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SICKNESS ABSENCE: AN INTERNATIONAL COMPARISON*

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This paper shows how internationally and intertemporally consistent information on sickness absence can be constructed from Labour Force Surveys, and describes some important features of data that we have generated using the Luxembourg Employment Study. We also analyse sickness absence rates by age, gender and other socio-economic characteristics of workers. These relationships prove to be similar across countries with widely differing mean rates of absence. In this dataset, workers with longer tenure tend to have higher absence rates even when age is controlled for. Absence is also positively correlated with higher usual hours of work.

We show how internationally and intertemporally consistent information on sickness absence can be constructed from Labour Force Surveys (LFS), and describe some important features of data that we have generated using the Luxembourg Employment Study (LES).

Such data fill an important gap in available information about absence, since they have the potential to provide answers to a number of issues that remain unresolved in its study. There is now substantial evidence, going back to the work of the Industrial Fatigue Research Board in the 1920s and 1930s,[1] that sickness absence is not purely a response to a medical condition. Workers who have access to compensation payments are more likely to be absent than those without (Buzzard and Shaw, 1952); the higher the rate of compensation, the more absences workers are likely to take (Buzzard and Shaw, 1952); furthermore, the higher the rate of compensation, the longer absences are likely to be (Barmby *et al.*, 1991).

The analysis of sickness absence is placed firmly in the agenda of economics by the idea that sickness absence rates are the consequence of choices that can be mediated by financial (and other) incentives. The provision and level of sickpay is typically determined at two levels: by negotiation between firms and their workforces, and by government regulation.

Interfirm variations in absence and their correlates are not well understood. Coles and Treble (1996) have argued that the marginal cost of an absence is partially in the control of firms, and can be usefully seen as driven by the nature of the technology adopted. These theoretical arguments remain largely unexplored empirically, but the ability to compare similar industries across different countries is likely to be revealing.

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[1] See, for example, Vernon and Bedford (1928).

To understand fully the impact of the government regulation of sickpay on absence rates, it is necessary to have data that either enable analysis of a regime shift within a single jurisdiction, or for which comparisons across jurisdictions can be made. Data constructed using the method described here enable both types of comparison to be undertaken.

There are at least two main areas of policy formulation in which such data are potentially useful:

(i) *Sickpay Regulation* National sickpay policies vary enormously across Europe and across the OECD countries. The US has none, the UK regulates, while most other countries in Europe, not only regulate but also subsidise sickpay. A necessary tool for assessing the impact of these regulatory differences on economic activity across countries is a data source that uses an internationally consistent definition of absence. We believe that the LFS provides this.

(ii) *Family Policy* In some economies (e.g. Denmark) sickpay is available for workers who are not sick themselves, but who are responsible for the care of sick children. There are also international differences in public provision of child-care facilities, in school age and other aspects of family life that are likely to have an impact on the propensity of workers to be absent. Once again, analysis of the productivity impact of these differences, both in home production and market production relies on the availability of comparable data.

1. Method of Analysis

The definition of the absence rate used in this work is driven mainly by the questions asked in the LFS, but it also reflects two principles: one cannot be absent if one has not contracted to attend; and, the cause of an absence can only reasonably be that claimed by the absentee.

The first principle raises the question of what constitutes a contract. Some workers are contractually bound to be at a particular place at a particular time for all of their working hours. Others have contracts that place no constraint on where and when tasks should be performed. Yet others have no explicit contract at all. In the absence of any specific information about contracts, we treat the LFS concept of 'usual hours' as synonymous with contractual hours.

There is no objective notion of what is meant by 'sick', let alone 'sufficiently sick not to attend work'. Medical certification is insufficient since, in some countries (the UK, for instance), the certification process is initiated by workers themselves. We therefore take the pragmatic view that a worker's absence is counted as due to sickness if they say that it is. Analysts of the resulting figures will then have to grapple with the issue of whether the observed rate of absence is due to 'genuine sickness'. One thing is certain: the incidence of sickness absence is heavily influenced by the availability of sickpay.[2]

[2] See Buzzard and Shaw (1952) and, more recently, Barmby *et al.* (1997).

The measure of sickness absence we propose 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. Part-time and self-employed workers are excluded. The LFS 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. Those who did some paid work are then asked what their usual hours (LES variable FJ12) and actual hours (FJ13) of work are, and the reason for any difference (FJ14). Respondents who report being away from an occupation, are also asked what their usual hours are, and a reason for their absence. 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 (A_{it}) to contracted hours (C_{it}) in the reference week (t),

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

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[3] 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.[4]

[3] We note two problems with this procedure:
(i) It is possible for A_{it} constructed in this way to be negative in some cases. This occurred only in 0.02% of cases in Barmby *et al.* (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 the overall rate is 3.17%, which decomposes into 2.87% for men and 3.82% for women. Comparable rates when overtime is included 3.21% overall, 2.91% for men and 3.87% for women. These facts are inconsistent with the idea that absence on overtime hours should be lower, as the rate increases when we add overtime.

[4] 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 *et al.*, 1991) and almost certainly underestimates the overall rate.

2. International Comparability

This paper uses data from all the countries included in the LES database for which variables FJ12, FJ13 and FJ14 are available – 8 European countries and Canada. The LES holds data for only one year for each country.[5] Table 1 lists the countries and the dates for which data are available. The limitations of LES imply that we are unable to investigate the full range of information that has been collected in the LFSs. For instance, LFS data have been collected for the UK every year from 1984 to the present, and many other countries have similar runs of data available.

Table 1

LFS Data Sets Available in the LES

Country	Canada	Czech Republic	France	Luxembourg	Slovenia	Spain	Sweden	Switzerland	UK
Year	1997	1994	1997	1992	1994	1993	1990	1997	1989

Data from different sources is rarely exactly comparable even if, as in the LFS, there has been a deliberate attempt on the part of the statistical services of the countries involved to make it so. LES has developed standardisation techniques which enable users to access multinational data with consistent variable names. However, despite the claim of international comparability between LFSs, there remain several differences in the questionnaires' coding which constrain the LES attempt at standardisation. The main issue for the present study is that the standardisation prevents us from measuring overtime.

Our concept of absence is contracted hours that are not worked. While the LFS questions appear to be quite explicitly asking about this in questions that refer to time spent away from work, none of the questions refer explicitly to contracted hours. The solution adopted here is to treat reported usual hours as contracted hours, although the meaning of the word 'usual' in these questions is not at all clear. Many respondents might think of usual hours as contracted hours, but if they work overtime regularly, reported usual hours may include some element of overtime, which may or may not be contractual. Some job contracts do not specify what hours are to be worked. For these, neither overtime nor absence are very meaningful ideas. Given the enormous variety of contractual arrangements (and especially international differences in the law relating to labour contracts), we take the view in the present study that what the employee thinks of as usual hours, is probably the best indicator of contractual hours that we are likely to find.

3. Summary Statistics

Table 2 reports internationally comparable raw absence rates, computed using the methods described in Section 2. They show wide variations in national rates.

[5] Apparently, this is due to the present reluctance of national governments to release data more freely.

Table 2

Sickness Absence Rates by Country and Gender (%)

Date	Country	Female	Male	Total	Obs. (no.)
1997	Canada	3.83	2.58	3.07	36,015
1997	Czech Republic	4.75	3.34	3.95	23,656
1997	France	2.76	2.49	2.59	42,835
1992	Luxembourg	1.62	1.92	1.83	5,345
1994	Slovenia	3.48	3.62	3.56	8,494
1993	Spain	2.47	2.49	2.48	39,019
1990	Sweden	8.42	5.13	6.31	24,933
1997	Switzerland	2.69	1.40	1.78	5,301
1989	UK	3.87	2.91	3.21	48,189

Sweden's rate is particularly high, perhaps because of the generous system of sickpay that was in place in 1990. France's sickpay system is also very generous, but France's absence rate seems low.[6] The UK's regulated rates of sickpay are very small relative to both countries, but its absence rate lies between the two. Clearly a more sophisticated explanation is required than the simple generosity of regulated sickpay provision in different economies. The second striking feature of Table 2 is that, in all but three of the economies covered, male absenteeism is lower than female.[7] The exceptions are Luxembourg, Slovenia and Spain (where the two rates are close). The causes of this phenomenon are complex. Explanations are likely to involve the relationship between household and market work, or the differing structure of temporary and permanent work contracts. We intend to study this difference more closely in the future.

4. Sickness Absence by Country and Socio-Economic Characteristics

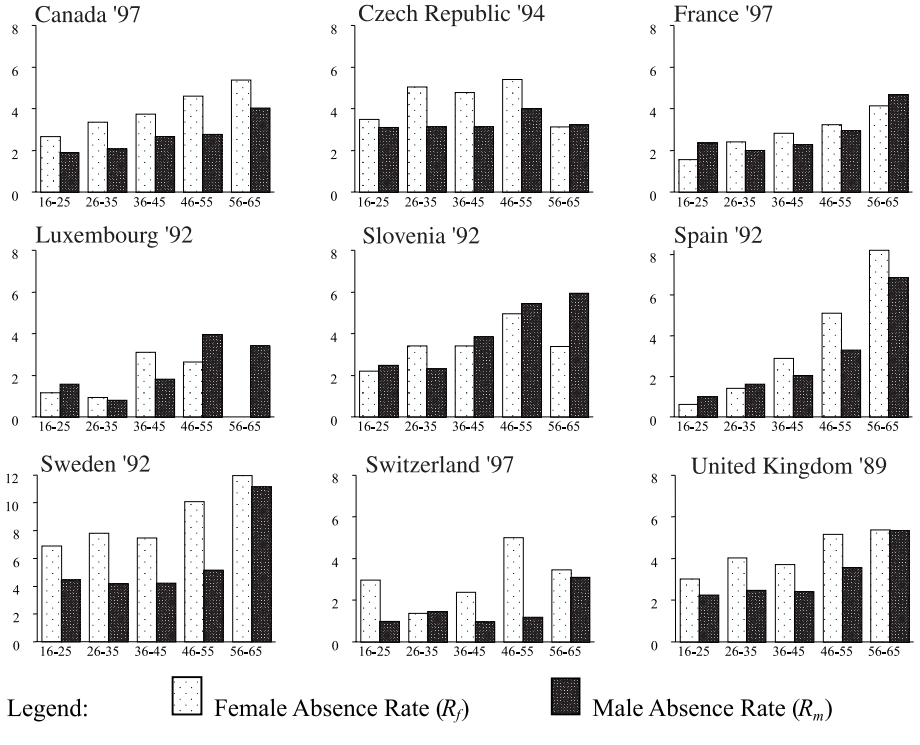
The broad outlines of international absenteeism patterns can be seen from the figures displayed below, showing the distribution of absence by age, gender, marital status, tenure, industry and occupation. These figures have been constructed to be as similar as possible to those reported in Barmby *et al.* (1999). In that paper we were able to use the UK LFS surveys 1984–97 and show the development of absence patterns over time. Here, we are limited to a single year for each country. For some countries, especially Luxembourg, Slovenia and Switzerland, cell sizes are small, leading to wide variation in computed absence rates.

[6] The accuracy of the data can also be called into question. A recent OECD study (1998) suggests that the hours recorded in the LFS for France, Luxembourg and Spain are probably underestimates of the true sickness absence hours and that the hours recorded for Canada, Sweden and the UK are probably quite accurate. Whether this also implies that the *rates* recorded here are internationally incomparable seems to us to depend on the definitional issues discussed in the text, and on international differences in contractual arrangements (especially the incidence of overtime working).

[7] This finding is contrary to the report by Bliksvær and Helliesen (1997). Cf footnote 1.

4.1. *Plots by Country, Age Bands and Gender*

Plots by country, age bands and gender are reported in Fig. 1. Age bands are used to attain reasonable sample sizes for each cell, though cell sample sizes for Luxembourg and Switzerland remain relatively small. The plots show some interesting consistencies between the economies studied. For the most part, absence rates rise monotonically with age for both sexes, although there is some evidence that the age gradient is negative for young male employees. In the cases of France, Slovenia, Spain and Luxembourg, the sickness absence rate for young males is higher than that for young females. With the exception of these young workers, male workers take sickness absence less frequently than females.



Pooled values for sample of all nine countries [absence rate] and (sample size)

	Females (f)		Males (m)	
Age band	R_f	n_f	R_m	n_m
16–25	[2.83%]	(16,317)	[2.31%]	(21,838)
26–35	[3.32%]	(24,087)	[2.28%]	(39,453)
36–45	[3.93%]	(24,703)	[2.61%]	(40,892)
46–55	[5.16%]	(17,812)	[3.49%]	(30,949)
56–65	[6.45%]	(4,890)	[5.85%]	(12,406)

Fig. 1. *Absence Rate by Gender and Age*

4.2. *Plots by Country, Gender and Marital Status*

The differences in absence rates between male and female employees may be due to the gender division of household work. Fig. 2 plots the absence rate by gender and marital status of the respondent. We would have liked to plot this decomposition by gender and by the presence of dependent children in the household but information on the latter is unavailable for five of the countries in this set. For the UK LFS, 'married' refers to those who are legally married and those who are cohabiting as if a married couple. This definition was adopted in 1989. For the other countries, we have insufficient documentation to identify the exact definition of marital status. We therefore take those who are married to be those who are legally married or possibly cohabiting as a married couple. Those who are single include those who have never been married, are divorced, separated or widowed. The 'single' category, therefore, covers a large age profile of the population.

The plots suggest that single men have the lowest absence rates while married women have the highest absence rates. An exception to the general pattern can be observed in Luxembourg where single females have the lowest absence rates of any

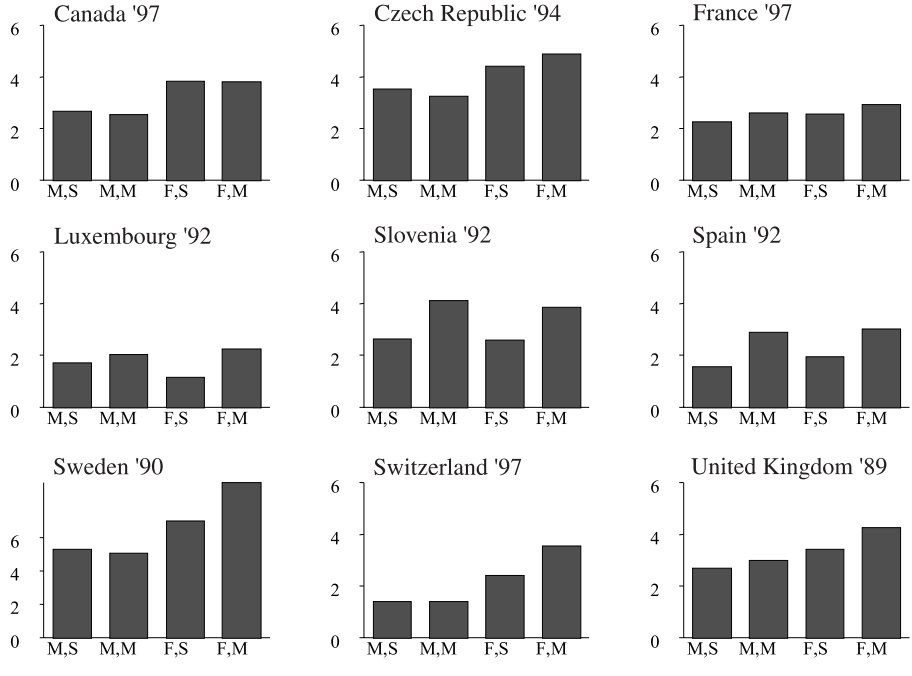


Fig. 2. *Absence Rate by Gender (M = male, F = female) and Marital Status (S = single, M = married)*

Notes: Marital status and gender with pooled [absence rate] and (sample size) across all nine countries. M,S [2.64%] (45,078); M,M [3.07%](100,851); F,S [3.33%] (35,522); F,M [4.39%] (52,329)

group across all nine countries. Another exception is observed in Spain where absence rates seem to vary by marital status but not by gender.

4.3. *Plots by Country, Industry, Occupation and Tenure*

Presented below are the absence rates by industry, occupation and tenure. The industrial breakdown presented in Fig. 3 suggests that, in several of the countries, heavy manufacturing industries have the highest absence rates. This may be partially attributable to higher risks in these industries of direct injury and exposure to factors leading to illness. Overall, the sector with the highest absence rate is 'Health and Social Services' (13) while the sector with the lowest absence rate is 'Financial and Related Services' (10).

In Fig. 4 we report decompositions of absence rates by occupation groups. With the exception of categories 0 'Armed Forces' and 6 'Skilled Agricultural and Fishery Workers'. Lower measured sickness absence is associated with occupations having a higher degree of responsibility in the workplace. Groups 7, 8 and 9 have been merged together so as to harmonise this variable for all nine countries. Regression analysis for the subset of countries for which categories 7, 8 and 9 were

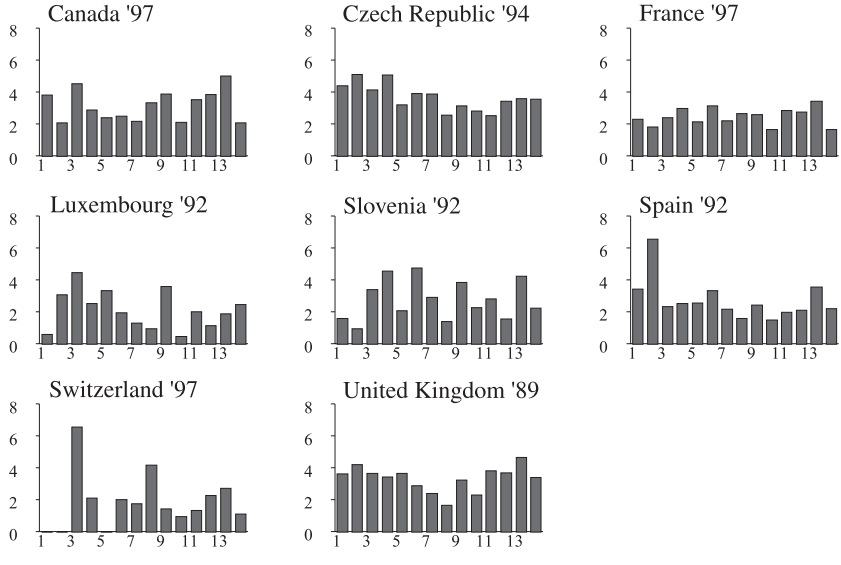


Fig. 3. *Absence Rate by Industry and Country* (excluding Sweden)

Notes: Industrial categories with pooled [absence rate] and (sample size): 1 = Agriculture, Forestry and Fishing [3.55%] (6,843); 2 = Extraction industries [3.64%] (3,327); 3 = Food, Drink and Tobacco [3.27%] (6,756); 4 = Manufacturing Industries [3.40%] (46,320); 5 = Electricity, Gas and Water [2.82%] (3,135); 6 = Construction [3.15%] (15,410); 7 = Wholesale and Retail Trade [2.36%] (27,090); 8 = Hotels and Restaurants [2.25%] (6,706); 9 = Transport and Communication [3.07%] (14,944); 10 = Financial and Related Services [1.89%] (20,784); 11 = Public Administration [2.89%] (18,204); 12 = Education [3.06%] (13,536); 13 = Health and Social Services [3.97%] (16,312); 14 = Personal and Recreational Services [2.49%] (9,021)

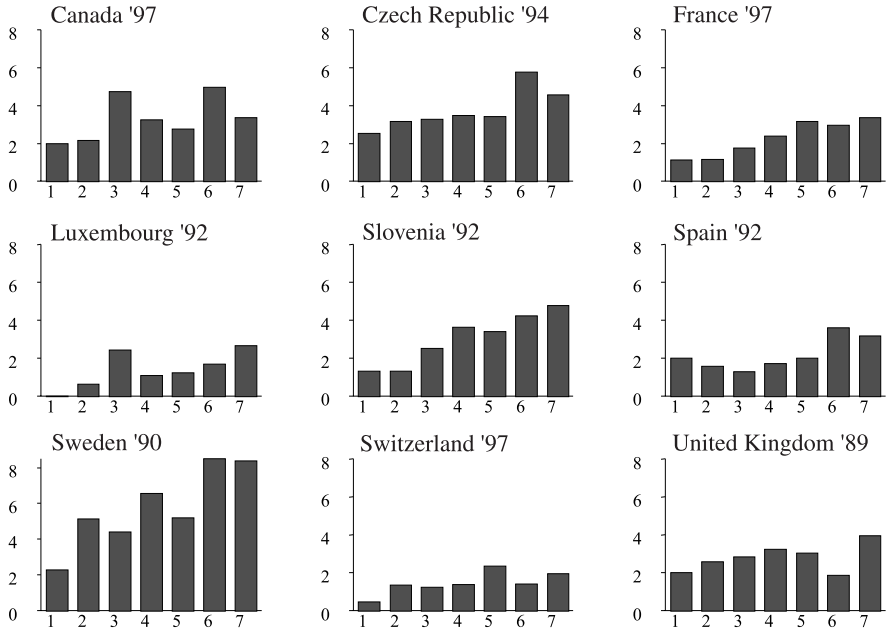


Fig. 4. *Absence Rate by Occupation and Country*
Occupation category 0 is excluded in the tabulation by country because of small sample size. Occupation category 7 in the graphs actually represents categories 7, 8 and 9 merged. Categories 7, 8 and 9 were merged because the summary statistics suggest they have similar absence rates and the regression analysis suggests these experience similar propensities for sickness absence
Notes: Occupational categories with pooled [absence rate] and (sample size): 0 = Armed Forces [2.46%] (941); 1 = Legislators, Senior Officials and Managers [1.92%] (17,211); 2 = Professionals [2.55%] (25,391); 3 = Technicians and Associated Professionals [2.80%] (30,204); 4 = Clerks [2.99%] (35,015; 5 = Service workers and shop and market sales workers [3.02%] (27,723); 6 = Skilled Agricultural and Fishery workers [4.28%] (4,031); 7, 8, 9 Craft & trade workers, Plant & Machine operators and Elementary Occupations [4.07%] (92,769)

available suggested that these three experiences similar propensities for sickness absence.

In Fig. 5, absence rates by tenure[8] are reported for six of the nine countries; these are only available by groups and not as a continuous variable. The univariate pattern here seems clear, employees with longer tenure have higher rates of sickness absence. Possible explanations for the positive correlation include:

(i) a job security effect – employees with long tenures may believe their jobs to be secure and the cost of an absence to be accordingly lower
(ii) tenure is correlated with age and we have already observed that sickness absence increases with age.

[8] Tenure is measured using the responses to the question: 'How long have you been with your current employer?' for employees; and 'How long have you been continuously self-employed?' for self-employed respondents. Note, the self-employed are not included in our data set.

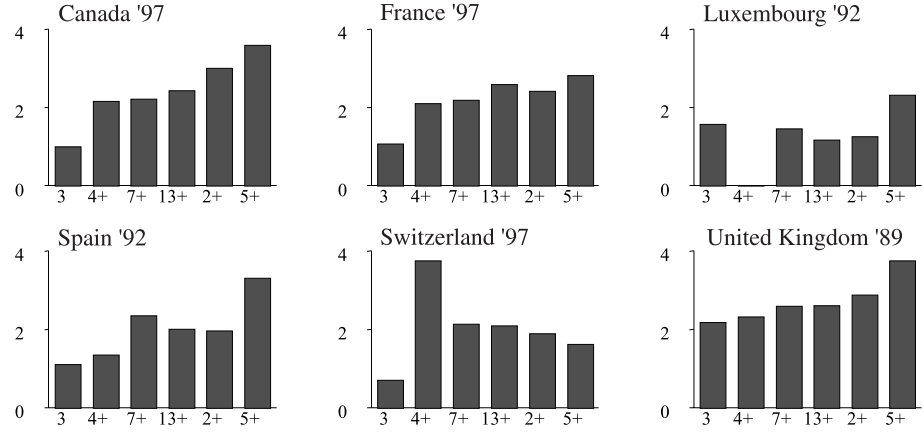


Fig. 5. *Absence Rate by Tenure and Country* (excluding Czech Republic, Slovenia and Sweden)

Notes: Tenure categories with pooled [absence rate] and (sample size): 3 = employed 3 months or less [1.30%] (12,376); 4+ = employed 4 to 6 months [1.91%] (8,046); 7+ = employed 7 to 12 months [2.35%] (14,908); 13+ = employed 13 to 24 months [2.44%] (16,768); 2+ = employed 2 to 5 years [2.55%] (28,368); 5+ = employed over 5 years [3.27%] (95,798)

The multivariate analysis in the next section sheds light on this pattern by simultaneously controlling for both age and tenure. Luxembourg and Switzerland are rather different from the other countries, since they have relatively small sample sizes and they are more subject to sampling error.

5. Multivariate Analysis

This section describes a multivariate analysis using OLS regressions, the results of which confirm the messages of the tables and figures discussed above. The dependent variable is formulated in two ways, simply as a ratio $R_i = A_i/C_i$ and as a log-odds ratio[9] $\ln[R_i/(R_i - 1)]$. OLS regressions are reported for each formulation. The subscript i denotes this as an individual absence ratio to distinguish it from the ratio specified in (1).

Independent variables include *Gender, Age, Married, Usual Hours, Industry* dummies (not available for Switzerland), *Occupation* dummies, and *Tenure* (not available for the Czech Republic and Slovenia). Because the full set of variables we would ideally have wanted to include is not available for all the countries, we have run regressions on all the countries but with a limited set of explanatory variables (Table 3) and another set of regressions with a full set of explanatory variables, but

[9] The distribution of the dependent variable is far from normal, being restricted between 0 and 1 with a large mass on 0. We have tried many different specifications for the error in these estimations, but report just the two. The outcome is almost completely invariant to the specification adopted. We have used the approximations $\ln[0/(1-0)] = -5$ and $\ln[1/(1-1)] = 5$ to account for the indeterminacy at the extremes of the distribution.

Table 3

OLS Regression Results for all nine Countries

	$R_i = A_i/C_i$		$\ln[R_i/(R_i - 1)]$	
Dependent variable	Coeff.	t-stat.	Coeff.	t-stat.
Constant	1.446	2.702	−4.833	90.100
Age	−0.112	4.176	−0.012	4.452
$Age^2/100$	0.247	7.575	0.025	7.788
Married	−0.258	2.251	−0.027	2.326
Usual Hours per Week	0.072	13.553	0.007	13.946
Occupation (*Other* is control)				
Armed Forces	−1.061	1.806	−0.109	1.846
Legislators and Managers	−2.996	16.877	−0.301	16.909
Professionals	−2.363	17.671	−0.237	17.681
Technicians & Associated	−2.012	16.175	−0.203	16.218
Clerks	−1.675	13.617	−0.169	13.690
Service and sales workers	−1.535	11.307	−0.158	11.618
Skilled Agricult. & Fishery	−0.139	0.472	−0.015	0.521
Country (*UK* is control)				
Canada	−0.326	0.544	−0.018	0.298
Czech Republic	0.148	1.066	0.001	0.053
France	−0.737	6.192	−0.086	7.249
Luxembourg	−1.213	4.916	−0.137	5.526
Slovenia	0.056	0.276	−0.010	0.493
Spain	−0.897	7.518	−0.103	8.604
Sweden	3.017	21.998	0.292	21.277
Switzerland	−1.588	6.054	−0.170	6.458
Gender specific terms				
Female	−0.444	0.565	−0.044	0.564
Female × *Age*	0.098	2.254	0.010	2.306
Female × $Age^2/100$	−0.129	2.375	−0.013	2.435
Female × *Married*	0.681	3.947	0.070	4.062
Number of observations	222,156		222,156	
Significance of regression	$F^{23}_{222,132} = 117.69$		$F^{23}_{222,132} = 118.09$	
R^2	0.0119		0.0120	

with data from only 6 countries (Table 4). In addition to the above regressions, we have sought to model the differences in absence rates observed between countries by allowing for different absence/age profiles for each country. The results for these are reported in Table 5.

5.1. *OLS Regression for all nine Countries*

OLS regression results based on all nine countries are reported in Table 3. These regressions show that age and marital status effects can account for the entire difference in absence rates between males and females in the sense that the dummy on gender is insignificant while the interactions are significant. Married women have higher absence rates, and the difference between male and female rates increases with age.

The age structure of absence is different for men and women. The mean absence rate is 2.71% for a base case of a 20-year-old unmarried man in the UK,

Table 4

OLS Regression Results for Subset of six Countries

	$R_i = A_i/C_i$		$\ln[R_i/(1-R_i)]$	
Dependent variable	Coeff.	t-stat.	Coeff.	t-stat.
Constant	1.057	1.724	−4.871	79.100
Age	−0.169	5.738	−0.018	6.024
$Age^2/100$	0.298	8.405	0.031	8.620
Married	−0.266	2.207	−0.027	2.253
Usual Hours per week	0.067	12.456	0.007	12.911
Occupation (*Other* is control)				
Armed Forces	−0.751	1.241	−0.081	1.319
Legislators & Managers	−2.243	11.750	−0.227	11.833
Professionals	−2.150	13.361	−0.215	13.311
Technicians & Associated	−1.602	10.789	−0.163	10.946
Clerks	−1.202	8.884	−0.123	9.053
Service and sales workers	−0.989	6.134	−0.104	6.434
Skilled Agricult. & Fishery	−0.120	0.314	−0.011	0.283
Country (*UK* is control)				
Canada	−0.317	0.518	−0.015	0.242
France	−0.714	6.397	−0.084	7.481
Luxembourg	−1.254	5.289	−0.141	5.911
Spain	−0.727	6.454	−0.086	7.559
Switzerland	−1.531	6.205	−0.164	6.611
Industry (*Personal & Recreation* is control)				
Agricul, Forestry & Fishing	0.565	1.747	0.055	1.697
Extraction industries	1.059	3.001	0.106	2.999
Food, Drink & Tobacco	0.615	2.227	0.063	2.272
Manufacturing Industry	0.507	2.580	0.050	2.547
Electricity, gas & water	0.472	1.293	0.043	1.163
Construction	0.768	3.339	0.074	3.221
Wholesale & retail trade	0.170	0.841	0.017	0.821
Hotels & Restaurants	0.290	1.055	0.030	1.080
Transport & Comm.	0.606	2.653	0.059	2.552
Financial & Related	0.006	0.027	0.002	0.079
Public Administration	0.799	3.664	0.082	3.757
Education	1.005	4.167	0.100	4.106
Health & Social Services	1.646	7.423	0.163	7.295
Tenure (1 to 3 months is control)				
4 to 6 months	0.674	3.004	0.068	3.004
7 to 12 months	1.105	5.780	0.112	5.821
13 to 24 months	1.263	6.653	0.129	6.762
over 2 to 5 years	1.291	7.450	0.131	7.506
over 5 years	1.567	9.650	0.157	9.638
Gender specific terms				
Female	−0.595	0.701	−0.058	−0.675
Female × *Age*	0.088	1.872	0.009	1.906
Female × Age^2	−0.118	2.012	−0.012	−2.051
Female × *Married*	0.449	2.461	0.047	2.581
Number of observations	167,014		167,014	
Significance of regression	$F^{38}_{166,975} = 38.91$		$F^{38}_{166,975} = 39.97$	
R^2	0.0088		0.0090	

Table 5

OLS regression with interactions between Country, Age *and* Usual Hours *per week*

	$R_i = A_i/C_i$		$\ln[R_i/(1-R_i)]$	
Dependent variable	Coeff.	t-stat	Coeff.	t-stat
Constant	0.323	0.430	−4.935	65.40
Female	1.179	15.611	0.122	16.18
Age (*UK* is control group)	−0.128	3.296	−0.014	3.702
Age × *Canada*	0.144	2.142	0.015	2.155
Age × *Czech Republic*	0.257	3.880	0.027	4.121
Age × *France*	0.002	0.030	0.001	0.179
Age × *Luxembourg*	0.126	0.882	0.015	1.052
Age × *Slovenia*	0.089	0.713	0.011	0.888
Age × *Sweden*	−0.391	5.408	−0.038	5.275
Age × *Spain*	−0.063	1.050	−0.005	0.772
Age × *Switzerland*	−0.006	0.042	0.002	0.112
$Age^2/100$	0.236	4.773	0.025	5.060
$Age^2/100$ × *Canada*	−0.187	2.211	−0.019	2.239
$Age^2/100$ × *Czech Republic*	−0.377	4.455	−0.039	4.638
$Age^2/100$ × *France*	−0.010	0.112	−0.002	0.203
$Age^2/100$ × *Luxembourg*	−0.126	0.676	−0.015	0.805
$Age^2/100$ × *Slovenia*	−0.033	0.201	−0.005	0.331
$Age^2/100$ × *Sweden*	0.567	6.173	0.056	6.096
$Age^2/100$ × *Spain*	0.181	2.385	0.017	2.180
$Age^2/100$ × *Switzerland*	−0.029	0.154	−0.005	0.277
Usual hours per Week	0.085	10.079	0.009	10.55
Usual hours × *Canada*	−0.069	4.464	−0.007	4.567
Usual hours × *Czech Republic*	−0.064	2.907	−0.007	3.153
Usual hours × *France*	−0.071	4.233	−0.007	4.441
Usual hours × *Luxembourg*	−0.083	1.607	−0.009	1.683
Usual hours × *Slovenia*	−0.029	0.760	−0.003	0.890
Usual hours × *Sweden*	0.129	5.151	0.012	5.028
Usual hours × *Spain*	0.011	0.702	0.001	0.500
Usual hours × *Switzerland*	0.000	0.020	−0.000	0.030
Country				
Canada	0.201	0.144	0.042	0.042
Czech Republic	−0.527	0.346	−0.080	0.080
France	2.440	1.625	0.218	0.218
Luxembourg	−0.403	0.123	−0.093	0.093
Slovenia	−1.226	0.439	−0.167	0.167
Sweden	3.957	2.429	0.374	0.373
Spain	−1.350	1.064	−0.174	0.174
Switzerland	−0.591	0.172	−0.115	0.115
Number of observations	222,644		222,644	
Joint significance tests.				
Of whole regression.	$F^{36}_{222,607} = 64.98$		$F^{36}_{222,607} = 65.30$	
Of country specific age profiles.	$F^{16}_{222,607} = 15.81$		$F^{16}_{222,607} = 16.38$	
Of country specific hours profiles.	$F^{8}_{222,607} = 10.50$		$F^{8}_{222,607} = 10.70$	
R^2	0.0102		0.0103	

usually working 35 hours a week in an occupation included in the omitted category.[10] The mean absence for women with similar characteristics is 3.6%. Men's absence has a U-shape through the age range, with a minimum of 2.69% at slightly under 23. By 40, the mean rate has risen to 3.4%, and to 5.3% at age 55. Married men have rates 0.25 of a percentage point lower than these.

Women's absence increases throughout the range of working ages. Equivalent figures for the ones given above are 3.71% at age 20, 4.85% at age 40 and 6.32% at age 55. Married women have rates about 0.4 of a percentage point above these.

All occupation groups have significantly lower measured absence rates than the control group, except 'Armed Forces' and 'Skilled Agricultural and Fishery workers' which have the same rates. Workers who usually work longer hours, also have higher absence rates.

Country dummies measure the differences between mean rates for different countries. They should not be interpreted as indicating simply behavioural differences between countries, since there are also likely to be systematic international differences in measurement error. The most striking result here is that for any given population group, the absence rate in Sweden is measured at 3 percentage points greater than in the UK. France, Luxembourg, Spain and Switzerland have significantly lower rates.

5.2. *OLS Regression for Subset of six Countries*

In Table 4, we report regression results including variables measuring job tenure and industry in the analysis. Since there is no tenure variable in LES for the Czech Republic, Slovenia or Sweden, these three countries are omitted from the analysis. All the findings reported in Table 3 persist in the results reported in Table 4, including the positive effect of usual hours per week. The mean absence rate is 2.48% for a base case of a 20-year-old unmarried man in the UK, usually working 35 hours a week in an occupation included in the omitted category, and tenure of 1–2 years. The mean absence for women with similar characteristics is 3.2%. Men's absence has a U-shape through the age range, with a minimum of 2.27% at the age of 28½. By 40, the mean rate has risen to 2.67% (3.71% for women), and to 4.38% at age 55 (5.06% for women). Again, married men have rates 0.25 of a percentage point lower than these.

Interestingly, people with longer tenure tend to have higher absence rates even when age is controlled for. Rates increase monotonically with tenure, and these effects are both statistically significant and large. People who have been in a job for 4 years or more have absence rates 1.5 percentage points higher than those who have just joined. Could this be because job security increases with tenure? The industry dummies yield results wholly consistent with the bar graphs in Fig. 3.

[10] The omitted category 'Other Occupations' includes 'Craft and trade workers', 'Plant and Machine operators' and 'Elementary Occupations'.

5.3. *OLS Regression Allowing for Country Specific Age/absence Profile*

In the final regressions (Table 5), we interact 'Usual hours per week' and 'Age' with the country dummies so that the impact of usual hours and age is measured for each individual country. Computer capacity constraints on the LES system prevent including a full set of interactions with the gender variable as well as these others.

Nearly all the significant differences in absence rates between the countries are removed once these country specific age/absence profiles have been accounted for, except that there is still a 3.957 percentage point excess in the Swedish absence rate. This does not mean that the variance in absence itself is adequately described by this regression. The $R^2 \approx 0.01$ for the regressions is very low even for data of this degree of complexity. Why absence in Sweden is different from other countries is a question worth pursuing in future research. The mean difference between the genders across all these economies is 1.2 percentage points. The mean age profile is monotonic increasing and convex. There are significant differences between the age profiles in different countries. Absence increases in usual hours, but the effect is not present in Canada, the Czech Republic, France or Luxembourg. The effect is stronger in Sweden than in the UK, and much the same in the UK, Spain and Switzerland.

6. Conclusion

The main objective of this paper has been to make an international comparison of sickness absence behaviour for nine countries, using LFS data deposited at the LES.

Economic models of absence behaviour[11] stress the importance of labour supply and demand in the determination of absence rates. The results we describe illustrate several aspects of this. In most countries, women have higher absence rates than men. Older workers have higher rates than younger ones, except that rates decline for men until their mid-20s. The age profile needs careful interpretation, since the data we use do not form a panel. The age profile is affected not only by the changing propensities of employees to attend as they grow older, but also by the fact that the group of older employees is a selection from the relevant cohort. Employees who drop out of the labour force may do so for a variety of reasons, some of which will be health related. If the distribution of sickness is changing[12] among each cohort as it ages and is being truncated in the upper tail, the net impact on absence is unpredictable. The fact that absence tends to increase with age despite the attrition implies that the estimated slope of the age profile is biased downwards. A further complication in interpreting these results arises because absence rates are affected by moral hazard as well as by any objective notion of morbidity.

There are many aspects of sickness absence that we cannot study in the present paper because we lack data with time variation for each country. Combined with extraneous information about sickpay arrangements in the various countries, this would possibly enable us to identify financial incentive effects, and to be able to

[11] Allen (1981), Barmby *et al.* (1991; 1995), Coles and Treble(1993; 1996).
[12] Some evidence on this is offered by Palme and Johansson (1999).

disentangle the determinants of absence with a greater degree of confidence than has been possible in the past. For instance, one effect which is quite robust in the results reported here is the positive relationship between usual hours and absence. An interpretation of this is that, at higher hours, the marginal rate of substitution of goods for leisure is higher making the marginal non-market hour more valuable.

Finally, with panel data, another extension would be possible. The literature on social capital and health claims that the degree of income inequality is an important determinant of the health status of nations.[13] The literature relies entirely on mortality measures to represent health. An alternative approach is to use data on sickness absence. Although it is tainted by incentive problems, it should be possible to control for these, and determine whether the relationship that has been claimed on the basis of mortality statistics, also holds for a measure that is more closely related to morbidity.

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Spain	Encuesta de poblacion activa, Instituto Nacional de Estadistica (INE), Madrid.
Sweden	AKU, Swedish Labour Force Survey, Statistics Sweden, Stockholm.
Switzerland	Swiss Labour Force Survey, Swiss Federal Statistical Office, Bern.
UK	Labour Force Survey, Office for National Statistics, London.

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