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Seniority-based Pay and Labour Market Adjustment

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Résumé

La manière dont le marché du travail s'ajuste au choc démographique est au centre des préoccupations des politiques du marché du travail. En effet, le population ageing pourrait affecter la capacité de l'économie à s'ajuster, non seulement au choc de vieillissement lui-même, mais aussi aux chocs engendrés par les cycles économiques, le commerce international et les changements technologiques (Kuhn, 2003). La présente étude contribue au débat portant sur la manière dont les entreprises s'ajustent à un environnement devenu de plus en plus turbulent. Entre autres, seniority-based pay a été identifié comme l'un des facteurs qui pourraient freiner la capacité des entreprises à s'ajuster au marché, dans un contexte de vieillissement de la main-d'œuvre. Cette étude se penche sur le recours aux non-standard jobs (ou la numerical flexibility) et l'adoption de la rémunération variable comme stratégies d'évitement du seniority-based pay. En utilisant des données uniques qui apparient les employeurs et les employés au niveau des workplaces, nous avons estimé l'impact de la composition démographique des workplaces sur le recours à l'une ou l'autre des stratégies de flexibilisation. Nous concluons que la composition démographique des workplaces n'est pas associée à la probabilité de recours à la rémunération variable. Par contre, la proportion des travailleurs âgés (45 ans et plus) dans un workplace est associée positivement à la probabilité de recourir à la numerical flexibility. De même, une complémentarité entre les deux stratégies de flexibilisation a été mise en évidence. Les implications politiques de ces résultats sont multiples. Si les entreprises continuent à avoir des difficultés à instaurer des systèmes de rémunération flexible, elles continueront de s'ajuster en recourant à la numerical flexibility. Bien que cette flexibility ait permis aux travailleurs âgés de combiner le travail avec une retraite progressive, aux femmes de combiner le travail avec les soins des enfants et des parents, et aux jeunes de combiner le travail et les études, elle peut avoir des effets néfastes à long terme. Cette stratégie de flexibilisation peut entraîner, à long terme, un sous investissement dans la formation, un manque d'épargne-retraite ainsi qu'une accentuation des inégalités salariales. Le défi de la nouvelle génération des politiques publiques consiste à identifier le compromis entre les incitatifs et les programmes d'activation qui permettrait d'atteindre un équilibre entre les impératifs économiques (la flexibility) et les aspirations sociales (la sécurité).

Abstract

The labour market's ability to adjust to the current demographic shock is a central concern for labour market policies. An aging population could affect the economy's ability to adjust, not only to the aging population shock itself, but also to those associated with the business cycle, international trade and technological changes (Kuhn, 2003). This study contributes to discussions about the ways in which organizations adjust to such an increasingly turbulent environment. Among others, seniority-based pay has been identified as a factor that could potentially hinder an organization's ability to adjust to the market, within the context of an aging workforce. This study focuses on the use of non-standard jobs (or numerical flexibility) and variable compensation as strategies to avoid seniority-based pay. Using unique data that match employers and employees at the micro level, we investigated the link between the demographic composition of workplaces and the adoption of either or both « flexibilization » strategies. Consequently, we conclude that there is no link between workplace demographics and the adoption of variable compensation. However, a high proportion of older workers (45 years and older) in the workplace is positively related to the use of numerical flexibility. Moreover, a complementarity in the use of both strategies emerged from our study. The implications of these results on policies are numerous. If organizations continue experiencing difficulties in resorting to flexible compensation, they will likely continue to adjust by relying on numerical flexibility. While this type of flexibility allows older workers to ease into retirement gradually, women to cope with both working and caring for children or aging parents, and youths to combine work and studies, it can also have detrimental effects. Over time, this flexibilization strategy can lead to an underinvestment in training, a lack of savings for retirement and an increase in wage inequalities. The main challenge of the new generation of public policies lies in the identification of an effective compromise between incentives and activation programs that would allow a balance between economic imperatives (flexibility) and social aspirations (security).

1. Introduction

Understanding the labour market adjustment mechanism is a key to any exercise in identifying market failures and exploring opportunities for government intervention. The phenomenon of population aging has generated a good deal of interest in labour market adjustment. Indeed, an aging population could affect the economy's ability to adjust, not only to the aging population shock itself, but also to those associated with the business cycle, international trade and technological changes (Kuhn, 2003). Despite recent developments in the research into labour market adjustment, our understanding of corporate behaviour in the face of an aging workforce is limited. Compared to studies on how individuals behave and adjust to incentives (supply side), the literature on how companies adjust (demand side) is less abundant, relatively speaking. The present study seeks to contribute to our understanding of this latter type of adjustment.

The jumping-off point for this study is the observation that extending the employment life of older workers is at the heart of governments' employment strategies (OECD, 2006). Seniority-based pay has been identified as one of the obstacles to retaining older workers. In addition to being rigid, seniority-based pay is incompatible with abolishing the mandatory retirement age, a measure that is necessary in extending the employment life of older workers. Adopting variable compensation and resorting to "non-standard" jobs (or numerical flexibility) are strategies for getting round the rigidity imposed by seniority-based pay. The present study profiles businesses that are employing these adjustment strategies and explores the impact of the demographic composition of workplaces on the choice of which of these strategies to use.

This study's findings might guide public policy in pursuing the objective of minimizing market adjustment costs in the face of an aging workforce. Indeed, a better understanding of companies' adjustment strategies will enable government to support desirable adjustments and mitigate the adverse effects of undesirable ones. For example, if it turns out that businesses relying more on older workers tend to adjust via variable compensation rather than non-standard jobs, encouraging this type of adjustment might improve retention of older workers. From another angle, adjustments through recourse to non-standard jobs might have negative effects in the long term, requiring government intervention. Information on the scope of this type of adjustment, the activity sectors

involved, workers' characteristics and the demographic structure of the businesses employing it might allow governments to take better-informed actions. This information could be used to target active policies and avoid the effects of windfalls. Case in point: wage subsidies granted to businesses to retain older workers are an example of measures aimed at reducing the costs associated with seniority-based pay. Furthermore, since adjustment via the non-standard job route can contribute to an under-investment in human capital, the results of this research might guide workforce training actions.

2. Relevant literature

Contrary to the general perception, seniority-based pay is not found solely in unionized sectors. Seniority-based pay is also used to motivate and retain staff, and is compatible with the incentives theory that states that in an environment where businesses cannot observe work effort, it is best that they structure wages to increase with seniority (Lazear, 1979). The risk of paying a wage that exceeds productivity as a career draws to a close is mitigated by a below-productivity wage in the early part of the career and the existence of a mandatory retirement age. The potential widening of the late-career gap between wage and productivity is the reason why seniority-based pay has been called into question in the context of an aging population. This wage gap will continue to widen if businesses continue to systematically increase wages on the basis of seniority, or if productivity continues to lag with age. Another factor behind the doubts raised about seniority-based pay – and one that has attracted less attention – is the destabilization of internal labour markets (Gautié, 2002). This explanation posits that in an internal labour market, there is a form of implicit subsidization of older workers on the part of younger ones, who are paid below their productivity level. Thus, a demographic balance within a business is necessary to the survival of the internal market, which affords older workers a sort of pension. Population aging calls into question this demographic balance, and businesses are obliged to adjust by adopting strategies allowing them to manage this pension better.

Non-standard employment[3] (e.g. part-time work or self-employed workers) and a policy of variable compensation[4] are some of the potential strategies. Other human resource strategies allow businesses to manage the demographic imbalance, but we will restrict ourselves here to these two

[3] Precarious employment and atypical employment are other descriptors found in the literature.
[4] Individualization of compensation or merit pay are variants of the same compensation strategy.

strategies, for two reasons. From a political implications standpoint, both adjustment strategies are more relevant. Indeed, relying on non-standard employment might have negative implications when it comes to social coverage, pension fund accumulation and access to training. As for recourse to variable compensation, this is probably limited to specific employment categories and sectors that need to be identified.

In terms of theory, we have restricted ourselves to these two adjustment strategies because there is a relevant body of literature delving into the complementarity (or substitutability) between use of variable compensation and non-standard employment (Booth et al, 2000). On the one hand, variable compensation is seen as a form of flexibility, and so – if adopted – there is less need for a flexible labour force (substitutability). On the other hand, since non-standard workers are generally non-unionized, they tend to be more open to variable compensation (complementarity). In addition, variable compensation can be compatible with a high proportion of a non-standard workforce operating outside the workplace. In these circumstances, variable wages can reduce supervisory costs (complementarity).

To isolate the impact of companies' demographic structure on use of variable compensation and non-standard jobs, we will identify the other variables likely to affect use of these two flexibility strategies.

Use of variable compensation

Variable compensation can take several forms, including piece work, profit sharing, gain-sharing programs and team bonuses. Use of variable compensation is affected by factors that can be lumped into two main groups: those related to job characteristics, and those related to employee characteristics.

- *Job characteristics*

The link between use of variable compensation and corporate strategy has been explored in a number of studies. Some authors feel that businesses which adopt a strategy of innovation are more likely to use variable compensation than businesses relying on standard technology and operating in a stable environment (Gomez-Mejia et al., 1992, Heneman et al., 2001). Others suggest that businesses adopting a quality-based strategy tend toward variable compensation (Zarifian 1988, 1999; Lawler 1990). Heneman et al. (1998). Still others maintain that businesses employing cost-

reduction strategies are less inclined to adopt variable compensation out of concern to contain wage- and training-related labour costs. The association between the quality-based strategy and the practice of variable compensation was also identified by Snell et al. (1994).

The effect of unions on adoption of variable compensation is controversial. On the one hand, unions can oppose this form of compensation because it leaves a lot to the employer's discretion when it comes time to measuring employee performance. On the other hand, unions would be favourable to compensation based on an objective measurement of effort, such as piece work (Brown, 1990); Heywood et al. (1997); Booth et al. (1999).

The product market where businesses operate plays an important role in the adoption of variable compensation. Indeed, stepped up competition in the product market can lead to increased delegation of tasks within businesses, which in turn leads to greater use of performance-based compensation.

Company size has been identified as a major variable in explaining the use of variable compensation. Indeed, small businesses employ variable compensation less, since they can easily observe their employees' effort and put in place effective control systems.

- *Employee characteristics*

Variable compensation is associated with a larger percentage of well educated employees. Brown (1990) attributes this to the fact that these workers' productivity is more sensitive to effort, perhaps on account of these intrinsic characteristics or the characteristics of the jobs to which they are assigned. Also, a high percentage of women and part-time workers has been associated with lower use of variable compensation.

It should also be pointed out that the empiric link between individual characteristics and the type of compensation adopted can result from a selection problem. Indeed, a recent study – based on a laboratory experiment – showed that characteristics such as gender, productivity level and risk aversion play an important role in the preferences for various types of compensation, and hence the employer's choice (Dohmen et al. 2006). From another perspective, a case study shows that a

change in the form of compensation within a business can lead to a change in workforce composition. (Lazear, E. P. 2000)

Use of non-standard jobs

Several classifications of so-called non-standard jobs have been used in the literature. There is a very restrictive classification that takes in part-time work (be it permanent or not and voluntary or not), a less restrictive classification that includes, in addition to part-time work, temporary workers (be it full time or not and voluntary or not), and a broader classification that includes part-time work, temporary work and self-employment. Factors affecting use of non-standard employment were grouped by Tremblay et al. (1999) into two main categories.

- *Environmental factors*

These include fluctuation of demand in the company, source of main competitors and activity sector.

- *Factors internal to the company*

These include variables associated with labour costs (e.g. size of the business and composition of workforce) and variables relating to organizational flexibility (e.g. proportion of unionized employees) and competitiveness factors (price, quality, distribution, innovation). Given the overlap between the variables explaining the use of variable compensation and those explaining the use of non-standard jobs, we will use the same variables to explain both "flexibilization" strategies.

3. Estimate model and method

We propose estimating a bivariate probit in which the first equation explains the incidence of numerical flexibility using a series of characteristics peculiar to the businesses as well as characteristics specific to the workforce that compose it, and the second equation explains the incidence of variable compensation using the same variables, in addition to a binary variable indicating use of numerical flexibility. This is what is called a recursive bivariate probit.
The model can be written as follows.

$$F^* = X\alpha + \nu \qquad F=1 \text{ if } F^* > 0 \text{ ; } F=0 \text{ otherwise} \qquad (1)$$

$$R^* = X\beta + \gamma F + \varepsilon \text{ ;} \qquad (2)$$

Rho: $\rho = Corr(\varepsilon, \nu)$

(1) F^**:* a latent variable reflecting the attraction of numerical flexibility. We don't observe *F**, but rather *F,* which is the incidence of numerical flexibility. *F* takes the value "1" if the business adopts flexibility, and the value "0" otherwise.
X: a series of characteristics peculiar to the businesses, as well as characteristics specific to the workforce that composes it.
ν : an error term, normally distributed (expectation nil and variance equal to 1).

(2) R^*: a latent (unobservable) variable reflecting the attraction of variable compensation. We don't observe R^*, but rather *R*, which is the incidence of variable compensation. *R* takes the value "1" if the business establishes variable compensation, and the value "0" otherwise.

X: a series of characteristics peculiar to the businesses, as well as characteristics specific to the workforce that composes it.
ε : an error term, normally distributed (expectation nil and variance equal to 1).

The recursive bivariate probit will allow us to simultaneously estimate (1) and (2). This model is justified only if the correlation between the error terms (Rho) is significant; otherwise, the two equations must be estimated separately – in which case the seemingly unrelated bivariate probit estimation model would be more appropriate.

In addition to the independent variable reflecting the businesses' demographic composition (distribution by age group), the two equations include the same business variables (e.g. branch of activity, size of workplace, percentage of unionized workers, occupational composition of workforce, proportion of women, distribution by level of education, etc..)

4. Description of data and variables

Statistics Canada's Workplace and Employee Survey (WES) is the only North American database providing us with information on characteristics pertaining to both the workplaces and their workers. The WES contains information on use of non-standard employment as well as adoption of variable compensation. And since the employers and employees are linked through the microdata,

we can ascertain the demographic distribution within each workplace. Based on information contained on the workplace sheet, we used the following variables:

- *Non-standard jobs*

We used question 1(b) of the employer questionnaire to construct the variable relating to non-standard jobs.

"Of the total employment in March 200X, how many were in the following categories?"

A: Permanent full-time employees

B. Permanent part-time employees

C: Non-permanent full-time employees

D: Non-permanent part-time employees

We used another question concerning use of contract workers

E: During the month of March 200X, how many independent contractors provided products or services to your location?

We identified three measurements of non-standard employment. The first includes part-time workers (*Flex_tp*, *B+D*), the second includes non-permanent workers and permanent part-time workers (*Flex_nptp*, *B+C+D*), and the third adds independent workers (*Flex_large*, *B+C+D+E*). For each measurement we calculated the incidence and intensity of numerical flexibility use. Incidence is a dichotomous variable for which the value is 1 if the number of employees belonging to a given category is positive, and 0 elsewhere. Intensity is calculated by dividing the number of employees in each category by the total number of employees.

To explore the impact of teleworking on flexibility strategies, we used the information on proportion of employees working off-site (*P_offsite*)

- *Variable compensation*

Regarding variable compensation, we used question (6a) from the employer questionnaire:

"Does your compensation system include the following incentives?"

A: Individual incentive systems (*INCEN*)

"Individual incentive systems" such as bonuses, piece-rate and commissions are systems that reward individuals on the basis of individual output or performance.

B: Group incentives systems (*GAINS*)

"Group incentives systems» such as productivity/quality gain-sharing are systems that reward individuals on the basis of group output or performance. Commonly, these benefits can be in form of money payments in the primary industries."

C: Profit-sharing plan (*PROFT*)

"Profit-sharing plan" is any plan by which employees receive a share of the profits from the workplace.

D: Merit pay and skill-based pay (*MERIT*)

"Merit pay or skill-based pay" is a reward or honour given for superior qualities, great abilities or expertise that comes from training, practice etc.

E: Employee stock plans (STCK)

"Employee stock plans" are employee stock purchase plans, ownership plans or stock options.

Using these variables, we calculated a dichotomous variable for which the value is 1 if the workplace's compensation system includes at least one of these various forms of variable compensation (*REMV*). Unfortunately, we do not have a reliable way of measuring the intensity of variable compensation use.

- **Workplace size**

The following classification of workplace size was used.

1- *Fewer than 20 employees (Siz20)*
2- *Between 20 and 99 (Siz2099)*
3- *Between 100 and 499 (Siz100499)*
4- *500 employees or more (Siz500p)*

- **Industry**

The following industry classification was used.

1) *Forestry, mining and oil and gas extraction (Ind1)*
2) *Finance and insurance (Ind2)*
3) *Real estate and renting (Ind3)*
4) *Business services (Ind4)*
5) *Education and health care (Ind5)*
6) *Information and cultural industries (Ind6)*
7) *Manufacturing: labour intensive tertiary (Ind7)*
8) *Manufacturing: primary product (Ind8)*
9) *Manufacturing: secondary product (Ind9)*
10) *Manufacturing: capital intensive tertiary (Ind10)*
11) *Construction (Ind11)*
12) *Transportation, warehousing, wholesale trade (Ind12)*
13) *Communications and other utilities (Ind13)*
14) *Retail trade and consumer services (Ind14)*

- **Business strategies**

The WES distinguishes 15 types of strategies.

1) *Undertaking research and development*
2) *Developing new products / services*
3) *Developing new production / operating techniques*
4) *Expanding into new geographic markets*
5) *Total quality management*
6) *Improving product / service quality*
7) *Reducing labour costs*
8) *Using more part-time, temporary or contract workers.*
9) *Reducing other operating costs*
10) *Reorganizing the work process*
11) *Enhancing labour-management cooperation*
12) *Increasing employees' skills*
13) *Increasing employees' involvement / participation*
14) *Improving coordination with customers and suppliers*
15) *Improving measures of performance*

For each strategy, the business owner was asked to rate their relative importance according to the following scale: not important, slightly important, important, very important and crucial. We built dichotomous variables to identify important strategies. A strategy is considered important if the respondent deemed it "very important" or "crucial".

- **Foreign competition**

We used the following variable to assess the foreign competition that businesses must contend with:

"Do you directly compete with locally, Canadian or internationally-owned firms?"

1) No competition (CONC_none)
2) Local competition (CONC_loc)
3) Canadian competition (CONC_can)
4) US competition (CONC_us)
5) International competition (CONC_intl)

- **Occupation**

The WES includes information on the number of jobs by occupational type.

1) Managers
2) Technical
3) Office personnel
4) Professionals
5) Trade and sales

Based on the employee data, we calculated the following variables:

1) *Employee mean age (Mean_age)*
2) *Distribution by age group:* we used four age groups
    a. Proportion of those aged 24 and under (*age_24m*)

b. Proportion of those aged 25-34 (*age_2534*)
c. Proportion of those aged 35-44 (*age_3544*)
d. Proportion of those aged 45 and over (*age_45p*)

3) *Proportion of women (Femt)*
4) *Proportion of unionized workers (Syndt)*
5) *Distribution by education level:* we used three categories
    a. Proportion of employees who did not finish high school (*Educ_nhs*)
    b. Proportion of employees who finished high school but did not obtain a bachelor's degree (*Educ_mb*)
    c. Proportion of employees with a bachelor's degree and higher (*Educ_bp*)

Since some information is available only during odd-numbered years of the WES, we confined ourselves to two comparable years, 2001 and 2003. In addition, we eliminated workplaces employing fewer than 10 people.

5. Analysis of results

5.1. Descriptive statistics

Of the 4085 workplaces examined in 2001, most rely exclusively on numerical flexibility or combine it with one of the various forms of variable compensation. Indeed, 36% of the workplaces rely exclusively on numerical flexibility, while 43.7% use both numerical flexibility and variable compensation. Only 10.6% of the workplaces use neither form of flexibility, while 9.6% use only variable compensation. The form in widest use is "individual incentive systems", followed by "merit pay or skill-based merit pay", "group incentive systems", "profit-sharing plans" and "employee stock plans". The proportion of workplaces using these various forms of variable compensation is, respectively, 40.3%, 24%, 16.2%, 13.6% and 9%.

The two flexibilization strategies are positively correlated, which tends to confirm their hypothesized complementarity. Below we will present workplace characteristics by type of flexibility, as well as their variances between the two reference years. We will identify the characteristics peculiar to the workplaces (such as size, industry and business strategies) and those specific to the employees (such as distribution by age group, by gender, by level of education and by type of occupation).

5.1.1 Characteristics peculiar to the workplaces

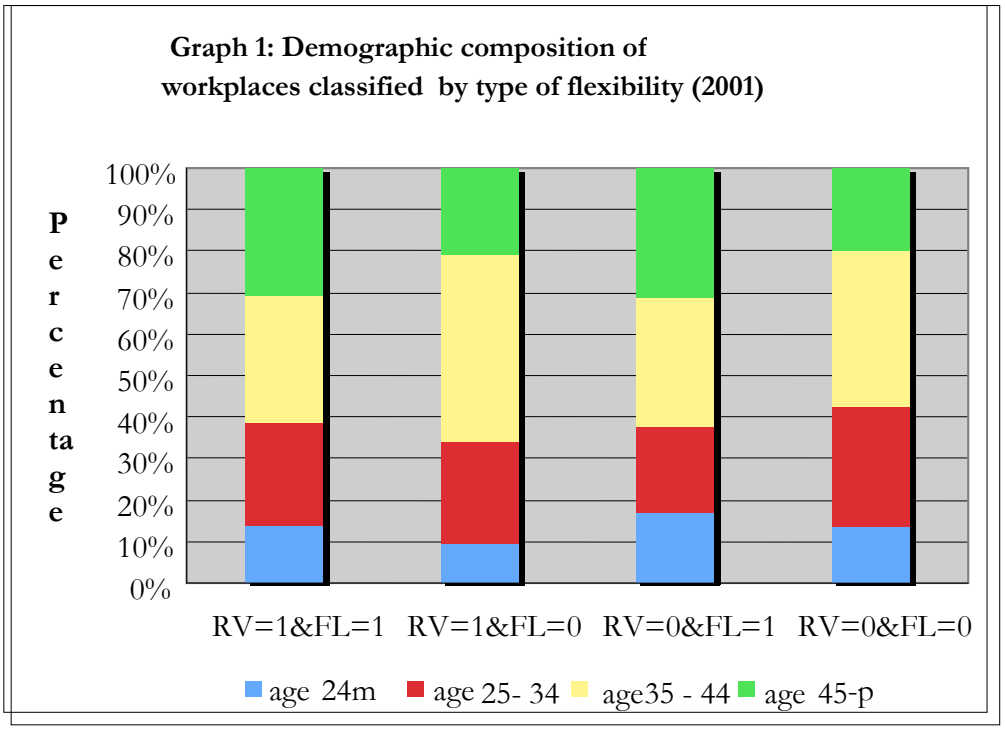
Comparing the characteristics peculiar to the workplaces by type of flexibility (see Table 1), we note that workplaces combining numerical flexibility and variable compensation tend to *be relatively large.*

In 2001, 9.7% of the workplaces combining both forms of flexibility were medium-sized (400 to 499 employees) or large (500 employees or more). During the same year, workplaces this size accounted for 6.4% of the total. Except for workplaces using neither form of flexibility, and these are very small, relatively speaking (fewer than 20 employees), the other types of workplace are small (fewer than 100 employees). In addition, compared to the distribution of all workplaces by industry, workplaces combining both forms of flexibility are relatively more common in *manufacturing: capital intensive tertiary*" (10.6% versus 6.5%) and *transportation, warehousing, wholesale trade* (14% versus 10%). However, workplaces resorting exclusively to variable compensation are over-represented in the following industries: *business services* (7.8% versus 3.1%), *education and health care* (10.6% versus 4.9%), and *manufacturing: capital intensive tertiary* (11% versus 6.5%). And workplaces resorting exclusively to numerical flexibility tend to be over-represented in the following industries: *Communications and other utilities* (21.5% versus 11.6%), *Information and cultural industries* (7.9% versus 6.1%), and *manufacturing: secondary product* (35.1% versus 30.2%). Lastly, workplaces using neither form of flexibility are more present in the following industries: *Education and health care* (9.1% versus 4.9%), *business services* (5.4% versus 3.1%), and *transportation, warehousing, wholesale trade* (15.1% versus 10%).

As for the degree of exposure to competition, the same distributions show that workplaces combining both types of flexibility are *relatively more exposed to Canadian or US competition.* In 2001, 41.6% of workplaces combining both forms of flexibility reported competition with Canadian firms, versus 26.3% with US firms. The proportion of all workplaces dealing with both types of competition was 32.3% and 21%, respectively. Compared with workplaces as a whole, those relying exclusively on variable compensation are relatively more exposed to competition from US firms (32.9% versus 21%) and international firms (33.7% versus 12.6%). As for the other workplaces, they tend not to face competition, or are faced with local competition.

Lastly, compared with the workplaces as a whole, those combining both forms of flexibility or that rely solely on variable compensation tend to attach relatively *greater importance to research & development and total quality management* than to *reducing costs.* Indeed, 55.3% of the workplaces combining both forms of flexibility attached greater importance to these two business strategies. However, those workplaces resorting exclusively to numerical flexibility tend to attach relatively greater importance to the *cost reduction* strategy.

5.1.2 Employee characteristics



A comparison of employee characteristics by type of workplace (see Table 2) reveals that employees aged 45 and over tend to be over-represented in workplaces combining both forms of flexibility or relying exclusively on numerical flexibility. Indeed, the proportion of employees in this age group in both types of workplaces was 30.7% and 31.1% respectively, while they accounted on average for 28.7% of the workforce as a whole. Employees aged 24 and under, however, tend to be over-represented in workplaces relying solely on numerical flexibility. The proportion of employees belonging to this age group was 17.2%, while they represented 14.6% of the workforce as a whole. As for employees in the intermediate age group (25 to 44), who represented 56.7% of the total workforce, they are over-represented in workplaces resorting exclusively to variable compensation or resorting to neither of the two forms of flexibility. Employees in this age group accounted for 70% and 66.3%, respectively, of the total workforce in these two types of workplace. These observations suggest a non-linear relationship between, on the one hand, reliance on flexibility (be it in combination with variable compensation or not) and, on the other, the demographic structure of

the workplaces. This relationship can be interpreted two ways. First, the increase in the proportion of workers aged 45 and over – who are more inclined to receive seniority-based compensation – generates an increase in the workplaces' payroll. This increase in costs, combined with stepped up competition, could lead workplaces to adopt wage or numerical flexibility strategies. Second, the observed relationship could be due to a pure effect of selection of young and older workers in workplaces resorting to numerical flexibility. Indeed, this form of flexibility would enable young people to combine work and education, and older workers to combine work and phased retirement. Although the causality between the workplaces' demographic structure and adoption of flexibility is difficult to establish, the two adjustment mechanisms are not mutually exclusive.

As regards the other employee characteristics, employees stating that they are unionized are over-represented in workplaces that offer only numerical flexibility. Indeed, in 2001 unionized workers accounted on average for 16.9% of the employees in these workplaces, versus 12.9% of the workforce in all of the workplaces. The same trend is seen in the proportion of women, who make up 52.9% of the employees in workplaces resorting solely to numerical flexibility, as against 47.7% of the employees in all of the workplaces. But women are especially under-represented in workplaces relying exclusively on variable compensation, where they make up only 31.8% of the workforce. In addition, well educated employees are over-represented in workplaces resorting solely to variable compensation or combining it with numerical flexibility, while less-educated employees are over-represented in the other types of workplace. Indeed, in 2001 the proportion of employees with at least a bachelor's degree who occupy positions in workplaces that combine both forms of flexibility was 16.6%, while they make up 12.5% of the employees in all of the workplaces.
However, employees with more than high school but less than a bachelor's degree comprise the majority of employees in workplaces combining both forms of flexibility or relying exclusively on variable compensation. Respectively, these employees make up 57.4% and 57.1% of the personnel in these two types of workplace, compared to 54.9% of the personnel in all of the workplaces. But employees without a high school diploma are over-represented in workplaces resorting solely to numerical flexibility or using neither form of flexibility. Respectively, these employees comprise 22.5% and 24.3% of the personnel in these two types of workplace, compared to 19% of the personnel in all of the workplaces.

As for the distribution of employees by type of occupation, employees in occupations relating to trade and sales are over-represented in workplaces combining both forms of flexibility or relying exclusively on variable compensation. Indeed, in 2001, employees in these occupations made up, respectively, 15.7% and 16.5% of the personnel in these two types of workplace, compared to 11.7% of the personnel in all of the workplaces. But employees in technology-related occupations are over-represented in workplaces resorting solely to variable compensation, while professionals are over-represented in workplaces relying exclusively on numerical flexibility or using neither form of flexibility. In addition, employees in office jobs tend to be over-represented in workplaces combining both forms of flexibility or using neither form of flexibility. Lastly, managers tend to be over-represented in workplaces combining or eschewing both forms of flexibility, and are under-represented in workplaces relying exclusively on numerical flexibility.

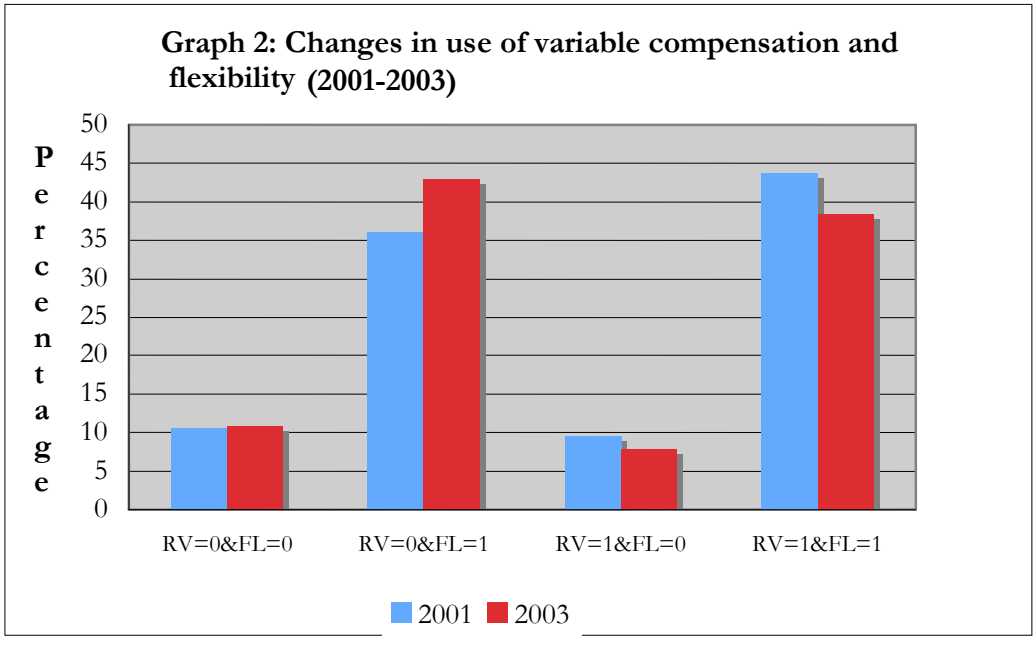
As expected, the intensity of use of numerical flexibility is relatively higher in workplaces resorting solely to numerical flexibility. Indeed, in 2001, employees in non-standard jobs (according to the broad definition) made up 45.6% of the personnel in workplaces resorting solely to numerical flexibility, compared to 33.3% of the personnel in workplaces combining both forms of flexibility. During the same year, these workers made up 31% of the workforce. But employees working off-site are over-represented, both in workplaces using variable compensation and those resorting solely to numerical flexibility. Respectively, these employees made up 10% and 10.9% of the personnel in both types of workplace, compared to 9.1% of the total workforce.

We have just seen that most workplaces resort to numerical flexibility, either alone or in combination with variable compensation. This corroborates the hypothesis that these two flexibilization strategies complement one another. We also identified a link between employee age structure and adoption of both types of flexibility. Also, referring to the observations from 2001, we highlighted connections between, on the one hand, workplace characteristics (activity sector, size and business strategy) and employee characteristics (level of education, gender and occupation), and on the other, adoption of the various flexibility strategies. In general, workplaces can be grouped into two main categories, namely those using variable compensation (be it alone or in combination with numerical flexibility) and those not using variable compensation (i.e. those resorting solely to numerical flexibility or using neither form of flexibility). Reviewing the characteristics of both categories, we see that workplaces belonging to the first tend to be large, face stiffer foreign

competition, adopt business strategies geared to R&D and total quality, and employ relatively higher numbers of persons in the intermediate age group and well educated people. These characteristics are similar to those of an *internal labour market*. However, workplaces coming under the second category tend to be small, adopt business strategies geared to reducing costs, are less exposed to foreign competition, employ relatively higher numbers of young people and women, and make relatively greater use of flexible labour, lower-educated people and relatively more unionized staff. These characteristics are similar to those of an *external labour market*. Let us look now at the main changes that have taken place between the two reference years, i.e. 2001 and 2003.

5.1.3 Changes between the two reference years (2001-2003)

A comparison of the two reference years shows a decline in the proportion of workplaces using variable compensation and an increase in the proportion of those resorting solely to numerical flexibility. Indeed, the proportion of workplaces resorting solely to numerical flexibility was up 19.4%, while that of workplaces offering only variable compensation and those combining it with numerical flexibility were down 18.8% and 12.1%, respectively. This decline involved all forms of variable compensation, but especially *individual incentive systems, merit pay or skills-based pay* and *group incentives systems*.



Indeed, between 2001 and 2003, the proportion of workplaces using these three forms of variable compensation dropped by about 20.4%, 18.1% and 15.8%, respectively.

The increased incidence of numerical flexibility (measured by the proportion of workplaces using numerical flexibility) was not reflected in the intensity of the use of numerical flexibility (measured by the proportion of employees affected by numerical flexibility). Regardless of how broadly "numerical flexibility" is defined, the proportion of employees affected by this form of flexibility remained relatively stable between the two reference years. Indeed, the proportion of part-time employees went from 24.9% to 24.4%, that of non-permanent workers and permanent part-time workers from 26.8% to 26%, and that of non-permanent workers, permanent part-time workers and independent workers from 31% to 29.9%.

Note: the changes in the incidence and intensity of both forms of flexibility (numerical flexibility and variable compensation) can be attributed to a change in workplace behaviour or to composition effects. For example, these changes can be affected by incoming and outgoing workplace movements, which are unevenly distributed between differently-sized workplaces and by industry. Similarly, these changes can reflect changes in the composition of the workforce by gender, age group and level of education. Indeed, these various groups are unevenly distributed beteween workplaces resorting to the various forms of flexibility (selection effect). In this case, the proportion of young people in workplaces combining both forms of flexibility or resorting solely to variable compensation declined by 21.9% and 33.7% respectively, while their share of the workforce declined by only 14.4%. At the same time, the proportion of persons aged 45 and up increased in both types of workplace (by 8.5% and 81.2% respectively), while their share of total workforce increased by 19.5%. A similar increase was seen in workplaces resorting solely to flexibility or eschewing all forms of flexibility. During the same period, we saw a 10.5% increase in the proportion of women in workplaces combining both forms of flexibility, and a 13.4% increase in workplaces resorting solely to numerical flexibility. Also during the same period, we observed an increase in the proportion of employees with a high level of education. Indeed, the proportion of employees with at least a bachelor's degree to their credit increased by 31% in workplaces resorting solely to numerical flexibility, and by 41.7% in workplaces resorting solely to variable compensation. If we refer to workplace typology, which classifies them in two markets (internal and external), we can conclude

that the contraction of the internal labour market coincided with the greying of the workforce, the feminization of the labour market and an increase in the supply of educated labour.

To isolate the impact of the workplaces' demographic structure on adoption of the two flexibilization strategies, below we will analyse the results of the bivariate probit estimation model.

5.2. Results of estimate

To estimate the bivariate probit (or recursive bivariate probit) model, we organized the data on both reference years into a panel (specifically a cluster). And in order to reduce the impact of incoming and outgoing workplace movements between the two years, we used only those workplaces observed during both years (balanced panel). The first model estimates had an insignificant error correlation coefficient (Rho), which led us to estimate the two probits separately. The first probit estimates the probability of variable compensation use, while the second estimates the probability of numerical flexibility use. Both models were estimated using the *seemingly unrelated bivariate probit* method. This method recorded a significant (Rho) of 0.22. Robust coefficients (estimated with the help of the Stata's cluster command) are reported in Table 2.1. Given the complementarity of the two flexibility strategies, the probit coefficients reflect both the direct and indirect effects of the various variables used. To distinguish between the two effects, we calculated the marginal effects on the four combinations of both strategies, i.e. use of variable compensation only (REMV=1 and FLEX-0), combination of the two strategies (REMV=1 and FLEX=1), use of numerical flexibility only (REMV=0 and FLEX=1) and use of neither flexibility strategy (REMV=0 and FLEX=0). The marginal effects are reported in Table 2.2.

We first observe that there is a positive relationship between the proportion of workers aged 45 and over and use of numerical flexibility. The coefficients on the other age groups are not significant. A review of the marginal effects shows a negative relationship between the proportion of workers aged 45 and over and the probability of resorting solely to variable compensation or use of neither form of flexibility. We can safely conclude that workplaces tend to adjust to an increase in the proportion of older workers by resorting to numerical flexibility, either on its own or in combination with variable compensation. Given the attraction of numerical flexibility for young and older workers, we can assume that workplaces target both groups by using numerical flexibility, and target intermediate-age workers by using variable compensation. This corroborates in some respect the

non-linear relationship that we identified while reviewing the descriptive statistics. As we indicated, this relationship can be due to a selection effect, just as it could be related to the cost increases associated with a greater proportion of older workers and an attempt to reduce costs in order to deal with foreign competition. We can see that competition certainly plays an important role. Indeed, the probit coefficients have a positive relationship between the extent of the Canadian and US competition and the probability of resorting to variable compensation. However, the marginal effects show a positive link between the two types of competition and the probability of using a combination of both flexibility strategies, as well as a negative relationship between these two variables and the use of numerical flexibility alone. This confirms the importance of the strategy of combining both forms of flexibility in workplace ajustment. In addition, the probit coefficients show a positive and significant link between, on the one hand, adoption of R&D and total quality improvement strategies and, on the other, the probability of variable compensation use. We also see a positive relationship between adoption of a strategy geared to reducting costs and the probability of numerical flexibility use. It should be noted that the cost reduction strategy affects the probability of resorting solely to numerical flexibility.

As for the other variables, their effects are relatively comparable to the results obtained in the preivous research. For example, the proportion of women is positively associated with the probability of resorting solely to numerical flexibility and negatively with the use of variable compensation alone. Also, the proportion of workers with at least a bachelor's degree has a positive effect on the probability of using variable compensation and a negative effect on resorting solely to numerical flexibility. The proportion of unionized workers has no significant effect on use of both flexibility strategies. As far as occupation type is concerned, the marginal effects show a positive relationship between, on the one hand, the proportion of managers and the proportion of technology workers and, on the other, the probability of combining the two forms of flexibility or of using neither form of flexibility. We also observe a significant and extensive relationship between the proportion of trade and sales employees and the probability of variable compensation use. As for the proportion of workers working off-site, it has a positive effect on the probability of resorting solely on numerical flexibility and a negative effect on combining both flexibility strategies.

Lastly, we should point out that workplace size plays a very important role in the choice of flexibility strategies. Indeed, the probit coefficients show that medium-sized (100 to 400 employees) and large

(500 employees and over) workplaces tend to use both numerical flexibility and variable compensation, while small workplaces (20 employees and under) are less likely to use numerical flexibility. The marginal effects flesh out this relationship. Indeed, medium- and large-sized workplaces are more likely to combine the two forms of flexibility and less likely to use numerical flexibility alone or to eschew both forms of flexibility. Lastly, we observed that workplaces operating in the *manufacturing: capital intensive tertiary* industry are more inclined to use variable compensation, while those operating in service industries, such as *transportation, warehousing, wholesale trade*, *communications and other utilities*, and *retail trade and other consumer services* are more inclined to use numercial flexibility.

While it is difficult to establish causality, it is clear that the greying of the workforce, combined with foreign competition, has contributed to the tendancy toward a shrinking of the internal labour market and increased use of numerical flexibility. Feminization of the labour market and a better educated workforce in general, as well as an expansion of the services sector, have surely facilitated this flexibilization strategy.

6. Conclusion and implications for labour market policies

The way in which the labour market is adjusting to the demographic shock is a cental concern of labour market policies. Understanding the labour market adjustment mechanism is a key to any exercise in identifying market failures and exploring opportunities for government intervention. In a context of an aging workforce, seniority-based pay has been identified as a factor that could hinder businesses' ability to adjust to the demographic shock. Employing flexibilization strategies, such as reliance on "non-standard" jobs (or numerical flexibility) and on variable compensation, could be a way to get round seniority-based pay. Using unique data, which match employers with employees at the workplace level, we estimated the impact of workplaces' age structure on use of one or the other of the flexibilization strategies. Our results show that these two strategies are complementary. We also identified a positive relationship between the proportion of workers aged 45 and up in a workplace and use, either on its own or in combination with variable compensation, of numerical flexibility. In addition, we brought to light a negative relationship between the proportion of workers aged 45 and over and use of variable compensation alone. This relationship, combined with the increase in the proportion of workers aged 45 observed between 2001 and 2003, could explain the increase in the proportion of workplaces using flexibility and the decline in those resorting solely to variable compensation, recorded over the same period.

Certainly, this relationship could be attributed to a pure effect of selection of older workers in workplaces resorting to numerical flexibility, but other evidence suggests that other factors come into play. For example, both competition and reliance on a strategy geared to reducing costs are positively associated with the probability of using flexibility. Feminization of the labour market and the increased level of education of the workforce in general, as well as the expansion of the services sector, have surely facilitated this flexibilization strategy.

The increased reliance on flexibility can be seen at once as a challenge and an opportunity for governments. On the one hand, use of numerical flexibility could allow young people to combine work and education, women to combine work with caring for children and the elderly, and older workers to combine work with phased retirement. But if we look at it from a lifestyle perspective, the flexibility offered by non-standard jobs could generate unintended and negative consequences in

the long term. Examples include lack of access to employment benefits (such as drug insurance plans, parental leave and pension funds) and to training. This market failure, if not addressed by public policy, risks generating a decline in productivity, greater wage inequities, a deterioration in social well-being and an increase in social exclusion. Two approaches could guide labour market policies aimed at rectifying this market failure. The first consists in regulating the labour market to protect workers from the negative effects of flexibility. Amending labour standards, expanding access to parental leave to include the self-employed and introducing a universal drug insurance system are programs that fit into this approach (the Quebec example). The second approach consists in identifying barriers to flexibility, identifying the risks associated with flexibility and introducing active employment programs that make it possible to combine flexibility with security (Flexicurity). This approach, more popular in Europe, promotes job security on the labour market rather than job security with the same employer. Investing in life-long learning is seen as the best security for a workforce called on to change jobs more often. Individual accounts, which allow users to bank time or money with a view to redistributing it throughout the course of their lives, constitute one instrument under this approach. This approach, based on employability and accumulation of assets, has been criticized on the grounds that it risks exacerbating inequities and social exclusion. Pursuit of an *integrated approach*, consisting in combining incentives, active employment programs and minimum coverage (e.g. guaranteed minimum income), constitutes a sizeable challenge for the new generation of labour market policies.

Appendix 1: Descriptive statistics

Table 1.1: Labour market characteristics, 2001

	Total (%)	**REMV=1**		**REMV=0**	
		FLEX=1	FLEX=0	FLEX=1	FLEX=0
Mean_age	38.0	38.4	37.9	38.5	36.0
age24m	14.6	13.7	9.2	17.2	13.7
age2534	23.8	25.0	24.7	20.6	28.8
age3544	32.9	30.6	45.3	31.1	37.5
age45p	28.7	30.7	20.7	31.1	20.0
off_site	9.1	7.7	10.0	10.9	8.6
flex_tp	24.9	26.0	0.0	37.5	0.0
flex_nptp	26.8	28.0	0.0	40.3	0.0
flex_large	31.0	33.3	0.0	45.6	0.0
Syndt	12.9	10.9	10.2	16.9	10.2
femt	47.7	48.6	31.8	52.9	40.7
educ_bp	12.5	16.6	10.8	9.6	7.3
educ_mb	54.9	57.4	57.1	53.2	49.7
educ_nhs	19.0	15.2	16.4	22.5	24.3
gest	15.9	16.0	15.7	13.0	25.0
tech	16.2	13.5	19.1	18.6	16.6
prof	8.1	7.7	4.1	8.7	11.0
comv	11.7	15.2	16.5	8.0	5.0
bur	14.5	16.9	12.0	11.6	17.4
aut	6.7	4.6	5.6	10.6	2.9
	N=(4085)				

Table 1.2: Labour market characteristics, 2003

	Total (%)	**REMV=1**		**REMV=0**	
		FLEX=1	FLEX=0	FLEX=1	FLEX=0
Mean_age	39.3	39.4	40.6	38.9	40.1
age24m	12.5	10.7	6.1	16.0	9.4
age2534	23.5	24.6	26.3	21.9	23.6
age3544	29.8	31.5	30.1	28.2	30.0
age45p	34.3	33.3	37.5	33.9	36.9
off_site	10.8	9.2	9.5	12.8	9.2
flex_tp	24.4	26.3	0.0	33.3	0.0
flex_nptp	26.0	28.5	0.0	35.1	0.0
flex_large	29.9	33.0	0.0	40.2	0.0
Syndt	12.2	12.2	13.0	12.6	9.8
Femt	52.8	53.7	30.1	60.0	36.8
educ_bp	14.2	16.2	15.3	12.6	12.6
educ_mb	56.7	59.2	62.8	53.7	55.5
educ_nhs	18.3	12.4	15.4	23.5	20.9
Gest	15.4	15.1	16.4	13.7	22.2
Tech	18.2	16.0	20.5	18.9	21.8
Prof	7.0	7.7	4.6	7.3	5.2
Comv	11.1	15.7	12.6	8.1	5.0
Bur	14.0	16.7	15.7	11.9	11.5
Aut	6.9	5.7	5.6	8.5	5.6
	N=(4555)				

Table 1.3: Workplace characteristics, 2001

	Total (%)	REMV=1		REMV=0	
		FLEX=1	FLEX=0	FLEX=1	FLEX=0
Sizm20	51.4	44.5	52.9	51.7	77.8
Siz2099	41.9	45.9	42.8	43.4	19.9
Siz100499	5.8	8.5	4.0	4.2	2.3
Siz500p	0.8	1.2	0.3	0.8	0.0
Conc_none	6.7	4.7	3.3	9.3	11.3
Conc_can	32.3	41.6	38.0	22.3	15.0
Conc_us	21.0	26.3	32.9	12.3	11.1
Conc_loc	47.9	46.0	38.7	56.9	38.8
Conc_intl	12.6	14.3	33.7	5.2	5.3
Ind1	1.1	0.8	1.7	1.1	0.0
Ind2	4.4	3.4	6.1	4.7	6.0
Ind3	2.3	2.6	3.5	1.6	2.9
Ind4	3.1	2.5	7.8	2.1	5.4
Ind5	4.9	4.2	10.6	2.9	9.1
Ind6	6.1	4.9	2.4	7.9	8.5
Ind7	12.9	13.7	17.8	10.2	14.9
Ind8	2.5	2.5	4.0	2.4	1.9
Ind9	30.2	27.7	23.5	35.1	0.0
Ind10	6.5	10.6	11.0	1.8	0.0
Ind11	1.9	2.3	0.3	1.7	2.0
Ind12	10.0	14.0	7.1	4.4	15.1
Ind13	11.6	8.5	0.0	21.5	0.0
Ind14	2.5	2.6	3.2	2.7	0.0
Strtgy1	10.8	12.6	12.4	8.2	10.9
Strtgy5	39.8	42.7	47.1	37.3	29.3
Strtgy7	28.4	28.5	27.8	31.9	16.8
	N=(4085)				

Tableau 1.4: Caractéristiques des workplaces, 2003

	Total (%)	**REMV=1**		**REMV=0**	
		FLEX=1	FLEX=0	FLEX=1	FLEX=0
Sizm20	52.0	45.0	54.3	56.5	57.6
Siz2099	41.2	44.2	40.3	38.9	40.9
Siz100499	5.9	9.6	5.2	3.9	1.4
Siz500p	0.8	1.2	0.2	0.7	0.2
Conc_none	7.2	4.9	7.4	9.6	6.8
Conc_can	28.8	38.3	32.3	17.5	29.5
Conc_us	17.5	24.1	28.8	9.4	13.4
Conc_loc	47.8	47.0	50.9	46.4	53.5
Conc_intl	11.0	14.6	19.5	7.0	5.4
Ind1	0.9	0.9	1.8	0.7	0.8
Ind2	5.0	3.2	4.1	5.5	10.6
Ind3	2.1	2.3	4.9	1.2	2.8
Ind4	3.2	3.8	5.3	1.4	6.7
Ind5	4.3	4.2	7.1	3.4	6.5
Ind6	6.0	5.5	7.2	5.5	8.9
Ind7	13.9	13.2	34.5	11.3	11.7
Ind8	2.2	1.8	2.6	2.6	1.8
Ind9	30.3	26.8	7.5	38.3	27.4
Ind10	6.2	10.6	14.5	2.1	0.0
Ind11	1.5	1.9	0.9	1.3	1.2
Ind12	10.8	11.9	6.9	9.1	16.0
Ind13	11.1	10.0	0.0	15.4	4.8
Ind14	2.7	3.9	2.1	2.3	0.0
Strtgy1	10.7	13.7	21.5	6.8	8.1
Strtgy5	37.9	36.5	42.1	33.7	32.5
Strtgy7	30.3	27.7	25.9	32.4	20.0
	N=(4555)				

Appendix 2: Bivariate probit estimation results

Table 2.1 Bivariate probit model coefficients (cluster data)

	2001-2003	
	REMV	FLEX
Sizm20	-0.16	-0.33***
Siz100499	0.64***	0.37**
Siz500p	0.95***	0.86***
age24m	0.05	0.52
age2534	0.13	0.28
age45p	-0.09	0.51**
Ind1	-0.05	-0.10
Ind2	-0.49***	-0.16
Ind14	0.31	1.01***
Ind4	0.06	-0.20
Ind5	-0.09	-0.15
Ind6	-0.02	0.25
Ind7	0.13	0.07
Ind8	-0.01	0.36
Ind9	-0.30	0.33
Ind10	0.92***	0.38
Ind11	-0.14	0.48
Ind12	0.09	0.54*
Ind13	0.23	1.10***
syndt	-0.05	-0.03
Conc_can	0.32***	0.01
Conc_usa	0.33**	0.02
Conc_loc	-0.12	-0.05
femt	-0.32*	0.76***
Rstrtgy1	0.40***	-0.14
Rstrtgy5	0.20*	0.15
Rstrtgy7	-0.19*	0.07
Off_site	-0.61	0.55**
educ_bp	0.67***	0.17
educ_mb	0.29**	0.06
gest	-0.17	-1.17**
tech	0.02	-0.22
prof	-0.36	-1.13*
comv	1.35***	-0.08
bur	0.51	-0.03
Constante	-0.15	0.20
RhO	0.22***	

*: significant at 10%; **: significant at 5%; ***significant at 1%

Table 2.2: Marginal effects of bivariate probit model (2001-2003)

	REMV=1 and FLEX=1 (0.49)	REMV=1 and FLEX=0 (0.09)	REMV=0 and FLEX=1 (0.31)	REMV=0 and FLEX=0 (0.11)
Sizm20	-0.1**	0.03*	0.00	0.06***
Siz100499	0.23***	-0.01	-0.15***	-0.07***
Siz500p	0.35***	-0.06***	-0.20***	-0.10***
P_age24m	0.09	-0.07	0.06	-0.07
P_age2534	0.08	-0.03	0.00	-0.05
P_age45p	0.04	-0.08**	0.10	-0.06*
ind1	-0.03	0.01	0.00	0.02
Ind2	-0.17***	-0.02	0.13*	0.07
Ind14	0.19*	-0.08***	-0.02	-0.09***
Ind4	-0.01	0.04	-0.05	0.02
Ind5	-0.05	0.01	0.00	0.03
Ind6	0.02	-0.03	0.04	-0.03
Ind7	0.05	0.00	-0.03	-0.02
Ind8	0.04	0.04*	0.05	-0.04
Ind9	-0.06	-0.06**	0.14**	-0.02
Ind10	0.30***	0.00	-0.21***	-0.09***
Ind11	0.00	-0.06**	0.10	-0.05
Ind12	0.09	-0.06**	0.03	-0.07**
Ind13	0.17	-0.08***	0.01	-0.10***
P_syndt	-0.02	0.00	0.01	0.00
Conc_can	0.10**	0.02	-0.10***	-0.03
Conc_usa	0.10**	0.02	-0.10**	-0.03
Conc_loc	-0.04	0.00	0.03	0.02
P_femt	0.00	-0.13***	0.20***	-0.08**
Rstrtgy1	0.09	0.06	-0.13***	-0.02
Rstrtgy5	0.08**	0.00	-0.04	-0.04**
Rstrtgy7	-0.05	-0.02	0.07*	0.00
P_off_site	-0.11	-0.12**	0.26***	-0.03
P_educ_bp	0.23**	0.03	-0.19**	-0.08
P_educ_mb	0.10*	0.01	-0.08	-0.03
P_gest	-0.22	0.15**	-0.10	0.17*
P_tech	-0.02	0.03	-0.04	0.03
P_prof	-0.27	0.13*	-0.04	0.18*
P_comv	0.41***	0.12**	-0.43***	-0.10**
P_bur	0.42	0.04	-0.16	-0.04

*: significant at 10%; **: significant at 5%; ***significant at 1%

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