category ( $p < 0.01$ )

\*\*\* significantly different from reference category ( $p < 0.001$ )

**Notes:** The odds of over-education or marginal over-education relative to education–occupation match are significantly different from those odds in 2016. Percentages for observed and adjusted distributions may not add up to 100.0% because of rounding.

**Sources:** Statistics Canada, 2001, 2006 and 2016 censuses and 2011 National Household Survey.

## 5 Discussion and conclusion

This paper documents changes in the supply of university-educated workers by immigration status in Canada. It further compares the education–occupation match among recent immigrant and young Canadian-born university-educated workers from 2001 to 2016, and how the different trends for each group were associated with changes in selected demographic characteristics and supply and demand factors.

From 2001 to 2016, the supply of university-educated individuals expanded in Canada. The number of individuals aged 25 to 64 with at least a bachelor's degree grew 66%, while the number of individuals in the same age range without a university degree increased only 3%. Although there was a much higher share of university graduates among immigrants, and particularly recent immigrants, during the study period, the educational attainment among the Canadian-born population also increased substantially.

The large increase in the supply of university-educated workers outpaced the growth of employment requiring a university education. Over the 15-year period, the number of university-educated workers aged 25 to 64 in Canada increased by 1.7 million, of which 911,000 individuals were Canadian-born. But the number of jobs requiring a university education grew only by 857,000 among all workers with a university degree. The weaker demand for university-educated workers relative to the supply may be partially a result of significant structural shifts in the Canadian economy: a cooling off in knowledge-based industries, a large decline in manufacturing and a boom in resource-based industries (Beaudry, Green, and Sand 2016; Green and Sand 2015; Hasanzadeh and Khan 2017).

The type of employment growth among university-educated workers varied considerably by immigration status. Among the Canadian-born, about 60% of employment growth was concentrated in high-skilled jobs. Among recent immigrants, the majority of employment growth was in low-skilled and medium-skilled jobs. Overall, university-educated immigrants accounted for 70% of the growth in low-skilled employment, but only 38% of the growth in high-skilled employment.

These differential employment growth patterns led to divergent shifts in occupational status by immigration status. Canadian-born youth with a university degree achieved an upgrading in occupational standing, in which a slight increase in the education–occupation match rate was accompanied by a decrease in over-education and an increase in marginal over-education. The rising supply and weakened demand in terms of educated labour did not deter progress in occupational status for Canadian-born youth, although the improvement would have been stronger if demand had remained strong. Canadian-born youth may have been favourably positioned to take advantage of new demand for university-educated workers. Canadian-born youth do not face the challenges common to recent immigrants, including language and culture barriers, limited skill transferability, inadequate social networks, and discrimination.

In contrast, recent immigrants experienced a clear occupational downgrading, in which there was a substantial decline in education–occupation match and corresponding increases in the rates of over-education and marginal over-education. Rising own-group share in the total labour force (the supply measure used in this study) and weakened demand were associated with the downgrading in occupational standing from 2001 to 2016 among recent immigrants. These results are consistent with the findings of previous studies, which suggest that the sizes of immigrant cohorts have a negative impact on immigrants' chances in the labour market (Hou and Picot 2014).

Broadly speaking, this study shows that the growth in employment requiring a university education lagged behind the rising supply of university-educated workers in Canada from 2001 to 2016. In this broad context, university-educated recent immigrants have been increasingly employed in jobs requiring less than a university education.

# Appendix

**Appendix Table 1**

**Results from multinomial logit models predicting over-education and marginal over-education among university-educated workers**

Variables	Recent immigrants		Canadian-born youth	
	Over-education	Marginal over-education	Over-education	Marginal over-education
	coefficients			
<b>Year (reference: 2016)</b>				
2001	-0.078	-0.252 ***	0.235 ***	0.029
2006	0.049	-0.315 ***	0.097 **	-0.120 ***
2011	-0.151 ***	-0.075 *	-0.075 ***	-0.009
Age	0.014 ***	0.005 **	-0.063 ***	0.004
Female	0.232 ***	0.060 **	-0.065 **	-0.078 *
Graduate degree	-1.002 ***	-0.736 ***	-1.209 ***	-0.909 ***
Married or common-law	-0.036 ***	0.077 ***	-0.380 ***	-0.055 ***
Separated, divorced or widowed	0.127 ***	0.156 ***	-0.076 *	0.107 ***
Ability to speak an official language	-0.327 ***	-0.095 ***	...	...
Years since immigration	-0.070 ***	-0.012 ***	...	...
Highest degree received abroad	0.840 ***	0.567 ***	...	...
<b>Fields of study (reference: education)</b>				
Fine arts	0.168 **	0.655 ***	2.020 ***	2.080 ***
Humanities	0.401 ***	0.515 ***	1.521 ***	1.526 ***
Social science	0.345 ***	0.513 ***	1.692 ***	1.886 ***
Commerce	0.102	0.355 ***	1.342 ***	1.684 ***
Agriculture	0.091	0.439 ***	1.456 ***	1.892 ***
Engineering	-0.641 ***	0.142	-0.085	0.907 ***
Health	-0.656 ***	-0.314 *	-0.437 ***	0.055
Mathematics	-0.385 ***	-0.058	0.980 ***	1.357 ***
Computer science	-1.390 ***	-0.910 ***	-0.374 ***	0.173 ***
Other fields of study	0.468 ***	0.926 ***	1.309 ***	1.970 ***
Share of workers in knowledge-based industries	-2.334	-5.850 *	-6.417 ***	-2.837 ***
Supply of university-educated individuals in own group	6.478 ***	6.172 ***	-1.964	3.525

... not applicable

\* significantly different from reference category ( $p < 0.05$ )

\*\* significantly different from reference category ( $p < 0.01$ )

\*\*\* significantly different from reference category ( $p < 0.001$ )

**Notes:** The number of observations is 393,165 in the model for recent immigrants, and 649,408 for Canadian-born youth. The model pseudo R-squared is 0.092 for recent immigrants and 0.096 for Canadian-born youth. All models also include economic region fixed effects. For recent immigrants, the model also controls for source regions. For the Canadian-born, the model controls for visible minority status.

**Sources:** Statistics Canada, 2001, 2006 and 2016 censuses and 2011 National Household Survey.

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