Sickness absence in the UK 1984-2002

Tim Barmby, Marco Ercolani and John Treble*

Summary

■ This paper uses the UK Labour Force Survey data over the period 1984-2002 to analyse the determinants of the level of employee absenteeism in the UK. Though the average annual absence rate has remained at a relatively constant 3.1 per cent over the period, we do identify a large degree of variation between groups. In regression analysis we find that sickness absence is particularly sensitive to measured aspects of the employees' contractual arrangements, particularly the hourly wage rate and contracted work hours. We find that though sickness absence is sensitive to other socio-economic characteristics, these are of secondary importance when compared to the aforementioned contractual characteristics. We argue that this sensitivity to contractual arrangements is of interest to policy makers who might be concerned with regulatory measures involving sick pay and working time. We also carry out regressions for the sub-period 1993-2002 that allow for structural breaks in every year by interacting year dummies with the contractual variables. In every case, these interaction variables are found to be jointly insignificant suggesting a remarkable degree of structural stability over the sample period.■

JEL classification: J28, J32, M12.
Keywords: Absenteeism, sickness.

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The paper gives a picture of sickness absence amongst UK employees over the period 1984-2002. It extends work already reported for the UK in Barmby, Ercolani and Treble (1999). Comparisons across some European countries as well as other countries can be found in Barmby, Ercolani and Treble (2002). In the present paper, as well as reporting trends graphically, we use simple regression techniques to analyse what factors are important in determining an individual's observed absence rate.

Economists have used two main approaches to guide their thinking on absenteeism. The first of these involves thinking about how a market for labour might work when employees have different preferences for the amount of absence they might want to take, and firms have different technologies which determine how costly employee absenteeism is for them. In this type of model employees with differing preferences sort themselves between firms with different costs, so firms for whom absence is relatively more costly will tend to offer higher wages for lower levels of absence. Those employees who can supply reliable attendance will sort themselves into these jobs. This approach was first explored in this context by Allen (1981), the main empirical implication of this approach is a negative relationship between absence and wages driven by this interaction of firms and employees. Coles and Treble (1993, 1996) use a similar framework to that described above and draw out further implications for the choice of technology and contracts for firms.

The second approach to the analysis of workplace absence looks more closely at the way individual employees respond to variations in the terms of their contracts. The standard labour-leisure choice theory gives us a framework within which to think about how variations in

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contracted hours and overtime working might affect absence. In these models, equilibrium is characterised by employees equating their marginal rate of substitution of goods for leisure (which is the value the employee places on the marginal non-work hour measured in terms of consumption) to the wage rate. This is the modelling framework used by Dunn and Youngblood (1986). They construct a direct measure of the marginal rate of substitution and enter this directly into their absence equation.

In thinking about these effects we have to recognise that the contract which we observe the employee in will have been chosen out of those available in the market. For these chosen contracts, desired hours of work (that is the hours level at which the marginal rate of substitution equals the wage rate) might exceed contracted hours. In this case there is no ongoing incentive for absence. If, however, desired hours are less than contracted then the employee will have an ongoing incentive to deviate from the contract. With this framework in mind we can think about the possible effects of changes in wages, overtime premia and contracted hours. For changes in wages or overtime premia, as long as any counteracting income effects are relatively small higher wages or overtime premia will be associated with lower absence, as this will tend to increase desired hours of work supplied. On the other hand higher contracted hours should be associated with higher absence, as at higher hours the marginal non-work hour has higher value.

In many European countries, state intervention in the provision of sick pay is common, and changes in provision introduced by state action appear to be important in determining the absence rate[1]. The UK is unusual in having had minimal state intervention in sickpay during the period of our data. Indeed, since the Statutory Sickpay Act of 1994, sickpay has been a benefit provided entirely by employers, subject only to minimum rates set by the state. Prior to 1991, the state set minimum rates and also funded them (Between 1991 and 1994, it funded only 80 per cent). The main changes in sickpay law during the period we consider here are the reduction in the state subsidy, which occurred both in 1991, when it was reduced to 80 per cent; and 1994, when it was reduced to zero, and the revision from time to time of the minimum rates. The minimum rates are not generous and are the same nominal rate for all employees, so that they provide a less gen-

[1] For instance, Johansson and Palme (2004).

erous replacement rate for more highly paid employees. The standard rate of sick pay is currently GBP 64.35 (about EUR 95) per week. This represents a 42.75 per cent replacement rate for an employee earning the national minimum wage and working 35 hours a week. As far as we know, there have been no recent systematic attempts to establish patterns of sick pay provision by firms in the UK.

As we will see, the data at our disposal does not enable us to sensibly test for a structural break in 1994 (nor 1991) with respect to these changes in sick-pay legislation. This is because some important contractual variables, such as the wage, are only available from 1993 onward. However, in Section 6 we do report regression results where year-dummy interactions allow for a structural break in every year during the period 1993-2002. What emerges from these is an extraordinary degree of parameter stability over the period.

1. Empirical method

The data sources for this paper are the UK Labour Force Surveys, which have been conducted on an annual basis during 1979-1991 and on a quarterly basis since 1992. The method of computing an absence rate for an individual employee is essentially the same as in Barmby et al. (1999, 2002). We summarise this method again here. The measure of sickness absence we use is the ratio of the number of hours absent due to sickness to the number of hours contracted to work. We aim to compute estimates of this for full-time employees and part-time employees. Self-employed workers are excluded.

The Labour Force Surveys elicit information from respondents about work during a "reference week", which is the last full week before the interview date. Specifically they are asked if they did any paid work, or if they were away from a job or business that they would normally attend. Our respondents are asked what their usual hours and actual hours are, and the reason for any difference. Our estimated absence rates are constructed by treating usual hours as contractual hours, and any difference between usual hours and actual hours as absence. In this paper, we consider only those absences that are regarded by LFS as due to sickness.

Specifically, following our procedure in Barmby et al. (1999), we define the absence rate R_t as the ratio of the hours reported absent due to illness in the reference week (A_{it}) to contracted hours (C_{it}),

$$R_t = \frac{\sum_{i=1}^{n} A_{it}}{\sum_{i=1}^{n} C_{it}} \tag{1}$$

To construct A_{it}, our measure of absence hours due to illness, we take the difference between usual hours C_{it}^u and actual hours C_{it}^w and multiply it by an indicator of absence due to illness in the reference week, s_{it}. If the absence is due to illness, we set $s_{it} = 1$. If the absence is not due to illness, we set $s_{it} = 0$. Then A_{it} is defined[2] as

$$A_{it} = (C_{it}^u - C_{it}^w)s_{it} \tag{2}$$

The variables C_{it}^u, C_{it}^w and s_{it} are also used to construct the measure of contracted work hours C_{it} as

$$C_{it} = C_{it}^w(1 - s_{it}) + C_{it}^u s_{it} \tag{3}$$

Therefore contracted hours are measured by actual hours worked if there was no absence due to sickness in the reference week and by usual hours if there was some absence due to sickness[3].

[2] We note two problems with this procedure: i) It is possible for A_{it} to be negative in some cases. This occurred only in 0.02 per cent of cases in Barmby, Ercolani and Treble (1999). We conclude that the error from this is very small. ii) This measure may misrepresent absence in cases where overtime is worked. We can assess the extent of the bias induced by the omission by comparing the 1989 UK rates reported here and those in Barmby et al. (1999). When overtime is excluded (we define overtime here as the employee reporting positive hours of actual overtime) the overall rate is 3.52 per cent, which decomposes into 3.16 per cent for men and 3.90 per cent for women. Comparable rates when overtime is included 3.02 per cent overall, 2.61 per cent for men and 3.52 per cent for women. These facts are consistent with the idea that absence on overtime hours should be lower.

[3] Bliksvær and Helliesen (1997) used a measure of absence based only on observing whether an individual was absent from work for the *whole* of the reference week. This ignores short absences, which can constitute a large proportion of total absence (Barmby, Orme and Treble, 1991) and almost certainly underestimates the overall rate.

2. Overall trends

Figures 1 to 3 give an idea of the overall trend in absence for full time and part time employees for the period we study in this paper.

Figure 1. Yearly absence rate 1984-2002

Figure 2. Quarterly absence rate 1992q1-2003q1

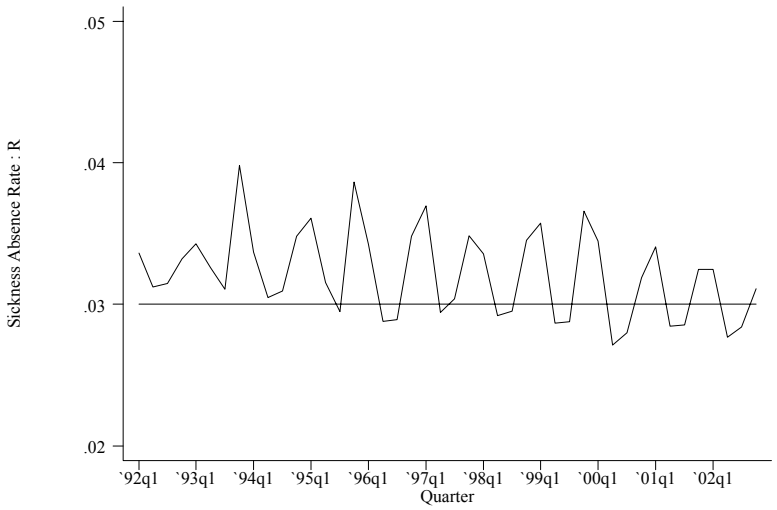
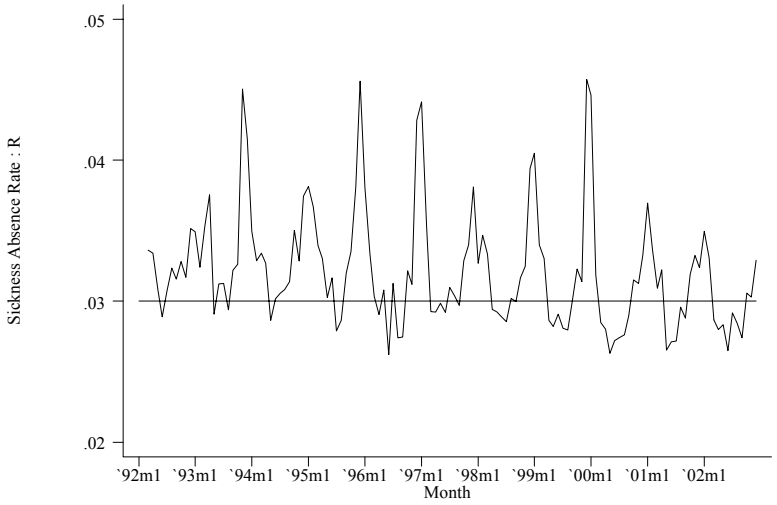


Figure 3. Monthly absence rate, 1992m1-2003m1



Viewed as a yearly percentage, the UK absence rate depicted in Figure 1 has hovered just above 3 per cent since start of our data period. There is perhaps some evidence of an increase up to about 3.3 per cent in 1993, and a decline of similar magnitude in the years since then. The yearly average of course masks seasonal variation within the year and variation between individual employees within the sample. Figures 2 and 3 give some indication of variation within the year. Figure 2 shows a strong seasonal element in quarterly absenteeism rates, with the winter highs having rates some 25 per cent—30 per cent higher than the summer lows. The monthly seasonality shown in Figure 3 is even stronger[4].

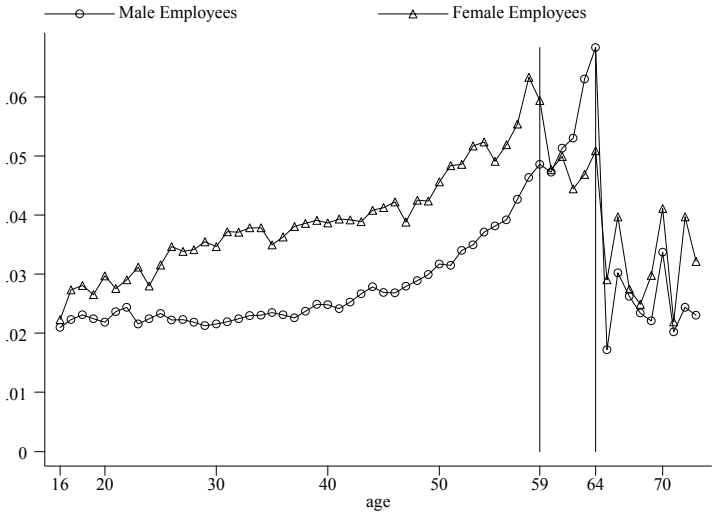
3. Trends by gender and age

Figure 4 and 5 give a breakdown of absence rates by gender and age over our period of study.

[4] These monthly statistics should be treated with some caution, since the LFS sample is not designed to be nationally representative on a monthly basis.

Figure 4. Absence rates by gender

Figure 5. Absence rates by age and gender



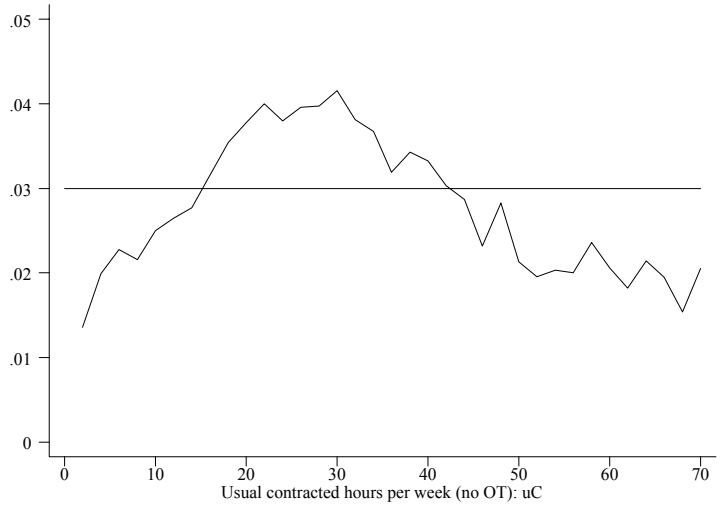
These figures reconfirm the well-known pattern of female absence being higher than male absence. As might be expected absence rates increase with age for both genders. There is a stark fall in absence rates at both men's and women's conventional retirement age. We

interpret this is the following way; those employees who continue to work beyond retirement age are a self-selected group with a relatively lower propensity for sickness absence.

4. Effects of contracted hours and wage

If the view is taken that observed absenteeism is a labour supply response then the terms of the labour contract which the employee faces is going to be centrally important. We are able to observe two aspects of this contract in the LFS data: hours of work; and an estimate of the average hourly wage rate. This estimate is constructed from gross weekly wage (observed from 1992 onwards), by dividing by usual hours plus 1.5 times usual hours of paid overtime. We concentrate on hours of work initially as this potentially has something to say about working time regulation. Figure 6 provides a plot of the absence rate for various levels of usual work hours. These are usual work hours excluding overtime and are therefore taken to represent weekly contracted work hours.

Figure 6. Absence rates by weekly contracted work hours (excludes all overtime)



The rate of absence appears, on the evidence of this aggregate figure, to increase with contracted hours of work (*uC*) and then fall again. This presents something of a puzzle for the standard labour

supply model where the effect should be monotonically increasing. We feel that what we might be observing here is a selection effect on unobserved differences; those individuals with low propensity to be absent also have higher propensity to work longer hours. The same non-linear effect appears present in regressions with usual hours when we are conditioning for observed differences. We note however that the regressions estimates seem to suggest a higher turning point than does the aggregate plot of around 38 hours. This suggests that there are other characteristics of individuals which are positively correlated with absence but are negatively correlated with contracted hours, so that when these factors are not conditioned for, as in the aggregate plot, then the schedule shifts leftwards.

The non-linearity of the effect however warrants further research, particularly in the relationship that might exist between the levels of contracted hours and overtime hours. In the data we analyse here there is a low positive correlation between contracted hours and overtime hours. This suggests the following possible linkage: high contracted hours are associated with high overtime hours, so we can imagine the propensity of individuals in our sample to have some overtime to increase as contracted hours increase. The propensity to take absence on overtime hours is lower, theory would suggest this and our estimations support this view. If there is limited ability to substitute absence between normal and overtime hours, then as contracted hours increase absence would initially increase (due to increased MRS) this would correspond to the first segment of the non-linear relationship, as contracted hours increased further this would be associated with more overtime hours and lower absence.

Figure 7 illustrates how the sickness absence rate varies with the deviation from the median of the natural log of the hourly wage:

$$\text{(Log Wage Deviation)} = \ln(\text{Wage}) - \text{median}[\ln(\text{Wage})] \qquad (4)$$

This wage has been deflated to year 2000 prices using the retail price index (RPI) excluding mortgage repayments. The RPI has been used as we assume employees are interested in the purchasing power of their earnings in their income/leisure tradeoff.

Figure 7. Absence rates by deviation from median in natural log of hourly wage rate

5. The data

Table 1 gives summary statistics for the data we use in our analysis. The sample period is 1984-2002 for entire dataset, and 1993-2002 for a subset of important variables. Note that for some variables the number of observations is smaller than the full sample. The *Wage* variable is indexed to 2000 prices. Note that when the wage question was first introduced in 1992q4, UK LFS respondents were asked to report their earnings only in their fifth (i.e. final) quarterly interview. From 1997q1, the question was included in the first interview as well. The *Public* variable was introduced in 1993q2. Questions relating to the International Labour Organization's (ILO) definition of unemployment were introduced only in 1992 meaning the derived variable *Unemployment* can only be defined for this sub-sample. Questions relating the number of employees at the workplace and consistent questions relating to the educational attainment were introduced in 1992q1.

Though the UK LFS became a rolling panel as of 1992q1, the panel element is too small to be exploited in the regression analysis. This is mainly due to the questions on earnings being asked only intermittently (see previous paragraph). This means that for the 1984-

2002 sample there is no panel element in 1984-1991, 52.08 per cent of the sample only have one interview and only 16.67 per cent have the full five interviews available. For the 1992-2002 sample that includes wage data, 79.02 per cent of the sample have only one interview and the remaining 20.98 per cent have only two interviews.

Table 1. Summary statistics

	Obser-vations	Mean	Std. dev.	Min	Max
Dependent variable					
Absence rate[a]	2,648,924	3.157	16.240	0	100
Demographic characteristics					
Age[b]	2,648,924	38.180	12.378	16	64
Age^2/100	2,648,924	16.110	9.740	2.56	40.96
Retired[c]	2,648,924	0.026	0.158	0	1
Couple[d]	2,648,924	0.713	0.453	0	1
Female	2,648,924	0.485	0.500	0	1
Contractual (economic) characteristics					
uC[e]	2,648,924	33.936	11.870	0.15	98
uC^2/100	2,648,924	12.926	8.092	0.0002	96.04
Paid OT[f]	2,648,924	0.174	0.379	0	1
Unpaid OT[f]	2,648,924	0.154	0.361	0	1
Public[g]	485,077	0.273	0.446	0	1
Wage[h]	504,214	8.250	6.116	0.01	198.80
Unemployment[i]	504,214	6.547	2.366	3.28	14.40
# *Employees* 01-10	503,152	0.185	0.388	0	1
# *Employees* 11-49	503,152	0.285	0.452	0	1
# *Employees* 50+ [j]	503,152	0.530	0.499	0	1

Table 1. Continued….

	Obser-vations	Mean	Std. dev.	Min	Max
Contractual (economic) characteristics					
Educ:degree	504,214	0.157	0.364	0	1
Educ:higher	504,214	0.102	0.303	0	1
Educ:GCE	504,214	0.235	0.424	0	1
Educ:GCSE	504,214	0.233	0.423	0	1
Educ:other	504,214	0.138	0.345	0	1
Educ:none[k]	504,214	0.134	0.341	0	1

Notes: [a] Individual percentage absence rate given by: *Absence Rate* = $100A_{it}/C_{it}$. A_{it} is "absent hours" and is defined in equation (2) of the text. C_{it} is "contracted hours" and is defined in equation (3) of the text. [b] Equals 64 if Male Age>64, or 59 if Female Age>59, age otherwise. [c] Equals 1 if Male and Age>64 or Female and Age>59, zero otherwise. [d] Married or Cohabiting in a couple. [e] Usual contracted hours per week, see equations (2) and (3). [f] *Worked* paid and/or unpaid overtime in the reference week. [g] Worked in public sector, available only from 1993q2 onwards. [h] Hourly wage at 2000 prices, deflated using retail price index (excluding mortgage repayments). Available only from 1992q4 onwards. [i] Percentage Unemployment rate using ILO definition, calculated by the authors. Calculated by region and year. [j] Number of employees at workplace, WorkSize50+ is the excluded/control category. Available only from 1992q1 onwards. [k] Educational attainment, EducNone is the excluded/control category. Available only from 1992q1 onwards. Other dummy variables: Year(1984-2002): Excluded year is 2000; Month(1-12): Excluded/control category is Month1; Region(1-19): Excluded region is the South-East of England; Industry(0-9): One digit SIC 1980 codes, excluded industry is SIC9 (non financial services).

6. Regression results

In this section we present regression results for nine regressions with the individual *Absence Rate* as the dependent variable. The first three regressions in Table 2 cover the whole sample period 1984-2002 at the expense of missing some variables that only become available in the years 1992/1993. The second three regressions in Table 3 cover the sub-sample period 1993-2002 and include the additional explanatory variables such as the wage. The final three regressions presented in table 4 cover the sub-sample period 1993-2002 and include interaction variables to test for parameter stability. In each table, regressions are presented for Females, Males and Both genders (including gender interactions).

Table 2 reports a linear regression of the individual absence rates for the whole 1984-2002 period. Individual characteristics are included with appropriate interactions together with year and month dummies. The regression results confirm many of the broad implications given by the aggregate plots. Women have higher absence rates than men as seen in Figure 4. The *Female* gender dummy is significant and negative (-0.835), there may be at least two explanations for this counterintuitive result. The first explanation is that the interactions of gender with age imply the gender shift occurs at age zero, obviously we have no employees aged zero in the sample. The second explanation is that the negative parameter is due to bias arising from omission of the *wage* variable because of the wage differential between the genders. Indeed, one can see from the regression reported in Table 3 that the parameter on the wage variable is significant and the parameter on the *Female* gender dummy is significant and positive (1.32). Variations of the absence rate with age and gender have been seen in Figure 5. On attaining retirement age those employees who choose to continue to work have markedly lower absence rates. The plot appears to indicate that the fall is around 2.5 percentage points. However, the regression results point to a lower gap of between 1.2 and 1.5 percentage points after other influences are controlled for.

Table 3 reports a linear regression for the 10-year sub-period 1993-2002. Restricting the period enables us to include variables on the employees' *Wage*. It also enables us to include measure on: if the employee is in the *Public* sector, the unemployment rate (*Unemployment*), the number of employees at the workplace *(# Employees*) and the employee's educational attainment (*Educ*:). This allows a more meaningful analysis of the effects of contract structure. In terms of the significance of the coefficients in the regression, another notable aspect is that the regressors measuring aspects of the contract (Usual Hours, Usual Hours squared, Wage and dummies for overtime) appear to be relatively more significant than individual employee characteristics. This implies that the rate of absence is susceptible to influence from policies which affect these contractual arrangements, for example working time regulation and taxation of earnings. As discussed in section 4, the absence to usual contracted hours (*uC*) profiles are concave with maxima at around 38 hours per week. In all the regressions, the parameter estimates on the dummy for having worked paid overtime in the reference week (*paidOT*) are negative, this may simply reflect the fact that in many cases employees are only eligible for overtime

pay if they have satisfied their contracted hours by not being absent. In all regressions the parameter estimates on the dummy for having worked unpaid overtime in the reference week (*unpaidOT*) are also negative though not quite as significant. Here the interpretation is less clear, it may be that unpaid overtime is undertaken to improve future career progression and may only be viable if contracted hours are satisfied. However, unpaid overtime may be used to make up for recent absences in which case one would have expected a non-negative parameter. As expected, the estimated parameter on the *Public* sector dummy is significantly positive. The parameters on Local unemployment rates (*Unemployment* and *Lag(Unemployment)*) are positive, which would generally be seen as counterintuitive, but the effect is insignificant. As expected, the parameters on dummies measuring education (*Educ:*) suggest more education tends to reduce absence significantly.

Table 4a and b reports extensions of the regressions in Table 3 that have the addition of year-interaction variables to test whether the estimated coefficients vary through time. Given the importance of the contractual variables ln(*wage*), *uC* and uC^2, these have been interacted with the year dummies (e.g. ln*(wage)*year*1984, etc.). In each case the year 2000 is the excluded/control category. Note that none of the F-tests reject the null hypothesis that the coefficients on these interactions (of *ln*(*wage*), *uC* and uC^2) with the year dummies are jointly equal to zero. For example, in regression (7) of Table 4 the F-test equals 1.56 which gives a probability value of 0.12. All other F-tests for the interaction variables have even higher probability values. These are strong results given the large sample sizes and they suggest parameter stability over the period 1993-2002 in the effect of contract structure. The estimated values of these interaction terms are reported in Table 4b. Similar regressions for the period 1984-2002 are not possible given the unavailability of many significant variables.

Table 2. Regression of absence rate, 1984-2002

Dependent variable: Absence rate	**(1)**	**(2)**	**(3)**
	Both	**Females**	**Males**
Parameter estimates, absolute value of t statistics in parentheses			
Constant	1.837	0.823	2.261
	(12.18)	(4.27)	(13.93)
Demographic characteristics			
Age	-0.052	0.044	-0.056
	(6.83)	(4.67)	(7.45)
Age^2/100	0.130	0.011	0.141
	(13.95)	(0.86)	(15.16)
Retired	-1.473	-0.904	-2.834
	(20.11)	(9.60)	(22.88)
Couple	-0.073	-0.070	-0.121
	(2.03)	(1.90)	(3.59)
Female	-0.835		
	(4.31)		
*Female*age*	0.079		
	(7.15)		
*Female*age*^{2}/100	-9.060		
	(6.51)		
*Female*couple*	-0.053		
	(1.08)		
Contractual (economic) characteristics			
uC	0.150	0.164	0.115
	(56.38)	(37.84)	(26.19)
uC^2/100	-0.202	-0.215	-0.167
	(53.57)	(29.06)	(32.85)
Paid OT	-3.651	-3.709	-3.627
	(134.97)	(76.18)	(115.27)
Unpaid OT	-3.655	-4.058	-3.361
	(128.46)	(87.37)	(95.44)
Observations	2648924	1284305	1364619
R^2	0.016	0.013	0.018
F-tests (and corresponding significance level) for non-reported dummies			
Industry dummies	137.18	75.01	94.10
Significance	0.00	0.00	0.00
Region dummies	29.37	13.58	18.12
Significance	0.00	0.00	0.00
Month dummies	72.43	46.60	27.27
Significance	0.00	0.00	0.00
Year dummies	18.45	10.89	14.14
Significance	0.00	0.00	0.00

Table 3. Regressions of absence rate 1993-2002

Dependent variable: Absence rate	(4)	(5)	(6)
	Both	**Females**	**Males**
Parameter estimates, absolute value of t statistics in parentheses			
Constant	1.816	2.657	2.271
	(4.61)	(5.31)	(5.30)
Demographic characteristics			
Age	0.106	0.085	0.123
	(5.54)	(3.69)	(6.38)
Age^2/100	-0.058	-0.060	-0.070
	(2.50)	(2.02)	(2.99)
Retired	-0.888	-0.268	-2.707
	(5.11)	(1.22)	(8.81)
Couple	-0.112	-0.055	-0.077
	(1.32)	(0.66)	(0.98)
Female	1.116		
	(2.35)		
*Female*age*	-0.021		
	(0.80)		
*Female*age*^{2}/100	0.442		
	(0.13)		
*Female*couple*	0.050		
	(0.44)		
Contractual (economic) characteristics			
ln(*Wage*)	-1.451	-1.179	-1.727
	(27.28)	(14.06)	(25.77)
uC	0.151	0.149	0.135
	(23.05)	(13.66)	(12.89)
uC^2/100	-0.201	-0.193	-0.189
	(21.06)	(10.23)	(15.04)
Paid OT	-4.054	-4.100	-4.080
	(63.86)	(37.48)	(54.13)
Unpaid OT	-3.200	-3.827	-2.684
	(47.15)	(35.34)	(31.70)
Public	1.038	1.150	0.774
	(13.62)	(10.82)	(6.97)
Unemployment	0.036	0.013	0.061
	(0.61)	(0.14)	(0.80)
Lag(Unemployment)	0.021	0.038	0.001
	(0.38)	(0.46)	(0.02)
# *Employees* 01-10	-1.689	-1.770	-1.594
	(24.94)	(17.83)	(17.28)
# *Employees* 11-49	-0.730	-0.821	-0.665
	(13.20)	(9.85)	(9.11)

Table 3. Continued….

Dependent variable: Absence rate	(4)	(5)	(6)
	Both	**Females**	**Males**
Contractual (economic) characteristics			
Educ: degree	-0.511	-0.266	-0.692
	(5.02)	(1.70)	(5.22)
Educ: higher	0.175	0.610	-0.443
	(1.68)	(4.02)	(3.09)
Educ: GCE	-0.236	-0.278	-0.247
	(2.78)	(2.08)	(2.24)
Educ: GCSE	-0.304	-0.365	-0.168
	(3.60)	(3.07)	(1.38)
Educ: other	-0.052	-0.146	0.049
	(0.58)	(1.13)	(0.39)
Observations	484074	243495	240579
R^2	0.020	0.017	0.024
F-tests (and corresponding significance level) for non-reported dummies			
Industry dummies	11.99	3.26	13.38
Significance	0.00	0.00	0.00
Region dummies	1.95	0.86	2.54
Significance	0.01	0.62	0.00
Month dummies	14.90	10.54	5.32
Significance	0.00	0.00	0.00
Year dummies	0.75	0.52	1.15
Significance	0.66	0.86	0.32

Table 4a. Regressions of absence rate 1993-2002 including interaction dummies with years

Dependent variable: Absence rate	***(7)***	***(8)***	***(9)***
	Both	***Females***	***Males***
Parameter estimates, absolute value of t statistics in parentheses			
Constant	2.058	2.489	3.170
	(4.14)	(3.72)	(4.46)
Demographic characteristics			
Age	0.106	0.084	0.124
	(5.54)	(3.66)	(6.40)
Age^2/100	-0.058	-0.059	-0.071
	2.50)	(1.98)	(3.02)
Retired	-0.885	-0.263	-2.713
	(5.09)	(1.20)	(8.83)
Couple	-0.113	-0.055	-0.075
	(1.33)	(0.67)	(0.96)
Female	1.122		
	(2.36)		
*Female*age*	-0.022		
	(0.81)		
*Female*age*^{2}/100	0.498		
	(0.15)		
*Female*couple*	0.052		
	(0.45)		
Contractual (economic) characteristics			
ln(*wage*)	-1.435	-1.099	-1.775
	(11.88)	(5.60)	(11.87)
uC	0.131	0.160	0.089
	(7.22)	(5.15)	(3.13)
uC^2/100	-0.172	-0.231	-0.127
	(6.35)	(4.22)	(3.63)
Paid OT	-4.056	-4.102	-4.080
	(63.90)	(37.50)	(54.15)
Unpaid OT	-3.198	-3.827	-2.679
	(47.12)	(35.34)	(31.63)
Public	1.037	1.146	0.774
	(13.61)	(10.78)	(6.97)
Unemployment	0.043	0.017	0.075
	(0.73)	(0.19)	(0.98)
Lag(Unemployment)	0.014	0.032	-0.009
	(0.26)	(0.39)	(0.13)
Worksize 01-10	-1.689	-1.771	-1.594
	(24.93)	(17.84)	(17.28)
Worksize 11-49	-0.731	-0.824	-0.665
	(13.21)	(9.88)	(9.11)

Table 4a. Continued….

Dependent variable: Absence rate	***(7)***	***(8)***	***(9)***
	Both	***Females***	***Males***
Contractual (economic) characteristics			
Educ: degree	-0.477	-0.179	-0.714
	(5.46)	(1.30)	(6.48)
Educ: higher	0.205	0.689	-0.469
	(2.25)	(5.14)	(3.79)
Educ: GCE	-0.206	-0.201	-0.273
	(3.00)	(1.76)	(3.24)
Educ: GCSE	-0.275	-0.289	-0.195
	(4.01)	(2.97)	(2.00)
Observations	484074	243495	240579
R^2	0.020	0.017	0.024
F-tests (and corresponding significance level) for non-reported dummies			
Industry Dummies	12.00	3.27	13.40
Significance	0.00	0.00	0.00
Region Dummies	1.95	0.86	2.54
Significance	0.01	0.62	0.00
Month Dummies	14.89	10.52	5.32
Significance	0.00	0.00	0.00
ln(*Wage*)**year*(1993-2002)	1.56	1.26	1.42
Significance	0.12	0.25	0.17
*uC*year*(1993-2002)	0.69	1.17	0.98
Significance	0.72	0.31	0.45
uC^2*year(1993-2002)	0.51	1.35	0.79
Significance	0.87	0.20	0.62

Table 4b. Regressions of absence rate 1993-2002 showing interaction dummies with years

	(7)	(8)	(9)
Parameter estimates, absolute value of *t* statistics in parentheses	**Both**	**Females**	**Males**
ln(*wage)*Yd*1993	-0.067	-0.151	-0.017
	(0.28)	(0.38)	(0.06)
ln(*wage*)**Yd*1994	0.029	0.111	-0.015
	(0.15)	(0.36)	(0.06)
ln(*wage*)**Yd*1995	-0.187	-0.289	-0.159
	(0.97)	(0.91)	(0.67)
ln(*wage*)**Yd*1996	0.113	0.322	-0.112
	(0.59)	(1.04)	(0.47)
ln(*wage*)**Yd*1997	-0.033	-0.263	0.182
	(0.20)	(1.00)	(0.91)
ln(*wage*)**Yd*1998	0.278	0.192	0.396
	(1.76)	(0.74)	(2.04)
ln(*wage*)**Yd*1999	-0.196	-0.428	0.028
	(1.21)	(1.62)	(0.14)
ln(*wage*)**Yd*2001	-0.038	-0.086	0.005
	(0.23)	(0.32)	(0.03)
ln(*wage*)**Yd*2002	-0.177	-0.165	-0.198
	(1.06)	(0.60)	(0.95)
*uC*Yd*1993	0.021	-0.024	0.060
	(0.59)	(0.44)	(1.04)
*uC*Yd*1994	0.015	-0.008	0.052
	(0.51)	(0.17)	(1.14)
uC*Yd1995	0.022	0.010	0.013
	(0.76)	(0.20)	(0.28)
uC*Yd1996	0.035	-0.022	0.077
	(1.18)	(0.45)	(1.67)
uC*Yd1997	0.030	0.013	0.064
	(1.24)	(0.31)	(1.68)
*uC*Yd*1998	-0.007	-0.089	0.017
	(0.30)	(2.12)	(0.45)
*uC*Yd*1999	0.030	0.010	0.054
	(1.18)	(0.22)	(1.38)
*uC*Yd*2001	0.028	-0.015	0.043
	(1.07)	(0.32)	(1.07)
*uC*Yd*2002	0.038	0.026	0.092
	(1.43)	(0.56)	(2.28)

Table 4b. Continued….

Parameter estimates, absolute value of *t* statistics in parentheses	(7) Both	(8) Females	(9) Males
(uC^2/100)**Yd*1993	-0.013 (0.24)	0.082 (0.86)	-0.067 (0.93)
(*u*C^2/100)**Yd*1994	-0.035 (0.80)	0.020 (0.23)	-0.073 (1.29)
(*u*C^2/100)**Yd*1995	-0.028 (0.65)	0.006 (0.07)	-0.029 (0.52)
(*u*C^2/100)**Yd*1996	-0.059 (1.32)	0.046 (0.52)	-0.117 (2.05)
(*u*C^2/100)**Yd*1997	-0.040 (1.09)	0.003 (0.04)	-0.074 (1.57)
(uC^2/100)**Yd*1998	-0.001 (0.03)	0.182 (2.46)	-0.048 (1.03)
(*u*C^2/100)**Yd*1999	-0.038 (0.99)	0.013 (0.17)	-0.064 (1.30)
(*u*C^2/100)**Yd*2001	-0.035 (0.89)	0.058 (0.72)	-0.062 (1.25)
(*u*C^2/100)**Yd*2002	-0.056 (1.41)	-0.044 (0.55)	-0.107 (2.10)

7. Concluding remarks

We have analysed the determinants of absenteeism using up to 18 years of Labour Force Survey data and up to 2.6 million individual observations. Although on aggregate the absence rate appears to change only marginally over this period, individual level regressions show that the absence rate varies substantially between sub-groups of the data and is particularly sensitive to variables which measure aspects of the employees' contractual arrangements. This is important both for individual employers and for policy makers.

Though we are unable to test for the effect of the 1991 and 1994 changes in sick-pay legislation, we are able to run regressions where year-dummy interactions with the most important contractual variables allow for a structural break in every year during 1993-2002. What emerges from these regressions is the extraordinary degree of parameter stability over the period. If we speculate that the impact from the 1994 change in legislation was distributed over a number of years, what emerges is a lack of responsiveness to the change in sick-pay regulation. Admittedly, these results may simply confirm our ini-

tial view that sick-pay legislation is of tertiary importance in the UK. As stated above, what does emerge is the primary importance of contractual arrangements such as the hourly wage rate and the contracted work hours and the secondary importance of demographic aspects.

In designing labour contracts employers seem to recognise that contracts affect employee behaviour, and in particular their absence. Policy makers concerned with regulatory measures should be aware of the impact of sick pay benefits and working time arrangements on absence behaviour.

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