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**Organizational and Individual  
Determinants of Atypical  
Employment: The Case of Multiple  
Jobholding and Self-Employment**

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# Organizational and Individual Determinants of Atypical Employment: The Case of Multiple Jobholding and Self-Employment\*

Gilles Simard<sup>†</sup>, Denis Chênevert<sup>‡</sup>, Michel Tremblay<sup>§</sup>

## Résumé / Abstract

Le rôle traditionnel de la gestion de carrière attribuit à l'entreprise un certain contrôle sur le cheminement des individus, dans la mesure où la prise en charge organisationnelle était très active. Toutefois, le besoin incessant de flexibilité organisationnelle, qui mène à l'utilisation croissante du travail atypique, contribue à la consolidation des nouvelles carrières dans lesquelles les thèmes du contrôle et de l'autonomie sont questionnés. Parmi ces formes de travail atypique, le cumul d'emplois et le travail autonome/à son compte ont particulièrement retenu l'attention des chercheurs. En utilisant des données produites par Statistique Canada, nous avons cherché à identifier, par l'entremise des analyses de régression logistique, les facteurs qui influencent la probabilité de faire partie de ces deux catégories d'emploi atypique. Nos résultats suggèrent que les facteurs d'influence ne sont pas les mêmes pour les deux catégories d'emploi non standard considérées. Le secteur d'activité, le sexe et les promotions jouent davantage sur la probabilité de joindre les effectifs des autonomes/à son compte alors que la catégorie professionnelle, la fréquence du mouvement et l'absence de promotion influencent davantage la probabilité d'appartenir au groupe des cumulards. Finalement, nos résultats montrent que les effectifs de ces deux types de travail atypique ne sont pas homogènes et que l'appartenance à l'un ou l'autre de ces groupes n'implique pas exclusivement la précarité des conditions de vie et de travail.

*Traditionally, the company has been attributed relative control over employees' career paths, particularly in the case of very active organizational management. However, the growing need for organizational flexibility has led to the increasing recourse to atypical work, which in turn contributes to consolidating new careers in which the themes of control and autonomy acquire new meaning. Of these forms of atypical work, multiple jobholding and self-employment have particularly intrigued researchers. Using data compiled by*

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*Statistics Canada, we have sought to identify, through logistic regression analyses, the factors that influence the probability of belonging to these two categories of atypical employment. Our results suggest that the influence factors are not identical for the non-standard two job categories studied. Sector of activity, sex and the absence of promotion have a considerable impact on the probability of joining the ranks of the self-employed, whereas professional category and frequency of movement significantly influence the probability of belonging to the multiple jobholder group. Our results also show that the makeup of the populations engaging in these two forms of atypical work is not homogeneous, and that belonging to one of these groups does not necessarily entail precarious living and working conditions.*

**Mots Clés :** Travail atypique, cumul d'emplois, travail autonome/à son compte, flexibilité organisationnelle

**Keywords:** Multiple jobholding, self-employment, new career

## **Introduction**

For several years, organizations have been rocked by profound structural changes and by the advent of management philosophies that have impacted work organization and the nature of the job market. Central to the structural modifications that are radically transforming organizations is a generalized and constant goal: to enhance organizational flexibility (Chênevert & Tremblay, 1995). There is every indication that this quest for flexibility and the growth of different forms of atypical employment in the active population are two indissociable phenomena. Issues related to commitment are a necessary function of analyses of atypical employment, given that the use of non-standard workers heightens autonomy, independence and distance between individuals and organizations (Payette, 1998). Moreover, some forms of atypical employment, such as self-employment, considerably transform the aspects of control because in these cases control is essentially manifested by the attainment of objectives and results included in a global mandate. In this perspective, organizational control is thus limited to products, not processes, and human resource management can be compared to a client/supplier process.

After a brief discussion of atypical employment in the specialized literature, we present highlights that describe the main characteristics of atypical employment in the Canadian active population in 1994. This general description is supplemented by a more in-depth examination of two forms of non-standard employment: multiple jobholding and self-employment. Of the significant characteristics to be considered in the description of non-standard work, according to the specialized documentation, particular attention is paid to the sector of activity, the occupational category, sex and career movement. In the discussion of the results, we first investigate, using the logistic regression method, the elements that influence the probability of joining the ranks of multiple jobholders and the self-employed. We then add to the analysis of multiple jobholding and self-employment by illustrating how these two forms of atypical employment encompass heterogeneous individuals whose situation is not necessarily characterized by precarious living and working conditions.

### **1. Atypical employment: questioning traditional career foundations**

Documentation on atypical employment is divided into two large complementary fields. The first covers analyses that describe the phenomenon as a whole, using databases produced by government agencies, such as the General Social Survey (GSS) that we use in this paper. Researchers have described the general profile of jobs and atypical workers in terms of sex, education, industrial sector and occupation (Akyeampong, 1989, 1997; Kranh, 1991, 1995; Webber, 1989). A second field of interest encompasses analyses of one or more forms of non-standard employment, in particular relevant managerial strategies and perceptions (Booth, 1997; Macbride-King, 1997). Our description of non-standard work is inspired by aspects of these two broad areas of interest.

Even before atypical work attracted attention, studies on career plateauing (Cardinal & Lamoureux, 1992; Tremblay, 1992) had clearly illustrated how the concept of the traditional career was being increasingly eroded by structural or individual blockage mechanisms. In the case of non-standard work, it is not so much the absence of movement as the constancy of direction that attracts attention (Simard, 2000). This specialized literature is unanimous that vertical movement is clearly tapering off, and is even absent from typical new career paths (Brousseau, Driver et al. 1996; Hall, 1996). However, the absence of promotions does not necessarily indicate the absence of movement because individuals in

new careers are less likely to acquire long-term experience in the same job category and within the same organizational setting; opting instead for a path punctuated by work experience associated with different job categories. This prompts the individual to evolve within various organizational settings (Hall, 1996). The same reasoning applies to non-standard work; atypical workers would be more subject to frequent job changes than standard workers.

### 1.1 Atypical employment

Analysts of non-standard work have not agreed on a common definition of this phenomenon. Consequently, they do not necessarily use the same criteria to distinguish standard jobs from atypical jobs. Krahn wrote two papers summarizing the progress of non-standard employment in the Canadian active population. In his first article, Krahn (1991) describes the non-standard employment situation by presenting five modes of participating in the labour market, namely part-time work, temporary work, self-employment, seasonal work and multiple jobholding. In a more recent article, Krahn (1995) excludes seasonal work but conserves the four other forms of jobs defined in the 1991 article. Several authors (Booth, 1997; Macbride-King, 1997) propose an analogy between atypical jobs and contingent work. Therefore, all jobs that are not permanent, in general all forms of “temporary” work – part-time, seasonal, on call or contract – have been directly studied (Booth, 1997).

Although these definitions are subject to interpretation, with the number of atypical workers varying accordingly, this is not a critical problem, because even if the number of atypical workers differs between analyses, there is a consensus that these forms of employment are constantly growing within the Canadian active population – and more extensively in Europe and North America (Booth, 1997; Krahn, 1991, 1995). The impressive proliferation of atypical and/or contingent work in the job market is structurally linked to a generalized and constantly evolving quest for organizational flexibility (Booth, 1997; Krahn, 1991, 1995; Macbride-King, 1997; Tremblay, 1990). This perspective seems to parallel the Canadian context: a 1997 study of human resources management senior executives conducted by the Conference Board of Canada shows that 57% report that they have increased their use of contingent work in the past two years; only slightly more than one third do not envision a decrease in the core workforce (Booth, 1997). The same study reveals that 93% of managers questioned stated that the growing use of contingent work is mainly fuelled by the desire to increase the flexibility of their organization. In addition, 72.0% of these managers anticipated, for a five-year horizon, an increase in the use of contingent work that would ultimately yield a numerical equilibrium between the core workforce and non-standard work (Booth, 1997). The direction of the relation between the search for organizational flexibility and growth in atypical employment therefore leaves no room for doubt. We can thus conclude that the search for flexibility is a fundamental determinant of the use of contingent work (Booth, 1997; Macbride-King, 1998) and the growth of atypical employment.

Nonetheless, it is important to note that the flexibility discussed above refers primarily to the forms of external flexibility represented by the various types of non-standard jobs. The objective underpinning the use of external flexibility is to emphasize an employment status (Jacob, 1993; Tremblay, D.G, 1990) that favours a decrease in direct salary costs by maximizing the coherency of the relationship between production requirements and availability of labour. Moreover, one should be aware that organizations are also seeking strategies based on internal flexibility, particularly technological flexibility and skills (Jacob, 1993; Kolodny et al., 1996; Chênevert & Tremblay, 1995). It is therefore understandable that organizational flexibility is expanding, and does not solely cover the peripheral

activities of organizations, those that rely on less qualified resources, but also applies to essential tasks, which are nonetheless non-critical. Essential tasks such as compensation management, employee benefits or development of skills may entail technical or professional procedures, in principle performed by workers and jobs that are ultimately more qualified than those situated in the peripheral activities of the organization (Booth, 1997). It is along these lines that we have examined the literature on outsourcing by indicating how these types of expert work are taking shape in an employment market that relies heavily on atypical employment.

The use of external flexibility and non-standard work therefore cannot be considered as a short-term context-driven phenomenon, with a fixed duration, i.e. a waning fad effect. Rather, the contrary appears to be true. As the elements stated above demonstrate, together with recent statistics, we are witnessing a sweeping and probably irreversible trend within the employment market. Of all the forms of atypical work, multiple jobholding and self-employment deserve attention due to their substantial, continuous and rapid growth (Edwards & Hendrey, 1996; Kranh, 1995).

## 1.2 Career foundations

As various forms of atypical employment gain ground, the consolidation of contingent work strengthens the thesis of the constantly decreasing core workforce (Booth, 1997; Macbride-King, 1997). Some even state that by increasingly targeting external flexibility, organizations are partially relieving themselves of the responsibility of career management (Brousseau, Driver et al. 1996; Hall, 1996). Therefore, the predominance of management practices oriented toward increasing organizational flexibility and consolidating non-standard employment directly contribute to accelerating the evolution of the traditional career paradigm.

In the past, organizational career management implied the existence of professional mobility channels that enabled individuals to ascend through a series of positions and functions, along with an identification system of potential candidates and management mechanisms that support and direct individuals (Caudron, 1994). In this career management system, individuals would spend little time organizing their career paths because they followed fairly standardized models that corresponded to criteria such as qualification, age, stage and seniority. These career models evolved within social and organizational environments that were relatively stable and predictable.

This is definitely not the case with regard to new careers whose development and consolidation unfold in unstable, constantly changing organizational settings. As a result, the representation of the traditional career can no longer constitute a universal reference paradigm, even if several “nostalgic” scholars continue to cling to it and desperately wish it to hold true. The competing paradigm, that of new careers, is quite distant from the old model, and points to renewed attitudes and behaviours as well as contradictory effects on individuals (Hall, 1996). Therefore, even if the description of multi-purpose careers is often presented in an enticing light, i.e. almost liberating and emancipating, conjuring up freedom of action and practically unlimited movement, it can also inspire fear and insecurity, given the magnitude of the change in reference paradigm (Bailly, Cadin and Saint-Giniey, 1998; Hall, 1996).

In fact, it is not only career representation that is changing; the criteria of success previously used in career evaluation no longer apply. In the traditional perspective, career success was measured essentially through promotions, income and social status attained after a long career, often within the

same organization (Caudron, 1994; Chênevert & Tremblay, 1998). Career success was therefore essentially calculated by the distance travelled between the individual's starting point – i.e. social origin and/or first job – and the arrival point. The notion that the all-encompassing criteria of success in the traditional career paradigm are difficult to extend to new careers easily generates a consensus. At least this is the case if we accept that the new careers are defined as paths composed of a long series of identity changes and continuous learning sequences, numerous movements in which the experience of hierarchical progress are scarcely evident, even practically excluded (Arthur & Rousseau, 1996; Hall, 1996).

On this subject, note that most of the respondents in the Canadian database that we used (75.1%) have not been promoted in the past five years. This data reinforces the hypothesis that blockage situations affect a growing number of workers (Cardinal & Lamoureux, 1992; Tremblay, 1992). However, atypical workers in the Canadian active population in 1994 reported even fewer promotions than standard workers. We have already demonstrated in an earlier article that the direction of movement presents a polarizing and distinctive effect because the probability of being an atypical worker increases by 26.6% for respondents who have not experienced a single promotion in the past 5 years, whereas those of respondents who received 3 to 5 promotions decreases by 35.6% (Simard, 2000). To build upon these findings, we concentrate our analysis on multiple jobholding and self-employment. The research question that orients our analysis is formulated as follows: what are the organizational and individual determinants that increase the probability that a standard worker will join the ranks of the self-employed or multiple jobholders?

## **2. Hypotheses and research methodology**

The elements of the research problem above have led us to define six research hypotheses that all use multiple jobholding or self-employment as the dependant variable. The formulation of these hypotheses examines the probability of a standard worker's engaging in one of these two forms of atypical employment.

### **2.1 Research hypotheses**

Apart from sectors of activity that traditionally lend themselves to seasonal work, all of the other sectors are presumed to use atypical work in a comparable fashion. The vast majority of organizational settings should therefore be seeking the competitive advantages of organizational flexibility offered by non-standard work.

Nonetheless, we know that multiple jobholding is not limited to a particular sector of activity (Simard & Legault, 1997). It is therefore difficult to imagine what sector has a marked positive influence on the probability of joining the group of multiple jobholders. For self-employed workers, the specialized literature reveals that many work at home or on borrowed premises (Edwards & Hendrey, 1996), which often denotes employment in the services sector, in the broad sense. Moreover, there is a concentration of self-employed workers in construction and commerce (Bregger, 1996). Our first hypothesis is twofold:



H1a The probability of being in a self-employment situation is higher for individuals who work in the commerce (wholesale and retail) sectors, financial services and construction

H1b No sector of activity has a positive influence on the probability of multiple jobholding

As mentioned above, the literature demonstrates that the search for flexibility extends to central activities that are non-critical for organizations. As a result, atypical work is not limited to low-skilled jobs and poorly qualified occupational categories. These jobs are certainly but not exclusively affected; all occupational categories should thus be equally affected. In addition, the specialized literature reveals that many self-employed individuals have a high level of education, which presupposes qualified occupations (Meyer & Bruce, 1996). Therefore, we postulate that:

H2 In terms of the job held five years ago, no single occupational category positively influences the probability of engaging in multiple jobholding or self-employment

Since at least a decade, many career analysts have studied the issues that directly question the traditional notion of the career. This traditional view has been overturned, a phenomenon that is even more evident in a context of generalized atypical employment. Given that the scarcity of hierarchical movement is manifested as a characteristic of the generalization of the plateauing of traditional careers, and also as a net trend toward the systematic use of non-standard employment, the absence of promotions considerably increases the probability of being an atypical worker (Simard, 2000). Therefore, there is no reason to insist on this point except if, and this is probably the case, many atypical workers arrived at these types of jobs owing to the low possibilities of promotion. In this sense, our third hypothesis states that:

H3 The absence of a promotion in the past five years increases the probability of being in a self-employment or multiple jobholding situation.

We also know that atypical Canadian workers in 1994 are likely to be in careers with more movement than standard workers, without this factor considerably influencing the probability of being an atypical worker (Simard, 2000). Nonetheless, we can postulate, by definition, that multiple jobholding is probably the form of non-standard work that entails the highest non-ascending mobility. In contrast, self-employment presupposes a short-term employment link with a client, a contractual relationship that does not necessarily involve a change in position or job. We therefore formulate a dual hypothesis that reads as follows:

H4a The probability of being in a multiple jobholding situation is higher for individuals who have experienced high mobility in the past five years.

H4b The frequency of movement does not influence the probability of being a self-employed worker.

Several individual variables may also influence the probability of being self-employed or holding multiple jobs. Sex, education and age are notable examples. Concerning the latter variable, there is no specialized literature to support a precise hypothesis. Moreover, sex is not significantly linked to

multiple jobholding (Simard & Legault, 1997). However, we know that among self-employed workers, men far outnumber women, a trend that has already been identified in American studies on this topic (Matthews & Moser, 1995). Therefore:

H5a Men have a higher probability of being self-employed than women

H5b Men and women have an equal probability of being in a multiple jobholding situation

Lastly, we formulated a sixth hypothesis concerning the makeup of the population of multiple jobholders and self-employed workers. Our previous research has led to the observation that multiple jobholders do not form a very homogeneous group (Simard, 1997). The same finding applies to self-employed workers. Accordingly, these forms of atypical jobs are associated with unequal individual characteristics, conditions and living opportunities for the same type of workers. We therefore formulate the final hypothesis:

H6 There are several distinct families of multiple jobholders and self-employed workers.

## 2.2 Research methodology

To adequately answer the questions raised by the hypotheses, logistic regression analysis and various bi-variate analyses have been used. The probability of occurrence of holding one of the two forms of atypical jobs is evaluated according to seven independent variables described below.

### 2.2.2 Sample

To attain our demonstration objectives, we used secondary data produced by Statistics Canada, namely the micro-data file of the General Social Survey (GSS) 1994 — *Cycle 9 Education, Work and Retirement*. The data has been gathered during the period of January to December 1994.<sup>1</sup> In this article, we examine respondents in Section H, i.e. individuals active at the time of the survey (which excludes retired people but not active people age 65 and over). The sample therefore comprises 6,365 cases. However, two samples are analyzed: 808 individuals for regression of multiple jobholders and 1,204 for self-employed workers.<sup>2</sup>

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<sup>1</sup> The sample is equally distributed over the 12-month period, which allows spreading of the effects of seasonal variation (Statistics Canada, 1995). The General Social Survey covers all individuals aged 15 and over living in Canada, with the exception of the inhabitants of the Yukon, Northwest Territories and full-time pension recipients residing in an institution. For Canada as a whole, the sample contains 11,880 respondents distributed proportionately in the ten provinces. The weighted results are representative of the Canadian population overall and not by province.

<sup>2</sup> To obtain equal groups in logistic regression analyses, we used a sampling factor of 0.08 for multiple jobholders and 0.125 for self-employed workers.

### 2.2.3 Operational definition of variables used in logistic regression

The dependent variables are dichotomous, and correspond to the job status of respondents – multiple jobholder or self-employed. Multiple jobholding is covered directly in question H1, which asks the respondent whether they held more than one job in the week preceding the survey. Self-employment is a constructed variable that encompasses individuals who claim to be self-employed professionals in question H13, and those who consider themselves as self-employed workers in question H8, and who have no employees, i.e. the reply to question H9. This transformation and control are necessary because respondents that fall into more than one variable must not be counted more than once. In addition, if a self-employed worker has employees, he/she must be considered an employer and not a non-standard worker.

The seven independent variables integrated into the two logistic regression equations are as follows. First, there are two organizational characteristics: the sector of activity in which the respondent primarily situates their work activity in the past five years, and whether the respondent held a unionized job five years ago. The latter variable is dichotomous, and is listed in raw form in the database. For the sector of activity, we have recorded the original variable of Statistics Canada constructed based on an open question. This variable includes 18 sectors of activity, whereas the variable we used encompasses the primary sector, the manufacturing sector and the commerce sector.

Job and career attributes are the focus of questions that determine the occupational category held five years ago, along with the number of job changes without vertical mobility and promotions in the past five years. The occupational category held five years ago is obtained via an open question coded based on the 16-category Pinéo scale. We have recoded this variable by grouping all professionals in one category, managers in another, supervisors and foremen, vendors, manual labourers, farmers/farm workers. The number of movements in the past five years is obtained from a question that asks the respondent to indicate the number of different jobs held, specifying that this refers to the holding of different positions within the same company or another company. The sum of these two variables provides the basis for the variable used in this study. Variance is low after six jobs, and we have grouped respondents in seven categories: from one to seven and up. The number of promotions is obtained by an open question. Similar to the number of jobs, we have grouped respondents into five categories: none, one, two, three/four, five and up. Lastly, for individual variables, we use sex and age. This variable is produced based on a metric variable, and includes five categories: 18-29, 30-44, 45-59, 60-64, 65 and +.

We used the ENTER method to force all variables into the equation. Each variable is introduced sequentially, not in a block. The four category variables (sector of activity, number of movements, number of promotions and occupational category) are integrated into the regression model using the deviation technique. This technique allows generation of coefficients expressing the differing impact of each of the categories of the variable in relation to the general effect of the variable. The three other variables are dichotomous and are integrated into the model using the “indicator” technique, which allows selection of the category of the variable included in the constant.

In the bi-variate analyses used to describe the families of multiple jobholders and self-employed workers, we also use the number of hours worked per week, annual income and the highest level of education attained. The duration of the work week is obtained by an open question that yields a metric variable that we have used as such. The respondents’ annual income is recorded by the same type of

variable and is used in raw state, whereas the level of education is measured by an ordinal 12-category scale, with the latter category corresponding to no education. The variable used has five categories: graduate studies, certificate, undergraduate studies, college studies and the equivalent of a Secondary V diploma or less.

### 3.1 Presentation of results

The logistic regression analysis<sup>3</sup> initially evaluates the validity of the global model, i.e. the model's capacity to reproduce original data at a level of significance of  $\alpha=0.05$ . In this case, the null hypothesis, that expresses the similarity of the global model to the model that contains the constant only, must be accepted. To this effect, some use the results of the classification table, but it is preferable to bear in mind that this statistic is not reliable, as it is essentially descriptive (Hosmer & Lemeshow, 1989). The chi-square statistic, which allows judging of the significant character of the variation of -2 log likelihood, may be used. For our analysis, the models are significant because the value of the chi-square of Goodness of fit is 482.245—the critical distribution of chi-squares with 27 degrees of freedom is 55,47 —  $p = 0.000$  — for the model relating to self-employment, whereas the statistics for multiple jobholders are: 113.765 for the chi-square.<sup>4</sup> The global model is significant because, as a whole, the coefficients are different from zero ( $p = 0.000$ ). The two models thus generate valid predictions of the probability of being a multiple jobholder or self-employed worker. Nonetheless, the predictive capacity of the two models is unequal. The statistic of Cox and Snell, which provides a pseudo R<sup>2</sup>, reveals that the model used for multiple jobholders explains only 13% ( $R^2=0.131$ ) of the probability of the shift from standard work to multiple jobholding, whereas that of self-employment is markedly stronger ( $R^2=0.330$ ).

To identify the variables that influence the probability of becoming a multiple jobholder or self-employed worker, we use Wald's statistic to evaluate the importance of the contribution of a variable or variable category. Note that only three variables are excluded from the model used for multiple jobholding, namely age group, sex and union membership. Regarding self-employment, two variables are rejected: number of jobs in the past five years and age group. To tease out the individual effect of the significant variables, the impact of each variable is translated into a net variation (percentage) of the base probability.<sup>5</sup>

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<sup>3</sup> For more information regarding the logistic regression table generated by SPSS, please contact the principal author by email: simard.gilles@uqam.ca.

<sup>4</sup> Other statistical tests allow evaluation of the significance of the -2 log likelihood whose classification ensue from the model. Several authors, including Hosmer & Lemeshow (1989) warn that these results should not be used to assess the predictive capacity of the model because they are overly influenced by factors independent of the performance level of the model, notably the segregation point (0.5) and the relative size of each of the groups.

<sup>5</sup>  $[(1+e^{-(a+b)})^{-1} / (1-e^{-a})^{-1}]-1$ .

### 3.1.1 Sector of activity

Table 1 presents the results of the logistic regression analyses performed for multiple jobholders and self-employed workers.

The sector of activity has a determining influence on the probability of being self-employed (Wald = 100.7830). This result differs substantially from that of multiple jobholders. Table 1 reveals that 8 out of 12 sectors of activity of the original variable have a significant effect on the probability of being a self-employed worker. Of this number, four produce a negative effect and the remaining four a positive effect.

The probability of being self-employed decreases by 86.1% for individuals who work in public administration, 44.2% in the communications and public services sector, 29.7% in the manufacturing sector and 26.9% in the education sector. In contrast, the personnel services sector increases this probability by 31.6%, construction 30.6%, management services 29.2% and finance, insurance and real estate by 16.8%.

Regarding multiple jobholding, the results show a weak effect of sector of activity on this variable (Wald = 14.5669). Nonetheless, note that for individuals working in the construction sector, the probability of holding multiple jobs increases by 46.7%, whereas that of workers in finance, insurance and real estate decreases by 41.2%. In the latter case, the influence is strong but negative, which indicates that this sector does not use multiple jobholding; however this does not imply that all forms of atypical jobs are excluded.

Lastly, unionization exerts a mitigated influence on the probability of being self-employed, but not of holding multiple jobs, which is explained by the fact that multiple jobholders use atypical forms of employment that are generally unionized, such as part-time work. Therefore, holding a non-unionized job five years before the study increases the probability of being self-employed by 16.1%.

### 3.1.2 Professional categories

Regarding the influence of the occupational category held five years ago, Table 1 shows that 2 out of 7 categories of the original variable produce an effect on the probability of holding multiple jobs. The influence of this variable is comparable to that of the sector of activity (Wald = 15.2970), i.e. minimal. The two most influential categories: professionals and semi-professionals along with senior and middle managers. In the first case, the probability of holding multiple jobs increases by 52.6%, whereas it decreases by 33.4% for respondents who held a senior or middle manager position five years before the survey.

For self-employment, Table 1 illustrates that the influence of the professional category is fairly weak (Wald = 16.4104). Accordingly, only one category out of 7 of the original variable produce an effect--in this case negative--on the probability of self-employment. Note that respondents who were senior and middle managers five years earlier are 20.6% less likely to be self-employed. This result is consistent with that obtained for multiple jobholders, and indicates that this occupational category is very little affected by these atypical forms of employment, perhaps even by all types of non-standard work.

Table 1: Net variation in the probability of holding multiple jobs or being self-employed

Variables	Multiplication factor Exp (B)	Percentage points	Net variation in %
<b>Self-employed</b>			
Manufacturing sector	-0.8025	-19.5 %	-29.7 %
Construction	1.1498	20.1 %	30.6 %
Clerical and public service	-1.1977	-29.1 %	-44.2 %
Personnel	1.2067	20.8 %	31.6 %
Finance, insurance, real estate	0.5443	11.1 %	16.8 %
Management	1.0743	19.2 %	29.2 %
Education	-0.7278	-17.6 %	-26.9 %
Public administration	-2.9472	-56.6 %	-86.1 %
Senior and middle management	-0.5625	-13.5 %	-20.6 %
One promotion or more in past 5 years	-1.4303	-34.3 %	-52.2 %
No union membership in past 5 years	0.5194	10.6 %	16.1 %
Male	0.4487	9.3 %	14.2 %
<b>Multiple-jobholder</b>			
Construction	0.5206	10.1 %	46.7 %
Finance, insurance, real estate	-0.6395	-8.9 %	-41.2 %
Professional and semi-professional	0.5790	11.4 %	52.6 %
Senior and middle management	-0.4941	-7.2 %	-33.4 %
4 jobs or more	0.5078	9.8 %	45.4 %
One promotion or more in past 5 years	-0.4820	-7.1 %	-32.7 %

### 3.1.3 Career mobility

Table 1 also reveals that some career elements have a marked influence on the probability of being in a multiple jobholding situation. This is notably and clearly the case with frequency and direction of movement in the five years preceding the study (Wald=53.8196). In effect, we noted that respondents that experienced one or more promotions in the past five years had a 32.7% decrease in the probability of their holding multiple jobs. Moreover, a very high frequency of non-hierarchical movement (over five jobs) increases the probability of holding multiple jobs by 45.4%. In contrast with multiple jobholding, frequency of movement in the past five years does not influence the probability of being self-employed. In fact, Table 1 demonstrates the marked influence of the direction of movement (Wald=41.1818). As observed for multiple jobholding and atypical work overall (Simard, 2000), respondents promoted in the past five years were 52.2% less likely to be self-employed.

### 3.1.4 Individual characteristics

Regarding self-employment, only one individual characteristic influences the probability of carrying on this form of atypical employment: the sex of the respondent. Accordingly, men have a 14.2% higher probability of being self-employed. As for multiple jobholding, no individual variable emerged from the logistic regression analysis, which implies that men and women have an equal probability of holding multiple jobs

### 3.1.5 Multiple jobholding and self-employment: homogeneity or heterogeneity?

In the General Social Survey of 1994, 7.2 % of the respondents were holding multiple jobs. Self-employed workers represented 11.6% of the GSS, a result that is comparable with American data on the subject (Edwards & Hendrey, 1996; Segal, 1996). To concisely yet systematically describe these two forms of atypical jobs, we will present them in terms of heterogeneous populations divided into broad family types.<sup>6</sup>

Table 2 shows that it is possible to isolate three broad families of multiple jobholders: a majority of *insecure* (51.7 %), followed by *consolidated* (40.7 %) and a minority of *stars* (7.6 %), who are characterized by very high income. The *stars* also report the longest work weeks, yet their results are similar to the *consolidated* family. In contrast, the *stars* clearly stand out from the *insecure* because of their considerably longer work weeks. When annual income is taken into consideration, *stars* are categorically differentiated from *insecure* and *consolidated* by a much higher average annual income. Table 2 shows that men and women are equally represented in the group of multiple jobholders. However, 2 out of 3 women are found in the *insecure* family, whereas, inversely, two thirds of the *star* family are men. *Stars* account for most of the university graduates who hold multiple jobs, whereas *insecure* comprise more individuals with a high school diploma or less.

Table 2 distinguishes three significantly different families among the self-employed. The first is made up of *conquerors*, who comprise 17% of the population, the second family, *survivors*, account for 36.7% and *victims* are the majority, at 46.4%. Similar to multiple jobholders, one family of self-employed workers clearly stands out from the others. In effect, *conquerors* have an annual average income of \$89,158, i.e. twice as high as that of *survivors* and five times higher than that of *victims*. In terms of education, note that the *conquerors* encompass the majority of self-employed university graduates, whereas the *victims* family comprises more than half of respondents with high school diplomas or less. In contrast with multiple jobholders, men are over-represented in self-employment, at 61.6% of the population holding this type of atypical job. Moreover, men constitute the majority among the *conquerors* and the *survivors*. In terms of duration of work week, *conquerors* significantly stand out from the two other families because of their considerably longer average schedule.

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<sup>6</sup> To isolate these families within each of the atypical forms of employment selected, we performed a cluster analysis with the annual income and duration of the work week variables. The groups produced in these analyses have been used as independent variables in bi-variate analyses to produce the descriptive results that follow.

Table 2: Families of multiple jobholders and self-employed workers

	Multiple jobholders				Self-employed			
	Insecure	Consolidated	Stars	ref. %.	Victims	Survivors	Conquerors	ref. %.
Hrs. work/week	41	52	55**		37	47	54**	
Level of education								
Graduate Studies	2.3%**	6.7%**	32.0%**	6.3%	1.7%**	4.4%**	15.9%**	5.1%
Bachelor's	13.1%**	21.5%**	36.0%**	18.2%	1.7%**	21.3%**	49.2%**	21.3%
Univ. certificate	1.7%**	5.2%**	8.0%**	3.6%	11.0%**	3.7%**	3.2%**	2.7%
College	26.9%**	34.1%**	12.0%**	28.7%	32.0%**	26.5%**	12.7%**	26.7%
High school or less	56.0%**	12.0%**	12.0%**	43.3%	53.5%**	44.1%**	19.0%**	44.2%
	100%	100%	100%	100%	100%	100%	100%	100%
Av. annual income	\$21,092	\$45,414	\$86,987**		\$17,665	\$45,952	\$89,158**	
Sex (Male)	36.6%	60.4%	64.0%**	48.1%	40.1%	75.7%	77.8%**	59.6.6%
Age								
18-29	42.2%**	23.7%**	0.0%**	31.5%	15.9%	16.5%	9.5%	9.5%
30-44	39.8%**	46.7%**	69.6%**	44.8%	45.2%	55.9%	55.6%	55.6%
45-59	16.9%**	28.1%**	26.1%**	22.2%	31.8%	22.1%	27.0%	27.0%
60-64	1.2%**	1.5%**	4.3%**	1.5%	7.0%	5.5%	7.9%	7.9%
	100%	100%	100%	100%	100%	100%	100%	100%
% of the family	51.7%	40.7%	7.6%		46.4%	36.7%	17.0%	

\*\* p < 0.01

#### 4 Discussion of results

Overall, the results related to the effect of the sector of activity show that self-employment tends to span more sectors of activity than does multiple jobholding. In addition, the results obtained confirm a trend toward polarization, or rejection of recourse to self-employment in certain sectors of activity, given that four of the sectors have a positive influence on the probability of holding this form of atypical job, whereas four other sectors have a negative effect. It is as if some sectors of activity refuse to use self-employment, i.e. this employment link is not part of their organizational reality, whereas other sectors rely on it considerably. It is essential to note the under-representation of self-employment in sectors traditionally related to government action, which have never favoured this type of employment. Nonetheless, the case of the manufacturing sector is somewhat surprising because a number of autonomous workers would presumably agree to work as subcontractors, under service contracts, in premises and with equipment outside the organization.

Moreover, self-employment can easily advance in this sector because, like real estate, the form and organization of work lends itself well to this type of employment. In contrast, the construction sector



has a positive effect on both self-employed and multiple jobholders. This sector should therefore be considered one that particularly values strategies based on external flexibility, together with fewer employee commitments and employment costs (Tremblay, D.G, 1990). Because the construction sector produces a significant effect for both types of atypical jobs analyzed, our results partially support the conclusions of other studies on the subject (Bregger, 1996). This is hardly surprising because this sector is characterized by frequent fluctuations in activity that oblige organizations and individuals to be more flexible. Moreover, this sector of activity is replete with small contractors, subcontractors and craftspeople who can easily engage in multiple jobholding and self-employment. **Our results tend to confirm Hypothesis 1a, because only the commerce sector did not emerge.** However, aside from the construction sector, no other sector influences the probability of holding multiple jobs. This result corroborates the findings of previous analyses (Simard & Legault, 1997) and **partially supports Hypothesis 1b.**

To conclude the discussion of sector of activity, note that holding a job in the management services sector increases the probability of self-employment. It is important to consider that our results illustrate a trend toward outsourcing of many activities formerly carried out by the core workforce of organizations. It would be interesting to more precisely determine the management activities that are most affected. Overall, it is clear that atypical work affects activities that were formerly carried out by the central core work force (Booth, 1997; Chênevert & Tremblay, 1995; Jacob, 1993).

At first glance, for both multiple jobholding and self-employment, the results relating to occupational category held five years ago confirm that individuals in hierarchical situations are unlikely to engage in atypical work. These results corroborate studies of new careers (Brousseau, Driver et al. 1996; Hall, 1996) which predicate that these careers are characterized by the absence of a hierarchy. At the very least, one can presume that individuals who find themselves in traditional career paths, characterized by relative job stability, promotions and high social status, as is the case for senior and middle managers, are not truly affected by the phenomenon studied. Therefore, **without totally confirming Hypothesis 2, our results support** the hypothesis by showing that the occupational category of the job held five years ago has little influence on the future employment status. Our results nonetheless illustrate that more qualified jobs, such as those held by professionals and semi-professionals, are beginning to be slightly but significantly affected by multiple jobholding. Here again, the results show that atypical work extends to activities and functions that call for skills previously found within the core workforce; in other words, the phenomenon affects essential but non-critical tasks (Booth, 1997; Chênevert & Tremblay, 1995; Jacob, 1993).

With regard to multiple jobholding, the results relating to the frequency of movement **fully confirm Hypothesis 4a**, in that respondents who have experienced high non-ascending mobility are more likely to hold multiple jobs. This tends to indicate, as does the literature on new careers, that these workers experience higher mobility compared with the majority of traditional career itineraries. In contrast, the frequency of movement does not influence the probability of being self-employed, thus **confirming Hypothesis 4b.** There are two possible explanations. First, perhaps several self-employed workers were in a very stable job situation before the study; this element should be verified. In addition, one should bear in mind that self-employed workers do not change jobs frequently: being self-employed, the changes mainly revolve around clients.

Lastly, for these two forms of non-standard employment, it is clear that hierarchical experiences are not predominant, reflecting a fundamental characteristic of new careers (Bailly, Cadin & Saint-Ginie, 1998; Hall, 1996). These results therefore **confirm Hypothesis 3**.

Concerning individual variables, only the sex of the respondent exerts a significant influence. Accordingly, our results point in the expected direction. The sex of the respondent does not influence the probability of holding multiple jobs, which **confirms Hypothesis 5b**. In addition, the results obtained for self-employment support **Hypothesis 5a**, reinforcing the findings of the specialized documentation on the subject (Scherer et al., 1989; Matthews & Moser, 1995), which reports that men have a higher probability of being self-employed than do women.

In light of analyses of the differentiation between multiple jobholders and self-employed, we argue that these two forms of atypical jobs differ. Moreover, despite a proximity between the families within each of these two types of non-standard work, one must conclude that they definitely do not constitute homogeneous groups. **These results confirm our sixth hypothesis**. In addition, the differentiation of families within the multiple jobholder and self-employed worker groups highlights the discriminating influence of education. Our results show that the higher the respondents' education, the more likely they will be in the *star* or *conqueror* family. Therefore, even if the trend is clearer for the *stars*, note that multiple jobholders and self-employed workers abide by the same logic as standard workers, in that education apparently engenders markedly more favourable living conditions. Annual income of *stars* and *conquerors* is comparable and ultimately much higher than the average income. Nonetheless, higher income often co-occurs with longer work weeks. Note that women are over-represented among the *insecure* and the *victims*, which tends to indicate that they do not necessarily occupy choice places in the atypical workforce.

## Conclusion

The results of this study allow a better understanding of the role that some organizational and individual variables play in the probability of being a multiple jobholder or self-employed worker. In effect, 8 out of 12 sectors of activity influence this probability for self-employed workers. As for determining sectors, we have observed that the probability of being a self-employed worker decreases by 86.1% among respondents who work in public administration, thus confirming the lack of importance placed on this employment link in the government apparatus. This variable nonetheless has a more mitigated effect on multiple jobholding, because only two sectors of activity influence the probability of holding multiple jobs. More generally, our results clearly demonstrate that the construction sector is characterized by a constant search for external flexibility, because it is this sector of activity exclusively that positively influences the probability of joining one of the atypical groups studied.

In terms of career-related factors, note that ascending mobility plays a very different role from other forms of movement. This effect, homogeneous for multiple jobholding and self-employment alike, is manifested significantly with regard to the probability of engaging in either of these atypical forms of employment. Therefore, the fact of being promoted in the five years prior to the survey substantially reduces the chances of belonging to one of the two atypical employment categories studied, whereas non-ascending mobility increases only the probability of holding multiple jobs. It should also be noted that individuals who held senior and middle manager positions five years before the study have a

substantially lower probability of holding multiple jobs and being self-employed, thus confirming the persisting impact of more traditional career paths on occupational categories whose status in the organizational hierarchy is high. On this point, we can consider that individuals in a situation of blockage in traditional paths may be inclined to adopt these forms of atypical employment in order to satisfy expectations that go beyond promotion and financial aspects.

Lastly, aside from the fact that men are over-represented in the self-employed category and that their probability of taking on this atypical employment is higher, sex has no influence on multiple jobholding. It is worth mentioning that these two forms of atypical employment are subdivided into families that are not homogeneous in terms of annual income, level of education, hours worked and average age. In addition, women are much more prevalent in the families that have the most precarious job and living conditions. Nonetheless, major differences exist among the families of multiple jobholders and the self-employed, such that prudence is essential to avoid indiscriminately associating the expressions atypical and precarious. In conclusion, although precariousness is indeed present, it is not a sine qua non of atypical employment.

## References

- Akyeampong E. B. (1997). "Work Arrangements: 1995 Overview, *Perspectives on Labour and Income*, Catalogue 75-001-XPE, Statistics Canada.
- Akyeampong E. B. (1989). "Évolution de la main-d'œuvre temporaire". *Perspective*, catalogue 75-001F, Ottawa, Statistics Canada, 53-59.
- Bailly A-F.; Cadin L. and Saint-Giniez V. (1998). "Les carrières nomades: recherche empirique et apports pour la GRH éclatée». in: Bruno Sire and José Allouche. *Ressources humaines. Une gestion éclatée*. Paris. Economica.
- Booth, P (1997). *Contingent Work: Trends, Issues and Challenges for Employers*, 192-97 Conference Board of Canada.
- Bregger, J.E. (1996) "Measuring Self-employment in the United States», *Monthly Labor Review*, Vol. 119, No 1-2.
- Bridges, W (1994) *Job shift: How to prosper in a Workplace Without Jobs*, Mass., Addison-Wesley-Publishing.
- Brousseau K.R., Driver, M.J., Eneroth, K and Larsson R, (1996) "Career pandemonium: Realigning organizations and individuals», *Academy of Management Executive*, Vol. 10 No. 4.
- Cardinal, L. and Lamoureux, C. (1992) "Le plateau de carrière chez les gestionnaires: diagnostic et intervention," *Gestion*, Vol. 17, No 3, 83-90.
- Caudron, S. (1994) "HR Revamps Career Itineraries," *Personnel Journal*, Vol. 73, No. 4.
- Chênevert, D. and Tremblay, M. (1995) "La flexibilité organisationnelle et la gestion des ressources humaines," *Info Ressources Humaines*, 8-12.
- Chênevert, D. and Tremblay, M. (1998) *Managerial Career Success in Canadian Organizations: Is Gender a Determinant?*, CIRANO, Série Scientifique, 41 p.
- Edwards, L. and Hendrey, E. (1996) "Home-Based Workers: Data from the 1990 Census of Population," *Monthly Labor Review*, Vol. 119, No 11, 26-34.
- Fairlie, R.W. and Meyer, B.D. (1996) "Ethnic and Racial Self-employment Differences and Possible Explanations," *The Journal of Human Resources*, Vol. 31, No 4, 757-793.
- Hosmer. D. and Lemeshow. S. (1989). *Applied logistic regression*. New-York. John Wiley and Sons.
- Jacob. R. (1993). "Flexibilité organisationnelle et gestion des ressources humaines". *Gestion*, 30-36.
- Hall, D. T. (1996). "Protean Careers of the 21<sup>st</sup> Century," *Academy of Management Executive*, Vol. 10 No. 4.
- Kolodny. H., Liu. M., Stymne, B. and Denis. H. (1996). "New technology and the emerging organizational paradigm" *Human Relations*, 49:12.
- Kolvereid, L. (1996) "Prediction of Employment Status Choice Intentions," *Entrepreneurship Theory and Practice*, Vol. 21, No 1, 47-57.
- Krahn H. (1995). "Accroissement des régimes de travail atypiques," *Perspective*, Vol. 7, No 4, catalogue 75-001F, Ottawa, Statistics Canada, 39-47.

- Krahn H. (1991). "Les régimes de travail non standard." *Perspective*, catalogue 75-001F, Winter, Ottawa, Statistics Canada, 41-52.
- Mackbride-King, J.L. (1997). "*Contingent Work: Lessons from Individuals and Organizations*, 217-97. Conference Board of Canada.
- Matthews, C. and Moser, S.B. (1995). "Family background and gender: Implications for interest in small firm Ownership." *Entrepreneurship and Regional Development*, Vol. 7, No. 4
- Meyer, R. W. and Bruce, D. (1996). "Ethnic and racial self-employment differences and possible explanations," *The Journal of Human Resources*, Vol.31, No.4.
- Payette. S. (1998). *Le travail à durée déterminée: les tendances, les enjeux et les difficultés pour les syndicats*. 243-98. Conference Board of Canada.
- Segal, L. (1996). "Flexible employment: Composition and Trends," *Journal of Labor Research*, Vol. 17, No. 4
- Simard, G. (2000), "Dix hypothèses sur le travail atypique," *Psychologie du travail et des organisations* (in press).
- Simard, G. (1997), "Le cumul de postes/emplois: un retour camouflé de la centralité du travail," in *Psychologie du travail et des organisations*, Vol. 3, Nos. 3 and 4.
- Simard G. and Legault G. (1997). "Le cumul de postes/emplois: des semaines de travail plus longues et ..," *GRH face à la crise: GRH en crise?* (Under the direction of M. Tremblay), Montréal, Presses HEC, 550-562.
- Tremblay. D.G. (1990). "L'adaptation par la flexibilité," in *L'emploi en devenir*. Montréal. IQRC.
- Tremblay, M. (1992) "Comment gérer le blocage des carrières," *Gestion*, Vol. 17, No 3, 73-82.
- Webber M. (1989). "Le cumul d'emplois». *Perspective*, catalogue 75-001F, Winter 1989, Ottawa, Statistics Canada, 23-33.

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