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Linking labour demand and labour supply: Job vacancies and the unemployed

by Marie Drolet

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Linking labour demand and labour supply: Job vacancies and the unemployed

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Overview of the study

This study provides additional insight into labour demand and supply based on the joint availability of job vacancy and unemployment data over the past two years (2015 and 2016). Specifically, it uses data from the Job Vacancy and Wage Survey (JVWS) and Labour Force Survey (LFS) to answer the following questions: To what extent are job vacancies and unemployment related? What can the unemployment-to-job-vacancy ratio tell us? To what extent do occupations differ in their relative degree of being slack (more workers than jobs) or tight (more jobs than workers)? How does the unemployment-to-job-vacancy ratio differ by education level?

- In 2015/2016, there were 3.4 unemployed persons per job vacancy in Canada. Newfoundland and Labrador (8.2) had the highest ratio, while British Columbia had the lowest ratio (2.2).
- In 2015/2016, sales and service occupations accounted for a disproportionately high number of job vacancies (37%) and a high number of unemployed persons with recent work experience (29%).
- The labour market was the tightest for health occupations. There were 0.7 unemployed health workers for each job vacancy.
- Conversely, there were about 3.5 unemployed workers for each job vacancy for trades, transport and equipment operators, which suggests a relatively slack labour market for these occupations.
- About two-thirds of job vacancies require no more than a high school education, while nearly one-half (49%) of unemployed persons have a postsecondary education.

Introduction

Observers of the Canadian labour market are familiar with standard measures of the labour supply and labour demand for workers. The unemployment rate provides information on the supply of persons looking for work in excess of those who are currently employed. Data on employment provide information on the demand for workers that is already met by employers. Additional information about the demand side of the labour market is collected by the Job Vacancy and Wage Survey (JVWS). As of January 2015, the JVWS provides an indicator of unmet labour demand by asking employers to report the number of job vacancies at their business location.¹

By linking unmet labour demand (job vacancies) and excess labour supply (unemployed persons), a number of labour market dynamics may be observed, particularly how easily and efficiently workers find jobs and whether the skills employers are looking for differ from the ones available in the labour market. The availability of unfilled jobs—the number of job vacancies or the job vacancy rate—and its relationship to unemployment is an important measure of how tight or slack the labour market is.

This paper explores the additional analytical insights that can be gained from the joint availability of job vacancy and unemployment data.² This study uses data from the Job Vacancy and Wage Survey (JVWS) and Labour Force

Survey (LFS) to answer the following questions: (1) To what extent are job vacancies and unemployment related? (2) What can the unemployment-to-job vacancy ratio tell us? (3) To what extent do occupations differ in their relative degree of being "slack" or "tight"?

Three dimensions of labour demand and supply are examined in this article: differences across provinces, differences across occupations, and differences across levels of education. Prior to discussing the results, the next section will examine some conceptual issues related to unemployment and job vacancies.

Job vacancies and unemployment

The definition of job vacancies and unemployment are conceptually similar. The three conditions for a job to be considered vacant mirror the three conditions for a person to be considered unemployed. For a job to be considered vacant, a position must be currently available, work could start within 30 days and an employer must be actively recruiting someone to fill the job from outside the organization.³ To be considered unemployed, a person must be available for work, could start work immediately and must be actively searching for work.

Job vacancies and unemployment coexist in a dynamic labour market.⁴ In some situations, vacancies and unemployment are associated with normal turnover in the labour force. Individuals join or return to the labour market to search for work, while others leave the labour market to retire, go to school or work in the home. Similarly, new jobs are created while other jobs disappear. Employers and job seekers need time to be brought together. In other

situations, workers lack the skills to meet the job requirements or live too far from regions where jobs are available. Finally, some firms or industries may respond to fluctuations in economic activity with temporary layoffs. While those on temporary layoff are considered unemployed, job vacancies do not necessarily exist since the unemployed are waiting for their previous job to reappear.⁵

In the two-year period from January 2015 to December 2016, there was an average of about 1.3 million unemployed persons in Canada and about 390,100 vacant jobs. That said, in any given quarter, the number of unemployed persons is greater than the number of vacant positions (Table 1).

Job openings move in the opposite direction of unemployment over the course of the business cycle. This theory is supported by evidence from the United States, which suggests that job vacancies fluctuate in a countercyclical movement with the number of unemployed persons.⁶

During economic expansions, the demand for goods and services strengthens. The labour market is described as tight with employers searching for employees: most people who want a job are already working, unemployment is low and job vacancies tend to be high. As the economy contracts, the demand for goods and services weakens. The labour market is described as slack with employers cutting back on recruiting new employees, while the few job vacancies that do exist tend to be filled quickly. Unemployment is higher due to a reduction in overall hiring relative to a decline in workers quitting and to an increase in layoffs.

With such a short times series, it is not possible to formally evaluate how Canadian job vacancies and unemployment jointly vary over time.⁷ For this reason, this article focuses on the estimates of job vacancies and unemployment averaged over the eight quarters of data from January 2015 to December

Table 1
Job vacancies and unemployment, 2015 and 2016

	Job vacancies	Employment ¹	Unemployment	Job vacancy rate	Unemployment rate ²
		in thousands			percent
2015					
1st quarter	406.7	14,864.7	1,345.2	2.7	7.4
2nd quarter	449.3	14,932.2	1,316.2	2.9	7.1
3rd quarter	405.9	15,174.3	1,354.8	2.6	7.2
4th quarter	355.0	15,282.1	1,239.7	2.3	6.7
2016					
1st quarter	328.2	14,970.7	1,446.0	2.2	7.8
2nd quarter	391.1	15,024.7	1,339.1	2.5	7.1
3rd quarter	404.7	15,298.7	1,366.3	2.6	7.2
4th quarter	379.9	15,447.9	1,213.2	2.4	6.5
Average	390.1	15,124.4	1,327.6	2.5	7.1

1. Refers to the number of payroll employees from the Job Vacancy and Wage Survey.

2. As provided by the Labour Force Survey.

Note: Job vacancies were rounded to the nearest 5; unemployment was rounded to the nearest 10. Monthly unemployment figures are converted to quarterly estimates by adjusting survey weights and summing across the three months in question.

Sources: Statistics Canada, Job Vacancy and Wage Survey; Labour Force Survey, 2015 and 2016.

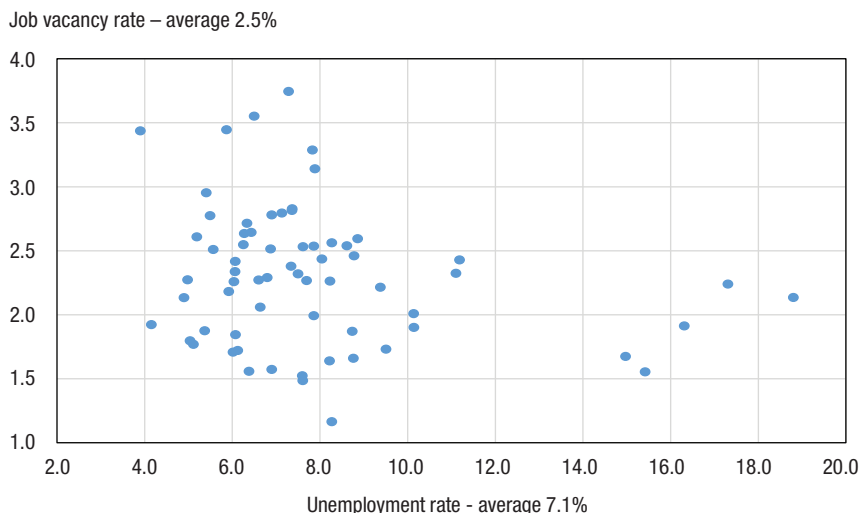
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2016.⁸ The [Data sources, methods and definitions](#) section provides a detailed description of how the data are used in the current context.

The relationship between the job vacancy rate and the unemployment rate can be shown in a chart (Chart 1). Each data point corresponds to the average job vacancy rate and the average unemployment rate in an economic region over the eight quarters of data from 2015 to 2016. There are a total of 66 economic regions.⁹

There is a modest negative yet statistically significant relationship between unemployment and job vacancies: a high rate of unemployment is typically associated with a low job vacancy rate and, conversely, a high job vacancy rate coincides with a low unemployment rate. To test the robustness of the relationship between the vacancy rate and the unemployment rate, a linear regression was performed. The results indicate that a 1.0 percentage point increase in the

Chart 1
Correlation between unemployment rate and job vacancy rate by economic region, 2015 and 2016

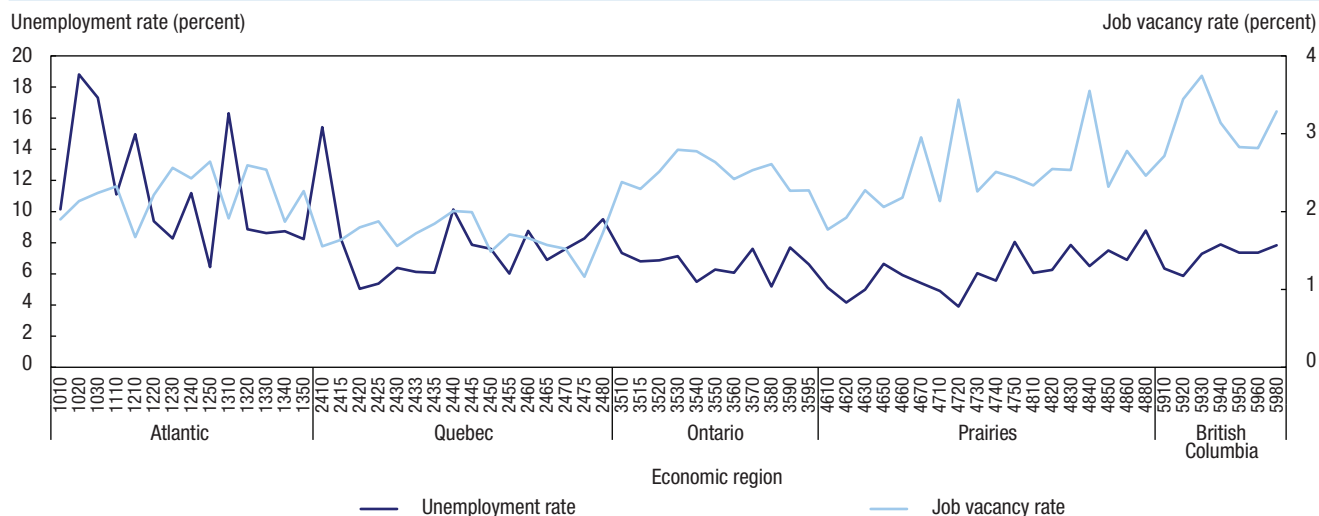


Sources: Statistics Canada, Job Vacancy and Wage Survey; Labour Force Survey, 2015 and 2016.

unemployment rate is associated with a 0.9 percentage point decline in the average job vacancy rate.¹⁰ It should be noted that, at most, 9%

of the cross-regional variation in job vacancy rates is explained by the unemployment rate in the economic region.

Chart 2
Job vacancy rate and unemployment rate by economic region, 2015 and 2016



Sources: Statistics Canada, Job Vacancy and Wage Survey; Labour Force Survey, 2015 and 2016.

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An alternative chart can be produced by sorting the economic regions from eastern Canada to western Canada and plotting both the job vacancy rate and unemployment rate (Chart 2). In economic regions with high job vacancy rates (as seen in the western provinces), the unemployment rates are typically lower, while economic regions with low job vacancy rates typically have higher unemployment rates (as seen in the Atlantic provinces and Quebec).¹¹

In 2015/2016 there were 3.4 unemployed persons per job vacancy in Canada

This section introduces the ratio of unemployed persons per job vacancy. The unemployment-to-job-vacancy ratio combines both labour supply and demand measures by gauging excess supply of labour relative to the unmet needs of Canadian employers. This ratio is constructed by using the number of unemployed persons and dividing it by the number of job vacancies. The number of unemployed persons is a measure of persons looking for work in excess of those who are currently employed. Job vacancies are a measure of the demand for workers not currently met by employers. While there are some caveats when using JVWS and LFS data sources together,¹² this ratio is a simple way of examining the composition of labour supply as it relates to labour demand.

The ratio is often used to describe how tight or slack the labour market is. Lower values of the ratio imply that there are fewer unemployed persons per job vacancy and possibly greater ease of finding a new job, suggesting a tight labour market. Conversely, higher values of the ratio imply that there are more unemployed persons per job vacancy and possibly greater difficulty finding a new job, suggesting a slack labour market.

The ratio of unemployed persons per job vacancy is sensitive to the measure of unemployed persons used and raises the following conceptual issues:

- A. The Labour Force Survey classifies **unemployed persons** into the three following groups: those who are searching for a job, those on temporary layoff, and those who are starting a new job in the next four weeks. Using this measure results in 3.4 unemployed persons per job vacancy.
- B. While it is clear that job searchers should be included in the ratio, it is not clear whether those on temporary layoff and future job starters should be included. Persons on temporary layoff are expecting to be recalled to their previous position, while future job starters include those who are starting a new job within

the next four weeks. When attention is restricted to unemployed job searchers, the result is **3.2 unemployed job searchers** per job vacancy.

- C. Hidden unemployment refers to situations in which individuals may be without work but are not classified as unemployed according to official statistics. Such individuals include discouraged workers or individuals who are not actively seeking work because they believe that no work is available but wish to work at the prevailing wage rate. In addition, some workers find themselves underemployed. An example is part-time workers actively searching for full-time work. When discouraged workers and underemployed individuals are counted as unemployed, the result is **4.2 persons who want to work** per job vacancy.

Table 2

Job vacancies, unemployed population and number of unemployed persons for each job vacancy, by province, 2015 and 2016

	Job vacancies	Unemployed population	Job vacancy rate	Unemployment rate	Unemployed / Job vacancies
	in thousands		percent		ratio
Canada	390.1	1,327.6	2.5	7.1	3.4
Newfoundland and Labrador	4.2	34.2	2.0	13.6	8.2
Prince Edward Island	1.4	8.2	2.3	11.1	5.8
Nova Scotia	9.4	40.1	2.4	8.7	4.3
New Brunswick	6.8	36.8	2.3	10.1	5.4
Quebec	61.8	322.8	1.8	7.6	5.2
Ontario	159.9	489.2	2.7	6.8	3.1
Manitoba	12.2	38.8	2.1	6.0	3.2
Saskatchewan	11.2	33.8	2.4	5.8	3.0
Alberta	54.0	173.0	2.7	7.3	3.2
British Columbia	69.3	150.8	3.3	6.3	2.2

Note: Job vacancies were rounded to the nearest 5; unemployed population was rounded to the nearest 10. Monthly unemployment figures are converted to quarterly estimates by adjusting survey weights and summing across the three months in question.

Sources: Statistics Canada, Job Vacancy and Wage Survey; Labour Force Survey, 2015 and 2016.

Each of these examples illustrates the conceptual difficulties in accounting for the unemployed in the ratio of unemployed persons to job vacancies. For the remainder of this article, unemployed refers to those who are searching for a job, on temporary layoff and starting a new job in the next four weeks, and is used in the ratio of unemployed to job vacancies. This is consistent with the literature and other international evidence.¹³

In the next section, the labour market is partitioned into characteristics such as geography, occupation and education. Showing how labour market dynamics vary along these dimensions yields further insight into how the labour market functions.

British Columbia has the lowest unemployment-to-job vacancy ratio whereas Newfoundland and Labrador has the highest

There are provincial differences between those searching for work and where job opportunities exist (Table 2). A larger ratio of unemployed persons per job vacancy can occur when there is a larger share of unemployed persons relative to their share of job openings. For example, Quebec has a higher share of unemployment (24%) relative to its share of job vacancies (16%). This is also the case in Newfoundland, which has 3% of the unemployed, but 1% of job vacancies. The slack labour market conditions in these provinces are reflected in the high ratios of unemployed persons per job vacancy: there were 5.2 and 8.2 unemployed persons per job vacancy in Quebec and Newfoundland, respectively.

Ontario's share of unemployed persons (37%) is relatively close to its share of job openings (41%). There are 3.1 unemployed persons per job vacancy in Ontario, a rate lower than in Quebec and the Atlantic provinces.

A small ratio of unemployed persons per job vacancy can occur when a province has a lower share of unemployment relative to job openings. British Columbia has a relatively lower share of unemployment (11%) relative to its job vacancies (18%). The tighter labour market conditions in British Columbia are reflected in the low ratio of unemployed persons per opening (2.2 unemployed persons per job vacancy).¹⁴

Worker mobility is traditionally from areas of high unemployment towards areas where job opportunities are more abundant.¹⁵ The federal government publication *Jobs Report: The State of the Canadian Labour Market* suggests that only 1% of Canadians move across provincial borders and 3.4% move across census subdivisions within a province in a given year. The decision of unemployed workers to migrate to regions with higher job vacancies is often complicated and may be influenced by a number of factors such as age, income, marital status, presence of children, language, culture, distance from home province and position in the business cycle, as well as institutional factors such as credential recognition.¹⁶

Provincial differences in unemployment and job vacancies may reflect a variety of other differences, most notably those by occupation and industry.

There are more job vacancies than unemployed persons in health occupations in all provinces

This section reports differences in the ratio of the unemployed to job vacancies by occupation group. Occupations are grouped according to the work usually performed as determined by the tasks, duties and responsibilities of the occupation.¹⁷

The LFS collects information on the occupation of the previous job held during the past year for individuals who did not have a job during the reference week. Currently unemployed persons who held a job in the past year represent about 58% of the total unemployed population. As such, they may not represent the experience of all unemployed persons in the Canadian labour market. In addition, these unemployed persons may find it easier to secure future employment given that they have recent and relevant work experience in the occupation.¹⁸

Since currently unemployed persons who held a job in the past year are a subset of total unemployment and holding the number of job vacancies constant, the ratio of unemployed persons per job vacancy is smaller than previously reported. Overall, there are 2.0 unemployed persons who held a job during the past year per job vacancy (compared with 3.4 unemployed persons per job vacancy). The ratios of unemployed persons who held a job in the past year to job vacancies are shown for each major occupation group in Chart 3.

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Workers in health occupations face tight labour market conditions. Of all major occupation groups, health occupations report the lowest unemployment-to-job vacancy ratio. The ratio (less than 1.0) indicates that there are more job vacancies than unemployed workers in health occupations: for every job vacancy reported for health occupations, there are 0.7 unemployed health workers. Within the health field, detailed occupations such as professional occupations in nursing, technical occupations in health, and assisting occupations in support of health services have ratios of less than 1.0 (Table 3).¹⁹

There are 1.6 unemployed persons per job vacancy in sales and service occupations. This broad occupation group accounts for a disproportionately high number of job vacancies (37%) and a high number of unemployed persons (29%). This suggests that employers can easily find the workers they need and that employees can easily transition from

job to job in these occupations—which is the case in the retail and accommodation and food industries, where sales and service occupations are predominately found.²⁰

Trades, transport and equipment operator occupations are characterized by high unemployment and low job vacancies, resulting in a relatively high ratio of unemployed persons per job vacancy. About 202,830 unemployed persons worked in trades, transport and equipment operator occupations in the previous 12 months—with 57,510 job vacancies in those occupations—resulting in 3.5 unemployed persons per job vacancy. The data reported for the construction and manufacturing industries corroborate these findings, and may suggest there is currently a surplus of workers in such industries.²¹

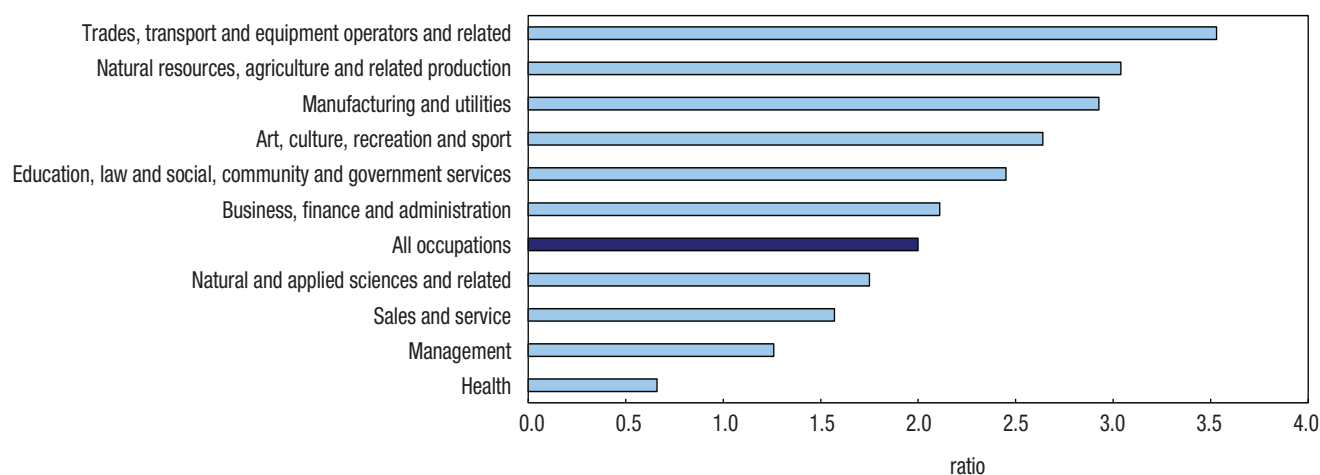
There is heterogeneity within major occupation classification groups. Generally speaking, professional

occupations have lower ratios of unemployed persons per job vacancy than technical or support occupations within the same major occupation groups. For example, there are 1.4 unemployed persons per job vacancy among natural and applied science professionals, compared with 2.2 unemployed persons per job vacancy among technical operations related to natural and applied sciences. Similar conclusions are found in the broad business and finance occupation group.²²

It is important to note, however, that the ratio of unemployed persons per job vacancy may not be always indicative of a slack versus tight labour market (relative to an all-occupation average or a national average). In some cases, a low ratio may also simply reflect an occupation characterized by a high degree of labour turnover. For instance, high turnover occupations (which are predominantly low skilled) may have a large number of vacancies relative to the number of unemployed persons

Chart 3

Number of unemployed persons¹ for each job vacancy, by major occupation group, 2015 and 2016



1. The Labour Force Survey collects information about the occupation of the previous job held during the past year for individuals who did not have a job during the reference week.

Sources: Statistics Canada, Job Vacancy and Wage Survey; Labour Force Survey, 2015 and 2016.

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Table 3

Job vacancies, unemployed population, and number of unemployed persons for each job vacancy by detailed occupation, 2015 and 2016

		Job vacancies	Unemployed ¹ number	Unemployed / Job vacancies ratio
Management		23,855	30,050	1.3
00	Senior management	910	1,070	1.2
05	Specialized middle management	11,240	10,480	0.9
06	Middle management in retail and wholesale trade and customer services	8,560	11,180	1.3
09	Middle management in trades, transportation, production and utilities	3,145	7,320	2.3
Professional		47,065	73,050	1.6
11	Professional in business and finance	12,220	16,040	1.3
21	Professional in natural and applied sciences	15,035	20,910	1.4
30	Professional in nursing	7,285	2,230	0.3
31	Professional in health (except nursing)	2,065	2,140	1.0
40	Professional in education services	4,140	17,950	4.3
41	Professional in law and social, community and government services	4,910	9,350	1.9
51	Professional in art and culture	1,410	4,430	3.1
Technical and paraprofessional		31,125	60,350	1.9
22	Technical related to natural and applied sciences	10,765	24,130	2.2
32	Technical in health	5,925	4,370	0.7
42-43	Paraprofessional in legal, social, community and education services / front line protection	7,155	13,320	1.9
52	Technical in art, culture, recreation and sport	7,280	18,530	2.5
Administration and administrative support		29,310	84,980	2.9
12	Administrative and financial supervisors and administrative	11,120	26,600	2.4
13	Finance, insurance and related business administrative	2,395	16,310	6.8
14	Office support	10,555	28,080	2.7
15	Distribution, tracking and scheduling co-ordination	5,240	13,990	2.7
Sales		53,540	91,700	1.7
62	Retail sales supervisors and specialized sales	7,510	13,880	1.9
64	Sales representatives and salespersons – wholesale and retail trade	27,680	39,910	1.4
66	Sales support	18,350	37,910	2.1
Personal and customer information services		105,330	150,230	1.4
63	Service supervisors and specialized service	21,820	29,420	1.3
65	Service representatives and other customer and personal services	35,300	46,140	1.3
67	Service support and other service	37,585	60,510	1.6
34	Assisting in support of health services	7,205	6,120	0.8
44	Care providers and educational, legal and public protection support	3,420	8,040	2.4
Industrial, construction and equipment operation trades		26,470	99,630	3.8
72	Industrial, electrical and construction trades	17,355	77,460	4.5
73	Maintenance and equipment operation trades	9,115	22,170	2.4
Workers and labourers in transport and construction		31,045	103,200	3.3
74	Other installers, repairers and servicers and material handlers	6,470	24,590	3.8
75	Transport and heavy equipment operation and related maintenance	17,165	46,440	2.7
76	Trades helpers, construction labourers and related	7,410	32,170	4.3
Natural resources, agriculture and related production occupations		15,880	48,210	3.0
82	Supervisors and technical occupations in natural resources, agricultural and related	1,220	11,530	9.5
84	Workers in natural resources, agriculture and related production	7,325	16,280	2.2
86	Harvesting, landscaping and natural resources labourers	7,335	20,400	2.8
Occupations in manufacturing and utilities		18,470	54,030	2.9
92	Processing, manufacturing and utilities supervisors and central control operators	1,345	4,050	3.0
94	Processing and manufacturing machine operators and related production workers	5,885	17,340	2.9
95	Assemblers in manufacturing	3,830	14,130	3.7
96	Labourers in processing, manufacturing and utilities	7,410	18,510	2.5

1. The Labour Force Survey collects information about the occupation of the previous job held during the past year for individuals who did not have a job during the reference week.

Sources: Statistics Canada, Job Vacancy and Wage Survey; Labour Force Survey, 2015 and 2016.

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Table 4

Number of unemployed persons for each job vacancy, by major occupation group and region, 2015 and 2016

	Atlantic	Quebec	Ontario	Manitoba and Saskatchewan	Alberta	British Columbia
	ratio					
Occupation group	3.9	3.2	1.7	1.9	2.1	1.3
Management	1.6	2.2	1.1	0.8	1.3	0.8
Business, finance and administration	3.3	2.6	1.6	2.0	3.8	1.8
Natural and applied sciences and related	2.8	1.7	1.4	1.6	4.9	1.3
Health	0.6	0.7	0.8	0.4	0.6	0.3
Education, law and social, community and government services	3.3	5.0	2.3	2.1	2.0	1.6
Art, culture, recreation and sport	3.2	3.1	3.0	2.5	2.0	1.6
Sales and service	2.3	3.2	1.4	1.4	1.2	1.0
Trades, transport and equipment operators and related	10.9	6.7	2.5	3.8	3.5	1.8
Natural resources, agriculture and related production	13.3	4.9	1.7	3.0	3.4	2.0
Manufacturing and utilities	3.6	3.0	2.8	2.9	3.7	2.1

1. The Labour Force Survey collects information about the occupation of the previous job held during the past year for individuals who did not have a job during the reference week.

Sources: Statistics Canada, Job Vacancy and Wage Survey; Labour Force Survey, 2015 and 2016.

(hence a low ratio). These jobs are not in high demand and the job market is not tighter in these lower-skilled jobs than in higher-skilled jobs; rather, this situation is due to worker turnover and the resulting job vacancies are high for these positions.²³ Examples of such occupations may include sales occupations and personal and customer information services, which are characterized by a relatively high number of job vacancies (more than 40% of the total), and a relatively low ratio of unemployed persons to vacancies.

The previous discussion showed how the ratio of the unemployed per job vacancy varied by geography and occupation independent of one another. This section combines this information in order to gain a better understanding of the labour market situation they represent.

In this scenario, the assumption is that the unemployed are searching in the same occupation and region where they worked in the previous 12 months. While some job applicants may not be searching for new opportunities in their previous field, their recent and relevant work

experience in their last occupation may help them be more successful in their job search.²⁴ Some provinces are grouped to allow for adequate sample sizes for analysis.

On one hand, workers in health occupations face the tightest labour market conditions in all regions of the country. The ratio is less than 1.0 regardless of whether the region is characterized by a tight (as in the case of British Columbia) or slack (as in the case of the Atlantic provinces) labour market (Table 4).

On the other hand, signals are mixed for occupations in natural resources, agriculture and related production. The labour market for this occupation is described as slack in the Atlantic provinces (similar to slack regional labour market conditions) where there are 13.3 unemployed persons per job vacancy, and as tighter in Ontario where there are 1.7 unemployed persons per job vacancy.

It is possible that there are more job opportunities in a province in occupations other than in the occupation in which the individual

is searching. It may be the case that job seekers need to retrain to get job offers in different occupations, but they may not be willing to retrain given costly investments in human capital. Others may hold out for a position requiring their skills and may not seek or accept job opportunities in alternative occupations that may offer lower wages than they earned in the past.

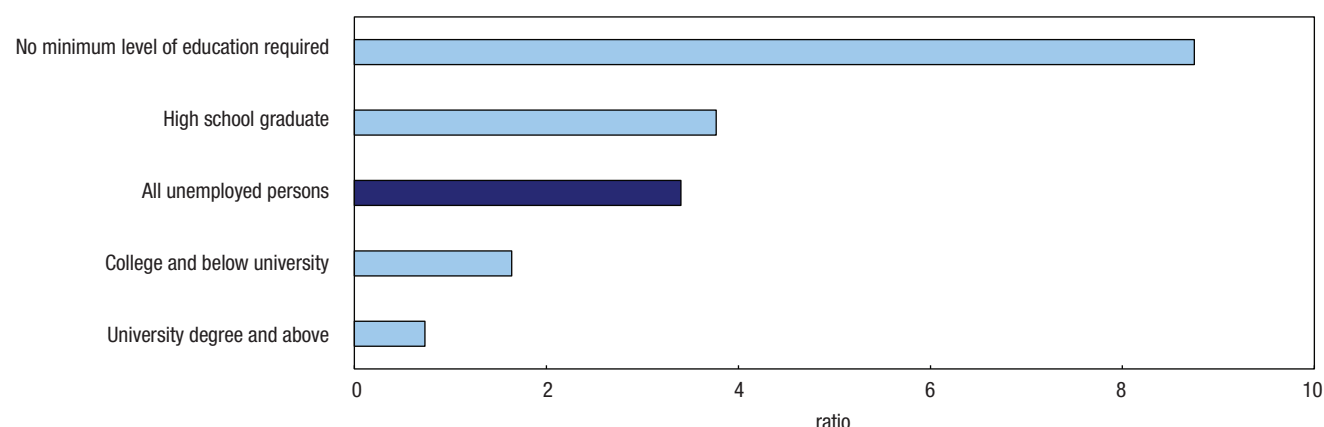
About two-thirds of job vacancies require no more than a high school education, but nearly one-half (49%) of the unemployed have a postsecondary education

The ratio of unemployed persons to job vacancies falls as education levels increase. Over one-third of all job vacancies require no minimum level of education. These jobs are available to all unemployed persons, regardless of their education level. As such, there are potentially 8.7 unemployed persons competing for each job vacancy that requires no minimum level of education (Chart 4).

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Chart 4

Number of unemployed persons for each job vacancy for those at or above education level required, 2015 and 2016



Note: Job vacancies that require an apprentice or trade certificate or diploma are excluded. Also excluded are unemployed persons with that level of education.

Sources: Statistics Canada, Job Vacancy and Wage Survey; Labour Force Survey, 2015 and 2016.

As the education requirement for job openings increases, the potential pool of applicants with at least the minimum level of required education gets smaller while the number of available jobs gets larger. Unemployed persons with a university education are qualified for vacant jobs requiring a university education and for all job vacancies requiring less education. For this group, there are more job vacancies available than there are unemployed persons. This translates into a ratio of less than 1.0.²⁵

While university-educated persons benefit from having the most jobs available to them, in most cases their educational qualifications exceed those required for the vacant positions. In other words, they may be overeducated or overqualified for 9 out of 10 available jobs. They may not accept positions requiring lower skill levels and may prefer to hold out for a position more closely related to their skills.²⁶ Similarly, people with a trades certificate or diploma may be looking for specific job openings that correspond to their qualification level. It is thus important to examine

how many job openings correspond to unemployed persons in every category of educational attainment.

If unemployed university-educated persons restricted their job search only to jobs requiring a university education (or to jobs that they are adequately qualified for), there would be over 5.9 unemployed persons per job opening (Table 5).²⁷ Conversely, restricting vacancies that require a high school education only to those with this level of education would result in 3.8 unemployed persons per vacancy.

About two-thirds of job vacancies require no more than a high school education, but nearly one-half (49%) of the unemployed have a postsecondary education. These results reflect the fact that job vacancies are more likely to demand lower skills than those possessed by the unemployed population. Again, this may be partially attributable to high worker turnover and the relatively large number of job vacancies in low-skilled jobs. It may also be that jobs requiring a higher

Table 5

Job vacancies, unemployed population, and number of unemployed persons for each job vacancy, by education level, 2015 and 2016

Education level	Job vacancies	Unemployed	Unemployed / Job vacancies
	number (in thousands)		ratio
No minimum level of education required	135.7	259.8	1.9
High school graduate	110.4	415.7	3.8
Apprentice or trade certificate or diploma	32.8	140.4	4.3
College and below university	66.1	250.1	3.8
University degree and above	44.1	261.5	5.9

Sources: Statistics Canada, Job Vacancy and Wage Survey; Labour Force Survey, 2015 and 2016.

level of education are more likely to be advertised internally within firms, or that these jobs do not necessarily meet the requirement that work must begin within 30 days.

The unemployed may not be filling available jobs

Not all persons filling jobs come from the pool of unemployed persons. Each year, thousands of workers in Canada start a job with a new employer. Some are new entrants into the labour force or re-entrants searching for work, while others move quickly into new jobs without an intervening job search period.

Previous Canadian research has shown that worker turnover is a salient feature of the Canadian labour force. Regardless of general economic conditions, a large volume of worker reallocation across employers takes place each year.²⁸ Several indicators are used to show the importance of such reallocation in the current context of job vacancies and unemployment. First, according to the Labour Force Survey, about 19% of the unemployed in any given month move into a paid job the next month.²⁹ Second, LFS data show that about 6.5% of Canadian workers started a new job in the last three months. Third, according to the Longitudinal and International Study of Adults, 13% of employed Canadian workers looked for a new job in 2014.³⁰

In general, more workers started a new job in the last three months than the number of reported job vacancies, which may be the result of how vacancies are reported. Some jobs may become vacant and filled during the month. For other jobs, recruiting and hiring may take place long before the job start date (i.e., a period longer than the condition used to define job vacancy that work must begin within 30 days). Pools of successful candidates may be created to fill current and/or future vacancies, as may be the case in larger firms with more formal and lengthy hiring processes, or in industries or occupations that require specialized skills. Both of these very short-term and longer-term vacancies may not be included in this paper's measure of job vacancies.

Conclusion

This article provides a simple framework to compare job vacancies and unemployment. It attempts to explore the additional analytical insights that can be gained from the joint availability of job vacancy and unemployment data.

This paper began by showing that job vacancies are negatively correlated with the unemployment rate. As more data become available, analysts may be able to distinguish between cyclical and frictional or structural explanations in both level and trend. Job vacancies may become a leading indicator of changes in

the business cycle as changes in job vacancies may predate changes in the unemployment rate.

This analysis has also shown how job vacancies and unemployment co-exist at the provincial, occupation and education levels. This adds to the understanding of labour market conditions described as tight or slack. For example, health occupations have a relatively high number of vacancies relative to the number of unemployed persons with recent work experience in health occupations. Conversely, the labour market has a relatively high number of unemployed persons who work as trades, transport and equipment operators relative to the number of job vacancies in those occupations. This result points to the difficulty matching jobs and workers.

Lastly, the results have shown that there are discrepancies between the characteristics of the vacancies and the characteristics of the unemployed. Job vacancies are largely concentrated in sales and service occupations, while the unemployed are proportionately less likely to have been employed in those occupations. Furthermore, two-thirds of job vacancies require no more than a high school education, while nearly one-half of the unemployed have a postsecondary education.

Readers should note, however, that not all job vacancies are filled by the unemployed. Job vacancies are sometimes filled by discouraged workers, underemployed workers, and even employed workers who are looking for a new job.

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Data sources, methods and definitions

Data sources

This study uses data from two sources: the Job Vacancy and Wage Survey (JVWS) and the Labour Force Survey (LFS). Statistics Canada began publishing quarterly estimates of labour demand (the job vacancy rate) from the Job Vacancy and Wage Survey in 2015. The JVWS program involves the collection, processing and dissemination of job vacancies from a sample of 100,000 business locations.

The JVWS target population is all business locations in Canada excluding religious organizations; private households; and federal, provincial and territorial as well as international and other extraterritorial public administrations. The JVWS sample is selected from a survey population of approximately 1 million business locations compiled in the Business Register (BR). The JVWS sample selected from the sampling frame is stratified by major industry division, economic region and size class. Business locations remain in sample for eight consecutive quarters or two years. Quarterly employment estimates from the JVWS are calibrated to the Survey of Employment, Payrolls and Hours (SEPH) employment estimates.

In addition, the JVWS collects information about the characteristics of the job vacancy including the requirements to fill these vacancies (in terms of minimum level of education and experience required); type of job available (part time or full time; permanent/seasonal/temporary); offered wage; and duration of the job vacancy. The JVWS asks employers to report the minimum level of education required for each detailed occupation-specific job vacancy.

The Labour Force Survey (LFS) is a monthly survey that collects labour market information from nearly 100,000 individuals in 56,000 households nationwide. The target population is the civilian, non-institutionalized population aged 15 and over. The LFS uses a rotating panel sample design so that selected dwellings remain in the LFS sample for six consecutive months.

Employment status is collected as of the 15th day of the month and provides a snapshot of the number of unemployed persons in the month. To be considered unemployed, a person must be available for work, be able to start work immediately and be actively searching for work. The unemployed includes those on temporary layoff and people waiting to start a job in the next four weeks.

Conceptual difference between employment in the Job Vacancy and Wage Survey and Labour Force Survey

The employee concept in the JVWS refers to the number of employees receiving pay for the reference period—also known as payroll employees. It is comprised of full-time and part-time employees, as well as permanent, casual, temporary and seasonal employees. It also includes working owners, directors, partners and other officers of incorporated businesses, as well as employees who work at home or on the road but report to

the location. It is meant to exclude owners of or partners in unincorporated businesses and professional practices, the self-employed, subcontractors, external consultants, unpaid family workers, persons working outside Canada, and military personnel. It also excludes employees on unpaid leave (for example, those on extended sick leave who are receiving insurance benefits). Multiple job holders are counted for each payroll job.

This differs from the employee concept in the LFS. The LFS provides an estimate of employed persons. It includes individuals absent from work without pay and multiple job holders are counted only once.

Difference in who is included by occupation: Unemployment by occupation includes only persons who worked in that occupation in the previous 12 months. It excludes re-entrants and new entrants in the labour force.

Difference in when survey respondent is sampled: Persons are asked if they are unemployed during the reference week, which includes the 15th day of the month. Businesses are asked to report all job vacancies on the 1st day of the reference month.

While both reference periods provide a snapshot at a point in time, their differences in when the information is collected may produce small variations in the number of unemployed persons and job vacancies. For example, the number of job vacancies is reported for the 1st day of the month, which is a shorter period that may not capture as many job vacancies as asking for data that cover a period that stretches from Sunday to Saturday.

Difference between employment and job numbers: The LFS counts the number of employed persons. Multiple job holders are counted once. The JVWS counts the number of jobs. For persons holding multiple jobs, each job is counted.

Missing detailed information on job searches of unemployed persons: The LFS does not collect detailed information about the job searches of the unemployed. Notably, unemployed persons are not asked about the occupation or sector in which they are searching for work, the pay they are willing to accept, their willingness to relocate, or their willingness to retrain.

Restrictions to job vacancy definitions: The definition of job vacancies may exclude some types of vacancies, for example:

- 1) Some job vacancies that become available and filled during the month are not included.
- 2) Some employers may actively recruit far in advance of when the work actually begins, whereas the definition requires work to begin within 30 days.
- 3) Job vacancies that occur in the internal labour market are normally filled by promotion except for those at the bottom rung of the promotion ladder, which may skew the statistics towards the availability of entry-level positions.

Data sources, methods and definitions (concluded)

Definitions and methods

Job vacancies are collected as of the 1st day of the reference month and provide a snapshot of the number of job vacancies in the month. A job is considered vacant if (a) a specific position exists; (b) there is work to accomplish this month; and (c) the employer is actively recruiting from outside the business. The position can be full time or part time and it can be permanent, temporary or seasonal.

The **job vacancy rate** is calculated as the number of job openings (on the 1st day of the month) divided by the sum of employment and job vacancies. Including job vacancies in the denominator allows the rate to reflect the total number of jobs at the location, both filled and unfilled.

The **unemployment rate** is calculated as the number of unemployed persons (on the 15th day of the month) divided by the number of persons aged 15 and over in the labour force. Persons in the labour force include those who are currently employed and unemployed.

In this paper, the **unemployed-to-vacancy ratio** is calculated as the total number of unemployed persons (on the 15th day of the month) divided by the number of job vacancies.

The variance of the unemployed-to-vacancy ratio is calculated as follows:

$$Var\left(\frac{\hat{U}}{\hat{V}}\right) = Var(\hat{R}) \approx \frac{1}{\hat{V}^2} [Var(\hat{U}) + \hat{R}^2 Var(\hat{V})]$$

A reasonable assumption for highly aggregated estimates (at, say, the provincial or occupation level) is that the $Var(\hat{U})$ is much smaller than \hat{V}^2 . The variance reduces to $Var(\hat{R}) \approx \hat{R}^2 CV^2(\hat{V})$. This value is fairly small and can be used to construct a confidence interval. To further simplify the calculation, the CV is taken from CANSIM tables 285-0001, 285-0002 and 285-0003. Ratios reported throughout the text are significantly different from one another.

Job vacancy and unemployment rate in economic regions

Table 6 regroups economic regions according to whether their job vacancy rate and unemployment rate fall above or below the national average. Note that the national average job vacancy rate is 2.5% and the unemployment rate is 7.1%. An economic region is said to have a high (low) job vacancy rate if their rate is above 2.7% (below 2.3%). An economic region is said to have a high (low) unemployment rate if their rate is above 7.6% (below 6.8%).³¹

About 17% of all employed Canadians live in economic regions characterized by low job vacancy rates and high unemployment. This includes all economic regions in the Atlantic provinces (with the exception of Halifax) and 8 of the 16 economic regions in Quebec (covering 56% of payroll employees in that province). This group includes Montréal and the surrounding area. These regions can be characterized as having a slack labour market.

About 16% of all employed Canadians live in economic regions characterized by high job vacancy rates and low unemployment. This group includes larger urban areas such as Kitchener–Waterloo–Barrie, Vancouver Island and Lower Mainland British Columbia. In these regions, the labour market conditions are particularly more likely to be tight.

However, another 17% of employed Canadians live in economic regions characterized by low job vacancy rates and low unemployment. This group comprises 15 economic regions mostly located in Quebec, Manitoba and Saskatchewan. Why those regions have relatively few vacancies and few job searchers is not clear, however, this situation could be attributable to social and economic characteristics specific to those regions.

Job vacancy and unemployment rate in economic regions (continued)

Table 6

Job vacancy and unemployment rates, by category of economic region, 2015 and 2016

	Unemployment rate	Job vacancy rate	Payroll employment
		percent	number
High job vacancy rate / Low unemployment rate			
Percent of paid employees = 16.0%			
3540 Kitchener–Waterloo–Barrie, Ont.	5.5	2.8	568,240
4670 Parklands / Northern, Man.	5.4	3.0	40,340
4720 Swift Current–Moose Jaw, Sask.	3.9	3.4	37,190
4840 Banff–Jasper–Rocky Mountain House / Athabasca–Grande Prairie–Peace River, Alta.	6.5	3.6	164,750
5910 Vancouver Island and Coast, B.C.	6.3	2.7	298,075
5920 Lower Mainland / Southwest, B.C.	5.9	3.4	1,308,020
High job vacancy rate / Average unemployment rate			
Percent of paid employees = 25.8%			
3530 Toronto, Ont.	7.1	2.8	2,955,265
4860 Edmonton, Alta.	8.8	2.5	670,230
5930 Thompson–Okanagan, B.C.	7.3	3.7	207,245
5950 Cariboo, B.C.	7.4	2.8	67,940
High job vacancy rate / High unemployment rate			
Percent of paid employees = 0.9%			
5940 Kootenay, B.C.	7.9	3.1	60,690
5960 North Coast / Nechako, B.C.	7.4	2.8	38,660
5980 Northeast, B.C.	7.8	3.3	34,035
Average job vacancy rate / Low unemployment rate			
Percent of paid employees = 8.1%			
1250 Halifax, N.S.	6.4	2.6	181,350
3550 Hamilton–Niagara Peninsula, Ont.	6.3	2.6	558,980
3560 London, Ont.	6.1	2.4	264,545
3580 Stratford–Bruce Peninsula, Ont.	5.2	2.6	118,705
4740 Yorkton–Melville, Sask.	5.6	2.5	30,530
4820 Camrose–Drumheller, Alta.	6.3	2.5	74,630
Average job vacancy rate / Average unemployment rate			
Percent of paid employees = 4.1%			
3510 Ottawa, Ont.	7.3	2.4	491,940
3520 Muskoka–Kawartha, Ont.	6.9	2.5	128,580
Average job vacancy rate / High unemployment rate			
Percent of paid employees = 8.7%			
1230 Annapolis Valley, N.S.	8.3	2.6	40,290
1240 Southern, N.S.	11.2	2.4	45,595
1320 Moncton–Richibucto, N.B.	8.9	2.6	92,080
1330 Saint John–St. Stephen, N.B.	8.6	2.5	68,755
3570 Windsor–Sarnia, Ont.	7.6	2.5	249,455
4750 Prince Albert / Northern, Sask.	8.0	2.4	77,560
4830 Calgary, Alta.	7.9	2.5	736,280

Job vacancy and unemployment rate in economic regions (concluded)

Table 6

Job vacancy and unemployment rates, by category of economic region, 2015 and 2016

		Unemployment rate	Job vacancy rate	Payroll employment
			percent	number
Low job vacancy rate / Low unemployment rate				
Percent of paid employees = 16.6%				
2420	Capitale-Nationale, Que.	5.0	1.8	332,480
2425	Chaudière-Appalaches, Que.	5.4	1.9	171,610
2430	Estrie, Que.	6.4	1.6	125,985
2433	Centre-du-Québec, Que.	6.1	1.7	104,060
2435	Montréal, Que.	6.1	1.8	512,175
2455	Laurentides, Que.	6.0	1.7	184,170
3595	Northwest, Ont.	6.6	2.3	108,275
4610	Southeast, Man.	5.1	1.8	38,585
4620	South Central-North Central, Man.	4.2	1.9	47,340
4630	Southwest, Man.	5.0	2.3	47,480
4650	Winnipeg, Man.	6.6	2.1	358,735
4660	Interlake, Man.	5.9	2.2	30,835
4710	Regina-Moose Mountain, Sask.	4.9	2.1	155,990
4730	Saskatoon-Biggar, Sask.	6.0	2.3	161,340
4810	Lethbridge-Medicine Hat, Alta.	6.1	2.3	130,320
Low job vacancy rate / Average unemployment rate				
Percent of paid employees = 2.9%				
2465	Abitibi-Témiscamingue, Que.	6.9	1.6	64,700
2470	Mauricie, Que.	7.6	1.5	100,310
3515	Kingston-Pembroke, Ont.	6.8	2.3	176,225
4850	Red Deer, Alta.	7.5	2.3	98,340
Low job vacancy rate / High unemployment rate				
Percent of paid employees = 17.0%				
1010	Avalon Peninsula, Nfld.	10.1	1.9	129,020
1020	South Coast-Burin Peninsula, Notre Dame-Central Bonavista Bay, Nfld.	18.8	2.1	38,790
1030	West Coast-Northern Peninsula-Labrador, Nfld.	17.3	2.2	35,740
1110	Prince Edward Island	11.1	2.3	58,790
1210	Cape Breton, N.S.	15.0	1.7	50,580
1220	North Shore, N.S.	9.4	2.2	62,585
1310	Campbellton-Miramichi, N.B.	16.3	1.9	45,070
1340	Fredericton-Oromocto, N.B.	8.7	1.9	52,260
1350	Edmundston-Woodstock, N.B.	8.2	2.3	28,910
2410	Gaspésie-Îles-de-la-Madeleine, Que.	15.4	1.6	28,440
2415	Bas-Saint-Laurent, Que.	8.2	1.6	82,395
2440	Montréal, Que.	10.1	2.0	1,101,205
2445	Laval, Que.	7.9	2.0	151,155
2450	Lanaudière, Que.	7.6	1.5	136,560
2460	Outaouais, Que.	8.8	1.7	90,330
2475	Saguenay-Lac-Saint-Jean, Que.	8.3	1.2	108,040
2480	Côte-Nord / Nord-du-Québec, Que.	9.5	1.7	55,000
3590	Northeast, Ont.	7.7	2.3	233,920
4880	Wood Buffalo-Cold Lake, Alta.	8.8	2.0	76,730

Sources: Statistics Canada, Job Vacancy and Wage Survey; Labour Force Survey, 2015 and 2016.

Notes

1. In recent years, Statistics Canada has collected job vacancy data from various surveys: monthly data starting in March 2011 from the Survey of Employment, Payrolls and Hours; and annual data from 1999 to 2006 from the Workplace and Employee Survey and one-off Workplace Survey in 2011. With the exception of the Workplace Survey, job vacancies are not the focal point of the other surveys. The Job Vacancy and Wage Survey, which is sponsored by Employment and Social Development Canada, is the largest business survey focused on job vacancies conducted by Statistics Canada since the early 1970s.
2. Job vacancy data are released quarterly and accompanied by a brief analysis. See Statistics Canada's website for information on job vacancies for the fourth quarter of 2016 (<http://www.statcan.gc.ca/daily-quotidien/170413/dq170413b-eng.htm>).
3. The JWVS does not distinguish between the types of jobs that are becoming vacant and the types of jobs that are being created.
4. See Gunderson and Riddell (1993).
5. Some analyses refer to the co-existence of reasons for frictional versus structural job vacancies and unemployment. Frictional reasons refer to the normal turnover in the labour market while structural reasons generally refer to the skills or location of unemployed workers not matched with the characteristics of the job vacancy (Gunderson and Riddell, 1993).
6. See Faberman (2009).
7. Estimates of the relationship between job vacancies and unemployment over time (as depicted by the Beveridge curve) will be conducted as more quarterly data become available.
8. Using the average of eight data quarters provides more robust estimates of job vacancies and unemployment by reducing the impact of outliers, smoothing out the potential effects of seasonality, and reducing the variance of estimates. In the current context, estimates of the variance are complex. For the LFS, quarterly variances could be calculated using the average variances calculated from the monthly LFS data. The covariance between months is assumed to be positive thus reducing the overall variance. The average of these quarterly variances is interpreted as an approximation for the true variance. For the JWVS, the average of the quarterly variances, again assuming that the covariance between quarters is positive, is interpreted as an approximation for the true variance.
9. The data for each economic region are available in Table 6 (see the Job vacancy and unemployment rate in economic regions section). The table groups economic regions according to whether their job vacancy and unemployment rates fall above or below the national average.
10. This result is statistically significant at the 1% level. When it is assumed that each economic region is a local labour market and is equally as important as another local labour market (in other words, when it is not weighted by total employment in the economic region), a 1.0 percentage point increase in the unemployment rate is associated with a 0.43 percentage point decline in average job vacancy rates. This result is statistically significant at the 5% level. Robust regression (which detects outliers and provides stable results in the presence of outliers by limiting the influence of outliers) was used to verify the results, and similar results were obtained. Alternative specifications included the square of the unemployment rate divided by 10 to capture the potential non-linearity of the relationship between unemployment rates and job vacancy rates. These specifications captured the same part of the variability in the data as the linear regression that used the economic region unemployment rate. The trendline in Chart 1 is expected job vacancy rate = $0.02755 - 0.045^* (\text{economic region unemployment rate}^2 \div 10)$. This result is statistically significant at the 5% level.
11. A similar result was noted when the 66 economic regions were sorted in ascending order of job vacancies. For discussion purposes, economic regions were grouped into top third, middle third, and bottom third of the job vacancy distribution. Between the bottom and upper third of the job vacancy distribution, job vacancy rates varied between 1.7% and 2.9%, while the average unemployment rate varied between 8.4% and 6.8%.
12. The JWVS and the LFS are two distinct surveys that are sampled and designed to collect different types of information. See the Data sources, methods and definitions section.
13. Similar ratios of unemployed persons per job opening are reported quarterly by the Job Openings and Labor Turnover Survey in the United States (Hirasuna, 2013). In Canada, the Business Payrolls Survey portion of the Survey of Employment, Payrolls and Hours has made these ratios publicly available since March 2011.
14. See the Data sources, methods and definitions section for a discussion about how the variance is estimated for the ratios.

Linking labour demand and labour supply: Job vacancies and the unemployed

15. Chan and Morissette (2016) provide estimates of the causal impact of wages on interprovincial mobility during the 2000s.
16. See Gunderson and Riddell (1993).
17. The focus is on occupation. Workplaces belong to an industry, while each individual employed in each workplace is grouped into the same industrial classification based on the nature of the product made or service rendered. Workplaces can employ individuals performing completely different occupations, and these individuals are classified into appropriate occupation groups based on the tasks and responsibilities of the job.
18. About 2 in 5 unemployed persons did not hold a job in the previous 12 months. This could include the long-term unemployed, persons previously not in the labour force, or those starting a job search for the first time.
19. Since health occupations are predominantly found in the health industry, the health industry also reports a ratio of less than 1.0.
20. According to the LFS, about two-thirds of employment in sales and service occupations are found in retail trade and accommodation and food service industries.
21. Over one-half of trades, transport and equipment operator occupations are found in the construction industry. Similarly, occupations related to manufacturing are found primarily in the manufacturing industry.
22. While some occupations are concentrated in specific industries, others are found in all industries. Take, for example, business, finance and administration occupations: some occupations within this broad group are unique to the financial and business service sector, but most occupations are found in all industries. For business, finance and administration occupations, the ratio of job vacancies per unemployed person varies from 0.8 in the finance and insurance industry and 1.4 in the health industry to 2.4 in the professional, scientific and technical services industry.
23. These findings are consistent with those of Galarneau et al. (2001). Using data from the 1999 Workplace and Employee Survey, they find that many vacant jobs are low paying and associated with high turnover.
24. According to the 2014 Longitudinal and International Study of Adults, 39% of unemployed persons looked for work outside their community (more than 60km away) and 34% looked for work outside their province.
25. One limitation is that the major field of study is not considered in this analysis.
26. The empirical literature shows that overeducated workers earn less than workers who are adequately educated for their job (Boothby, 2002).
27. A noticeable caveat is that neither the JWVS nor the LFS contains information on the education level's major field of study.
28. See Ci et al. (2016).
29. This is measured as the average transition rate from unemployment to employment (or the flow of unemployed to employed divided by the previous month's total number of unemployed persons), based on Labour Force Survey data from January 2001 to December 2016.
30. According to the 2014 Longitudinal and International Study of Adults, employed workers searching for a new job cite reasons related to seeking higher pay to better match their qualifications and getting more work hours.
31. While these boundary lines are arbitrary, they are meant to provide the reader with a qualitative interpretation of the quantitative results in Chart 1.

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