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Men at Work in a Land Down-under

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Abstract

We use new training data from waves 3-6 of the Household, Income and Labour Dynamics in Australia Survey to investigate the training and wages of full-time men. We explore the extent to which the data are consistent with the predictions of human capital theory or with recent alternative theories based on imperfectly competitive labour markets. According to the raw data, most work-related training received by full-time private sector men is general but it is also paid for by employers. Our fixed effects estimates reveal that this training is associated with higher wages in current and in future firms, and that the effect in future firms is larger and more precisely determined. These results are more consistent with the predictions of human capital theory based on imperfectly competitive labour markets than with the alternative of perfect competition.

JEL Codes: J24, J30, J31, J63
Keywords: work-related training, full-time men, training costs, general human capital, turnover

1. INTRODUCTION

For many years it was believed that orthodox human capital theory – as formalized by Becker (1964) and Oi (1962) and based on the assumption of a perfectly competitive labour market - fully explained who would pay for general training.[1] The consensus was that stylized facts diverging from the predictions of this model could be explained by imperfections in the capital market such as credit constraints. However, from the mid-1990s, this orthodoxy was challenged by, inter alia, Stevens, (1994 and 1996) and Acemoglu and Piscke (1999a, 1999b).[2] These papers relaxed the assumption of perfectly competitive labour markets. They argued instead that the labour market is imperfectly competitive, resulting in a wedge between wages and productivity. By showing conditions under which wage returns to general training are less than productivity returns, they also demonstrated that firms may find it profitable to pay for general training, provided that post-training productivity is increasing in training intensity at a faster rate than are wages.

In this paper we use data from the Household, Income and Labour Dynamics in Australia Survey to confront the main predictions of the various human capital theories for wages and cost-sharing. The Household, Income and Labour Dynamics in Australia Survey is particularly appropriate for studying work-related training and wages following the addition, from wave 3, of a new module incorporating a number of new questions on training. The dataset also provides a very rich set of controls and its panel nature – where the same individuals are surveyed over time - facilitates estimation controlling for unobserved heterogeneity.[3]

[1] By definition, general training can be used at more than one employer and is therefore transferable across firms. In the perfectly competitive case, there are countless other firms where the training can be utilised.
[2] See also papers in the volume edited by Green (2007).
[3] To our knowledge, ours is the first study using representative Australian panel data to estimate the impact of work-related training on wages, probably because a suitable panel dataset has only very recently become available with the HILDA Survey.

Our main results can be summarised as follows: First, a large proportion of work-related training received by full-time private sector men is general. Second, this general training is not paid for by the men receiving it. Third, our fixed effects estimates reveal that this employer-financed general skills training is associated with higher wages in future firms than in current firms. This is the case regardless of whether the training is measured as incidence or as counts. We will show that these results are more consistent with alternative hypotheses put forward by recent theoretical developments in the training literature than with the predictions of human capital theory.

The remainder of our paper is set out as follows. In Section 2, we briefly outline the theoretical hypotheses and their predictions as to who pays for general training and the returns to training (at both the training firms and at subsequent firms). In the following section we describe the data source and the novel features of the training questions. In Section 4 we present and interpret our estimates of the impact of the various forms of training on wages. The concluding section compares our main results with those of Loewenstein and Spletzer (1998) and Booth and Bryan (2005), who used a broadly similar approach on US and British data respectively.

2. BACKGROUND

The main predictions of the various human capital theories for wages and cost-sharing are summarized in Table 1, reproduced from Booth and Bryan (2005). According to human capital theory – Row [1] of Table 1 - workers in competitive labour markets invest in *general* work-related training by receiving low training wages and reap the returns by receiving higher wages afterwards (Becker, 1964). This is because general training represents skills that can be used at numerous other firms, and hence the training is general or portable across companies as

individuals change jobs. According to human capital theory, general training would therefore be financed by the worker through the receipt of lowered wages during training. This is because training is embodied in the worker, who could leave at any time to another job where she would be equally as productive, and therefore no firm would ever finance such training.[4]

Workers who cannot afford to accept low wages during general training will be adversely affected by credit market constraints disbarring them from borrowing to finance their investment. But if the firm were willing to act as lender, it could pay workers more than their marginal product (net of training costs) during training and less afterwards – see Row [2]. The firm would agree to such a contract only if it can devise a mechanism (like an apprenticeship contract or a minimum employment guarantee) to bind workers to the firm until repayment of the loan. The wedge between wages and productivity reflects the degree of cost-sharing. Since general training is transferable across firms by definition, trained workers who change employers should get a greater return than they received in the firm providing the training and the loan.

Insert Table 1 near here

In the *specific* training model - see Row [3] of Table 1 - it is efficient for the firm and worker to share both the costs and the net returns of the training investment (Hashimoto, 1981). Consequently workers' wages will be above net productivity during training and below after training, and the magnitude of this wedge will reflect the degree of cost-sharing. Specific training will not be transferable across firms since, by definition, it is of value only to the firm providing the training. Hence, to reduce potential hold-up problems, both parties would contribute to the financing of training. This sharing mechanism ensures that both firm and worker have the incentive to maintain the relationship after training and thereby to reap the returns.

[4] We use the terms *firm* and *employer* interchangeably and reserve the term *job* for a particular function or set of duties within a firm. The theories being tested concern employers not jobs.

If training comprises a mix of general and specific components, workers will finance the general component and firms will share the costs of the specific training component. Since there will be some cost-sharing, wages at the training firm will be greater than net productivity during training and less than productivity after training – see Row [4]. Wages at subsequent firms will reflect returns *only* to the general component of training, and will consequently be less than wages at the training firm (in which there is some return to the worker to the shared investment in specific training).

However in a labour market characterized by imperfectly competitive wage-setting, it can be shown that the associated wage 'compression' may increase the incentive for firms to invest in general training, provided that post-training productivity net of training costs is increasing in training at a faster rate than wages.[5] Moreover the equilibrium amount of training provided may be sub-optimal from society's viewpoint. The predictions are that the firm may finance general training and that the training firm's wages will be less than net marginal product. According to the contracting model of Loewenstein and Spletzer (1998), if a minimum wage guarantee binds in the current job, the current employer can extract rents from providing general training and the wage-return to training may be greater in future firms than in the current firm. According to the model of Acemoglu and Pischke (1999a, 1999b) – based on mobility costs – although all workers receive a positive return to their training, the current employer has monopsony power over the worker because of the mobility costs. Consequently wages will increase more with the future employer than the current employer. These predictions are summarized in Row [5].

Finally, consider the impact of asymmetry of information about the value of firm-provided training, where the firm providing general training knows its value but other firms do

[5] For examples of this new training literature, see Katz and Ziderman (1990), Stevens (1994), Chang and Wang (1996), Loewenstein and Spetzer (1998), Booth and Chatterji (1998) and Acemoglu and Pischke (1999a, 1999b), Booth and Zoega (2004), and Green (2007).

not. This can affect training transferability in an otherwise competitive labour market. For example, according to the asymmetric information model of Acemoglu and Pischke (1998), training is rewarded more in current than outside firms. This is because the current firm will pay higher wages to retain high ability workers, whereas low ability workers will be dismissed. Some high ability workers who need to leave their jobs will be treated as low ability workers in the outside market. Since training and ability are complements, training will be valued less for laid-off workers than for workers who quit. Consequently in the outside market these workers will receive lower returns to their training. The predictions of this model are as for Row [4].

The predictions of some hypotheses are observationally equivalent.[6] For example, two models predict that transferable training might have bigger returns to subsequent firms than to the firms at which training actually takes place - see Rows [2] and [5]. However, some predictions are quite distinct. For example, the models in Rows [1] and [5] predict that training is transferable, but the first predicts workers pay for it while the fifth predicts that firms do.

In the next section we describe the data source that will be used to discriminate between some of the hypotheses outlined above. The econometric model and the estimates will be reported in the following section.

3. THE DATA AND VARIABLES

3.1 The Data

The Household, Income and Labour Dynamics in Australia (HILDA) survey is a nationally representative random-sample panel survey of private households in Australia. While the

[6] Although we have no information in our dataset about whether or not the training has been accredited, it is interesting to consider its implications (for details see Booth and Bryan, 2007). A formal qualification associated with a training course might be a means of conveying to the outside market the value of the employer-provided general training and of worker ability. For this reason accredited training should have a larger impact on wages in future firms than non-accredited training. One might also expect it to be financed by the individual, since it is transferable. If the qualification is a good signal of worker ability, the predictions of the model with accreditations for training are therefore the same as for Row [1] – the individual will pay and will get all the pay returns.

HILDA survey data have been collected annually in a standardised format since 2001, the relevant questions on work-related training were not asked until wave 3. However, once asked, they were repeated through subsequent waves, and they covered training incidence, training type and training financing.[7] We therefore use data from waves 3 to 6, spanning the period 2003-6.[8]

The HILDA Survey data offer a number of advantages for our purposes. First, they are micro-data that trace the same individuals over time, allowing us to control for changes in circumstances, and for unobserved individual effects. Clearly the richer the set of controls, the lower is unobserved heterogeneity. Second, the HILDA Survey is a remarkably rich source of information on education and other relevant attributes. Finally, HILDA is particularly appropriate for studying training and wages because of its new module on training added from wave 3 onwards.

Our analysis covers full-time male private-sector employees aged between 18 and 60 years in Wave 3, who are not in the armed forces, farming or fisheries, and with valid information on our main variables (hours of work, salary, and whether or not training was received). We exclude the self-employed and owner-managers drawing a salary from their own businesses. Men reporting over 100 working hours per week (hours are used to derive hourly wages) were dropped, as were full-time students. Our measure of full-time work is based on individuals' usual hours of work in their main job (including any paid or unpaid overtime for work done at the workplace or at home). We dropped from the estimating sub-sample men

[7] The questions were expanded in Wave 7 to include additional questions about the location and the duration of training, as well as some subjective information about its perceived value. These data have not yet been released.

[8] This a panel study of representative households in Australia; see http://www.melbourneinstitute.com/hilda.

reporting fewer than 35 hours per week.[9] This is also the definition of full-time work used by Rodgers (2004) and Booth and Wood (2008).

Where there were many missing observations for control variables, we created dummy variables indicating their status, to maintain reasonable sample sizes. Our estimating subsample represents an unbalanced panel of men who are present - and satisfy the selection criteria - in at least two adjacent waves. It comprises 1689 men, representing 5152 person-year observations.[10]

3.2. The Wages and Training Variables

The dependent variable in equation (1) is the *hourly wage rate* in the main job. To calculate this, we used the HILDA derived variables for the current weekly gross wages and salary for the main job, and for hours worked per week in the main job during the survey week.[11] We deflated wages to 2003 (wave 3) levels using the headline Consumer Price Index (CPI) from the Australian Bureau of Statistics. Respondents earning an hourly wage of less than A$1 or more than A$100 in 2003 values were omitted from the analysis.

The precise form of the first training question in the HILDA Survey questionnaire is as follows:

> "During the last 12 months, have you taken part in any education or training schemes or courses, as part of your employment? (We are only interested in structured training courses the respondent has received. Do not include training they may have participated in as a trainer.)"

[9] This differs from the Australian Bureau of Statistics measure, where part-time workers are defined as those reporting that they worked fewer than 35 hours per week in *all* of their jobs in the survey week.

[10] These 1689 men with usable responses and in full-time employment are distributed across waves as follows. There are 710 men (2840 person-year observations) present in all four waves; 158 men in waves 4, 5 and 6 only; 196 men in waves 3, 4 and 5 only; 280 men in waves 5 and 6 only; 74 men present in waves 4 and 5 only; and 271 men in waves 3 and 4 only.

[11] If the reported wages and salary for the main job in the survey week are not the usual wages and salary then the usual wages and salary were substituted in the derivation. Where the reported hours for the main job varied, the average hours worked per week were substituted.

The framing of this question suggests that training responses should be interpreted more as formal courses of instruction rather than informal on-the-job training. We will proxy the latter by job tenure.[12]

Insert Table 2 near here

Column [1] of Table 2 indicates mean training incidence across all waves, and shows that around 42% of men received training over the period**.** [13] The table also gives means for training of various types to be described below. Figure 1 in the Appendix illustrates training transitions across adjacent waves, using data from the above training question.

The second training question asked respondents who had received training about its purpose. They were shown a card on which there were seven potential responses: induction; improving skills in the current job; maintaining professional/occupational standards; preparation for future job; developing skills generally; health and safety; other. Respondents were allowed to pick multiple responses. Panel C of Table 2 illustrates the frequency of these responses. The most common response was that the training was to improve skills in the current job, followed by training to maintain professional or occupational standards and training to develop skills generally. Perhaps unsurprisingly, the least common form of training was for induction purposes. The highest correlation between pairs of training types is 0.495, between training to improve skills in the current job and training to develop skills generally. The lowest correlation was

[12] A separate question asks about "general or higher education".

[13] Arulampalam, Booth and Bryan (2004), using the European Community Household Panel, identify three high training incidence countries—Britain, Denmark, and Finland—where each year over a third of individuals begin training. Austria, Belgium, France, and Spain form a group of medium-incidence countries, where the proportion ranges from 10% to 16%, while Ireland, Italy, and the Netherlands have incidence below 10%. See also Green, Machin and Wilkinson (1999) and the cross-country comparisons using a variety of different data sources reported in OECD (1999) and also Bassanini et al. (2007). In contrast, training incidence in the US is much lower; see for example Lynch (1992) and Loewenstein and Spletzer (1998). For studies using Australian data (none yet using HILDA) see *inter alia* Tan et al. (1992), .Miller (1994), and Wooden and van den Heuvel (1997).

0.066, and this was between induction training and training to maintain professional status or occupational standards. [14]

We now consider the most appropriate proxy for general training. Training to "improve skills in the current job" might be either general or specific, or might comprise elements of each. This therefore does not seem to most suitable measure for our purposes. The most appropriate proxy for general training would seem to be training to develop skills generally. However, training to maintain professional or occupational standards could also be regarded as general, in that by definition it is transferable to other firms in that profession or occupation. For this reason, we construct separate variables for "training to maintain professional or occupational standards" and "training to develop skills generally" and we use these in our empirical analysis, as will be explained further below.

The third question in the training module of the HILDA survey enquired about the *financing* of training. Individuals were asked if they contributed towards the cost of any training they had received and were prompted with the following ways of contributing towards training costs: pay course fees; purchase materials, books, etc.; pay for travel, accommodation, while attending the course; or take unpaid time off to attend training course. While this is a comprehensive set of prompts, respondents were only given the opportunity to answer 'yes' or 'no' and were not required to specify in precisely which way they may have contributed.

[14] The precise form of the second training question was:"Looking at SHOWCARD C27b, what was the aim of any of this training?
-To help you get started in your job.
-To improve your skills in your current job.
-To maintain a professional status and/or meet occupational standards.
-To prepare you for a job you might do in the future or to facilitate promotion.
-To develop your skills generally.
-Because of health/safety concerns.
-Other aims (please specify)."

However, as we shall see, the vast majority of men being trained paid for none of these training costs listed above.

We now define *employer-financed training* as courses to which the individual makes no financial contribution, that is, where respondents did not reply in the affirmative to any of these prompts above. Table 2 shows that 83% of training of any type is employer-financed. Further disaggregation showed that 82% of training "to improve skills in the current job" is employer-financed, while 80% of "training to develop skills generally" or "to maintain professional or occupational standards" is employer-financed. Around 76% of the least common form of training, induction training, is employer-financed.

Some men did, however, contribute to the costs of their training. Where respondents replied in the affirmative to one or more of these prompts, we defined their training as "other-financed" or "shared financing" (we use these two terms interchangeably in what follows). Notice that around 18% of training to improve skills is "other-financed".

What can we infer from these raw data? Like Booth and Bryan who used British data, we find that in Australia a large proportion of work-related training is viewed by its recipients as general. We also find that private sector men in Australia are largely not paying any of the explicit costs of general training. The obvious inference is that this private-sector general training is financed by employers. Yet this is not what orthodox human capital theory predicts, as we saw in Section 2. In Section 4 we will present estimates of the impact of the various forms of training on wages, but first we briefly consider some of the other variables.

3.3. The Other Explanatory Variables

Table A.1 in the Appendix gives the means of the other explanatory variables. Full-time male employees work on average 46 hours per week and earn an average hourly wage of A$23.34.

Their mean age is 38.06 years and 55% of them are married while 15% are cohabiting. On average, their job tenure is 6.3 years and their labour market experience is 19.6 years. Around 86% of men have permanent employment and some 20% have a degree or above, while just under 23% have only Year 11 qualifications or less. The mean number of job changes across the sample period is 0.45. Less than half the men in the sample change job one or more times. Of those who did change job, more than 90% did so only once. This suggests a low degree of turnover for full-time male employees in Australia.

4. THE FIXED EFFECTS WAGE GAP ESTIMATES

4.1. The Econometric Model

Our basic estimating equation, incorporating the influence of observed and unobserved characteristics on hourly wages, is given by:

$$\ln w_{ijt} = \boldsymbol{X}'_{ijt}\beta + T_{it}'\alpha + D'_t\gamma + \mu_i + \upsilon_{ij} + \varepsilon_{ijt} \qquad (1)$$

where w_{ijt} is the natural logarithm of the real (2003 prices) hourly wage of individual i in job j at time t; $\boldsymbol{X}_{ijt}$ is a vector of individual and firm characteristics that influence the outcome variable w_{ijt}; the associated parameter vector is β; T_{it} is a vector containing various measures of training and is associated with parameter vector α; and D_t comprises year-specific dummy variables with associated parameter vector γ. Unobservable characteristics affecting individual's wages are decomposed into a permanent effect μ_i, an employer match-specific component $\upsilon_{ij,}$ and a transitory effect ε_{ijt} (the random error term). The parameter vector of interest is α.

Equation (1) is estimated as a fixed effects (FE) model, in which μ_i is treated as the fixed effect that can be differenced out.[15] We approximate v_{ij} by dummy variables. Thus we have a dummy variable taking the value one throughout the duration of a new job (if an individual changes jobs), and zero otherwise; and another similar dummy capturing a second new job, and so on (a maximum of three job changes can be observed within our sample period). The base case is the first job observed in the panel. This is similar to the approach of Loewenstein and Spletzer (1998) in their analysis of the returns to training across jobs.

In the specifications of equation (1) reported in Table 3, we include the following separate types of training: (i) employer-financed professional status training; (ii) employer-financed general skills training; (iii) other-financed professional status training; (iv) other-financed general skills training; (v) all other types of training not included in the first four categories. (Recall that in Section 3 we defined employer-financed training to be all training for which the individual has not made any financial contribution.) We further divide the variables into training undertaken with the *current* employer (including training received in the past year) and training undertaken with *previous* employers. If training is general, it should be transferable across jobs and therefore we would expect it to have a positive returns after job changes. However, general training may depreciate, so that the effect might for this reason be smaller in future than in current jobs.

The broad types of training outlined above can be measured in two ways: incidence and event counts. *Training incidence* takes the value one if the individual reported taking part in any employment-related training courses of that type during the last 12 months, and zero otherwise.

[15] The unobserved individual-specific effect μ_i may capture individual ability or motivation that reduces the cost of training and which will therefore be positively associated with training receipt. It may also reflect the stock of pre-sample training. If past and future training are correlated (either negatively or positively) then T_{it} will be correlated with μ_i (Loewenstein and Spletzer, 1998: p160). This source of bias is eliminated by estimating (1) as a FE model, so that identification uses only within-individual variation and time-invariant effects are removed.

Training counts represent the cumulative total of training of that type received since wave 3 (or the first wave in which the man appeared in the dataset). Thus the maximum value this can take is four (when the individual has received training of that type in all four waves). Since training is positively correlated (individuals who received training in one year are 31 percentage points more likely to receive training the next year than those who had no training in the first year), the cumulative variable increases the share of the variance due to the true training indicator as opposed to that caused by the measurement error. We would therefore expect its coefficient to be more precisely determined and to be larger in magnitude than for the incidence variable.

4.2. The Estimates

Table 3 reports the coefficients to the training variables obtained from estimating equation (1). The first pair of columns reports estimates from a *balanced* panel of men present in all four waves, while the last pair of columns presents estimates from the *unbalanced* panel described above. The specifications in columns (1) and (3) of Table 3 estimate the impact of training incidence on the natural logarithm of hourly wages, while the specifications in Columns (2) and (4) estimate the impact of training counts. Table A.2 of the Appendix reports the remaining coefficients, including year dummies for waves 4, 5 and 6. The number of person-year observations is given in the last row of Table 3. The unbalanced panel contains more observations (since it includes not only men present in all four waves but also some men present in just two or three adjacent waves). Hence the coefficients are likely to be more precisely estimated. However, the unbalanced panel does not provide such a good testing ground for the effect of accumulated training since, for some men, the maximum number of events they can accumulate is two. We therefore present estimates from both subsamples and discuss these below.

Insert Table 3 near here

First, consider the estimates from the balanced panel in Column (1). We constructed a number of training variables, as shown in Table 3. The first panel reports the wage effects of employer-financed professional status training. This is training that respondents have defined as being to maintain professional or occupational standards, and which they have *not* paid for themselves. We label this "employer-financed professional status training". We further stratify this into training received with the current employer and training received at any previous employers during the sample period. The variable "undetermined employer" measures training courses of this type where the man changed job but we were unable to determine if the training was in the current or previous job.[16] The top panel of coefficients shows that *employer-financed professional* training has no statistically significant effect on wages, regardless of whether the training was received in the present or the previous job, or with an undetermined employer.

The second panel presents the estimated coefficients to the *employer-financed general* training variables.[17] These variables are of most interest to us in the present context. The estimates show that employer-financed general training received with previous employers raises present hourly wages more than similar training undertaken with the current employer. Indeed, employer-financed general training appears to have a statistically significant impact on hourly wages only if the individual subsequently changed employer. Receipt of employer-financed training at previous employers is associated with 11.2% higher expected wages subsequently, whereas training at the current employer has no statistically significant effect on wages. Moreover, this difference in impact is significant. An analogous result is found for the training

[16] In some cases it was not possible to determine whether training was undertaken in previous jobs or in the current one. This was because the survey does not specify exactly when in the previous 12 months training was received, and the "undetermined employer" cases arise when reported tenure was less than one year.
[17] We tested to see if the coefficients to each set were equal and this hypothesis was rejected. Thus it is inappropriate to pool these two forms of general training variables.

counts estimation reported in Column (2), but here the statistically significant impact of training at previous employers is slightly smaller, at 10.8%, and is more precisely determined as expected. [18]

These results are interesting because they show that general training that is employer-financed is clearly portable across employers and the impact is large. Hence workers' assessment of the training type seems to have been correct – it is genuinely transferable. Indeed, workers only get a return to this form of training if they change employers. But the puzzle for theory is that, if the labour market is perfectly competitive, employers should not be providing transferable training because of the potential hold-up problem. And yet they do, and the following might explain why. According to imperfectly competitive models of the labour market, firms might be willing to finance transferable training if the wage returns to training are increasing at a slower rate than the productivity returns (see Row [5] of Table 1).

Next we consider the impact of general training to which the individual has made some financial contribution. As noted in Section 2, this could be the individual paying course fees; purchasing materials or books, paying for travel or accommodation while attending the course; or taking unpaid time off to attend training course. This represents only 18% of all training events of this type, and more closely approximates the orthodox human capital theory of general training – that it should be worker-financed. The third panel of Table 3 displays the coefficients to other-financed professional status training, while the fourth panel shows the coefficients to other-financed general skills training. Notice that the returns to other-financed professional status training are large and statistically significant for training in the current job and become even larger if the person changes job subsequently. This is as one might expect. Individuals who self-

[18] As noted above, the cumulative training variable increases the share of the variance due to the true training indicator as opposed to that caused by the measurement error. We therefore expected its coefficient to be more precisely determined than for the incidence variable.

finance professional status training are rewarded for it. This effect is not found for counts however, when the training effect is insignificant. From the fourth panel of estimates we see that other-financed general skills training has a negative effect (although typically not for counts). Other-financed general training at the current, future or an undetermined employer is associated with lower wages.

The fifth panel of Table 3 includes "Other types of training". This is the residual category comprising all other forms of training apart from those described above. The impact of these variables is typically statistically insignificant. They are not of interest to our hypotheses and were included only as controls.

Finally the results using the unbalanced panel – reported in the last pair of columns in Table 3 - support the findings from the balanced panel, although the effects are smaller and less precisely estimated. Employer-financed general skills training is associated with 6.4% higher wages (t-statistic 2.5) only if the person changes jobs.

In the bottom panel of Table 3 we have the employer match-specific component, which is approximated by an employer-specific effect that is constant across individuals. This is modelled by including a dummy variable taking the value one throughout the first change of jobs, another one capturing a second job change and a third one for a third new job. The base case is the first job observed in the panel. Note that none of the estimated coefficients on the "employer match" variables are statistically significant.

4.2. Other Variables

The estimated coefficients of the extra explanatory variables not reported in Table 3 are given in Table A.2 of the Appendix. The most interesting additional findings are as follows. Union membership is associated with an increase in the hourly wage of full-time men of just under 3%,

although this is statistically significant only at the 10 percent level. Job tenure (proxying informal on-the-job training) has a statistically insignificant effect, as was also found by Booth and Bryan (2007) using comparable data from the British Household Panel Survey. However, while Australian men do not benefit from an extra year of job tenure, they do benefit from labour market experience. This has a statistically significant positive effect of between 1% and 2% for each extra year spent working, and is slightly larger than the comparable analysis for Britain. Finally, a *ceteris paribus* change from a small establishment or workplace to a larger one brings a significant earnings boost of between 5% (for a shift into a workplace of 100-499 employees) and 7% (for a shift into a workplace of more than 500 employees). This a similar effect to that found for Britain by Booth and Bryan (2007).[19]

4.3. A Robustness Check

The HILDA Survey did not ask respondents to indicate whether or not their wages were reduced during training. It is possible that the wage returns at the current employer are measured too soon after training ended and reflect a salary reduction during the training period. We cannot test this precisely because we are not able to date training courses within that 12-month period between interviews. But what we can do is to see if there is a negative correlation between pretraining wages and training received some time in the 12 month period after those wages were measured.

Insert Table 4 near here

To deal with this, we ran additional specifications in which we included training to be received in the *next* year in our current wage equations. While the fixed-effect framework solves the problem of time-invariant unobserved ability, our test does assume that the current wage is

[19] Union status was a dummy variable obtained from the question "Do you belong to a trade union or employee association?" Workplace size was obtained from the question "approximately how many people (including yourself) are employed at the *place* at which you work?" job tenure and experience are both measured in years and are derived variables provided by the HILDA Survey team.

the same as that to be paid during the following year's training spell, which could take place any time between one and twelve months after the current wage is observed. Our test also assumes that next year's training is not a response to a current unobserved productivity shock (which would not be removed by the estimation procedure). Nonetheless, if wages are lowered during training, the coefficient on the additional regressor – next period's training - should be negative and statistically significant. In fact, while the estimates reported in Table 4 are negative, they are typically statistically insignificant, suggesting that wages are not lowered during training. Thus, for our sample, employees do not appear to be paying for training indirectly through reduced earnings.

5. CONCLUSIONS

Our main results can be summarised as follows: First, a large proportion of work-related training received by full-time private sector men is general. Second, this general training is typically not paid for by the men receiving it. Third, our fixed effects estimates reveal that this employer-financed general skills training is associated with higher wages in future firms than in current firms. This is the case regardless of whether the training is measured as incidence or as counts. Our findings are similar to those of Booth and Bryan (2005, 2007). Those authors used British data to establish that employers do indeed pay the explicit costs of training that is general, and that employer-financed general training has a statistically significant positive impact on wages in the subsequent firm conditional on changing firm.

The fact that employers pay the direct costs of training that is transferable across employers is inconsistent with orthodox human capital theory without credit constraints. It is, however, consistent with some of the relatively recent training literature that assumes

imperfectly competitive labour markets (see Row [5] of Table 1). It is also consistent with the hypothesis that firms offer credit-constrained workers binding training contracts whereby firms pay for general training and workers repay this 'loan' by receiving a post-training wage below their marginal product - see Loewenstein and Spletzer (1998), whose model is also based on imperfectly competitive labour markets.[20] Our results from the Australian labour market corroborate theirs. In an empirical study using US data on wage and productivity growth, Barron, Black and Berger (1999) also show that employees pay only a small fraction of the training costs even though this training is reported by employers as being general.

In summary these separate studies corroborate our conclusion that the available stylised facts for Australia, Britain and the US are consistent with the predictions of human capital theory based on imperfectly competitive labour markets rather than the alternative of perfect competition.

[20] In their model, training is determined within long-term contracts, including minimum wage guarantees, in an environment of uncertainty. If the wage guarantee binds, the employer can earn rents by providing general training, and the worker can only receive the full return by switching employers.

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Table 1: Predictions of Human Capital Theory

Row No.	Model	Who Pays	Divergence between Wages (w) and Net Marginal Productivity (MP) at Training Firm	Transferability of Training
[1]	Perfect competition, general training	Worker	None	Fully transferable
[2]	As above but with credit constraints	Sharing	w>MP during training and w<MP after training	Transferable but wage returns elsewhere greater than returns at firm providing training
[3]	Perfect competition, specific training	Sharing	w>MP during training and w<MP after training	Non-transferable
[4]	Perfect competition, mix of general and specific training	Sharing	w>MP during training and w<MP after training	Partially transferable; wage returns elsewhere less than returns at firm providing training
[5]	Oligopsonistic labor market, general training	Firm	w<MP during and after training, implying rents for the firm	Fully transferable, wage returns elsewhere greater than returns at firm providing training

Source: Booth and Bryan (2005).

Table 2: Means of Training Variables

	N	%
A. Number of training events		
2003	503	0.43
2004	593	0.42
2005	604	0.43
2006	459	0.4
All years	2,159	0.42
B. Financing method		
Employer	1,790	0.83
C. Training type		
Induction	146	0.07
Current skills	1,467	0.68
Future skills	592	0.27
General skills	1,045	0.48
Professional status/ Occupational standards	1,145	0.53
Other	651	0.3
N	**5,152**	

Table 3: Professional status and general skills training disaggregated

Effect of training on wages				
	BALANCED PANEL		UNBALANCED PANEL	
	Incidence eq. [1]	Counts eq. [2]	Incidence eq. [3]	Counts eq. [4]
Employer-financed professional status training				
Current employer	0.000	0.018	-0.005	0.009
	(0.00)	(1.58)	(0.37)	(0.88)
Previous employers	0.007	0.021	0.003	0.012
	(0.22)	(0.97)	(0.11)	(0.59)
Undetermined employer	-0.017	-0.017	-0.014	-0.011
	(0.46)	(0.47)	(0.53)	(0.44)
Employer-financed general skills training				
Current employer	-0.013	0.000	-0.013	-0.001
	(0.77)	(0.01)	(0.91)	(0.08)
Previous employers	0.112***	0.108***	0.064**	0.077***
	(3.61)	(4.69)	(2.48)	(3.79)
Undetermined employer	-0.029	-0.021	0.028	0.042
	(0.75)	(0.55)	(1.01)	(1.51)
Other-financed professional status training				
Current employer	0.113***	-0.035	0.041	-0.036
	(2.91)	(1.13)	(1.28)	(1.36)
Previous employers	0.220***	0.051	0.153***	0.074*
	(3.53)	(0.94)	(3.06)	(1.65)
Undetermined employer	0.061	-0.008	0.017	-0.010
	(0.91)	(0.11)	(0.35)	(0.19)
Other-financed general skills training				
Current employer	-0.099**	0.031	-0.033	0.045
	(2.52)	(0.89)	(1.03)	(1.56)
Previous employers	-0.115*	0.037	-0.085*	-0.001
	(1.77)	(0.60)	(1.67)	(0.02)
Undetermined employer	-0.278***	-0.200**	-0.154***	-0.119**
	(3.62)	(2.57)	(2.97)	(2.24)
Other types of training				
Current employers	-0.029	-0.016	-0.024	-0.023*
	(1.60)	(1.15)	(1.51)	(1.85)

Previous employers	0.011	0.031	0.033	0.034
	(0.34)	(1.05)	(1.27)	(1.47)
Undetermined employer	0.032	0.039	0.007	0.007
	(0.93)	(1.16)	(0.27)	(0.26)
Job changes				
Employer match 1	0.000	-0.002	0.008	0.007
	(0.02)	(0.08)	(0.55)	(0.51)
Employer match 2	-0.004	-0.003	-0.014	-0.019
	(0.13)	(0.08)	(0.43)	(0.57)
Employer match 3	0.024	0.048	-0.016	-0.013
	(0.26)	(0.53)	(0.17)	(0.14)
Intercept	3.832***	3.669***	1.912***	2.014***
	(3.71)	(3.57)	(4.05)	(4.27)
Log-likelihood	1324.428	1327.774	2331.448	2341.161
Rho	0.940	0.928	0.893	0.884
Observations	2812	2812	5152	5152

Notes: (1) Asterisks denote level of significance: *10%, **5%, ***1%. (2)Absolute z-statistics in parenthesis. (3) Other controls included but not reported are age, tenure, tenure squared, experience, experience squared and dummies for multiple jobs, part-time, casual contracts, union member, marital status, highest educational qualification, occupation, charity sector, establishment size, industry, region and year.

Table 4: Professional status and general skills training disaggregated *(Adding next period's training spell)*

Effect of training on wages				
	BALANCED PANEL		**UNBALANCED PANEL**	
	Incidence eq. **[1]**	Counts eq. **[2]**	Incidence eq. **[3]**	Counts eq. **[4]**
Employer-financed professional status training				
Current employer	-0.012	0.016	-0.013	0.008
	(0.68)	(1.09)	(0.81)	(0.60)
Previous employers	-0.008	0.020	-0.006	0.010
	(0.24)	(0.81)	(0.23)	(0.46)
Undetermined employer	-0.027	-0.020	-0.020	-0.012
	(0.73)	(0.56)	(0.72)	(0.45)
Next period	**-0.023**	**-0.005**	**-0.013**	**-0.002**
	(1.47)	**(0.29)**	**(0.97)**	**(0.12)**
Employer-financed general skills training				
Current employer	-0.020	0.001	-0.019	0.001
	(1.10)	(0.06)	(1.14)	(0.09)
Previous employers	0.107***	0.108***	0.060**	0.080***
	(3.32)	(4.30)	(2.21)	(3.54)
Undetermined employer	-0.031	-0.019	0.025	0.044
	(0.81)	(0.50)	(0.87)	(1.48)
Next period	**-0.014**	**0.000**	**-0.010**	**0.003**
	(0.91)	**(0.03)**	**(0.73)**	**(0.19)**
Other-financed professional status training				
Current employer	0.135***	-0.069*	0.075**	-0.030
	(3.11)	(1.81)	(2.06)	(0.89)
Previous employers	0.246***	0.011	0.192***	0.082
	(3.71)	(0.18)	(3.55)	(1.61)
Undetermined employer	0.080	-0.046	0.051	-0.001
	(1.15)	(0.62)	(0.99)	(0.02)
Next period	**0.044**	**-0.065**	**0.062***	**0.009**
	(1.12)	**(1.51)**	**(1.95)**	**(0.26)**
Other-financed general skills training				
Current employer	-0.131***	0.053	-0.085**	0.022
	(2.90)	(1.23)	(2.26)	(0.58)
Previous employers	-0.148**	0.062	-0.139**	-0.025
	(2.13)	(0.91)	(2.53)	(0.47)

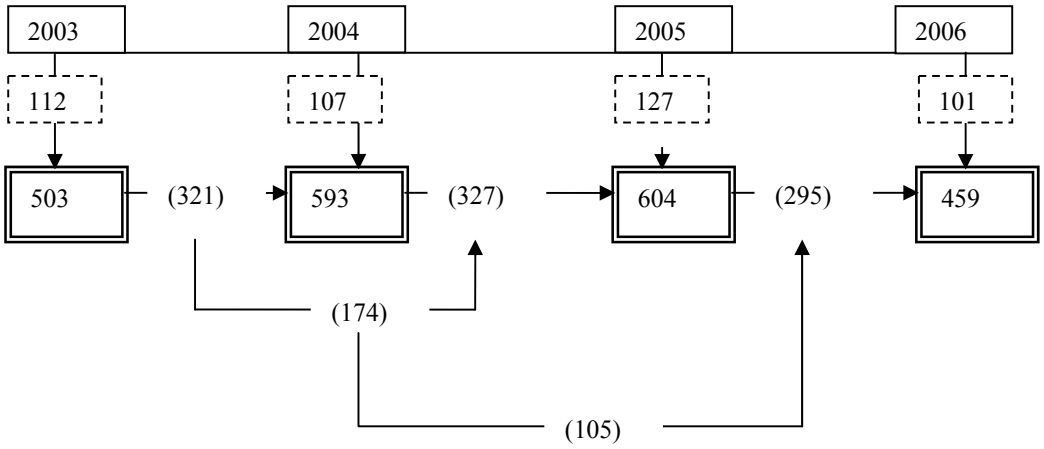
Undetermined employer	-0.301***	-0.183**	-0.201***	-0.144**
	(3.84)	(2.24)	(3.68)	(2.44)
Next period	**-0.058**	**0.033**	**-0.092*** **	**-0.038**
	(1.41)	**(0.74)**	**(2.71)**	**(0.99)**
Other types of training				
Current employer	-0.029	-0.019	-0.022	-0.027*
	(1.45)	(1.06)	(1.16)	(1.65)
Previous employers	0.013	0.030	0.036	0.030
	(0.37)	(0.94)	(1.31)	(1.15)
Undetermined employer	0.031	0.035	0.008	0.003
	(0.87)	(0.96)	(0.31)	(0.10)
Next period	**-0.005**	**-0.006**	**0.002**	**-0.007**
	(0.28)	**(0.30)**	**(0.13)**	**(0.38)**
Job changes				
Employer match 1	-0.000	-0.000	0.007	0.007
	(0.02)	(0.02)	(0.52)	(0.52)
Employer match 2	-0.002	-0.002	-0.012	-0.019
	(0.05)	(0.06)	(0.36)	(0.57)
Employer match 3	0.031	0.047	-0.007	-0.014
	(0.34)	(0.52)	(0.08)	(0.15)
Intercept	3.847***	3.628***	1.917***	1.987***
	(3.72)	(3.52)	(4.06)	(4.20)
Log-likelihood	1328.476	1329.454	2338.575	2342.239
Rho	0.940	0.927	0.894	0.884
Observations	2812	2812	5152	5152

Notes: (1) Asterisks denote level of significance: *10%, **5%, ***1%. (2)Absolute z-statistics in parenthesis. (3) Other controls included but not reported are age, tenure, tenure squared, experience, experience squared and dummies for multiple jobs, part-time, casual contracts, union member, marital status, highest educational qualification, occupation, charity sector, establishment size, industry, region and year.

Appendix A

Figure 1, using the unbalanced panel sample, indicates that the number of men receiving training in each wave and combinations of training across waves. The wave is indicated in the top row, while the numbers in rectangles formed by double-lines, occupying the 3rd row of the figure, indicate the number of individuals trained in that year. The numbers in the dashed rectangles indicate men training only in that year. Thus, considering the first column of Figure 1, 503 men received training in 2003. Of these, 112 did not receive training in the following wave, while 321 went on to receive training in 2004. Analogously, a total of 593 men were trained in 2004, of whom 327 also received training in the following year (69 in only 2003, 2004 & 2005, and 95 in only 2004 & 2005). In 2005, 127 of the 604 men receiving training did not receive training the next year, and 295 were trained at least in 2005 and 2006. Of the 174 men who received training in the first three years, 105 (60%) also did in the last year.

Of the 503 individuals who received training in 2003, 22% (112) were only trained in 2003, another 64% (321) were also trained in 2004. Of these last ones (trained in 2003 & 2004), more than half (174) were also trained in 2005. Finally, 105 received training in all four years, representing one fifth of the total reporting training in the initial wave.



Notes:
(i) Between parentheses: individuals trained in more than one year.
(ii) In dashed squares: individuals trained in only one year.
(iii) In double squares: individuals trained in each pair of years.

APPENDIX: Table A.1: Means of Other Explanatory Variables

	Mean
Hourly wage	23.34
Hours of work per week	45.75
A. Industry	
Mining	0.049
Manufacturing	0.27
Utilities	0.009
Construction	0.1
Wholesale trade	0.074
Retail trade	0.123
Accommodation, cafes, and restaurants	0.037
Transport and storage	0.058
Communication services	0.021
Finance, insurance, property and business services	0.164
Education	0.025
Health and community services	0.025
Other services	0.041
Unknown	0.004
B. Occupation	
Professional	0.181
Managerial	0.1
Non-manual	0.247
Skilled manual	0.374
Unskilled	0.098
C. Multiple jobs	0.052
D. Day worker	0.803
E. Trade union covered	0.264
F. Charity worker	0.057
G. Contract	
Fixed-term	0.079
Permanent	0.857
Casual	0.061
Other	0.003
H. Tenure	6.3
I. Experience	19.59
J. Workplace size	
1-19	0.351
20-99	0.319
100-499	0.223
500-.	0.105

Unknown	0.002
K. Highest education level	
Year 11 and below	0.227
Year12	0.156
Tertiary (certificate / advanced diploma)	0.414
Bachelor	0.139
Postgraduate	0.064
L. Marital status	
Married	0.553
Cohabiting	0.146
Divorced / Widowed / Separated	0.067
Single	0.234
M. Age	38.06
N. Region of residence	
ACT	0.008
NT	0.008
QLD	0.228
NSW	0.288
VIC	0.239
TAS	0.032
SA	0.094
WA	0.103
Urban	0.691
O. Wave	
3	0.228
4	0.273
5	0.275
6	0.224
P. Labor turnover	
Number of job changes	0.45
Changed jobs at least once	0.39
Changed jobs more than once	0.03
N	**5,152**

APPENDIX: Table A.2: Control variables coefficients (Table 3 estimations)

FE- Wage Equation – Coefficient estimates

	BALANCED PANEL		UNBALANCED PANEL	
	Incidence eq.	Counts eq.	Incidence eq.	Counts eq.
Employment attributes				
Multiple jobs	-0.016	-0.019	0.021	0.019
	(0.60)	(0.71)	(0.98)	(0.88)
Casual contract	0.036	0.030	0.042**	0.040**
	(1.36)	(1.14)	(2.21)	(2.11)
Day worker	-0.033*	-0.036**	-0.034**	-0.034**
	(1.85)	(1.99)	(2.40)	(2.41)
Union member	0.032*	0.027	0.029*	0.027*
	(1.68)	(1.43)	(1.89)	(1.78)
Tenure	0.003	0.004	0.003	0.004
	(0.98)	(1.23)	(1.10)	(1.38)
Tenure squared	-0.000	-0.000	-0.000	-0.000
	(0.75)	(1.04)	(1.38)	(1.61)
Individual characteristics				
Age	-0.088	-0.074	0.021	0.018
	(1.52)	(1.28)	(0.89)	(0.77)
Married	-0.038	-0.042	-0.006	-0.005
	(1.11)	(1.22)	(0.22)	(0.19)
Cohabiting	0.025	0.024	0.019	0.021
	(0.89)	(0.85)	(0.87)	(0.93)
Widowed/Divorced/	0.028	0.025	0.062	0.064
Separated	(0.58)	(0.52)	(1.58)	(1.63)
Manager	-0.005	-0.002	0.013	0.013
	(0.15)	(0.07)	(0.53)	(0.52)
Professional	0.016	0.021	0.014	0.015
	(0.50)	(0.69)	(0.58)	(0.62)
Non-manual	-0.000	0.001	-0.010	-0.011
	(0.02)	(0.04)	(0.50)	(0.54)
Skilled manual	-0.003	-0.002	0.012	0.013
	(0.15)	(0.09)	(0.64)	(0.69)
Experience	0.166***	0.145**	0.062**	0.060**
	(2.78)	(2.42)	(2.45)	(2.35)
Experience squared	-0.001***	-0.001***	-0.001***	-0.001***
	(5.40)	(5.13)	(7.18)	(6.86)
Highest education level (lagged 1 year)				
Postgrad/Graddip	-0.090	-0.103	-0.049	-0.053
	(0.86)	(0.99)	(0.87)	(0.94)
Bachelor	-0.053	-0.075	-0.024	-0.030
	(0.57)	(0.80)	(0.48)	(0.60)

Cert/AdvDiploma	-0.045	-0.047	0.039	0.041
	(0.70)	(0.72)	(1.06)	(1.11)
Year12	-0.073	-0.094	0.012	0.007
	(0.98)	(1.27)	(0.30)	(0.19)
Employer attributes				
Charity worker	-0.001	-0.005	-0.011	-0.017
	(0.03)	(0.11)	(0.34)	(0.53)
20_99 employees	-0.003	-0.002	0.012	0.013
	(0.21)	(0.12)	(0.97)	(1.06)
100_499 employees	0.052***	0.052***	0.054***	0.055***
	(2.83)	(2.84)	(3.56)	(3.67)
500+ employees	0.071***	0.071***	0.079***	0.080***
	(3.06)	(3.07)	(4.08)	(4.18)
Mining	0.013	0.034	0.011	0.017
	(0.22)	(0.59)	(0.25)	(0.39)
Manufacture	-0.079*	-0.067	-0.068**	-0.065**
	(1.74)	(1.46)	(2.07)	(2.00)
Utilities	0.082	0.097	0.055	0.057
	(1.06)	(1.26)	(0.86)	(0.89)
Construction	-0.081	-0.067	-0.083**	-0.081**
	(1.63)	(1.37)	(2.34)	(2.29)
Wholesale trade	-0.110**	-0.098**	-0.086**	-0.083**
	(2.30)	(2.05)	(2.50)	(2.41)
Retail trade	-0.087*	-0.073	-0.074**	-0.072**
	(1.78)	(1.49)	(2.14)	(2.07)
Hospitality	-0.065	-0.053	-0.106**	-0.103**
	(1.11)	(0.90)	(2.32)	(2.24)
Transport	-0.108**	-0.095*	-0.085**	-0.083**
	(2.04)	(1.79)	(2.18)	(2.13)
Community services	-0.121	-0.103	-0.026	-0.025
	(1.59)	(1.35)	(0.47)	(0.46)
Finance	-0.104**	-0.089*	-0.082**	-0.078**
	(2.23)	(1.90)	(2.50)	(2.38)
Education	-0.274***	-0.288***	-0.241***	-0.251***
	(2.91)	(3.06)	(3.04)	(3.18)
Health	-0.166**	-0.172**	-0.119**	-0.128**
	(2.30)	(2.39)	(2.11)	(2.27)
Region of residence				
New South Wales	-0.157	-0.126	-0.267*	-0.241
	(0.68)	(0.55)	(1.75)	(1.58)
Victoria	-0.188	-0.173	-0.265*	-0.237
	(0.90)	(0.83)	(1.81)	(1.62)
Queensland	-0.414*	-0.375	-0.396**	-0.376**
	(1.73)	(1.57)	(2.52)	(2.39)
South Australia	-0.206	-0.180	-0.353*	-0.323*
	(0.82)	(0.71)	(1.95)	(1.79)
Western Australia	-0.533**	-0.494**	-0.537***	-0.512***
	(2.22)	(2.07)	(3.15)	(3.01)
Tasmania	0.000	0.000	-0.616**	-0.583**
	.	.	(2.18)	(2.07)

Northern Territory	-0.078	-0.041	-0.302	-0.275
	(0.28)	(0.15)	(1.57)	(1.44)
Urban	-0.006	-0.005	0.003	0.001
	(0.17)	(0.15)	(0.09)	(0.02)
Wave				
wave4	0.006	0.006	0.003	0.003
	(0.68)	(0.67)	(0.48)	(0.49)
wave5	0.002	0.002	0.001	0.001
	(0.19)	(0.27)	(0.16)	(0.21)
R^2 – within	0.154	0.156	0.115	0.118
R^2 – between	0.009	0.012	0.099	0.101
R^2 – overall	0.011	0.014	0.088	0.091

Notes: (1) Asterisks denote level of significance: *10%, **5%, ***1%. (2)Absolute z-statistics in parenthesis.