Firm Size and Employer-Sponsored Training in Australia

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Abstract

This study examines the relationship between employer size and job training. Data from the 2001 wave of the Australian Bureau of Statistics' Survey of Education and Training were used to estimate the probability that workers would receive employer-sponsored in-house, external, and/or on-the-job training. The results show an increasing probability of in-house training as employer size increases, while workers employed in the smallest firms are more likely to receive external rather than in-house training. Findings also show that workers—especially unionized workers—in larger firms are substantially more likely to receive on-the-job training than workers in smaller firms.

Introduction

Rapidly evolving technological change and increased competition have stimulated discussion about how firms address skill formation among their workers. Even though it is clear that employer-sponsored training plays a significant role in the larger effort to invest in an economy's human capital formation, research on the incidence and determinants of training remains deficient, often because of the lack of appropriate and consistent data. Fortunately, the Australian Bureau of Statistics (ABS) provides a rich and consistent source of information on job training with its Survey of Education and Training (SET), a quadrennial survey of a large random sample of working-aged Australians.

The present study focuses on the relationship between firm size and employer-financed training, which consists of in-house training, external training courses paid for by the employer, and on-the-job training. Although a substantial literature exists assessing the differences in the incidence of training based on gender, educational attainment, and union status, fewer studies have focused on size-training effects. The results reported here indicate that the difference in the incidence and intensity of training between small and large firms significantly outstrips differences based on gender, educational attainment, or union status.

Previous Research

Research has clearly shown that an employer's size affects labor market outcomes such as wages, fringe benefits, and turnover (Brown and Medoff 1989, Oi and Idson 1999, Troske 1999). Studies from the United Kingdom and United States have also documented the relationship between firm size and training, although the findings are often in the context of assessing other determinants of training such as gender, educational attainment, or union status. For example, using individual level data from the British Social Attitudes Survey of 1987, Booth (1991) finds that female workers in Britain employed in larger firms were more likely to train. Although the size effect was positive for male workers, it was not statistically significant. Green, Machin and Wilkinson (1999) reported similar results from their analysis of firm-level data in Employers' Manpower and Skills Practices Survey, finding a statistically significant higher probability of training in firms with over 25 employees.

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Lynch and Black (1998) conducted research on the incidence of training based on U.S. establishment-level data from 1991. They found that even after controlling for an extensive array of worker- and firm-level characteristics, large firms were more likely to provide formal training programs than small firms. Their results also indicate that firms that adopt high-performance work practices, that are capital-intensive, and that hire more educated work forces are more likely to train, regardless of size. Similarly, using a combined individual- and establishment-level dataset on the United States from 1995, Frazis, Gittleman, and Joyce (2000) also report a positive size-training effect. Their findings show that 70 percent of firms of 50 or more employees offered their workers some kind of formal training. They also found a positive correlation between size and incidence of training among employees when the question was whether workers had *ever* received training from the firm. When the time frame for receiving training was confined to the previous 12 months, however, the size effect did not reach statistical significance.

Several other studies focused more directly on the size-training effect. For example, Barron, Black and Loewenstein (1987) suggest that larger employers face higher monitoring costs, which makes it difficult to ascertain the productive capability of their workers. Along with higher wages and capital–labor ratios, firms respond to the monitoring problem by devoting more resources to training. Using data gathered from a random sample of employers in the United States, which observed wages, hiring activities, and training activities prior to August 1981, they found that, compared to small firms, large firms were more likely to train newly hired workers by 1) having employees observe co-workers doing the job during the first three months of employment, 2) offering new workers formal training, 3) training workers directly using management and supervisory personnel, 4) training new workers using nonsupervisory co-workers, and 5) providing job orientation.

Other explanations are also consistent with a positive correlation between employer size and the incidence training. For example, Oi and Idson (1999) argue that, compared to smaller firms, larger firms adopt technological improvements at a faster rate, set higher effort standards, and have higher rates of labor productivity. They also argue that such firms are likely to recruit, train, and retain more highly skilled workers than their smaller counterparts. In a similar vein, Troske (1999) finds evidence supporting the capital-skilled worker complementarity hypothesis to explain why larger firms pay workers higher wages than smaller firms. This hypothesis holds that capital and skill are complements in production, and thus that larger, capital-intensive firms are more likely to employ more highly skilled workers. Troske conjectures that firm-sponsored training likely produces some of the higher skill levels observed among workers in larger firms. Such an expectation, however, was not tested because of the lack of appropriate data.

Holtmann and Idson (1991) also found that larger firms are more likely to train than smaller firms, but they argue that a more tolerant attitude toward risk on the part of larger firms may underlie the higher incidence of training. They present empirical evidence based on data from the United States that larger firms are more likely to train workers who may be seen as more risky, such as female workers and those with less formal education. Female workers, for example, could be considered more risky because of higher turnover rates, and less educated workers more risky because of a higher probability that training will fail to impart the intended skills.

In another interesting theoretical treatment relevant to the size-training question, Booth, Francesconi, and Zoega (2002) suggest that unions in oligopsonistic firms increase the incidence of training in firms. The increased training occurs either through negotiating for higher levels of general training or by raising relative wages. A reduced turnover rate lowers the risk of firms' losing investment in general training and provides them with more incentive to train. To the extent that it is reasonable to expect more oligopsony power in larger firms, one may expect a positive relationship between firm size, unionism, and training.[1]

Several papers have examined the determinants of training using data from the SET; however, to my knowledge, only Baker and Wooden (1992), Miller (1994), Wooden (1996), and Wooden and VandenHuevel (1997) address size-training effects.[2] Baker and Wooden (1992) and Miller (1994) used the 1989 SET to assess training differentials between males and females, and, using firm size as a control variable, found that larger firms were significantly more likely to offer structured training than their smaller counterparts. Similarly, Wooden (1996), using the 1993 SET, found that larger firms were substantially more likely to provide structured in-house training than smaller firms. He also found that the relationship between size and

employer-sponsored in-house training was substantially weaker, with medium-sized firms being more likely to train.

Besides providing updated estimates of the size-training effect, the present study provides two additional contributions to the literature. First, the SET data from 2001 differ from the previous releases based on the specificity of the employer size variable. The 1989, 1993, and 1997 releases defined the largest employer size category as "100 or more" employees, which significantly blurs important differences among smaller "large" employers (those with closer to 100 workers) and larger "large" employers (those with more than 1,000 workers). The more recent data from 2001 add three additional size categories (100–499, 500–999, and 1000 or more employees). Thus an updated estimate of the size-training effect with newer data allows for a more nuanced analysis of the size-training effect. Second, unlike previous research, this study addresses interactions between size-training effects and other characteristics such as gender, low educational attainment, and unionism according to the analyses in Holtmann and Idson (1991) and Booth, Francesconi, and Zoega (2002).

Discussion of the Data

The data originate from the 2001 wave of the ABS's SET. The SET is composed of observations from a random sample of Australian households, which were asked questions relating to their training on the job, other human capital investments, the size of employers, and other variables generally controlled for in labor market analyses. The sampling frames consist of individuals of working age, defined as ages 15 to 64. Sample sizes of male and female workers are 7,902 and 7,807, respectively. The final samples are further limited to respondents who were working for their main period employer, who had been with that employer for at least a year, who were not self-employed or working for a self-owned business, who were between the ages of 15 and 64, and who were not full-time students.[3] In addition, because the training questions ask about training during the previous year, only respondents who reported employment with their firm for one year or more were included in the final sample. This exclusion increases the likelihood that workers report training only for the firm in which they are currently employed. After the exclusions, the final samples contain 4,896 males and 4,448 females.

Proportions of workers engaging in three types of training are located in Table 1. The variable "in-house training" observes whether the respondent reports at least one in-house training course during the last 12 months. Such training consists of formal training courses conducted by either the employer or a consultant hired by the employer. The results in Table 1 show a clear positive correlation between size of the firm and the incidence of internal training courses. These results from 2001 are similar to Wooden's (1996) findings using SET data from 1993 for the smaller firms. The larger firms in Wooden's study trained 42.8 percent of workers. The 2001 data in Table 1 exhibit a clearly higher rate of training in the larger size categories, reaching approximately 62 percent for males and females among firms employing 1,000 workers or more.[4] Summary statistics of all variables are found in Appendix Table 1.

Another training variable, "external training," measures the proportion of workers who completed at least one employer-financed external training course in the previous 12 months. Table 1 reveals that the rate of external training is similar across size categories. The results on external training exhibit a remarkably consistent proportion of workers who trained across firm size categories, which suggests that there is not necessarily a pattern of workers in smaller firms specializing in external training and workers in larger firms specializing in in-house training. The figures in Table 1 also demonstrate that workers are most likely to receive on-the-job training rather than external or in-house training. This is especially true for those with higher levels of education. Less-educated workers—those with less than year 12 completed—are less likely to have received on-the-job training.

The types of in-house and external training courses are also of interest. The figures in Table 2 refer to the proportion of instances where workers reported a specific type of training during the previous 12 months. For example, 16.7 percent of the 4,140 reported instances of training were in "computing." An individual may report more than one type of training, so "number" in the table refers to the number of training spells, not the number of respondents. The results indicate that training courses in management, professional, technical, and paraprofessional represent more than half of in-house and external training

courses offered. Training in computing and health and safety are also quite common subjects for both in-house and external courses.

TABLE 1
Proportion of Workers Reporting Employer-Sponsored Training During Past 12 Months by Employer Size, Training Type, and Gender

	In-house training[1]		External training[2]		On-the-job training[3]	
	Male	Female	Male	Female	Male	Female
<10 employees	0.070	0.107	0.138	0.158	0.676	0.670
10–19 employees	0.161	0.238	0.161	0.194	0.708	0.734
20–99 employees	0.286	0.335	0.177	0.186	0.731	0.780
100–499 employees	0.441	0.472	0.202	0.218	0.772	0.765
500–999 employees	0.511	0.531	0.200	0.159	0.807	0.796
>1,000 employees	0.615	0.627	0.144	0.126	0.809	0.832
	Union	Nonunion	Union	Nonunion	Union	Nonunion
<10 employees	0.118	0.084	0.169	0.145	0.560	0.682
10–19 employees	0.341	0.178	0.147	0.182	0.730	0.720
20–99 employees	0.442	0.270	0.224	0.169	0.753	0.755
100–499 employees	0.499	0.432	0.201	0.212	0.724	0.791
500–999 employees	0.558	0.501	0.186	0.180	0.755	0.824
>1,000 employees	0.631	0.612	0.114	0.154	0.796	0.841
	Higher education[4]	Lower education	Higher education	Lower education	Higher education	Lower education
<10 employees	0.100	0.066	0.167	0.116	0.752	0.552
10–19 employees	0.236	0.132	0.201	0.132	0.776	0.616
20–99 employees	0.327	0.273	0.206	0.129	0.824	0.609
100–499 employees	0.489	0.367	0.244	0.123	0.818	0.648
500–999 employees	0.548	0.441	0.206	0.115	0.828	0.728
>1,000 employees	0.655	0.527	0.156	0.079	0.874	0.671

Source: The data used to generate the estimates were obtained from the Survey of Education and Training, Australian Bureau of Statistics, 2001. Excluded are respondents with no earnings, the self-employed, those who did not know their employer size, students, and those who have been with their employers for less than one year. The sample consists of 4,896 males and 4,498 females.

[1] Consists of formal training courses conducted by the employer or a consultant.

[2] Consists of formal training courses supported financially by the employer that are conducted by training or educational establishments.

[3] Consists of less-structured training activities that occur on the job, such as watching others work, asking questions of co-workers, and learning by doing.

[4] "Higher education" refers to workers with year 12 or more.

Empirical Model and Estimation Results

By estimating a model of the determinants of training while controlling other variables besides employer size, it is possible to get a more complete view of the decision to train. The empirical strategy is to

TABLE 2
Distribution of Training Spells by Category of Training

	In-house	External
Clerical	0.060	0.048
Computing	0.167	0.167
English, literacy, numeracy	0.023	0.014
Health and safety	0.284	0.153
Induction	0.045	0.018
Labouring	0.020	0.004
Management professional	0.349	0.415
Music	0.005	0.003
Sales, personal service	0.119	0.056
Supervision	0.048	0.029
Trade and craft	0.076	0.084
Technical, paraprofessional	0.164	0.160
Transport, machinery operation	0.049	0.036
Number	4,140	1,563

Source: Survey of Education and Training, 2001, Australian Bureau of Statistics. Excluded are respondents with no earnings, the self-employed, students, and those who have been with their employers for less than one year.

estimate the probability of training (P) using a maximum likelihood probit procedure according to the following:

$$P = a + \beta\,(Employer\ Size) + \delta X + \varepsilon,$$

where P represents the probability of training in the previous 12 months, "employer size" represents a vector of size dummy variables that control for employer size, X is a vector of other variables that may affect the probability of training, β and δ are vectors of parameters to be estimated, and ε is a random error term.

The first probit model estimates the probability that a worker will engage in at least one in-house training course during the previous 12 months, specifically controlling for employer size using a firm-size measure that defines size as the number of employees across all the establishments located in Australia. The equations were estimated separately for males and females. The second and third models estimate the probability of external and on-the-job training, again separately for male and female workers. The parameter estimates in Table 3 are presented as marginal effects with "fewer than 10 workers" being the omitted firm-size category.[5] The results in Table 3 reinforce the summary statistics in Table 1, exhibiting a clearly increasing probability of internal training as the size of the firm increases, even after controlling for other factors that may have affected the incidence of training. As marginal effects, the estimate on "1000 + Empl" has the following definition: everything else equal, a male worker in a firm with more than 1,000 employees is 52.9 percent more likely to have had a training course sponsored by the firm in the last 12 months than a worker in a firm with fewer than ten workers. The biggest jump (17.1 percentage points) occurs for males when moving from very small firms (fewer than ten workers) to small firms (10 to 19 workers). The results also indicate that females are slightly less likely than males to receive on-the-job training in larger firms.

Compared to the results on in-house training, the results on external and on-the-job training exhibit much less variation by firm size. Notably male workers in the largest firms and female workers in firms with 100 workers or more are somewhat less likely to obtain external training than workers in the smallest firms. Larger firms no doubt experience economies of scale in conducting their own in-house training compared to

TABLE 3
The Impact of Firm Size on the Probability of Training in the Last 12 Months (Marginal Effects; Absolute Value of Asymptotic z Statistic in Parentheses)

	In-house training[1]				External training				On-the-job training			
	Male		Female		Male		Female		Male		Female	
Employees	Coeff	z stat	Coeff	z stat	Coeff	z stat	Coeff	z stat	Coeff	z stat	Coeff	z stat
10–19[2,3]	0.171	(4.02)	0.159	(4.15)	0.006	(0.26)	-0.002	(0.09)	0.016	(0.66)	0.025	(1.17)
20–99	0.309	(9.55)	0.269	(8.46)	0.002	(0.10)	-0.025	(1.45)	0.019	(0.97)	0.051	(2.85)
100–499	0.426	(14.89)	0.361	(12.22)	0.013	(0.63)	-0.037	(2.21)	0.055	(2.87)	0.006	(0.28)
500–999	0.452	(15.72)	0.392	(12.79)	0.002	(0.10)	-0.079	(5.34)	0.065	(2.88)	0.039	(1.52)
>1,000	0.529	(20.67)	0.458	(17.34)	0.051	(2.86)	-0.118	(7.07)	0.063	(3.26)	0.063	(3.32)

Source: The data used to generate the estimates were obtained from the Survey of Education and Training, 2001 gathered by the Australian Bureau of Statistics. Excluded are respondents with no earnings, the self employed, those who did not know their employer size, students, and those who have been with their employers for less than one year.
[1] Independent variables are defined as the probability that a worker reported at least one internal training course, external training course, or engaged in on-the-job training in the last 12 months.
[2] The control for employer size is the number of employees in all the employers' establishments throughout Australia.
[3] The probit equation controls for age, tenure with employer, and tenure in occupation and their squares. It also controls for education, casual employment, public sector employment, marital status, part-time, English speaking ability, region of residence, occupation, and industry of employment.

smaller firms. The results also suggest a slightly higher propensity of larger firms to train workers on the job compared to smaller firms. Overall, the clear advantage in in-house training coupled with the slight disadvantage of external and small advantage in on-the-job training suggests that workers in larger firms are more likely to train compared to workers in smaller firms.

I next turn to a test of whether larger employers are more likely to offer training to workers that may, because of turnover propensities, be more or less risky. As indicated above, Holtmann and Idson (1991) suggest that female workers and those with low education may be more likely to train in larger firms because of their relative lack of risk aversion. Also, as discussed earlier, Booth, Francesconi, and Zoega (2002) suggest that unions may increase the incidence of training, especially in larger, more oligopsonistic firms. To test such hypotheses, I pool data on male and female workers then uses a female dummy along with a vector of female*firm size interactions to control for differences in training propensities of female workers along the size spectrum. A similar procedure is used to determine whether low levels of education (less than year 12) and union membership exert different degrees of influence on training across the size spectrum. Thus the following model is estimated:

$$P = a + \beta_1 (Employer\ Size) + \beta_2 (Female) + \beta_3 (Female*Employer\ Size) + \beta_4 (Union) + \beta_5 (Union*Employer\ Size) + \beta_6 (Low\ Education) + \beta_7 (Low\ Education*Employer\ Size) + \delta X + \varepsilon$$

The results in Table 4 show that very small firms may be slightly more likely to provide in-house and external training to female workers. There is no difference by sex in on-the-job training. Generally speaking, the female advantage in external training disappears in larger firms. Indeed, in the largest two size categories females are between 5 and 6 percent less likely to train than males. These results differ from Holtmann and Idson (1991) who use U.S. data from 1972–73 to find that larger establishments appear to be more likely to train female workers.

Turning to results on firm size and low education, one finds that very small firms are substantially less likely to offer in-house training to less-educated workers, but once firm size increases to more than 10 employees, the difference in training propensity by education level is negligible. There appears to be no statistically significant relationship between firm size, low educational attainment, and the incidence of external training. The results also show that moderately large firms (from 100 to 999 employees) are more likely to offer on-the-job training to less educated workers than firms in other size categories.

TABLE 4
The Impact of Firm Size on the Probability of Internal Training in the Last 12 Months, Including Interactions (Marginal Effects)

	In-house training[1]		External training		On-the-job training	
	Coeffi-cient	z statistic[3]	Coeffi-cient	z statistic	Coeffi-cient	z statistic
10–19 employees[2]	0.151	(3.18)	-0.002	(0.09)	-0.016	(0.55)
20–99 employees	0.265	(7.18)	-0.019	(0.95)	-0.004	(0.16)
100–499 employees	0.409	(13.06)	0.004	(0.19)	0.028	(1.21)
500–999 employees	0.423	(12.88)	-0.004	(0.15)	0.035	(1.17)
>1,000 employees	0.536	(19.52)	-0.058	(3.11)	0.045	(2.17)
Female = 1	0.070	(1.76)	0.046	(2.16)	-0.019	(0.84)
Female* (10–19 employees)	0.007	(0.12)	0.002	(0.07)	0.021	(0.67)
Female* (20–99 employees)	-0.028	(0.59)	-0.015	(0.61)	0.049	(2.02)
Female* (100–499 employees)	-0.039	(0.83)	-0.031	(1.31)	-0.043	(1.23)
Female* (500–999 employees)	-0.022	(0.39)	-0.066	(2.93)	-0.023	(0.53)
Female* (>1,000 employees)	-0.062	(1.52)	-0.050	(2.51)	0.015	(0.61)
Union member = 1	0.055	(0.79)	-0.016	(0.43)	-0.109	(2.51)
Union member* (10–19 employees)	0.155	(1.73)	-0.001	(0.01)	0.101	(3.19)
Union member* (20–99 employees)	0.097	(1.26)	0.047	(0.92)	0.085	(2.80)
Union member* (100–499 employees)	0.034	(0.45)	0.004	(0.10)	0.062	(1.77)
Union member* (500–999 employees)	0.026	(0.31)	0.002	(0.05)	0.061	(1.55)
Union member* (>1,000 employees)	-0.031	(0.44)	-0.003	(0.08)	0.092	(2.90)
Less than year 12 (low education) = 1	-0.147	(2.03)	-0.004	(0.08)	-0.041	(0.89)
Low education* (10–19 employees)	-0.045	(0.74)	0.008	(0.24)	0.026	(0.82)
Low education* (20–99 employees)	0.046	(0.91)	0.016	(0.52)	0.010	(0.36)
Low education* (100–499 employees)	-0.023	(0.46)	-0.013	(0.47)	0.052	(2.05)
Low education* (500–999 employees)	0.005	(0.08)	-0.028	(0.78)	0.071	(2.40)
Low education* (>1,000 employees)	-0.021	(0.50)	0.000	(0.01)	-0.007	(0.27)

Source: The data used to generate the estimates were obtained from the Survey of Education and Training, 2001, gathered by the Australian Bureau of Statistics. Excluded are respondents with no earnings, the self-employed, those who did not know their employer size, students, and those who have been with their employers for less than one year.

[1] Independent variables are defined as the probability that a worker reported at least one internal training course, one external training course, or on-the-job training in the last 12 months.

[2] The control for employer size is the number of employees in all the employers' establishments throughout Australia.

[3] Absolute value of asymptotic z statistics are in parentheses.

The results on training propensity of union members by firm size show that there is no statistically distinguishable relationship between union membership, size, and either in-house or external training. The action is all located in on-the job training. Very small firms are significantly less likely to train union members compared to all the other size categories, the estimates on which are all positive and either statistically significant or nearly so.

Intensity of Training

One problem with a probit model in this context is that it just measures the incidence of training without measuring differences in intensity. For example, it may be that while male and female workers receive training at similar rates, male workers receive more intense, or substantially more hours of training. Fortunately, the SET asks trainees to report how many hours during the previous year they engaged in in-house or external training. Table 5 contains descriptive statistics of training hours for in-house and external training variables. For those receiving training (2,092 male and 2,048 female respondents), the average amount was 36.8 hours and 24.2 hours for males and females respectively. The intensity of training grows as firm size increases, and males in the largest firms have significantly higher rates of training than females.

TABLE 5
Descriptive Statistics of Hours of In-House and External Training

	Male			Female		
In-house	Mean[1]	Standard deviation	Number	Mean	Standard deviation	Number
<10 employees	17.0	(23.5)	57	14.7	(20.7)	74
10–19 employees	17.0	(16.3)	61	16.6	(19.8)	92
20–99 employees	20.0	(26.4)	216	18.5	(50.3)	262
100–499 employees	26.0	(32.7)	326	20.1	(28.6)	266
500–999 employees	30.3	(34.9)	171	24.0	(35.1)	142
>1,000 employees	45.1	(91.7)	1,261	27.8	(43.4)	1,212
Total	36.8		2,092	24.4		2,048
	Male			Female		
External	Mean[1]	Standard deviation	Number	Mean	Standard deviation	Number
<10 employees	36.7	(103.9)	103	21.5	(33.8)	103
10–19 employees	34.0	(57.3)	59	21.7	(18.9)	77
20–99 employees	28.9	(61.0)	136	22.5	(27.0)	146
100–499 employees	31.0	(38.6)	158	29.9	(46.1)	123
500–999 employees	32.6	(33.0)	70	21.7	(31.9)	40
>1,000 employees	33.2	(40.2)	299	28.1	(41.0)	249
Total	32.5		825	25.4		738

Source: The data used to generate the estimates were obtained from the Survey of Education and Training, Australian Bureau of Statistics, 2001. Excluded are respondents with no earnings, the self-employed, those who did not know their employer size, students, and those who have been with their employers for less than one year. The sample consists of 4,896 males and 4,498 females.

[1]Mean hours of training for those reporting training.

The following is estimated once for in-house and once for external training as a maximum likelihood tobit model:

$$Hours\ of\ Training = a + \beta_1\ (Employer\ Size) + \beta_2\ (Female) + \beta_3\ (Female*Employer\ Size) + \beta_4\ (Union) + \beta_5\ (Union*Employer\ Size) + \beta_6\ (Low\ Education) + \beta_7\ (Low\ Education*Employer\ Size) + \delta X + \varepsilon$$

The findings located in Table 6 suggest that females in very small firms have an advantage over males in terms of hours of in-house training. However, hours of in-house and external training are significantly lower among females in the largest firms (and the second-to-largest firms for external training). The tobit results thus are similar to the probit results for external training. The findings on union members and the less educated are also similar to the probit results (with the exception of in-house training among union members in very small firms). That is, there is no statistically significant difference in training hours of union members and nonmembers or less-educated and more educated workers across the firm-size spectrum.

TABLE 6
The Impact of Firm Size on the Hours of Training in the Last 12 Months: Tobit Model

	In-house training[1]		External training	
	Coefficient	z statistic[3]	Coefficient	z statistic
10–19 employees[2]	27.101	(3.34)	2.041	(0.22)
20–99 employees	44.965	(6.74)	–5.974	(0.81)
100–499 employees	72.584	(10.82)	0.431	(0.06)
500–999 employees	75.290	(10.12)	–0.493	(0.06)
>1,000 employees	104.432	(16.86)	–14.226	(2.03)
Female = 1	15.329	(2.24)	10.080	(1.64)
Female* (10–19 employees)	–1.095	(0.12)	–2.698	(0.27)
Female* (20–99 employees)	–5.519	(0.69)	–3.995	(0.50)
Female* (100–499 employees)	–12.914	(1.67)	–6.576	(0.82)
Female* (500–999 employees)	–8.558	(0.99)	–23.303	(2.29)
Female* (over 1,000 employees)	–24.026	(3.37)	–14.566	(2.10)
Union member = 1	7.768	(0.68)	–8.042	(0.77)
Union member* (10 to 19 employees)	18.627	(1.33)	4.289	(0.28)
Union member* (20 to 99 employees)	10.626	(0.87)	14.359	(1.22)
Union member* (100–499 employees)	–5.634	(0.46)	2.578	(0.22)
Union member* (500–999 employees)	–6.136	(0.48)	2.856	(0.21)
Union member* (over 1,000 employees)	–14.311	(1.22)	1.625	(0.15)
Less than year 12 (low education) = 1	–17.572	(1.53)	1.767	(0.12)
Low education* (10–19 employees)	–6.460	(0.63)	–0.224	(0.02)
Low education* (20–99 employees)	7.897	(0.95)	2.521	(0.30)
Low education* (100–499 employees)	–0.822	(0.10)	–2.080	(0.23)
Low education* (500–999 employees)	1.965	(0.21)	–10.088	(0.84)
Low education* (>1,000 employees)	–1.392	(0.19)	–4.828	(0.64)

Source: The data used to generate the estimates were obtained from the Survey of Education and Training, 2001, gathered by the Australian Bureau of Statistics. Excluded are respondents with no earnings, the self-employed, those who did not know their employer size, students, and those who have been with their employers for less than one year.

[1] Independent variables are defined as the hours of internal or external training in the last 12 months.

[2] The control for employer size is the number of employees in all the employers' establishments throughout Australia.

[3] Absolute value of asymptotic z statistics are in the parentheses.

Conclusion

The purpose of this study is to further examine the relationship between firm size and training. Using data from a random sample of Australian workers, a clear size–training link is established for in-house training programs. The size–training link for external training and on-the-job training, however, is much smaller and more tenuous. The results also point to a slight advantage in both in-house and external training among females in the smallest firms, which becomes a disadvantage in larger firms among those receiving external training. The most glaring difference in training propensities between males and females occurs in external training among the largest two employment size categories. The results also show that union members have a substantial edge in on-the-job training compared to their nonunion counterparts and that this advantage persists along most of the firm-size spectrum. Low education is mostly unrelated to training across the size spectrum, but less-educated workers do appear to get less in-house training in small firms and more on-the-job training in moderately large firms (those with 100 to 999 workers).

Although much of the research has focused on differences in training by gender or union membership, the results of this study show clearly that firm size is the most important indicator of the incidence and intensity of training. Thus, general policies meant to enhance employer-sponsored job training opportunities in Australia would do well to focus on getting smaller firms to train as often and intensely as larger ones.

Notes

[1] Interestingly, a large majority of workers who received employer-sponsored training (approximately 94 percent) reported that the skills acquired would be useful in other firms.

[2] Miller (1994) used the 1989 SET to assess training differentials between males and females. Although the regression equations contained controls for firm size, that was not explicitly addressed in the analysis.

[3] See Australian Bureau of Statistics (2003) for a detailed description of the SET data.

[4] Wooden (1996) used different exclusion criteria in his study. In particular, he did not exclude workers with less than a year of tenure with the main period employer.

[5] Complete estimation results are available upon request.

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APPENDIX TABLE 1

Summary Statistics of Variables Used in the Analysis

Variables	Male		Female	
	Mean	Standard deviation	Mean	Standard deviation
In-house training	0.415	—	0.446	—
External training	0.161	—	0.159	—
On-the-job training	0.764	—	0.781	—
Age	38.5	11.72	38.797	11.605
Duration with employer	8.6	7.39	7.242	6.242
Duration in occupation	9.9	8.27	9.020	7.758
Education: postgraduate	0.039	—	0.030	—
Education: graduate diploma	0.045	—	0.064	—
Education: bachelor's degree	0.125	—	0.161	—
Education: advanced diploma	0.092	—	0.107	—
Education: certificate III or IV	0.231	—	0.088	—
Education: certificate I or II	0.008	—	0.011	—
Education: other certificate	0.002	—	0.002	—
Education: year 12	0.180	—	0.198	—
Education: year 11	0.064	—	0.078	—
Education: year 10	0.127	—	0.196	—
Education: year 9	0.038	—	0.032	—
Education: year 8 or less	0.036	—	0.023	—
Firm size: <10	0.158	—	0.148	—
Firm size: 10–19	0.074	—	0.086	—
Firm size: 20–99	0.150	—	0.162	—
Firm size: 100–499	0.143	—	0.116	—
Firm size: 500–999	0.062	—	0.057	—

Firm size: >1,000	0.414	—	0.431	—
Casual employment	0.117	—	0.223	—
Union member	0.331	—	0.296	—
Public sector employment	0.218	—	0.289	—
Part-time employment	0.097	—	0.426	—
Married	0.665	—	0.653	—
Disabled	0.219	—	0.194	—
Born in an English-speaking country	0.115	—	0.099	—
Born in a non-English-speaking country	0.138	—	0.126	—
Region: New South Wales	0.337	—	0.335	—
Region: Victoria	0.252	—	0.258	—
Region: Queensland	0.179	—	0.179	—
Region: South Australia	0.078	—	0.074	—
Region: Western Australia	0.101	—	0.102	—
Region: other	0.054	—	0.053	—
Occupation: manager	0.090	—	0.030	—
Occupation: professional	0.187	—	0.261	—
Occupation: prod./transportation	0.138	—	0.026	—
Occupation: elem. clerical	0.060	—	0.133	—
Occupation: labourer	0.079	—	0.065	—
Industry: agriculture	0.025	—	0.007	—
Industry: mining	0.019	—	0.004	—
Industry: manufacturing	0.200	—	0.070	—
Industry: utilities	0.014	—	0.002	—
Industry: construction	0.076	—	0.010	—
Industry: accommodation	0.036	—	0.054	—
Industry: wholesale trade	0.060	—	0.030	—
Industry: retail trade	0.109	—	0.157	—
Industry: transportation	0.067	—	0.027	—
Industry: communication	0.031	—	0.015	—
Industry: finance	0.040	—	0.058	—
Occupation: paraprofessional	0.141	—	0.099	—
Occupation: trade	0.201	—	0.026	—
Occupation: adv. clerical	0.011	—	0.071	—
Occupation: inter. clerical	0.095	—	0.288	—
Occupation: prod./transp.	0.138	—	0.026	—
Occupation: elem. clerical	0.060	—	0.133	—
Occupation: labourer	0.079	—	0.065	—
Industry: agriculture	0.025	—	0.007	—
Industry: mining	0.019	—	0.004	—
Industry: manufacturing	0.200	—	0.070	—
Industry: utilities	0.014	—	0.002	—
Industry: construction	0.076	—	0.010	—

Industry: accommodation	0.036	—	0.054	—
Industry: wholesale trade	0.060	—	0.030	—
Industry: retail trade	0.109	—	0.157	—
Industry: transportation	0.067	—	0.027	—
Industry: communication	0.031	—	0.015	—
Industry: finance	0.040	—	0.058	—
Industry: property	0.092	—	0.099	—
Industry: government	0.072	—	0.058	—
Industry: education	0.059	—	0.152	—
Industry: health	0.038	—	0.194	—
Industry: culture	0.022	—	0.023	—
Industry: personal services	0.040	—	0.039	—
Number of observations	4,896		4,448	

Source: Survey of Education and Training, 2001, Australian Bureau of Statistics. Excluded are respondents with no earnings, the self-employed, those who did not know their employer size, students, and those who have been with their employers for less than one year.