Injury-related absenteeism and job satisfaction: insights from Greek and UK data

Stavros A. Drakopoulos[a] & Katerina Grimani[a]

[a] Department of Philosophy and History of Science, University of Athens, Athens, Greece
Published online: 14 Apr 2013.

PLEASE SCROLL DOWN FOR ARTICLE

Routledge
Taylor & Francis Group

Injury-related absenteeism and job satisfaction: insights from Greek and UK data

Stavros A. Drakopoulos* and Katerina Grimani

Department of Philosophy and History of Science, University of Athens, Athens, Greece

Most of the literature on absenteeism suggest that absence from work is a complex issue influenced by multiple causes, both of personal and of organizational nature. Job satisfaction has also been identified as one of the factors affecting an employee's motivation to work attendance. There is no universal agreement concerning the relationship between absenteeism and job satisfaction. Some research have found no correlation between these two variables, whereas other studies indicate a weak relationship between these two variables. It has also been suggested that absence and job satisfaction might be more strongly related under some conditions, for instance in the case of blue-collar workers. There is a lack of attention in the literature, however, to injury-related absenteeism, which is a particular type of absenteeism. This paper attempts to fill this gap and examines the effect of job satisfaction on injury-related absenteeism by using Greek and UK data. The empirical results suggest that there is a negative relationship between injury-related absenteeism and job satisfaction. The paper also discusses possible policy measures towards reducing injury-related absenteeism.

Keywords: absenteeism; job satisfaction; labour market participation; occupational injuries; working conditions

1. Introduction

In recent years, there has been an increasing interest concerning the issue of absenteeism, spurred by a growing awareness that the economic and social costs of the phenomenon are quite substantial. Thus, it is not surprising that many studies have concentrated on the determinants of absenteeism in an attempt to discover ways and policies to reduce it. Absenteeism, however, is influenced by many factors, which make it difficult to quantify, qualify or rectify (Tylczak 1990). Family obligations, working conditions, occupational accidents and distance to work can be some of these factors (see Rhodes and Steers 1990; Michie and Williams 2003; Ose 2005). Furthermore, the employee's level of job satisfaction in the workplace has also been suggested by different researchers as one of the main factors affecting absenteeism (e.g. Steers and Rhodes 1978; Tylczak 1990; George and Jones 2002; Gyekye and Salminen 2006; Böckerman and Ilmakunnas 2008). Job satisfaction is generally defined as an employee's attitude towards the job and the job situation. In particular, Robbins, Odendaal and Roodt (2003) define job satisfaction as 'the difference between the rewards employees receive and the reward they believe they should receive' (p. 16).

Absence from work is defined as non-attendance when attendance was scheduled or clearly expected. The majority of absences are generally attributed to sickness or incapacity, but there may be other reasons. According to Brown and Sessions (1996), there are three different classes of absenteeism: absence due to sickness, absence due to

---

*Corresponding author. Email: sdrakop@phs.uoa.gr

accidents and a residual class, interpreted as voluntary absence. The causes of absenteeism are in general multifaceted, and are influenced not only by the health status of individuals but also by the social insurance system, the work environment, biological factors, attitudes and commitment to work, macroeconomic conditions and other social and psychological determinants (see Chelius 1981; Drago and Wooden 1992; Brown and Sessions 1996; Løkke Nielsen 2008).

There is ample literature focusing on the effect of job satisfaction on absenteeism. However, there is a lack of attention regarding the effect of job satisfaction on a specific type of absenteeism: injury-related absenteeism. A more detailed investigation of this issue might also increase our understanding concerning appropriate policy recommendations for reducing injury-related absenteeism. In particular, a negative relationship between satisfaction levels and the number of days employees stay absent would imply that policies towards increasing job satisfaction might also lead to a reduction of injury-related absenteeism. Apart from the obvious benefits to employees, this reduction will in turn lead to lower levels of general absenteeism costs (including health care costs) and increased labour productivity.

This paper attempts to fill this literature gap by concentrating on relevant data from Greece and the UK. Greece can be seen as a typical southern European country, while the UK is considered a typical northern European country with the relevant socio-economic, institutional and cultural differences (see also Gimeno, Benavides, Benach and Amick 2004). Furthermore, according to recent European data, there are marked differences concerning absenteeism and job satisfaction in those two countries compared to EU-27 average levels.[1] Thus, a comparison between the two countries might offer some general insights concerning the differences between southern and northern EU countries in this respect.

Given the above, this paper will examine the effect of job satisfaction on injury-related absenteeism, employing data drawn from a recent European research project (socio-economic and occupational effects on the health inequality of the older workforce; SOCIOLD). The structure of the paper is as follows: Section 2 will present an extensive literature survey concerning absenteeism and job satisfaction and also the nature of their relationship. The following two sections will describe the data and the empirical methodology followed in this paper. Section 5 will present the research findings regarding the statistically significant effect (if there is any) of job satisfaction and other determinants on injury absenteeism. A concluding section with possible policy recommendations will close the paper.

2. Theory and literature review

2.1 *Job satisfaction and absenteeism*

Recent theorizing on job satisfaction describes it as a multifaceted construct and a function of workers' personality traits and workplace factors. Implicit in these definitions is the importance of both internal and external factors as determinants of job satisfaction. Relevant research has demonstrated the importance of job satisfaction in organizations, especially in terms of efficiency, productivity, employee relations and absenteeism (Dormann and Zapf 2001; Gyekye and Salminen 2006; Jones, Jones, Latreille and Sloane 2009).

The connection between job satisfaction and absenteeism has attracted the interest of numerous studies. The paper by Steers and Rhodes (1978) was one of the first to attempt to construct a theory of absenteeism, attributing its incidence primarily to job dissatisfaction. In particular, job satisfaction was highlighted as the key to an individual's voluntary absence decision. This approach was also supported by Scott and Taylor (1985) and

Brooke and Price (1989). The basis of the theory was that employees will withdraw or be absent from a work situation that is painful and dissatisfying (Waters and Roach 1971; Muchinsky 1977). Although other factors such as avoiding painful work situations and inability to come to work are also included, motivation to attend work is assumed to be a major factor determining the rate of absenteeism (Scott and Mabes 1984; Siu 2002). Moreover, more recent works on this topic indicate that job dissatisfaction seems to be linked to the external causal factors responsible for accident occurrence. Gyekye and Salminen (2006) explore the influence of job satisfaction on causal attributions for occupational injuries. It was noted that employees who experienced higher levels of job dissatisfaction attributed accident causality more to job environmental factors than to their personal characteristics. In addition, the results of Barling, Kelloway and Iverson (2003) supported that there is a significant effect of job satisfaction on occupational injuries. Empirical research on occupational accidents has demonstrated that accident causality is attributed to internal (dispositional characteristics of the worker) and external causal factors (characteristics of the work environment). Models of occupational accident process have included variables such as employees' social work environment, organizational climate, behaviour at work and personality variables as contributory factors (Dormann and Zapf 2001; Hardy, Woods and Wall 2003).

Other empirical studies have supported the effect of job satisfaction on absenteeism. In two early papers, Waters and Roach (1971) and Hrebiniak and Roteman (1973) reported that the level of frequency of absence and the number of absent days, respectively, were significantly related to job satisfaction. Oldham, Kulik, Ambrose, Stepina and Brand (1986) suggested that the workers who felt under-rewarded were less satisfied and exhibited lower performance and higher absenteeism than employees who felt equitably treated. Moreover, Rosse and Miller (1984) and Hoque and Islam (2003) found that job dissatisfaction contributes positively to absenteeism; thus, the lower the dissatisfaction levels, the higher the absenteeism among the sample of workers. Lau, Au and Ho (2003) conducted a meta-analysis on 19 different studies and found job satisfaction effect (although a weak one) on absence from work.

In the same tone and from a more economic viewpoint, absences are understood as the outcome of the worker's labour–leisure choice. A worker is absent whenever the benefits of not working are greater than the costs (Allen 1981; Böckerman and Ilmakunnas 2008). Thus, one can argue that job satisfaction is a predictor of absenteeism.

It has to be pointed out though that there is no universal agreement concerning the exact nature of the relationship between absenteeism and job satisfaction. As was mentioned above, researchers have generally believed that job satisfaction is inversely related to absenteeism. Since the early 1970s, many specialists started to question the nature of this relationship. More specifically, the established theory that an undesirable work situation causes absenteeism was criticized by Nicholson (1976) by arguing that many findings were inconsistent. Thus, alternative hypotheses concerning this relationship started to appear. One of those advanced by Steers and Rhodes (1978) and Clegg (1983) is that the relationship between job satisfaction and employee absenteeism is not direct. They suggested that undiscovered moderator variables might cause the mixed findings.

Other studies have challenged those that observed a strong relationship between job satisfaction and absenteeism. More specifically, in an early paper, Nicholson (1976) found that job satisfaction is not a major cause of absence. They suggested that under some situational and individual circumstances, there may be some causal relationship. Clegg (1983) and Goldberg and Waldman (2000) also found no relationship between the two

variables, while others found a highly negative relationship (Farrell and Stamm 1988). Spector (2000) has suggested that absence and job satisfaction might be more strongly related under some conditions (e.g. blue-collar workers). Scott and Taylor (1985) concluded that the conflicting findings are a result of sampling error and measurement reliability, scale inadequacies and of different measures of job satisfaction and absence.

2.2 Absenteeism

Most research on absenteeism have concentrated on two main themes: the association of personal characteristics with absence and the association of job satisfaction with absence. Job satisfaction and personal characteristics (such as age and family size) have been found to be related to absenteeism in some studies, but not related in others. As was mentioned earlier, according to Steers and Rhodes (1978), the inconsistency of job satisfaction–absenteeism findings may be explained by other variables that moderate the relationship. Scott and Mabes (1984) identified gender as one such moderator. Gender has become a significant employment factor due to the changing nature of the labour force in many countries. Traditionally, it has been assumed that men and women participate in the workforce for different reasons. In the past, men provided the primary source of family income, while most women were unpaid homemakers. In more recent years, the increase in the number of single-parent households, the feminist movement, civil rights legislation and inflation have all had an effect on changing the make-up of the workforce and on the nature of the relationship between women and their jobs (for a discussion, see Schultz 1990). Not only are more women working but they also are holding more diverse jobs, some of which were previously held only by men (Scott and Mcclellan 1990). According to Clegg (1983), females tend to be more frequently absent than males, most of the time for unexcused reasons (Fitzgibbons and Moch 1980). This gap may be due to differences in the social roles females and males play as well as to differential socialization (Romme 1990). Lau et al. (2003) support these findings and also report that women are generally more absent than men due to domestic and general health issues.

The relevant literature provides some insights concerning the relationship of demographic and socio-economic characteristics with the absence rate. More specifically, research on the relationship between age and absenteeism is equivocal. Age has been shown to be negatively related to absence frequency (Lau et al. 2003). This implies that absenteeism is higher among younger employees. This relationship can be explained by the fact that older workers usually take up higher responsibility at work, and they will not ask for a sick leave as a result of minor illness. Rhodes (1983) suggested that the relation between age and absenteeism may depend on factors such as the type of absence measures used, whether the job is physically demanding and the worker's gender. Thus, employee absenteeism might depend on this type of factors and not necessarily on their age (Hackett 1990).

Furthermore, a number of researchers have found education to be negatively related to absence rate. Hence, years of education are inversely related to absenteeism. The rational here is that higher educated employees have more autonomy at work and more involvement in their jobs and thus are less absence prone (Muchinsky 1977; Allen 1981; Leigh 1991, Chaudhury and Ng 1992; Zatzick and Iverson 2011). Moreover, the proportion of employees on fixed-term/temporary contracts that face a greater risk of job loss is negatively associated with absenteeism, while flexible working time arrangements are found to be related with lower employee absence (Pouliakas and Theodossiou 2013). Individuals with inflexible working hours are more prone to absence than those with

flexible hours and part-time jobs (Brown and Sessions 1996). Böckerman and Ilmakunnas (2008) suggest that absences are more frequent in manufacturing sector than in other sectors. Finally, Drago and Wooden (1992) supported that absenteeism is higher among females, singles, blue-collar workers and low-educated employees (for a review of the empirical literature on absenteeism, see Harrison and Martocchio 1998).

Most of the above-mentioned studies use absenteeism in general, without distinguishing any particular type of absenteeism. However, more specialist studies support the distinction between voluntary and involuntary absenteeism. Involuntary absenteeism can be influenced by organizational, personal and attitudinal variables (Driver and Watson 1989). Job satisfaction is considered to be one of the main attitudinal variables (Steers and Rhodes 1978, 1984). Thus, a potential contribution of this paper is the utilization of a specific type of involuntary absenteeism, the injury-related absenteeism, and its relation to job satisfaction. There are almost no references examining the empirical dimensions of injury-related absenteeism and its relationship to job satisfaction. Although the relationship between occupational injuries and job satisfaction has been investigated, the issue of absenteeism due to occupational injuries associated with job satisfaction has not been the subject of systematic investigation. This is probably because injury absenteeism has a strong clinical dimension and thus it is seen more as a subject of the medical literature where it is used as an indicator of the health-related variable under study (see also Harrison and Martocchio 1998). Thus, this paper will attempt to explore the empirical dimensions of the effect of job satisfaction to injury absenteeism by using a set of recent Greek and UK data.

3. Data

The data used in this paper were drawn from SOCIOLD,[2] a European research survey. This three-year research project contains data from six EU countries (the UK, France, Finland, Denmark, the Netherlands and Greece). The participants were aged 45–65 years, and were selected by the method of multistage sampling. The procedure had four stages of random and systematic sampling. Multistage sampling is similar to cluster sampling, but with several stages of sampling and sub-sampling. This method is usually used in large-scale population surveys as it gives more objective and scientifically defensible evaluation findings and is less prone to bias. The participants responded to a questionnaire of 40-minute duration, comprising 58 questions relating to issues such as physical and mental health status, past working experiences, incidence of diseases, sense of well-being, job satisfaction, absenteeism and socio-economic and occupational background of the participants of the labour force. The surveys were conducted in the summer–autumn of 2004 through Internet (face-to-face interviews took place in Greece where Internet penetration at the time was limited especially with regard to the sample population). Owing to missing information on some variables for some participants and after necessary data processing, the final sample consists of 1001 individuals from Greece and the UK. The UK sample was the most consistent and similar to the one from Greece regarding our data of interest. In addition, the UK variable is utilized as a reference point in order to emphasize the difference between southern and northern European countries as some papers suggest (e.g. Gimeno et al. 2004).

The questionnaire data of interest included injury absenteeism and job satisfaction variables. It also included type of employment (three dummy variables: fixed [3.3%], temporary [3.4%] and permanent [59%] contracts), type of industry (seven separate dummy variables: agriculture, forestry and fishing [2.6%], construction [8%],

manufacturing [16.8%], hotels and catering [3.5%], transport and communication [6%], banking, finance, insurance [6.2%] and other services [39.6%]), career path (25% of the respondents saw themselves as following a career path), the percentage of the spouse's contribution to the overall household income and the UK dummy variable. Finally, the data contained personal variables such as age (from the record of the participants' birth date), gender (547 [55%] males and 454 [45%] females) and education level (three dummy variables: primary [30% pre-primary and primary education], secondary [35% lower, upper and postsecondary education] and tertiary [30% first and second stage of tertiary education]) (see Table 1).

Injury absenteeism was assessed by the number of days off work due to a recent serious occupational injury that the participants experienced during their current or last job, if not employed or retired. According to the sample, 89% of the respondents reported no absence due to a recent serious injury at work, 3% reported 1–15 days absence and 8% reported more than 15 days absence. The job satisfaction measure was constructed from ten separate items comprising of occupational characteristics: work environment, the respect you get from your employer, decision latitude, workload, job stress, working hours, physical risk, wage compensation, job security, career prospect. In addition, the participants were asked how satisfied or dissatisfied they were with their present job, using a 1–6 Likert scale (1 was very dissatisfied and 6 was very satisfied). The constructed index variable was linearized by using z-scores transformation. The negative values of the z-scores were transformed into positive and the natural logarithm (ln) was estimated. Reliability and validity estimations were conducted prior to index variable construction. The internal consistency approach (Cronbach's α) was employed in order to assess the reliability of the scale. Cronbach's α is the most widely used method for evaluating inter-item reliability because it refers to the correlation of each item with every other item. According to the results, the Cronbach's α of the overall job satisfaction scale was 0.9587. This suggests that the internal reliability of the scale is very high, since an instrument with an internal consistency coefficient of 0.80 (scale total) or higher is considered to be adequate (Van Saane, Sluiter, Verbeek and Frings-Dresen 2003). The validity of the scale used was also assessed by content validity. The term 'content validity' refers to the extent to which an instrument covers the whole concept. The content validity was assessed by examining the fit between relevant work factors retrieved from the literature search and work factors included in the instrument under assessment. The work factors were categorized in 11 related domains (autonomy, financial rewards, promotion, workload, work demands, co-workers, work content, growth/development, supervision, communication and meaningfulness), representing the content of job satisfaction. The content validity was estimated as adequate under the assumption that the greater the number of work factors, the more this instrument would measure the concept of job satisfaction. The used scaled – instrument measured ten work factors, thus its content validity is considered to be satisfactory (see Van Saane et al. 2003).

4.   Empirical methodology

The methodological tool for analysing absence data that will be used in this paper is the Tobit model. Although ordinary least-squares (OLS) regression remains the dominant model of absenteeism research, the Tobit model would seem to be a more appropriate and sensible approach, according to Hammer and Landau (1981), Leigh (1985), Baba (1990) and Green (1993). This is because the Tobit model is a regression model designed to handle truncated data, where the truncated value occurs with a high probability and the variable is continuously distributed beyond that point (Tobin 1958; Wooldridge 2001).

Table 1.   Summary statistics and definitions of variables.

Variables/definitions	Mean	SD
Injury absenteeism (number of days off work due to recent serious occupational injury)	10.570	57.235
Age (45–65 years)	52.734	5.352
Males = 1, females = 0	0.546	0.498
Fixed contract (lasting between 1 and 3 years) = 1, otherwise = 0	0.032	0.179
Temporary contract (lasting (12 months) = 1, otherwise = 0	0.034	0.181
Primary education = 1, otherwise = 0	0.299	0.458
Secondary education = 1, otherwise = 0	0.356	0.479
Ln job satisfaction	−1.437	2.634
Agriculture, forestry and fishing = 1, otherwise = 0	0.026	0.159
Construction = 1, otherwise = 0	0.081	0.273
Manufacturing = 1, otherwise = 0	0.168	0.374
Transport and communication = 1, otherwise = 0	0.060	0.237
Banking, finance, insurance = 1, otherwise = 0	0.062	0.241
Other services = 1, otherwise = 0	0.396	0.489
UK = 1, otherwise = 0	0.573	0.495
Career path = 1, otherwise = 0	0.245	0.430
Spouse's contribution to the overall household income (%)	36.625	33.144
Ln job satisfaction predictors	−1.437	1.275

Thus, the Tobit model is espoused in order to provide more consistent, reliable and less biased estimates than the OLS model (Baba 1990; Sturman 1996). In our case, injury absenteeism will be the dependent variable, which is determined by a number of variables including job satisfaction.

Theoretically, job satisfaction can simultaneously be affected by injury absenteeism (Clegg 1983; Brooke 1986; Erwin and Iverson 1995; Kumar and Bakhshi 2008). Thus, there might be an issue of endogeneity, which can be dealt with by also employing an instrumental variables (IV) Tobit model. More specifically, we first estimate a job satisfaction equation using the same variables as our basic equation with the addition of a variable which should be correlated to job satisfaction but which does not affect injury absenteeism. We then use the predicted values of job satisfaction, which we then place in the injury absenteeism estimation in order to overcome the endogeneity issue.

Before we proceed to the report of the results, we should also mention a limitation of the present study that needs to be acknowledged. The limitation concerns the survey instrument used, which was a self-reporting measure of satisfaction. This implies that the information presented by participants is based on their subjective perceptions. Although participants were assured of confidentiality, it is possible that they either over- or under-reported their level of satisfaction. However, self-reporting measures are widely used in many similar contemporary empirical studies (for instance, see Böckerman and Ilmakunnas 2008; García-Serrano 2009).

5.   Results

As has been mentioned in the empirical methodology section, our equation of interest is

$$A_j = \alpha_1 + \alpha_2 JS_j + \alpha_3 X_j + \varepsilon_j \tag{1}$$

Assume injury absenteeism (A) for individual j in country c. Then, A_j, the dependent variable, is determined by a variety of factors. JS is job satisfaction, which is the basic

independent variable; X is a vector of other individual characteristics variables, such as *age*, *gender*, *type of employment*, *education level*, *industry* dummy variables and *career*, assumed to influence injury absenteeism. The α are the associated coefficients, and ϵ_j is a randomly distributed error term.

The results of the Tobit model (Table 2, column A), concerning Equation (1), reveal a strong negative effect of job satisfaction on injury absenteeism. Moreover, two predictors exhibit significant relationship to injury absenteeism. The coefficients for males, job satisfaction and UK are statistically significant. For a one unit increase in age, there is a 0.17 point increase in the predicted value of injury absenteeism. There is a positive relation between injury absenteeism and gender, while males have higher percentage of absence. Moreover, injury absenteeism is higher for the UK than for Greece.

It is well known that the validity of the Tobit estimator depends on the assumption of normality (Barros, Galea, Gonzalez and Leiva 2010). Several potential misspecifications in the form of heteroskedasticity and incorrect normal assumption imply inconsistency for the Tobit estimation (Brannas and Laitila 1989). Goldberger (1983), among others, showed that the Tobit estimator becomes inconsistent when the normal distribution assumption of the disturbance is not satisfied. A number of alternative tests for the normality assumption in the Tobit model have been suggested (Reynolds and Shonkwiller 1991; Jeong and Jeong 2010). A Lagrangean multiplier (LM) test was used to test the null hypothesis of no specification error of the Tobit model (Vincent 2010a). The LM statistic has been computed for testing the Tobit specification against the alternative of a model that

Table 2. Tobit model – dependent variable: injury absenteeism (column A). OLS model: dependent variable: Ln job satisfaction (column B).

	(A) Tobit model Injury absenteeism	(B) OLS model Ln job satisfaction
Ln job satisfaction	−21.587 (4.22)**	
Age	−0.176 (0.08)	−0.048 (3.52)**
Males	99.092 (3.46)**	0.870 (4.76)**
Fixed contract	−37.146 (0.50)	1.408 (5.96)**
Temporary contract	42.002 (0.64)	1.317 (4.54)**
Primary education	14.084 (0.42)	−0.413 (2.03)*
Secondary education	55.704 (1.89)	−0.294 (1.63)
Agriculture, forestry and fishing	23.119 (0.28)	0.048 (0.09)
Construction	62.613 (1.27)	0.147 (0.45)
Manufacturing	14.003 (0.34)	0.225 (0.92)
Transport and communication	79.011 (1.52)	0.549 (1.57)
Baking, finance, insurance	−10.374 (0.16)	0.831 (2.47)*
Other services	26.224 (0.75)	0.197 (0.94)
UK	121.307 (4.15)**	1.445 (8.10)**
Career path	−28.145 (0.91)	0.567 (3.32)**
Spouse's contribution (%) to the overall household income		−0.010 (3.71)**
Constant	−487.987 (3.65)**	−0.043 (0.05)
Observations	1001	1001
Pseudo R^2	0.0288	
R^2		0.23
Log likelihood	−932.03101	

Note: Absolute value of *t*-statistics in parentheses (column A). Robust *t*-statistics in parentheses (column B). *Significant at 5%; **significant at 1%.

is non-linear in the regressors and contains an error term that can be heteroskedastic and non-normally distributed. A rejection of the null hypothesis suggests that the Tobit specification is unsuitable (Vincent 2010b). The results indicated that there was no specification error of the Tobit model (see Table 3).

As was mentioned earlier, there might be an issue of endogeneity in the job satisfaction–injury absences relationship, which can be resolved by adopting the following equation:

$$JS_j = \gamma_1 + \gamma_2 X_j + \gamma_3 Z + \varepsilon_j \qquad (2)$$

Z is a vector of individual characteristics that influences JS and contains one variable that is not in X above. The X variables that are used are the same as before: *age*, *gender*, *type of employment*, *education level*, *industry* dummy variables and *career*. The Z variable has to be highly correlated to job satisfaction but it should not affect injury absenteeism directly. The *spouse's contribution to the overall household income* was used as Z variable. Several studies have found a strong correlation between an individual's job satisfaction and the income of other workers in the household, especially that of the spouse (Clark 1996; Clark and Oswald 1996; Sloane and Williams 2000).

The results from the OLS model (Table 2, column B), with robust standard errors, reveal a strong negative correlation between job satisfaction and Z variable (*spouse's contribution [%] to the overall household income*) that is consistent with Clark's (1996) findings. In addition, eight of the independent variables (age, males, fixed contract, temporary contract, primary education, baking/finance/insurance, UK, career path) exhibit significant relationship to job satisfaction.

From Equation (2), job satisfaction is predicted from each individual. Then, these predictions JS_{pr} are placed in the injury absenteeism estimation:

$$A_j = \alpha_1 + \alpha_2 Js_{prj} + \alpha_3 X_j + \varepsilon_j \qquad (3)$$

The utilization of the Tobit model (Table 4, column A) indicates a negative effect of job satisfaction on injury absenteeism. The coefficients for males, job satisfaction, transport and communication, and UK are statistically significant. A non-significant negative relationship between age and injury absenteeism has been found. The results indicate a positive relation between injury absenteeism and sex (males). In the present study, the predicted value is higher for men than for women. It is also higher for individuals with temporary and fixed contract than for those with permanent contract. Moreover, there is no effect of career path and education on absenteeism. The predicted value is lower for primary education individuals and higher for secondary education individuals than for those with high education. This implies that individuals with secondary education are more prone to absenteeism. The spouse's contribution to the overall household income is not significantly related to injury absenteeism. Finally, injury absenteeism is higher for the UK than is for Greece.

Table 3. LM test of Tobit specification.

LM	Bootstrap critical values		
	%10	%5	%1
39.257	3.407	5.519	13.248

Table 4. Dependent variable – injury absenteeism: Tobit with endogeneity (column A); marginal effects (column B), instrumental variables Tobit model (column C), marginal effects for IV Tobit (column D).

	(A) Tobit (considering endogeneity) Injury absenteeism	(B) Marginal effects after Tobit Injury absenteeism	(C) IV Tobit Injury absenteeism	(D) Marginal effects after IV Tobit Injury absenteeism
Ln job satisfaction	−91.460 (1.98)*	−14.980 (1.99)*	−91.381 (1.93)	−17.230 (1.94)
Ln job satisfaction predictors				
Age	−3.436 (1.04)	−0.5628 (1.04)	−3.594 (1.05)	−0.678 (1.06)
Males	177.745 (2.95)**	28.802 (3.00)**	177.661 (2.86)**	33.146 (2.94)**
Fixed contract	53.634 (0.53)	9.344 (0.50)	61.683 (0.60)	12.373 (0.56)
Temporary contract	125.789 (1.37)	23.895 (1.19)	133.663 (1.41)	28.893 (1.24)
Primary education	−12.766 (0.32)	−2.078 (0.32)	−12.643 (0.31)	−2.371 (0.31)
Secondary education	41.302 (1.25)	6.866 (1.24)	36.680 (1.07)	6.996 (1.06)
Agriculture, forestry and fishing	33.368 (0.39)	5.681 (0.37)	31.265 (0.35)	6.084 (0.34)
Construction	82.101 (1.57)	14.651 (1.45)	77.639 (1.41)	15.706 (1.33)
Manufacturing	19.817 (0.46)	3.298 (0.45)	26.271 (0.58)	5.046 (0.57)
Transport and communication	119.453 (1.97)*	22.343 (1.74)	120.061 (1.88)	25.411 (1.70)
Banking, finance, insurance	44.275 (0.59)	7.605 (0.56)	44.323 (0.58)	8.711 (0.55)
Other services	35.036 (0.95)	5.791 (0.95)	37.259 (0.97)	7.085 (0.97)
UK	249.251 (3.09)**	39.774 (3.16)**	233.269 (2.83)**	42.926 (2.92)**
Career path	11.690 (0.27)	1.929 (0.27)	16.819 (0.38)	3.200 (0.37)
Constant	−558.873 (3.88)**		−530.437 (3.60)**	
Spouse's contribution (%) to the overall household income	0.381 (0.53)		0.438 (0.64)	
Observations	1001		1001	
Pseudo R^2	0.0214			
Log likelihood	−939.03839		−3186.6275	
y		108.96221		139.94376

Note: Absolute value of t-statistics (for Tobit) and z-statistics (for IV Tobit and marginal effects) in parentheses.
*Significant at 5%; **significant at 1%.

Table 5.   Weak instrument robust tests and confidence sets for IV Tobit.

Test	Statistic	p	95% confidence set
AR	4.31	0.0379	$-224.642, -6.91981$
Wald	3.72	0.0539	$-184.289, 1.52632$

Moreover, in order to enhance the statistical analysis, we estimated the effects of marginal changes. The marginal effects were computed for the expected value of the dependent variable conditional on being uncensored. Marginal effects measure the expected instantaneous change in the dependent variable as a function of a change in a certain explanatory variable while keeping all the other covariates constant. The marginal effect measurement is required to interpret the effect of the regressors on the dependent variable and is also needed to infer the substantive significance of coefficients (for a discussion, see Green 2003). According to the results (Table 4, column B), marginal effects did not differ from the level effects (Tobit regression) in terms of significance.

An IV Tobit model (Table 4, column C), which controls for the endogeneity problem, has also been estimated. Compared to the Tobit model considering endogeneity, the IV Tobit estimation supplies very similar results. However, the effect of job satisfaction on absent injuries is marginally non-significant. The marginal effects (Table 4, column D) obtained from the IV Tobit estimation are also very similar to those from the Tobit estimation considering endogeneity, but as before the effect of job satisfaction on absent injuries is marginally non-significant.

In order to check the strength of the instruments against the null hypothesis of weak instruments, a test of over-identification restriction has been used (Staiger and Stock 1997). The test of over-identification restrictions supports the validity and the relevance of the instruments. It performs tests of the coefficient on the endogenous variable after the IV model. The tests are robust to the weak instruments problem, which occurs when the correlation of instruments to the endogenous variable is weak and renders the standard inference tools unreliable, producing spuriously significant results. In particular, it calculates the minimum distance version of the Anderson–Rubin (AR) test statistic, which is a joint test of the structural parameter and the over-identification restrictions (Finlay and Magnusson 2009). The Wald test and the Wald confidence interval are also presented in the results. We found that the reported *p*-values of the AR test indicate high significance, and therefore the weak instrument problem is not present in our estimations (see Table 5).

6.   Discussion and concluding comments

This paper utilized a large sample to test the issue of injury absenteeism–job satisfaction relationship by using Greek and UK data. In particular, the results indicated a statistically significant inverse relationship between the number of days employees stay absent due to occupational injury and their job satisfaction levels. This implies that a low level of employee job satisfaction is associated with an increase in the number and frequency of injury absences. This is an important result highlighting the effect of job satisfaction on a specific type of absenteeism.

Although there is a lack of attention concerning injury absenteeism in the literature, prior empirical research on absenteeism in general provides some insights regarding the main variables. As was pointed out, there is no unanimous agreement supporting the idea

that all of the predictors should relate to absenteeism. In this study, three predictors exhibited significant relationship. A non-significant negative relationship between age and injury absenteeism has been found. The negative relationship could be explained by the fact that older workers usually take up higher responsibility at work and are more satisfied, appreciating greater benefits (see, for instance, Siu 2002). However, it is consistent with Hoque and Islam (2003), who found a non-significant relationship between age and absenteeism, with Gellatly (1995), who suggested that age is negatively related to absence, and with Hackett (1990), who suggested that the relationship is quite complex, implying that other factors play a role too.

Furthermore, there is a significant relation between injury absenteeism and gender (males). Previous evidence on gender differences in their associations with absence has been inconsistent. In one study, Barmby, Ercolani and Treble (2002) found that in most countries women have higher absence rates than men. Various factors relating to home and private life have been suggested to explain female excess in absence (Laaksonen, Martikainen, Rahkonen and Lahelma 2008). In this study, males tend to show higher absence percentages than females, and this is consistent with other empirical work such as Gimeno et al. (2004), in which males tend to show higher absence percentages than females. The result might be also explained by the fact that males are more prone to occupational accidents and thus to injury absenteeism (see also Rhodes and Steers 1990).

Although there is no effect of type of employment and education on absenteeism, permanent workers exhibit less absenteeism rates (Böckerman and Ilmakunnas 2008), while individuals with middle education are more prone to absenteeism. Moreover, both career path and type of industry have no effect on absenteeism. Finally, injury absenteeism is higher for the UK than for Greece; hence, absence percentages in southern European countries are lower than in central and northern European countries (Gimeno et al. 2004).

The results of this paper indicate that a specific type of absenteeism might offer more empirical information to the complex absenteeism–job satisfaction relationship. Furthermore, it might provide some scope for policy recommendations. The relevant literature has identified a number of crucial job satisfaction determinants such as salary, job autonomy, opportunities for promotion, quality of supervision and good working conditions (e.g. Barling et al. 2003). In terms of possible policy implications, the results of this paper suggest that the above factors, which have a high impact on increasing job satisfaction, might also lead to a reduction of injury-related absenteeism. Similarly, establishments where high injury absenteeism is observed might benefit from appropriate measures to increase the level of job satisfaction. Apart from the obvious advantages to employees, a reduction of injury-related absenteeism will also lead to lower absenteeism costs and increased labour productivity. However, further research and more inter-country comparisons of absenteeism similarities and differences are clearly needed for the greater understanding of this important issue.

Acknowledgements

Conference in Perth, April 2011. Special thanks to Professor I. Theodossiou (University of Aberdeen, UK) for useful comments and suggestions, to the participants of the 20th session of the conference and to an anonymous referee of this journal. The usual disclaimer applies.

Notes

1. The percentage of absenteeism and job satisfaction for Greece is lower than the corresponding levels of EU-27 countries. In the UK, the level of job satisfaction is relatively higher than the EU-27 average, while absenteeism is close to the average (Eurofound 2012).
2. Further information on the project can be found at http://www.abdn.ac.uk/sociold/index.hti.

References

Allen, S.G. (1981), 'Compensation, Safety and Absenteeism: Evidence From the Paper Industry,' *Industrial and Labor Relations Review*, 34, 207–218.

Baba, V.V. (1990), 'Methodological Issues in Modeling Absence: A Comparison of Least Squares and Tobit Analysis,' *Journal of Applied Psychology*, 75, 428–432.

Barling, J., Kelloway, E.K., and Iverson, R.D. (2003), 'High-Quality Work, Job Satisfaction and Occupational Injuries,' *Journal of Applied Psychology*, 88, 2, 276–283.

Barmby, T.A., Ercolani, M.G., and Treble, J.G. (2002), 'Sickness Absence: An International Comparison,' *The Economic Journal*, 112, 315–331.

Barros, M., Galea, M., Gonzalez, M., and Leiva, V. (2010), 'Influence Diagnostic in the Tobit Censored Response Model,' *Statistical Methods & Applications*, 19, 379–397.

Böckerman, P., and Ilmakunnas, P. (2008), 'Interaction of Working Conditions, Job Satisfaction, and Sickness Absences: Evidence From a Representative Sample of Employees,' *Social Science & Medicine*, 67, 520–528.

Brannas, K., and Laitila, T. (1989), 'Heteroskedasticity in the Tobit Model,' *Statistical Papers*, 30, 185–196.

Brooke, P. (1986), 'Beyond the Steers and Rhodes Model of Employee Attendance,' *Academy of Management Review*, 11, 2, 345–361.

Brooke, P., and Price, J. (1989), 'The Determinants of Employee Absenteeism: An Empirical Test of Causal Model,' *Journal of Occupational Psychology*, 62, 1–19.

Brown, S., and Sessions, J.G. (1996), 'The Economics of Absence: Theory and Evidence,' *Journal of Economic Surveys*, 10, 1, 23–53.

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

Chelius, J. (1981), 'Understanding Absenteeism: The Potential Contribution of Economic Theory,' *Journal of Business Research*, 9, 409–418.

Clark, A.E. (1996), 'Is Utility Relative? Evidence From Household Data,' *Economie et Prévision*, 21, 151–164.

Clark, A.E., and Oswald, A.J. (1996), 'Satisfaction and Comparison Income,' *Journal of Public Economics*, 61, 359–381.

Clegg, C. (1983), 'Psychology and Employee Lateness, Absence and Turnover: A Methodological Critique and Empirical Study,' *Journal of Applied Psychology*, 68, 88–101.

Dormann, C., and Zapf, D. (2001), 'Job Satisfaction: A Meta-Analysis of Stabilities,' *Journal of Business and Psychology*, 22, 483–504.

Drago, R., and Wooden, M. (1992), 'The Determinants of Labor Absence: Economic Factors and Workgroup Norms Across Countries,' *Industrial and Labor Relations Review*, 45, 764–778.

Driver, R., and Watson, C. (1989), 'Construct Validity of Voluntary and Involuntary Absenteeism,' *Journal of Business and Psychology*, 4, 109–118.

Erwin, P.J., and Iverson, R.D. (1995), 'Strategies in Absence Management,' *Journal of Human Resources*, 32, 3, 13–32.

Eurofound (2012), *Fifth European Working Conditions Survey*, Luxembourg: Publications Office of the European Union.

Farrell, D., and Stamm, C. (1988), 'Meta Analysis of the Correlates of Employee Absence,' *Human Relations*, 41, 211–227.

Finlay, K., and Magnusson, L.M. (2009), 'Implementing Weak-Instrument Robust Tests for a General Class of Instrumental-Variables Models,' *The Stata Journal*, 9, 3, 1–24.

Fitzgibbons, D., and Moch, M. (1980), 'Employee Absenteeism: A Multivariate Analysis With Replication,' *Organizational Behavior and Human Performance*, 26, 349–372.

García-Serrano, C. (2009), 'Job Satisfaction, Union Membership and Collective Bargaining,' *European Journal of Industrial Relations*, 15, 1, 91–111.

Gellatly, I.R. (1995), 'Individual and Group Determinants of Employee Absenteeism: Test of a Causal Model,' *Journal of Organizational Behavior*, 16, 469–485.

George, J.M., and Jones, G.R. (2002), *Organisational Behaviour* (3rd ed.), Upper Saddle River, NJ: Prentice Hall.

Gimeno, D., Benavides, F.G., Benach, J., and Amick, B.C. (2004), 'Distribution of Sickness Absence in the European Union Countries,' *Occupational & Environmental Medicine*, 61, 867–869.

Goldberg, C.B., and Waldman, D.A. (2000), 'Modelling Employee Absenteeism: Testing Alternative Measures and Mediated Effects Based on Job Satisfaction,' *Journal of Organizational Behavior*, 21, 665–676.

Goldberger, A. (1983), 'Abnormal Selection Bias,' in *Studies in Econometrics, Time Series and Multivariate Statistics*, eds. S. Karlin, T. Amemiya, and L. Goodman, New York: Academic Press.

Green, W.H. (1993), *Econometric Analysis* (2nd ed.), New York: Macmillan Publishing.

Green, W.H. (2003), *Econometric Analysis* (5th ed.), Upper Saddle River, NJ: Prentice Hall.

Gyekye, S.A., and Salminen, S. (2006), 'Making Sense of Industrial Accidents: The Role of Job Satisfaction,' *Journal of Social Sciences*, 2, 4, 127–134.

Hackett, R. (1990), 'Age, Tenure and Employee Absenteeism,' *Human Relations*, 43, 601–619.

Hammer, T.H., and Landau, J. (1981), 'Methodological Issues in the Use of Absence Data,' *Journal of Applied Psychology*, 66, 574–581.

Hardy, G.E., Woods, D., and Wall, T.D. (2003), 'The Impact of Psychological Distress on Absence from Work,' *Journal of Applied Psychology*, 88, 2, 306–314.

Harrison, D., and Martocchio, J. (1998), 'Time for Absenteeism: A 20-Year Review of Origins, Offshoots, and Outcomes,' *Journal of Management*, 24, 305–350.

Hrebiniak, L.G., and Roteman, R.M. (1973), 'A Study of the Relationship Between Need Satisfaction and Absenteeism Among Managerial Personnel,' *Journal of Applied Psychology*, 58, 381–383.

Hoque, E., and Islam, M. (2003), 'Contribution of Some Behavioural Factors to Absenteeism of Manufacturing in Bangladesh,' *Pakistan Journal of Psychological Research*, 18, 81–96.

Jeong, J., and Jeong, D. (2010), 'A Test on the Normality in the Tobit Model,' Working Paper. http://www.sef.hku.hk/events/conference/jes2010/paper

Jones, M., Jones, R., Latreille, P., and Sloane, P. (2009), 'Training, Job Satisfaction and Workplace Performance in Britain: Evidence From WERS 2004,' *Labor*, 23, 139–175.

Kumar, K., and Bakhshi, A. (2008), 'Missing Workforce: Some Personality Correlates of Absenteeism,' available at SSRN: http://ssrn.com/abstract=1366342

Laaksonen, M., Martikainen, P., Rahkonen, O., and Lahelma, E. (2008), 'Explanations for Gender Differences in Sickness Absence: Evidence From Middle-Aged Municipal Employees From Finland,' *Occupational and Environmental Medicine*, 65, 5, 325–330.

Lau, V.C.S., Au, W.T., and Ho, J.M.C. (2003), 'A Qualitative and Quantitative Review of Antecedents of Counterproductive Behaviour in Organizations,' *Journal of Business and Psychology*, 18, 1, 73–98.

Leigh, J.P. (1985), 'The Effects of Unemployment and the Business Cycle on Absenteeism,' *Journal of Economics and Business*, 37, 159–170.

Leigh, J.P. (1991), 'Employee and Job Attributes as Predictors of Absenteeism in a National Sample of Workers: The Importance of Health and Dangerous Working Conditions,' *Social Science & Medicine*, 33, 2, 127–137.

Løkke Nielsen, A-K. (2008), 'Determinants of Absenteeism in Public Organizations: A Unit-Level Analysis of Work Absence in a Large Danish Municipality,' *The International Journal of Human Resource Management*, 17, 7, 1330–1348.

Michie, S., and Williams, S. (2003), 'Reducing Work-Related Psychological Ill Health and Sickness Absence: A Systematic Literature Review,' *Occupational and Environment Medicine*, 60, 3–9.

Muchinsky, P.M. (1977), 'Employee Absenteeism: A Review of the Literature,' *Journal of Vocational Behavior*, 10, 316–340.

Nicholson, N. (1976), 'Management Sanctions and Absence Controls,' *Human Relations*, 29, 139–151.

Oldham, G.R., Kulik, C.T., Ambrose, M.L., Stepina, L.P., and Brand, J.F. (1986), 'Relations Between Job Facet Comparisons and Employee Reactions,' *Organizational Behavior and Human Decision Processes*, 38, 28–47.

Ose, S.O. (2005), 'Working Conditions, Compensation and Absenteeism,' *Journal of Health Economics*, 24, 161–188.

Pouliakas, K., and Theodossiou, I. (2013), 'The Economics of Health and Safety at Work: An Interdisciplinary Review of the Theory and Policy,' *Journal of Economic Surveys*, 27, 1, 167–208.

Reynolds, A., and Shonkwiller, J.S. (1991), 'Testing and Correcting for Distributional Misspecifications in the Tobit Model: An Application of the Information Matrix Test,' *Empirical Economics*, 16, 313–323.

Rhodes, S. (1983), 'Age-Related Differences in Work Attitudes and Behaviour,' *Psychological Bulletin*, 93, 328–367.

Rhodes, S.R., and Steers, R.M. (1990), *Managing Employee Absenteeism*, Reading, MA: Addison-Wesley.

Robbins, S., Odendaal, A., and Roodt, G. (2003), *Organizational Behaviour – Global and Southern African Perspectives*, South Africa: Pearson Education.

Romme, A.G.L. (1990), 'Projecting Female Labor Supply: The Relevance of Social Norm Change,' *Journal of Economic Psychology*, 11, 85–99.

Rosse, J., and Miller, H. (1984), 'Relationship of Absenteeism and Other Employee Behaviors,' in *Absenteeism: New Approaches to Understanding, Measuring and Managing Employee Absence*, eds. P.S. Goodman and R.S. Atkin, San Francisco: Jossey-Bass, pp. 194–228.

Schultz, T.P. (1990), 'Women's Changing Participation in the Labor Force: A World Perspective,' *Economic Development and Cultural Change*, 38, 457–488.

Scott, K.D., and Mabes, D.A. (1984), 'The Job Satisfaction/Absenteeism Relationship: Gender as a Moderating Variable,' *Akron Business and Economic Review*, 15, 43–47.

Scott, K.D., and Mcclellan, E.L. (1990), 'Gender Differences in Absenteeism,' *Public Personnel Management*, 19, 2, 229–253.

Scott, K.D., and Taylor, G.S. (1985), 'An Examination of Conflicting Findings on the Relationship Between Job Satisfaction and Absenteeism,' *Academy of Management Journal*, 28, 599–612.

Siu, O. (2002), 'Predictors of Job Satisfaction and Absenteeism in Two Samples of Hong Kong Nurses,' *Journal of Advanced Nursing*, 40, 2, 218–229.

Sloane, P.J., and Williams, H. (2000), 'Job Satisfaction, Comparison Earnings and Gender,' *Labor*, 14, 473–502.

Spector, P.E. (2000), *Industrial and Organisational Psychology – Research and Practice*, New York: John Wiley & Sons.

Staiger, D., and Stock, J.H. (1997), 'Instrumental Variables Regression With Weak Instruments,' *Econometrica*, 65, 557–586.

Steers, R.M., and Rhodes, S.R. (1978), 'Major Influences on Employee Attendance: A Process Model,' *Journal of Applied Psychology*, 63, 391–407.

Steers, R.M., and Rhodes, S.R. (1984), 'Knowledge and Speculation About Absenteeism,' in *Absenteeism: New Approaches to Understanding, Measuring, and Managing Employee Absence*, eds. P.S. Goodman and R.S. Atkin, San Francisco: Jossey-Bass, pp. 229–275.

Sturman, M.C. (1996), 'Multiple Approaches to Absenteeism Analysis,' *CAHRS Working Paper Series*, Cornel University.

Tobin, J. (1958), 'Estimation of Relationships for Limited Dependent Variables,' *Econometrica*, 26, 1, 24–36.

Tylczak, L. (1990), *Attacking Absenteeism: Positive Solutions to an Age-Old Problem – A Practical Guide to Help Slash Absenteeism*, Menlo Park, CA: CRISP.

Van Saane, N., Sluiter, J.K., Verbeek, J.H.A.M., and Frings-Dresen, M.H.W. (2003), 'Reliability and Validity of Instruments Measuring Job Satisfaction—A Systematic Review,' *Occupational Medicine*, 53, 191–200.

Vincent, D.W. (2010a), 'Bootstrap LM Tests for the Box Cox Tobit Model,' http://econpapers.repec.org/paper/bocbost10/9.htm

Vincent, D.W. (2010b), 'BTOBIT: Stata Module to Produce a Test of the Tobit Specification,' http://econpapers.repec.org/software/bocbocode/s457163.htm

Waters, L.K., and Roach, D. (1971), 'Relationship Between Job Attitudes and Two Forms of Withdrawal From the Work Situation,' *Journal of Applied Psychology*, 55, 1, 92–94.

Wooldridge, J.M. (2001), *Econometric Analysis of Cross Section and Panel Data*, Cambridge, MA: MIT Press.

Zatzick, C., and Iverson, R. (2011), 'Putting Employee Involvement in Context: A Cross-Level Model Examining Job Satisfaction and Absenteeism in High-Involvement Work Systems,' *The International Journal of Human Resource Management*, 22, 17, 3462–3476.