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Determinants of skill gaps in the workplace and recruitment difficulties in Canada

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Note of appreciation

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Determinants of skill gaps in the workplace and recruitment difficulties in Canada

by **Eyob Fissuh**[¥], **Kodzo-Kuma Gbenyo**[¥], and **Andrew Ogilvie**[€]

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Highlights

- According to the Survey of Employers on Workers' Skills 2021, more than half (56.1%) of businesses reported having employees who were not fully proficient to be able to perform their job at the required level. Of these businesses, more than half (57.5%) reported that the skills that needed the most improvement were technical, practical or job-specific, followed by problem-solving skills (46.2%).
- More than two-fifths (44.5%) of businesses experienced difficulties finding candidates who possessed the skills needed to do the job at the required level. The majority (55.4%) of these businesses reported that the main reason they experienced difficulties recruiting candidates was 'not enough people interested in doing the type of work required'.
- Businesses with one to four employees had the lowest likelihood of facing skills gaps and recruitment difficulties, compared with other businesses, even after controlling for several business characteristics.[1]
- The proportions of employees in jobs that require no postsecondary education and employees in jobs that require vocational training in the workforce are associated with higher probablities of reporting skills gaps and recruitment difficulties.
- Businesses in construction and accommodation and food services were more likely to face skills gaps and recruitment difficulties, compared with other industries.
- Businesses in professional, scientific and technical services and health care and social assistance were less likely to report skills gap. Similarly, businesses in arts, entertainment and recreation and real estate and rental and leasing industries were less likely to encounter difficulties in recruitment.
- After controlling for other factors, businesses in Quebec stood out in terms of facing both elevated probabilities of a skills gap and recruitment difficulties, compared to Ontario. The other two provinces that reported higher than average probabilities were Saskatchewan in terms of skills gaps and Yukon in respect to recruitment difficulties

1. If a business reported that less than 100% of its employees were fully proficient to do their job to the required level, based on the skills needed to do their job, it was considered to have a skills gap in its workforce.

1. Introduction

The purpose of this paper is to examine the nature of the skills gaps and recruitment difficulties in Canada from the perspective of employers. In particular, the paper uses the Survey of Employers on Workers' Skills (SEWS) to examine firm-level determinants of skills gaps and skills recruitment difficulties in Canada. In addition to descriptive statistics, binary multivariate regression models are used to determine the key factors behind skills gaps and recruitment difficulties.

Background: skills gaps, skills shortages and recruitment difficulties

Population aging coupled with technological change raises concerns about labour and skills shortages in Canada. The retirement rate is at an all time high and is expected to increase in the foreseeable future as many baby boomer cohorts exit the labour force (Statistics Canada, 2022). Not only does population aging reduces labour supply, but it also leads to compositional change in demand for labour because of the changes in consumer tastes, e.g., relative increase in demand for labour in occupations related to healthcare . At the same time, the economy is going through fundamental changes in demand for skills because of technological changes, e.g., automation. Technological change increases the level of required skills for some jobs and renders some others obsolete. The combined effect (of population ageing and technological change) is imbalances between the supply of and demand for labour in the economy, resulting in labour and skills shortages. Thus, employers find it hard to recruit employees with the required skills and may be forced to hire less qualified employees, causing skills gaps in their workforce. The concern is that skills gaps can have a detrimental impact on innovation and profitability of firms, and hamper productivity and competitiveness in the economy (e.g. McGuinness et al, 2017; Kampelmann and Rycx ,2012; Bennett & McGuinness, 2009; Tang and Wang, 2005).

In the literature of skills gaps, there is lack of clarify in the definition of 'skills'. In most studies, the proxy variable for 'skills' is 'qualifications', such as degrees, certificates, diplomas and other credentials that show the successful completion of an educational program (e.g., Gingras and Roy, 2000; Krueger and Lindahl, 2001). The main flaw with this concept is that it excludes the skills acquired through informal training and experience. Some studies also use scores from standardized tests as a proxy for skills (e.g., Ashton and Green, 1996; Gingras and Roy, 2000). In the recent years, a major advance in the attempt to measure skills is the Programme for International Assessment of Adult Competencies (PIAAC), by the Organization for Economic Co-operation and Development, which aims to assess and analyze adult skills and allow for international comparability. Conducted in over 40 countries, the PIAAC measures the proficiency adults in key information-processing skills —literacy, numeracy and problem solving —and gathers information and data on how adults use their skills at home, at work and in the wider community. [2] Although the PIAAC is a major step forward, it does not capture the perspective of employers.

In Canada, there have been some attempts to collect demand-side information on skills and labour shortages, albeit at a limited scale. Statistics Canada's 1999 *Survey on Innovation* involved employers' perception of skills shortages in the Canadian manufacturing sector and selected resources industries, but with only two statements in the questionnaire. More recently in 2020, Statistics Canada conducted the *Survey of Innovation and Business Strategy* (SIBS), which collected information on the strategic decisions, innovation activities, operational tactics and global value chain activities of businesses in Canada. The SIBS devoted an entire section to surveying businesses about their skills needs, skill shortages and recruitment, as well as their retention and training strategies. Statistics Canada also conducts the *Canadian Survey on Business Conditions* on a quarterly basis, which reports businesses conditions and expectations including labour markets obstacles like skills shortage. The SEWS goes a step further by collecting data exclusively on skills needs, skills gaps, recruitment difficulties, training issues and retention difficulties as experienced by businesses.

Like the concept of 'skills' references to the notion of a 'skills gap' are often vague and ambiguous (Gingras and Roy, 2000). For our purpose, the most relevant concept is the literature that treats a skills gap as a situation whereby the employer believes that workers do not possess the adequate competencies to successfully discharge their current role (McGuiness and al, 2017). Thus, in a skills gap situation, all positions may be filled in an existing company, but some of the employees are not fully proficient to do their job to the required level.

2. Canada actively participates in the PIAAC.

It is useful to mention that skills gaps are not synonymous with skills shortages, although these two concepts are related. Unlike a skills gap, a skills shortage refers to a situation where employers are unable to fill vacant positions because of a lack of suitable candidates. Thus, a skill shortage refers to a disequilibrium condition in which the demand for a specific type of skill exceeds its supply at the prevailing market wage rate (Junankar, 2009). In essence, it is possible that skills shortage may arise during periods of high unemployment, if there is a mismatch between the demand for and supply of skills. According to Green et al. (1998), a skills shortage arises when it appears impossible to fill vacancies even though reasonable efforts of recruitment have been made and reasonable wages and training prospects have been offered. Skills shortages are usually measured by aggregating hard-to-fill vacancies across firms. Conceivably, skills shortages could lead to skills gaps, as firms are forced to allocate inadequately skilled workers to avoid vacant positions.

To identify a skills gap, businesses were asked the following question in the SEWS: "Taking into account the skills needed to do their current job, what percentage of employees are fully proficient in your business?" Respondents were asked to choose from a scale of 1 to 7, where 1 stands for 100% of the business employees being fully proficient, and 7 stands for 0% of business employees being fully proficient (no employee has all the necessary skills). Respondents were also allowed to choose "Don't know". In this paper, if a business reported that less than 100% of its employees were fully proficient to do the job to the required level, based on the skills needed to do their job, it was considered to have a skills gap in its workforce.

The term "recruitment difficulties" refers to situations when employers cannot fill vacancies in spite of an adequate supply of workers in the labour market. The literature usually links recruitment difficulties to reasons other than inadequate skills supply, such as the work conditions, geographical location of the job, lack of interest in the job and remuneration conditions (e.g., Shah and Burke, 2005). In this paper, recruitment difficulties relate only to workers' skills supply, vis-à-vis the skills needs of the employer (i.e., skills demand). The SEWS asked businesses the following question: "In the last 12 months, did your business experience difficulties finding candidates who possessed the skills needed to do their job to the required level?" If a business provides an affirmative answer, it is assumed to have experienced recruitment difficulties.

Labour market context

As of May 2022, during the collection period of the SEWS, the Canadian labour market has recovered most of its employment losses since the onset of the COVID-19 pandemic. According to the Labour Force Survey, employment has gone back-to pre-pandemic levels or above in most industries.3 Additionally, the employment and unemployment rates were near or at record levels. For example, the employment rate was 75.4%, close to the highest recorded employment rate of 75.6% recorded in March 2022.Canada also recorded its lowest unemployment rate of 5.0% in May 2022.

As the economy recovered from the pandemic, people returned to work and employers began seeking to hire at record numbers, leading to a tightening of the labour market in 2021 and 2022. This tightening is reflected in the number of unemployed people per job vacancy, which has decreased steadily from 3.2 in the last quarter of 2020 to 1.2 in the second quarter of 2022, its lowest level since the beginning of the Job Vacancy and Wage Survey (JVWS) in 2015. The labour market is also tightening across all provinces, with Quebec and British Columbia having less than one unemployed person for every job vacancy (both 0.8) in the second quarter of 2022. Comparing unemployment and job vacancies can give an indication of how easily unemployed workers find jobs and if workforce skills are in line with those required by employers. A lower unemployment-to-job vacancy ratio indicates that it may be relatively harder for employers to find workers.[4]

According to the JVWS, there were 1.01 million job vacancies in May 2022, which was the highest level since comparable data became available. Furthermore, job vacancies are taking longer to fill. In the first quarter of 2022, only 36% of vacancies were filled within 30 days, while 46% of vacancies were able to be filled within 30 days in the first quarter of 2020. Employers also reported that labour shortages are restricting their ability to meet demand, with 42% of businesses reporting such issues in the second quarter of 2022

3. The six industries that did not fully recover in terms of employment were agriculture, manufacturing, transportation and warehousing, business, building and other support services, accommodation and food services and other services (except public administration).
4. The number of unemployed comes from the Labour Force Survey, while the number of vacancies from the Job Vacancy Wage Survey.

(Business Outlook Survey, 2022 Q2). Job vacancies are prevalent in all industries, with accommodation and food services and the health care and social assistance industries posting the highest number of vacancies.

The SEWS data collection took place from March 2022 to May 2022, asking employers to report information for the reference year 2021. This period is characterized by the re-opening of non-essential services following the easing of public health measures related to the COVID-19 pandemic, a tightening of the labour market, and the emergence of labour and skill shortages. This is the context in which the SEWS sheds light on employers' skills needs, the strategies they use to address skill deficiencies, as well as any recruitment and retention difficulties.

2. Data: Survey of Employers on Workers' Skills

In September 2021, at the request of Employment and Social Development Canada, Statistics Canada conducted the Survey of Employers on Workers' Skills (SEWS). The targeted sample size for the SEWS consisted of 17,880 Canadian establishments covering all sectors of activity, with a response rate of 52.1% resulting in an effective sample of 9,313 units. The target population was comprised of establishments found on Statistics Canada's Business Register across 18 sectors defined by 2017 North American Industry Classification System (NAICS) two-digit codes.

The sample was composed of 894 strata, created by combining provinces and territories (13), sectors (18), and size categories (4). The four establishment size categories are: micro businesses with 1 to 4 employees, small, with 5 to 19 employees, medium-sized businesses, with 20 to 99 employees, and large businesses, with 100 or more employees. Of the 894 strata, 163 of them were marked as take-all (i.e., all businesses in these strata were part of the sample). A minimum of 5 establishments was selected in each stratum.

The sample unit for this survey is the establishment. Establishments that did not have at least one employee and a minimum annual revenue of $30,000 were out of scope for the survey. Establishments in the NAICS sub-categories of agriculture, forestry, fishing and hunting (11); public administration (91); religious organizations (8131); and private households (814) were also out of scope.

Data collection took place between March 8 and May 11, 2022. Most survey questions refer to activities undertaken between February 2021 and March 2022.

In the SEWS microdata, each record has a final weight, which should be used to calculate estimates. Weighting ensures that estimates from the sample represent the population. The final weights were adjusted for non-response and calibrated to account for some exclusions, such as influential values. In this paper, all estimations were done by applying the final survey weights.

The questionnaire consisted of 32 questions, and information collected could be divided into the following five categories:

- number of employees and workforce characteristics
- skills needs and skills gaps
- recruitment and retention difficulties
- staffing and training practices
- impact of COVID-19 on issues related to staffing, training or skills gaps.

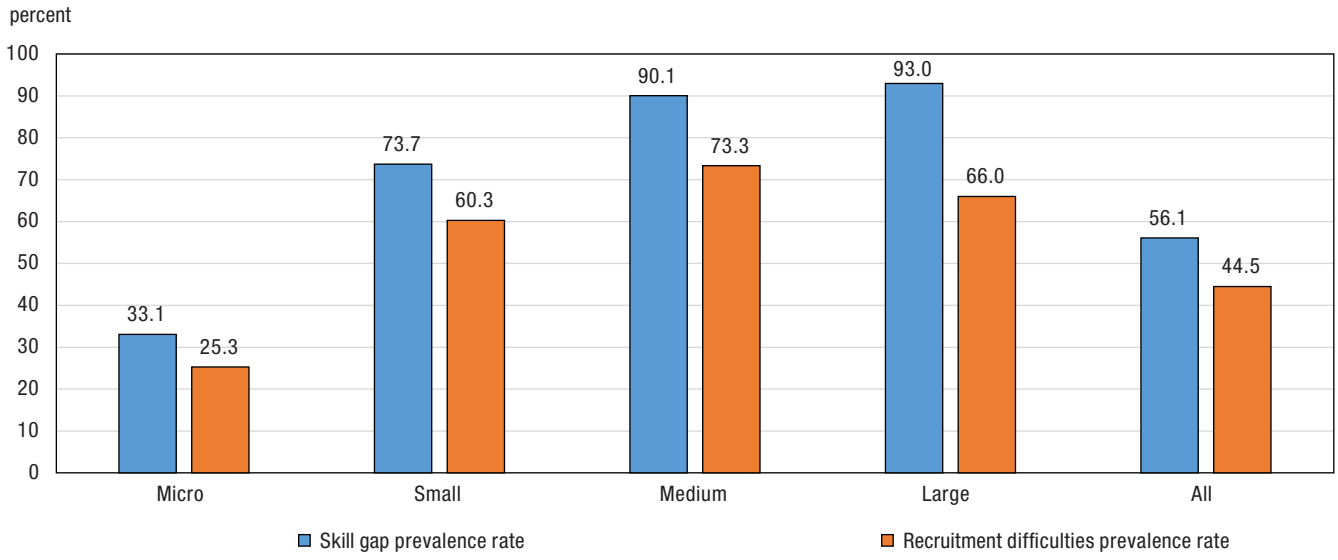
3. Descriptive results

Through descriptive analysis, this section presents the prevalence of skills gaps and recruitment difficulties in Canada by industry and business size.

Skills gaps

In this study, a firm is considered to have a skills gap in its workforce, if it has reported that less than 100% of its employees were fully proficient to do their job to the required level. Based on this working definition, more than half (56.1%) of businesses in Canada reported skills gaps in their workforce. The proportion of businesses reporting skills gaps is relatively low among micro businesses, compared with proportions among the other size categories. Only 33.1% of micro businesses declared skills gaps (below average), compared with 73.7% of small businesses, 90.1% of medium businesses and 93.0% of large businesses (Chart 1).

Chart 1
Prevalence of skills gaps and recruitment difficulties, by firm size



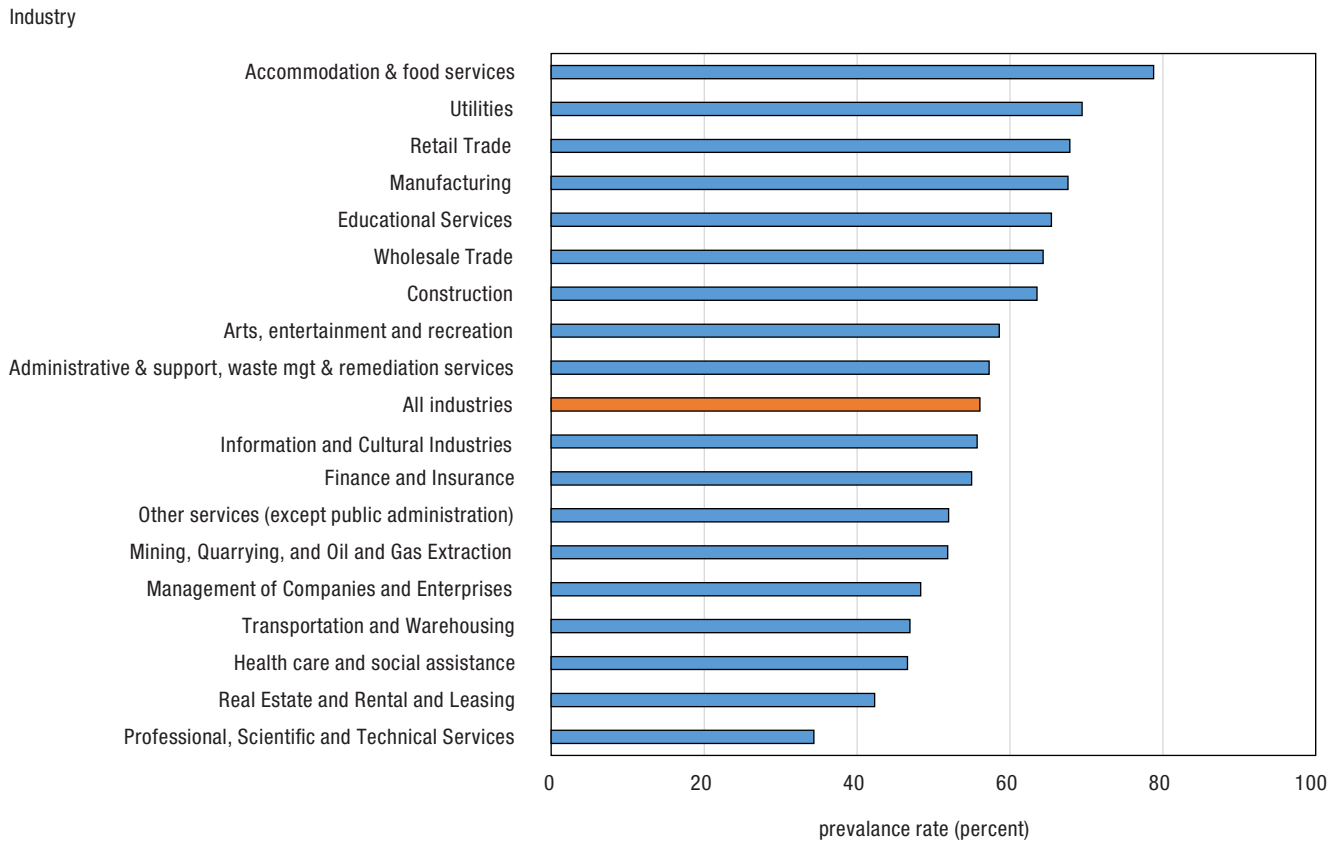
Source: SEWS (2022).

There are minor regional differences, but the Northwest Territories (77.4%) and Nunavut (65%) had a higher-than-average prevalence rate of skills gaps. Provinces with below-average rates included Ontario (51.5 %) and Newfoundland and Labrador (52.2 %).

The data also reveals that there are sectoral disparities in skills gaps prevalence. About four-fifths (78.8%) of businesses in accommodation and food services reported skills gaps in their workforce, the highest rate across all sectors. The second-highest rate observed was among businesses in the utilities sector (69.0%), followed closely by retail trade (67.8%), manufacturing (67.3%), educational services (64.8%), wholesale trade (64.4%) and construction (63.6%). By contrast, the lowest rate was posted in businesses in the professional, scientific and technical services sector (34.3%), followed by the real estate and rental and leasing (42.3%) sector (Chart 2).

Of the businesses that reported skills gaps in their workforce, more than half (57.5%) reported that the skills needing the most improvement are technical, practical or job-specific skills, followed by problem-solving skills (46.2%), customer service (34.3%) and critical thinking (33.4%) skills. About one in four businesses also reported that team working (27.8%) and oral and written communication (24.2%) skills need improvement. Conversely, fewer than 1 in 10 businesses reported that their workforce needed to improve on reading comprehension (3.6%) and basic math and calculating skills (6.8%).

Chart 2
Percentage of bussinesses that reported skills gaps in their workforce, by industry



Source: SEWS (2022).

Recruitment difficulties

More than two-fifths (44.5%) of businesses experienced difficulties finding candidates who possess the skills needed to do the job at the required level. Notably, the proportion of businesses that experienced recruitment difficulties differs greatly depending on business size. More than two-thirds (73.3%) of businesses with 20 to 99 employees, two-thirds (66.0%) of businesses with 100 or more employees and three-fifths (60.3%) of businesses with five to nine employees experienced difficulties finding candidates with the required skills. By contrast, one-quarter (25.3%) of businesses with one to four employees experienced recruitment difficulties (Charts 1 and 2).

The proportion of businesses that reported having experienced difficulties finding sufficiently skilled candidates was the highest in the accommodation and food services (63.2%), followed by the manufacturing (57.0%) and construction (54.8%) sectors. Industries with the lowest proportions of businesses that reported recruitment difficulties were management of companies and enterprises (21.5%) and real estate rental and leasing (24.54%) (Chart 2).

Businesses in Quebec (55.6%) and the territories (50.7%) were more likely to report difficulties recruiting candidates. By contrast, a small proportion of businesses in Alberta (37.7%) reported facing difficulties in hiring.

The majority (55.4%) of businesses reported that the primary reason for difficulties in recruiting candidates was “Not enough people interested in doing this type of work.” By comparison, a smaller proportion of businesses (13.7%) reported lower wages and compensation than in other organizations as the primary reason. As well, relatively few businesses reported geographic location (5.2%) or challenging working conditions (7.8%) as a primary reason for difficulties in recruiting.

However, it is important to note that the descriptive analysis does not control for the other factors that may affect, skills gaps and recruitment difficulties. Section 4 attempts to address this shortcoming by controlling for various firm characteristics and other confounding factors that may influence the prevalence of skills gaps and recruitment difficulties.

4. Determinants of skills gaps and recruitment difficulties

To investigate the correlates of skills gaps, a probit model was used to estimate the effect of each variable that may impact the likelihood of a business reporting a skills gap within its workforce. For the skills gap model, the dichotomous dependent variable had a value of 0 if a firm reported that 100% of its employees were fully proficient in the skills needed to do their current job, and a value of 1 otherwise (implying the presence of a skills gap). Another probit model was run to report the effects of variables which influence the likelihood that a business says it had recruitment difficulties. For this model, the dependent variable had a value of 1 if the firm reported having experienced difficulties finding skilled candidates during the last 12 months, and a value of 0 otherwise.

The independent variables in the two probit models are similar and all drawn from the SEWS. The list of variables includes:

- workforce composition, including size, occupational distribution of workforce, share of older workers and share of full-time permanent workers.
- market conditions: relative position of business in terms of innovation and competition; the geographic coverage of markets for products and services.
- workplace policies related to skills assessment, training, employees' engagement, retention and recruitment.
- industry: 18 industries at 2-digit NAICS.
- province and territory: 13 provinces and territories.

Table A1 in the Appendix contains definitions of the variables used in the regression models. The marginal effects (MEs) from the two probit models are repotted in Table 1. The MEs are the change in probability for an infinitesimal change in each independent continuous variable and the discrete change in the probability for binary variables, at the mean values of the other independent variables that are in the model.

Table 1
Marginal effects of probit estimation

	Skills gap model		Recruitment model	
Variables	ME (%)	S.E¥	ME (%)	S.E¥
Business size				
Micro (ref)	...	...	...	...
Small	23.71***	(2.53)	24.58***	24.58
Medium	34.83***	(3.21)	34.75***	34.75
Large	35.50***	(4.10)	23.00***	23.00
Occupational composition of workforce	...	...	...	...
Jobs requiring university education (ref)	...	...	...	...
Management jobs (%)	0.04	(0.05)	0.09	(0.05)
Jobs requiring college education (%)	0.14***	(0.05)	0.24***	(0.05)
Jobs requiring high school education or on-the-job training (%)	0.14***	(0.05)	0.20***	(0.05)
Share of full-time permanent employees (%)	-0.05	(0.03)	0.01	(0.03)
Share of employees aged 55+ (%)	-0.06*	(0.03)	-0.07**	(0.03)
Product/ service market				
local (ref)	...	...	...	...
Provincial	1.13	(2.47)	3.70	(2.31)
National	1.01	(3.06)	-3.30	(2.75)
International	5.54	(3.93)	3.88	(3.72)
Workplace practices and polices	...	...	...	...
Business does not assess skills needs (ref)	...	...	...	...
Assesses skills irregularly	15.69***	(3.03)	19.35***	(2.74)
Assess skills regularly	12.91***	(3.18)	17.67***	(2.95)
Employees participate on decision making	-7.20***	(2.09)	-4.24**	(1.86)
Employees meet to think about improvements (%)	-0.11***	(0.04)	-0.06*	(0.03)
Employees document good work practice (%)	-0.04	(0.04)	-0.03	(0.03)
Business provides training	16.80***	(3.00)	...	...
Business faces recruitment difficulties	17.82***	(2.43)	...	...
Business faces retention difficulties	22.01***	(2.84)	23.02***	(2.45)
Province/territory				
Ontario (ref)	...	...	...	...
Newfoundland and Labrador	-4.64	(4.29)	-8.55**	(3.89)
Prince Edward Island	-2.55	(4.45)	-1.40	(4.36)
Nova Scotia	2.88	(4.32)	3.35	(3.93)
New Brunswick	3.77	(4.69)	-6.25	(4.32)
Quebec	9.13***	(3.38)	15.43***	(3.22)
Manitoba	3.70	(3.99)	-3.84	(3.59)
Saskatchewan	7.25*	(3.97)	-2.74	(3.63)
Alberta	3.40	(3.25)	-4.20	(3.02)
British Columbia	3.98	(3.32)	2.50	(3.03)
Yukon	-0.08	(4.69)	8.01*	(4.49)
Nunavut	3.53	(5.80)	4.31	(4.55)
Northwest Territories	9.70	(6.68)	-2.70	(5.31)
Industry				
Manufacturing (ref)	...	...	...	...
Mining, quarrying, and oil and gas extraction	-0.04	(6.62)	-4.19	(6.80)
Utilities	6.89	(6.49)	-12.60	(8.08)
Construction	9.12*	(5.26)	11.85**	(5.12)
Wholesale trade	3.98	(5.08)	-6.77	(4.55)
Retail trade	6.19	(5.24)	-7.22	(4.85)
Transportation and warehousing	-9.02	(5.89)	-4.53	(5.39)
Information and cultural industries	-3.28	(6.36)	-8.13	(4.94)
Finance and insurance	-1.75	(6.02)	0.68	(5.65)
Real estate and rental and leasing	2.80	(5.44)	-10.54**	(4.95)
Professional, scientific and technical services	-10.18**	(5.15)	-2.70	(4.85)
Management of companies and enterprises	14.66	(18.70)	-8.69	(5.93)
Administrative and support	-2.49	(5.44)	-0.14	(5.25)
Educational services	4.14	(5.19)	2.41	(5.17)

Table 1
Marginal effects of probit estimation

	Skills gap model		Recruitment model	
Variables	ME (%)	S.E¥	ME (%)	S.E¥
Health care and social assistance	-9.40*	(5.56)	1.22	(5.13)
Arts, entertainment and recreation	-4.11	(5.64)	-9.59*	(4.97)
Accommodation and food services	9.59*	(5.57)	7.57	(5.40)
Other services (except public administration)	-4.90	(5.31)	3.51	(5.03)
Observed probability	60.1%		44.5%	
Observations (unweighted)	9,002		9,313	

… not applicable

¥ Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Source: Data source: SEWS (2022).

Results of the skills gaps model

Firm size is positively and significantly correlated with the probability of a firm reporting a skills gap. Compared to micro firms, small businesses are 23.7 percentage points more likely to experience a skills gap. The probability of reporting a skills gap for medium-sized and large businesses is about 35 percentage points higher than for micro businesses. [5] This finding is consistent with the descriptive analysis displayed in **Chart 1**.

A higher share of employees in jobs that require on-the-job training or vocational training (i.e., college education, specialized or apprenticeship training) in the workforce were correlated with a higher likelihood of reporting a skills gaps. The estimated marginal effects reveal that, on average, for every 10 percentage points increase in the share of these categories of workers, the likelihood of reporting skills-gaps increases by 1.4 percentage points.

Another interesting finding was that businesses with a higher percentage of workers aged 50 years and older were less likely to experience skills gaps This is not surprising as older workers are more likely to be experienced, which increases the likelihood of being proficient at their jobs.

The regression results in Table 1 reveal that some of the sectoral differences in the prevalence of skills gaps persist even after controlling for confounding factors. The likelihood of reporting skills gaps by businesses in the construction and accommodation and food services industries were about 10 percentage points higher than those reported by businesses in the manufacturing sector. Conversely, the likelihood of reporting skills gaps was about 10 percentage points lower for businesses in the healthcare and social assistance services as well as the professional, scientific and technical services sectors, compared with those in manufacturing. Firms in all other industries were just as likely to experience skill gaps as those in manufacturing as their coefficients were not statistically significant.

Most of the regional differences in skills gap dissipate after controlling for other characteristics of businesses. Only the marginal effects for Quebec and Saskatchewan were statistically significant: businesses in these two provinces had about 8 percentage points higher likelihood of reporting skills gaps, compared with businesses in Ontario. For all other provinces, firms were as likely as firms in Ontario to experience skills gaps, given that their coefficients were not statistically significant.

Businesses that follow participatory decision making in their production process are less likely to report skills gaps. In businesses where employees participate in the decision-making process about how work is done, the probability is 7.2 percentage points lower than for those businesses that do not involve their employees in that process. Similarly, the percentage of employees who met regularly to think about improvements that could be made within the workplace is negatively correlated with the probability of reporting skills gaps.

Businesses that undertake an assessment of skills needs are more likely to report skills gaps in their workforce. Also, businesses that reported retention difficulties were more likely to report skills gaps. Table 1 reports that businesses encountering retention difficulties have about a 23 percentage-point higher chance of facing skills

5. Note that the marginal effects for medium and large business size (Medium and Large in Table 1) were not statistically different at less than 10% level.

gaps. Businesses with a proper workforce development strategy are in a good position to identify their skill needs and gaps, as well as to develop mechanisms to recruit, train, and retain employees. The estimated marginal effects may reflect this effect. Another interesting result from Table 1 is that there was no effect on the likelihood of reporting skills gaps regardless of whether a firm engages in international trade.

Last, the analysis showed a strong positive correlation between the likelihood of reporting skills gaps and provisions of training. However, the estimated marginal effect should be interpreted with caution, as it could suffer from endogeneity bias related to simultaneity. Provision of training could be correlated with the error term or an omitted variable that explains a business-decision to offer training to employees as a solution to skills gaps. Businesses that have skills gap issue may have put in place training for their employees. One way to solve this problem is to use instrumental variables (IV) estimation. Unfortunately, the data does not contain good instruments that can allow the deployment of the IV estimation. The marginal effects for other variables were, however, not sensitive to the inclusion or exclusion of this variable.

Results of the recruitment difficulties model

The link between business size and the likelihood of experiencing recruitment difficulties remains unchanged, even after controlling for confounding factors. Compared with micro-businesses, medium-sized businesses had a much higher likelihood (34.75 percentage points) of facing difficulties finding candidates with the skills needed to do their job at the required level. The corresponding marginal effect for the small businesses was 24.6 percentage points and, 23.0 percentage points for large businesses. This finding was consistent with the result from the descriptive analysis that showed an overall non-linear positive correlation between business size and recruitment difficulties. This is an interesting result as larger companies are relatively equipped with advanced human resources departments to recruit, hire, train, and retain a skilled workforce.

Another key finding is that businesses with a high proportion of workforce in jobs that usually require college education, specialized training or apprenticeship training and jobs that usually require high school and job-specific training were more likely to face recruitment difficulties. The estimated marginal effects reveal that, on average, for every 10 percentage points increase in the share of these categories of workers, the likelihood of reporting recruitment difficulties increases by about 2 percentage points. Conversely, the share of workers in jobs that require a university degree is not correlated with the likelihood of experiencing recruitment difficulties. Indeed, when firms are faced with difficulty recruiting qualified candidates, they may be forced to hire less qualified employees and, thus, they report skills gaps. In periods with tight labour market conditions, this may suggest a stronger shortage of the vocationally trained as well as unskilled labour.

The share of full-time permanent employees in the workforce of a business had no effect on the likelihood of experiencing recruitment difficulties. However, businesses with a higher percentage of workers aged 50 and older were less likely to experience recruitment difficulties.

Compared with manufacturing businesses, businesses in construction and accommodation and food services were more likely to experience difficulties in recruitment. Conversely, businesses in real estate and rental and leasing and information and cultural industries were less likely to encounter difficulties in recruitment, compared with those in manufacturing.

Most regional differences in recruitment difficulties dissipate after controlling for other factors. Businesses in Quebec had the highest probability of facing recruitment difficulties, compared with those in Ontario, followed by firms in Yukon. Businesses in Alberta were slightly more likely to face recruitment difficulties than those in Ontario. Conversely, businesses in Newfoundland and Labrador were less likely to experience difficulties finding candidates with the skills needed to do the job at the required level, compared with those in Ontario. For all the other provinces, the estimated marginal effects were not statistically different from that of Ontario.

The probability of reporting recruitment difficulties was positively correlated with the probability of experiencing retention difficulties. On average, the likelihood of experiencing recruitment difficulties for businesses that faced retention difficulties was about 23 percentage points higher than for firms that did not face retention difficulties.

As with the skills gaps model, the likelihood of reporting recruitment difficulties was not correlated with a firm's participation in international trade.

5. Summary of findings

The SEWS conducted by Statistics Canada provides firm-level information on issues related to skills requirements and gaps. The survey also collected information on human resources management practices, work organization, training programs, and talent recruitment and retention programs. The survey presents a unique opportunity to examine firm-level determinants of skills gaps, recruitment difficulties, and the firm's practice of retention and training. More than half (56.1%) of businesses had employees who were not fully proficient to perform the job at the required level. Furthermore, more than two-fifths (44.5%) of employers experienced difficulties finding candidates who possessed the skills needed to do their job at the required level.

Compared with businesses with one to four employees, those with five or more employees were more likely to face skills gaps or recruitment difficulties, even after controlling for other characteristics.

The results show that a higher share of employees in jobs requiring no postsecondary education and a higher share of employees with vocational training in the workforce is associated with a higher probability of reporting skills gaps and recruitment difficulties. This is not surprising because in a labour market where firms face difficulties recruiting fully qualified candidates, they may be forced to hire less qualified employees, giving rise to skills gaps.

After controlling for confounding factors, businesses in construction and accommodation and food services were more likely to face skills gaps and recruitment difficulties, compared with those in manufacturing. Conversely, businesses in information and culture, and real estate and rental and leasing were less likely to experience difficulties in recruitment, compared with manufacturing.

After controlling for other factors, businesses in Quebec stood out in terms of facing both elevated probabilities of skills gaps and recruitment difficulties, compared to Ontario. The other two provinces that reported higher than average probabilities were Saskatchewan in terms of skills gaps and Yukon, in terms of recruitment difficulties.

The issues of skills gaps and recruitment difficulties in Canada need further discussion and research. This paper is a first exploration in that direction. It would be useful to exploit the SEWS data to examine how severe particular skill gaps are among certain industries or regions. As well, future research could examine the various strategies used by employers to address skill gaps, such as the provision of training or the adoption of new technology.

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Table A1
Variable definitions

VARIABLE name	Definition or description
Skills_gap	Equals 1 if a firm reported less than 100% of its employees are fully proficient in skills needed to do their current job (otherwise, 0)
Recruitment difficulties	Equals 1 if a firm reported recruitment difficulties (otherwise, 0)
Business size	
Micro	Equals 1 if the business has 1-4 employee, otherwise 0
Small	Equals 1 if the business has 5-19 employees, otherwise 0
Medium	Equals 1 if the business has 20-99 employees, otherwise 0
Large	Equals 1 if the business has 1001+ employees, otherwise 0
Occupational composition of workforce	
Management jobs (%)	Share of employees in management jobs
Jobs requiring university education (%)	Share of employees in jobs that usually require a university degree
Jobs requiring college education (%)	Share of employees in jobs that usually require college education, specialized training or apprenticeship training
Jobs requiring high school education (%))	Share of employees in jobs that usually require high school and/or job-specific training
Jobs requiring on-the-job training (%)	Share of employees in jobs that usually give on-the-job training
Jobs requiring high school education and on-the-job training (%)	Jobs requiring high school education (%) + Jobs requiring on-the-job training (%)
Full time permanent employees (%)	share of full-time permanent employees
Employees aged 55+ (%)	Share of employees aged 50 and above
Product/ service market	Geographical area where the business mainly sells its products or services
local	Equals to 1 if locally (otherwise, 0)
Provincial	Equals to 1 if provincially (otherwise, 0)
National	Equals to 1 if nationally (otherwise, 0)
International	Equals to 1 if internationally (otherwise, 0)
Innovation	
prt_invn	Compared to other businesses in the same sector or industry, how does the business stand out in terms of the quality of products or services?
prt_invn1	Equals to 1 if does not stand out at all (otherwise, 0)
prt_invn2	Equals to 1 if stands out slightly (otherwise, 0)
prt_invn3	Equals to 1 if stands out moderately (otherwise, 0)
prt_invn4	Equals to 1 if stands out a lot and (otherwise, 0)
prt_invn5	Equals to 1 if don't know (otherwise, 0)
Needs assessment practice	How regularly the business assesses skills and competences needed for the future
business does not assess skills needs	Equals to 1 if the business does not assess skills needs (otherwise, 0)
business assess skills irregularly	Equals to 1 if the business assesses skills needs but not regularly (otherwise, 0)
business assess skills regularly	Equals to 1 if the business assesses skills needs regularly (otherwise, 0)
Business provides training	Equals to 1 if the business provides training (otherwise, 0)
Employees particpate on decision making	Equals 1 if employees participate in the decision making process regarding how work is done (othersie, 0)
Employees document good work practice (%)	The percentage of employees who document good work practices or lessons learned.
Employees meet to think about improvements (%)	The percentage of employees who met regularly to think about improvements that could be made within the workplace

Table A1
Variable definitions

VARIABLE name	Definition or description
Business faces recruitment difficulties	Equals 1 if business experienced difficulties in hiring candidates with the required skills (otherwise, 0)
Business faces retention difficulties	Equals 1 if business experienced difficulties in retaining employees (otherwise, 0)
Province/territory	
Ontario	Equals 1 if province or territory is Ontario (otherwise, 0)
Newfoundland and Labrador	Equals 1 if province or territory is Newfoundland and Labrador (otherwise, 0)
Prince Edward Island	Equals 1 if province or territory is Prince Edward Island (otherwise, 0)
Nova Scotia	Equals 1 if province or territory is Nova Scotia (otherwise, 0)
New Brunswick	Equals 1 if province or territory is New Brunswick (otherwise, 0)
Quebec	Equals 1 if province or territory is Quebec (otherwise, 0)
Manitoba	Equals 1 if province or territory is Manitoba (otherwise, 0)
Saskatchewan	Equals 1 if province or territory is Saskatchewan (otherwise, 0)
Alberta	Equals 1 if province or territory is Alberta (otherwise, 0)
British Columbia	Equals 1 if province or territory is British Columbia (otherwise, 0)
Yukon	Equals 1 if province or territory is Yukon (otherwise, 0)
Nunavut	Equals 1 if province or territory is Nunavut (otherwise, 0)
Northwest Territories	Equals 1 if province or territory is Northwest Territories (otherwise, 0)
Industry	Two-digit NAICS code
Manufacturing	Equals 1 if NAICS = 31- 33 (otherwise, 0)
Mining, quarrying, and oil and gas extraction	Equals 1 if NAICS = 21 (otherwise, 0)
Utilities	Equals 1 if NAICS = 22 (otherwise, 0)
Construction	Equals 1 if NAICS = 23 (otherwise, 0)
Wholesale trade	Equals 1 if NAICS = 41 (otherwise, 0)
Retail trade	Equals 1 if NAICS = 44 and 45 (otherwise, 0)
Transportation and warehousing	Equals 1 if NAICS = 48 and 49 (otherwise, 0)
Information and cultural industries	Equals 1 if NAICS = 51 (otherwise, 0)
Finance and insurance	Equals 1 if NAICS = 52 (otherwise, 0)
Real estate and rental and leasing	Equals 1 if NAICS = 53 (otherwise, 0)
Professional, scientific and technical services	Equals 1 if NAICS = 54 (otherwise, 0)
Management of companies and enterprises	Equals 1 if NAICS = 55 (otherwise, 0)
Administrative and support	Equals 1 if NAICS = 56 (otherwise, 0)
Educational services	Equals 1 if NAICS = 61 (otherwise, 0)
Health care and social assistance	Equals 1 if NAICS = 62 (otherwise, 0)
Arts, entertainment and recreation	Equals 1 if NAICS = 71 (otherwise, 0)
Accommodation and food services	Equals 1 if NAICS = 72 (otherwise, 0)
Other services (except public administration)	Equals 1 if NAICS = 81 (otherwise, 0)