

Participation in Workplace Employer-sponsored Training in Canada:  
Role of Firm Characteristics and Worker Attributes\*

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Summary

This paper empirically investigates the role of firm characteristics and worker attributes in determining participation in workplace employer-sponsored training in Canada using the Workplace and Employee Survey (WES) of Statistics Canada, which links firms and their workers and covers important firm characteristics such as training provision, market competition, organizational changes, and technological innovation. This linkage enables us to explore the role of firm characteristics beyond the commonly-studied firm characteristics such as firm size, industry, and union status. In this paper, we ask the following questions: Does firms' provision of workplace training encourage workers' participation in Canada? How do changes in market competition, organizational changes, and technological innovation affect workers' participation in workplace training in Canada?

Some new empirical findings emerge from the WES data. First, firms' training provision significantly affects workers' participation in Canada. Second, increased international competition, organizational changes, and technological innovation are significantly correlated with workers' training participation at workplaces. In addition, workers in some sectors and in smaller firms have lower workplace training incidence and older, part-time, production and marketing/sales workers and workers with pre-school children participate less in workplace training.

# Participation in Workplace Employer-sponsored Training in Canada: Role of Firm Characteristics and Worker Attributes

## 1. Introduction

In order to be successful in the highly innovative and internationally competitive knowledge-based global economy, Canada must produce, attract, retain, and upgrade the well-educated labor force. In addition to producing new graduates and attracting skilled immigrants, renewing and upgrading skills of the existing labor force remain one of the most challenging and important tasks. Employer-sponsored training is one important vehicle for this skills upgrading.

On the one hand, employer-sponsored training in Canada has been falling short of international standards (Government of Canada 2002a, p. 59) but is increasingly demanded across industries (Government of Canada 2002b, p.41). This is of particular importance considering the Canadian ageing population and smaller future cohorts of new workers entering the labor force in the years and decades to come.

On the other, as illustrated in the paper, the US and international evidence indicates that increased market competition, organizational changes, research and development, and technological innovation have raised the demand for job-related training. But the empirical evidence for Canada is quite limited. Many existing studies on employer-sponsored training are primarily based on household-based surveys (such as the Adult Education and Training Survey (AETS) for Canada) where the information on firm characteristics is not as rich as that in firm-based surveys (such as the Workplace and Employee Survey (WES) for Canada).

Lin and Tremblay (2003) note that many existing Canadian studies have examined employer-sponsored training in programs and courses from the perspective of households but few studies have examined directly workplace job-related classroom and on-the-job training from the perspective of firms. Many studies have examined the relationship between worker

attributes and participation in employer-sponsored training based on surveys that contain limited information on firm characteristics (e.g., firm size, industry, and union status) but few studies have examined the role of other critical firm characteristics such as market competition, research and development, technological innovation, and management practices. The WES data link these firm characteristics to their workers' attributes and record workplace classroom and on-the-job training. Therefore, the WES data enable us to better understand workplace training.

This paper adds to the literature in the following ways. First, we attempt to evaluate the role of firms' training provision in workers' participation. We find that when firms provide more training, their workers tend to participate more in workplace training. This finding has an important implication to firms and their training decisions. Second, we try to examine how workers' participation is correlated with changes in market competition, organizational changes, and technological innovation. The new evidence from the WES data indicates that changes in market competition, organizational changes, and technological innovation affect workers' participation in workplace training. This finding explains in part why workers in some firms participate more in workplace training than those in other firms. These new findings suggest that there is a strong and direct relationship between those important firm characteristics and workplace training.

The remainder of the paper proceeds as follows. In section 2, we review the existing literature and state our key hypotheses about workplace training participation. In section 3, we describe the WES data and highlight some observations based on the statistical analysis of workplace training participation with reference to each and every of the firm characteristics and worker attributes. In section 4, we use the econometric models to analyze workplace training participation by taking into consideration all firm characteristics and worker attributes so that we

can identify and interpret the net marginal impact of each of these determinants on workplace training participation. The paper closes with some concluding remarks in section 5.

## **2. Employer-sponsored Training: What We Do and Do Not Know?**

Generally, there are three interdependent main components of human capital — early ability (whether acquired or innate); qualifications and knowledge acquired through formal education; and skills, competencies and expertise acquired through training on the job. All of these components are essential for productive capacities. However, the provision and utilization of employer-sponsored training are dependent upon the rational decisions of both firms and their workers in question.<sup>1</sup> It is possible that firms consider job-related training beneficial and hence offer training to workers but workers may or may not participate, or that workers believe job-related training beneficial but firms may or may not offer it to workers. Observed data on workplace training reflect rational choices made by both firms and their workers.

The labor economics literature recognizes the necessity for firms to offer or sponsor job-related training for various reasons. Jovanovic (1979) notes that job-matching difficulties in the labor market lead to a high turnover of workers. Barron, Black, and Loewenstein (1989) show that it is the process of job matching in a heterogeneous labor market that explains the necessity of job-related training. Stevens (1994) also identifies a natural link between training and labor market imperfection.

The literature also recognizes the economic implications of job-related training to firms and their workers. Loewenstein and Spletzer (1998) analyze how firms and workers share both costs of and returns on general training, and how the general training financed by previous

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<sup>1</sup> Becker (1975) suggests that individuals and firms invest in training when the discounted expected benefits outweigh the discounted expected costs. Contrarily, if the discounted expected benefits are less than the discounted expected costs, individuals and firms will not invest in training.

employers has a larger wage effect than the general training financed by the current employer. Acemoglu and Pischke (1998) and Acemoglu and Pischke (1999a, 1999b) note that firms provide general training in addition to specific training and that workers including those with minimum wages finance their own general training. Acemoglu and Pischke (1999c and 2002) find that the compressed wage structure may motivate firms to finance general training and that it is the rent collected by firms via monopsony that motivates general training for workers. According to Audor (2001), training helps firms to attract higher ability workers and lowers wages of the workers who are trained at workplaces. Díaz-Vázquez and Snower (2003) propose a theory showing that employer-sponsored training influences firing costs that would occur to firms in question.

Given the necessity of providing job-related training on the part of firms, is it the case that training provision encourages workers' participation? Altonji and Spletzer (1991), Hui and Smith (2004), and Lillard and Tan (1992) find that employer sponsorship may help workers' involvement in job-related training. However, Barron, Black and Loewenstein (1987) and Lynch (1992) note that the evidence on the role of employer sponsorship is not strong. Hence it is critical to know more about the role of training provision among Canadian firms. For this purpose, we wish to test an important hypothesis: Does firms' provision of workplace training encourage workers' participation? The WES data contain the information on firm characteristics including firms' training provision. As such, we are able to test this hypothesis using the WES data.

In general, if firms can gain net benefits from offering training to their workers, they will offer it. The net benefits can result from employees' greater capacity in dealing with increased market competition, organizational changes, and technological innovation. Hence, these

challenges may be important drivers for more job-related training provision and participation at workplaces. Knoke and Kalleberg (1994) note that market competition pressures are a non-trivial factor for firms to train their workers at workplaces. Bartel and Lichtenberg (1987) find that the rapid technological change causes firms to provide more training to production workers. Mincer (1989) notes that employer-sponsored training becomes increasingly important as an economy becomes more knowledge-based. Bresnahan, Brynjolfsson, and Hitt (2002) find that information technology, complementary workplace reorganization, and new products and services constitute a significant skill-biased technological change affecting labor demand and hence, employer-sponsored training. These findings are confirmed by OECD (2003). But the empirical evidence directly from Canadian workplaces is quite limited. Therefore, we wish to test another important hypothesis: How do changes in market competition, organizational changes, and technological innovation affect workers' participation in workplace training in Canada?

To test the above two hypotheses, we also need to take into consideration other plausible factors that are important to workers' training participation. Existing empirical studies suggest that employer-sponsored training can also be affected by the following worker attributes and firm characteristics: age, gender, marital status, presence of preschool children, schooling/education, job status, occupation, job tenure, income, industry, firm size, union membership, and region (provinces and metro centers).

On the role of worker attributes, Blinder and Weiss (1976), Weiss (1986), and Polachek and Siebert (1993) note that older workers rake less benefits from investment in human capital and hence participate less in training. Heckman and Smith (1999) find that adult female workers in the US obtain less training. Holtman and Idson (1991) show that marital status in the US is a significant factor influencing workers' participation in job-related training. Greenhalgh and

Stewart (1987) find that the presence of children affects workers' participation in job-related training in the UK. Brown (1990), Lillard and Tan (1992), Lynch (1992), Barnow, Giannarelli, and Long (1996), Barron, Berger, and Black (1997), Betcherman, Leckie, and McMullen (1997), Lynch and Black (1998), Holzer and Reaser (1999) and OECD (2003) show that adults with higher education attainment participate more in adult training than those with lower education attainment.<sup>2</sup> Hui and Smith (2004) find that white collar workers tend to get more training in general. Simpson (1984) and Bishop (1991) note that workers with longer job tenure receive more training although Hui and Smith (2004) find weaker evidence on this in Canada. Lillard and Tan (1992) find that disadvantaged groups such as low-income, non-white and part-time workers have lower training incidence.

On the role of firm characteristics, Lillard and Tan (1992) and Turcotte, Leonard and Montmarquette (2002) find that patterns of training vary across industries in both the US and Canada.<sup>3</sup> Barron, Black and Loewenstein (1987), and Holtmann and Idson (1991), Barron, Berger, and Black (1997), Betcherman, Leckie, and McMullen (1997), Lynch and Black (1998), and Holzer and Reaser (1999) show that smaller firms offer less job-related training for the US and Simpson (1984), Jennings (1996), Lin and Tremblay (2003), and Hui and Smith (2004) have the same observation for Canada. Mincer (1983) finds that union membership reduces training incidence in the US but Lynch (1992) and Lillard and Tan (1992) find that US unionized workers are more likely to participate in apprenticeship and on-the-job training. Dustmann and Schönberg (2004) find that union members receive more on-the-job training in Germany. While Simpson (1984) finds that union membership does not affect training incidence and durations in Canada,

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<sup>2</sup> Among OECD countries, Portugal is an exception where adults with middle education attainment have the highest participation rate.

<sup>3</sup> For details see the summary provided in Lin and Tremblay (2003).



Hui and Smith (2004) find that Canadian union members have lower training incidence and that no patterns can be deciphered in terms of training duration.

The WES data are particularly useful for the purpose of our hypothesis testing relative to the other household-based survey data (e.g., the AETS data) because the WES data contain more detailed information on firm characteristics. The two hypotheses (the role of training provision and that of firm structural characteristics) can be readily tested based on the WES data.

### **3. Data Source**

#### *3.1 The WES and Key Variables*

The WES is a firm-based survey conducted by Statistics Canada, which has two target populations, firms and their workers. The firm population is all business locations in Canada with paid workers. The worker population is derived from the Canada Customs and Revenue Agency T-4 supplementary forms of employees working in the selected business locations. The 1999 WES provides the data for 6,322 firms and 23,540 workers. The 2001 WES has the data for 6,223 firms and 20,377 workers. In our statistical analysis, we use the final sampling weights that account for both the multi-level sampling procedure and non-responses.

The WES data exclude private households, religious organizations, employers in public administration, and employers in crop production, animal production, fishing, hunting and trapping. It also excludes Nunavut, Yukon and Northwest Territories.

The use of the WES data has an advantage over the AETS data on which a large part of the existing Canadian literature is based. The WES data link firm characteristics directly to worker attributes in the sampling process so that researchers can analyze jointly the role of firm characteristics and that of worker attributes. In particular, we are able to examine the role of

firms' training provision and that of changes in market competition, organizational changes, and technological innovation.

In the WES data, workplace job-related training takes two different forms: classroom training and on-the-job training. The data contain not only worker attributes such as age, gender, marital status, presence of preschool children, education attainment and so on, but also richer firm characteristics which include, in addition to the usual firm characteristics (firm size, industry, union status), changes in market competition, organizational changes, and technological innovation.

### *3.2 Basic Statistics*

The overall participation rates of employer-sponsored training in 1999 and 2001 are 54.8% and 53.8%, respectively. Provincial variations are large. Quebec has the lowest rates in both years (46.6% in 1999 and 47.6% in 2001) and British Columbia the second lowest participation rates in both years (50.9% in 1999 and 47.6% in 2001). It is helpful to put these Canadian data in some international context. According to Lerman, McKernan, and Riegg (2004), the participation rate for informal workplace training in the US is about 95% of workers in establishments with 50 or more employees based on the 1995 Survey of Employer-provided Training (SEPT). The same survey shows that 70% of workers in the US establishments with 50 or more employees received formal employer-provided training. The 1995 National Household Education Survey (NHES) finds that the incidence rate in the US is about 37% among members of households rather than workers at workplaces.

In the WES data, workplace training participation does not vary much by gender, marital status, and the presence of pre-school children. However, as will be noted later, the presence of pre-school children affects workers' participation in workplace training when all other

determinants are controlled for. Better-educated workers have higher participation rates. As noted later, when all other determinants are controlled for, less schooling is associated with a higher tendency to participate in workplace training. Full-time workers tend to participate more in workplace training than their part-time counterparts do. By occupation, professionals and managers have higher participation rates while production workers and marketing and sales employees have lower participation rates.

By industry, workers in labor-intensive tertiary manufacturing, real estate and rental and leasing services, construction, and retail trade and consumer services participate less in workplace training while those in finance and insurance and communication and other utilities participate more. Workers employed in larger firms participate more in workplace training. Unionized workers also participate more. Employees with higher incomes participate more in workplace training than those with lower incomes do. However, as will be shown later, income loses its significance when all other determinants are controlled for.

The WES data provide insights into how the business environment affects workplace training participation. More specifically, workplace training participation is positively correlated with skill requirements. Workers facing higher skill requirements have much higher training participation rates. Workers in firms with organizational changes have higher participation rates. These changes take various forms in relation to the knowledge-based economy: greater integration, reduction in managerial levels, greater inter-firm research and development, collaboration, re-engineering, and adoption of flexible working hours.

More market competition is correlated with more workplace training. Workers in firms competing with firms beyond local markets or with internationally-owned firms have more

workplace training. Similarly, workers with firms recognizing these competitors have more workplace training.

However informative these observations from the basic statistics may be, they are obtained by examining each determinant in isolation. To identify the net marginal impact of each of firm characteristics and worker attributes, we now turn to econometric modelling where impacts of all determinants are properly controlled for.

#### **4. Determination of Workplace Job-related Training**

##### *4.1 Model and Variable Specification*

We are interested in the determinants of workplace job-related training. Since participation decision can be characterized by a binary variable (taking the value of 1 if a worker participates and the value of 0 otherwise), we use the logit model to analyze training participation. We present the model so that the log of odds ratio is expressed as a linear function of workers attributes and firm characteristics. The log of the odds ratio is a monotonic function of the odds ratio, which, in turn, is a monotonic function of the probability of training participation. This approach permits a straightforward interpretation of the slope parameter estimates in terms of odds ratios. That is, a slope parameter estimate is presented as the estimated net marginal impact of a change in an explanatory variable on the odds ratio for training participation.

The explanatory variables in the WES data are province, metropolitan center, age, gender, marital status, presence of pre-school children, education, job status (full- versus part-time), industry, occupation, job tenure, firm size, union status, and income. These variables are also analyzed by the existing literature based on the AETS data. However, the WES data provide

additional important firm characteristics such as technological complexity, amount of training, availability of training, skill requirements, human resource practices, various forms of organizational changes, innovation, and market competition.

Interpretation of an explanatory variable's contribution to the odds ratio should be made with reference to the baseline case, which is specified as in Table 1. When the contribution to the odds ratio is equal to 1,<sup>4</sup> there is no impact from a change in the associated explanatory variable. When the contribution to the odds ratio is greater (less) than 1, the impact from a change in the associated explanatory variable is positive (negative). The more the value of the contribution deviates from 1, the greater the contribution to the odds ratio will be.

#### *4.2 Empirical Results*

The estimated results for the final specifications of the logit models for 1999 and 2001 are presented in Table 1. In this table we report the estimated net marginal effects of the explanatory variables on the odds ratio of training participation. We proceed with our discussion of these results in turn.

##### *4.2a Effects of Worker Attributes*

Provincial differences are substantial in both 1999 and 2001 when all other determinants are controlled for. The incidence of workplace training in Atlantic Canada and that of Manitoba are not so different from that of the baseline case of British Columbia in 1999. Quebec, however, has the lowest participation rate in 1999. In 2001, Quebec is not so different from British

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<sup>4</sup> When participation and non-participation are equally likely, the probabilities of these two actions are the same (.50%). The odds ratio is therefore  $.50/.50 = 1$ . When the two probabilities are .90 and .10 respectively, the odds ratio  $.90/.10 = 9$ , suggests that participation is more likely. When the two probabilities are .10 and .90 respectively, the odds ratio  $.10/.90 = 1/9$  means that non-participation is more likely.

Columbia but all other regions in Canada have higher marginal participation rates than British Columbia.<sup>5</sup>

Age indeed plays a significantly negative role in workplace training participation. The older the worker gets, the less likely he/she participates in workplace training. Because older workers have fewer years remaining in their working lives, their returns on training investments are expected to decrease with age from both the employer and worker perspectives.

Compared to their comparable female counterparts, male workers participate less in workplace training in 1999 but not so in 2001. Marital status is not a statistically significant determinant for workplace training. When all other determinants are controlled for, the presence of pre-school children clearly lowers the probability that workers participate in workplace training in both 1999 and 2001.

Less education is correlated with more workplace training when all other determinants are controlled for. This finding differs from that in the literature based on the household surveys, from which we note more educated people tend to study more or have more training. But this finding is based on workplace behaviors of firms and their workers and is consistent with the fact that workplace training is driven primarily by the gap between the job functions performed by workers and the education backgrounds of these workers, everything else being equal. Full-time workers have a higher marginal participation rate in workplace training in 1999 but this is not the case in 2001.

Relative to the baseline case of production workers, managers, professionals and technical/trade workers have higher marginal participation rates in workplace training. Job tenure

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<sup>5</sup> This finding for overall training participation is consistent with that in Hui and Smith (2004). According to the detailed statistical analysis of the authors, we note that in Quebec classroom training tends to be higher than that of the baseline case (British Columbia) but on-the-job training tends to be lower than that of the baseline case.

is neutral (in 1999) or statistically insignificant (in 2001). Union membership and wage are also neutral in influencing workplace training.

#### *4.2b Effects of Firm Characteristics*

Now we turn to firm characteristics. Relative to the baseline case of workers in natural resources, workers in finance and insurance have a higher marginal participation rate in workplace training in both 1999 and 2001 while workers in communication and other utility have the highest marginal participation rate only in 2001. Workers in all other industries have lower marginal probabilities of workplace training. Larger firms tend to have higher participation rates in workplace training. This robust finding is consistent with that of Baron, Black, and Loewenstein (1987), Holtmann and Idson (1991), Simpson (1984), Jennings (1996), Lin and Tremblay (2003) and Hui and Smith (2004).

Does firms' provision of workplace training encourage workers' participation in Canada? For this first hypothesis, we note in Table 1 that the net contributions of high training availability to the odds ratio of training participation are 2.06 and 1.97, respectively, in 1999 and 2001. That is, when the availability of the training is high, the workplace training participation will be substantially higher than that of the baseline case. This net impact is also statistically significant in both 1999 and 2001. Clearly, this finding has some implications to firms and their decisions in providing more workplace training to their workers.

How changes in market competition, organizational changes, and technological innovation affect workers' participation in workplace training in Canada? Regarding to this second hypothesis, we also find some important evidence from the WES data. That is, workplace training incidence is indeed positively correlated with international market competition,

organizational changes, and technological innovation. The WES data offer some unique perspectives on this hypothesis.

More competition leads to more workplace training. For example, recognizing the pressure from international competition motivates firms to train more persistently in both 1999 and 2001. This is reflected in Table 1 which shows that the contributions of other international competition to the odds ratio of training participation are 2.18 and 1.40, respectively, in 1999 and 2001. National and local competitions are also important factors influencing workplace training although they are not as persistent.

As shown in Table 1, workplace training is also correlated with a series of organizational changes. Most noticeably, the organizational changes that are positively associated with workplace training are greater integration (in 1999), downsizing (in 2001), less management levels (in 2001), total quality control (1999), and more research and development (1999 and 2001). Research and development activities appear to be one of most important driving forces behind workplace training as the contribution of research and development activities to the odds ratio of training participation is 1.18 in both 1999 and 2001.

Table 1 also illustrates that the contributions of high technological complexity to the odds ratio stand at 1.29 and 1.27, respectively, in 1999 and 2001. This means that when technological complexity is higher, the participation rate in workplace training is higher. The contributions of high skill requirements to the odds ratio are 2.31 and 2.10, respectively, in 1999 and 2001. This shows that the higher skill requirements lead to higher training participation. These findings for Canadian firms are consistent with those found elsewhere.

Overall we have observed some important empirical results that support our two hypotheses. That is, in Canadian firms, the provision of training matters to workers' participation



and increased international market competition, organizational changes, and technological innovation are all positively correlated with workplace training participation.

## **5. Summary and Concluding Remarks**

In this paper, we have empirically investigated how firm characteristics and worker attributes are associated with workplace job-related training using the Canadian WES data. Some of these findings can be of great interest to decision makers of firms and economic policy makers for a region or nation.

We find that workers in Quebec had the lowest workplace training in both 1999 and 2001 than those in other provinces. Workers in British Columbia had the second lowest workplace training in both years.

Among various worker attributes, age is negatively associated with workplace training. Full-time workers participate more in workplace training. Workers with pre-school children participate less in workplace training in both 1999 and 2001. Workers with less schooling participate more in workplace training everything else being equal, as job functions dictate the need for training for those who have less education attainment but must do required work. This firm-survey-based finding is different from the finding based on household surveys where more educated people tend to have more training and/or education at and beyond workplaces. Relative to the baseline case of production worker, managers, professionals and technical/trade workers have higher participation rates in workplace training.

Among various firm characteristics, in addition to industry, firm size, and union status, our empirical results show that the firms' provision of training can lift workers' participation significantly and that increased international competition, organizational changes and

technological innovation are positively associated with workers' participation in workplace training. Organizational changes are embodied in greater integration, downsizing, less management levels, total quality control, and more research and development. Technological innovation is primarily reflected in high complexity of technology and high skill requirements. These new findings are not previously available without using the WED data.

This study also shows where workplace training is lacking. More specifically, lower participation rates occur among workers in some industries (such as labor-intensive manufacturing, construction, retail trade, and real estate), workers in some firms (such as firms with under 20 employees, firms with low technology, firms with little research and development, and firms facing little competition), older workers, workers with pre-school children, part-time workers, and production and marketing/sales workers.

## References

- Acemoglu, Daron and Jörn-Steffen Pischke (1998). "Why Do Firms Train? Theory and Evidence," *Quarterly Journal of Economics*, 113, 79-119.
- Acemoglu, Daron and Jörn-Steffen Pischke (1999a). "Beyond Becker: Training in Imperfect Labor Markets," *Economic Journal*, 109, F112-F142.
- Acemoglu, Daron and Jörn-Steffen Pischke (1999b). "Minimum Wages and On-the-Job Training," NBER Working Paper No. 7184.
- Acemoglu, Daron and Jörn-Steffen Pischke (1999c). "The Structure of Wages and Investment in General Training," *Journal of Political Economy*, 107, pp. 539-572.
- Acemoglu, Daron and Jörn-Steffen Pischke (2000). "Certification of Training and Training Outcomes," *European Economic Review, Papers and Proceedings*, 44, 917-927.
- Altonji, Joseph and James Spletzer (1991). "Worker Characteristics, Job Characteristics, and Receipt of On-the-Job Training," *Industrial and Labor Relations Review*, 45 (1), 58-79.
- Audor, David H. (2001), "Why Do Temporary Firms Provide Free General Skills Training?" *Quarterly Journal of Economics*, 116(4), 1409-1448.
- Barnow, Burt, Linda Giannarelli, and Sharon Long (1996). "Training Provided by Private Sector Employers," The Urban Institute, Washington DC, 1996.
- Barron, John M., Dan A. Black, and Mark A. Loewenstein (1987). "Employer Size: The Implications for Search, Training, Capital Investment, Starting Wages, and Wage Growth," *Journal of Labor Economics*, 5(1), 76-89.
- Barron, John M., Dan A. Black, and Mark A. Loewenstein (1989). "Job Matching and On-the-Job Training," *Journal of Labor Economics*, 7, 1-19.
- Barron, John M., Mark C. Berger, and Dan A. Black (1997). *On-the-Job Training*, W.E. Upjohn Institute for Employment Research, Kalamazoo, Michigan, 1997.
- Bartel, Ann P., and Frank R. Lichtenberg (1987). "The Comparative Advantage of Educated Workers in Implementing New Technology: Some Empirical Evidence," *Review of Economics and Statistics*, 69(1), 1-11.
- Becker, Gary (1975). *Human Capital*, 2nd ed. New York: National Bureau of Economic Research.

- Bishop, John (1991). "On-the-Job Training of New Hires," In David Stern and Jozef Ritzen (eds.), *Market Failure in Training? New Economics Analysis and Evidence on Training of Adult Employees*, Berlin: Springer-Verlag, 61-98.
- Blinder, Alan S. and Yoram Weiss (1976). "Human Capital and Labor Supply: A Synthesis," *Journal of Political Economy*, 84(3), 449-472.
- Bresnahan, Timothy F., Erik Brynjolfsson, and Lorin M. Hitt (2002). "Information Technology, Workplace Organization, and the Demand for Skilled Labor: Firm-Level Evidence," *Quarterly Journal of Economics*, 117, 339-376.
- Díaz-Vázquez, Pilar and Dennis Snower (2003). "On-the-Job Training, Firing Costs and Employment", Mimeo, Universidad de Santiago de Compostela, Departamento de Fundamentos del Análisis Económico, Spain.
- Dustmann, Christian and Uta Schönberg (2004). "Training and Union Wages," IZA Discussion Paper No. 1435, December 2004.
- Government of Canada (2002a). *Achieving Excellence: Investing People, Knowledge and Opportunity*, Ottawa: Industry Canada.
- Government of Canada (2002b). *Knowledge Matter: Skills and Learning for Canadians*, Ottawa: Human Resources Development Canada.
- Greenhalgh, Christine and Mark Stewart (1987). "The Effects and Determinants of Training," *Oxford Bulletin of Economics and Statistics*, 49(2), 171-190.
- Heckman, James and Jeffrey Smith (1999). "The Pre-Program Earnings Dip and the Determinants of Participation in a Social Program: Implications for Simple Program Evaluation Strategies," *Economic Journal*, 109(457), 313-348.
- Holtmann, Alphonse and Todd Idson (1991). "Employer Size and On-the-Job Training Decisions," *Southern Economic Journal*, 58(2), 339-355.
- Holzer, Harry, and Jess Reaser (1999). "Firm-Level Training for Newly Hired Workers: Its Determinants and Effects," *Research in Labor Economics*, 18, 377-402.
- Hui, Shek-wai and Jeffrey Smith (2004). "The Determinants of Participation in Adult Education and Training in Canada," Report Prepared for Human Resources and Development Canada, Ottawa, Canada.
- Javanovic, Boyan (1979). "Job Matching and the Theory of Turnover," *Journal of Political Economy*, 87, 972-990.

- Jennings, Philip. (1996). "Employer-Sponsored Training in Canada: Evidence from the 1994 Adult Education and Training Survey," Working Paper Series, W-96-4E, Applied Research Branch, Strategic Policy, Human Resources Development Canada.
- Knoke, David and Arne L. Kalleberg (1994). "Job Training in U.S. Organizations," *American Sociological Review*, 59(4), 537-546.
- Léonard, André, (2001). "Socio-economic Changes in the Population and Participation in Job-related Training," *Education Quarterly Review*, Vol. 7, No. 4, September, 7-17, Product No. 81-003-XPB in the Statistics Canada Catalogue.
- Lerman, Robert I., Signe-Mary KcKernan, and Stephanie Riegg (2004). "The Scope of Employer-Provided Training in the United States," Chapter 7 in Christopher J. O'Leary, Robert A. Straits, and Stephen A. Wandner (eds.), *Job Training Policy in the United States*, W.E. Upjohn Institute for Employment Research, Kalamazoo, Michigan, 2004, 211-243.
- Lillard, Lee and Hong Tan (1992). "Private Sector Training: Who Gets It and What Are Its Effects?" In Ronald Enrenberg (ed.), *Research in Labor Economics*, Volume 13, Greenwich, CT: JAI Press, 1-62.
- Lin, Zhengxi and Jean-Francois Tremblay (2003). "Employer-Supported Training in Canada: Policy-Research Key Knowledge Gaps and Issues," Ottawa: HRSDC-IC-SSHRC Skills Research Initiative Working Paper 2003 B-01.
- Loewenstein, Mark A. and James R. Spletzer (1998). "Dividing the Costs and Return to General Training," *Journal of Labor Economics* 16, 142-171.
- Lynch, Lisa (1992). "Private-Sector Training and the Earnings of Young Workers," *American Economic Review*, 82(1), 299-312.
- Lynch, Lisa M. and Sandra E. Black (1998). "Beyond the Incidence of Training," *Industrial and Labor Relations Review*, 52(1), 64-81.
- Mincer, Jacob (1983). "Union Effects: Wages, Turnover and Job Training," In J. Reid, Jr. (ed.), *Research in Labor Economics: New Approaches to Labor Unions*, Supplement 2. Greenwich, CT: JAI Press. 217-252.
- Mincer, Jacob (1989). "Human Capital Response to Technological Change in Labor Market," NBER Working Paper No. 3207.
- OECD (2003). *Beyond Rhetoric: Adult Learning Policies and Practices*, Paris, France: OECD Publications Service.
- Polachek, Soloman W. and W. Stanley Siebert (1993). *The Economics of Earnings*, Cambridge and New York: Cambridge University Press.

- Simpson, Wayne (1984). "An Econometric Analysis of Industrial Training in Canada," *Journal of Human Resources*, 19(4), 435-451.
- Stevens, Margaret (1994). "A Theoretical Model of On-the-Job Training with Imperfect Competition," *Oxford Economic Papers*, 46, 537-562.
- Stewart, Mark B. (1983). "On Least Square Estimation When the Dependent Variable Is Grouped," *Review of Economic Studies*, 50(4), 737-753.
- Turcotte, J., A Leonard and C. Montmarquette (2003). "New Evidence on the Determinants of Training in Canadian Business Locations," Ottawa: Statistics Canada and HRDC, *The Evolving Workplace Series*, Catalogue No. 71-584-MIE.
- Weiss, Yoram (1986). "The Determination of Life Cycle Earnings: A Survey," in Ashenfelter and R. Layard (eds.) *Handbook of Labor Economics*, Vol. 1, pp. 603-640, New York: North-Holland.

Table 1 Participation Models: WES Data

WES	1999		2001	
Logistic Regression Models	No. of obs	20662	No. of obs	19398
	LR chi2(42)	703.32	LR chi2(40)	664.35
	Prob > chi2	0.00	Prob > chi2	0.00
	Pseudo R2	0.11	Pseudo R2	0.12
	Log likelihood	-12577.54	Log likelihood	-11693.12
Independent Variable				
Participation	Odds Ratio	p-value	Odds Ratio	p-value
ATLANTIC CANADA			1.42	0.00
QUEBEC	0.82	0.02		
ONTARIO	1.23	0.01	1.40	0.00
ALBERTA	1.54	0.00	1.20	0.10
MANITOBA			1.30	0.05
SASKATCHEWAN	1.35	0.07	1.28	0.10
BRITISH COLUMBIA	Baseline		Baseline	
AGE	0.97	0.00	0.97	0.00
MALE	0.80	0.00		
PRE-SCHOOL CHILDREN	0.79	0.01	0.80	0.08
GRADE 0-10	3.22	0.16		
GRADE 11-13	1.28	0.01	1.38	0.00
SOME PS, PS	1.21	0.00	1.17	0.05
CERTIFICATE/DIPLOMA				
UNIVERSITY	Baseline		Baseline	
FULL-TIME	1.58	0.00		
MANAGERS	1.19	0.13	1.35	0.03
PROFESSIONALS	1.40	0.00	1.57	0.00
TECHNICAL/TRADES			1.24	0.02
PRODUCTION WORKER	Baseline		Baseline	
TENURE	1.00	0.08		
UNION MEMBER	1.17	0.06		
WAGE	1.00	0.08		
LABOR INTENSIVE TERTIARY	0.48	0.00	0.36	0.00
MANUFACTURING				
PRIMARY PRODUCT	0.72	0.00	0.55	0.00
MANUFACTURING				
SECONDARY PRODUCT			0.61	0.00
MANUFACTURING				
CAPITAL INTENSIVE TERTIARY			0.66	0.00
MANUFACTURING				
CONSTRUCTION	0.77	0.05	0.81	0.15
TRANSPORTATION, WAREHOUSING, WHOLESALE			0.78	0.04
COMMUNICATION AND OTHER UTILITIES			2.01	0.00
RETAIL TRADE AND CONSUMER SERVICES	0.81	0.05	0.77	0.06
FINANCE AND INSURANCE	1.88	0.00	1.58	0.01
REAL ESTATE, RENTAL AND LEASING OPERATIONS			0.63	0.01
INFORMATION AND CULTURAL INDUSTRIES	0.76	0.04	0.68	0.01

NATURAL RESOURCES	Baseline			Baseline		
1-19 EMPLOYEES		0.63	0.00		0.69	0.00
20-99 EMPLOYEES		0.88	0.13		0.86	0.06
100-499 EMPLOYEES						
500 EMPLOYEES OR MORE	Baseline			Baseline		
TECH COMPLEXITY HIGH		1.29	0.00		1.27	0.00
TECH COMPLEXITY EQUAL						
TECH COMPLEXITY LOW	Baseline			Baseline		
TRAINING TIME HIGH						
TRAINING TIME EQUAL		1.22	0.00		1.70	0.00
TRAINING TIME LOW	Baseline			Baseline		
AVAIL TRAINING HIGH		2.06	0.00		1.92	0.00
AVAIL TRAINING EQUAL						
AVAIL TRAINING LOW	Baseline			Baseline		
SKILL REQUIRED HIGH		2.31	0.01		2.30	0.00
SKILL REQUIRED EQUAL		1.64	0.14		1.35	0.20
SKILL REQUIRED LOW	Baseline			Baseline		
TRAINING DECISION BY SUPERVISORS		1.19	0.01			
NEW SOFT/HARDWARE					1.27	0.01
GREATER INTEGRATION		1.13	0.12			
DOWNSIZING		0.85	0.04		1.17	0.11
GREATER RELIANCE ON PART-TIME WORKERS		0.82	0.03			
MORE OVERTIME					0.80	0.05
LESS MANAGEMENT LEVELS					1.28	0.06
MORE JOB ROTATION		0.77	0.00			
TOTAL QUALITY CONTROL		1.23	0.01			
GREATER RELIANCE ON EXTERNAL SUPPLIERS		0.86	0.09			
MORE R AND D		1.18	0.06		1.18	0.08
COMPETITION FROM CANADIAN FIRMS		0.69	0.09			
COMPETITION FROM LOCAL FIRMS					0.55	0.01
NO COMPETITION					0.81	0.14
COMPETITION FROM OTHER INTERNATIONAL FIRMS		0.56	0.02			
IMPORTANCE OF CANADIAN COMPETITION		1.53	0.06			
IMPORTANCE OF LOCAL COMPETITION		0.79	0.00		1.47	0.11
IMPORTANCE OF OTHER INTERNATIONAL COMPETITION		2.18	0.00		1.40	0.00

Notes: The models in this table, which are selected on the basis of a model search process, do not include all listed explanatory variables. There are no odds ratio estimates for those excluded explanatory variables.



Appendix Table 1 List of Variables from 1999/2001 WES

KEY VARIABLE OF INTEREST	VARIABLE DESCRIPTION	VARIABLE NAME	
<b>CLASSROOM JOB-RELATED TRAINING</b>	Received classroom training	PARTCLRM	
	Length of first course taken	DURCLRM	
<b>ON-THE-JOB TRAINING</b>	Received on-the-job training	PARTOTJ	
	Time spent on-the-job training	DUROTJ	
<b>REGION</b>	Region	DOM_REG	
	Atlantic	ATLANTIC	
	Québec	QC	
	Ontario	ON	
	Alberta	AB	
	British Columbia	BC	
	Manitoba	MB	
<b>AGE</b>	Saskatchewan	SK	
	Employee birth date	AGE	
	Age groups	AGE_GRP	
	Age group: less than 25	AGELT25	
	Age group: 25-34	AGE25_34	
	Age group: 35-44	AGE35_44	
	Age group: 45-54	AGE45_54	
	Age group: 55-64	AGE55_64	
<b>SEX</b>	Age group: 65 and older	AGEGT64	
	Gender	MALE	
<b>MARITAL STATUS</b>	Marital status	MARRIED	
<b>DEPENDENT CHILDREN</b>	Dependent children	PRESCH	
<b>SCHOOLING</b>	Highest grade of ele. or hs completed	EDUC	
	Schooling: Less than 10 years	GRADE10	
	Schooling: 10-13 years	GRADE13	
	Schooling: Some post-secondary	SOMEPS	
	Schooling: University and above	UNIVER	
	Terms of employment	FULLTIME	
<b>EMPLOYMENT STATUS</b>	WES Industry Aggregation	DOM_IND	
	Forestry, mining, oil, and gas extraction	NATRESRC	
	Labor intensive tertiary manufacturing	MANUL3RD	
	Primary product manufacturing	MANU1ST	
	Secondary product manufacturing	MANU2ND	
	Capital intensive tertiary manufacturing	MANUK3RD	
	Construction	CONSTRUT	
	Transportation, warehousing, wholesale	TRANSWHS	
	Communication and other utilities	COMMUTIL	
	Retail trade and consumer services	RETAIL	
	Finance and insurance	FININSUR	
	Real estate, rental and leasing operations	REALEST	
	Business services	BUSISRV	
	Education and health services	EDHTHSRV	
	Information and cultural industries	INFOSRV	
	<b>OCCUPATION GROUPS</b>	WES occupation group	OCP_GRP
		Managers	MGMT
Professionals		PROF	
Technical/Trades		TECH	
Marketing/Sales		SALES	

	Clerical/Administrative	ADMIN
	Production workers	PRODWKR
<b>JOB TENURE</b>	Number months previously worked for employer	TENURE
	Job tenure groups	TEN_GRP
<b>FIRM SIZE</b>	Size	FIRMSIZE
	1-19 employees	FZ20LS
	20-99 employees	FZ20TO99
	100-499 employees	FZ1HTO5H
	500 employees or more	FZ5HPLS
<b>UNION</b>	Covered by CBA	UNION
<b>INCOME</b>	Wage	WAGE
<b>COMPLEX TECHNOLOGY</b>	Complexity of technology	TECH_COM
<b>CHANGE</b>	Remained about the same	CMLXEQU
	Increased	CMLPXHI
	Decreased	CMLPLXLO
<b>SUBJECTIVE VIEW/ ON TRAINING-</b>	Amount of training	AMTRAIN
<b>MOTIVATION</b>	about right for the demands of the job	AMTTREQU
	too little for the demands of the job	AMTTRLO
	too much for the demands of the job	AMTTRHI
	Not applicable, no training required	AMTTRNND
	Availability of training	AVTRAIN
	increased	AVTRHI
	remained about the same	AVTREQU
	decreased	AVTRLO
	Overall skill requirements	SKILL
	increased	SKILLHI
	remained about the same	SKILLEQU
	decreased	SKILLLO
<b>HUMAN RESOURCE PRACTICE</b>	Training decided by Groups	DSCNBY
	Training decided by non managers	BYCOWKR
	Training decided by work group	BYWKGRP
	Training decided by work supervisor	BYSUPER
	Training decided by manager/owner	BYMGMT
	Training decided by people outside workplace	BYOUTSID
<b>ORGANIZATION CHANGE</b>	Greater integration among different functional areas	INTEGRATE
	Reduction in the number of managerial levels	LESSMGNT
	Greater reliance on job rotation, multi-skilling	ROTATION
	Implementation of total quality management	QUALITY
	Greater reliance on external suppliers of prod./serv.	EXTERNAL
	Greater inter-firm collaboration in R&D, production	RANDD
	Other, specify	OTHER
	Increase in degree of centralization	CENTRALI
	Downsizing	DOWNSID
	Decrease in degree of centralization	DCENTRA
	Greater reliance on temporary workers	TEMPWKR
	Greater reliance on part-time workers	PTWKR
	Re-engineering	REENGINE
	Increase in overtime hours	OVERTIME

	Adoption of flexible working hours	FLXB HOUR
<b>TECHNOLOGY USE - COMPUTER</b>	Implementation of new software application or hardware	NEW_SOFT
<b>TECHNOLOGY USE - OTHER</b>	Implementation of other technologies or machinery	OTH_TECH
<b>TECHNOLOGY</b>	Innovation Types	INOVTYPE
<b>INNOVATION</b>	Innovation: Improved processes	IMPV_PRC
	Innovation: improved products or services	IMPV_PRD
	Importance of innovation	INNOV
	Innovation: new processes	NEW_PRC
	Innovation: new products or services	NEW_PRD
<b>COMPETITION</b>	Competitions with Canadian-owned firms	CMP_CAN
	Competitions with locally-owned firms	CMP_LOC
	No Competition from other firms	CMP_NONE
	Competitions with Other internationally-owned enterprises	CMP_OTH
	Competitions with American-owned firms	CMP_USA
	Level of competition from Canadian-owned firms	LEV_CAN
	Level of competition from locally-owned firms	LEV_LOC
	Level of competition from other internationally-owned firms	LEV_OTH
	Level of competition from American-owned firms	LEV_USA
<b>WEIGHTS</b>	Sampling weights for employees	EMP_FINA

Appendix Table 2 Participation Rates of Employer-sponsored Training:

	1999	2001
	Rate of Participation	Rate of Participation
VARIABLE GROUPS	All Training	All Training
<b>TOTAL</b>	54.78%	53.76%
<b>REGION AND PROVINCE</b>		
ATLANTIC	51.21%	54.25%
QUEBEC	46.60%	47.62%
ONTARIO	59.75%	58.34%
ALBERTA	59.28%	53.34%
BRITISH COLUMBIA	50.90%	47.64%
MANITOBA	56.15%	54.65%
SASKATCHEWAN	60.65%	53.22%
<b>AGE GROUP</b>		
AGE LESS THAN 25	53.44%	55.02%
AGED 25-34	58.45%	59.59%
AGED 35-44	57.35%	53.09%
AGED 45-54	53.48%	51.87%
AGED 55-64	43.55%	40.67%
AGE GREATER THAN 64	25.01%	20.83%
<b>GENDER</b>		
MALE	56.36%	53.49%
FEMALE	53.06%	54.02%
<b>MARITAL STATUS</b>		
MARRIED/COMMON-LAW	54.60%	53.26%
OTHER	55.18%	54.79%
<b>PRESCHOOL CHILDREN</b>		
WITHOUT	54.72%	53.74%
WITH	55.08%	53.86%
<b>EDUCATION</b>		
BELOW HIGH SCHOOL	39.34%	34.47%
HIGH SCHOOL GRADUATES	47.04%	45.54%
SOME UNIVERSITY OR POST SECONDARY	56.16%	56.35%
UNIVERSITY OR ABOVE	63.48%	64.95%
<b>TYPE OF JOB</b>		
FULL-TIME	56.06%	54.39%
PART-TIME	42.71%	46.88%
<b>OCCUPATION</b>		
MANAGERS	60.60%	58.13%
PROFESSIONALS	68.06%	68.19%
TECHNICAL/TRADES	51.45%	51.24%
MARKETING/SALES	43.08%	44.71%
CLERICAL/ADMINISTRATIVE	54.83%	51.92%
PRODUCTION WORKERS	44.63%	41.54%
<b>JOB TENURE</b>		
1-12 MONTHS	54.49%	53.59%
1-5 YEARS	58.87%	57.50%
6-10 YEARS	63.08%	51.24%

11-20 YEARS	60.83%	50.15%
<b>UNION MEMBERSHIP</b>		
YES	58.29%	58.18%
NO	53.42%	52.03%
<b>INCOME</b>		
UNDER 15,000	48.68%	47.67%
15,000-19,999	58.34%	52.88%
20,000-29,999	58.12%	44.67%
30,000-39,999	60.08%	60.93%
40,000-49,999	64.86%	66.25%
50,000 OR MORE	67.64%	66.91%
<b>INDUSTRY</b>		
FORESTRY, MINING, OIL, AND GAS EXTRACTION	61.94%	59.91%
LABOR INTENSIVE TERTIARY MANUFACTURING PRIMARY PRODUCT MANUFACTURING	38.45%	35.00%
SECONDARY PRODUCT MANUFACTURING	52.64%	47.67%
CAPITAL INTENSIVE TERTIARY MANUFACTURING CONSTRUCTION	59.30%	52.19%
CONSTRUCTION	61.41%	55.04%
TRANSPORTATION, WAREHOUSING, WHOLESALE	43.08%	43.28%
COMMUNICATION AND OTHER UTILITIES	55.43%	50.27%
RETAIL TRADE AND CONSUMER SERVICES	66.01%	73.55%
FINANCE AND INSURANCE	45.33%	44.99%
REAL ESTATE, RENTAL AND LEASING OPERATIONS	75.39%	75.97%
BUSINESS SERVICES	43.46%	40.14%
EDUCATION AND HEALTH SERVICES	58.61%	61.49%
INFORMATION AND CULTURAL INDUSTRIES	61.39%	62.76%
<b>FIRM SIZE</b>		
LESS THAN 20 EMPLOYEES	56.05%	55.36%
20 TO 99 EMPLOYEES	43.62%	43.43%
100 TO 499 EMPLOYEES	54.46%	52.32%
500 EMPLOYEES OR OVER	61.47%	58.20%
<b>COMPLEXITY OF TECHNOLOGY</b>		
REMAINED ABOUT THE SAME	65.76%	66.62%
INCREASED	46.31%	46.07%
DECREASED	62.53%	62.88%
<b>AMOUNT OF TRAINING</b>		
ABOUT RIGHT	50.29%	39.85%
TOO LITTLE	54.93%	57.72%
TOO MUCH	54.28%	56.97%
<b>AVAILABILITY OF</b>		
	57.16%	41.33%

<b>TRAINING</b>		
INCREASED	71.24%	70.62%
REMAINED ABOUT THE SAME	45.83%	45.02%
DECREASED	52.05%	50.98%
<b>OVERALL SKILL REQUIREMENTS</b>		
INCREASED	63.99%	64.17%
REMAINED ABOUT THE SAME	44.63%	43.71%
DECREASED	36.81%	34.48%
<b>TRAINING DECISION MARKERS</b>		
BY NON MANAGERS	43.67%	45.14%
BY WORK GROUP	56.67%	61.03%
BY WORK SUPERVISOR	58.49%	55.57%
BY MANAGER/OWNER	54.90%	52.86%
<b>TYPES OF INNOVATION</b>		
NEW PROCESSES	62.59%	60.34%
NEW PRODUCTS OR SERVICES	58.15%	58.05%
<b>ORGANIZATION CHANGE</b>		
NO GREATER INTEGRATION	50.82%	51.01%
GREATER INTEGRATION	63.67%	63.19%
NO REDUCTION IN MANAGERIAL LEVELS	53.61%	53.06%
REDUCTION IN MANAGERIAL LEVELS	62.75%	64.63%
NO GREATER RELIANCE ON JOB ROTATION	53.85%	52.91%
GREATER RELIANCE ON JOB ROTATION	57.28%	57.42%
NO TOTAL QUALITY MANAGEMENT	53.01%	52.58%
TOTAL QUALITY MANAGEMENT	61.10%	60.49%
NO GREATER RELIANCE ON EXTERNAL SUPPLIERS	54.41%	53.41%
GREATER RELIANCE ON EXTERNAL SUPPLIERS	56.41%	56.62%
NO GREATER INTER-FIRM COLLABORATION IN R&D	52.73%	52.26%
GREATER INTER-FIRM COLLABORATION IN R&D	62.98%	64.45%
NO INCREASE IN DEGREE OF CENTRALIZATION	53.11%	51.73%
INCREASE IN DEGREE OF CENTRALIZATION	62.36%	65.61%
NO DOWNSIZING	54.22%	52.49%
DOWNSIZING	57.06%	61.27%
NO DECREASE IN DEGREE OF CENTRALIZATION	53.61%	53.38%
DECREASE IN DEGREE OF CENTRALIZATION	63.34%	58.51%
NO GREATER RELIANCE ON TEMPORARY WORKERS	54.33%	53.17%

GREATER RELIANCE ON TEMPORARY WORKERS	58.81%	59.51%
NO GREATER RELIANCE ON PART-TIME WORKERS	54.78%	53.52%
GREATER RELIANCE ON PART-TIME WORKERS	54.78%	55.80%
NO RE-ENGINEERING	49.64%	49.45%
RE-ENGINEERING	61.71%	62.52%
NO INCREASE IN OVERTIME HOURS	53.78%	52.56%
INCREASE IN OVERTIME HOURS	59.24%	60.08%
NO FLEXIBLE WORKING HOURS	54.43%	52.78%
ADOPTION OF FLEXIBLE WORKING HOURS	56.35%	60.64%
<b>NEW</b>		
<b>COMPUTER/TECHNOLOGY</b>		
NO NEW SOFTWARE APPLICATION OR HARDWARE	55.49%	52.49%
NEW SOFTWARE APPLICATION OR HARDWARE	59.48%	63.94%
NO OTHER TECHNOLOGIES OR MACHINERY	54.71%	53.68%
OTHER TECHNOLOGIES OR MACHINERY	55.73%	55.16%
<b>COMPETITION</b>		
NOT WITH CANADIAN-OWNED FIRMS	53.70%	53.00%
WITH CANADIAN-OWNED FIRMS	55.96%	54.69%
NOT WITH LOCALLY-OWNED FIRMS	60.67%	60.17%
WITH LOCALLY-OWNED FIRMS	51.03%	49.07%
WITH ANY OTHER FIRMS	55.15%	54.21%
WITHOUT ANY OTHER FIRMS	49.45%	45.68%
NOT WITH INTERNATIONALLY-OWNED FIRMS	53.03%	51.17%
WITH INTERNATIONALLY-OWNED FIRMS	60.67%	62.79%
NOT WITH AMERICAN-OWNED FIRMS	53.13%	51.83%
WITH AMERICAN-OWNED FIRMS	57.69%	57.43%
<b>IMPORTANCE OF COMPETITION</b>		
COMPETITION FROM CANADIAN-OWNED FIRMS NOT IMPORTANT	53.47%	52.74%
COMPETITION FROM CANADIAN-OWNED FIRMS IMPORTANT	56.31%	55.13%
COMPETITION FROM LOCALLY-OWNED FIRMS NOT IMPORTANT	60.24%	58.96%
COMPETITION FROM LOCALLY-OWNED FIRMS IMPORTANT	50.79%	49.53%

COMPETITION FROM INTERNATIONALLY-OWNED FIRMS NOT IMPORTANT	52.77%	51.20%
COMPETITION FROM INTERNATIONALLY-OWNED FIRMS IMPORTANT	62.51%	63.23%
COMPETITION FROM AMERICAN-OWNED FIRMS NOT IMPORTANT	53.03%	51.64%
COMPETITION FROM AMERICAN-OWNED FIRMS IMPORTANT	58.12%	57.97%

Note: The participation rates are for employer-funded courses training and on-the-job training at work places.