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Can Canadians' Work Histories Be Deduced from Administrative Data? A Feasibility Study

by René Morissette and Hanqing Qiu

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Analytical Studies: Methods and References

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The papers can be downloaded free at www.statcan.gc.ca.

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Abstract

This study assesses the degree to which administrative data, namely the Statistics Canada Longitudinal Worker File (LWF), can be used to construct individuals' work histories. It describes why information obtained from work histories is useful, provides a brief overview of Canadian datasets that have measured work histories to date, and highlights the strengths and weaknesses of the LWF and household surveys regarding the construction of individuals' work histories. Using a simple framework for measuring work histories, the study identifies which components of this framework can be adequately measured with the LWF linked to the 1991 Census of Population. The main finding is that, while it lacks information on key time-varying variables such as occupation and work hours, the LWF linked to the Census of Population can measure individuals' work histories to a fairly large extent.

Keywords: work histories; employment histories; life course; life paths.

1 Introduction

How many employers do Canadian workers have during their career? How much money do they earn, on average, during their years of employment? How often do they lose their job or have a work interruption because of injury or illness? What fraction of them are continuously employed, and, conversely, what fraction of Canadian workers experience significant periods of non-employment? To what extent do employees hold jobs in which they are with the same employer for at least 10 consecutive years? To what extent do they hold multiple jobs in a given year? How often do workers move from small firms to large firms, or from non-unionized to unionized jobs? How often do they experience substantial earnings gains or substantial earnings declines from one year to the next?

These questions are often asked by researchers, governments, the media and Canadians in general. They reflect a strong and widespread interest in the employment and earnings trajectories that diverse groups of people in Canada experience during their lifetime, in the transitions these groups go through during their career, and in key events (e.g., job loss, injury, illness, parental leave, promotions) that affect their well-being and future employment prospects.

In the past, statistical agencies have generally used household surveys to answer these questions. One strategy has been to design longitudinal surveys that track individuals over time and to collect information on workers' labour market involvement on an annual basis. An alternative approach has been to periodically conduct cross-sectional household surveys that are based on retrospective information (i.e., asking individuals questions about their previous work history).

While the aforementioned household surveys—based on panel data or retrospective data—have deepened researchers' understanding of individuals' work histories, they have come under increasing scrutiny of late (Meyer, Mok and Sullivan 2015; Meyer and Mittag 2019). One reason is that longitudinal household surveys conducted on an annual basis are relatively costly. Another reason is that some of these surveys—and, more generally, some household surveys—have recently struggled to maintain relatively high response rates. For example, the overall response rate of the General Social Survey was 51% in 2016, down from 80% in 1989. When combined with the fact that surveys using retrospective data might be subject to recall bias (the fact that the quality of the information provided declines as the period considered goes further back in time), these challenges may raise doubts about whether household surveys are now the best instrument for constructing individuals' work histories (Meyer, Mok and Sullivan 2015).

In the absence of alternative datasets, such concerns would be hard to address. Fortunately, alternative datasets based on administrative records have emerged over the past few decades. One of these administrative datasets, the Statistics Canada Longitudinal Worker File (LWF), covers the universe of employees in Canada, gathers accurate information on earnings, employment, and work interruptions, and now follows workers over a 30-year period (i.e., from 1989 to 2018). For these reasons, the LWF can potentially be a useful tool for constructing individuals' work histories. Whether this is the case or not has not been thoroughly investigated to date.[1]

The goal of this study is to fill this information gap and investigate the degree to which the LWF can be used to deduce Canadians' work histories. Section 2 describes why information obtained from work histories is useful. Section 3 provides a brief overview of Canadian datasets that have

1. With the exception of Bonikowska and Schellenberg (2013), who document the working lives of older baby boomers, the LWF has been used mainly for analyses of job displacement (Morissette, Zhang and Frenette 2007; Bonikowska and Morissette 2012; Morissette, Qiu and Chan 2013; Ci, Frenette and Morissette 2016; Morissette and Qiu 2020), worker reallocation (Morissette, Lu and Qiu 2013), transitions into postsecondary education (Frenette, Upward and Wright 2011), long-term jobs (Bonikowska and Schellenberg 2014), cumulative earnings (Ostrovsky and Frenette 2014), and interprovincial mobility and interprovincial employment (Chan and Morissette 2016).

measured work histories. Section 4 highlights the strengths and weaknesses of household surveys and the LWF regarding the construction of individuals' work histories. Section 5 provides a simple framework for measuring work histories. Section 6 shows which components of this framework can be adequately measured with the LWF. A discussion and concluding remarks follow.

2 Usefulness of work histories

Work histories generally describe employment trajectories, income trajectories and related trajectories that are observed for individuals during their life course, or at least part of it. **Employment trajectories** include several elements, such as the number and duration of employment or unemployment spells, the transitions individuals make from one employer to the next within a given local market or across local labour markets, the transitions individuals make across labour market states (e.g., unemployed, employed, inactive), the reasons underlying the permanent separations of employees from their employer (e.g., quits, layoffs, retirement), the type of temporary work interruptions workers experience within a given employment spell (e.g., parental leave, illness, injury), the type of jobs held by workers during a given employment spell (e.g., industry of employment, occupation, union status, part-time versus full-time, temporary versus permanent, covered by a pension plan or not, with or without paid sick leaves), and the degree to which individuals hold multiple jobs at a given point in time. **Income trajectories** broadly describe the annual income received by individuals in a given year, its composition—wages and salaries, self-employment income, Employment Insurance (EI) benefits, income from social assistance (SA), etc.—and the pay rates (hourly wages, weekly wages) received in each of the paid jobs held during that year. **Related trajectories** generally include information about school-to-work transitions and lifelong learning through on-the-job training or additional schooling outside work. They also include information about interrelationships between labour market transitions and key events such as marriage or divorce, the birth of a first child and entry into homeownership.

The information obtained from work histories is useful for a variety of reasons. Information on employees' permanent separations because of layoffs is often used by researchers to assess the impact of job loss on workers' wages (Jacobson, Lalonde and Sullivan 1993) or on their health status (Sullivan and Von Wachter 2009). Information on the cumulative work experience of men and women can be used to quantify the degree to which gender differences in this facet help explain the gender wage gap (Phipps, Burton and Lethbridge 2001). Information on parental leave may help assess the degree to which the gender wage gap widens a few years after women's entry into the labour market. Information on school-to-work transitions helps inform discussions about the degree to which transitions into adulthood have been delayed over the last few decades relative to previous decades (Ravanera et al. 2002). Information on transitions into and out of unemployment or SA can be used to assess the effect of changes in EI or SA parameters on the duration of spells of unemployment or SA receipt, and thus, on the speed with which workers reintegrate into the labour market. It can also be used to investigate whether individuals who received EI or SA benefits in the past are more likely to receive these benefits again in the future, and whether the duration of previous spells receiving EI or SA can predict the duration of subsequent spells. Certain factors may help predict the age at which workers will retire, such as information on workers' lifetime earnings, the number of years during which they had an employer-sponsored pension plan and the characteristics of this pension plan (e.g., defined-benefit versus defined-contribution plan). Information on job characteristics can be used to document the degree to which youth who hold precarious jobs subsequently move to better paying and more stable jobs. Transitions across labour market states (employment, unemployment, inactivity) help to understand why two regions with the same overall unemployment rate may display different average durations of unemployment.

3 Canadian datasets with information on work histories: A brief overview

To provide information on work histories, the following datasets have been constructed in the past or are currently available:

a) the 1977-to-1985 Survey of Annual Work Patterns (SWAP)

b) the 1986-to-1990 Labour Market Activity Survey (LMAS)

c) the 1993-to-2011 Survey of Labour and Income Dynamics (SLID)

d) various cycles of the General Social Survey (GSS)

e) the Longitudinal and International Study of Adults (LISA)

f) the Longitudinal Worker File (LWF).

The SWAP was the first attempt to measure part of Canadians' work histories. This cross-sectional survey, conducted on an annual basis, collected information on Canadians' work patterns during the year preceding the interview. It identified months of the year when Canadians (a) worked for the whole month or part of the month; (b) worked full time or part time; (c) looked for work; and (d) attended school, colleges or universities on a full-time basis.

The LMAS was a longitudinal household survey that was conducted on an annual basis, and that had a two-year panel (from 1986 to 1987) and a three-year panel (from 1988 to 1990). For every year, the LMAS collected detailed information about spells of employment or unemployment, the characteristics of the jobs held in a given year, start dates and end dates of jobs, and individuals' transitions across labour market states (employed, unemployed, inactive).

A few years after the LMAS was terminated, the SLID was conducted on an annual basis and followed individuals over a series of six-year periods. For example, the first panel tracked individuals from 1993 to 1998, and the second panel followed individuals from 1996 to 2001. For every year, the SLID collected labour market information that was similar to that gathered by the LMAS.

While the LMAS and the SLID were longitudinal surveys that were conducted on an annual basis, the GSS is a cross-sectional survey that periodically collects information on work histories using a retrospective approach. For example, the 1995 GSS collected information on workers' previous employment spells and work interruptions (lasting six months or more), as well as the reasons for these work interruptions (e.g., layoffs, maternity leave, child care, illness).[2] The overall response rate for the 1995 GSS was 81%. Information on work histories was collected for the last time in 2011. The 2011 GSS collected information on up to five work periods (lasting six months or more) experienced by Canadians since the beginning of their career. Information on whether workers had been away from work for more than three months because of a lack of work, sickness, parental leave, retirement or any other reason was also collected. The overall response rate for the 2011 GSS was 66%.

The LISA is a longitudinal household survey that collects information on Canadians every two years. To date, the LISA has gathered information on Canadian workers in 2012, 2014, 2016 and 2018. While the LISA does not provide as detailed information as the LMAS and the SLID on employment or unemployment spells and labour market transitions, it measures personal income

2. Information was collected for up to four work interruptions.

back to 1982 and workers' earnings back to 2000, using a linkage with the T1 Family File and the T4 files. Hence, the LISA has accurate information on workers' income and earnings histories.

The LWF is a longitudinal administrative dataset that combines information from four different sources: T1 tax files, the T4 statement of remuneration paid, the record of employment (ROE) and the Longitudinal Employment Analysis Program (LEAP). T1 tax files provide individual-level information on variables such as workers' age and sex; province of residence; annual wages, salaries and income from self-employment; coverage by registered pension plans (RPPs) or deferred profit-sharing plans; and—starting in 1999—deductions for enrolment in postsecondary education institutions on a part-time and full-time basis. The T4 statement of remuneration paid provides job-level information on workers' annual wages and salaries, union status and province of employment.[3] The ROE provides job-level information on employees' separations from employers that employees experience while holding a given job. These may occur as a result of layoffs, quits, retirement or other reasons (including temporary work interruptions because of parental leave, injury or illness, strike or lockout, etc.). The LEAP is an enterprise-level file that follows firms over time and that has information on firm size and industry of employment. It allows a distinction between permanent employee separations from one's employer and temporary employee separations or temporary work interruptions.[4]

The LWF is a potential alternative to Canadian household surveys for several reasons. Firstly, as is shown below, it covers virtually all employees in Canada. Secondly, it measures workers' transitions from one employer to the next, identifies the reasons underlying employees' separations (e.g., layoffs, parental leave, injury or illness, quits) and measures temporary work interruptions experienced while working for a given employer. Thirdly, it provides accurate measures of earnings and employer-sponsored pension coverage. Fourthly, it has information on important job characteristics such as union status, firm size and industry of employment. Lastly, it currently follows individuals over a 30-year period (i.e., from 1989 to 2018), thereby capturing a significant portion of individuals' work histories. However, like household surveys, the LWF has some limitations. The next section compares the strengths and limitations of the LWF with those of household surveys to put these limitations into perspective, and to gain insights into the question of which instrument can best measure work histories in Canada.

4 Strengths and limitations of household surveys and the Longitudinal Worker File

Household surveys typically have the following advantages and limitations for measuring work histories:

Advantages

- **Rich set of sociodemographic characteristics:** Household surveys often include a rich set of sociodemographic characteristics, such as educational attainment, ethnicity, Indigenous identity, disability status and immigrant status. This information helps to identify economically vulnerable groups and cannot always be measured with

3. As long as a person filed their income tax form once during the 1989-to-2018 period, information on their wages and salaries for year *t* will be captured (by the T4 records), even though this person did not file their income tax form for that year.
4. A separation from one's employer is deemed to be permanent when the employee leaves a firm in year *t* and goes back neither that year nor the following year. If the employee goes back to their original employer in either year *t* or year *t*+1, the separation is deemed to be temporary.

administrative data. For example, the LWF has no information on the five aforementioned characteristics.[5]

- **Rich set of job characteristics:** Household surveys often include several job characteristics such as occupation, the number of work hours and hourly wage rates. They also often determine whether a job is temporary or not, whether a job is held in the private sector or not, or whether a worker is entitled to paid sick leaves. Many of these characteristics cannot be captured with administrative data. For example, the LWF has no information on the six characteristics outlined above.[6]

- **Information about labour market status:** Household surveys often distinguish between whether a person is inactive (i.e., is not a labour market participant), unemployed or employed at a given point in time. In contrast, administrative datasets such as the LWF can only distinguish between whether a person receives employment income in a given year or not.

- **Detailed measurement of the start dates and end dates of jobs:** Household surveys often measure the day and month at which a job was started or ended, and this is a prerequisite for computing accurate measures of cumulative work experience. In contrast, the LWF can measure the start date of a job only when a job ends **and** an ROE is issued. Thus, for the numerous workers who go from one employer to the next without an unemployment spell, and for whom an ROE is not issued, the start date and end date of the previous job cannot be captured.

- **Detailed measurement of the duration of unemployment or SA spells:** Household surveys often measure the number of weeks individuals have been inactive, employed or unemployed or have received SA during a given year. In contrast, the LWF cannot measure the duration of unemployment spells or spells of SA receipt.

- **Ability to verify specific answers by probing respondents during the next interview:** When longitudinal household surveys are conducted, it is possible to probe respondents about specific information provided during the previous interview, thereby allowing one to correct misreported information. This data verification strategy is not available when using administrative data.

- **Ability to collect information on subjective well-being and other socioeconomic outcomes:** Some key events such as job loss, promotions and injuries affect not only workers' economic well-being but also their subjective well-being. Household surveys can collect information on subjective well-being (e.g., life satisfaction or job satisfaction) and other outcomes such as self-reported health, thereby allowing researchers to study interrelationships between these outcomes and key labour market transitions. Administrative data, taken in isolation, cannot be used to perform this task.[7]

- **Ability to add content in subsequent modules of longitudinal surveys:** With longitudinal household surveys such as the LISA, it is possible to add new content (e.g., about wealth holdings or health) that enriches analyses of work histories. In contrast, the

5. However, such information can be obtained by linking the LWF with the Census of Population. This is the strategy used in this paper. In addition, linking the LWF to the Longitudinal Immigration Database allows researchers to identify immigrants who arrived in Canada from 1980 onwards.
6. As mentioned above, the LWF has data on industry, firm size and union status.
7. That being said, as more administrative data are being collected, information on specific socioeconomic outcomes that is not currently available might become available in the future by linking various administrative datasets. For example, the linkage between administrative data and other data sources, such as hospitalization records, may provide information on health outcomes that was not previously available.

ability to add new content to administrative datasets is limited by the information collected by the organizations or departments providing these data.

Limitations

- **Cost:** Partly because of the intensive data editing and data coherency procedures they require, longitudinal household surveys that are conducted on an annual basis are relatively costly. This limits their ability to collect information on a relatively large sample of respondents.

- **Inability to support analyses at a highly disaggregated level:** Household surveys like the GSS and the LISA typically have sample sizes that hover around 10,000 to 15,000 observations. With such sample sizes, these surveys generally cannot support analyses at a highly disaggregated level (e.g., analyses by population group such as Black, Chinese, Filipino or Latin American people). Given the growing demand for such analyses, the relatively small sample size of household surveys is an important limitation.[8]

- **Non-response and selective samples:** In recent years the overall response rates to voluntary household surveys have declined substantially. For example, the overall response rate to the 2016 GSS amounted to 50%, down from 80% in 1989. Such a decline in response rates raises concerns that some household surveys might no longer be representative of the Canadian population. If so, the resulting selectivity of respondents might lead to biased estimates of work histories.[9,10] Because the LWF uses administrative data that cover virtually all employees, it does not have this limitation.

- **Attrition:** In addition to non-response during the first interview, longitudinal household surveys face attrition issues. Individuals who agree to respond to the first interview may subsequently choose not to do so. If attrition is substantial and non-random—as is usually the case—the resulting estimates of work histories will be biased. Because the LWF follows individuals over time by matching their administrative records through a personal identifier, and because the resulting match rates are fairly high, the LWF does not have this limitation.

- **Recall bias:** Cross-sectional household surveys based on a retrospective approach ask questions that often refer to past periods of time that are fairly distant. If respondents have difficulty remembering the occurrence and dates of certain transitions, their responses will have measurement error, thereby lowering the quality of information gathered. In contrast, the LWF constructs work histories by assembling administrative records that are produced on an annual basis. Therefore, it is not subject to recall bias.

8. To allow for a somewhat greater level of disaggregation, one strategy is to oversample some population groups, as was done recently in the GSS cycle on social identity. However, this strategy faces serious limitations—i.e., it requires large increases in sample sizes—if the goal is to disaggregate data both by region and population group.
9. To deal with overall non-response, statistical agencies reweight the final samples obtained from household surveys along certain observable characteristics (for example, age, gender and region). This ensures that the weighted number of observations aligns with population estimates disaggregated by such observable characteristics. However, such reweighting will not eliminate bias if non-response is non-ignorable (i.e., if it is based on unobservable factors). For example, if survey respondents, regardless of their age, sex and education, tend to have higher-than-average motivation and dedication to their career, and if motivation and dedication are associated with stable employment patterns, then household surveys (with relatively low response rates) will end up overestimating the degree to which workers exhibit fairly stable employment patterns during their lifetime. Selectivity based on unobservable dimensions is not simply a remote possibility: using data from the U.S. Current Population Survey, Bollinger and Hirsch (2013) provide evidence that non-response is not simply based on observable socioeconomic characteristics.
10. If auxiliary datasets are not available, analyses cannot, as response rates fall, quantify the degree to which the observed change in a given outcome within cells (jointly defined by several sociodemographics) is attributable to (a) a true change in that outcome, (b) the decline in response rates or (c) a mixture of a and b.

- **Measurement error:** Even when the information requested is fairly recent, survey respondents might provide responses that contain measurement error. For example, some of them may choose to provide rounded estimates of the annual wages they received in the previous year. More importantly, survey respondents may have a poor understanding of key concepts, such as whether they are covered or not by an employer-sponsored pension plan (Morissette and Zhang 2004). In contrast, the LWF measures annual employment income and pension plan coverage using T1 tax files and the T4 statement of remuneration paid, both of which provide fairly accurate measures of these statistics.

- **Justification bias:** One important component of work histories is the measurement of the reasons that lead employees to separate from an employer. Such reasons include layoffs, quits, retirement and return to school, as well as whether a person has been fired for cause (e.g., bad performance on the job). Some survey respondents who have been fired for cause might be reluctant to report their dismissal when asked about the reason for leaving their previous employer. They might choose to report alternative reasons to justify themselves. This justification bias is not present in administrative datasets such as the LWF.[11]

The Longitudinal Worker File has the following advantages and limitations for measuring work histories:

Advantages

- **Greater timeliness:** The LWF is updated annually and, thus, can often provide more recent information about work histories than household surveys like the GSS that measure work histories periodically (e.g., every five years).[12] That being said, the different steps involved in constructing the LWF imply that in any given year *t*, the most recent information available will pertain to year *t*-2. For example, in the fall of 2020, the most recent year for which the LWF can provide labour market information is 2018.

- **Large sample sizes:** The LWF covers virtually the whole population of Canadian employees. When linked to the 1991 Census of Population, the LWF has a sample that consists of roughly 20% of the population of employees. Since the 1991 Census data include information on individuals' ethnic origins, as well as several other characteristics, this sample allows analyses at a highly disaggregated level.

- **Absence of recall bias:** Recall bias is not present because workers' transitions from one employer to the next are captured with administrative data. This yields several benefits. Firstly, short-term jobs can be captured with the LWF, whereas they are likely underreported in household surveys.[13] Secondly, earnings received 30 years ago would be captured with the LWF but would likely be misreported—if reported at all—in household surveys.

- **Precise measurement of key statistics:** Key variables such as annual wages and employer-sponsored pension coverage are more precisely measured in administrative

11. A different type of bias might be present in the LWF. Although employers are required by law to report accurate information about the reason underlying an employee separation, it is conceivable that some employers who are on the verge of firing employees for cause end up reporting, on the ROE, that these employees left the firm because of "shortage of work" (i.e., because of layoffs). One reason for doing so is that employees who are laid off might be eligible for EI benefits, whereas employees fired for cause are not. The degree to which such substitution actually occurs is currently unknown.
12. Some current survey initiatives at Statistics Canada—like omnibus data collection—could in principle address this timeliness issue.
13. A comparison of the 1986/1987 LMAS and the 1978-to-1989 LWF shows that, as a result, the number of person-jobs captured in the LWF exceeds that in the 1986/1987 LMAS. See Statistics Canada (1992).

data than in household surveys because of rounding or respondents' misunderstanding of pension plan benefits in household surveys (Morissette and Zhang 2004). One advantage of combining information from T1 tax records and T4 tax records—as the LWF does—is that, even if a person does not file their T1 income tax form in a given year, their annual wages and salaries will be captured by T4 files. Information on pension coverage is also captured by T4 files.

Limitations

- **Limited set of socioeconomic characteristics:** As mentioned above, the LWF has no information on educational attainment, ethnicity, Indigenous identity, disability status and immigrant status. However, such information can be obtained by linking the LWF to the Census of Population.[14]

- **Limited set of job characteristics:** The LWF has no information on job characteristics such as occupation, number of work hours, hourly wage rates, whether a job is temporary or whether a worker is entitled to paid sick leaves. The last three job characteristics cannot currently be obtained even if the LWF is linked to the Census of Population.

- **Partial information on labour force status:** The LWF does not measure labour force status at a given point in time. It records whether or not individuals had employment income in a given year. It also measures the amount of EI benefits received in a given year. However, it does not measure the number of weeks a person has been receiving EI or has been unemployed, inactive or employed.

- **Absence of sub-annual data for all employees:** Contrary to household surveys, the LWF cannot measure the start date and end date of a job for all employees. Start dates and end dates of jobs are not captured when an employee is still, at the time of data processing, holding their first job. Start dates and end dates are also not captured when an employee leaves a firm and no ROE has been issued. This may occur when a worker makes a job-to-job transition (i.e., leaves an employer and immediately starts with a new employer without periods of unemployment). Only yearly data indicating whether or not a job is observed in a given year are available for all employees.

- **No information on establishments:** The LWF uses the LEAP to capture employer-level information. Because the LEAP measures employer characteristics at the enterprise level, rather than the establishment level, the LWF can provide employer-level information only at the enterprise level. This limitation precludes analyses that seek to investigate whether a person has moved up in the earnings ladder within a given establishment or whether the proportion of women, immigrants or other groups in a given establishment affects workers' wages.

- **Backcasting of firms' acquisitions:** The LEAP is built in such a way that when a firm buys another firm, the LWF integrates employees of the firm being purchased into the purchasing firm for all years prior. For example, if a firm buys another firm in 2010, it would integrate employees of the purchased firm for all years prior to 2010. Hence, employees who moved between these two firms prior to 2010 will be, after the acquisition, classified as not having changed employers. This will generate, for a subset of employees, some measurement error in worker turnover and in the number of employers a person had during their career. Since a firm that operated further in the past is more likely to have been acquired than a firm that started operating recently,

14. As mentioned above, a link between the LWF and the Longitudinal Immigration Database can identify immigrants who arrived in Canada from 1980 onwards.

such measurement error will likely be more pronounced for distant employment spells than for recent ones.

- **Under-coverage of selected groups:** Using the Canadian Employer–Employee Dynamics Database (CEEDD)—a dataset similar to the LWF—Morissette, Ci and Schellenberg (2016) show that the number of employees in some northern regions, as estimated by administrative data, represents less than 90% of the number of employees in these regions, as estimated with the 2006 Census of Population.[15] This suggests that the LWF might cover employees in some northern regions to a lesser extent than other employees.

The discussion above demonstrates that neither household surveys nor the LWF can perfectly measure the work histories of Canadian workers. Determining which dataset is the optimal instrument for measuring Canadians' work histories requires identifying the trade-offs involved and clarifying the relative importance of the advantages and limitations documented above, given the research question being asked. Before doing so, it is important to highlight which components of work histories can be adequately measured with the LWF. The next two sections address this question.

5 Work histories: A simple framework

To illustrate which components of work histories can be adequately measured with the LWF, the following aspects are considered:

- 1) summary statistics of one's career
- 2) duration of jobs held
- 3) sequencing of jobs held
- 4) characteristics of jobs held
- 5) temporary work interruptions while holding a given job
- 6) permanent employee separations and reasons for leaving a given job (job loss, quits, etc.)
- 7) periods of non-employment
- 8) periods of multiple job holding
- 9) work-to-school transitions.

Summary statistics synthesize individuals' work histories using indicators such as the number of employers a person had in their career, the number of years a person was covered by an RPP, the cumulative earnings received by this person during their career, the variability of their earnings relative to their average earnings received, or the number of jobs in which the person was unionized or employed in a large firm.

Since two individuals who have had the same number of jobs during their career might have held these jobs for different amounts of time, the duration of each job is important to rigorously define work histories. The sequencing of these jobs is also crucial. For example, having a low-wage job

15. Overall, the total number of employees in the CEEDD represents 95% of the number of employees estimated from the 2006 Census.

at the beginning of one's career does not carry the same financial implications as holding such a job in the middle of one's career (i.e., when aged 40 or 45).

Individuals' work histories can also be defined according to the characteristics of the jobs held. Job characteristics include whether jobs are unionized, are held in small or large firms, are covered by an RPP, pay relatively high or relatively low annual wages, and are in goods-producing industries or service-producing industries.

In a given job, temporary work interruptions are significant because they may affect the well-being of workers, the stability of the income workers receive and the workers' career progression within firms. For example, workers who are temporarily laid off will experience a drop in income. Many of them may, as a result of employment uncertainty, experience stress and anxiety during these difficult times. Likewise, women who separate temporarily from their employer because of pregnancy and people who stop working temporarily because of injury or illness might miss promotion opportunities while being absent from work.

Like temporary separations from one's employer, permanent separations are important. Workers who permanently separate from an employer as a result of job loss often subsequently find lower-paying jobs, while many of their counterparts who quit their jobs move to higher-paying positions. Workers who permanently separate from their employer because of an injury that leads to long-term disability will generally have to rely on public disability insurance and other government transfers to meet their financial obligations. Hence, the reasons that underlie permanent separations matter because they are often associated with different subsequent earnings trajectories.

Permanent separations such as job loss can also lead to prolonged periods of non-employment. If these periods of non-employment are involuntary, their frequency and duration will likely have adverse effects on workers' well-being. Unless they are offset by other sources of income, such periods of non-employment will reduce workers' living standards.

Conversely, some workers might go through periods during which they hold multiple jobs. They may do so by choice or out of necessity. While individuals who have been unemployed for a long time may face financial constraints, multiple job holders who work a large number of hours per week may face challenges balancing work and family responsibilities.

Because of job loss or other reasons, workers may decide to enter postsecondary education to increase their skills. In an environment where technological advances in robotics and artificial intelligence may change the set of tasks performed by workers (Acemoglu and Restrepo 2019), these work-to-school transitions are potentially an important form of workers' adaptation to changes in skill requirements.

6 Measuring work histories with the Longitudinal Worker File linked to the 1991 Census of Population

When linked to the 1991 Census of Population, the 1989-to-2018 LWF can measure the nine components of work histories shown above to varying degrees. To show this, the analysis performed in this section uses a cohort of individuals aged 25 to 29 in 1991 (aged 23 to 27 in 1989).[16] This group of individuals is followed over a 30-year period (from 1989 to 2018). By 2018, these individuals will be aged 52 to 56. To ensure that the individuals selected for the analysis

16. When the linkage between the LWF and the 1991 Census of Population is performed, only individuals aged 25 and older in 1991 can be linked. For this reason, the cohort of new "labour market entrants" examined in this study is aged 25 to 29 in 1991.

are still alive by 2018, the sample is further restricted to individuals who filed a T1 income tax form in 2018.[17]

All statistics are presented separately for men and women and are disaggregated by individuals' education level in 1991,[18] immigrant status (Canadian-born individuals versus immigrants) and visible minority status and by whether or not individuals reported activity limitations in 1991.

Such disaggregation has a few limitations. Firstly, grouping different population groups (Black people, Chinese people, Japanese people, etc.) into a single category of groups designated (by the *Employment Equity Act*) as visible minorities masks the diversity of work histories experienced by various population groups. While this heterogeneity of outcomes must be kept in mind throughout this section, documenting such heterogeneity is beyond the scope of this paper. Secondly, the subset of individuals reporting activity limitations in 1991 is likely broader than the subset of individuals one would have obtained had respondents to the 1991 Census been asked a battery of questions on limitations, as was done in the 2017 Canadian Survey on Disability. Thirdly, information on the LGBTQ2+ community—lesbian, gay, bisexual, transgender, queer (or sometimes questioning) and two-spirited—is not available in the LWF–1991 Census file. This precludes a comparison of individuals' work histories for this dimension.

Lastly, readers should keep in mind that the goal of this section is to illustrate what is feasible with the LWF and to identify which components of work histories can be measured adequately with this dataset. Importantly, the goal of this section is **not** to conduct an analysis of differences in work histories across groups. As a result, not all group differences that might be of interest from an analytical point of view will be highlighted.

6.1 Summary statistics of one's career

Table 1 shows the summary statistics that the LWF can produce. Among these, some key statistics are

- the number of years with employment income
- cumulative employment income
- the number of employers one had during one's career
- the number of permanent layoffs experienced during one's career.

17. To ensure that immigrants were at risk of being employed for the entire year in 1989, the sample of immigrants is restricted to those who arrived in Canada in 1988 or before.
18. As shown below, it is possible to see whether individuals upgraded their skills after 1991 by entering postsecondary education.

Table 1
Summary statistics available with Statistics Canada's Longitudinal Worker File

Summary statistics	Period covered
A) Number of years with:	
Wages and salaries	1989 to 2018
Income from unincorporated self-employment	1989 to 2018
Employment income	1989 to 2018
Employment Insurance benefits	1989 to 2018
RRSP income	1989 to 2018
RRSP deductions	1989 to 2018
RRSP contributions	1994 to 2018
C/QPP contributions	1989 to 2018
RPP contributions	1989 to 2018
An RPP or a deferred profit-sharing plan	1991 to 2018
A married or common-law spouse	1992 to 2018
B) Number of:	
Employers	1989 to 2018
Provinces of residence	1989 to 2018
Provinces of employment	1989 to 2018
Permanent separations from employers (because of layoffs, injury or illness, parental leave, return to school, strike or lockout, other)	1989 to 2018
Temporary separations from employers (because of layoffs, injury or illness, parental leave, return to school, strike or lockout, other)	1989 to 2018
Unionized jobs	1989 to 2018
Jobs by firm size	1989 to 2018
Jobs by industry	1991 to 2018
C) Cumulative:	
Wages and salaries	1989 to 2018
Net income from unincorporated self-employment	1989 to 2018
Employment income	1989 to 2018
Employment Insurance benefits	1989 to 2018
RRSP income	1989 to 2018
RRSP deductions	1989 to 2018
RRSP contributions	1994 to 2018
C/QPP contributions	1989 to 2018
RPP contributions	1989 to 2018

Notes: RRSP = Registered Retirement Savings Plan; C/QPP = Canada Pension Plan or Quebec Pension Plan; RPP = Registered Pension Plan.

Source: Statistics Canada, Longitudinal Worker File User Guide and Data Dictionary, 2020.

Tables 2 to 7 illustrate these indicators. Table 2 shows that over the 30-year period from 1989 to 2018, men who were aged 23 to 27 in 1989 received employment income (wages and salaries or self-employment income) for an average of 27.2 years. The corresponding average for women was 24.8 years. For both sexes, the average number of years with employment income generally rises with educational attainment and is lower for individuals with activity limitations than for those without.

Table 2
Average number of years employed from 1989 to 2018

	Average number of years with:							
	Wages and salaries		Self-employment income		Wages and salaries or self-employment income		Wages and salaries and self-employment income	
	Men	Women	Men	Women	Men	Women	Men	Women
	number							
All individuals	25.2	23.2	4.0	3.2	27.2	24.8	2.0	1.5
Canadian-born	25.3	23.2	4.0	3.2	27.2	24.8	2.1	1.5
Visible minority	25.4	24.1	3.8	3.0	27.1	25.5	2.0	1.6
Non–visible minority	25.3	23.2	4.0	3.2	27.2	24.8	2.1	1.5
Immigrant	24.5	23.1	4.2	3.1	26.8	24.7	1.9	1.4
Visible minority	24.1	23.0	4.1	2.6	26.4	24.4	1.8	1.3
Non–visible minority	24.9	23.2	4.4	3.6	27.3	25.2	2.0	1.6
With activity limitations	18.1	16.6	2.7	2.0	19.5	17.7	1.3	1.0
Without activity limitations	25.5	23.4	4.1	3.2	27.5	25.1	2.1	1.6
Less than high school	23.1	19.8	3.9	2.4	25.3	21.2	1.7	1.0
High school diploma	25.3	23.3	3.9	2.9	27.3	24.8	1.9	1.4
Trades certificate	26.0	22.9	4.1	3.7	27.9	25.1	2.2	1.5
PSE below bachelor's degree	26.5	25.2	3.9	3.3	28.1	26.6	2.2	1.8
Bachelor's degree or higher	26.1	25.4	4.6	4.2	28.1	27.3	2.5	2.3

Notes: Individuals aged 23 to 27 in 1989 who filed an income tax form (T1) in 2018. Immigrants arrived in Canada in 1988 or before. PSE = postsecondary education.
Sources: Statistics Canada, Longitudinal Worker File and 1991 Census of Population.

Table 3
Percentage distribution of the number of years employed from 1989 to 2018

	Percentage of individuals who were employed							
	None of the 30 years		Between 1 and 15 years		Between 16 and 29 years		All 30 years	
	Men	Women	Men	Women	Men	Women	Men	Women
	percent							
All individuals	0.7	1.3	5.7	11.1	35.9	47.5	57.8	40.1
Canadian-born	0.7	1.3	5.6	11.1	35.0	47.1	58.7	40.5
Visible minority	0.9	0.8	4.8	9.9	38.2	44.7	56.2	44.6
Non–visible minority	0.7	1.3	5.6	11.1	35.0	47.1	58.7	40.4
Immigrant	0.3	0.8	6.3	11.3	43.1	50.6	50.3	37.3
Visible minority	0.3	0.9	7.2	12.5	45.8	51.0	46.7	35.5
Non–visible minority	0.3	0.6	5.2	9.9	40.1	50.1	54.4	39.4
With activity limitations	10.6	11.3	22.9	28.3	38.1	41.5	28.3	18.9
Without activity limitations	0.2	0.9	4.9	10.5	35.8	47.7	59.1	41.0
Less than high school	1.9	3.6	10.6	20.5	40.6	53.2	46.9	22.6
High school diploma	0.4	1.0	5.1	10.7	36.6	50.5	57.9	37.8
Trades certificate	0.1	0.6	3.8	10.3	33.7	50.6	62.4	38.4
PSE below bachelor's degree	0.2	0.2	3.2	6.5	31.6	42.4	65.0	50.8
Bachelor's degree or higher	0.1	0.1	3.1	5.1	34.0	38.5	62.9	56.3

Notes: Individuals aged 23 to 27 in 1989 who filed an income tax form (T1) in 2018. Immigrants arrived in Canada in 1988 or before. PSE = postsecondary education.

Sources: Statistics Canada, Longitudinal Worker File and 1991 Census of Population.

Table 4
Earnings received from 1989 to 2018

	Average cumulative earnings		Average cumulative wages and salaries		Average annual earnings (years with no earnings are included)		Average annual wages and salaries (years with no wages and salaries are included)	
	Men	Women	Men	Women	Men	Women	Men	Women
	2018 dollars							
All individuals	1,659,554	1,038,393	1,571,343	989,724	55,318	34,613	52,378	32,991
Canadian-born	1,665,413	1,034,026	1,579,057	986,004	55,514	34,468	52,635	32,867
Visible minority	1,827,618	1,299,965	1,717,697	1,225,353	60,921	43,332	57,257	40,845
Non–visible minority	1,662,722	1,029,896	1,576,757	982,287	55,424	34,330	52,559	32,743
Immigrant	1,611,938	1,073,440	1,508,647	1,019,577	53,731	35,781	50,288	33,986
Visible minority	1,474,494	1,037,736	1,380,608	992,302	49,150	34,591	46,020	33,077
Non–visible minority	1,767,905	1,112,948	1,653,940	1,049,760	58,930	37,098	55,131	34,992
With activity limitations	888,103	578,131	843,380	556,548	29,603	19,271	28,113	18,552
Without activity limitations	1,694,332	1,055,561	1,604,133	1,005,880	56,478	35,185	53,471	33,529
Less than high school	1,149,744	582,429	1,088,198	558,358	38,325	19,414	36,273	18,612
High school diploma	1,510,950	908,524	1,444,815	877,953	50,365	30,284	48,160	29,265
Trades certificate	1,642,920	857,341	1,576,829	818,087	54,764	28,578	52,561	27,270
PSE below bachelor's degree	1,925,446	1,230,017	1,858,355	1,192,828	64,182	41,001	61,945	39,761
Bachelor's degree or higher	2,494,738	1,802,705	2,275,124	1,662,370	83,158	60,090	75,837	55,412

Notes: Individuals aged 23 to 27 in 1989 who filed an income tax form (T1) in 2018. Immigrants arrived in Canada in 1988 or before. PSE = postsecondary education.
Sources: Statistics Canada, Longitudinal Worker File and 1991 Census of Population.

Table 5
Average number of employers among individuals with some wages and salaries from 1989 to 2018

	Average number of:							
	Employers		Employers with 500 employees or more		Employers with fewer than 20 employees		Employers with 20 to 499 employees	
	Men	Women	Men	Women	Men	Women	Men	Women
	number							
All individuals	7.7	6.9	1.5	1.7	4.0	3.5	2.2	1.7
Canadian-born	7.7	6.9	1.5	1.7	4.0	3.5	2.2	1.7
Visible minority	7.6	6.9	1.9	1.9	3.6	3.4	2.2	1.6
Non–visible minority	7.7	6.9	1.5	1.7	4.0	3.5	2.2	1.7
Immigrant	7.5	6.9	1.5	1.8	3.9	3.5	2.1	1.6
Visible minority	7.8	7.2	1.6	1.9	4.1	3.5	2.1	1.8
Non–visible minority	7.2	6.5	1.5	1.7	3.7	3.4	2.0	1.5
With activity limitations	8.0	7.3	1.5	1.8	4.2	3.6	2.3	1.9
Without activity limitations	7.7	6.9	1.5	1.7	4.0	3.5	2.2	1.7
Less than high school	9.1	7.9	1.4	1.7	5.0	4.0	2.7	2.2
High school diploma	7.6	6.9	1.5	1.7	3.9	3.5	2.2	1.7
Trades certificate	8.3	7.3	1.5	1.7	4.3	3.8	2.4	1.8
PSE below bachelor's degree	6.7	6.5	1.6	1.7	3.4	3.4	1.8	1.4
Bachelor's degree or higher	6.0	5.7	1.7	1.7	3.0	2.9	1.3	1.0

Notes: Individuals aged 23 to 27 in 1989 who filed an income tax form (T1) in 2018, and had at least one year of wages and salaries from 1989 to 2018. Immigrants arrived in Canada in 1988 or before. PSE = postsecondary education.
Sources: Statistics Canada, Longitudinal Worker File and 1991 Census of Population.

Table 6
Percentage distribution of the number of employers among individuals with some wages and salaries from 1989 to 2018

	Percentage of employees with:							
	1 employer		2 to 5 employers		6 to 9 employers		10 employers or more	
	Men	Women	Men	Women	Men	Women	Men	Women
	number							
All individuals	8.0	8.0	40.1	42.3	25.4	26.9	26.5	22.7
Canadian-born	8.1	8.1	40.1	42.2	25.1	26.8	26.7	22.8
Visible minority	6.8	6.6	41.1	46.1	26.4	24.8	25.7	22.5
Non–visible minority	8.2	8.2	40.1	42.2	25.1	26.9	26.7	22.8
Immigrant	7.0	7.3	40.7	42.5	27.5	27.9	24.9	22.4
Visible minority	6.5	6.2	38.9	40.3	28.6	28.8	26.0	24.7
Non–visible minority	7.5	8.5	42.8	44.9	26.2	26.9	23.5	19.8
With activity limitations	11.5	11.5	36.5	37.2	22.7	24.8	29.4	26.5
Without activity limitations	7.9	7.9	40.3	42.4	25.5	27.0	26.4	22.6
Less than high school	7.6	7.8	33.5	36.1	24.0	26.9	34.8	29.3
High school diploma	8.5	8.1	39.7	41.5	25.3	27.2	26.6	23.3
Trades certificate	7.8	8.2	38.0	39.7	25.0	26.8	29.3	25.2
PSE below bachelor's degree	9.0	8.4	44.8	44.6	25.3	26.9	21.0	20.2
Bachelor's degree or higher	7.1	7.8	49.2	51.0	28.2	26.7	15.6	14.4

Notes: Individuals aged 23 to 27 in 1989 who filed an income tax form (T1) in 2018, and had at least one year of wages and salaries from 1989 to 2918. Immigrants arrived in Canada in 1988 or before. PSE = postsecondary education.
Sources: Statistics Canada, Longitudinal Worker File and 1991 Census of Population.

Table 7
Distribution of the number of permanent layoffs, non-construction workers with at least 20 years of wages and salaries from 1989 to 2018

	Percentage of individuals who:							
	Were never permanently laid off		Were permanently laid off once		Were permanently laid off twice		Were permanently laid off three times or more	
	Men	Women	Men	Women	Men	Women	Men	Women
	number							
All individuals	58.1	56.5	21.8	22.9	10.0	10.2	10.0	10.4
Canadian-born	58.7	56.5	21.4	22.8	9.8	10.2	10.1	10.5
Visible minority	58.2	63.2	23.0	21.3	10.1	8.5	8.8	6.9
Non–visible minority	58.7	56.4	21.4	22.8	9.8	10.2	10.1	10.6
Immigrant	54.3	55.8	24.9	23.6	11.7	10.8	9.2	9.8
Visible minority	50.4	52.6	25.9	24.6	12.9	11.3	10.8	11.5
Non–visible minority	59.3	59.3	23.5	22.5	10.0	10.3	7.2	7.9
With activity limitations	48.9	50.1	23.6	25.5	11.9	10.9	15.6	13.6
Without activity limitations	58.4	56.6	21.8	22.8	10.0	10.2	9.8	10.4
Less than high school	49.6	43.9	22.2	25.3	12.3	13.8	15.9	17.0
High school diploma	57.2	54.2	22.3	24.0	10.4	11.0	10.1	10.8
Trades certificate	57.6	53.0	21.3	23.9	10.3	10.7	10.8	12.4
PSE below bachelor's degree	62.5	62.5	20.8	21.0	9.0	8.7	7.7	7.7
Bachelor's degree or higher	63.1	65.7	22.4	20.7	8.3	7.5	6.2	6.2

Notes: Individuals aged 23 to 27 in 1989 who filed an income tax form (T1) in 2018. Immigrants arrived in Canada in 1988 or before. PSE = postsecondary education.

Sources: Statistics Canada, Longitudinal Worker File and 1991 Census of Population.

These patterns suggest that the percentage of individuals who had employment income in all 30 years of the 1989-to-2018 period should be higher among men, and, for both sexes, among highly educated workers and individuals with no activity limitations. Table 3 confirms this.

Table 4 shows the cumulative earnings (or employment income) received from 1989 to 2018 by the cohort of individuals who were aged 23 to 27 in 1989. Individuals with no employment income during that period are included. On average, men's cumulative earnings averaged $1.66 million (in 2018 dollars), an amount that is 1.6 times higher than that observed for women ($1.04 million).

Table 5 focuses on the subset of individuals who had at least one paid job during the 1989-to-2018 period. It shows how many employers these workers had during the period. The data indicate that, on average, women in the selected sample had 6.9 employers during that period, compared with 7.7 for men. For both men and women, the number of employers observed during that period falls with workers' educational attainment, thereby suggesting greater employment stability among highly educated workers. This pattern is also observed in Table 6, where the proportion of individuals with no high school diploma who have 10 employers or more is, for both sexes, twice as high as that of degree holders.

Table 7 uses a narrower sample made up of workers employed outside of construction who had received wages and salaries during at least 20 years.[19] It shows that 56.5% of women and 58.1% of men in this sample were never permanently laid off from 1989 to 2018. For both sexes, highly educated workers were more likely than other workers to have never been permanently laid off. This suggests, once again, that highly educated workers experience greater job stability than their less educated counterparts.

As Table 1 shows, in addition to the number of employers and the number of permanent layoffs experienced during one's career, the LWF can identify variables such as

- the number of permanent and temporary separations experienced during one's career for reasons such as parental leave, injury or illness, strike or lockout, return to school, or other reasons
- the number of provinces of residence
- the number of provinces of employment
- the number of unionized jobs
- the number of jobs held, by industry
- the number of jobs held, by firm size.

Information on workers' province of residence and province of employment is critical for studies of interprovincial mobility and interjurisdictional employment.[20] Information on the number of jobs held by union status, industry or firm size synthesizes some useful job characteristics.

19. Because of the project-specific nature of their work, construction workers tend to have abnormally high permanent layoff rates. Hence, excluding these workers provides layoff estimates that are more representative of those experienced by typical Canadian employees. Attention is restricted to employees who had wages and salaries during at least 20 years to focus the analysis on workers who had a significant involvement in the labour market during the 30-year period considered.
20. Interjurisdictional employment refers to a situation where workers' province or territory of employment differs from their province or territory of residence. For example, during the oil boom of the 2000s, many workers residing in the Atlantic provinces worked in Alberta (Green et al. 2019).

6.2 Duration of jobs

Researchers often seek to quantify the degree to which employees hold stable or long-term jobs, however defined. The LWF allows the measurement of such jobs by providing estimates of the number of years a given job has been held. For example, Table 8 assesses the degree to which individuals who received wages and salaries for all 10 years held at least one job with the same employer for 10 years or more during the 1989-to-2018 period. The numbers show that about 7 in 10 employees in this sample held at least one job (with the same employer) for 10 years or more during the 1989-to-2018 period. For both sexes, the propensity to hold such jobs tends to rise with educational attainment, thereby adding evidence that highly educated workers tend to experience greater job stability.

Table 8
Long-term jobs among individuals with at least 10 years of wages and salaries from 1989 to 2018

	Percentage of employees holding at least:							
	One job for 10 years or more		One unionized job for 10 years or more		One non-unionized job for 10 years or more		One job paying at least $50,000 for 10 years or more	
	Men	Women	Men	Women	Men	Women	Men	Women
	percent							
All individuals	73.1	70.8	27.1	28.9	46.7	42.8	44.4	26.1
Canadian-born	73.2	70.6	27.7	29.4	46.3	42.1	44.6	26.1
Visible minority	75.2	72.4	21.8	28.2	53.6	46.0	48.3	35.1
Non–visible minority	73.2	70.6	27.8	29.4	46.2	42.0	44.5	25.9
Immigrant	72.6	72.4	22.9	24.9	50.5	48.8	42.7	26.2
Visible minority	72.0	72.7	21.8	24.8	51.8	49.1	37.6	24.8
Non–visible minority	73.3	72.1	24.2	25.0	49.2	48.4	48.5	27.8
With activity limitations	63.4	59.0	21.6	23.9	41.0	34.6	27.8	15.6
Without activity limitations	73.5	71.2	27.3	29.0	46.9	43.1	44.9	26.4
Less than high school	64.4	59.7	22.3	20.4	41.7	39.4	26.8	9.1
High school diploma	74.0	70.7	27.9	24.7	47.1	47.1	41.1	20.1
Trades certificate	73.6	69.7	28.6	27.5	45.6	43.0	42.9	17.5
PSE below bachelor's degree	78.8	75.9	30.6	33.2	49.7	43.7	57.0	33.4
Bachelor's degree or higher	78.5	78.8	27.8	41.4	52.1	38.7	64.5	53.2

Notes: Individuals aged 23 to 27 in 1989 who filed an income tax form (T1) in 2018, and who had wages and salaries for at least 10 years from 1989 to 2018. Immigrants arrive in 1988 or before. PSE = postsecondary education.
Sources: Statistics Canada, Longitudinal Worker File and 1991 Census of Population.

As mentioned above, the LWF can provide, for all employees, only yearly data indicating whether or not a given job is observed in a given year. Hence, the LWF cannot support, for all employees, duration analyses that require sub-annual data such as monthly data or weekly data.

6.3 Sequencing of jobs

Because the LWF measures annual wages and salaries for each job, it can identify, for example, whether a second job ended up paying more—at least on an annual basis—than the first one. Table 9 selects individuals who had at least two jobs from 1989 to 2018 to illustrate this point. It shows that among this sample, roughly 60% of men and women had a second job that paid more than the first one. For about 15% of men and women in this sample, the second job was unionized, while the first one was not. In addition, for about 20% of men and women in this sample, the second job was in a large firm while the first one was not.

Table 9
Comparison of the first two main jobs held by employees—individuals with at least two main jobs from 1989 to 2018

	Percentage of employees for whom:					
	Second main job paid more (in 2018 dollars) than first main job		Second main job was unionized and first main job was not		Second main job was in a large firm and first main job was not	
	Men	Women	Men	Women	Men	Women
	percent					
All individuals	60.8	59.3	13.8	14.9	18.8	20.8
Canadian-born	60.9	59.2	13.9	15.0	18.8	20.7
Visible minority	62.3	59.6	11.8	15.6	21.2	17.5
Non–visible minority	60.9	59.2	14.0	15.0	18.8	20.8
Immigrant	59.8	59.7	12.6	14.1	18.6	21.1
Visible minority	59.6	60.7	11.9	13.7	18.3	21.4
Non–visible minority	59.9	58.7	13.3	14.4	18.9	20.8
With activity limitations	59.1	59.1	11.8	16.7	18.5	21.1
Without activity limitations	60.9	59.3	13.8	14.8	18.8	20.7
Less than high school	57.2	61.0	14.6	15.0	15.9	21.0
High school diploma	58.4	58.1	13.9	14.5	18.6	20.6
Trades certificate	59.1	58.5	16.0	15.8	18.9	21.0
PSE below bachelor's degree	62.9	57.9	12.6	14.3	21.5	20.6
Bachelor's degree or higher	69.9	61.8	11.1	15.6	20.3	20.8

Notes: Individuals aged 23 to 27 in 1989 who filed an income tax form (T1) in 2018. Immigrants arrived in Canada in 1988 or before. The main job is the job that pays the highest annual wages and salaries in a given year. PSE = postsecondary education.
Sources: Statistics Canada, Longitudinal Worker File and 1991 Census of Population.

6.4 Job characteristics

Compared with previous household surveys that measured Canadians' work histories, the LWF can provide information on fewer job characteristics. While the LWF measures union status, industry, firm size and whether a job is held outside one's province of residence, it does not measure job characteristics such as

- workers' occupation[21]
- the number of hours worked per week in a job
- the number of weeks worked per year in a job
- whether a job is permanent (i.e., has no predetermined end date) or temporary
- establishment-level information on industry and employer size
- non-wage benefits (e.g., the number of paid sick leaves available to employees, medical insurance, dental insurance)
- subprovincial information on workers' location of employment.[22]

The inability of the LWF to provide information on work hours has important consequences. It precludes analyses of differences in pay rates (hourly wages) across groups of workers and analyses of changes in the structure of hourly wages. Likewise, the absence of information on workers' occupation precludes several analyses, such as those that document the degree to which workers climb the occupational ladder as they gain more experience.

That being said, information on union status, industry, firm size and location of employment can provide useful insights into workers' careers. For example, Table 10 shows selected attributes of the highest-paying job that employees aged 23 to 27 in 1989 held during the 1989-to-2018 period. The numbers indicate that, in about 30% of the cases, the highest-paying job (i.e., the job that paid the highest real annual wages and salaries in a given year) held by men and women was unionized. Roughly half of the highest-paying jobs were held in large firms (firms with 500 employees or more). In a few cases—2.6% for men and 1.4% for women—the highest-paying job was held outside workers' province of residence.

21. Linking the LWF with the 1991 Census of Population allows workers' occupation to be measured in 1991 but not for subsequent years.
22. T4 records capture only workers' province of employment. The lack of subprovincial information on workers' location of employment precludes analyses of location of employment at the regional or city level.

Table 10
Characteristics of the highest-paying job held from 1989 to 2018

	Average wages and salaries in this job		Job is unionized		Job is in a large firm		Job is outside the province of residence	
	Men	Women	Men	Women	Men	Women	Men	Women
		2018 Dollars	percent	percent	percent	percent	percent	percent
All individuals	95,773	63,918	29.8	31.9	47.8	50.8	2.6	1.4
Canadian-born	96,046	63,678	30.4	32.6	48.1	50.8	2.8	1.5
Visible minority	107,147	78,340	24.7	31.2	52.0	57.3	1.6	1.5
Non–visible minority	95,862	63,449	30.5	32.6	48.0	50.7	2.8	1.5
Immigrant	93,569	65,836	24.6	26.6	45.5	50.9	1.2	0.7
Visible minority	86,582	63,207	23.0	26.7	45.1	51.9	0.9	0.7
Non–visible minority	101,502	68,740	26.4	26.5	45.9	49.9	1.4	0.7
With activity limitations	63,741	45,498	22.9	26.2	37.0	42.5	2.3	1.4
Without activity limitations	97,062	64,526	30.1	32.1	48.3	51.1	2.6	1.4
Less than high school	70,727	41,965	27.4	25.7	35.2	38.8	2.9	1.3
High school diploma	86,996	57,442	30.3	28.1	47.7	48.6	2.4	1.4
Trades certificate	92,458	53,746	32.4	30.9	44.8	46.0	2.9	1.4
PSE below bachelor's degree	107,714	71,977	31.6	35.5	57.4	56.1	2.3	1.3
Bachelor's degree or higher	142,296	102,292	27.7	42.9	61.4	67.5	2.5	1.9

Notes: Individuals aged 23 to 27 in 1989 who filed an income tax form (T1) in 2018, and who had wages and salaries for at least one year from 1989 to 2018. Immigrants arrived in Canada in 1988 or before. PSE = postsecondary education.
Sources: Statistics Canada, Longitudinal Worker File and 1991 Census of Population.

6.5 Temporary work interruptions while holding a given job

While holding a given job, employees often experience a temporary separation from their employer because of a temporary layoff, a parental leave, an injury or illness, or other reasons. The LWF can measure such temporary separations. To illustrate this point, Table 11 focuses on the main job held by paid workers in 1989 and assesses what percentage of employees had, in 1989, at least one (a) temporary layoff, (b) temporary separation because of injury or illness, (c) temporary separation because of parental leave, or (d) temporary separation for other reasons. In 1989, 13.3% of men aged 23 to 27 and 7.2% of women aged 23 to 27 had at least one temporary layoff in their main job.[23] About 1% had at least one temporary separation because of injury or illness. Almost 7% of these women had a parental leave, and about 8% of these men and women had at least one temporary separation for other reasons.

23. Temporary layoffs were less prevalent among highly educated workers than among their less-educated counterparts.

Table 11
Temporary work interruptions in the main job held in 1989—individuals with a main job in 1989 still held in 1990

	One temporary layoff		One interruption because of injury or illness		One interruption because of parental leave		One interruption for other reasons	
	Men	Women	Men	Women	Men	Women	Men	Women
				percent				
All individuals	13.3	7.2	1.0	1.1	0.0	6.5	8.1	7.6
Canadian-born	13.9	7.4	0.9	1.1	0.0	6.5	8.0	7.6
Visible minority	6.8	3.2	0.4	0.9	0.0	3.9	6.3	7.8
Non–visible minority	14.1	7.5	0.9	1.1	0.0	6.5	8.1	7.6
Immigrant	8.1	5.0	1.1	1.2	0.0	6.8	8.2	7.7
Visible minority	7.0	5.6	1.3	1.4	0.0	6.8	7.9	8.8
Non–visible minority	9.4	4.3	0.9	1.0	0.0	6.7	8.5	6.6
With activity limitations	13.4	6.6	2.5	3.5	0.0	3.5	10.2	7.6
Without activity limitations	13.3	7.2	0.9	1.1	0.0	6.6	8.0	7.6
Less than high school	21.6	12.3	1.4	2.0	0.0	6.5	8.2	8.4
High school diploma	13.9	7.0	1.1	1.2	0.0	7.5	7.2	6.7
Trades certificate	14.8	7.9	1.1	1.4	0.0	7.6	9.8	6.9
PSE below bachelor's degree	7.7	4.8	0.5	0.9	0.0	7.1	7.0	6.9
Bachelor's degree or higher	4.7	5.6	0.2	0.4	0.0	3.5	8.4	9.8

Notes: Individuals aged 23 to 27 in 1989 who filed an income tax form (T1) in 2018. Immigrants arrived in Canada in 1988 or before. PSE = postsecondary education.

Sources: Statistics Canada, Longitudinal Worker File and 1991 Census of Population.

6.6 Permanent separations and reasons for leaving a given job

The LWF can also measure permanent separations. Using the same sample as in Table 11, Table 12 shows that 5.5% of men and 3.3% of women lost their job (i.e., were permanently laid off) in 1989. Less than 1% left their employer permanently because of an injury or illness. A minority of women (1.4%) left their employer permanently as a result of a parental leave. However, as the last two columns of Table 12 show, a substantial proportion of men (17.9%) and women (20.5%) left their employer and were not issued an ROE. Presumably, most of these workers decided to quit their job.

Table 12
Permanent separations from one's employer in the main job held in 1989—individuals with a main job in 1989

	Percentage of employees who:							
	Were permanently laid off		Left because of injury or illness		Left because of parental leave		Left for other reasons	
	Men	Women	Men	Women	Men	Women	Men	Women
				percent				
All individuals	5.5	3.3	0.2	0.3	0.0	1.4	17.9	20.5
Canadian-born	5.7	3.3	0.2	0.3	0.0	1.3	17.5	20.2
Visible minority	4.0	2.0	0.1	0.2	0.0	1.4	20.3	23.3
Non–visible minority	5.7	3.3	0.2	0.3	0.0	1.3	17.4	20.2
Immigrant	4.4	3.3	0.2	0.3	0.0	1.9	21.3	22.4
Visible minority	4.0	4.2	0.2	0.4	0.0	1.8	22.7	23.6
Non–visible minority	4.8	2.4	0.2	0.2	0.0	2.0	19.8	21.0
With activity limitations	6.8	3.4	1.3	1.4	0.0	0.8	25.8	28.6
Without activity limitations	5.5	3.3	0.1	0.3	0.0	1.4	17.6	20.3
Less than high school	8.1	5.3	0.3	0.5	0.0	1.5	18.6	25.8
High school diploma	5.3	3.1	0.2	0.3	0.0	1.7	16.9	19.9
Trades certificate	6.5	4.0	0.2	0.4	0.0	1.7	15.8	20.5
PSE below bachelor's degree	3.7	2.3	0.1	0.2	0.0	1.3	17.3	17.4
Bachelor's degree or higher	2.8	2.3	0.0	0.1	0.0	0.7	21.5	20.1

Notes: Individuals aged 23 to 27 in 1989 who filed an income tax form (T1) in 2018. Immigrants arrived in Canada in 1988 or before. PSE = postsecondary education.

Sources: Statistics Canada, Longitudinal Worker File and 1991 Census of Population.

This last point highlights one limitation of the LWF regarding the measurement of permanent separations. As the LWF user guide shows, roughly 6 in 10 permanent separations—measured by the disappearance of an employer–employee pairing from year *t* to year *t*+1—are found to have an ROE. For the remaining permanent separations (40%), identifying the reason underlying the separation is impossible because these permanent separations have no associated ROEs. The LWF user guide also shows that most of these permanent separations with no ROEs appear to result from quits. This, in turn, suggests that permanent separations that have an ROE, and that are reported as quits, will underestimate the true number of permanent quits.[24] This limitation should be kept in mind.

6.7 Periods of non-employment

Not all individuals have the same involvement in the labour market. Whether it is by choice, or as a result of negative shocks such as job loss, injury or illness, some individuals experience significant spells of non-employment.

Contrary to household surveys, the LWF has no information on labour force status and, therefore, cannot distinguish whether these periods of non-employment result from inactivity (i.e., not participating in the labour market), unemployment or a combination of both. As a result, the LWF cannot produce, for example, a weekly vector of labour force status in which a given labour force state (i.e., employed, unemployed, inactive) is associated for each week of the year.

Nevertheless, the LWF can accurately capture yearly spells with no employment income that last one year, two years, three years, etc. For example, among women who had a paid job in 1989, 13.3% had no employment income for at least two consecutive years from 1989 to 1993 (Table 13). The corresponding percentage for men was 7.0%.

24. In contrast, the LWF user guide shows that the number of layoffs obtained from the LWF is generally in line with the numbers obtained from the Labour Force Survey and the SLID.

Table 13
Periods of non-employment among individuals who were employees in 1989, 1989 to 2018

	Percentage of individuals with no employment income for at least two consecutive years:											
	From 1989 to 1993		From 1994 to 1998		From 1999 to 2003		From 2004 to 2008		From 2009 to 2013		From 2014 to 2018	
	Men	Women	Men	Women	Men	Women	Men	Women	Men	Women	Men	Women
	percent											
All individuals	7.0	13.3	13.3	22.7	14.0	20.6	14.9	18.4	16.7	18.7	19.0	21.1
Canadian-born	6.7	13.1	12.9	22.4	13.5	20.4	14.5	18.0	16.4	18.4	18.7	20.9
Visible minority	7.0	11.5	12.7	21.2	13.2	20.3	13.4	18.4	16.2	19.0	19.4	19.9
Non–visible minority	6.7	13.2	12.9	22.5	13.5	20.4	14.5	18.0	16.4	18.4	18.7	20.9
Immigrant	9.0	14.4	16.7	24.5	17.6	22.5	18.6	21.0	19.7	21.2	21.1	22.5
Visible minority	9.9	15.6	18.0	24.9	19.0	21.9	20.3	20.4	21.6	21.9	22.9	23.0
Non–visible minority	8.0	13.1	15.2	24.1	16.0	23.2	16.8	21.6	17.5	20.4	19.2	22.0
With activity limitations	21.2	25.4	29.2	36.0	28.0	33.6	29.8	33.3	32.6	35.9	36.5	40.1
Without activity limitations	6.5	12.9	12.7	22.3	13.5	20.3	14.4	17.9	16.1	18.2	18.4	20.5
Less than high school	10.0	22.7	17.5	31.4	18.1	25.6	20.0	22.9	22.9	24.7	25.4	28.0
High school diploma	6.8	14.6	12.5	24.2	13.3	20.5	14.5	17.9	16.5	18.4	18.9	20.9
Trades certificate	6.1	14.6	11.9	25.1	12.3	22.0	13.5	19.9	14.7	20.2	17.1	22.3
PSE below bachelor's degree	4.9	8.8	10.3	17.9	11.1	17.7	11.1	15.5	12.7	15.4	14.9	17.7
Bachelor's degree or higher	6.0	6.7	12.8	16.2	13.6	18.7	13.7	17.3	14.1	16.3	15.6	17.8

Notes: Individuals aged 23 to 27 in 1989 who filed an income tax form (T1) in 2018. Immigrants arrived in Canada in 1988 or before. PSE = postsecondary education.

Sources: Statistics Canada, Longitudinal Worker File and 1991 Census of Population.

6.8 Periods of multiple job holding

Conversely, other individuals might hold multiple jobs in a given year. Contrary to household surveys, the LWF does not allow researchers to measure multiple job holding at a given point in time. However, the LWF can provide an alternative measure of multiple job holding: the percentage of workers who, in a given year *t*, held at least two jobs that did not end in a permanent separation that year. Table 14 illustrates this concept, using a sample of workers who had at least one paid job in 1989. It shows that during the 1989-to-1993 period, about 17% of men and women held, in at least one year, at least two jobs not ending in a permanent separation.

Table 14
Periods of multiple job holding among individuals who were employees in 1989, 1989 to 2018

	Percentage of individuals holding at least two jobs in at least one year:											
	From 1989 to 1993		From 1994 to 1998		From 1999 to 2003		From 2004 to 2008		From 2009 to 2013		From 2014 to 2018	
	Men	Women	Men	Women	Men	Women	Men	Women	Men	Women	Men	Women
	percent											
All individuals	17.7	17.3	14.7	13.6	13.5	14.7	12.3	14.7	10.6	12.4	8.5	9.8
Canadian-born	17.6	17.3	14.8	13.7	13.7	14.8	12.5	14.8	10.9	12.4	8.5	9.8
Visible minority	18.6	19.3	17.0	12.8	14.0	11.8	12.9	13.0	10.7	12.4	9.2	10.8
Non–visible minority	17.6	17.2	14.8	13.7	13.7	14.8	12.5	14.8	10.9	12.4	8.5	9.8
Immigrant	18.7	17.8	13.4	13.0	12.5	14.0	10.9	14.0	8.7	12.4	7.8	9.7
Visible minority	19.7	18.7	14.0	13.2	13.7	14.9	11.6	15.3	8.5	13.0	7.4	10.0
Non–visible minority	17.5	16.8	12.7	12.8	11.3	13.0	10.2	12.5	8.9	11.7	8.1	9.3
With activity limitations	13.4	14.0	12.3	12.5	12.3	13.8	11.6	12.8	9.1	10.3	6.9	9.0
Without activity limitations	17.9	17.4	14.8	13.6	13.6	14.7	12.3	14.7	10.7	12.5	8.5	9.8
Less than high school	16.4	13.1	14.5	12.6	14.8	15.2	12.8	16.0	10.8	13.1	8.3	9.8
High school diploma	17.1	15.0	14.7	12.9	13.4	14.4	12.7	14.6	10.7	12.1	8.8	9.6
Trades certificate	18.1	15.6	16.3	13.2	15.0	14.9	13.3	15.6	11.6	12.8	9.1	10.5
PSE below bachelor's degree	18.3	19.2	14.1	14.5	12.7	15.6	11.6	15.3	9.9	12.8	7.7	10.2
Bachelor's degree or higher	19.8	23.9	13.6	14.7	11.2	13.2	10.4	12.0	9.9	11.2	8.1	9.2

Notes: Individuals aged 23 to 27 in 1989 who filed an income tax form (T1) in 2018. Immigrants arrived in Canada in 1988 or before. PSE = postsecondary education.

Sources: Statistics Canada, Longitudinal Worker File and 1991 Census of Population.

6.9 Work-to-school transitions

The LWF can measure transitions from work into postsecondary education. As Frenette, Upward and Wright (2011) explain, "The LWF does not contain information on the stock of education at a point in time. Nevertheless, participation in post-secondary schooling (…) can be identified. Specifically, the T1 file includes information on tuition credits and education deductions claimed for courses taken at a post-secondary education institution in Canada. And while a student may transfer these credits or deductions to a parent for tax purposes, it is possible for the years 1999 onwards to identify both the student and the claimant (if they are different). In short, training information is available from 1999 onwards."[25,26]

25. That being said, there is evidence that T1 information on postsecondary education somewhat underestimates true participation in postsecondary education. See Frenette (2021).
26. While it is possible to see whether individuals started attending postsecondary institutions, it is not possible, with the T1 files, to determine whether someone with a bachelor's degree may have subsequently acquired a master's degree, for example.

7 Discussion and concluding remarks

Along with Section 4, the results of Section 6 indicate that Canadians' work histories can be constructed with the LWF–1991 Census of Population **to a fairly large extent**.

The LWF can provide fairly accurate summary statistics of workers' careers, such as cumulative earnings, the number of years with employment income, the number of employers, the number of permanent layoffs, the number of parental leaves, the number of jobs in a given industry and the number of jobs held at large firms.

The LWF can also provide fairly accurate estimates of

- the incidence of long-term jobs, however defined
- the order in which workers have held jobs that provided relatively low or relatively high wages and salaries during their career
- the degree to which workers hold unionized jobs, jobs in small or large firms and jobs in a given industry in a given year
- temporary separations because of layoffs, parental leave, injury or illness, or other reasons throughout one's career
- permanent separations because of layoffs, parental leave, injury or illness, or other reasons throughout one's career
- periods with no employment income
- periods where multiple jobs have been observed in a given year, with none of these jobs ending in a permanent separation.

However, the LWF lacks information on

- workers' occupation, work hours and important job characteristics such as hourly wages, establishment size, subprovincial location of employment, non-wage benefits and whether a job is permanent or temporary
- labour force status (employed, unemployed, inactive)
- the duration, measured at sub-annual frequencies, of spells of employment or unemployment and receipt of government transfers such as SA and EI benefits.

It is important to acknowledge that discussions about constructing Canadians' work histories with the LWF (or administrative data) should be considered with the following question: can Canadians' work histories be realistically collected with traditional survey methods in 2021? Put simply, the study examines this key question: which data collection instrument is best suited to construct work histories in 2021?

Along with potential recall bias and the possibility of non-response being driven partly by unobservable factors whose influence cannot be handled by reweighting, the fact that household surveys like the GSS have obtained overall response rates of about 50% in recent years suggests that solely using household surveys to gather information about work histories is unlikely to be a promising approach. Likewise, solely using datasets like the LWF–Census of Population will allow for fewer analyses than would otherwise be feasible if variables such as work hours and occupation can be added to administrative data

One possible strategy might be to use a hybrid approach—as is done in the LISA—whereby administrative data and survey data are combined. For example, one could periodically draw a sample of workers from the LWF–Census of Population and ask respondents for limited information about work hours and occupation, among other variables.

A second possible approach would be to link longitudinally the 2001, 2006 and 2016 censuses of population (or the 2006 Census, the 2011 National Household Survey and the 2016 Census) and merge the resulting longitudinal file with the LWF. This would allow researchers to measure workers' educational attainment, work hours, weekly wages and occupations at various points in their life course, while taking advantage of the strengths of the LWF regarding earnings, pension coverage, layoffs and other types of separations.

A third possible approach would be to repeat the exercise conducted in this study—whereby the LWF was linked to the 1991 Census of Population—and link the LWF with the subsequent censuses of population (1996 onwards). This would allow a comparison of various cohorts of individuals (those aged 25 to 29 in 1991, those aged 25 to 29 in 1996, etc.). However, this strategy would not allow researchers to have multiple measurements of important time-varying variables such as occupation, work hours and weekly wages.

Given the aforementioned strengths and weaknesses of the different approaches outlined, the second possibility should receive particular attention because it would (a) allow for multiple measurements of key variables such as workers' educational attainment, work hours, weekly wages and occupations; (b) reduce concerns regarding relatively low response rates;[27] (c) likely generate a dataset with a reasonable sample size; and (d) combine the strengths of census data and the LWF in a longitudinal setting.

Discussions about the best way to measure work histories in 2021 should consider hybrid approaches because they have greater analytical potential than a conventional approach based solely on household surveys or administrative data.

27. Concerns would be reduced, but not eliminated, since the 2011 National Household Survey had a lower response rate than previous or subsequent censuses.

References

Acemoglu, D., and P. Restrepo. 2019. “Automation and new tasks: How technology displaces and reinstates labor.” *Journal of Economic Perspectives* 33 (2): 3–30.

Bollinger, C.R., and B.T. Hirsch. 2013. “Is earnings nonresponse ignorable?” *Review of Economics and Statistics* 95 (2): 407–416.

Bonikowska, A., and R. Morissette. 2012. *Earnings Losses of Displaced Workers with Stable Labour Market Attachment: Recent Evidence from Canada*. Analytical Studies Branch Research Paper Series, no. 346. Statistics Canada Catalogue no. 11F0019M. Ottawa: Statistics Canada.

Bonikowska, A., and G. Schellenberg. 2013. *An Overview of the Working Lives of Older Baby Boomers*. Analytical Studies Branch Research Paper Series, no. 352. Statistics Canada Catalogue no. 11F0019M. Ottawa: Statistics Canada.

Bonikowska, A., and G. Schellenberg. 2014. *Employment Transitions Among Older Workers Leaving Long-term Jobs: Evidence from Administrative Data*. Analytical Studies Branch Research Paper Series, no. 355. Statistics Canada Catalogue no. 11F0019M. Ottawa: Statistics Canada

Chan, P.C.W., and R. Morissette. 2016. *The Impact of Annual Wages on Interprovincial Mobility, Interprovincial Employment, and Job Vacancies*. Analytical Studies Branch Research Paper Series, no. 376. Statistics Canada Catalogue no. 11F0019M. Ottawa: Statistics Canada.

Ci, W., M. Frenette, and R. Morissette. 2016. *Do Layoffs Increase Transitions to Postsecondary Education Among Adults?* Analytical Studies Branch Research Paper Series, no. 380. Statistics Canada Catalogue no. 11F0019M. Ottawa: Statistics Canada.

Frenette, M. 2021. *Claiming Postsecondary Education Tax Credits: Differences by Level of Parental Income and Implications for Trends in Enrolment Rates.* Economic and Social Reports, Catalogue no. 36-28-0001. Ottawa: Statistics Canada. Forthcoming.

Frenette, M., R. Upward, and P.W. Wright. 2011. *The Long-term Earnings Impact of Post-secondary Education Following Job Loss*. Analytical Studies Branch Research Paper Series, no. 334. Statistics Canada Catalogue no. 11F0019M. Ottawa: Statistics Canada.

Green, D.A., R. Morissette, B. Sand, and I. Snoddy. 2019. “Economy-wide spillovers from booms: Long distance commuting and the spread of wage effects.” *Journal of Labor Economics* 37 (S2): S643–S687.

Jacobson, L.S., R.J. Lalonde, and D.G. Sullivan. 1993. “Earnings losses of displaced workers.” *American Economic Review* 83 (4): 685–709.

Meyer, B.D., and N. Mittag. 2019. “Using linked survey and administrative data to better measure income: Implications for poverty, program effectiveness, and holes in the safety net.” *American Economic Journal: Applied Economics* 11 (2): 176–204.

Meyer, B.D., W.K.C. Mok, and J.X. Sullivan. 2015. “Household surveys in crisis.” *Journal of Economic Perspectives* 29 (4): 199–226.

Morissette, R., W. Ci, and G. Schellenberg. 2016. *Hiring and Layoff Rates by Economic Region of Residence: Data Quality, Concepts and Methods*. Analytical Studies: Methods and References Series, no. 1. Statistics Canada Catalogue no. 11-633-X. Ottawa: Statistics Canada.

Morissette, R., Y. Lu, and T. Qiu. 2013. *Worker Reallocation in Canada*. Analytical Studies Branch Research Paper Series, no. 348. Statistics Canada Catalogue no. 11F0019M. Ottawa: Statistics Canada.

Morissette, R., and T. Qiu. 2020. *Turbulence or Steady Course? Permanent Layoffs in Canada, 1978-2016.* Institute for Research on Public Policy Study 76. Montréal: Institute for Research on Public Policy.

Morissette, R., H. Qiu, and P.C.W. Chan. 2013. "The risk and cost of job loss in Canada, 1978-2008." *Canadian Journal of Economics* 46 (4): 1480–1509.

Morissette, R., and X. Zhang. 2004. "Retirement plan awareness." *Perspectives on Labour and Income* 5 (1): 11–18. Statistics Canada Catalogue no. 75-001-X.

Morissette, R., X. Zhang, and M. Frenette. 2007. *Earnings Losses of Displaced Workers: Canadian Evidence from a Large Administrative Database on Firm Closures and Mass Layoffs*. Analytical Studies Branch Research Paper Series, no. 291. Statistics Canada Catalogue no. 11F0019M. Ottawa: Statistics Canada.

Ostrovsky, Y., and M. Frenette. 2014. *The Cumulative Earnings of Postsecondary Graduates Over 20 Years: Results by Field of Study*. Economic Insights, no. 40. Statistics Canada Catalogue no. 11-626-X. Ottawa: Statistics Canada.

Phipps, S., P. Burton, and L. Lethbridge. 2001. "In and out of the labour market: Income consequences of child-related interruptions to women's paid work." *Canadian Journal of Economics* 34 (2): 411–429.

Ravanera, Z.R., R. Fernando, T.K. Burch, and C. Le Bourdais. 2002. "The early life courses of Canadian men: Analysis of timing and sequences of events." *Canadian Studies in Population* 29 (2): 293–312.

Statistics Canada. 1992. *Worker Turnover in the Canadian Economy: Separations and Hiring, 1978 - 1989*. Statistics Canada Catalogue no. 71-539. Ottawa: Statistics Canada.

Sullivan, D.G., and T. Von Wachter. 2009. "Job displacement and mortality: An analysis using administrative data." *Quarterly Journal of Economics* 124 (3): 1265-1306.