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THE GEOGRAPHIES OF PRECARIOUS LABOUR IN CANADA

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Abstract: Using Statistics Canada's 2011-2016 Labor Force Surveys, this paper examines the spatial dimensions of precarious forms of employment (PFE) in Canada. We first compare different PFEs across a range of geographies including national, provincial, census metropolitan areas and urban/rural areas. The results show that different PFEs exhibited distinct spatial patterns across space and scale. Second, using logistic regression models, results show that patterns in PFEs were reinforced by factors such as immigration status, gender, age, education, and income. These models further confirm that spatial variations in PFEs were robust even when controlling for socio-demographic and socio-economic effects. Taken together, these marked spatial patterns advances our understanding of the spatial divisions of precariousness in Canada.

INTRODUCTION

A growing share of Canada's working population is employed in precarious forms of employment (PFEs) (Hardy et al., 2018; Galarneau 2005). These forms of non-standard employment (i.e. part-time, temporary, seasonal, and multiple job holding) deviate from the normative standard employment relationship (SER) model of full-time full-year employment, common in the post World War II era (Vosko et al., 2003). PFEs are generally associated with a degree of precariousness including low wages and a lack of security and stability (Cranford et al., 2003a, 2003b; Fudge and Owens 2006; Fuller & Vosko 2008; Galarneau 2005; Rodgers 1989; Vosko et al., 2003). A growing body of evidence in Canada has uncovered that certain social groups including women, immigrants and visible minorities (especially South and West Asian immigrants) have a higher propensity of being employed in precarious work (Ali and Newbold 2020a; Cranford et al., 2003a, 2003b, Noack and Vosko 2011).

Within the precarious employment literature in Canada, the understanding of whether geography matters has received less consideration, despite several studies theoretically affirming that space is a significant factor shaping precarious labour market outcomes (MacDonald 2009; Strauss 2018). MacDonald (2009: 211), for instance, emphasizes the importance of examining the influence of space when suggesting that "precariousness is created not just by specific job characteristics but by the spatial contexts in which such work occurs. Precarious employment affects individuals in particular locations and is shaped by spatial dynamics." More so, "the spatial dimension is part of the dynamic that creates and maintains precarious employment and determines its distribution" (MacDonald 2009: 212).

MacDonald's (2009) affirmations are corroborated by Strauss (2018) who further insists that there is much-needed attention to understanding the spatial division of precarious work within and between work sites, firms, and sectors. Hanson (2004: 720), on the other hand, explains why the geographic advantage (that recognizes the significance of processes operating at multiple and interlocking spatial scales) is necessitated in addressing research questions on "globalization and transnationalism affecting people's livelihoods" [this includes the changing nature of work]. Similarly, MacDonald (2009: 211) states that a focus on multi-scalar analysis "brings the importance of space to the forefront, as the socially produced scales of regulation, policy discourse, and individual action interact with geography". In this way, knowing what is occurring at one scale enables comparisons with other scales.

The purpose of this paper is therefore three-fold. First, it examines the spatial patterning of PFEs in Canada, focusing on a suite of geographic scales including the national, provincial, CMAs and urban/rural areas. Second, it considers the socio-demographic, socio-economic and spatio-temporal correlates of PFEs. Third, it explores whether spatial patterns of PFEs are robust when controlling for socio-demographic and socio-economic effects. We hypothesize that differences in PFE vary across geographies and over multiple scales. Our theoretical expectations of 'why' PFEs would vary across the geographies of interest in the study is based on Peck's (1996) affirmation that labour markets are regulated in distinct geographic ways, such that the casual bases of labour market segmentation (labour demand and labour supply) are associated with spatial unevenness in the labour market. In this sense, the supply and demand of workers into precarious employment settings is shaped in distinct geographical ways. Our expectations of 'how' PFEs would vary across the geographies of interest are explained as follows. The Atlantic region of Canada would tend to be over-represented by temporary employment due to the high concentration of seasonal industries in this region (Guillemette et al., 2000). With respect to in-

voluntary part-time employment, Statistics Canada data shows that the unemployment rate and involuntary part-time work are positively related to each other; as such, we expect involuntary part-time work to be high in the Atlantic region where unemployment rates are also high (Statistics Canada 2009). On part-time work, Patterson (2018) reveals that in the western region of Canada, the core working labour force population (aged 25-54) is likely to be employed in part-time work for reasons other than economic (e.g. caring for own children, going to school and personal preference). As such, we expect part-time work to be concentrated in the Western region. We similarly expect this spatial pattern to hold for multiple jobholders who are more likely to have a part-time position as a main job than single job holders (Statistics Canada 2009).

Exploring each of the paper's aims highlighted above advances our understanding of precarious employment and its spatial contours. This advancement has implications for the formulation of place-based economic policies as spatial patterns of PFEs might help us identify population profiles and geographic areas of high precarious employment, where economic policies may be beneficial to improve economic growth, as well as informing the debate on Employment Insurance (E.I.).

LITERATURE REVIEW

Employment arrangements under the standard employment relationship (SER) during the Fordist regime were generally characterized by permanent and full-time employment contracts (Fudge and Owens 2006; Fudge & Vosko 2001; Harvey 1990). The system of production under the Fordist economy was rather unsustainable and was confronted by difficulties (i.e., rigidities) in both long term and large-scale fixed capital investments in mass production systems, as well as in labour markets, labour allocation, and labour contracts (Harvey 1990). These rigidities paved the way for a new form of flexible capital accumulation that is the basis of the flexibility of labour markets and processes (Harvey 1990; Kalleberg & Vallas 2017). The demand for labour flexibility by firms has since resulted in the decline of the SER and a rise in non-standard employment relationships (non-SER) or precarious forms of employment (Fudge & Owens 2006). The rise of precarious employment has been documented by numerous authors in Canada (Fudge & Owens 2006; Vosko 2006; 2010; Vosko et al., 2009), with precarious employment used to describe nonstandard employment arrangements (NSE) that deviate from SER and generally characterized by low income, lack of control over the labour process, high levels of uncertainty, and a lack of regulatory protection (Cranford et al., 2003a, 2003b; Galarneau 2005; Standing 2011).

Various authors have taken differing approaches when defining and measuring NSE (see table 1). The definitions of NSE from the selected literature in table 1 are, however, unified by their deviation from the SER. In Canada, for example, the main conceptualization of precarious employment has generally been through 'non-standard forms of employment' (Cranford et al., 2003b; also see Krahn 1991) i.e., employment that differs from permanent full-time employment. This includes: temporary employment (employment that has a predetermined end date such as contract or casual jobs); part-time employment (employment that carries less than 30 hours per week); involuntary part-time employment (part-time employment that includes persons who could not find employment with 30 or more hours per week because of economic slack or for the reason that full-time employment could not be found); self-employment (working owners of an incorporated/unincorporated business, farm or professional practice) and multiple job holders (working persons who are employed in two or more jobs simultaneously, often in other nonstandard work

Table 1. Definitions and scope of nonstandard/precarious employment within the selected literature

Authors	Measure	Definition
Krahn (1991)	Form	NSE that deviate from the SER. This includes temporary employment, own-account self-employment, part-time employment, and employment in multiple jobs.
Kalleberg (2000)	Form	NSEs including part-time work, temporary help agency and contract company employment, short-term and contingent work, and independent contracting.
Sunter (1993)	Form	Inclusion of shift work in the definition of NSE.
Cranford et al. (2003a, 2003b); Vosko et al (2003)	Form	NSEs that are mutually exclusive such as self-employment, part-time employment, and temporary employment.
Krahn (1995); Zeytinoglu and Weber (2002)	Form	NSEs limited to part-time and temporary employment.
Abraham (1990)	Form	Market mediated employment arrangements that include temporary, contract and subcontract work.
Polivka (1996)	Form	Contingent employment limited to temporary employment with job tenure of one year or less.
Rodgers (1989)	Characteristic	Rodgers (1989) lists four dimensions of 'precariousness' in the labour market. They include short/limited working arrangements (instability); less control of wages/ working conditions (insecurity); absence of worker protection (lack of protection) and low income/poverty (economic vulnerability).

arrangements such as temporary and involuntary part-time employment) (Statistics Canada 2015). In comparison to the form measures, Rodgers (1989) definition of precarious work focuses more on the characteristics/dimensions that make work precarious, with dimensions including high risk of employment loss, job insecurity, lack of protection, and low income/poverty.

The main distinction between the form and characteristics measures of precarious employment (in table 1) are as follows; form measures are widely available using census data and rely on a "binary classification" of employment (e.g., temporary vs permanent employment), while characteristics measures explore the 'detailed' degree of insecurity of the forms (e.g., use of indexes to examine the effects of temporary, part-time, self-employment, etc. on social relations) (Lewchuk 2017). While characteristic measures tend to be a more nuanced measure of labour market insecurity, they were not feasible to measure in this study due to data limitations in census datasets, ultimately resulting in the use of the broad form measures as proposed by Krahn (1991).

One disadvantage of relying on the form measure of precarious work (i.e., non-standard forms of precarious employment) is that it is an indirect indicator of insecure/precarious employment (Cranford et al, 2003b). Another disadvantage is that there is growing heterogeneity within particular forms of employment. For instance, temporary employment is composed of different subtypes (including contract, casual, agency and seasonal employment) that vary in their risk and rewards) (Cranford et al., 2003b; Fuller & Vosko 2008). As such, Cranford et al. (2003b) argue that this makes it problematic when assessing the growth of varying sub-classifications of non-standard forms of employment (situated within the broader forms of non-standard employment) and further examining how/whether their growth has contributed to labour market insecurity. Although forms of precarious employment that capture non-standard work are a limited indicator of labour market security, Cranford et al (2003b) and Fudge and Vosko (2001) stress their broader significance in understanding labour market insecurity. Cranford et al. (2003b: 9), for example, write " ...still, an analysis of non-standard forms of employment is important because as long as the standard employment relationship is the basis for extending labour and social protections to workers... these employment forms (as well as work arrangements) will be linked to precarious employment. A more complete portrait of insecurity in the Canadian labour market must, therefore, consider the relationship between employment forms and dimensions of precarious employment."

In Canada, there has been an extensive research focus on the variability and frequency of PFEs at the national level (Cranford et al, 2003a, 2003b; Krahn 1991, 1995; Noack & Vosko 2011; Vosko et al, 2003). Nonetheless, this work does not focus on how PFEs can vary by levels of geography. Other studies that explore the nexus between

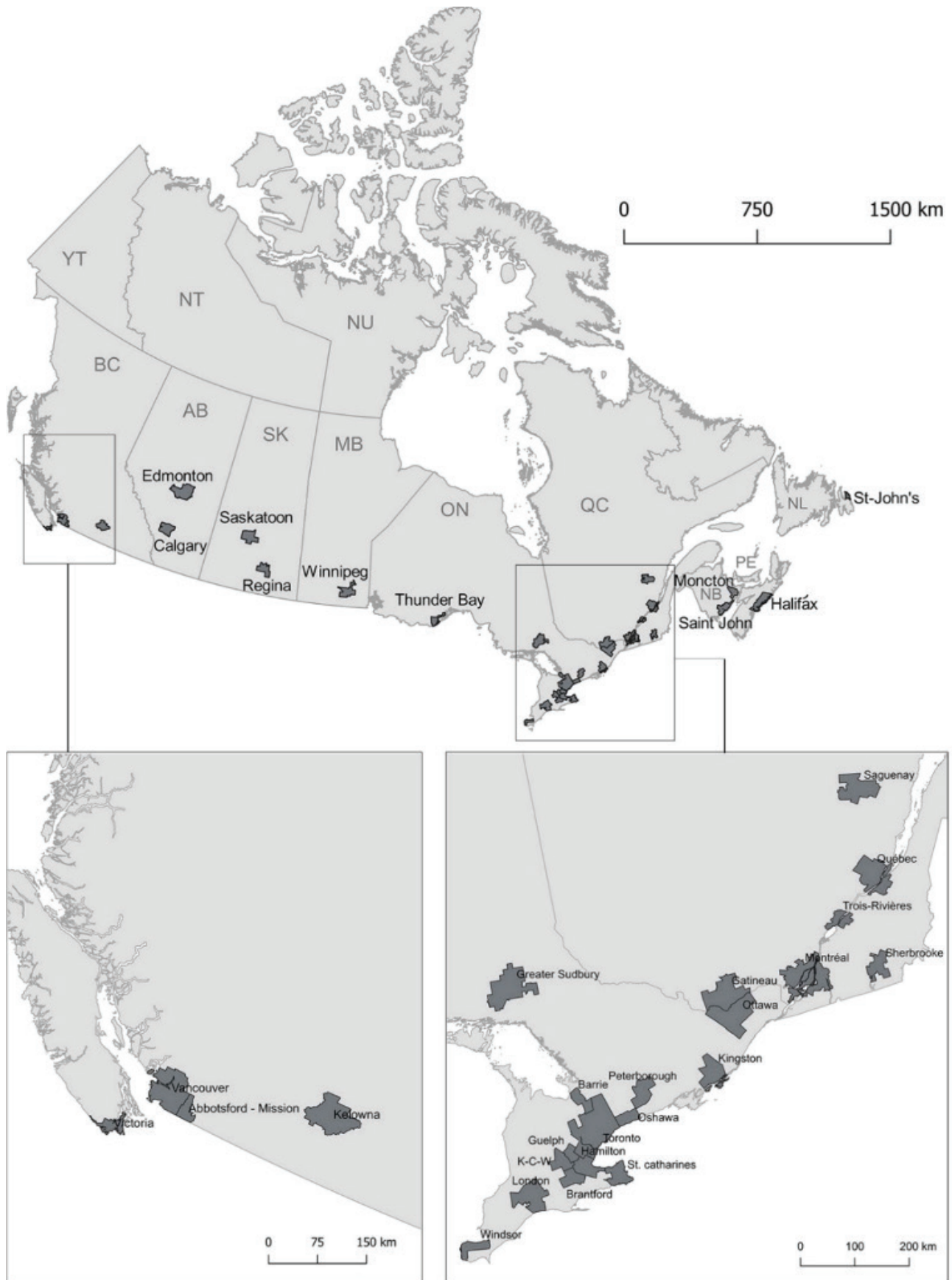
space and labour market outcomes (Hanson et al., 1997, Herod 2003; Jacquemond & Breau 2015; MacDonald 2009; McDowell et al., 2009; Peck & Theodore 2001) either do not examine the heterogeneity among PFEs that fall outside the SER, fail to examine the prevalence of PFEs from a multi-scalar approach across an array of geographies, and/or are situated beyond the Canadian context.

Peck & Theodore (2001), for example, show how at an intra-urban/metropolitan scale (in Chicago's inner cities), temporary agencies are actively engaged in the facilitation and exploitation of racialized populations into precarious settings. Somewhat similar findings are reported by McDowell et al. (2009) at the metropolitan scale in the U.K. context. Jacquemond & Breau (2015) on the other hand find spatial clusters of low levels of precarious employment in northern regions of France. They also find that precarious temporary (interim) work was higher in urban geographies. Modeling results in their study further show that the spatial distribution of PFEs is associated with the unemployment rate, the industrial composition of a region, gender and the structure of family households. In Canada, Ali & Newbold (2020b) adopt an ecological approach to show that census metropolitan and agglomeration areas (CMA/CAs) characterized by high shares of tertiary-educated populations, low-income earners and unemployed populations had a greater probability of workers engaged in temporary employment and its types (seasonal, casual, and contract jobs).

Spatial divisions in precarious labour outcomes are also observed at the urban/rural scale. In the United States for example, Nelson et al. (2015) show how Latino and Latina immigrants are recruited into 'precarious labour regimes' in the service and construction sector within rural geographies (Georgia and Colorado) undergoing gentrification. In Canada, a differentiating factor between rural and urban labour markets is the high incidence of seasonal temporary jobs in rural areas (Rothwell 2002; Stanford et al., 2004). MacDonald (2009) further argues that the maintenance of precarious employment in low income rural geographies is linked with spatial labour mobility constraints (MacDonald 2009). Alternatively, MacDonald (2009) presents the argument that spatial labour mobility can be a factor maintaining precarious work, given the availability of workers willing to commute great distances or migrate permanently or temporarily to occupy low paying precarious jobs.

In summary, the literature points to the growth in PFEs in the Canadian labour market. Studies examining broader labour processes with a geographical lens have been useful in theorizing the complex implications of spatial arrangements on labour market outcomes. However, missing from the surveyed literature is specifically how PFEs manifests and shapes itself across space and scale. The underlying aims of this paper are to examine the variegated geography of precarious forms of employment across a suite of geographic scales including the national, provincial, CMAs and urban/rural areas.

Figure 1. Provinces and CMAs in Canada



Notes: Cartographic boundary files used to create this map were retrieved from : <http://www12.statcan.gc.ca/census-recensement/2011/geo/bound-limit/bound-limit-2016-eng.cfm>.
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METHODS

Data and sample: The data in this study were drawn from the 2011-2016 Labour Force Surveys (LFS) administered by Statistics Canada. This survey provides monthly-nationwide estimates on the labour force status of Canada's population. A suite of socio-economic, socio-demographic and geographic population characteristics supplements each sample. The target population of the LFS includes household residents who are 15 years of age or older. Exemptions to the target population of the LFS include full-time members of the Canadian forces, populations in aboriginal reserves, remote areas and institutions. These populations are excluded for accessibility reasons. The LFS collects data from all ten provinces (at a variety of spatial scales) and three territories. Statistics Canada, however, does not include estimates for the territories with the national total due to differences in methodology (in sample design and rotation pattern) from the 10 provinces. Estimates for the territories are calculated and reported separately as moving averages and are not included with the monthly provincial totals. The provinces and CMAs considered in this study are shown in figure 1.

The LFS sample size typically includes 100,000 individuals representing 56,000 households. The LFS follows a rotating panel sample design, with data collected from the same subsample for six consecutive months, with each month consisting of six subsamples. In any given month, the survey drops 1 subsample after completing its 6 months stay in the survey. A new subsample is then drawn to replace the dropped respondents. The use of a rotating panel sample design results in a month to month sample overlap occurring over five to six consecutive months. To ensure that the samples in this study do not overlap, January and July samples were focused on, thus ensuring that the two months are within separate rotating panels and have unique household identifications. We specifically chose the months of January and July due to the high sample counts within these months in comparison to other survey months. This was imperative for statistical vetting purposes. We, however, acknowledge that these months differ in their economic activity and are subject to season

variation. Lastly, the study sample was then restricted to include Canada's population who are 25-64 years of age, employed and not full-time students. We impose these restrictions to capture the core working-age population that is fully engaged in the labour market.

Method of analysis: We conducted both descriptive and multivariate statistics using SAS 9.4. The first stage used descriptive statistics to characterize PFEs, including temporary employment, part-time employment, involuntary part-time employment and employment in multiple jobs^{1,2}.

We exclude self-employment (specifically own-account self-employment) from our analysis as the unweighted sample counts for a sizable number of CMAs were small and unreliable. Similarly, for disclosure and data quality purposes we treated temporary employment types (seasonal, contract, and casual employment). Frequencies for each PFE were calculated at the national, provincial, CMA and urban/rural geographic levels. While some of our focus is at the CMA scale, we are also interested in variations in precarious employment across the urban-rural spectrum, with this spectrum differentiated by seven levels, ranging from CMAs to non-CA rural areas. Statistics Canada's LFS dictionary defines each of the urban/rural geographies used in this paper.

The second stage used logistic regression analysis to examine the relationship between socio-demographic, socio-economic, spatial and temporal variables for each of the four types of PFE. Logistic regression models were also used to assess whether geography is a significant determinant of precarious employment when controlling for socio-demographic, socio-economic and temporal effects. Finally, to ensure the stability of the variance estimates for key survey estimates we weight each model in the logistic regression analysis using the normalized LFS final weight and the LFS bootstrap weights (1000 bootstrap replicate weights).

Key Variables: The rationale for the socio-demographic and socio-economic variables used in this study are highlighted in table 2.

Table 2. The rationale for socio-demographic and socio-economic covariates

Variable	Explanation
Immigration status	Disparities in labour market outcomes exist between immigrant and Canadian born populations with immigrants likely to be relegated in low-wage, low-skilled employment arrangements (Ali and Newbold 2020a; Creese and Wiebe 2009; Noack and Vosko 2011). Aydemir and Skuterud (2005) and Creese and Wiebe (2009) further add that the failure of employers to recognize immigrants' foreign credentials/experiences is a contributing factor explaining their deteriorating income and segmentation in secondary labour markets.
Age	Vosko et al (2003) empirically find that younger aged populations are more likely to be precariously employed than older workers who are at the peak of their careers.
Gender	Moyser (2017) shows that gender disparity in the Canadian labour market remains pervasive. Moyser's (2017) study, for instance, finds that following the Second World War, women performed fewer hours of paid work per week on average (from 1976-2014) and were more likely to work part-time relative to men. Comparable findings are reported by Cranford et al. (2003b) who note that women's positioning in precarious forms of employment is reflected by the feminization of employment norms.
Marital status	Young (2010) reports how family-related determinants such as marital status has an impact on precarious work, as single populations were reported to have a higher likelihood of employment in part-time work.
Education	Longitudinal studies using 1999-2004 SLID in Canada confirm lower transition rates from temporary to permanent employment for tertiary-educated populations (Fang and MacPhail 2008). In Germany and the UK, Gebel (2010) finds that tertiary-educated populations have a greater risk of being precariously employed at the beginning of their career.
Income	Rodgers (1989) establishes economic vulnerability (i.e., low income/poverty) as a dimension of precariousness.
Union status	Rodgers (1989) further establishes that the absence of worker protection through collective bargaining is also another dimension of precariousness.
Occupation¹	Occupations specific to the service sector have been identified in the literature to be precarious (Fuller and Vosko 2008).

¹ We focus on occupations rather than industries to understand whether the specific jobs performed by workers are precarious.

¹ It is essential to note that the PFEs examined in this study are not mutually exclusive.

² The difference between how part-time and involuntary part-time employment is calculated is based on the universal denominator for each variable. The universal denominator used to calculate the frequencies for involuntary employment includes respondents who are currently employed part-time only while the universal denominator used to calculate part-time employment includes respondents who are currently employed only.

MAIN RESULTS

Descriptive statistics: At the national scale, part-time employment was the most prevalent form of precarious employment (12.5%) followed by involuntary part-time employment (11.3%), while multiple job holding was the least common (5.0%). Overall, 9.3% of workers in Canada were found to be employed on a temporary basis. Keeping in mind national rates of precarious forms of employment, we consider geographic variations at smaller, sub-national scales in figure 2. We find that temporary employment was more prevalent in Atlantic Canada and became gradually less prevalent moving westward (with very low prevalence in central Canada). Specifically, Newfoundland and Labrador and Prince Edward Island were the provinces where the greatest percentage of workers were engaged in temporary employment (19.9% and 18.3%, respectively). The provinces of Ontario and Manitoba comparatively had the lowest share of temporary employment (8.1% and 7.8%, respectively). In a similar fashion the highest rates of involuntary part-time employment were reported in the Atlantic province of Prince Edward Island (20.4%), while the lowest in Saskatchewan (7.9%). Findings for part-time employment differed from those of involuntary part-time employment. Employment in part-time work was most common in western provinces and least common in the Atlantic provinces. Newfoundland and Labrador, Canada's easternmost province, reported the lowest part-time employment prevalence (9.3%), while British Columbia had the highest (15.7%). Like part-time work, employment in multiple jobs was more prevalent in western Canada and least common in Atlantic Canada. In the west, Manitoba and Saskatchewan had high rates of employment in multiple jobs (6.7% and 7.1% respectively). Moreover, Saskatchewan's share was higher in comparison to other provinces. Alternatively, employment in multiple jobs was least common in Newfoundland and Labrador and Québec, with 3.6% and 3.8% of the working population employed in multiple jobs, respectively.

Echoing trends observed at the provincial level, the findings at the CMA scale in table 3 show that on average, temporary employment was higher within specific CMAs in Atlantic Canada (e.g. St. John's, NL -13.5%) and less common in central and western CMAs. The broad east-west pattern in temporary work were however partially distorted with slight variations across space, with Ontario CMAs reporting the lowest share in temporary work. Specifically, lower rates of temporary employment are observed in Oshawa, ON (5.7%) in comparison to CMAs in Ontario and other provinces.

Variations across space are observed at the CMA scale with respect to involuntary part-time employment with a high in eastern CMAs of Newfoundland and Labrador, Nova Scotia and New Brunswick. Lower rates were generally observed across Quebec CMAs and higher rates across Central Canadian CMAs (specifically Toronto and Windsor (17.1% and 19.2% respectively)). Moving further westward, rates tended to be lower. In comparison, part-time work was more common in western Canada CMAs and least common in Atlantic CMAs. Victoria, BC, the westernmost CMA, reported the highest participation in part-time employment (16.7%), while St. John's, NL had the lowest (7.7%). Larger CMAs in Ontario, such as Toronto, had the lowest share of workers employed in part-time time work relative to other CMAs in Ontario (10.8%). However, in general part-time employment exhibited greater spatial variations across CMAs. Similar to part-time employment, the share of Canada's population employed in multiple jobs tends to be greater on average in CMAs located in western Canada (e.g. CMAs in British Columbia, Alberta, Saskatchewan and Manitoba). Although a west to east spatial difference was evident, specific CMAs in central Canada were distinct with respect to having a high percentage of their population working multiple jobs. For example, Kingston, ON, reported the highest population percentage employed in multiple jobs (7.0%) relative to other CMAs.

Figure 2. Weighted percentages for Canada's population engaged in PFE, across provinces, 2011-2016

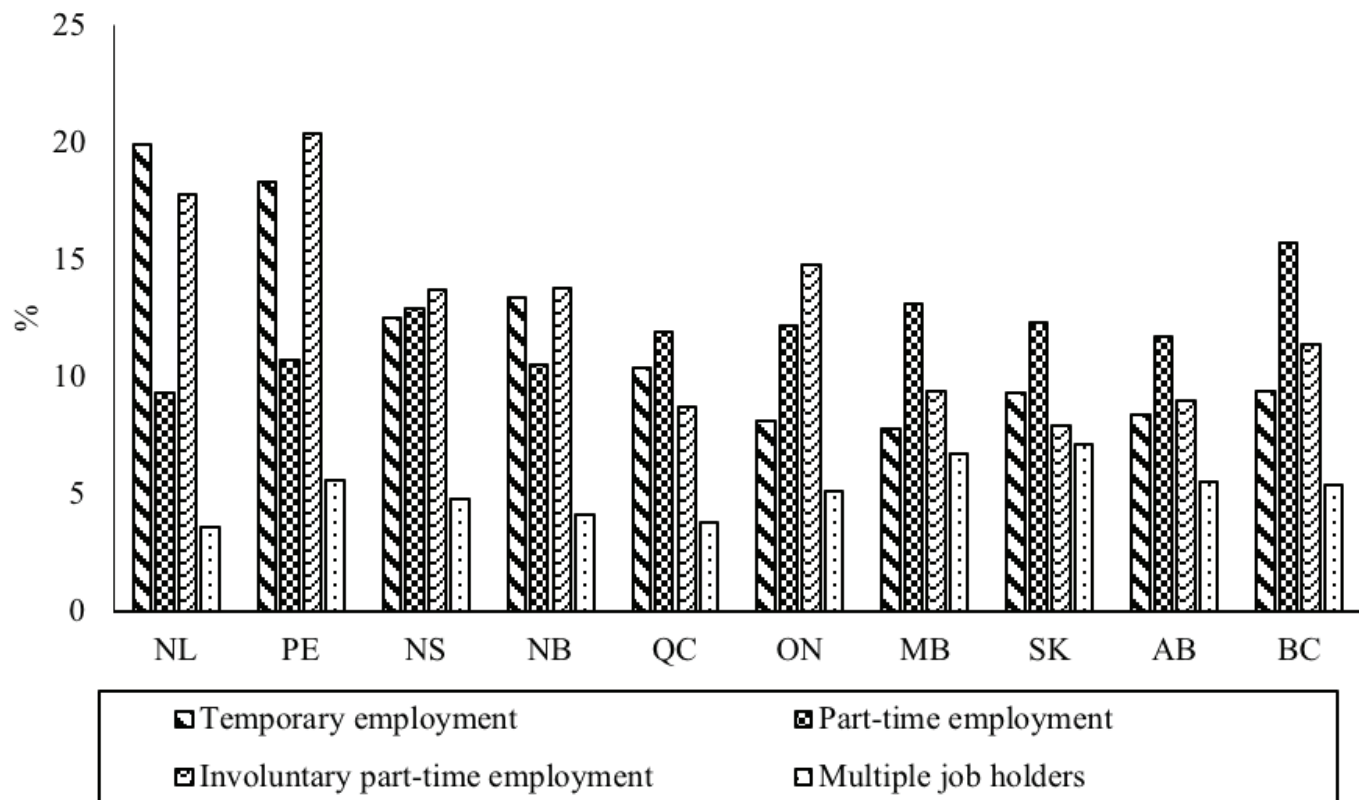


Table 3. Weighted percentages for Canada's population engaged in PFE, across CMAs, 2011-2016

Geography	Temporary employment	Part-time employment	Involuntary part-time employment	Multiple job holders
St John's, NL	13.5	7.7	13.6	4.1
Halifax, NS	9.8	11.5	12.0	5.0
Moncton, NB	9.2	9.9	12.9	4.3
Saint John, NB	9.8	10.0	x	4.4
Saguenay, QC	11.6	13.4	8.2	3.0
Quebec, QC	11.5	10.3	8.1	3.9
Sherbrooke, QC	11.0	14.9	8.8	4.6
Trois-Rivieres, QC	9.9	14.0	9.2	3.8
Montréal, QC	9.8	11.7	9.3	3.8
Gatineau, QC	10.4	9.1	10.5	3.9
Ottawa, ON	9.1	11.2	14.0	5.3
Kingston, ON	9.9	14.5	14.7	7.0
Peterborough, ON	9.1	16.5	x	5.9
Oshawa, ON	5.7	12.2	15.8	4.2
Toronto, ON	8.3	10.8	17.1	4.7
Hamilton, ON	6.4	12.5	11.6	4.5
St.Catharines-Niagara, ON	8.2	15.7	14.4	5.8
Kitchener-Cambridge-Waterloo, ON	6.3	12.2	12.9	5.0
Brantford, ON	6.2	13.5	x	5.0
Guelph, ON	7.4	12.6	11.6	5.7
London, ON	8.7	13.8	16.5	5.4
Windsor, ON	6.3	13.8	19.2	5.2
Barrie, ON	7.9	12.4	x	5.0
Greater Sudbury, ON	9.5	11.6	13.6	3.8
Thunder Bay, ON	9.4	14.3	10.0	6.7
Winnipeg, MB	8.0	12.5	11.5	6.5
Regina, SK	8.7	9.2	9.6	6.2
Saskatoon, SK	9.1	12.1	10.4	6.5
Calgary, AB	8.1	10.9	10.6	5.2
Edmonton, AB	8.8	10.9	9.7	5.1
Kelowna, BC	10.4	16.1	x	5.4
Abbotsford-Mission, BC	7.9	15.3	9.4	5.7
Vancouver, BC	9.1	14.5	11.9	5.1
Victoria, BC	9.9	16.7	12.8	6.1

Notes: x-indicates that the sample is too small for disclosure.

Figure 3 provides a summary of PFE across the urban/rural spectrum. The results show that temporary employment (12.8%), part-time employment (14.8) and multiple job holders (6.1%) were more common in rural and small-town areas (non-CA Rural) and gradually decreased across urban geographies. Involuntary part-time employment, on the other hand, was the only form of precarious work that was common in urban core areas (13%) and gradually decreased across rural geographies.

Estimation results- Spatial effects. We now turn to the estimation results of the logistic regression analysis of PFE (table 4). Results of the logistic regression support our finding that geography is significantly associated with precarious employment even when controlling for socio-demographic and socio-economic effects. Moreover, geographic effects in the logistic regression models validate the general pattern observed in the descriptive statistics. For example, in comparison to Toronto, the likelihood of being employed in temporary work is generally greater amongst CMAs located in Atlantic Canada and less in western CMAs. In contrast, the odds of being employed

in part-time jobs was significantly reduced among CMAs located in Atlantic Canada and increased in western CMAs. This was not the case for involuntary-part-time employment that was represented in high shares in Atlantic Canada's CMAs. Multiple jobs on the other hand was more common in western CMAs and less common across the Eastern CMAs. Moving to urban/rural effects, the findings show that the chances of being employed in all PFEs generally increases as one progresses from an urban to a more rural geography (i.e. CMA-CA Secondary Urban Core to Non-CA Rural) in comparison to CMA/CA Urban Code (except for involuntary part-time employment, in both the base model).

Socio-demographic effects. Multivariate analysis indicate that women were significantly more likely to be employed in temporary and part-time work than their male counterparts ((OR=1.096, $p < .0001$), (OR = 2.808, $p < .0001$) respectively)). Gender differences in other PFE show contrasting findings. For example, women were 46.9% (OR = 0.531 $p < .0001$) less likely to be employed in involuntary part-time work than men. Turning to immigration status, we find that immigrants were significantly more likely to be employed in temporary, involuntary part-time and multiple jobs ((OR = 1.160, $p < .0001$), (OR= 1.658, $p < .0001$), (OR =1.098, $p = 0.0002$), respectively) than the Canadian born population, although they were 15% less likely to be engaged in part-time work (OR = 0.850, $p < .0001$). Age effects reveal that increasing age is associated with a decreasing likelihood of being employed in involuntary part-time and multiple jobs (in comparison to the 55-64-year age group). Moving to marital status effects, respondents that are single were significantly more likely to be employed on a temporary basis in comparison to separated, divorced and widowed respondents (OR = 1.216, $p < .0001$). However, single and married respondents were significantly less likely to be employed in multiple jobs than separated, divorced or widowed respondents (OR = 0.896, $p = 0.002$). With respect to education, the results illustrate a slight positive linear relationship between higher levels of education and employment in all forms of precarious employment. The cross-sectional design of the LFS however limited our ability to further understand the duration of tertiary-educated populations in PFEs and the rate at which they transition to more permanent wage work.

Socio-economic effects. We find that as income increases, the likelihood of being employed in all forms of precarious work significantly decreases. Regarding occupation, the results show a significant association between all occupations and temporary precarious employment. However, effect measures (odds ratios) were not pronounced in the temporary employment model in comparison to other PFEs, although contrasting findings are observed in other cases such as occupations in trades, transport, and equipment operators (OR = 1.219, $p = 0.0955$) and manufacturing and utilities (OR = 1.344, $p = 0.0867$), both of which were associated with a greater likelihood of involuntary part-time employment than natural resources, agriculture, and related production occupations. Furthermore, occupations in health (OR= 1.761, $p < .0001$) and art, culture, recreation and sport (OR=1.626, $p < .0001$) were associated with a significantly greater probability of part-time employment than natural resources, agriculture, and related production occupations. Occupations in art, culture, recreation and sport (OR = 1.848, $p < .0001$) and education, law and social, community and government services (OR = 1.569, $p < .0001$) were associated with a greater likelihood of multiple job employment than the reference occupation. Lastly, our results show that non-unionized workers had a greater likelihood of employment in multiple jobs. However, one should note that the less likeliness of non-unionized workers to be employed in other PFEs such as part-time and involuntary and part-time work was minimal (i.e., 0.7 % and 3.7% less likely respectively).

Figure 3. Weighted percentages for Canada's population engaged in PFE, across urban/rural geographies, 2011-2016

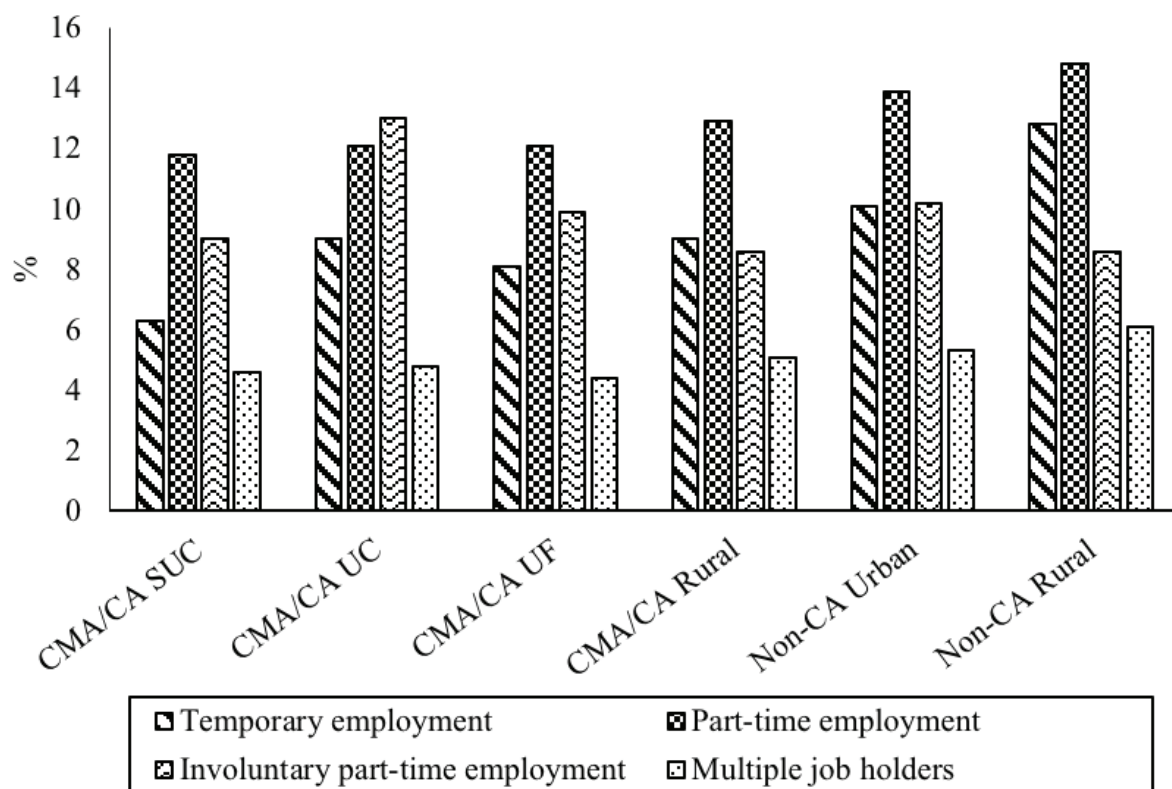


Table 4. Logistic regression estimates for PFEs - Canada's population, 2011-2016

Independent variables	Temporary employment	Part-time employment	Involuntary part-time employment	Multiple job holders
	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)
Socio-demographic				
Immigration status (reference : non-immigrants)				
Immigrants	1.160*** (1.116-1.206)	0.850*** (0.818-0.883)	1.658*** (1.521-1.808)	1.098*** (1.046-1.153)
Population age (reference: 55-64)				
25-34	1.106*** (1.064-1.151)	0.544*** (0.523-0.566)	3.038*** (2.696-3.423)	1.318*** (1.241-1.400)
35-44	0.851*** (0.815-0.888)	0.608*** (0.586-0.632)	2.581*** (2.308-2.887)	1.282*** (1.210-1.358)
45-54	0.800*** (0.769-0.832)	0.603*** (0.581-0.626)	2.555*** (2.282-2.861)	1.245*** (1.180-1.314)
Gender (reference: men)				
Women	1.096*** (1.063-1.131)	2.808*** (2.718-2.902)	0.531*** (0.486-0.580)	0.966 (0.927-1.008)
Marital status (reference: separated, divorced, widowed)				
Married, common law	0.909*** (0.868-0.951)	1.278*** (1.227-1.331)	0.547*** (0.490-0.609)	0.752*** (0.710-0.797)
Single	1.216*** (1.155-1.281)	1.217*** (1.160-1.278)	0.867** (0.763-0.986)	0.896*** (0.835-0.960)
Education (reference: without high school graduation)				
High school graduate	0.813*** (0.771-0.857)	0.991 (0.941-1.044)	1.212*** (1.052-1.397)	1.339*** (1.230-1.458)
Some post-secondary education	0.943 (0.878-1.013)	1.107*** (1.035-1.185)	1.423*** (1.186-1.707)	1.609*** (1.443-1.795)
Postsecondary certificate or diploma	0.914*** (0.870-0.960)	0.990 (0.942-1.041)	1.638*** (1.428-1.878)	1.668*** (1.539-1.809)
University degree	1.271*** (1.199-1.347)	1.087*** (1.027-1.150)	1.923*** (1.656-2.234)	1.941*** (1.783-2.113)

Table 4. Logistic regression estimates for PFEs - Canada's population, 2011-2016 (continued)

	Temporary employment	Part-time employment	Involuntary part-time employment	Multiple job holders
Socio-economic				
Income (reference: Hourly Earnings (HE) greater than \$30.00)				
HE < \$12.00	4.109*** (3.886-4.346)	5.524*** (5.247-5.814)	2.931*** (2.510-3.423)	1.823*** (1.690-1.966)
\$12.00 ≤ HE ≤ \$19.99	2.431*** (2.329-2.536)	2.427*** (2.33-2.528)	2.442*** (2.131-2.798)	1.772*** (1.679-1.871)
\$20.00 ≤ HE ≤ \$29.99	1.575*** (1.513-1.639)	1.347*** (1.294-1.402)	1.710*** (1.487-1.967)	1.379*** (1.306-1.456)
Occupation (reference: natural resources, agriculture and related production occupations)				
Management occupations	0.132*** (0.120-0.146)	0.200*** (0.177-0.226)	0.623** (0.404-0.962)	0.833*** (0.731-0.948)
Business, finance and administration occupations	0.241*** (0.226-0.256)	0.694*** (0.639-0.754)	0.751*** (0.605-0.934)	1.035 (0.927-1.156)
Natural and applied sciences and related occupations	0.269*** (0.249-0.290)	0.314*** (0.279-0.353)	0.598*** (0.409-0.875)	0.670*** (0.587-0.766)
Health occupations	0.318*** (0.296-0.341)	1.761*** (1.618-1.916)	0.777** (0.627-0.964)	1.915*** (1.708-2.147)
Occupations in education, law and social, community and government services	0.558*** (0.524-0.594)	1.224*** (1.126-1.331)	1.102 (0.896-1.356)	1.569*** (1.406-1.750)
Occupations in art, culture, recreation and sport	0.607*** (0.546-0.676)	1.626*** (1.447-1.826)	1.074 (0.812-1.421)	1.848*** (1.590-2.147)
Sales and service occupations	0.204*** (0.191-0.217)	1.160*** (1.071-1.257)	0.917 (0.751-1.121)	1.104* (0.993-1.227)
Trades, transport and equipment operators and related occupations	0.499*** (0.470-0.530)	0.520*** (0.475-0.569)	1.219* (0.966-1.539)	0.646*** (0.573-0.729)
Occupations in manufacturing and utilities	0.230*** (0.211-0.250)	0.194*** (0.171-0.220)	1.344* (0.958-1.885)	0.590*** (0.515-0.677)
Union status (reference: union member)				
Not a union member	0.870*** (0.843-0.898)	0.993 (0.962-1.024)	0.963 (0.882-1.051)	1.028 (0.987-1.071)
Spatial				
CMA (reference: Toronto)				
St-John's	1.794*** (1.632-1.973)	0.584*** (0.521-0.654)	1.073 (0.828-1.389)	0.844*** (0.745-0.956)
Halifax	1.117*** (1.029-1.213)	0.802*** (0.743-0.865)	0.834* (0.693-1.004)	0.936 (0.839-1.045)
Moncton	1.030 (0.913-1.162)	0.585*** (0.509-0.673)	1.034 (0.758-1.410)	0.795*** (0.673-0.939)
Saint John	1.168** (1.029-1.326)	0.621*** (0.556-0.694)	0.976 (0.718-1.326)	0.895 (0.774-1.034)
Saguenay	1.405*** (1.268-1.557)	1.077 (0.966-1.201)	0.570*** (0.426-0.762)	0.601*** (0.485-0.745)
Quebec	1.442*** (1.328-1.565)	0.852*** (0.784-0.926)	0.596*** (0.432-0.821)	0.735*** (0.639-0.845)
Sherbrooke	1.279*** (1.163-1.407)	1.198*** (1.073-1.338)	0.697** (0.502-0.969)	0.866 (0.720-1.042)
Trois-Rivieres	1.144*** (1.036-1.263)	1.166*** (1.058-1.286)	0.694** (0.516-0.933)	0.720*** (0.615-0.844)
Montréal	1.134*** (1.068-1.205)	0.968 (0.912-1.026)	0.565*** (0.480-0.666)	0.755*** (0.695-0.820)
Gatineau	1.335*** (1.231-1.449)	0.781*** (0.705-0.864)	0.738** (0.547-0.997)	0.827*** (0.723-0.945)
Ottawa	1.143*** (1.055-1.238)	0.996 (0.912-1.087)	0.918 (0.752-1.121)	1.123*** (1.003-1.258)
Kingston	1.173*** (1.073-1.282)	1.131*** (1.042-1.227)	1.284** (1.052-1.568)	1.385*** (1.230-1.559)
Peterborough	1.074 (0.902-1.280)	1.292*** (1.089-1.532)	1.364* (0.967-1.922)	1.232* (0.986-1.539)
Oshawa	0.725*** (0.645-0.816)	1.058 (0.962-1.164)	1.292** (1.035-1.614)	0.960 (0.839-1.099)
Hamilton	0.763*** (0.685-0.848)	1.066 (0.975-1.166)	0.879 (0.690-1.119)	0.934 (0.805-1.083)
St. Catharines-Niagara	0.963 (0.864-1.075)	1.195*** (1.099-1.301)	1.212* (0.999-1.470)	1.150** (1.019-1.298)
Kitchener-Cambridge-Waterloo	0.747*** (0.667-0.836)	1.138*** (1.049-1.235)	1.004 (0.813-1.240)	1.105 (0.965-1.265)

Table 4. Logistic regression estimates for PFEs - Canada's population, 2011-2016 (continued)

	Temporary employment	Part-time employment	Involuntary part-time employment	Multiple job holders
Brantford	0.750*** (0.661-0.851)	1.151** (1.017-1.302)	0.786 (0.559-1.104)	1.140* (0.987-1.317)
Guelph	0.850** (0.727-0.995)	1.160** (1.034-1.300)	0.821 (0.545-1.237)	1.263*** (1.074-1.486)
London	1.042 (0.954-1.139)	1.146*** (1.063-1.235)	1.227** (1.001-1.506)	1.114* (0.991-1.252)
Windsor	0.723*** (0.632-0.826)	1.231*** (1.141-1.328)	1.349*** (1.088-1.674)	1.068 (0.916-1.246)
Barrie	0.982 (0.877-1.099)	1.025 (0.854-1.230)	1.388** (1.028-1.874)	1.029 (0.863-1.227)
Greater Sudbury	1.118** (1.006-1.243)	0.913** (0.835-0.998)	1.179 (0.921-1.509)	0.800*** (0.692-0.926)
Thunder Bay	1.135** (1.021-1.262)	1.185*** (1.072-1.310)	0.788* (0.607-1.023)	1.493*** (1.307-1.706)
Winnipeg	0.857*** (0.808-0.909)	1.025 (0.973-1.080)	0.764*** (0.662-0.881)	1.352*** (1.259-1.452)
Regina	1.115** (1.026-1.213)	0.832*** (0.760-0.911)	0.702** (0.520-0.949)	1.401*** (1.270-1.546)
Saskatoon	1.036 (0.957-1.122)	1.069* (0.988-1.158)	0.779** (0.621-0.977)	1.473*** (1.331-1.631)
Calgary	0.997 (0.924-1.076)	1.098** (1.018-1.185)	0.771** (0.625-0.952)	1.231*** (1.113-1.363)
Edmonton	1.092** (1.010-1.182)	1.064 (0.988-1.146)	0.734*** (0.597-0.903)	1.213*** (1.106-1.331)
Kelowna	1.323*** (1.132-1.548)	1.393*** (1.201-1.616)	1.016 (0.697-1.483)	1.026 (0.784-1.342)
Abbotsford-Mission	0.820*** (0.727-0.925)	1.203*** (1.094-1.323)	0.706** (0.523-0.952)	1.290*** (1.126-1.478)
Vancouver	1.033 (0.968-1.102)	1.298*** (1.227-1.372)	0.804*** (0.694-0.931)	1.098** (1.012-1.191)
Victoria	1.238*** (1.132-1.354)	1.456*** (1.353-1.568)	1.012 (0.844-1.213)	1.261*** (1.113-1.428)
Urban/rural (reference: CMA/CA Urban Code)				
CMA/CA Secondary Urban Core	0.776*** (0.703-0.856)	1.026 (0.939-1.122)	0.834 (0.652-1.066)	1.064 (0.914-1.239)
CMA/CA Urban Fringe	0.998 (0.914-1.090)	1.031 (0.954-1.113)	0.933 (0.753-1.156)	1.009 (0.883-1.152)
CMA/CA Rural	1.086*** (1.031-1.144)	1.030 (0.985-1.078)	0.902 (0.793-1.026)	1.101*** (1.029-1.177)
Non-CA Urban	1.183*** (1.117-1.252)	1.118*** (1.063-1.176)	0.812*** (0.707-0.931)	1.178*** (1.092-1.270)
Non-CA Rural	1.538*** (1.467-1.611)	1.169*** (1.119-1.221)	0.854*** (0.759-0.962)	1.378*** (1.289-1.472)
Temporal				
Survey year (reference: 2016)				
2011	0.995 (0.948-1.043)	0.934*** (0.894-0.977)	1.167*** (1.041-1.308)	0.954 (0.896-1.017)
2012	0.997 (0.949-1.048)	0.920*** (0.881-0.961)	1.029 (0.912-1.162)	0.945* (0.888-1.006)
2013	1.011 (0.964-1.061)	0.942*** (0.902-0.984)	1.025 (0.908-1.158)	0.937*** (0.88-0.997)
2014	0.979 (0.934-1.027)	0.963*** (0.922-1.005)	1.052 (0.934-1.186)	1.000 (0.938-1.066)
2015	0.997 (0.949-1.047)	0.941*** (0.900-0.983)	0.981 (0.866-1.112)	0.970 (0.911-1.032)
Survey month (reference: July)				
January	0.849*** (0.826-0.873)	1.148*** (1.119-1.178)	1.100*** (1.027-1.179)	1.082*** (1.041-1.124)
Summary statistics				
N (unweighted)	498,371	498,371	57,468	4983,71
Likelihood ratio/F statistic	261.72	718.99	54.64	76.18
Percent concordant	68	78	70	63

Note: OR = Odds Ratio. *Significant at the 90% level; **significant at the 95% level; and ***significant at the 99% level.

DISCUSSION AND CONCLUSION

This paper has described the spatial variations associated with precarious forms of employment across Canada's landscape. The analysis yielded several key findings. At the provincial and CMA levels, we observe different spatial patterns by type of PFE, thus supporting the study's hypothesis that differences in PFE vary over multiple scales. For instance, temporary and involuntary part-time work were found to be more prevalent in the Atlantic provinces and CMAs, with lower rates of these types of work moving across central and western provinces and CMAs. In contrast, part-time employment and multiple job holding were more common in western provinces and CMAs and were less prevalent in central and Atlantic provinces and CMAs. Results of the multivariate analysis support our finding that geography is significantly associated with precarious employment as shown by the distinct spatial patterns even when controlling for socio-demographic and socio-economic effects

Of all forms of PFE, temporary employment had the most visible east-west spatial pattern. Studies have shown that the spatial concentrations of seasonal employment is high in Atlantic Canada and the impact of seasonality within this region leads to disparities in labour markets and earnings in Canada (De raaf et al., 2003; Guillemette et al., 2000). Moving to urban/rural areas, the results demonstrate that precarious employment is more of a rural phenomenon. General urban-rural findings in this study are analogous to findings of several studies within the Canadian context, all showing a higher incidence of non-standard work in rural areas (Alasia & Rothwell 2003; Curto & Rothwell 2003; Perusse 1997; Rothwell 2002). Other studies examining urban/rural labour markets beyond the Canadian context indicate similar prevalence in precarious work in rural regions (Bryden and Bollman, 2000). Bryden and Bollman (2000), for example, examined changes in rural employment in Organisation for Economic Co-operation and Development (OECD) economies, and noted that the decline in agricultural employment is supplemented by the increase in service employment and changes in urban labour markets (feminization, shift to part-time and casual work etc.) that have contributed to increases in part-time or temporary jobs (Bryden & Bollman 2000). It has been argued that the predominance of precarious work in rural areas has been exacerbated by a "spatial division of labour", with rural economies increasingly becoming the recipients of low-paid jobs (Barkley 1995; Phimister et al., 2006).

In conclusion, the findings of this paper clearly establish that PFEs have an inherent spatial dimension with provincial, CMA and rural/urban dimensions. The broad, regional, provincial, CMA and rural/urban spatial dimensions create, maintain or determine the spread of precarious employment (MacDonald 2009), while precarious employment is reinforced by factors such as immigration status, age and education. While this paper has offered insight into spatial patterns of PFEs, limitations remain, particularly with respect to small-scale patterns. Given that the spatial dimensions create, maintain or determine the spread of precarious employment (MacDonald 2009), there is a need to consider smaller spatial scales. However, such data is currently not available given resolution or reporting requirements by Statistics Canada. Furthermore, since the data in this study have clear spatial referents, spatial dependence tools (e.g., spatial autocorrelation) would have added further insights to the study. However, spatial autocorrelation analyses such as Moran I scatter plots were not feasible to conduct in this study as they fail to meet the disclosure requirements of Statistics Canada. Beyond these limitations, the findings of this study have implications for the formulation of place-based policies that could target geographies where precarious employment is prevalent. Generally, place-based policies have been conventionally used in labour markets in North America such as the United States through State Empowerment Zones (EMPZs) and Enterprise Community (ENTC) programs to improve employ-

ment prospects in disadvantaged geographies (Ham et al., 2011). Studies have shown that these programs and policies have positive, statistically significant impacts on local labour markets in terms of the unemployment rate, the poverty rate, the fraction with wage and salary income, and employment (Ham et al., 2011).

Although these policies/programs have been successful, their self-sustainability has been questioned by some authors. Moretti (2012), for instance, writes that "the real test is not whether [place-based policies] . . . create jobs during the push . . . Instead, we need to look at whether the publicly financed seed can eventually generate a privately supported cluster that is large enough to become self-sustaining" (Moretti 2012: 200-201). This limitation channels an area for future work to assess the efficacy of place-based policies, in the long run. Future research may also need to address two important questions on place-based policies that could address weak employment prospects within precarious geographies in Canada, namely for which populations? And why? To achieve this, future work could focus on any of the geographies where precarious employment is high and qualitatively examine what social reproduction activities create and manifest these precarious labour inequalities within and across space. Answers to these questions could better inform policymakers in the formulation of prudent place-based policies that address labor market inequalities in disadvantaged geographies. Beyond the need to enact more place-based policies, this study has implications for Canadian policies such as Employment Insurance (E.I). This social program does not account for the changing nature of work in Canada. The regionally differentiated entitlement to E.I leads to disparities in entitlements and eligibility between and within regions. For example, the regional differentiation of EI is disadvantageous to populations who are situated in urban geographies where the unemployment rate is low and precarious involuntary part-time work is high. As such, there is a growing need to improve the equity of the program by moving towards a single-entry system that takes into account the fewer working hours of precarious jobs.

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