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Absenteeism in a Low-wage Setting

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ABSTRACT

This study uses a unique data set, a low-paying manufacturing plant, to test many stylised facts of absenteeism. Analysis of both the demographic characteristics of employees, and external factors shows that female staff are more "reliable" and those who are promoted less so. The plant exhibited poor performance across many indicators and so managers introduced several improvements to pay and conditions. The reaction of different grades of employees to the discrete improvements in conditions showed limited variation, with pay rises proving to be the least critical factor in curbing absence.

Keywords:
Absenteeism, low wage, manufacturing, quantitative methods

Absenteeism in a Low-wage Setting

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1. INTRODUCTION

Absenteeism is a major workplace issue for the UK. Time off imposes costs on the employing organisation, individuals, and economy as a whole. In 2006, an average of 7 days was lost per employee, varying from 8 days for manual workers to 6.2 for non-manuals (CBI Press Release 2007). CBI estimates of the cost to the whole economy in sick pay and replacement staff was £13.4 billion in 2006, or £537 per employee (CBI Press Release 2007), rising from £10.5 billion, or £438 per worker in 1999 (CBI News Release 2000). The employer faces both direct costs from the lost production of the absent worker; disruption problems due to organising cover; the costs of monitoring and sometimes counselling absentees; and sick pay in excess of the statutory minimum. Indirect costs arise from disruption to the work patterns and productivity of attending staff, specifically where team work is important. Employees too face indirect and direct costs. Direct costs include any lost wages and benefits, whilst indirect costs may be decreased promotion chances, or the greater likelihood that they will be laid off or sacked.

This paper explores the longitudinal picture of absenteeism in one food manufacturing plant in North London in the mid 1990s. A particularly rich data set is available for this plant, comprising two and a half years payroll and personnel details. This plant was typified by low tenure, high absenteeism and poor economic performance until taken over by a national food manufacturer in 1992. The new owners subsequently sought to improve every aspect of performance, and introduced a significant sequence of changes in working conditions and pay from April 1995.

To set the scene, Table I presents industry level absence information from the 1990 Workplace Industrial Relations Survey (WIRS), and its follow up Workplace Employee Relations Survey of 1998. Respondents are asked for the percentage of staff taking time off sick over the last year. There is wide variation across and within industries, although the percentage of staff absent appears to have fallen, continuing a downward trend identified by Rose (1985). Looking at manufacturing, between 4 and 6 per cent of staff were off in the year prior to the 1990 survey, falling to 2-4% in the 1998 survey. At the chosen factory, hereafter called ‘Bun Factory’, 53% of staff took time off between July 1995 and June 1996. The WIRS survey data only gives banded values, but even these comparisons suggest that Bun Factory has extremely high levels of absenteeism. Whilst this might imply that the findings are not widely transferable, the analysis of any changes in absenteeism following changes to pay and conditions may have more general applicability.

Table 1 about here.

The lay out of the paper is as follows: firstly, absenteeism definitions are discussed. Then the impact of demographics, job characteristics, and internal and external pressures on patterns of absenteeism is reviewed and hypotheses generated. Research on the impact of changes in working conditions is discussed.

Following a discussion of the data, results are presented. Conclusions are offered in the final section.

2. WHAT IS MEANT BY "ABSENTEEISM"?

Studies of absenteeism are less numerous than those of other employment phenomena such as job satisfaction or labour turnover, and those that exist are fraught by definitional issues which make many of the results incomparable (Hackett: 1989). The commonest measures are the overall rate of absence – the total number of days lost divided by the total number of working days available; the frequency – spells of absence over total employees, and the incidence – employees off one or more times divided by total employees. These measures can be taken over different time periods - monthly, quarterly or annually and are generally multiplied out so that they can be expressed as percentages.

Concern with the length of spells relates to the recognition that reasons for time off will vary. A common argument is that absence can be broken down in to "voluntary" and "involuntary" time off. Longer spells are likely to indicate health problems (Vistnes, 1997), an involuntary cause of absence. Deery et al (1999) selected periods of one or two days where the worker did not obtain a medical certificate, whilst Mowday et al (1982) used a three day cut-off. Steers and Rhodes (1978) argue absence will depend upon both the motivation and ability to come to work. Motivation reflects satisfaction (voluntary absence), and family constraints and pressures reflecting the state of the wider job market (involuntary absence). Unusually here it is possible to distinguish between medically verified absences and those that were either self or uncertified. The latter two categories will be treated as voluntary absence.

The lack of consistency in defining absenteeism extends to the choice of measure. Some studies choose to look at the number of days off in a given period – severity (Chaudhury and Ng, 1992), whilst others choose the number of separate spells – frequency (Hackett, 1989; Mowday et al, 1982). Whilst there is no consensus, the measure chosen has implications for the modelling technique. The length of period chosen also varies. Absenteeism will be influenced by seasonal and cyclical pressures (Mowday et al, 1982). Longer periods give more robust results so both Edwards and Whitston (1993) and Chaudhury and Ng (1992) explore a year's data. Barmby and Treble (1991), take self-reported data for a period of two weeks, and fail to find significant influences. This data set covers a period of two and a half years with a focus is on July 1995 - June 1996. The source of the information can also influence the quality of the data. There is a risk of attribution bias – with the individual seeking to justify their absence from work. Recall bias is also an issue if data collection is not immediate. The use of employers' data offers a rich sample which enables most of the problems encountered in previous research to be surmounted.

3. THEMES AND HYPOTHESES

3.1) Absenteeism and Demographic, Job, Workgroup and Labour Market Characteristics

Female labour market participation rates are lower than those of men, and their choice of employment may be driven by the need to combine work and care for children. Most studies examining the impact of gender have found that women are more likely to take time off, though this may be driven by a number of factors:

their lower labour market commitment (Mastekaasen & Olsen, 1998, Chaudhury & Ng, 1992); their need to care for other family members (Mastekaasen and Olsen, 1998; Allen, 1983); or poorer health (Vistnes, 1997). Vistnes (1997) argues that the pattern of absenteeism varies so much by gender that separate equations should be run. Edwards and Whitston (1993) found that women of child bearing age were more likely to take time off, which led the employer to advocate avoiding their employment. Therefore we have:
Hypothesis 1: women will show a higher rate of absenteeism than men.

In a series of papers Allen (1981a, 1981b, 1983) finds higher absenteeism is associated with inflexibility in scheduling and accident rates. Access to flexible work scheduling is often argued to inhibit absence, as workers are better able to deal with other commitments (Allen, 1983; Chaudhury and Ng, 1992). Allen (1981a) finds that workers in large plants are more likely to take time off as they were more constrained by predetermined work schedules. Hours' data is not available in this sample, but shift pattern is. Those on day or night shifts are less likely to have flexibility for their non-work affairs and will have to adjust their lives to fit their work schedules. Therefore we develop:
Hypothesis 2: Staff on days and nights will take more time off.

Chaudhury and Ng (1992) suggest that those with higher levels of education face fewer hazards and have greater chance to use initiative, but in practice they find that lower rates are only observed for long-term absences. Allen (1983) discovered that blue-collar workers take more time off than white-collar, but this may reflect their relative inability to conceal their absence. Indeed, Delgado and Kniesner (1997) found that more highly skilled labour has a higher absence rate. In this sample grade represents skill level, acting as a proxy for wages. Therefore we have:
Hypothesis 3: Lower grade staff will take more time off work.

Steers and Rhodes (1978) and Mowday et al (1982) emphasise that attendance is driven by both desire and ability to attend. Distance from home to work can be classed as a factor affecting ability to attend. Delgado and Kniesner (1997) find that distance has a significant, negative impact on attendance. As postcode information is available for staff in this sample it is simple to calculate travel to work distances. This leads us to:
Hypothesis 4: Those with further to travel will be off more often than those living close to the plant.

Age effects on absenteeism are indeterminate. Chaudhury and Ng (1992) argue that older workers are more likely to be ill, but have stronger commitment due to financial constraints. However, Allen (1983) found that young workers were more likely to be off than older colleagues. The London bus driver sample showed age to be negatively associated with absenteeism (Delgado and Kniesner, 1997). Therefore we predict that:
Hypothesis 5: Younger workers will take more time off.

Both Delgado and Kniesner (1997) and Avery and Holtz (1984) argue that models must accommodate the individual's reaction to changing circumstances. Delgado and Kniesner find that lagged absence spells were significant (positive) explanatory variables. We now have:

Hypothesis 6: Lagged absenteeism will be positively correlated with current absenteeism.

Steers and Rhodes (1978), Markham (1985), and Markham and McKee (1991) mention the role of "pressures", such as unemployment, in determining attendance. Markham and McKee (1991) use a sample of US textile plants to investigate the effect of external and internal pressures, unemployment rates and changes in the size of the workforce, on attendance behaviour. They test whether behaviour is moderated by contemporaneous, lagged or anticipatory rates of plant size and unemployment. Contemporaneous changes in the levels of plant employment and anticipatory changes to local unemployment, and their interaction term, have the most significant impact on absenteeism, indicating a degree of economic awareness on the part of the employees. The nature of these jobs means that these employees have little labour market power and are likely to be sensitive to both plant and wider labour market demand. We thus have:

Hypothesis 7: Workers will reduce voluntary absence in line with falling plant employment.

Hypothesis 8: Falling labour demand in the local labour market will lower absenteeism.

3.2) Absenteeism and Changes to Working Conditions and Pay

Absence may be used to indicate dissatisfaction to the employer, particularly in the absence of other voice mechanisms, see for instance Hirschman (1970) and Allen (1984). Edwards and Whitston (1993) examine absenteeism during a period when the industrial relations climate deteriorated, and a "sophisticated", pluralist approach was replaced by a more cost-centred strategy and unitarist style. The changes proved so unpopular 39% considered leaving and absenteeism increased. Deery et al (1999) find improvements to the working environment may lower absenteeism, with those which are suggested by or negotiated with employees being the most likely to have an impact. Addison and Belfield (2001) find employee involvement (EI) is negatively correlated with time off in 1998 WERS data. When employee involvement was disaggregated the relationship disappeared, suggesting that EI is more than the sum of its parts. Bun Factory remained non-union until 1999, and introduced its first formal communication mechanism, team briefings, in November 1995. Therefore we predict:

Hypothesis 9: Improvement in working conditions and the industrial relations climate will lead to lower absenteeism.

Hypothesis 10: The introduction of team briefings will lower absence.

Katz et al (1983) look at the impact of many quality of working life (QWL) programmes in General Motors Plants on economic and industrial relations indicators, including undifferentiated employee absence. Absenteeism rose much more slowly where strong efforts to improve QWL were observed. They argue that introducing QWL programmes, especially supervisor training, boosts morale, and can alleviate conflict. Krueger and Rouse (1998) look at the impact of adult education provision for low skilled workers in two plants in New Jersey, on a number of indicators including absenteeism and find a small beneficial effect. Therefore we hypothesise that:

Hypothesis 11: The provision of training will have a negative impact on absenteeism rates.
Hypothesis 12: This effect will be greatest where training for supervisors is increased.

Any improvements in basic pay may be subject to two conflicting influences: income and substitution effects. Brown, D. (1998) investigates longitudinal survival rates for new starters at the plant used in this paper. Labour turnover did fall as terms and conditions improved, but grade-related wage increases in May 1996, had the greatest downward effect. Leading us to predict that:
Hypothesis 13: Real wage increases will be associated with falling absenteeism.

4. THE DATA

This study looks at the issue of absenteeism in a medium size food manufacturing plant in the outer London area. The data used are from the payroll information bank and personnel files for the period January 1994 to August 16 1996, though the focus will be on July 1995-June 1996. Observations are available for 1,445 individuals, with each absence spell counting as a separate observation. This provides a data set with 5,055 entries. Historically, Bun Factory performed poorly in the product market and experienced high absenteeism and labour turnover. The plant has relied upon an ethnically diverse workforce, predominantly non-native English speakers, including many seeking asylum seeker status. In-house personnel literature identifies a range of problems faced by new staff: the language barrier; low skills; and transportation issues. For this reason it issues a temporary four-week contract to all starters. It was taken over by a national food manufacturer in 1992, and immediate changes were made to improve its product market performance. Changes to working conditions and wages were introduced between April 1995 and May 1996.

Table II about here.

The tenure and voluntary absence history of these employees can be derived. Individual spells of time off average four periods in both years, and total days off is constant over the two year period, at 22 days, with the highest value for year two being 157 and the lowest 0. Table II presents the monthly statistics on employment levels, quits and absenteeism – in terms of spells and frequency of absence. The table shows that employment levels have fluctuated at around 300 staff. However, absence figures fluctuate much more erratically. The highest number of spells starting in a given month is 248, in March 1995, and the lowest 28 in April 1996. The highest frequency was 74.5%, recorded in April 1995, and highest incidence was 43.3% in December 1995. Figures for frequency and incidence drop off sharply from March 1996.
The data indicates the gender, ethnicity, job category, shift pattern, home postal code and pay grade of each employee. Sample means are presented in table III. The workforce is predominantly male, 90%, and is almost entirely comprised of ethnic minorities. In line with the relatively young age, the mean is 32 years, most workers are single. The factory operates a shift system based around a 45 hour basic working week, with compulsory overtime. Day, afternoon, night, morning and rotating shifts patterns are available, though the commonest by far

are days and nights with a 20% shift premium was payable for night work. The majority of staff is unskilled, 67%, with around 15% being classified as trainees.

Table III about here.

5. RESULTS

5.1) Absenteeism and Demographics, Job or Workplace characteristics

Column one of table IV presents the marginal coefficients from probit estimates of the probabilities of taking any voluntary time off, of taking one or more one-day periods, using a model in the form of equation 1. Probit coefficients and results for involuntary absence are available on request, as is all other output.

Prob (time off) = aX + bY + e
Equation 1

Where X is a vector of individual characteristics, Y of workplace characteristics and e represents the error term.

Table IV about here.

Whilst running separate equations by gender may be ideal (Vistnes, 1997), it requires a large data set, with a fairly even distribution of observations between the two sexes. Results of a log likelihood (Chow) test to estimate the difference in coefficients by sex show that given the small number of women merging information is preferable. Even merging the information, we find that gender has no impact. This is surprising, as literature shows women to have a much higher rate of absence, (Vistnes, 1997, Masktekaasen and Olsen, 1998, Chaudhury and Ng, 1992). This causes us to:
Reject Hypothesis 1.

We have information on which of the four shifts staff are working. We see that those on the afternoon/ morning or rotating shift are significantly less likely to take time off. Presumably this reflects the greater flexibility they enjoy to satisfy all obligations (Allen, 1981, 83). Therefore we can:
Accept Hypothesis 2

Looking at skill group, the sole significant coefficient is for the unskilled group which is significantly more likely to be absent, causing us to cautiously:
Accept Hypothesis 3

Travel to work time can add a lot to the working day in large cities like London. Despite our prediction distance from home to work has no impact. Therefore we:
Reject Hypothesis 4.

Data is classified as belonging to one of three age groups, however this is insignificant in this equation. Therefore we can:
Reject Hypothesis 5.

We also find that employees classed as white/other are less likely to take time off, and employee tenure also reduces the likelihood of time off, this by a small but consistent amount. Those who were promoted in the previous year are considerably more likely to be off. Whilst the tenure result is intuitive, those who dislike this work will hunt for other opportunities, the promotion result is startling. Those who are promoted seem to exploit their position in the company in order to miss work. Those falling in to the other marital category also show a greater propensity to be off though there is no theoretical explanation for this.
Whilst the choice of modelling technique for looking at the probability of absence is straightforward, assumptions about normal distributions may not apply when using a count dependent variable. The variance of this absence variable is as great, or greater, than the mean. Mastekaasen & Olsen (1998) and Chaudhury and Ng (1992) tested a variety of modelling techniques: OLS; Poisson; rank based regression; and negative binomial for use with count measures of absenteeism. The negative binomial model is suitable for use with a non-negative, truncated variable such total days off as it makes no assumptions about the distribution of the error term and is less vulnerable to extreme values than OLS. Whilst the OLS is a less obvious choice, both papers suggest that it is more interpretable and offers robust results. Therefore, this paper will discuss OLS models. For this reason column 2 of table 4 presents an OLS model of factors influencing total days off, estimated following Equation 2.

$$\text{OLS (count of time off)} = aX + bY + e$$

Equation 2

The mean number of days off between July 1995 and June 1996 was 9. A much wider range of variables is significant in the count equation. Women were shown to take significantly less time off. This is startling than in the previous model, where there was no significant difference. In a count model women take more than four days fewer than the default. The latter causes us to:
Reject Hypothesis 1.

Again the results on shift patterns are clear cut. Whilst those on nights take three more days in absence than the default, those on the more flexible rotating/afternoon or morning shifts take more than four days fewer than day workers. Therefore we again:
Accept Hypothesis 2.

Our hypothesis relating to skill argued that those with less skilled positions would take more time off. At the same time trainees on the four week temporary contract will have an incentive to attend. Our results confirm this with the more skilled grades and trainees taking respectively an average of five and almost four days fewer than the default. Those classed as unskilled are likely to be off for two days more than the default, presumably reflecting the repetitive nature of the work and their relative job security. Therefore we:
Accept Hypothesis 3

Delgado and Kniesner (1997) find that distance between work and home is positively related to time off, yet workers in this sample living more than five miles from work take one fewer day off. Therefore we:
Reject Hypothesis 4.

Allen (1983) predicts that young workers will take more time off. Those aged 46 or older take one day less per year, a result which just misses significance. However, prime aged workers of 26-35 years take an extra day off, a result which may reflect family responsibilities. Therefore we:
Reject Hypothesis 5.

In addition we find tenure has a significant influence on total days off. Each additional one hundred days' service reduces the total number of absences by one third of a day. Those promoted, divorced or separated workers, or married workers take one and a half days more than their single peers and those falling in to the other marital status category have significantly more than this, though there is again no obvious theoretical reason for this. Those promoted during this year are also likely to feel secure in their positions. They take an additional four days off per year, a result which is very highly significant. Ethnicity is strongly significant. Compared to the default group, workers of Asian origin, Afro-Caribbean employees take an extra two days off whilst white/other employees take four fewer.

Avery and Holtz (1984) advocate the use of event history techniques to model absenteeism. This requires that lagged absenteeism be used as an explanatory variable. Markham and McKee (1991) adopt a similar method for identifying the impact of external and internal pressures, represented by changes in local unemployment and plant employment levels. Falling plant employment and rising local unemployment would theoretically reduce job opportunities leading to lower absence. Conversely, rising employment levels and falling local unemployment, by increasing employees' prospects, leading to higher absenteeism. The correlation between absence spells and local unemployment is -0.17, which is insignificant. That between absence spells and plant size is 0.13, which is significant at the 1% level.

Table V about here.

Table V presents selected marginal coefficients from a probit model examining the influence of total days voluntary absence in year one, and various measures of plant employment levels and local unemployment and their interaction term, on the probability of taking time off in year two.

$$\text{Prob (voluntary time off}_t) = aX + bY + cZ + dT_{t-1} + e \qquad \text{Equation 3}$$

where X is a vector of individual characteristics, Y of workplace characteristics, Z represents internal and external pressures, T_{t-1} represents voluntary days off in the previous year, and e represents the error term.

Following Markham and McKee (1991), variations of the model are constructed using one-month lagged, current, and one month anticipatory values of plant size and local unemployment for the month of absence. This provides nine potential variations of the equation. Whereas the unemployment coefficient is of varying size and significance across the different models, it is more consistent in those variations using next month's employment level at Bun Factory. In versions 7-9, the unemployment coefficients are all sizeably positive, and Bun Factory employment levels are consistently related to a greater probability of taking voluntary time off. The most successful model in terms of diagnostics, version 7, combines anticipatory employment with last month's local unemployment rate. Unemployment is positively related to the probability of absence, a one-unit change in last month's unemployment increases the probability of voluntary absence by 257 percentage points, which is counterintuitive but may reflect the fact that unemployment was relatively stable over the course of the sample. Therefore we:

Reject Hypothesis 8

Each one-unit change in next month's employment at Bun Factory changes the probability of taking time off very slightly, which suggests that employees are sensitive to their firm's labour demand and so feel more confident that there will be no repercussions if they take time off. This leads us to:

Accept Hypothesis 7

The interaction terms between local unemployment and plant employment are generally negative, small but significant. The combination of anticipatory employment and lagged unemployment is marginally negatively related to the chance of voluntary time off. Introducing the number of voluntary days off in year one as an explanatory variable is consistently weakly, but significantly negatively related to time off in year two. The average number of days missed in year one for voluntary reasons is 11. Each additional day taken off last year lowers the chance of absence in year two by less than one hundredth of a percentage point. Therefore we:

Reject hypothesis 6

Table V shows introducing internal and external pressures and lagged absence massively increases the explanatory power of the probit model. However, few demographic and workplace explanatory variables retain significance, bar tenure. Each additional 100 days' service lowers the probability of time off by around 1.5 percentage points.

5.2) Absenteeism And Changes To Working Conditions And Pay

The time span available covers a number of workplace changes at Bun Factory. The general effect of these changes might be an improvement in industrial relations climate and morale. Information on the nature and date of each is available, and as wages and some of the improvements to conditions vary by grade, an analysis of difference in differences is employed. This enables variation by grade in response to each of the changed working conditions and wages to be identified (Wooldridge, 2003). This requires looking for the difference in difference estimator $\delta_{1,:}$

$$\delta_1 = (\text{absence}_{tw} - \text{absence}_{txyz}) - (\text{absence}_{t-1w} - \text{absence}_{t-1xyz}),$$

where W represents the grade in question, whilst xyz are the remaining staff categories, t is the month after the change, whilst t_{-1} is the month before the change.

Table VIa=VId about here

Table VIa looks at the impact of changes on absenteeism by employee grade over the period March 1995 until May 1995, using estimations of the following model:

$$\Delta \text{ (time off)} = \beta_0 + \delta_0 Time + \beta_1 Grade + \delta_1 (Time*Grade) + e \qquad \text{Equation 4}$$

where time takes a value of one in the second period, and is 0 otherwise; and the penultimate expression shows the extra effect by grade in the second period.
This enables us identify changes in absence following the introduction of basic food hygiene training for all workers and training for their line leaders in April 1995. The first row of the table shows there is a significant fall in absenteeism across the period, for all but unskilled workers. The coefficients on grade are significantly negative for three skill groups; trainees, semiskilled and the highest skill group, indicating falls in absence of between 6 and 7 percentage points. However, the unskilled coefficient indicates an increased probability of voluntary absence, of 8 percentage points. If the effect of the time trend, grade effect and the interaction of the two is combined the two highest skill groups react to changed working conditions by lowering absence by around 8 percentage points; the effect for the unskilled is neutral, and trainees' tendency to be absent rises by 43 percentage points. Therefore we:
Accept Hypothesis 12
Reject Hypothesis 11

Table VIb looks at the change between April and June 1995, capturing the effect of differential pay rises in May. At around 5.5% the pay rises of trainees and unskilled were worth one and a half times the rate of inflation, whereas their colleagues took a real wage cut. Again there appears to be a downward trend in absence of between four and five percentage points for all but the unskilled. Grade and interaction effects are insignificant. Previous work found that the pay rises were successful in reducing labour turnover (Brown, 1998), yet these results suggest that differential pay rises do not lower absenteeism. Leading us to:
Reject Hypothesis 13

In November 1995 the first voice mechanism was introduced, team briefings, and the canteen began to offer 24-hour cover for the first time. Table VIc looks at changes in absenteeism between October and December of 1995. This time the downward time trend in absence is only apparent for unskilled workers. Reactions by grade vary: absenteeism amongst trainees and the unskilled is unchanged, whilst that for the two higher skill groups falls by around 3 percentage points, perhaps in response to the opportunity to use a formal voice mechanism. So it is necessary to:
Reject Hypothesis 10

The 1996 May pay round saw semi-skilled, skilled, engineers and section leaders all gain wage rises comfortably in excess of inflation, then 2.2%, trainees only gained an increase of 1%. However, the biggest winners were the unskilled who again saw a significant increase, this time 6.5%. However, table VId shows that no time trend in absenteeism is discernible. Trainees and the semi-skilled react by dropping their absenteeism slightly, by around 2 percentage points but again the unskilled, benefiting from a higher percentage rise, do not change their behaviour. The sum of these changes had a significant impact upon labour turnover: new starters had a 60% chance of leaving in their first three months in 1994, falling to 10% in 1996 and 20% in 1997 by which time all the HR changes were in place

(Brown, 1998). The biggest impact on turnover rates was derived from wage increases. These tables show a general downward time trend, but it is also clear that the two more highly skilled groups were more responsive to change. This decline could reflect a better industrial relations climate as a result of the combined measures. W age rises had less impact than other forms of workplace change, with the first round of changes, including training and job security being the most influential. And so we:
Accept Hypothesis 9

6. Conclusions

This chapter examines Bun Factory, a food manufacturer, in the greater London area, from the mid1990s. Several years' personnel data and payroll information were made available. Comparison with WIRS data shows that Bun Factory had a significant problem with absence relative to all industries. This data set offers the opportunity to test the stylised facts of absence on an atypical workforce: workers here earn relatively low levels of pay and employment of ethnic minorities is very high.

Comparing previous work on absenteeism is complicated because of the range of definitions employed. The richness of the data enabled us to look at the probability of voluntary absence across the year and the total number of days taken off voluntarily. Certain demographic and job-related factors were consistently related to absence: those promoted were much more likely to take time off; whites; and those on flexible shifts were less likely to be off. Women took significantly fewer days off than men, as did those living more than five miles from the plant. Whilst absenteeism was sensitive to plant labour demand, the local rate of unemployment was positively related to time off which indicates that employees attach more importance to in-house job security than the availability of other jobs.

The takeover of Bun Factory by a national company was followed by a series of improvements to pay and working conditions aimed at improving performance and lowering quits and absence. However, longitudinal analysis shows that whilst absence at Bun Factory seemed to decline over time, it had not fallen in response to the discrete workplace changes such as pay rises or training, although the decline could be a response to a better climate emanating from the combined package of changes.

TABLES

Table I. Absence rates by industry, WIRS data

Main activity (Sic 1992)	Less than 2%	2% - <4%	4% - <6%	6% - <8%	8% or more	Total
Manufacturing	13.5 (10.0)	39.4 (15.2)	29.9 (36.7)	8.8 (30.4)	8.4 (17.7)	100.00 (100.00)
All non-manufacturing	23.0 (6.4)	36.4 (15.6)	21.8 (38.5)	7.6 (14.7)	11.2 (24.8)	100.00 (100.00)
Electricity, gas, water	20.83 (0.0)	62.5 (0.0)	12.5 (44.4)	1.4 (22.2)	2.8 (33.3)	100.00 (100.00)
Construction	36.6 (0.0)	35.5 (33.3)	14.0 (66.7)	7.5 (0.0)	6.5 (0.0)	100.00 (100.00)
Wholesale & retail	20.8 (8.0)	37.2 (12.0)	20.1 (44.0)	13.0 (24.0)	8.9 (12.0)	100.00 (100.00)
Hotels & restaurants	37.4 (25.0)	23.1 (50.0)	16.5 (0.0)	7.7 (0.0)	15.4 (25.0)	100.00 (100.00)
Transport & telecoms	15.9 (11.1)	28.0 (11.1)	29.9 (50.0)	10.3 (5.6)	15.9 (22.2)	100.00 (100.00)
Finance	17.7 (0.0)	50.6 (20.0)	21.5 (40.0)	0.00 (20.0)	10.1 (20.0)	100.00 (100.00)
Other business services	33.7 (16.7)	28.5 (16.7)	18.6 (33.3)	5.2 (16.7)	14.0 (16.7)	100.00 (100.00)
Public admin	7.6 (7.7)	39.6 (15.4)	29.9 (30.8)	13.2 (15.4)	9.7 (30.8)	100.00 (100.00)
Education	24.9 (0.0)	37.8 (50.0)	18.1 (25.0)	8.8 (12.5)	10.4 (12.5)	100.00 (100.00)
Health & social work	11.9 (0.0)	22.8 (0.0)	35.2 (30.0)	9.9 (10.0)	20.3 (60.0)	100.00 (100.00)
Other services	25.8 (0.0)	34.8 (12.5)	23.6 (37.5)	6.7 (12.5)	9.0 (37.5)	100.00 (100.00)
Total	20.8 (3.7)	35.5 (15.4)	23.8 (37.8)	8.7 (21.3)	11.3 (21.8)	1785 100.00 (188) (00.00)

Source: The definition of absence used is "the percentage of staff off sick over the last 12 months". WERS 1998 data are presented with WIRS 1990 percentages in brackets. As the 1990 survey gave the option to state absence for the last week, month, quarter or year, cells contain fewer observations for that year.

Table 2:

Table II. Absenteeism statistics for "Bun Factory"

Month & year	Total employees	Total spells off starting this month	Frequency (%)	Incidence	Quits	Month & year	Total employees	Total spells off starting this month	Frequency (%)	Incidence	Quits
July 1994	311	127	40.8	29.6	**29**	July 1995	328	196	59.8	37.2	16
August 1994	312	133	42.6	29.8	**22**	August 1995	319	125	39.2	27.6	31
September 1994	311	154	49.5	33.1	**19**	September 1995	306	141	46.1	30.7	28
October 1994	313	171	54.6	31.9	**38**	October 1995	316	194	61.4	38.9	21
November 1994	324	175	54.0	35.8	**50**	November 1995	366	181	49.5	32.2	20
December 1994	308	165	53.6	32.8	**39**	December 1995	330	223	67.6	43.3	40
January 1995	318	223	70.1	42.8	**17**	January 1996	297	174	58.6	36.4	46
February 1995	311	183	58.8	38.3	**33**	February 1996	289	140	48.4	32.9	22
March 1995	333	248	74.5	42.9	**21**	March 1996	297	132	44.4	32.3	18
April 1995	334	187	56.0	35.9	**15**	April 1996	317	28	8.8	8.2	16
May 1995	331	155	47.0	29.6	**16**	May 1996	324	55	17.0	15.4	22
June 1995	324	202	62.3	38.3	**28**	June 1996	312	66	21.2	18.3	23

Monthly frequency is:

$$\frac{\text{total spells of absence}}{\text{total employees.}} * 100$$

Monthly incidence is:

$$\frac{\text{total number of employees with one or more spells}}{\text{total employees}} * 100$$

Table 3:

Table III. Sample means & summary statistics

Variable		Variable	
Gender	90.1% male	Wage rate May 1994 - trainee	£3.00 per hour
Distance home to work (miles)	4.44(3.74)	Wage rate May 1994 – unskilled	£3.34
Marital status - single	53.9%	Wage rate May 1994 – semi-skilled	£4.22
Marital status – married	42.5%	Wage rate May 1994 – skilled	£4.67
Marital status – other (divorced, separated, widowed)	3.6%	Wage rate May 1994 – team leader	£5.11
Ethnic status – afro-Caribbean	57.1%	Wage rate May 1994 – engineer	£6.56
Ethnic status – Asian	40.5%	Wage rate May 1995 – trainee	£3.16 per hour
Ethnic status – white & other	2.4%	Wage rate May 1995 – unskilled	£3.52
Tenure (days)	494 (532)	Wage rate May 1995 – semi-skilled	£4.32
Age (years)	32 (7.7)	Wage rate May 1995-skilled	£4.78
Promoted 1/7/95-30/6/96	9.8%	Wage rate May 1995 – team leader	£5.23
Grade – trainee	15.4%	Wage rate May 1995 – engineer	£6.72
Grade – unskilled	66.9%	Wage rate May 1996 - trainee	£3.19 per hour
Grade – semi-skilled	11%	Wage rate May 1996 – unskilled	£3.75
Grade – high (skilled, team leaders, engineers)	6.2%	Wage rate May 1996 – semi-skilled	£4.45
Nights	54%	Wage rate May 1996 – skilled	£4.92
Days	44%	Wage rate May 1996 – team leader	£5.39
Other shifts	2%	Wage rate May 1996 – engineer	£6.92
Local unemployment rate	10% (0.60)	Bun Factory employment	311 (28)

Figures in parentheses are standard errors.

Table IV. Coefficients for variables in time off equations July 1995 – June 1996

Modelling technique	(Marginal) Probit	OLS
Dependent variable	Voluntary absences only	Total days off
Variable	Coefficient (sd)	Coefficient (sd)
Afro-Caribbean	-0.018 (0.025)	1.891*** (0.510)
White or other ethnic group	-0.228*** (0.072)	-3.629*** (0.781)
Married	-0.032 (0.024)	1.554*** (0.509)
Other marital status – divorced, widowed or not stated.	0.096* (0.055)	12.282*** (2.088)
Women	-0.018 (0.034)	-4.296*** (0.755)
Trainee	0.059 (0.042)	-3.773*** (0.764)
Unskilled	0.099*** (0.032)	1.943*** (0.644)
High Skilled – skilled, line leaders, or engineers.	0.036 (0.054)	-5.076*** (0.762)
Aged < 26 years	-0.030 (0.037)	0.523 (0.709)
Aged 26-35 years	0.040 (0.028)	0.986* (0.589)
Aged 45 years plus	0.066 (0.045)	-1.056 (1.111)
Promoted this year	0.347*** (0.022)	4.026*** (0.546)
Lives less than 2 miles away	-0.027 (0.025)	-0.708 (0.542)
Lives more than 5 miles away	-0.011 (0.026)	-1.396** (0.542)
Tenure	-0.024 x 10-2*** (0.003) x 10 −2	0.038 x 10-1*** (0.005)x 10 −1
Nights	0.027 (0.022)	3.138*** (0.471)
Other shifts – afternoons, mornings or rotating	-0.158** (0.070)	-4.177*** (0.667)
No of obs	2780	4217
Log likelihood/Constant	-1736.6012	4.527*** (1.082)
Pseudo R^2	9.9%	8.56%
Predicted probability	0.517	NA

Column one presents robust marginal coefficients from a probit estimation.
Column two presents robust coefficients from an OLS estimation.

*** indicates significance at the 1% level of confidence, ** at the 5% level, * at the 10% level. The default category is semi-skilled ethnically Asian men, who are single, aged 36-45 years, living 2-5 miles from the plant and working days.

Table VIa. Difference in difference equation for March to May 1995

March – May 1995	Trainees	Unskilled	Semi-skilled	High skilled
Time dummy	-0.060*** (0.012)	0.001 (0.016)	-0.062*** (0.015)	-0.061*** (0.015)
Grade	-0.069*** (0.011)	0.077*** (0.016)	-0.068*** (0.015)	-0.058*** (0.016)
Interaction	0.560 (0.355)	-0.078*** (0.023)	0.052*** (0.017)	0.042** (0.018)
Constant	0.069*** (0.011)	0.014** (0.006)	0.077*** (0.013)	0.077*** (0.013)
No of obs	466	466	466	466
R^2	13.59%	13.75%	13.87%	13.89%

These tables look at the difference in absenteeism rates by grade following significant changes to pay and conditions. *** indicates significance at the 1% level of confidence, ** at the 5% level, * at the 10% level.

Table VIb. Difference in difference equation for April to June 1995

April – June 1995	Trainees	Unskilled	Semi-skilled	High skilled
Time dummy	-0.042*** (0.016)	-0.040 (0.025)	-0.049*** (0.018)	-0.047** (0.018)
Grade	0.261 (0.274)	0.037 (0.029)	-0.052 (0.034)	-0.038 (0.032)
Interaction	-0.292 (0.274)	-0.007 (0.032)	0.028 (0.036)	0.013 (0.035)
Constant	0.073*** (0.013)	0.049** (0.024)	0.082*** (0.015)	0.081*** (0.015)
No of obs	522	522	522	522
R^2	18.32%	18.36%	18.38%	18.39%

See notes above

Table VIc. Difference in difference equation for October to December 1995

October – December 1995	Trainees	Unskilled	Semi-skilled	High skilled
Time dummy	0.001 (0.013)	-0.017** (0.015)	0.004 (0.016)	0.001 (0.015)
Grade	0.152 (0.103)	0.028 (0.018)	-0.031* (0.017)	-0.036** (0.014)
Interaction of grade & time	-0.047 (0.121)	0.028 (0.025)	-0.029 (0.021)	-0.010 (0.021)
Constant	0.045*** (0.008)	0.035*** (0.013)	0.056*** (0.010)	0.057*** (0.010)
No of obs	538	538	538	538
R^2	15.49%	15.55%	15.61%	15.64%

See notes above.

Table VId. Difference in difference equation for April to June 1996

April – June 1996	Trainees	Unskilled	Semi-skilled	High skilled
Time dummy	-0.006 (0.009)	-0.002 (0.012)	-0.001 (0.011)	0.002 (0.010)
Grade	-0.019*** (0.006)	0.012 (0.011)	-0.016** (0.008)	0.009 (0.025)
Interaction	0.042 (0.036)	-0.000 (0.018)	-0.003 (0.012)	-0.027 (0.027)
Constant	0.019** (0.006)	0.010 (0.009)	0.020*** (0.007)	0.016** (0.005)
No of obs	562	562	562	562
R^2	10.70%	10.70%	10.70%	10.70%

See notes above.

7. Bibliography

Addison, J. and Belfield, C. (2001). Updating the Determinants of Firm Performance: Estimation Using the 1998 UK Workplace Employee Relations Survey, *British Journal of Industrial Relations*, **39(3)**, 341-366.

Allen, P. (1982). Size of Workforce, Morale and Absenteeism: a Re-examination, *British Journal of Industrial Relations*, **20(1)**, 83-100.

Allen, S. (1981a). An Empirical Model of Work Attendance, *Review of Economics and Statistics*, **63**, 77-87.

Allen, S. (1981b). Compensation, Safety and Absenteeism: Evidence from the Paper Industry, *Industrial and Labor Relations Review*, **34(2)**, 207-218.

Allen, S. (1983). How Much Does Absenteeism Cost?, *The Journal of Human Resources*, **18(3)**, 379-393.

Allen, S. (1985). Trade Unions, Absenteeism, and Exit-Voice, *Industrial and Labour Relations Review*, **37(3)**, 331-345.

Avery, R. and Holtz, V. (1984). *Statistical Models for Analyzing Absentee Behavior*, in Goodman, P, Atkin, R. and Associates eds, New Approaches to Understanding, Measuring and Managing Employee Absence, London: Jossey-Bass Ltd.

Barmby, T. and Treble, J. (1991). Absenteeism in a Medium-Sized Manufacturing Plant, *Applied Economics*, **23(1),** 161-166.

Brown, D. (1998). What do I get?: How Employers Can Benefit from a National Minimum Wage, *Centrepiece*, **3(1)** 21-24.

Cahuc, P. and Kramarz, F. (1997). Voice and Loyalty as a Delegation of Authority: a Model and a Test on Matched Worker-Firm Panels, *Journal of Labour Economics*, **15 (4)**, 658-688.

CBI, (2007), Workplace Absence Rises Amid Concerns Over Long-term Sickness *CBI/AXA Survey, Press Release*, 10th April 2007.

CBI, (2000), Absence Costs Business £10 Billion in 1999- Says Survey, *News Release*, 8th May 2000.

Chaudhury, M. and Ng, I, (1992). Absenteeism Predictors: Least Squares, Rank Regression and Model Selection Results, *Canadian Journal of Economics*, **25(3)**, 615-635.

Deery, S., Erwin, P. and Iverson, R. (1999). Industrial Relations Climate, Attendance Behaviour and the Role of Trade Unions, *British Journal of Industrial Relations*, **37(4)**, 533-558.

Delgado, M. and Kniesner, T. (1997) Count Data Models with Variance of Unknown Form: An Application to a Hedonic Model of Worker Absenteeism, *Review of Economics and Statistics*, **79(1)**, 41-49.

Edwards, P. and Whitston, C. (1993). *Attending to Work: The Management of Attendance and Shopfloor Order*, Oxford: Blackwell.

Hackett, R. (1989). Work Attitudes and Employee Absenteeism: a Synthesis of the Literature, *Journal of Occupational Psychology*, **62**, 235-248.

Hirschman, A. (1970). *Exit, Voice and Loyalty*, Cambridge: Harvard University Press.

Katz, H., Kochan, T. and Gobeille, K. (1983). Industrial Relations Performance, Economic Performance, and QWL Programs: an Interplant Analysis, *Industrial and Labour Relations Review*, **37(l)**, 3-19.

Krueger, A. and Rouse, C. (1998). The Effect of Workplace Education on Earnings, Turnover and Job Performance, *Journal of Labor Economics*, **16(1)**, 61-94.

Markham, S. (1985). An Investigation of the Relationship Between Unemployment and Absenteeism: a Multi-level Approach, *Academy of Management Journal*, **28(2)**, 228-234.

Markham, S. and McKee, G. (1991). Declining Organizational Size and Increasing Unemployment Rates: Predicting Employee Absenteeism for Within and Between Plant Perspectives, *Academy of Management Journal*, **34(4)**, 952-965.

Mastekaasen, A. and Olsen, K. (1998). Gender, Absenteeism and Job Characteristics, *Work and Occupations*, **25(2)**, 195-228.

Mowday, R., Porter, L., & Steers, R. (1982), *Employee-Organisation Linkages: the Psychology of Commitment, Absenteeism, and Turnover*, London: Academic Press.

Porter, L. and Steers, R. (1973), Organisational, Work and Personal Factors in Employee Turnover and Absence, *Psychology Bulletin*, **80**, 151-176.

Rose, M. (1985). *Reworking the Work Ethic: Economic Values and Socio-Cultural Politics*, Batsford: London.

Steers, R. and Rhodes, S. (1978). Major Influences on Employee Attendance: a Process Model, *Journal of Applied Psychology*, **63 (4)**, 391-407.

Vistnes, J. (1997). Gender Differences in Days Lost From Work Due to Illness, *Industrial and Labor Relations Review*, **50(2)**, 304-321.

Wooldridge, J. (2003). *Introductory Econometrics: A Modern Approach*, 2e, Ohio: South-Western.

Endnotes

i. Separating data by gender does seem to suggest that the coefficients are significantly different: however, the female sample is rather small (less than 10% of the total).