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Does profit sharing increase training by reducing turnover?

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Abstract

We test the theoretical prediction that profit sharing reduces worker separations and by doing so increases the incidence of training. Using individual level UK data, we confirm that profit sharing is a robust determinant of lower separation rates and of greater training incidence. Critically, we cannot confirm the predicted link between separations and training. Instead, the evidence supports alternative theories suggesting a direct link between profit sharing and training. Our results suggest that profit sharing changes employer-worker relations in a way that leads to greater formal and informal investment in worker skills but that this is independent of its influence on reducing separations.

KEYWORDS: PROFIT SHARES, PERFORMANCE PAY, TRAINING, TURNOVER

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1. INTRODUCTION

Profit sharing has been shown to be associated with higher firm profitability, labor productivity and worker wages (Bhargara 1994, Cable and Wilson 1989, Estrin et al. 1997, Hubler 1993, Kruse 1992, Wadhwani and Wall 1990). While the expectation that linking pay and performance will increase worker productivity stands at the center of personnel economics, the causation in the case of profit sharing remains less obvious. The recognized 1/N problem suggests that free riding dramatically limits the effectiveness of profit sharing as a direct incentive device to elicit greater effort. While particular technologies or forms of group behavior can help reduce the 1/N problem (Fitzroy and Kraft 1987 and Adams 2006), there exists a largely alternative causation that has not received sufficient attention. Profit sharing changes employment relations so as to create greater investment in worker training and it is this training that improves productivity.

We pursue this second line of causation reviewing variations from the theoretical literature suggesting that profit sharing spurs training. We contrast two broad strands within this second line of reasoning. First, profit sharing reduces the likelihood of separations between workers and the firm. This reduced turnover increases the expected amortization period for investments in training that, in turn, increases the likelihood of training. Thus, profit sharing plays an indirect role on training through its influence on separations (Azfar and Danninger 2001). Second, profit sharing plays a direct role on training either by creating a contract that rewards the training by reducing fears of a hold-up problem and/or by encouraging co-workers to provide training. We are the first to investigate which of these two strands is predominant and to incorporate the roles of types of performance pay beyond profit sharing.

We use two separate data sources to present detailed UK individual level hazard estimates of the probability of separation showing it to be lower in the presence of profit sharing. We also demonstrate that this result remains robust to a wide set of alternative specifications including using panel data to hold worker fixed-effects constant, using alternative controls for tenure and jointly estimating the provision of training and separation risk. Further, we confirm that profit sharing stands as an important determinant of both the probability of receiving training and of its intensity. While these results would seem to support the view that profit sharing influences training through its influence on separation, we cannot confirm this despite numerous attempts at simultaneous estimation. Instead, we find that the influence of separation probabilities on training is typically absent, or even perversely positive. Yet, even as the predicted separation probability is included and fails to play a role, profit sharing continues to be positively associated with training.

Thus, using a wide range of testing strategies, we confirm that profit sharing positively influences training and that it appears to do so directly rather than indirectly through its influence on the probability of separation. In addition, we show that individual performance pay plays virtually no role in determining separations but plays a largely similar role in determining training. This casts further doubt on the existence of an indirect role for profit sharing through its influence on separations and speaks to the importance of a contract that rewards the productivity growth caused by training. At the same time, we have a unique indicator of informal training reflecting circumstances in which co-workers are crucial. Consistent with the second direct effect, profit sharing stands as a significant positive determinant of such training. Finally, individual performance related pay schemes are demonstrated to have no such effect on informal training by

co-workers. Thus, by contrasting profit sharing and alternative performance pay schemes, we present further support for both of the predicted direct causation paths between profit sharing and training.

The next section presents the theory suggesting that profit sharing enhances productivity with a special emphasis on the role of training. It reviews past evidence which indicates the value added by using new data from a country not yet examined and the critical need for a new testing strategy. The third section reviews our data and the methods used. The fourth section presents the evidence on the association between profit sharing and job separation while the fifth section presents the initial evidence on the association between profit sharing and training. The sixth section summarizes our estimates that allow for both direct effects of profit sharing and indirect effect through reduced turnover. A final section concludes.

2. PROFIT SHARING PRODUCTIVITY AND TRAINING

At its simplest, profit sharing aligns the interests of workers with those of owners leading employees to work harder or smarter. There is evidence that workers under profit sharing arrangements have reduced absence rates.[1] In addition there is evidence of a correlation between labor productivity and profit sharing (Kruse 1992, 1993 and Estrin et al. 1997). Yet, the causation is not as straightforward as it may first appear once one recognizes that the "incentive for effort" argument is undermined by the well-recognized 1/N problem. Highly interdependent worker productivities may reduce the power of the associated free riding (Adams 2006 and Heywood and Jirjahn 2006) as may strong horizontal peer monitoring (FitzRoy and Kraft 1987).

[1]See Wilson and Peel (1991) for evidence from the United Kingdom, Brown et al. (1999) for evidence from France, Chelius and Smith for evidence from the United States and Heywood and Jirjahn (2004) for evidence from Germany.

Also, discontinuous incentives that require a certain profitability to be achieved before there is any profit sharing payments can alleviate free riding (Holmstrom and Milgrom 1987 and Petersen 1992). Yet, these take on the characteristics of special cases needed to overcome the more general free-riding problem implied by such a broad group reward as profit sharing.

Parent (2004) takes the influence of profit sharing on productivity as given, but presents evidence that it does not occur by eliciting extra effort. He shows that those workers who received profit sharing on a previous job receive higher wages on their current job. This he claims is unlikely in a model of eliciting effort but fits with the alternative conjecture that profit sharing is associated with greater investment in skills and that these skills stand at the base of improved productivity. It also suggests that at least a portion of the skills acquired due to the influence of profit sharing may be general and thus of value to later employers.

There exist at least three variations in the literature as to why profit sharing may increase training and so influence worker productivity. The first emphasizes the importance of profit sharing on separations and we label this a model of indirect causation as it suggests that the reduced separations are ultimately responsible for the greater incidence of training and so the higher productivity. The second two variations are largely unrelated to separation and we label these models of direct causation. Among our major objectives, we will distinguish empirically between the direct and indirect models.

Profit sharing may reduce employee separations encouraging investment in firm specific capital as the expected amortization period for such investments grows. Kruse (1992) argues that workers may reduce their initiated separations because profit sharing "leads to greater

identification with the firm" and because workers may value the stronger link between compensation and effort implied by profit sharing. At the same time, firms may reduce their initiated separations because profit sharing reduces the marginal cost of labor during periods of weak firm performance making redundancy less likely (Weitzman 1984). The existing evidence on the relationship between profit sharing and separation is mixed. D'Art and Turner (2004) fail to find any influence of profit sharing on separation in their large survey of firms in 11 European countries. Chelius and Smith (1990) found only "borderline" evidence in earlier US data claiming it was at best "suggestive." These studies contrast with the more recent US individual level estimations of Azfar and Danninger (2001) showing a strong negative influence of profit sharing on the probability of a worker being made redundant and also showing a negative influence of profit sharing on the probability of a worker quitting.[2]

Azfar and Danninger (2001) combine their evidence that profit sharing reduces separations with similarly strong evidence that profit sharing is associated with increased training. They show that workers with profit sharing were 25 percent more like to receive training and that when trained, they received significantly more training as well. They argue that the combined findings that profit sharing reduces separations and that it increases training "support our hypothesis that greater job stability increases investment in firm-specific training." (Azfar and Danninger 2001, p. 626)

While recognizing the importance of these findings, the pattern of indirect causation between profit sharing and training relies upon a strong link between the likelihood of separation and

[2] Arranz-Aprete (2005) uses individual data from Finland confirming the negative influence of profit sharing on turnover. Earlier work by Kraft (1991) confirms that profit sharing decreases the number of dismissals while Kruse (1991) used more aggregate data showing that profit sharing firms had smaller employment decreases during economic downturns.

training. Although longer expected tenure is taken as a basic determinant of training (Lynch 1991, 1993), the influence of reduced separation probabilities on training may not be large if firm specific training is actually rare, as indicated by Lowenstein and Spletzer (1999), and most periods of unemployment following separation are short or non-existent. Thus, Royalty (1996) estimates the influence of predicted separation probabilities on the incidence of employer-provided training. She finds that the probability of "job to job" separation (the majority of separations for men) has no influence on training and that only the probability of "job to non-employment" separation has a negative influence. This confirms the importance of expected employment duration not expected tenure duration. Veum (1997) finds a *positive* association between training off-the-job and worker separation and, at best, a weak negative association between employer-provided training and separation. Levine (1993) finds no evidence that plants that provide greater training have lower turnover rates and Sieben (2005) finds evidence from European survey data that periods of general training actually trigger *increased* job search behavior. Using UK data Green et al (2000) find no relationship between training and mobility. In short, researchers interested in the influence of profit sharing on training should not take for granted that a reduced probability of separation necessarily increases training. There may, instead, be a direct link with profit sharing. Two channels have been suggested in the literature explaining how profit sharing may directly increase training.

First, profit sharing has been seen as an explicit contract that helps alleviate the well-known "hold-up problem" associated with investments in firm specific training (FitzRoy and Kraft 1987). Firm specific skills are inherently difficult to contract upon and because they have no market value, firms cannot be trusted to share the rents over those skills without resort to strong

reputation effects. Moreover, even for general training, workers may fear a hold-up problem from their current employer if it is costly or time consuming to find alternative employment. Thus, "by writing a contract in which it is specified that workers get a certain percentage of profits, workers can feel more confident that they will not be held up *ex post* (Parent 2004: 38)." Thus, workers under profit sharing arrangements may choose to devote more time investing in skills. Interestingly, this function might well be played by alternative performance pay schemes that allow workers to capture returns on their investment in training and improved performance (Kraft 1991). As a result, we will examine the role of both profit sharing and individual performance pay throughout our analysis. In either case, it is the explicit contract that rewards increased productivity that causes the investment not an indirect influence through a decreased risk of separation.

Second, profit sharing has been seen as directly encouraging "helping effort" in which workers allocate effort not only to their own tasks but also to assisting with the tasks of coworkers (Itoh 1991). Profit sharing thus helps reduce the confirmed tendency under individual incentives of ignoring the profitable allocation of effort to helping coworkers (Drago and Garvey 1996). Critically, training has very large elements of helping effort. Co-workers provide a large share of both formal and informal on-the-job training and do so by taking time away from other duties (Barron et al. 1989). The time and effort workers spend training co-workers has been thought to depend on the incentives they face. Profit sharing reduces the tendency to under-provide training effort. Indeed, Morrison and Wilhelm (2004) emphasize the role played by co-worker training in professional service firms (such law firms) arguing that partnership arrangements in which the trained workers retain a share of profit are critical to ensuring that the appropriate degree of training is provided to new hires. Similarly, Encinosa et al. (2007) find that U.S. doctors

receiving a share of firm profits rather than receiving earnings based on their individual contributions are more likely to consult with one another about cases and provide their expertise to colleagues. Thus, in this view profit sharing increases the incentive for informal and on-the-job training by co-workers and supervisors who might otherwise emphasize their own tasks. In this case, individual performance pay should work in the opposite direction as profit sharing. Explicit rewards for workers' own productivity should be at odds with helping and training newer hires as the diverted time increases overall productivity but not in ways rewarded by an individual based scheme.

We present estimates using UK data on profit sharing as a determinant of individual worker separations. Using two UK data sets and controlling for alternative performance pay schemes beyond profit sharing, we confirm a robust role for profit sharing in reducing separations for male employees. We show that profit sharing is associated with greater likelihood and intensity of training but we fail to find evidence for the hypothesized indirect causation through reduced separations. Instead, the evidence supports the existence of a direct influence of profit sharing on training.

3. DATA

We use two longitudinal data sets from the UK that sample very similar populations in similar time frames, the British Household Panel Survey (BHPS) and the 5 quarter longitudinal version of the UK Labour Force Survey (LFS). The BHPS is an annual longitudinal survey from 1991 to 2004. The longitudinal version of the LFS we use has been running since 1992 and comprises a five quarter rolling panel where each quarter a new cohort is observed. For both data sets, we limit our sample to male employees aged 20-65 who were not employed in the public sector.

We use these two data sets as each has off-setting strengths with respect to payment method information. The chief advantage of the LFS is its detailed measures of payment methods. From 1999 onwards, individuals record separately if they received tips, piece rates, bonuses, profit shares and a variety of compensatory wages (locality allowances, shift allowances etc).[3] However, payment information is only available in the LFS for the first and last quarter that the individual is observed. Hence, for our purposes, it has only a limited panel dimension. The information on payment schemes in the BHPS is available for 1998 onwards and the questions asked are, "In the last 12 months have you received any bonuses such as a Christmas or quarterly bonus, profit-related pay or profit sharing bonus, or an occasional commission?", this excludes overtime payments; and "Does your pay include performance related pay" (Taylor et al, 2006). Hence the categorization of profit share receipt in the BHPS is broad. A key difference between the two data sets is the time domain that the payment method questions cover. For the BHPS, these relate to payments made in the last year. Due to the quarterly nature of the LFS, payment method information is effectively for the previous 13 weeks.

Both data sets allow the disaggregation of job separations into a number of categories, including quits, fires and redundancies. We observe job separations in the year following the observation of pay type. For the BHPS we have a panel of separations of up to 8 years, whereas with the structure of the LFS we effectively only observe one year of separation data on each individual.

Training information is quite detailed in the BHPS, and has been extensively used by researchers in the past (see for instance Arulampalam and Booth (1998) and Booth and Bryan (2006)). We

[3] We group tips and piece rates into one category (performance pay).

focus on the incidence and intensity of employer funded training, general training and specific training. The LFS contains less detailed information on training, and much of this is only available for certain subsets of the data. However, unlike the BHPS, it has an explicit question on the incidence of informal on-the-job training. We use this to examine the role of profit shares on helping effort.

Table 1 provides summary statistics for the two data sets. In the BHPS roughly 42 percent of our sample report receiving a "profit share or bonus" in the past year and 19 percent report some form of performance pay. The more detailed pay scheme rates in the LFS appear somewhat lower; however recall that these are reported rates of payment in the past quarter. If these rates are roughly annualized, then profit share/bonuses are received by approximately 39 percent of male non-public sector employees. Whether the receipt of performance related pay is of a comparable level is dependant on how respondents in the BHPS viewed payments classified as compensatory wages and the other additional payments listed in the LFS. Otherwise the two samples appear roughly comparable, although there are slight variations by age and hours worked. Log weekly pay rates are noticeably lower in the LFS.

4. RESULTS: THE DETERMINANTS OF SEPARATION

Probit estimates of the risk of job separation are reported in Table 2 and Table 3 for the BHPS and LFS, respectively. For ease of interpretation we report marginal effects. We present overall estimates of separation and subsequent estimates disaggregated by quits, fires and redundancies (a subset of fires). Initially, risk of separation is estimated across the pooled sample for the BHPS with standard errors clustered at the individual level. Both data sets present clear evidence that

the receipt of profit sharing is associated with a lower risk of separation. Furthermore, profit sharing appears to be associated with both lower incidence of employee initiated separations (quits), employer initiated separations (fires) and redundancy. Such systematic effects are not observed for other performance pay and there is even some evidence that other performance pay types are associated with a higher risk of separation.

Greater tenure may simply reflect a lower probability of separation. This mechanical relationship may over-control the determinants of separation allowing misleading results to emerge. As a robustness check, Appendix Table A1 demonstrates that the reported effects of profit sharing on turnover are robust to the omission of tenure, which in a pre-sorted sample such as the BHPS and LFS is likely to be endogenously related to separation risk.

It has been suggested that any observed relationship between profit shares and job turnover may simply reflect the sorting of individuals by unobservable characteristics. As one illustration, workers who form strong bonds with co-workers may both sort into employers using profit sharing and be less likely to quit (Heywood et al. 2005). To investigate this and related possibilities, we re-estimate the models of overall separations for the BHPS where we utilize a fixed effects logit estimator in an attempt to control for unobserved individual level heterogeneity.[4] The results from this model are reported in table 4. This demonstrates that the sign and magnitude of profit sharing effects on separations are robust to the inclusion of individual level fixed effects.

[4] Two related problems emerge because the fixed effects logit estimator excludes observations with no variation in the dependent variable. First, the smaller sample size makes it difficult to gain efficient fixed effects estimates for the separation sub-categories. Second, the resulting sample may not be fully representative. We note that alternative fixed effects linear probability models yield profit share effects very similar in magnitude and significance to those reported in table 4. These estimates, and fixed effects logit estimates for the separation sub-categories, are available from the authors upon request.

5. RESULTS: THE DETERMINANTS OF TRAINING

Table 5 provides probit estimates of the impact of profit sharing on training incidence with standard errors clustered at the individual level. The estimates are reported for overall training incidence, along with the incidence of employer funded training, general training and specific training. Such a detailed level of disaggregation is not possible in the LFS, so reported estimates are from the BHPS. Nonetheless, estimates of the influence of payment method on overall training incidence from the LFS are reported as appendix A2. All control variables are as reported in table 2 and 3, respectively, but for brevity only the estimated payment method effects are reported.

The estimates of overall training incidence in table 5 and appendix Table A2 demonstrate that the receipt of profit sharing stands as a positive determinant of the incidence of training. The estimates for the disaggregated training incidence models also suggest a positive association between profit share receipt and the receipt of employer-funded training, specific training and general training. The magnitudes of these effects are roughly similar. Furthermore, evidence from the LFS indicates that profit sharing is positively associated with a higher incidence of informal on-the-job training (Column 5, Table A2), an effect that is not evident for performance pay. When combined with our inability to find a role for reduced separation probability on training (see section 6), this finding is consistent with the notion that profit sharing increases helping effort and so training within the workplace.

The estimated association between training and profit shares may merely signal that individuals who have higher unobservable propensity to train may sort into workplaces with

profit sharing arrangements. We investigate this by again controlling for individual specific unobservable characteristics by re-estimating the model of overall training incidence via fixed effects logit.[5] These estimates are reported in table 6. These retain the same signs to those reported in table 5, although the effect of profit sharing on overall training incidence just misses significance at the 10 per cent level.

6. DIRECT VS. INDIRECT EFFECTS - THE ROLE OF SEPARATIONS

As discussed, Azfar and Danninger (2001) argue that profit sharing increases the receipt of training by reducing the likelihood of separation, increasing the amortization period for investment and so making a larger share of training investments profitable. At the same time profit sharing may directly influence training receipt by alleviating the hold up problem in training and by increasing the willingness of coworkers to provide training. In this subsection we allow for the possibility of both direct and indirect effects. We investigate this by creating an instrument for the risk of separation and including it as a regressor in a 2SLS estimation of training incidence.[6] In both the instrumental equation on separation risk and in the training incidence equation profit sharing stands as a critical variable of interest. The combination of a significant role for profit sharing in the instrumental estimation of separation risk and a role for the instrumented separation risk variable in training incidence would indicate an indirect effect of profit sharing. A significant role for profit sharing in the second stage estimation of training

[5] Again this strategy may introduce sample selection bias into our estimates. We re-estimated all the models reported in table 6 by linear probability model with fixed effects. This produced similar estimates of the effect of profit sharing/bonuses and performance pay on the incidence of training.

[6] See Wooldridge (2002: 623-625) for a defense of using such a methodology even when using limited dependent variables.

would indicate a direct role. The ability to distinguish between these direct and indirect effects depends upon the success of the instrumental variable approach.

The identification of our instrument exploits a long recognized association between cigarette smoking and risk preference. Thus, Hersch and Viscusi (1990) and Hersch and Pickton (1995) use cigarette smoking to proxy individuals with greater risk preference. Experiments confirm this association by asking participants to engage in experimental lotteries designed to measure their risk aversion. At the conclusion of the experiment Barsky et al. (1997) found that those who undertook the larger risks in the laboratory were significantly more likely to smoke. Critically cigarette smoking has been correlated with important labor market choices. Viscusi and Hersch (2001) demonstrate that US workers who smoke take substantially more risky jobs (in terms of injuries on the jobs). In the UK Brown et al. (2006) show that smokers are more likely to accept jobs with greater earnings and employment risk. The critical point we apply from this literature is that smokers can be expected to receive less disutility from a given risk of job separation. As a consequence, in a hedonic labor market, we anticipate that workers that smoke will sort into jobs with higher expected separation risks all else equal.

At the same time that our identification scheme requires a variable that strongly determines a workers separation risk, that same variable should not influence the incidence of training itself. While some forms of training may be more risky than others, there is nothing about the association between smoking and risk that we think should influence the decision whether or not to undertake training itself. Statistically, the number of cigarettes smoked daily appears to be a highly satisfactory instrument insofar as it is statistically significant in the separation equation (*T-Stat* = 5.13), unrelated to any of the measures of training incidence (an average *T-Stat* of 0.11), and test statistics (*F-Test* = 135.86) are well above the critical values

outlined by Stock and Yogo (2005) to detect weak instruments. We experimented with another instrumental variable that met the same statistical criteria, whether the individual reported having a poor financial situation. We included this in estimates both in conjunction with the number of cigarettes smoked and in estimations where the smoking variable was omitted. In none of the training models did this materially affect the magnitude or sign of the profit sharing or performance pay effects on training incidence.

Estimates from the 2SLS model are reported as Table 7. The addition of the smoking variable does not change the important role that profit sharing plays as a negative determinant of probability of job separation. Thus, the indirect effect will be confirmed if the predicted probability of separation influences training.

Two critical observations emerge from Table 7. First, the predicted probability of separation never takes a statistically significant coefficient. Indeed, it is worth nothing in passing that if one ignores the proper instrumenting of the separation probability and simply includes separation as a normal regressor, it often takes not only positive a positive coefficient but one statistically significant from zero.[7] Thus, even though profit sharing lowers the rate of separation, the lowered rate of separation plays no role in increasing training. In short, we find no support for the indirect path of causation. Second, despite the addition of the estimated probability of separation, the role of profit sharing on training remains in the second stage estimates presented in Table 7. Profit sharing takes a significantly positive coefficient in all four estimates for the different types of training and thus appears to have a strong and robust *direct* influence on training.

It might be thought that our estimation is missing the critical role played by separation because of the range of tenures in our sample. Specifically, most separations may happen early

[7] Similar results are reported by Bassanini et al (2005) using the European Community Household Panel.

in a workers' tenure and it is also at this time that most training is undertaken (Greenhalgh and Marvotas 1996). Thus, our estimations might fail to uncover the true negative influence of the separation probability on training that happens throughout most of a worker's later tenure. To test this we re-estimate our model in Table 8 eliminating all workers within their first two years of tenure. While the point estimates move modestly, the direct effect of profit sharing remains strongly confirmed and there is no significant role for the estimated separation probability. We went further eliminating all of those with less than five years and than all of those with less than ten years. Neither set of estimations show the predicted negative influence of the estimated probability of separation and both strongly confirm the continuing direct role of profit sharing.

Furthermore, the 2SLS estimates of profit shares effects on training reported in tables 7 and 8 are robust to a number of additional tests and specifications. First, estimating the impact of separation within the next year on training is an arbitrary time interval. We estimated additional models using separation within the next 2 years and next 3 years, respectively. In no case did this markedly affect the point estimates of profit shares effect on training incidence or reveal an indirect effect. Second, separation may represent too coarse a turnover variable. Instead risk of employer initiated separations (fires) may be more likely to effect employers' decisions on who to train (especially in firm specific skills). We re-estimated the models in table 7 using fires instead of separations, again the point estimates of profit shares on training remain essentially unchanged.

In addition, we estimate separate 2SLS models of training incidence for two sub-groups where there is an expectation of longer term employment relationships, unionised workers and permanent (i.e. non-temporary) workers. For both groups we expect longer expected duration of employment and, as a result, less potential for profit sharing effects on training to be a result of

its indirect influence on turnover. Conversely, temporary workers and non-unionised workers should have relatively lower expected tenure, suggesting greater scope for indirect effect through separation. We estimate the 2SLS models of training incidence for non-unionised workers (there are too few observations to estimate a model for temporary workers alone). For permanent workers, the estimates of profit sharing effects on training are essentially unchanged to those reported in table 5. For unionized workers, estimated profit sharing effects are marginally higher than those in table 5 (marginal effects = 0.047 [0.018]). In neither case is there any evidence of an indirect effect of profit sharing on training through reduced separation risk. Estimates for the non-unionised sub-sample indicate a marginally lower direct effect (although still statistically significant) of profit sharing on training, but still no effect of separation risk on training incidence. Taken together, these estimates provide a further indication that the observed effect of profit sharing on training is being driven by a direct effect rather than indirectly through lower separation rates.

In an alternative robustness check, we examine the joint estimation of separation risk and training recognizing that common unobservable factors may influence both contemporaneous separation risk and training incidence. We estimate bivariate probit models (Zellner and Lee, 1965) which account for common errors and report the results in Table 9. Again we use number of cigarettes as the identifying variable. Indeed, unobservable individual level factors that increase separation risk are also associated with higher levels of training incidence. Yet, the presence of this association this does not fundamentally change the estimated effect of profit shares on the overall incidence of training or of its subcomponents.

7. CONCLUSION

Previous research demonstrates the link between the use of profit sharing schemes and increased profitability, labour productivity and worker wages. However, relatively little is understood about how profit sharing increases worker productivity. This paper investigated one particular channel, the effect of profit sharing on worker training. In particular, we distinguish between the direct effect of profit sharing on training through creating a contract that rewards training and/or encouraging co-workers to provide training, and the potential indirect effect through reduced separations and hence longer expected amortization period.

As a first step we use UK data to demonstrate that profit sharing is associated with lower separation rates. In turn, we demonstrate a positive, direct and statistically significant effect of profit sharing on the provision of worker training. This is true of overall training incidence and intensity, but also for sub-categories of training such as employer-funded, specific and general training. These results are robust to the inclusion of controls for individual fixed effects, simultaneity of training and separation, and remain once we attempt to control for the effect that profit sharing has on reducing the likelihood of future separation from the firm.

More generally, these direct effects on training are also present for other performance related pay. However, unlike performance related pay schemes that directly reward individual productivity, profit sharing may also increase informal and on-the-job training provision by co-workers. We present evidence that profit sharing does indeed increase the provision of informal on the job training, and that no such effect is present for direct performance related pay.

Together, our results suggest that profit sharing changes employer-worker relations in a way that leads to greater formal and informal investment in worker skills. We argue that this is

one likely source of the previously demonstrated worker productivity enhancing effect of profit sharing arrangements. We emphasize that we found no evidence that profit sharing has an indirect influence on training through its role in reducing turnover.

TABLE 1 Summary Statistics, Male Non-Public Sector Employees Aged 20-65

	BHPS 1998-2004		LFS 1999-2004	
Variables	Mean	Std Dev	Mean	Std Dev
Profit Sharing/Bonuses	0.426			
Performance Pay	0.188			
Piece Rate/Tips			0.008	
Profit Shares			0.015	
Bonuses			0.083	
Compensatory Wages			0.075	
Other Additional Payments			0.039	
Age (years)	37.921	11.134	40.450	11.952
Tenure (years)	11.540	7.433		
Tenure: 0-3 months				
3-6 months			0.110	
6-12 months			0.219	
1 – 2yrs			0.161	
2 – 5 yrs			0.219	
5 – 10 yrs			0.161	
10 yrs +			0.341	
Married	0.581		0.640	
Highest Level of Education:				
< A-Level	0.526		0.511	
A-Level	0.237		0.272	
Diploma/Vocational*	0.089		0.096	
Degree	0.119		0.143	
Higher Degree	0.029		-	
Log Pay (£1996)	6.482	1.026	5.506	0.636
Normal Hours Worked	40.040	6.923	42.980	12.354
Union Member	0.219			
Temporary Job	0.032		0.038	
Firm Size: 1-24 workers				
25-99 workers	0.256			
100-499 workers	0.267			
500 workers plus	0.161			
Observations	14047		40269	

Source: BHPS, LFS

TABLE 2 Turnover Estimates – Marginal Effects, Male Non-Public Sector Employees Aged 20-65, 1998-2004, BHPS.

	Separations		Quits		Fires		Redundancies	
	Coeff.	*Std.Err*	*Coeff.*	*Std.Err*	*Coeff*	*Std.Err*	*Coeff*	*Std.Err*
Profit Share/Bonus	-0.041*	0.007	-0.016*	0.004	-0.006	0.003	-0.004	0.003
Performance Pay	0.005	0.008	0.003	0.096	-0.007	0.004	-0.004	0.004
Age	0.001	0.002	0.0002	0.001	-0.001	0.001	-0.001	0.001
Age^2	-0.0001	0.0002	-0.00003*	0.00001	0.00002	0.00001	0.00001	0.00001
Tenure	-0.005*	0.0004	-0.002*	0.0002	-0.001*	0.0002	-0.001*	0.0002
Married	-0.013	0.008	0.003	0.005	-0.007**	0.003	-0.007**	0.003
A-Level	0.020**	0.009	0.009	0.005	-0.0001	0.004	-0.0001	0.004
Diploma	0.030**	0.013	0.021*	0.008	-0.013**	0.006	-0.012**	0.006
Degree or Higher	0.028**	0.011	0.028*	0.007	-0.019*	0.007	-0.017*	0.006
Log Weekly Wage	-0.009**	0.004	-0.008*	0.002	-0.001	0.001	0.0003	0.002
Normal Hours	0.001**	0.0004	0.001*	0.0002	-0.0001	0.0002	-0.0001	0.0002
Union	-0.051*	0.009	-0.020*	0.006	-0.012*	0.004	-0.011**	0.004
Temporary Worker	0.165*	0.017	0.031*	0.010	0.017**	0.008	0.017**	0.007
Firm Size 50-99	0.010	0.009	0.006	0.005	0.004	0.004	0.004	0.004
Firm Size 100 to 500	-0.013	0.009	-0.006	0.006	-0.002	0.004	-0.001	0.004
Firm Size 500+	-0.001	0.001	-0.010	0.007	-0.004	0.005	-0.003	0.005
Constant	-0.132		-0.107		-0.093		-0.100	
Pseudo r^2	0.053		0.074		0.035		0.033	
Observations	14047							

Source: BHPS. *, ** indicate statistical significance at the 1% and 5% level, respectively. Controls included but not reported: year, industry, occupation and region controls. Standard errors clustered at the individual level.

TABLE 3 Turnover Estimates - Marginal Effects, Male Non-Public Sector Employees Aged 20-65, 1999-2004, LFS

	Separations		Quits		Fires		Redundancies	
	Coeff.	*Std.Err*	*Coeff.*	*Std.Err*	*Coeff*	*Std.Err*	*Coeff*	*Std.Err*
Profit Share	-0.029**	0.013	-0.009	0.009	-0.015	0.008	-0.020**	0.009
Performance Pay	0.010	0.015	0.009	0.009	-0.007	0.009	-0.005	0.011
Bonus	0.009	0.005	0.003	0.003	0.004	0.003	0.003	0.003
Compensatory Pay	-0.015*	0.006	-0.011*	0.004	0.001	0.003	-0.004	0.004
Other Bonus	0.009	0.007	0.005	0.005	0.008**	0.004	0.004	0.005
Age	0.001	0.001	0.001	0.001	0.0004	0.004	0.002*	0.0005
Age^2	-0.00003*	0.00001	-0.0002*	0.000006	-0.00005	0.00005	-0.00001**	0.000006
Log Weekly Wage	-0.010*	0.003	-0.008*	0.002	0.0001	0.002	0.002	0.002
Hours	0.001*	0.0001	0.0002*	0.00008	0.0002**	0.0001	0.0001	0.0001
Tenure: 3-6 months	-0.028*	0.007	-0.018*	0.005	-0.007**	0.003	-0.002	0.005
6-12 months	-0.033*	0.006	-0.014*	0.004	-0.014*	0.003	-0.008	0.005
1 – 2yrs	-0.048*	0.006	-0.023*	0.004	-0.016*	0.003	-0.010**	0.004
2 – 5 yrs	-0.076*	0.006	-0.030*	0.004	-0.024*	0.003	-0.016*	0.004
5 – 10 yrs	-0.104*	0.006	-0.049*	0.004	-0.024*	0.003	-0.017*	0.004
10 yrs+	-0.146*	0.006	-0.071*	0.004	-0.032*	0.058	-0.023*	0.004
Married	0.010*	0.003	0.005**	0.002	0.001	0.032	-0.007*	0.002
A-Level	0.003	0.005	0.001	0.003	0.003	0.003	-0.002	0.003
Voc/Diploma	0.008**	0.004	0.042	0.029	-0.001	0.003	-0.001	0.002
Degree or higher	-0.008**	0.004	-0.116*	0.040	-0.001	0.003	-0.001	0.003
Temporary Worker	0.050*	0.006	0.006	0.050	0.040*	0.003	0.014*	0.004
Constant	-0.095		-0.067		-0.109		-0.185	
Pseudo r^2	0.072		0.073		0.053		0.017	
Observations	40269							

Source: LFS. *, ** indicate statistical significance at the 1% and 5% level, respectively. Controls included but not reported: year, industry, occupation, region and ethnicity controls. Robust standard errors.

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TABLE 4 Fixed Effects Estimates of Payment Method Effects on Separation (Average Effects), Male Non-Public Sector Employees Aged 20-65.

	Fixed Effects	
	Coeff.	*Std.Err*
Profit Share/Bonus	-0.809*	0.078
Performance Pay	0.199**	0.093
Observations	5,963	

Source: BHPS. *, ** indicate statistical significance at the 1% and 5% level, respectively. Controls included but not reported: year, industry, occupation and region controls.

TABLE 5 The Effect of Payment Method on Training Incidence and Intensity, Male Non-Public Sector Employees Aged 20-65, 1998-2004.

	Trained?		Employer Funded Training		Specific Training		General Training	
Incidence (marginal effects)	Beta	Std Err	Beta	Std Err	Beta	Std Err	Beta	Std Err
Profit Share/Bonus	0.038*	0.008	0.036*	0.007	0.041*	0.008	0.037*	0.008
Performance Pay	0.034*	0.011	0.017**	0.008	0.031*	0.010	0.032*	0.011
Intensity (hours)	Training Time		Employer Funded Training		Specific Training		General Training	
	Beta	Std Err	Beta	Std Err	Beta	Std Err	Beta	Std Err
Profit Share/Bonus	2.074*	0.661	2.668**	1.213	2.025	1.599	3.387**	1.444
Performance Pay	2.568*	0.750	0.087	1.519	0.207	2.003	0.176	1.809
Observations	14047							

Source: BHPS. *, ** indicate statistical significance at the 1% and 5% level, respectively. Controls included but not reported: year, industry, occupation and region controls.

TABLE 6 Fixed Effects Estimates of Training Incidence (Average Effects), Male Non-Public Sector Employees Aged 20-65.

	Trained?		Employer Funded Training		Specific Training		General Training	
	Coeff.	*Std.Err*	*Coeff.*	*Std.Err*	*Coeff.*	*Std.Err*	*Coeff.*	*Std.Err*
Profit Share/Bonus	0.105	0.069	0.241*	0.077	0.200*	0.072	0.146**	0.071
Performance Pay	0.134	0.080	0.083	0.089	0.155	0.082	0.153	0.082
Observations	7043		5633		6501		6692	

Source: BHPS *, ** indicate statistical significance at the 1% and 5% level, respectively.

Controls included but not reported: year, industry, occupation and region controls.

TABLE 7 IV Estimates of Payment Method on Training, Male Non-Public Sector Employees Aged 20-65.

	Trained?		Employer Funded Training		Specific Training		General Training	
	Coeff.	*Std.Err*	*Coeff.*	*Std.Err*	*Coeff.*	*Std.Err*	*Coeff.*	*Std.Err*
Separation	-0.039	0.100	0.012	0.087	-0.021	0.097	-0.027	0.094
Profit Share/Bonus	0.033*	0.011	0.036*	0.010	0.034*	0.011	0.038*	0.011
Performance Pay	0.039*	0.010	0.021**	0.009	0.038*	0.009	0.038*	0.010
Observations	14047							

Source: BHPS *, ** indicate statistical significance at the 1% and 5% level, respectively.

Controls included but not reported: year, industry, occupation and region controls.

TABLE 8 IV Estimates of the Effect of Payment Method on Training Incidence by Tenure Bands, Male Non-Public Sector Employees Aged 20-65, 1997-2004, BHPS.

	Trained?		Employer Funded Training		Specific Training		General Training	
Tenure > 2 yrs	Beta	Std Err	Beta	Std Err	Beta	Std Err	Beta	Std Err
Separation	-0.109	0.174	0.038	0.150	-0.078	0.164	-0.048	0.168
Profit Share/Bonus	0.029	0.016	0.039*	0.014	0.035**	0.015	0.033**	0.016
Performance Pay	0.041*	0.011	0.021**	0.009	0.039*	0.011	0.038*	0.011
Observations	13069							
				Tenure > 5 yrs				
	Beta	Std Err	Beta	Std Err	Beta	Std Err	Beta	Std Err
Separation	0.134	0.160	0.015	0.138	0.117	0.151	0.151	0.156
Profit Share/Bonus	0.049*	0.016	0.038*	0.011	0.053*	0.015	0.050*	0.016
Performance Pay	0.037*	0.012	0.016	0.011	0.038*	0.012	0.035*	0.012
Observations	9972							
				Tenure >10 yrs				
	Beta	Std Err	Beta	Std Err	Beta	Std Err	Beta	
Separation	0.223	0.203	0.105	0.175	0.218	0.192	0.215	0.197
Profit Share/Bonus	0.057*	0.018	0.045*	0.015	0.059*	0.017	0.055*	0.017
Performance Pay	0.021	0.014	0.002	0.012	0.020	0.014	0.035**	0.014
Observations	6817							

Source: BHPS *, ** indicate statistical significance at the 1% and 5% level, respectively.

Controls included but not reported: year, industry, occupation and region controls.

TABLE 9 Bivariate Probit Estimates of Profit Share Effects on Training and Separation, Male Non-Public Sector Employees Aged 20-65

	Trained?		Employer Funded Training		Specific Training		General Training	
	Coeff.	*Std.Err*	*Coeff.*	*Std.Err*	*Coeff.*	*Std.Err*	*Coeff.*	*Std.Err*
Profit Share/Bonus	0.084*	0.029	0.066**	0.032	0.085*	0.030	0.078*	0.030
Performance pay	0.062	0.038	0.059**	0.039	0.064	0.038	0.062*	0.037
				Separation				
Profit Share/Bonus	-0.161*	0.029	-0.162*	0.029	-0.162*	0.029	-0.162*	0.029
Performance pay	0.034	0.036	0.034	0.037	0.034	0.037	0.034	0.037
Number Cigs	0.005*	0.001	0.005*	0.002	0.005*	0.002	0.005*	0.002
Rho	0.045**	0.019	0.012	0.020	0.007	0.019	0.045**	0.019
Observations	12842							

Source: BHPS *, ** indicate statistical significance at the 1% and 5% level, respectively.

Controls included but not reported: year, industry, occupation and region controls.

TABLE A1 Turnover Estimates Omitting Tenure, Male Non-Public Sector Employees Aged 20-65

	Separations		Quits		Fires		Redundancies	
BHPS	*Coeff.*	*Std.Err*	*Coeff.*	*Std.Err*	*Coeff.*	*Std.Err*	*Coeff.*	*Std.Err*
Profit Share/Bonus	-0.393*	0.030	-0.145*	0.035	-0.088**	0.045	-0.071	0.046
Performance Pay	0.124*	0.035	0.032	0.045	-0.086	0.059	-0.057	0.060
LFS	*Coeff.*	*Std.Err*	*Coeff.*	*Std.Err*	*Coeff.*	*Std.Err*	*Coeff.*	*Std.Err*
Performance Pay	0.056	0.096	0.096	0.115	-0.137	0.170	-0.064	0.146
Profit Share	-0.239*	0.085	-0.164	0.107	-0.306**	0.147	-0.284**	0.123
Bonus	0.047	0.032	0.030	0.041	0.063	0.048	0.039	0.043
Compensatory Pay	-0.171*	0.037	-0.201*	0.048	-0.030	0.052	-0.073	0.046
Other Bonus	0.051	0.047	0.059	0.060	0.137**	0.067	0.054	0.062

Source: BHPS *, ** indicate statistical significance at the 1% and 5% level, respectively.

Controls included but not reported: year, industry, occupation and region controls.

Appendix A2 Training Incidence, LFS, Marginal Effects

LFS	Trained in last 13 weeks?		On the Job Training in Last 4 weeks?*	
	Beta	Std Err	Beta	Std Err
Performance Pay	-0.001	0.025	-0.007	0.014
Profit Share	0.092*	0.019	0.044*	0.013
Bonus	0.033*	0.008	0.009	0.005
Compensatory Pay	0.090	0.009	0.044*	0.006
Other Bonus	0.053*	0.012	0.002	0.007
Observations	40269			

* "On the job training" means learning by example and practice while actually doing the job. Any training conducted in a classroom or training section, even if on the employers premises is not "on the job training". (ONS, 2005)

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