The Evolving Workplace Series

Innovative work practices and labour turnover in Canada

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The Evolving Workplace Series

Innovative work practices and labour turnover in Canada

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Statistics Canada

Note of appreciation

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Foreword

This document provides data from the new Workplace and Employee Survey (WES) conducted by Statistics Canada with the support of Human Resources Development Canada. The survey consists of two components: (1) a workplace survey on the adoption of technologies, organizational change, training and other human resource practices, business strategies, and labour turnover in workplaces; and (2) a survey of employees within these same workplaces covering wages, hours of work, job type, human capital, use of technologies and training. The result is a rich new source of linked information on workplaces and their employees.

Why have a linked workplace and employee survey?

Advanced economies are constantly evolving. There is a general sense that the pace of change has accelerated in recent years, and that we are moving in new directions. This evolution is captured in phrases such as "the knowledge-based economy" or "the learning organization". Central to these notions is the role of technology, particularly information technology. The implementation of these technologies is thought to have substantial impact on both firms and their workers. Likely related to these technological and environmental changes, many firms have undertaken significant organizational changes and have implemented new human resource practices. Globalization and increasing international competition also contribute to the sense of change.

In this environment, greater attention is being paid to the management and development of human resources within firms. Education and training are increasingly seen as an important investment for improved prosperity—both for firms and individual workers.
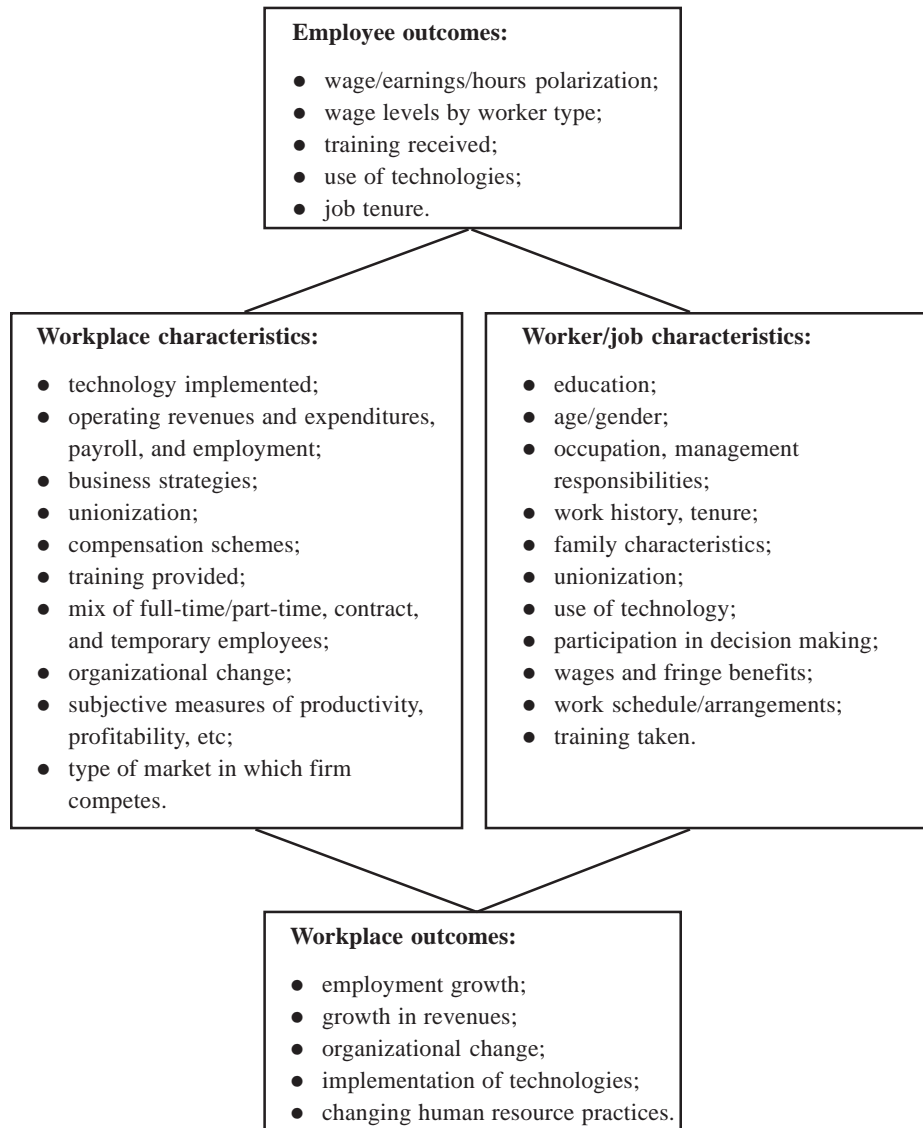
Thanks to earlier surveys, researchers have a good understanding of workers' outcomes regarding wages and wage inequality, job stability and layoffs, training, job creation, and unemployment. What is missing on the employees' side is the ability to link these changes to events taking place in firms. Such a connection is necessary if we hope to understand the association between labour market changes and pressures stemming from global competition, technological change, and the drive to improve human capital. Thus, one primary goal of WES is to establish a link between events occurring in workplaces and the outcomes for workers. The advantage of a linked survey is depicted in the figure which displays the main content blocks in the two surveys.

The second goal of the survey is to develop a better understanding of what is indeed occurring in companies in an era of substantial change. Just how many companies have implemented new information technologies? On what scale? What kind of training is associated with these events? What type of organizational change is occurring in firms? These are the kinds of issues addressed in the WES.

This report aims to give those interested in the determinants of employer-sponsored training some useful insights from the initial survey, as well as stimulating their interest in the possibilities provided by these new data.

Those interested in the methodology should go to our website at http://www.statcan.ca/english/survey/business/workplace/workplace.htm.

Link between the workplace survey content, employee survey content, and outcomes

Employee outcomes:

- wage/earnings/hours polarization;
- wage levels by worker type;
- training received;
- use of technologies;
- job tenure.

Workplace characteristics:

- technology implemented;
- operating revenues and expenditures, payroll, and employment;
- business strategies;
- unionization;
- compensation schemes;
- training provided;
- mix of full-time/part-time, contract, and temporary employees;
- organizational change;
- subjective measures of productivity, profitability, etc;
- type of market in which firm competes.

Worker/job characteristics:

- education;
- age/gender;
- occupation, management responsibilities;
- work history, tenure;
- family characteristics;
- unionization;
- use of technology;
- participation in decision making;
- wages and fringe benefits;
- work schedule/arrangements;
- training taken.

Workplace outcomes:

- employment growth;
- growth in revenues;
- organizational change;
- implementation of technologies;
- changing human resource practices.

I.   Introduction[1]

Over the last decade, a fast-growing literature has attempted to assess whether alternative work practices (AWPs) improve labour productivity, increase firms' profitability and reduce labour turnover. The general presumption is that there exists a set of "high performance" work practices which, under certain conditions, will improve employees' well-being and lead them to be more productive, thereby causing both an increase in labour productivity and a reduction in labour turnover.

However, no study has yet examined whether there is a negative association between AWPs and labour turnover in Canada. The goal of this study is to fill this gap. To do so, we focus our attention on a subset of key AWPs.

In our view, teamwork, flexible job design, performance-based pay systems and formal training aimed at improving workers' ability to work in teams are four fundamental components of AWPs. This is so for several reasons. First, of all alternative work practices, teamwork is the most studied in prior research (Cappelli and Neumark, 2001a: p.742). Second, by its very nature, teamwork—at least in its most intensive form such as self-directed workgroups—is likely to be implemented in conjunction with flexible job design. Third, it is often argued that new forms of work organization—such as teamwork—which attempt to elicit greater effort from workers should be accompanied by alternative compensation schemes such as profit sharing, gain sharing, merit pay or skill-based pay. Finally,

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[1] This study is an abridged version of Morissette and Rosa (2003).

because employees who work in teams may need more skills than those in traditional work environments (Bailey et al., 2001: p.527), formal training on various aspects such as group decision-making problem-solving, leadership and communication is likely a crucial element which allows workers to successfully perform the tasks they are expected to accomplish in a new work environment.

The literature on AWPs generally considers bundles of work practices, whose definition varies widely across studies. While there may be synergies among work practices, such a strategy does not allow researchers to identify which components, if any, are crucial in reducing quit rates. Furthermore, individual work practices may have opposite effects on employees' propensity to quit (Batt et al., 2002). We deal with these issues by considering both the individual effect of the work practices analyzed as well as synergies among these practices. Since the literature on AWPs provides little guidance on which bundles of work practices should be examined, we follow Cappelli and Neumark's (2001a) strategy of pre-specifying combinations of work practices, based on theoretical arguments.

The paper proceeds as follows. We first provide an overview of previous studies on AWPs and employee turnover (Section II). Next, we discuss the hypotheses tested in the paper (Section III). We describe the data and concepts used in Section IV. We investigate whether establishments which have key AWPs have lower quit rates than others in Section V. Concluding comments follow.

II.   Overview of Prior Research

Previous studies on AWPs and quit rates can be divided into two groups. A first set of studies examine employee turnover for a relatively narrow set of industries or establishments (Havlovic, 1991; Wilson and Peel, 1991; Buch, 1992; Arthur, 1994; Hamilton et al., 2001; Batt et al., 2002). Using monthly time series data on a manufacturing firm from 1976 to 1986, Havlovic (1991) finds that quality of work life initiatives reduce absenteeism, minor accidents, grievances and quits. Wilson and Peel (1991) use pooled cross-sectional time series data on quits and absenteeism for 52 engineering and metal working firms in the UK and find that firms with profit-sharing schemes and employee participation in decision-making have lower quit rates and absenteeism rates than others. Buch (1992) reports a negative association between employee turnover and quality circles for four organizations.[2] Arthur (1994) examines 30 steel minimills and finds that labour turnover is lower in plants with "commitment human resource systems" than in other plants. Hamilton et al. (2001) analyze individual-level job duration data in one garment plant in California and find that workers' probability of leaving the plant fell after the introduction of teams. Batt et al. (2002) study firms in the telecommunications industry and find that those with employee participation in offline problem-solving teams and self-directed workgroups have lower quit rates than others.

A second set of studies analyze labour turnover and AWPs for a broader set of industries (Delaney, 1996; Huselid, 1995; Cappelli and

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[2] The four organizations studied were: a bank, a manufacturing plant, a hospital and a university.

Neumark, 2001b; Azfar and Danninger, 2001). Delaney (1996) studies 495 large companies and finds that the number of AWPs implemented by a firm is negatively associated with its quit rate. Huselid (1995) uses a national sample of 855 firms with more than 100 employees and reports that those with a cluster of AWPs have lower employee turnover than others. Using the U.S. National Employers Survey, Cappelli and Neumark (2001b) examine quit rates among establishments with 20 or more employees and find that in manufacturing, establishments with self-directed workgroups, job rotation and profit-sharing have lower quit rates than others. Azfar and Danninger (2001) use the National Longitudinal Survey of Youth and find some evidence that in non-unionized jobs, young men participating in profit-sharing plans are less likely to quit than others.

Taken together, these findings appear to be consistent with the notion that AWPs tend to reduce quit rates. Yet, the available evidence is subject to several caveats. First, the results are not necessarily robust across industries. For instance, Cappelli and Neumark (2001b) find that the negative association between quit rates, on the one hand, and self-directed workgroups, job rotation and profit-sharing, on the other, does not hold outside the manufacturing sector. Second, the majority of the aforementioned studies use cross-sectional data on establishments and, consequently, are unable to control for unobserved establishment-specific fixed effects—such as management quality—which may influence quit rates substantially. The only exceptions are Havlovic (1991), Buch (1992) and Hamilton et al. (2001), which do so implicitly by examining longitudinal data on quits in a single establishment.[3] Third, some of the aforementioned studies (Arthur, 1994; Huselid, 1995) include both quits

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[3] Buch (1992) uses longitudinal data on turnover for one manufacturing plant. She finds that turnover fell in that plant following the implementation of quality circles.

and layoffs in their measure of employee turnover. If AWPs and layoffs are jointly determined by changes in product markets or technology— rather than AWPs determining layoffs—then the coefficient for AWPs in an employee turnover equation no longer has a causal interpretation. Fourth, in all studies using cross-sectional data on establishments, no attention is paid to the possible endogeneity of AWPs with respect to quit rates and little attention is paid to the endogeneity of wages.[4]

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[4] For a detailed discussion of the methodological issues which arise when analyzing AWPs and quit rates, see Morissette and Rosa (2003).

III. Hypotheses

One of the central arguments of the literature on AWPs is that while these work practices, taken individually, may not substantially affect firms' outcomes, combining them in bundles will likely yield substantial gains in terms of greater productivity or reduced labour turnover. Since this literature provides little guidance on which practices should be combined together, we follow Cappelli and Neumark's (2001a) strategy of pre-specifying combinations of work practices, based on theoretical arguments. This strategy avoids making inferences based on very peculiar bundles of work practices and providing findings which may not be robust when considering alternative combinations.

Our focus on teamwork, flexible job design, performance-based pay systems and teamwork-related formal training allow us to test three simple hypotheses when considering synergies. The first hypothesis, H1, is that teamwork is more likely to succeed in reducing quit rates if combined with flexible job design, and vice-versa. The reason is that workers may enjoy more teamwork if they are allowed to rotate to the various tasks that the teams need to perform and may enjoy more job rotation or other forms of flexible job design if they have control, through self-management, over when and where to move.[5]

Two versions of this hypothesis will be tested. The first version will consider a bundle which combines self-directed workgroups and flexible

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[5] This is essentially the argument Cappelli and Neumark (2001a: p.758) apply when analyzing the impact of AWPs on firms' productivity.

job design (bundle 13) while the second version will combine teamwork broadly defined—i.e. including either self-directed workgroups or problem-solving teams or both—and flexible job design (bundle 23).

The second hypothesis, H2, is that teamwork will be more effective in reducing labour turnover if combined with performance-based pay systems, such as profit sharing or gain sharing. Version H2a of this hypothesis will be tested by combining profit sharing/gain sharing with self-directed workgroups (bundle 14) or with teamwork, broadly defined (bundle 24). Since teamwork may require workers to master a greater set of skills than traditional work environments, workers may expect a compensation for having to adapt and learn new skills. If so, merit pay or skill-based pay can provide the incentives necessary to induce appropriate behaviour in a new work environment. This suggests that teamwork may also be more effective in reducing quit rates if combined with these forms of compensation (version H2b). To account for this possibility, we use merit pay or skill-based pay in conjunction with self-directed workgroups (bundle 15) or teamwork (bundle 25).

The third hypothesis, H3, is that teamwork will reduce quit rates only if firms send their employees a clear signal that they are serious about it, i.e. only if they provide appropriate training on group decision-making and problem-solving. To test this hypothesis, we combine classroom training on teamwork-related issues with self-directed workgroups (bundle 16) or teamwork broadly defined (bundle 26).

We also consider five additional bundles which combine these three hypotheses. Specifically, we combine teamwork (broadly defined) and flexible job design with profit sharing/gain sharing (bundle 234), merit pay/skill based pay (bundle 235) or formal training on teamwork-related issues (236). We also combine teamwork, flexible job design, alternative

compensation schemes and teamwork-related formal training (bundles 2346 and 2356). Hence, we consider 13 bundles of work practices.

Our empirical strategy will proceed in two steps. First, we will examine whether key AWPs, considered individually, are associated with lower quit rates. Second, we will analyze, for each of the 13 bundles defined above, whether the joint implementation of work practices yields a negative association with quit rates.[6]

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[6] In addition, Morissette and Rosa (2003) test for synergies by estimating interaction terms for each of the eight bundles combining two work practices.

IV. Data and Concepts

We use data from the Workplace and Employee Survey (WES) conducted in 1999 and 2000 by Statistics Canada. WES is a linked employer-employee file. Employers are sampled by physical locations—the statistical unit that comes the closest to the concept of a workplace in which employer and employee activities can be linked. Employees are then sampled from employer-provided lists within each location.

The survey covers all industries except farming, fishing, trapping and public administration. It examines a broad range of topics such as human resource practices, labour turnover, technology adoption, innovation and business strategies, among others. The employer portion of the survey was administered in the summer and fall of 1999 using a computer-assisted personal interview (CAPI). The primary respondent was the human resource manager in a large firm and the business owner in a small firm.[7] The survey was conducted though a computer-assisted telephone interview (CATI) in 2000. The response rate of WES is quite impressive: it equals 96.5% and 95.8% in 1999 and 2000, respectively.

Our analysis of quit rates is based on the following question, asked in the *second* interview, which was conducted in 2000:

"Please estimate the number of employees who have permanently left this location between April 1, 1999 and March 31, 2000, by reason:

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[7] While it may be argued that human resource managers may not have detailed knowledge about AWPs, Gittleman et al. (1998: p.104) find that answers provided by human resource persons did not systematically differ from those of line managers in the 1993 U.S. Survey of Employer Provided Training.

A. Resignations (No special incentives)

B. Lay-offs (No recall expected)*

C. Special workforce reductions**

D. Dismissal for cause

E. Retirement (No special incentives)

To construct our measure of quit rates, we divide the number of resignations (A) by the average level of employment observed between April 1999 and March 2000.[8]

Information about teamwork and flexible job design were obtained from establishments with more than 10 employees, using the following question, asked in the *first* interview, which was conducted in 1999:

"For non-managerial employees, which of the following practices exist on a formal basis in your workplace:

a) *employee suggestion program* [includes employee survey feedback].

b) *flexible job design* [includes job rotation, job enrichment/redesign (broadened job definitions), job enrichment (increased skills, variety or autonomy of work)].

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*   Involuntary lay-offs with enhanced severance packages should be included with "Lay-offs".

** Special workforce reductions include resignations and early retirements induced through special financial incentives (i.e. where employees voluntarily leave).

[8] If an establishment has seasonal peaks in employment, the average level of employment is constructed by taking a weighted average of maximum employment during these peaks and average employment in March 1999 and March 2000. Otherwise, the average level of employment is simply the average of employment observed in March 1999 and March 2000.

c) *Information sharing with employees* [for example, with respect to firm's performance, colleagues' wages, technological or organizational changes, etc. This implies that employees have some feedback on policies].

d) *Problem-solving teams* [responsibilities of teams are limited to specific areas such as quality or work flow (i.e. narrower range of responsibilities than self-directed work groups)].

e) *Joint labour-management committees* [include non-legislated joint labour-management committees and task teams that generally cover a broad range of issues, yet tend to be consultative in nature].

f) *Self-directed work groups* [semi-autonomous work groups or mini-enterprise work groups that have a high level of responsibility for a wide range of decisions/issues]".

Several points must be noted with respect to the aforementioned question. First, it refers to human resource practices which exist on a *formal* basis and thus, does not consider informal practices which may have an impact on working conditions and quit rates. Second, it specifies that flexible job design includes concepts such as job rotation and job enrichment. Third, it distinguishes at least two types of teamwork: 1) problem-solving teams, whose responsibilities are limited to specific issues and, 2) self-directed workgroups (or self-managed teams), the most intense form of teamwork. Fourth, when a firm reports having a practice, it also asks about the year of adoption of that practice. However, if a firm reports not having a work practice, it is not asked whether it implemented that practice in the past and abandoned it later. Fifth, it contains no information on the percentage of employees involved in that work practice.[9]

[9] Note that this question was not asked in 2000.

To analyze performance-based pay systems, we construct indicators of whether establishments had alternative compensation schemes such as profit sharing, gain sharing, merit pay and skill-based pay for *some* of their non-managerial employees in 1999. Contrary to the six work practices listed in the aforementioned question, WES provides no information on the year of implementation of these compensation schemes. We analyze formal training aimed at improving workers' ability to work in teams by constructing an indicator of whether establishments paid or provided for classroom training on group decision-making, problem-solving, team-building, leadership and communication between April 1998 and March 1999.

As argued above, AWPs may be endogenous with respect to quits. To minimize concerns regarding the endogeneity of AWPs, we omit from our analysis establishments which have implemented in 1999 *any* of the six practices listed in the aforementioned question. Adding this restriction to the set of selection criteria defined below drops the number of selected establishments from 3,285 to 3,142.[10]

We also distinguish establishments which adopted teamwork and/or flexible job design in 1996 or earlier from those which did so in 1997-1998. We introduce this distinction for four reasons. First, if establishments introduce work practices gradually and increase their use over time, those which adopted such practices at least two years ago may have a greater fraction of workers involved in these practices than those which adopted them more recently. If so, we may have more chances of finding a significant effect for early adopters than for late adopters. Furthermore, this strategy may help overcome the lack of information on the percentage

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[10] The 143 establishments excluded represent 3% of the (weighted) population of establishments covered by the selection criteria defined below.

of workers involved in AWPs. Second, if the impact of a given practice on workers' well-being takes time to operate—for instance, if workers in teams need stability to learn to work together—we may also have more chances of capturing an effect among establishments which adopted that practice early than among those which adopted it late. Third, as argued above, the introduction of AWPs may lead to a temporary increase in quit rates and a decline subsequently, at least for some workplaces. If so, establishments which implemented in 1997-1998 may have higher quit rates than others. Lastly, if establishments which adopted practices late differ from those which adopted them early in terms of management quality or other unmeasured dimensions influencing quits, quite different patterns could be found in the two groups.

To alleviate concerns regarding the endogeneity of wages, we use data on establishments' annual payroll per employee in period t-1, i.e. between April 1998 and March 1999. In order to obtain a measure of payroll which covers 12 months, we exclude from our analysis establishments which were born after March 1998. Since quit rates depend on hourly wages, rather than annual pay, we control for the number of hours worked in an establishment between April 1998 and March 1999 by conditioning our results on the percentage of employees working part-time as well as the average number of weekly hours worked by full-time employees.[11]

To ensure that the establishments analyzed represent workplaces which pay meaningful earnings, we further restrict our sample to establishments whose average payroll per employee varied between $5,000

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[11] Furthermore, we adjust our measure of annual payroll per employee by taking into account the number of person-years of temporary layoff when calculating the average number of employees.

and $200,000 (in 1998 dollars).[12] Finally, to ensure comparability with previous studies—in which the question about quits refer to the *percentage* of workers quitting—we delete establishments whose quit rates exceed 100%. As a result, our sample consists of profit-oriented establishments which operated between April 1998 and March 2000, which had more than 10 employees in March 1999, whose average annual pay per employee varied between $5,000 and $200,000 and whose quit rates did not exceed 100%. These restrictions lead to a sample of 3,142 establishments.[13]

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[12] Relaxing this restriction does not alter our results.

[13] The resulting sample is representative of establishments with more than 10 employees in terms of union status and size. It slightly underrepresents establishments in retail trade and consumer services. These establishments account for 29.5% of all establishments in our sample, compared to 32.5% in a sample of establishments with more than 10 employees in March 1999.

V.   Analysis of Quit Rates

V.1   Descriptive Statistics

Tables 1 and 2 illustrate two key messages of this paper. The first message is that AWPs do not appear to reduce quit rates in all industries. For instance, manufacturing establishments which have some bundles of work practices do not have lower quit rates than those with no AWPs (Table 1). However, a quite different pattern is observed in high-skill services. In this sector, establishments with bundles of AWPs have much lower quit rates than those with no AWPs.

The second message is that information sharing seems to play an important role in low-skill services. In this sector, of all establishments which have adopted neither teamwork nor flexible job design in 1996 or earlier, those with an information sharing policy have much lower quit rates than others (Table 2). All we shall see below, both messages hold in multivariate analysis.

High-skill services include finance and insurance, business services and information and cultural industries.[14] Low-skill services consist mainly of establishments in transportation, warehousing, wholesale trade, retail trade and consumer services, real estate, rental and leasing operations. While 31% of employees in high-skill services have a university degree,

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[14] Business services include industries such as professional, scientific and technical services, of which computer systems design and related services are a component. Information and cultural industries include industries such as telecommunications, publishing and broadcasting.

the corresponding proportions are only 11% in low-skill services and 16% in all industries of the private sector.[15]

V.2   Regression Analysis

In all models estimated in this section, we use the following set of controls: average wages in year t-1, industry, establishment size, whether the establishment belongs to a multi-establishment company, the percentage of unionized workers, the percentage of part-time workers, the percentage of temporary workers, the occupational composition of the workforce, average weekly hours of full-time employees, the unemployment rate of males 25-54 by economic region, the presence of a formal grievance system, whether the establishment was operating in 1997-1998 or in 1996 or earlier and whether employment fell in year t-1 (i.e. between March 1998 and March 1999).[16]

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[15] High-skill services, low-skill services and manufacturing account for 22%, 44% and 27% of total employment in our sample, respectively. The remaining 7% is accounted for by construction, forestry, mining, oil and gas extraction.

[16] For the sample consisting of establishments with more than 10 employees (N=3,142), we use 14 categories for industry, four categories for establishment size (10-19 employees, 20-99 employees, 100-499 employees and 500 or more employees) and seven variables representing the percentage of workers in a given occupational group (managers, professionals, technical/trades, marketing/sales, clerical/administrative, production workers with no trade/certification, other). Our measure of wages includes average annual pay per employee as well as average non-wage benefits per employee. We define a formal grievance system as a system where the final authority to settle disputes is held by either a labour-management committee or an outside arbitrator. We control for whether an establishment was operating in 1997-1998 or in 1996 or earlier to account for the possibility that workplaces which adopted teamwork and/or flexible job design in 1996 or earlier may have lower quit rates than those which did so in 1997-1998 simply because they are older establishments. All control variables are taken at the time of the first interview, i.e. in 1999.

V.2.1 Work Practices Considered Individually

Table 3 shows results of Tobit analyses performed on establishments with more than 10 employees. Regression analyses are performed for all industries as well as for the three following sectors: manufacturing, high-skill services and low-skill services.

The first column of Table 3 indicates that in the aggregate, establishments which pay relatively high wages and which are unionized have lower quit rates than others. In contrast, establishments with a high percentage of part-time workers and those whose employment fell last year have higher quit rates than others.[17] Having performance-based pay systems is not associated with significant effects while having teamwork-related formal training is associated with higher quit rates. Most important, establishments which adopted problem-solving teams, self-directed workgroups or flexible job design in 1996 or earlier and were still using these practices in 1999 have lower quit rates than those which did not use these practices in 1999.[18] However, quite different patterns are observed among establishments which adopted work practices later, i.e. in 1997-1998. Specifically, those which implemented problem-solving teams during that period have higher quit rates than those with no problem-solving teams in 1999. This confirms the need to distinguish early adopters from late adopters when analyzing quit patterns.

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[17] The finding that establishments whose employment fell last year have higher quit rates than others likely reflects the fact that workers quit firms whose performance is deteriorating to avoid being laid-off in the near future.

[18] Since the year of implementation of work practices is sometimes unknown, our set of covariates also includes indicators of whether or not an establishment adopted problem-solving teams, self-directed workgroups or flexible job design at an unknown date in the past. For a given practice, the reference group consists of establishments which are not using that practice in 1999.

The relationships documented above do not necessarily apply uniformly across sectors. The most robust pattern observed is the negative association between quit rates and the early adoption of self-directed workgroups: this negative association appears to hold in all three sectors, at least at the 10% level of significance.[19] However, the early adoption of problem-solving teams is associated with lower quit rates only in high-skill services. Furthermore, there is very little evidence that performance-based pay systems and teamwork-related formal training are associated with lower quit rates: only establishments operating in high-skill services and having profit sharing/gain sharing plans have lower quit rates than others.

Among establishments with 50 or more employees, the early adoption of self-directed workgroups is no longer associated with lower quit rates (Table 4, column 1). Furthermore, it is hard to find a work practice yielding consistently negative and statistically significant correlations with quit rates across sectors. The only exception is profit sharing/gain sharing, which is associated with lower employee turnover in both high-skill services and low-skill services. In sum, relatively low quit rates are generally found in establishments with more than 10 employees which adopted self-directed workgroups in 1996 or earlier and among establishments with 50 or more employees which have profit sharing or gain sharing.

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[19] Cappelli and Neumark (2001b) also find a negative relationship between self-managed teams and quit rates in manufacturing.

V.2.2 Joint Implementation of Work Practices

Skeptics might argue that the results of Tables 3 and 4 do not provide a satisfactory test of the impact of key AWPs on quit rates since they consider work practices individually, thereby neglecting potential synergies between these and other practices.[20] To take this argument into account, we analyze the impact of bundles of work practices in Table 5.

The 13 bundles considered in Table 5 include various combinations of the six following practices: 1) problem-solving teams adopted in 1996 or earlier and still in use in 1999, 2) self-directed workgroups adopted in 1996 or earlier and still in use in 1999, 3) flexible job design adopted in 1996 or earlier and still in use in 1999, 4) profit sharing or gain sharing in use in 1999, 5) merit pay or skill-based pay in use in 1999 and, 6) teamwork-related formal training in use in 1999. To maintain a constant control group across bundles, we use as a control group establishments which have *none* of the six aforementioned practices in 1999. In other terms, we ask the following question: compared to establishments which have none of the six practices, do establishments which have a given bundle

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[20] Another potential caveat is that Tables 3 and 4 consider work practices individually, conditional on the presence/absence of other AWPs. Since many of these practices may be implemented together, conditioning results on the presence/absence of other AWPs may lead to multicollinearity problems. To account for this possiblity, we also estimate separate Tobit models where a single work practice (e.g. self-directed workgroups adopted in 1996 or earlier) is considered and where results are not conditioned on the presence/absence of other AWPs. When we do so, the main message of Tables 3 and 4—i.e. the lack of uniformity of patterns across sectors—still holds.

of work practices have lower quit rates.[21] We ask that question for each of the 13 bundles considered, each of the three aforementioned industrial groupings and the two size categories, thereby estimating 78 separate Tobit models.

Table 5 presents the coefficients associated with each of the 13 bundles, i.e. the coefficients associated with a dummy variable indicating whether or not an establishment has a given bundle. The results are striking. In manufacturing and for both size categories, there is no evidence that key AWPs reduce quit rates: none of the 13 bundles considered yields a negative and statistically significant correlation.

Quite different patterns are found in the service sector. Among establishments with more than 10 employees operating in low-skill services, there is a negative association between bundles of work practices and quit rates for about half of the bundles considered. By far, the strongest evidence of a negative association is found in high-skill services, where all except two bundles are statistically significant at the 5% level. Although the number of significant and negative bundles drops when we consider establishments with 50 or more employees in the two service sectors, the evidence in favour of a negative association remains fairly strong in high-skill services.

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[21] For each of the bundles considered, there is also an intermediate group of establishments, which neither have the bundle nor fall into the control group. Unlike the control group, the intermediate group varies across bundles. Therefore, for each of the bundles considered, the regressions include: 1) an indicator of whether or not an establishment has a given bundle and, 2) an indicator of whether or not an establishment falls into the intermediate group. The omitted category is the control group. Among establishments with more than 10 employees, the percentage of establishments which fall into the control group varies between 29% and 36%, depending on the industrial sector considered. The corresponding numbers for establishments with 50 or more employees are 17% and 22%, respectively.

To investigate further the robustness of these patterns, we re-estimate all models of Table 5 simply adding an indicator of whether establishments adopted a formal policy of information sharing in 1996 or earlier and still used it in 1999. When we do so, the results found in Table 5 in manufacturing remain unchanged. Specifically, the finding that none of the 13 bundles yields a negative and statistically significant correlation holds, information sharing having no significant effect in most of the models. Accordingly, we show the results of this exercise for high-skill services and low-skill services only.

In columns 1 and 3 of Table 6, we first replicate the numbers shown in columns 5 and 6 of Table 5 for low-skill services, i.e. present Tobit coefficients without the information sharing indicator. Columns 2 and 4 show the Tobit coefficients with the information sharing indicator. Adding information sharing to the bundles previously defined sharply reduces the evidence of a negative association between these bundles and quit rates. Among establishments with more than 10 employees, the number of bundles implying a negative association drops from 7 to 3. Among establishments with 50 or more employees, there is no longer evidence of a negative association.

The story is different in high skill-services. For both size categories, adding information sharing reduces the number and the magnitude (in absolute value) of the significant negative correlations but even when the information sharing indicator is included, about two thirds of the bundles remain statistically significant among establishments with more than 10 employees.   Therefore, the most robust evidence of a negative association

between key AWPs and quit rates is found among establishments with 10 or more employees operating in high skill-services.[22]

To evaluate the magnitude of this association, we use the Tobit coefficients of column 6 of Table 6 and calculate the expected quit rates of establishments employing 10 or more employees in high-skill services. We do so for two bundles of work practices which combined teamwork—narrowly or broadly defined—with flexible job design (bundles 13 and 23, respectively). Since information sharing is common among establishments which have these bundles, we calculate the expected quit rates assuming that establishments have a formal information sharing policy. The results are shown in Table 7.

For both bundles, the expected quit rates of establishments with teamwork and flexible job design vary between 5% and 7%. In contrast, establishments with none of the six aforementioned practices have expected quit rates equal to 12%. Thus, having teamwork and flexible job design appears to have a sizable impact on labour turnover in high-skill services.

Since most establishments which have self-directed workgroups, problem-solving teams or flexible job design also have information sharing as a formal policy, one might argue that the negative effect obtained for information sharing in low-skill services simply captures the impact of teamwork and/or flexible job design. To investigate this hypothesis, we estimate a Tobit model on a subsample of establishments employing more

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[22] For high-skill services, we re-estimated the models of Table 5 adding not only information sharing, but also two indicators of whether establishments had adopted task teams/joint labour-management committees or employee suggestion programs in 1996 or earlier and were still using these practices in 1999. Doing so did not alter this conclusion.

than 10 workers in low-skill services and which had implemented *neither* problem-solving teams, self-directed workgroups *nor* flexible job design in 1996 or earlier (N=751). The resulting coefficient for information sharing equals -0.074 and is statistically significant at the 1% level.

The second panel of Table 7 presents expected quit rates for this subsample. Among establishments which implemented information sharing in 1996 or earlier, expected quit rates are 14%. In contrast, expected quit rates are 20% for other workplaces. Since we find a sizable effect for information sharing even among establishments which adopted neither teamwork nor flexible job design in 1996 or earlier, the negative effect obtained for information sharing in low-skill services does not simply capture the impact of teamwork and/or flexible job design.

V.2.3 Discussion

Taken together, Tables 1 to 7 suggest several stories. One interpretation of the negative correlations found in high-skill services is that key AWPs may be more successful in reducing quit rates in technologically complex work environments, i.e. in firms which employ a highly skilled workforce, require strong conceptual/analytical skills and de-emphasize repetitive tasks.

One explanation for the decrease in correlations (in absolute value) observed in low-skill and high-skill services when we add information sharing could be that the information sharing indicator is a proxy for policies which signal employers' interest in workers' well-being. If so, such policies may also be useful tools for achieving reductions in labour turnover. Alternatively, workers whose employers have a formal policy of information sharing (on firm's performance, organizational changes,

etc.) may *perceive* that they work in a less uncertain environment than others. If so, the perceived reduction in uncertainty might induce them to keep working with their current employer.

VI.   Summary and Conclusions

Using a nationally representative sample of establishments, this study has examined whether key AWPs tend to reduce quit rates. Overall, the analysis provides:

1. Strong evidence of a negative association between key AWPs and quit rates among establishments of more than 10 employees operating in high-skill services;

2. Some evidence of a negative association in low-skill services. However, the magnitude of this negative association is reduced substantially when we simply add an indicator of whether the workplace has a formal policy of information sharing;

3. Very little evidence of a negative association in manufacturing. While establishments with self-directed workgroups have lower quit rates than others, none of the bundles of work practices considered in this sector yields a negative and statistically significant effect.

Overall, the findings presented in this paper paint a rather complex picture of the relationship between key AWPs and quit rates. The evidence suggests that these practices appear to reduce quit rates in high-skill services and is therefore consistent with the findings of Batt et al. (2002), which show a negative association between teamwork and quit rates in telecommunications in the U.S. Whether these practices operate in a similar way in low-skill services remains an open question. Consistent with the findings of Cappelli and Neumark (2001b), self-directed workgroups,

considered in isolation, appear to be associated with lower quit rates in manufacturing. However, we find no further evidence that key AWPs reduce quit rates in this sector.

Our interpretation of the negative correlations obtained for information sharing in low-skill services is that this variable might proxy the use of practices—that some might label "conventional"—which send employees a clear signal of their employer's interest in their well-being. If so, such practices, whatever they are, might be successful in reducing labour turnover in traditional/low-skill work environments.

Taken together, the findings obtained for high-skill services and low-skill services suggest that key AWPs might be more successful in reducing labour turnover in technologically complex environments than in low-skill ones.[23]

Yet, alternative interpretations must be kept in mind. The negative association found in cross-sectional data between key AWPs and quit rates in high-skill services does not necessarily imply that adopting these practices causes a reduction in quit rates in this sector. As mentioned above, establishments with AWPs in high-skill services may have had lower quit rates than others even *before* they adopted these practices. Second, establishments which use these practices may simply have better managers than others and it might the quality of management—rather than the adoption of these practices—which causes a reduction in quit rates.[24]

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[23] Boning et al. (2001) find that the adoption of teamwork in U.S. steel minimills leads to larger productivity increases in technologically complex production lines than in other production lines.

[24] It is also important to acknowledge that if AWPs caused a reduction in quit rates in high-skill services, the magnitude of the impact will be overestimated if some of the establishments which adopted these practices have abandoned them later because they did not prove successful in reducing quit rates.

Given the demographic pressures firms will face in the near future as a result of the aging of their workforce, the search for work practices which reduce labour turnover will likely intensify over the next few years. The markedly different patterns that this paper has documented across industries and the possibility that other confounding factors underlie the correlations found in high-skill services suggest that it is still premature to conclude that key AWPs are the magic tool one may be looking for to achieve a substantial reduction in quit rates in all sectors of the economy.

Table 1

Average quit rates by industry and bundle of work practices
Establishments with more than 10 employees

Industry	Manufacturing	High-skill services	Low-skill services	All industries
Bundle of work practices			%	
Teamwork and flexible job design*	11.8	2.8	13.6	11.6
	(2.8)	(1.0)	(2.1)	(1.4)
Teamwork and profit sharing*	13.7	3.7	13.2	11.2
	(2.6)	(1.1)	(1.7)	(1.4)
Teamwork and merit pay/skill-based pay*	13.0	4.3	12.7	9.6
	(2.4)	(1.1)	(1.5)	(1.0)
Teamwork and formal training on teamwork*	15.8	6.1	14.6	13.4
	(3.3)	(0.7)	(2.0)	(1.4)
No alternative work practices**	10.7	15.8	19.3	15.5
	(1.1)	(3.7)	(1.9)	(1.4)

* Teamwork and flexible job design adopted in 1996 or earlier and still in use in 1999. Profit sharing, merit pay/skill-based pay and formal training on teamwork in use in 1999. Teamwork refers to problem-solving teams or self-directed workgroups. Bootstrap standard errors are between parentheses.

**Establishments with none of the following practices:

1) problem-solving teams adopted in 1996 or earlier and still in use in 1999.

2) self-directed workgroups adopted in 1996 or earlier and still in use in 1999.

3) flexible job design adopted in 1996 or earlier and still in use in 1999.

4) profit sharing or gain sharing in use in 1999.

5) merit pay or skill-based pay in use in 1999.

6) teamwork-related formal training in use in 1999.

Table 2

Average quit rates
Establishments with no teamwork or flexible job design adopted in 1996 or earlier*

Industry	Manufacturing	High-skill services	Low-skill services	All industries
Information sharing adopted in 1996 or earlier and still in use in 1999?			**%**	
Yes	8.7	10.4	8.4	8.7
	(1.1)	(2.3)	(1.3)	(0.9)
No	12.1	15.9	20.2	16.7
	(0.9)	(2.6)	(2.2)	(1.3)

* Establishments with more than 10 employees. Bootstrap standard errors are between parentheses.

Table 3

Selected alternative work practices and quit rates
Establishments with more than 10 employees

		All industries (1)	Manufac- turing (2)	High-skill services (3)	Low-skill services (4)
I. Teamwork and flexible job design					
Problem-solving teams	<= 1996	-0.046 **** *0.013*	-0.007 *0.021*	-0.167 **** *0.028*	-0.021 *0.022*
Self-directed workgroups	<= 1996	-0.049 *** *0.019*	-0.081 ** *0.033*	-0.071 * *0.041*	-0.058 * *0.031*
Flexible job design	<= 1996	-0.023 ** *0.012*	0.054 *** *0.019*	-0.097 **** *0.030*	-0.046 ** *0.019*
Problem-solving teams	1997-1998	0.170 **** *0.021*	-0.034 *0.025*	0.095 *0.062*	0.253 **** *0.037*
Self-directed workgroups	1997-1998	-0.014 *0.035*	0.056 *0.041*	0.087 *0.061*	-0.069 *0.081*
Flexible job design	1997-1998	0.036 * *0.022*	0.003 *0.032*	-0.178 ** *0.061*	0.045 *0.038*
II. Performance-based pay systems and training					
Profit sharing or gain sharing		-0.018 *0.012*	0.037 ** *0.018*	-0.055 ** *0.025*	0.005 *0.021*
Merit pay or skill-based pay		0.003 *0.010*	-0.014 *0.016*	0.067 *** *0.021*	0.008 *0.017*
Teamwork-related formal training		0.027 ** *0.012*	0.057 *** *0.021*	-0.004 *0.023*	0.009 *0.019*
III. Selected controls					
Wages		-0.0010 **** *0.0003*	-0.0007 * *0.0004*	0.0007 *0.0005*	-0022 **** *0.0006*
Percentage of unionized workers		-0.095 **** *0.022*	-0.108 *** *0.037*	-0.038 *0.048*	-0.057 *0.037*
Percentage of part-time workers		0.178 **** *0.023*	0.001 *0.054*	0.085 * *0.053*	0.209 **** *0.036*
Employment fell last year		0.059 **** *0.011*	0.027 *0.018*	0.134 **** *0.025*	-0.012 *0.019*
Observations		3,142	866	709	1,079
Likelihood Ratio Chi Square		844.47	136.11	265.24	478.29

Other controls include : industry (3-14 categories); establishment size (4 categories); occupation; percentage of temporary employees; average weekly hours of full-time employees; unemployment rate of males 25-54 by economic region; whether the establishment is the branch of a company; presence of a formal grievance system; whether the establishment was operating in 1997-1998 or in 1996 or earlier.
 – Standard errors of coefficients are in italics.
 * significant at the 10% level; ** significant at the 5% level; *** significant at the 1% level; **** significant at the 0.1% level.
 Source: Workplace and Employee Survey of 1999-2000.

Table 4

Selected alternative work practices and quit rates
Establishments with 50 or more employees

		All industries (1)	Manufac- turing (2)	High-skill services (3)	Low-skill services (4)
I. Teamwork and flexible job design					
Problem-solving teams	<= 1996	-0.014 *0.013*	-0.025 *0.022*	-0.044 ** *0.021*	-0.006 *0.023*
Self-directed workgroups	<= 1996	-0.011 *0.016*	-0.050 * *0.030*	-0.007 *0.022*	0.026 *0.030*
Flexible job design	<= 1996	-0.023 *0.013*	0.038 *0.023*	-0.032 *0.023*	-0.059 ** *0.024*
Problem-solving teams	1997-1998	-0.038 *0.019*	-0.096 *** *0.034*	0.095 *** *0.035*	-0.055 *0.034*
Self-directed workgroups	1997-1998	0.089 *0.029*	-0.041 *0.069*	0.086 ** *0.035*	0.070 *0.053*
Flexible job design	1997-1998	-0.029 *0.022*	0.058 *0.049*	-00.28 *0.051*	-0.019 *0.034*
II. Performance-based pay systems and training					
Profit sharing or gain sharing		-00.38 **** *0.010*	-0.023 *0.018*	-0.039 *** *0.015*	-0.039 ** *0.019*
Merit pay or skill-based pay		0.003 *0.010*	0.018 *0.018*	0.006 *0.015*	-0.013 *0.019*
Teamwork-related formal training		0.020 *0.010*	0.033 *0.022*	0.030 * *0.016*	-0.005 *0.018*
III. Selected controls					
Wages		-0.0004 *0.0003*	-0.0017 **** *0.0005*	0.0011 *** *0.0004*	-0.0003 *0.0006*
Percentage of unionized workers		-0.061 *0.018*	-0.093 *** *0.032*	-0.044 *0.034*	-0.071 ** *0.033*
Percentage of part-time workers		0.072 *0.023*	-0.145 * *0.086*	0.131 *** *0.043*	0.111 *0.036*
Employment fell last year		0.012 *0.010*	0.010 *0.019*	0.036 ** *0.018*	0.022 *0.018*
Observations		1,890	606	419	631
Likelihood Ratio Chi Square		414.66	175.17	167.97	172.48

Other controls include : industry (3-14 categories); establishment size (4 categories); occupation; percentage of temporary employees; average weekly hours of full-time employees; unemployment rate of males 25-54 by economic region; whether the establishment is the branch of a company; presence of a formal grievance system; whether the establishment was operating in 1997-1998 or in 1996 or earlier.
 – Standard errors of coefficients are in italics.
 * significant at the 10% level; ** significant at the 5% level; *** significant at the 1% level; **** significant at the 0.1% level.
 Source: Workplace and Employee Survey of 1999-2000.

Table 5

Bundles of work practices and quit rates

Industry	Establishments with >10 employees	Establishments with >=50 employees	Establishments with >10 employees	Establishments with >=50 employees	Establishments with >10 employees	Establishments with >=50 employees
	Manufacturing		High-skill services		Low-skill services	
	(1)	(2)	(3)	(4)	(5)	(6)
Bundles with components*:						
13	0.046	0.002	**-0.200******	**-0.101****	**-0.162******	-0.001
14	-0.020	-0.002	**-0.216******	-0.027	**-0.143******	-0.047
15	0.025	-0.042	**-0.166******	**-0.056***	-0.044	-0.015
16	-0.012	-0.018	**-0.253*****	**-0.064***	-0.078	-0.011
23	0.031	0.026	**-0.169******	**-0.069****	**-0.124******	-0.030
24	0.078***	-0.021	**-0.123*****	-0.030	**-0.150******	**-0.056***
25	0.064**	0.024	**-0.120******	**-0.059****	**-0.103******	-0.012
26	0.113****	0.039	**-0.076***	-0.043	-0.075**	0.010
234	0.033	-0.053	**-0.231******	-0.034	**-0.101*****	-0.043
235	0.058	0.091**	**-0.196******	**-0.097*****	**-0.132******	-0.016
236	0.077*	0.003	**-0.243*****	**-0.090****	-0.036	-0.011
2346	0.091*	-0.041	-0.148	-0.024	-0.030	-0.031
2356	-0.029	-0.027	**-0.217****	**-0.101*****	-0.072	-0.030

* Components of bundles are defined as follows:

1= self-directed workgroups adopted in 1996 or earlier and still in use in 1999

2= self-directed workgroups or problem-solving teams adopted in 1996 or earlier and still in use in 1999

3= flexible job design adopted in 1996 or earlier and still in use in 1999

4= profit sharing or gain sharing in use in 1999

5= merit pay or skill-based pay in use in 1999

6= teamwork-related formal training in use in 1999.

* Significant at the 10% level; ** significant at the 5% level; *** significant at the 1% level; **** significant at the 0.1% level.

Table 6

Bundles of work practices, information sharing and quit rates

Establishments with employees:	> 10	>10	>=50	>=50	> 10	>10	>=50	>=50
Industry	Low-skill services		Low-skill services		High-skill services		High-skill services	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Information sharing indicator included? Bundles with components*	No	Yes	No	Yes	No	Yes	No	Yes
13	**-0.162******	**-0.093***	-0.001	0.050	**-0.200******	**-0.138***	**-0.101**	**-0.087**
14	**-0.143******	**-0.071***	-0.047	-0.004	**-0.216******	**-0.149**	-0.027	-0.008
15	-0.044	0.029	-0.015	0.034	**-0.166******	**-0.101**	**-0.056***	-0.041
16	-0.078	-0.019	-0.011	0.032	**-0.253***	**-0.182**	**-0.064***	-0.049
23	**-0.124******	-0.048	-0.030	0.013	**-0.169******	**-0.106**	**-0.069**	-0.056
24	**-0.150******	**-0.078**	**-0.056***	0.019	**-0.123***	-0.039	-0.030	-0.011
25	**-0.103******	-0.028	-0.012	0.031	**-0.120******	-0.043	**-0.059**	-0.054
26	**-0.075**	0.005	0.010	**0.073**	**-0.076***	0.001	-0.043	-0.032
234	**-0.101***	-0.019	-0.043	0.040	**-0.231******	**-0.161**	-0.034	-0.013
235	**-0.132******	-0.059	-0.016	0.027	**-0.196******	**-0.130**	**-0.097***	**-0.085**
236	-0.036	0.035	-0.011	0.036	**-0.243***	**-0.170***	**-0.090**	**-0.078**
2346	-0.030	0.040	-0.031	0.015	-0.148	-0.074	-0.024	-0.0001
2356	-0.072	-0.022	-0.030	**0.079***	**-0.217**	-0.145	**-0.101***	**-0.089**

* Components of bundles are defined as follows:
1= self-directed workgroups adopted in 1996 or earlier and still in use in 1999
2= self-directed workgroups or problem-solving teams adopted in 1996 or earlier and still in use in 1999
3= flexible job design adopted in 1996 or earlier and still in use in 1999
4= profit sharing or gain sharing in use in 1999
5= merit pay or skill-based pay in use in 1999
6= teamwork-related formal training in use in 1999
* Significant at the 10% level; ** significant at the 5% level; *** significant at the 1% level; **** significant at the 0.1% level.

Table 7

Expected quit rates in high-skill services and low-skill services

I. Establishments with more than 10 employees in high-skill services and with an information sharing policy			
	Establishments with none of the 6 practices**		**Establishments with bundle**
	(1)	**%**	**(2)**
Bundle with components* :			
13	12		5
	[7]		
23	12		7
	[9]		
II. Establishments with more than 10 employees in low-skill services and with neither problem-solving teams, self-directed workgroups, nor flexible job design in 1996 or earlier (N=751)			
	No		Yes
	(3)		(4)
Information sharing in 1996 or earlier	20		14
			[12]

* Components of bundles are defined as follows:

1= self-directed workgroups adopted in 1996 or earlier and still in use in 1999

2= self-directed workgroups or problem-solving teams adopted in 1996 or earlier and still in use in 1999

3= flexible job design adopted in 1996 or earlier and still in use in 1999

** problem-solving teams (1996 or earlier), self-directed workgroups (1996 or earlier), flexible job design (1996 or earlier),profit-sharing or gain sharing, merit pay or skill-based pay and, teamwork-related formal training. The percentage of establishments with a given bundle (or with an information sharing policy) is in brackets.

Source: Authors' calculations from the Workplace and Employee Survey of 1999-2000.

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