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## **Employee Absenteeism**

**Construction of a Model for International Comparison of Influential Determinants**

ERASMUS UNIVERSITY ROTTERDAM

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‘Employee Absenteeism: Construction of a  
Model for International Comparison of  
Influential Determinants’

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# Abstract

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Employee absenteeism is a worldwide phenomenon which, due to the financial impact on a nation's economy, is an important subject on the international agenda. In order to provide new insights into employee absenteeism a model with a broad variety of determinants is constructed and tested for Europe as a whole and the individual countries. Based on previous studies, a wide selection of determinants was distinguished and divided into categories such as demographics, health-, household- and job characteristics. With the country comparison the designed model tested whether it also holds explanatory value for individual countries and whether differences existed in absence behaviour due to country characteristics. A dataset from the European Community Household Panel (ECHP) was used to test the model. This survey provided the necessary information and is constructed as such that it can be used for international comparisons. The designed model is based upon the effects of latent variables and because of the binary aspect of the dependent variable a probit analysis is conducted. The outcome of the marginal effects method of the probit model provides evidence that the pooled model has a high degree of explanatory power. Although not all determinants showed the expected results, strong significance was found for the constructed model as a whole and the individual determinants. Regarding the test results for the individual European countries, ambiguous results were found. These differences originate from different country characteristics and hence, the model should be adjusted for the individual countries.

Keywords: Employee Absenteeism, Country Comparison, ECHP, Probit, Institutional Factors, Demographics, Health Characteristics, Household Characteristics, Job Characteristics.

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# 1. Introduction

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Employee absenteeism is a costly yet poorly understood organizational phenomenon (e.g. Johns and Nicholson, 1982; Martocchio and Harrison, 1993; Mowday, Porter and Steers, 1982; Rhodes and Steers, 1990; Gellatly, 1995). The consequences of employee absenteeism are widespread and consist of direct and indirect effects. For instance higher costs are a result of absenteeism, which can be caused both directly as indirectly. Direct costs of sickness absence to employers include statutory sick pay, expense of covering absence with temporary staff and lost production. Indirect costs, such as low morale among staff covering for those absent because of sickness and lower customer satisfaction, are difficult to measure, while they also influence the overall levels of output (Leaker, 2008). Other effects associated with absenteeism are disruption of the work flow and reduction in product quality (Klein, 1986). Leaker (2008) estimated in 2008 for the Confederation of Business Industry that the United Kingdom had approximately lost £19.2 billion in 2007 to direct and indirect costs of employee absenteeism.

The impact of absenteeism on firms or even a nation's economy is enormous, taking account of the costs associated with it. A better understanding of the determinants of absenteeism can be valuable for firms and policymakers (Störmer and Fahr, 2010). For this reason governments are intensively researching better ways of handling with this problem (e.g. legislative). This resulted for example in a parliamentary inquiry in the Netherlands in 1993. The Dutch absence rate had a long history of high sickness absence and work disability rates compared with other European countries (Geurts, Kompier and Gründemann, 2000). As Whitaker (2001) and Gimeno, Benavides and Benach (2004) explain, the consequences of absenteeism make sickness absence one of the top priorities for European Union Governments.

A difficulty of researching employee absence is that, as stated by Barmby, Ercolani and Treble (2002), absence is not purely a medical condition. While employee absence often is described as sickness, there are more aspects which play a role or have an effect on the absence behaviour of employees. Johns and Nicholson (1982) describe this as an essential problem, because absenteeism is actually a variety of behaviours with different causes masquerading as a unitary phenomenon. Whitaker (2001) also stressed this aspect; sickness is a complex phenomenon that is influenced strongly by factors other than health. Throughout previous research many determinants have been tested upon their possible explanatory abilities on employee absence behaviour. While these determinants often showed similar results it is sometimes difficult to

compare these outcomes since other exogenous factors influenced them. For example as Gimeno et al. (2004) explained in their article that studies have examined the relation between psychosocial work conditions and sickness absence. Some have found that sickness absence is related to high demands, low control, or a combination of both, while other studies have found no relation. Another example of different relations found in previous research concerns the relation between absence and an employee's age, some found positive relations while others found negative.

Despite the wide variety of determinants used, they did not provide conclusive insights in their explanatory power on absenteeism due to the differences found including other factors. Another issue for finding usable determinants for decreasing absenteeism is that extensive research was executed for some determinants, while others have been given less attention. Gimeno et al. (2004) stated that many research was done on the effects of psychosocial work conditions. Also Fitzgibbons (1992) and Rhodes and Steers (1990) discussed that the vast majority of absence research has focused on the effects of work attitudes like job satisfaction. Besides the restrictions for the determinants itself, employee absence has also been proven to differ between countries (Lusinyan and Bonato, 2007; Gimeno, Benavides and Benach, 2004). Lusinyan and Bonato (2007) explain that although the empirical literature on work absence in individual countries is vast there are a few cross-country comparative studies. Gimeno, Benavides and Benach (2004) stress that surprisingly little research had considered the feasibility of using sickness absence in cross national comparisons. They further support their point by stating that international comparisons are urgently needed. They may not only help in assessing a country's economic performance, but also enable overall patterns across countries to be observed, indicating which policies are working for both public health and economic.

Since these limitations in previous literature restrain us from constructing a trustworthy and widely usable model for decreasing employee absenteeism, a research question is formulated which will provide the necessary tools to construct such a model.

*“What determinants affect an employee's absence behaviour and do they differ across European countries?”*

The goal of this research question is to help filling the void of the lack of internationally compared absenteeism models. The international comparison will also help to find strong determinants. If these determinants show explanatory power internationally, they ultimately

provide a better grasp on helping to understand absenteeism. The author believes that the model will provide an explanation for employee absenteeism which controls for most exogenous influences, since not only one sort of determinants, such as psychosocial work conditions or health characteristics, will be included, but also determinants from all different sorts of backgrounds.

First a theoretical background will be given of the different determinants which are found to have explanatory value according to previous literature. The effects of these determinants upon absenteeism will be discussed and will form the basis for their expected outcomes. After the literature review there will be elaborated on the data used and the construction of the model. Afterwards the results of the tests will be discussed and a conclusion and answer to the main research question will be given. Finally the policy implications as well as the limitations and research recommendations will be discussed.

## 2. Literature review

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At first we will discuss the different determinants which were found to have a relevant impact on employee absenteeism by previous research. To be able to keep a clear overview, the discussion of these factors will be divided into four categories. The four categories used throughout the study are: demographics, health characteristics, household characteristics and job characteristics.

### 2.1. Demographics

Employee absence behaviour is expected to vary with socio-demographic characteristics. This section will discuss the influence of gender, age and educational attainment on employee absenteeism.

#### 2.1.1. Gender

Women are expected to be absent more often since they are, traditionally seen, more inclined with taking care of the household (Barmby, Ercolani and Treble, 2002), but also other explanations were found in the literature.

Steers and Rhodes (1978) support the view that traditionally the family responsibilities, such as taking care of sick children, are ascribed to the wife or mother. Johns (2003) and Barham and Begum (2005) discuss similar explanations. Barham and Begum (2005) even found a similar rate of absence for women with or without dependent children while commonly is perceived that presence of children is associated with a higher rate. A study of Cuelenaere (1997) showed that most sick women did not resume work until they were fully recovered, whereas most men often (partially) resumed work even when they were not fully recovered. Geurts, Kompier and Grundemann (2000) further state that women are alleged by the media to hold lower work values because they make less serious attempts to resume work after sickness. Two final explanations mentioned by Johns (2003) are that, compared to men, women appeared to be more restless and busier during a scheduled day off. And secondly that women may experience or respond more negatively or proactively to stressful or dissatisfying events at work and use time off as an adjective mechanism.

Steers and Rhodes (1978), Geurts, Kompier and Grundemann (2000), Barmby, Ercolani and Treble (2002), Johns (2003), Gimeno et al. (2004), Barham and Begun (2005) and Leaker (2008)

all find a significant relation for women to be more absent than men. In line with these outcomes, a similar result between gender and absenteeism is expected in this study.

### **2.1.2. Age**

Despite much previous research, many contradictory evidence is found regarding the relationship between age and absenteeism. On one hand it is often argued that older employees will be absent more since older people are expected to be sick more. On the other hand also much research discusses a difference in work attitude between older and younger employees. Since health aspects are controlled for and will be discussed later on, this research will focus on the latter explanation. Older workers often show a higher commitment to their company. Another explanation discussed for lower absence among older workers regards the higher opportunity costs for being absent.

The basis for this view can be found in the theories concerning the labour-leisure choice framework (Allen, 1981) and organizational commitment (Gellatly, 1995). Like Drago and Wooden (1992) explain in their research, the higher absence rate among younger workers can be expected because of the greater opportunity cost of forgone leisure. They further state that younger workers are typically very mobile between jobs and thus will be less committed to the firm and workgroup than older workers are. Allen and Meyer (1993) and Hackett, Bycio and Hausdorf (1994) also state that affective and continuance commitment tends to be higher for older than for younger employees, as well for employees with longer, rather than shorter, organizational tenure. Analysis from Leaker (2000) concerning absenteeism in the United Kingdom supports the statement that younger employees are more likely to take sickness absence than older employees.

Barham and Begum (2005), Clegg (1983), Hackett (1990) and Leaker (2008) find support for the negative relation and Barmby, Ercolani and Treble (2002), Bergendorf et al. (2004), Geurts, Kompier and Grundemann (2000) and Lusinyan and Bonato (2007) find support for a positive relation between age and absenteeism. Although ambiguous results are found in previous research, a negative relation between age and absenteeism is expected.

### **2.1.3. Education**

A far less often tested factor in relation to absenteeism is level of education. It is expected that employees have finished their education before they started working. As such this factor will merely focus on whether significant differences can be found between absenteeism and highest finished level of education. In general it is to be expected that education will be inversely

associated with absence (Drago and Wooden, 1992). The higher level of education finished, the less absent this person will be. This expectation is mostly based upon the fact that better educated people are assumed to be healthier.

Koopmanschap et al. (1993) showed in their research that absence from work is strongly related to education and also that lower educated people have a higher risk of becoming disabled. An explanation for this result could be that increased educational attainment is related to greater knowledge about health (Winkleby, Fortmann and Barrett, 1990). This is in line with the statement that education could influence a persons' judgment regarding their capacity to work Lag (1962).

Drago and Wooden (1992), Steers and Rhodes (1978), Granlund (2010), Winkleby Fortmann and Barret (1990) and Koopmanschap et al. (1993) all found a negative relation between education and absenteeism. In line with the literature this study also expects a negative relation between the level of education and absenteeism.

## **2.2. Health characteristics**

Probably the most important indicators of absenteeism are related to the health of employees. While other factors have their impact on influencing the absence rate, health itself, for example general illness, is the most occurring reason for an employee to be absent. Better health associated with lower sickness absence (Lusinyan and Bonato, 2007). The factors discussed in this category will discuss how self-assessed health, certain health lifestyles, such as Body Mass Index (BMI) and smoking, and whether a person is hampered in his normal activities by his illness relate to absence.

### **2.2.1. Health status**

Self-assessed health status is an increasingly common measure of health in empirical research and has shown to provide a trustworthy view of a person's health (Linn and Linn, 1980; Crossley and Kennedy, 2002). It could be understood that people who assess their health better, thus rate their own health at a higher degree, are likely to be absent less often. People hampered by their health in their daily activities, for example disabled and chronically ill people, can be expected to have higher absence rates. Disabled and chronically ill people can also be expected to rate their own health lower. Which, as explained, also relate to a higher absence rate.

In their article Stormer and Fahr (2010) explained that employees that are on average or above satisfied with their health condition have a smaller propensity to be absent at all. Benavides et al. (2000) found in various studies that sickness absence may reflect not only physical health but also the employee's perception of his or her health. They explain that absence can be thought of as a coping device in response to illness (a subjective state, a psychological awareness of dysfunction) rather than physical disease. Barham and Begum (2005) found in their study that disabled employees were more than twice as likely to be absent as employees who were not disabled. North et al. (1993) showed that self-assessed health was a strong predictor of absence rates. People who reported average or worse health were also found to have higher rates for being absent for a short-, but especially a long-term period. They also found that these differences existed for other self reported measures of health, including presence of recurring health problems, longstanding illness and psychiatric symptoms. This positive relation between health perception and absence was also found by Stormer and Fahr (2010) and Lusinyan and Bonato (2007).

As found in previous research it is expected that both factors are significantly related to absenteeism. Self-assessed health is thought to be negatively related and whether people are hampered in activities by their health is thought to be positively related to absenteeism.

### **2.2.2. Lifestyles**

In this paper lifestyles resemble a person's BMI and smoking habits. A BMI informs whether a person has underweight, overweight or even obesity. A person, who is fitter, at good weight or physical condition, will be better able to fight illnesses or injuries. Smoking is well known to negatively influence health and is shown to have a negative relation with absenteeism.

Obesity and overweight increase mortality and have been associated with a wide range of chronic diseases. Underweight and weight change are also predictive of premature mortality and disease (Ferrie et al. 2007), which gives evidence of an U-shaped relation. Ferrie et al. (2007) further state that smoking has shown to be a determinant of well-validated general measures of health. Also Labriola, Lund and Burr (2006) suggest that a potential for reduction of sickness absence can be found in interventions towards smoking and obesity.

While theoretical support for these expectations is rather slim, there are many studies with significant outcomes concerning these indicators. Labriola, Lund and Burr (2006) and Ferrie et al. (2007) found significant results which showed that obesity is positively related to absence.

Ferrie et al. (2007) also had a significant result for underweight, which showed a negative relation. In the studies of Labriola, Lund and Burr (2006), Ferrie et al. (2007), North et al. (1993) and Niedhammer et al. (1998) significant evidence was found for the influence of smoking on the chance for being absent. All these articles showed that employees who smoke or used to smoke have a higher chance for being absent than employees who never smoked.

Previous research clearly shows that these two indicators have a significant influence on absenteeism. From these studies it can be expected that BMI has an U-shaped relation and that smoking, as well as previous smoking, has a positive relation with absenteeism.

### **2.3. Household characteristics**

Employee absenteeism is not merely influenced by so called internal factors as health and demographics, external factors can be expected to be just as important. Household characteristics are such external factors since the behaviour of employees is influenced by the state or actions of others in the household. The basis of the impact of household characteristics is expected to stem from the theories of the work/family conflict, discussing caring responsibilities and from lower sole dependency of one job or income. In order to cover the most common aspects of household differences, this group will include the factors Relationship status, Household size, Children, Looking after others and Household income.

#### **2.3.1. Relationship status**

The relationship status of a respondent seems to have an influence on absenteeism. Important to notice is that the distinction in relationship status will be made between married and single. The composition of the group married will be the same as used in the study of Barmby, Ercolani and Treble (2002) and will consist of those who are married or possibly cohabiting as a married couple, since both groups show large similarities. Often is perceived that the higher rate of absence among married people mainly stems from caring responsibilities, but previous research provides additional insights concerning a lower financial pressure of forgone income when absent.

Results from the study of Barmby, Ercolani and Treble (2002) show that single men have the lowest absence rates, while married women have the highest absence rates. The high rate of married women could be explained by a higher sensitivity towards family responsibilities such as taking care of the children. According to Miller (1984) this assumption cannot be made. Miller shows that married women were absent more than single women for all age categories. This

diminishes the likelihood of child care as the causal factor behind the greater absences of married women (Miller, 1984). Since child care responsibilities decrease and eventually disappear as children grow older, absence rates of older married or single women could be assumed to act similar. Miller (1984) further supported this statement with the fact that married women showed no reduction in absence relative to men of similar age after the children were grown up. Enterline (1964) suggested an explanation for this phenomenon; married women are often less dependent upon their jobs for economic support or as a career than are men or single women. Therefore they are more likely to stay away from their work because of illness. This explanation is supported by Baker and Pocock (1982) who state that in households with several wage earners, the financial consequences of absence from work may be less acute. There is less pressing need from financial incentives to continue working when in a state of minor ill health.

The positive relationship between marital status and absenteeism found by Enterline (1964), Miller (1984) and Barmby, Ercolani and Treble (2002) provide enough grounds to expect a similar outcome in this study.

### **2.3.2. Children**

Besides the relationship status the formation of the household, such as presence of dependent children and household size in general, has an influence on the absence behaviour of an employee. Dependent or young children cannot take care of themselves and depend on the care of their parents or others. Employees with such children will be absent more often due to caring responsibilities. This behaviour is also inclined to grow stronger as the total household size grows due to more children per household, which will cost more time and involvement.

The basis for the relationship between having children and absenteeism can be found in the theory of the work/family conflict. Pleck, Staines and Lang (1980) reported findings which showed that parents experience conflict between work and family more often than other workers. To clarify the work/family conflict, Greenhaus and Beutell (1985) provided the following definition: "Work/family conflict is a form of inter-role conflict in which the role pressures from the work and family domains are mutually incompatible in some respect whereby participation in one role is made more difficult by virtue of participation in the other". The work/family conflict is thus the conflict which parents face when choosing between taking care of their children and going to work. Taking care of their children can be seen in a lot of different ways such as picking up from school, supervising on trips or taking care of them when they are sick. Goff, Mount and Jamison (1990) hypothesized and have proven that work/family conflict is positively related to

absenteeism. Others related the age of children to work/family conflict and have shown that parents of younger children experience more conflict than parents of older children do (Fernandez, 1986; Greenhaus and Kopelman, 1981). Barham and Begum (2005) support this statement with their research that showed that parents were overall likely to be absent more often when their children were of young age.

Where the presence of one child already creates problems in the work/family conflict, the presence of more children creates an even larger conflict. Keith and Schafer (1980) found that having more children at home increased the work/family conflict. This is also stated by Rhodes and Steers (1978) who, based on earlier research, explain female absenteeism to rise with family size.

With the previous findings of Pleck, Staines and Lang (1980), Goff, Mount and Jamison (1990), Fernandez (1986), Greenhaus and Kopelman (1981), Barham and Begum (2005), Englander-Golden and Barton (1983) and Klein (1986), the existence of a positive relationship between dependent children and absenteeism can be well assumed. The research of Keith and Schafer (1980), Ilgen and Hollenback (1977), Isambert-Jamati (1962) and Nicholson and Goodge (1976) further strengthen the expectation of a positive relationship between household size and absenteeism.

### **2.3.3. Taking care of others**

This determinant has not been tested much. As such little theoretical support or results can be found in previous research concerning a link between taking care of others, besides only an employee's own children, and absenteeism. Despite the little explicit theoretical background for an assumption, it is expected that employees who are taking care of other persons are, in line with the work/family conflict, more likely to be absent than employees who are not taking care of others.

### **2.3.4. Other household income**

As mentioned, income or economic support from other household members could influence attendance behaviour. This additional household income could stem from income received by others in the household, capital or other non-labour income. When respondents have access to additional household income next to their personal income, they have fewer incentives to attend or exert maximum effort at their work. The explanation according to the labour-leisure framework is that their individual marginal cost of attending work is lower than for people

without additional household income. This lower marginal cost thus makes an extra unit of leisure desirable sooner.

When a household has several members with an income the pressure to attend work will be less when in a state of minor ill health (Baker and Pocock, 1982). The effect of foregone personal labour income will be less since they can be helped in case of certain financial setbacks. The assumed positive relationship between (previous) assets and absenteeism is supported by Drago and Wooden (1992), who expect that employees with assets will be absent more often than employees without. They further state that the positive relation between non-labour income and absence is based upon the work discipline model, or shirking model, of the efficiency wage theory. Evidence for a positive relation between non-labour income and absence is provided by Allen (1981). Lusinyan and Bonato (2007) also predict that non-labour income will be positively related to absence. They support this assumption by the explanation of the budget constraint, since the income spent on consumption is equal to the sum of income received through labour and non-labour.

Stemming from the results from Baker and Pocock (1982), Kim and Garman (2003), Allen (1981), Drago and Wooden (1992) and Lusinyan and Bonato (2007) other household income is expected to exert a positive relationship with absenteeism.

## **2.4. Job characteristics**

Besides individual characteristics, the working conditions or characteristics also has influence on the rate of absence. A basic psychological support for significance of such factors can be found in the aspect that when people enjoy what they are doing or if it matches their needs, they will exert more effort in order to meet the commitments, in this case attendance at work. Throughout the literature many different job aspects have been discussed and related to absenteeism. This study will encompass the following factors related to job characteristics; Job satisfaction, Contract characteristics, Labour income, Job status, Tenure, Company size, Company sector and Employment history.

### **2.4.1. Job satisfaction**

Price and Mueller (1981) describe job satisfaction as the overall degree to which employees like their jobs. As mentioned earlier, when somebody is satisfied with what he is doing he will exert more effort in keeping his promises, which here means showing up at work. Satisfied people are also less inclined to focus on the negative aspects which could result in a (more) negative attitude

which correlates with absence positively. Steers and Rhodes (1978) summarize this effect clearly; highly satisfied employees would probably want to attend strongly, while highly dissatisfied employees would probably want not to attend strongly.

Stormer and Fahr (2010) explain that the psychological literature on absenteeism was prevalently concerned with negative work attitudes, e.g. job satisfaction and organizational commitment. Drago and Wooden (1992) also use this approach of work attitude and they state that absence is viewed as a withdrawal response to a negative work environment. Therefore they predict that job satisfaction and absence are inversely related. Gellatly (1995) further explains that when work experiences are personally rewarding, commitment should increase and absenteeism should decrease.

Brooke and Price (1989), Drago and Wooden (1992), Clegg (1983) and Benavides et al. (2000) all found significant prove for the negative relationship between job satisfaction and absenteeism. In line with these previous studies this study also expects a similar negative relation.

#### **2.4.2. Contract characteristics**

Also contract characteristics were shown to have a relationship with absenteeism according to previous research. The influence of two types of contract characteristics will be discussed; permanent and non-permanent contracts and full- and part-time contracts.

##### **2.4.2.1. Permanent contract**

The permanent character of a contract is expected to influence absenteeism. Employees with permanent contracts have more job security and are thus less driven, while non-permanent employees are insecure whether their contract will be renewed. Non-permanent employees are thus more eager to exert more or extra effort in order to receive a positive assessment and perhaps contract prolongation.

Previous research (Gimeno et al. 2004; Benavides et al. 2000) explain that even though these non-permanent employees tend to do more hazardous work or work under poorer conditions than permanent employees, they still tend to be less absent. Sickness absence research suggests that the lower non-permanent employee absence rates are attributable to the insecurity of not being reemployed or lack of benefits, which leads non-permanent employees to remain at work (Gimeno et al. 2004).

There is evidence that temporary workers tend to be less sickness prone than permanent workers (Bergendorf et al. 2004). Also Benavides et al. (2000) found that absenteeism was generally negatively associated with non-permanent employment. Gimeno et al. (2004) found similar results strengthening the negative relation. Taken previous research, this study adopts the expected positive relation between permanent employment and absenteeism.

#### **2.4.2.2. Full-time contract**

Part-time employees are expected to be absent less. They are for example more able to plan personal errands at days they are not scheduled to work (e.g. for example a family task or doctor's appointment). Another explanation for a lower absence rate amongst part-time employees is that they have more time to recover since they do not have to work every day. A final reason is that following the labour/leisure framework, an extra unit of leisure is less rewording for part-time employees because they already work less.

Lusinyan and Bonato (2007) clearly state that shorter working hours reduce absence and that this effect is even larger when flexible working arrangements are apparent. Barham and Begum (2005) state that employees with fewer working days have a reduced chance of taking a day off because of sickness, when they were actually scheduled to work.

While little direct theoretical support exists for the relationship between contract type and absenteeism, numerous previous researches showed clear results. Drago and Wooden (1992), Leaker (2008), Benavides et al. (2000) and Barham and Begum (2005) showed a positive relation between full-time employment and absenteeism. A similar relationship is expected in this study.

#### **2.4.3. Personal labour income**

When an employee earns a higher labour income, according to the labour-leisure framework, his time being absent will have higher opportunity costs. An employee is thus expected to exert more effort to attend at work and choose less for leisure. This is in line with the efficiency wage theory which explains that employees earning higher wages will exert more effort and be less absent.

As Leaker (2008) clearly stated; sickness absence rates generally decrease as gross weekly pay increases. This assumption is supported by Steers and Rhodes (1978). The theoretical basis for the efficiency wage theory and labour-leisure framework for this relation are discussed by Drago and Wooden (1992) and Barmby, Ercolani and Treble (2003). The latter explain that the labour-

leisure framework gives us an insight to how employees respond to contract variations. They also state that this equilibrium is characterised by these workers equating their marginal rate of substitution of goods for leisure to the wage rate. With higher wage the marginal cost of leisure will increase. The efficiency wage theory has a few sub-models which encompass the relationship between income and absenteeism. The first sub-model discusses that when workers receive a higher wage, the cost of the foregone income becomes higher, and as such they will shirk less (Akerlof, 1984). The second sub-model is the gift-exchange model, which is mentioned by Shapiro and Stiglitz (1984), they explain that workers see a higher wage as a gift from the firm and that they will return this gift in form of higher effort. The third sub-model, the adverse selection model (Weiss, 1980) suggests firms with higher wages can attract employees who are generally predisposed to high performance levels and, by extension, low absence rates.

The negative relation between personal income and absenteeism has previously been found by Lundquist (1958), Fried, Wertman and Davis (1972), Beatty and Beatty (1975), Bernandin (1977), Drago and Wooden (1992) and Barmby, Ercolani and Treble (2003). It can thus be expected that personal labour income and absenteeism will exert a negative relation in this study.

#### **2.4.4. Job status**

Employees working at higher functions behave differently with respect to the rate of absence. Employees with a higher job status are assumed to be absent less than employees with a lower status. Reasons for this relationship are that employees with a higher status often have more responsibilities and work in less hazardous conditions.

Lower measured sickness absence is associated with occupations having a higher degree of responsibility at work (Barmby, Ercolani and Treble, 2002). Stormer and Fahr (2010) support this statement. Steers and Rhodes (1978) discuss the possibility that the more challenging nature of higher job level leads to higher job satisfaction, which, in turn, leads to higher attendance. Kenyon and Dawkins (1989) provided two possible explanations for the negative relationship. They explained that employees with a higher status are less likely to receive severe injuries because of less hazardous jobs and that these employees are better able to schedule their working hours, they have greater flexibility.

It appears that people who hold higher job level are less likely to be absent than those who hold lower level positions (Baumgartel and Sobol, 1959; Hrebiniak and Roteman, 1973; Waters and Roach, 1971, 1973; Yolles, Carone and Krinsky, 1975). Barmby, Ercolani and Treble (2002),

North et al. (1993), Klein (1986) and Leaker (2008) found a similar negative relationship between absenteeism and job status. In line with the previous research a negative relation is expected between job status and absenteeism.

#### **2.4.5. Tenure**

Tenure focuses on the time an employee has been working for the company. Employees with longer tenure normally have a higher degree of organizational commitment to the company and have a higher need for job stability. Besides an employee's personal characteristics, a company can be expected to filter his workforce. Employees who are absent more often, deliver poor results can be expected to be laid off at a certain point. With such selection tool a company will have a relatively high rate of trustworthy employees among the more tenured employees.

Clegg (1983) discusses a negative relation and based this upon a higher job commitment and an increased need for stability and regularity. Leigh (1985), on the other hand, suggested discipline consideration as an explanation. When employees are fired for high absence rates or if layoffs are concentrated among high-absence employees, then the data should induce a finding of a negative association between job tenure and levels of absence (Leigh, 1985).

Leigh (1986) and Barmby, Ercolani and Treble (2002) provide evidence for the positive relationship between tenure and absenteeism. Drago and Wooden (1992) found, despite the expected positive relation, a negative result, however this result was not significant. A negative relation was found by Fitzgibbons and Moch (1980), Watson (1981), Keller (1983) and Youngblood (1984). Leaker (2008), on the other hand, found proof for neither relationships, Leaker found an inverted U-shaped relationship. Despite the different results and explanations in previous literature, a negative relation is expected.

#### **2.4.6. Company characteristics**

Previous research showed that company characteristics also show a relationship with absence behaviour. Two different kinds of company characteristics will be discussed; the size of the company and whether the company is a privately- or publicly-owned company.

##### **2.4.6.1. Company size**

The size of the company influences the rate of absence of its employees. Company size is expected to have a positive relationship. The larger the firm the more absent employees tend to be. In smaller companies a single employee is relatively more important than in larger companies. When one employee is sick, there are less other employees who could potentially

cover for this sick employee. In larger firms people tend to work more in teams and do more complementary work which makes it easier to cover for a sick person's job. Self-employed people, with or without employees, account in general for most of the smallest companies. These people can be expected to be absent less because when they are sick, they cannot work, or open their company, and so they will not earn any income. It is thus of vital importance for them to be open or work as much as possible.

Larger workplaces do not follow the same pattern as smaller workplaces (Barham and Begum, 2005). Small employers and sole traders reported high percentages of stress and fatigue, but absenteeism was relatively low (Benavides et al. 2000). Same relationship was found by Leaker (2008) and Barham and Begum (2005). Leaker (2008) provided further support with a statement from a report from the Chartered Institute of Personnel and Development in 2008; smaller organisations typically record lower levels of absence because absence is more disruptive and harder to cover for. Other possible explanations for 'the company size influence' are provided by Geurts, Kompier and Grundemann (2000). They state that increased checking, reduced sickness benefits, financial incentives, more fixed-ended contracts and flexi-workers, aspects which have all proven to reduce absence, are more apparent in smaller companies.

As in the studies of Benavides et al. (2000), Barham and Begum (2005), Geurts, Kompier and Grundemann (2000) and Leaker (2008) a positive relation between company size and absenteeism is expected.

#### **2.4.6.2. Company sector**

Two different company sectors can be distinguished, publicly- and privately-owned companies. According to earlier research company sector also influences the rate of absence of employees. From these studies it can be expected that the rate of absence is higher in publicly-owned companies than in private companies. These studies do not provide much theoretical support for these differences, but looking at earlier discussed factors and their support, some assumptions could account for these differences. For example publicly-owned companies usually have higher job security and better secondary contract conditions, such as sick leave entitlements. Publicly-owned companies are normally also larger than most privately-owned companies. These factors are all positively associated with absence and could thus account for the difference in absenteeism.

Barham and Begum (2005) and Leaker (2008) both found a significant relation between company sector and rate of employee absence. They showed that employees from publicly-

owned companies were absent more often than employees from privately-owned companies. We assume a similar relation.

#### **2.4.7. Unemployment history**

A final determinant which we will research for its relation with absenteeism concerns an employee's unemployment history. Little is known about the effect of individual unemployment history since this aspect has not yet been discussed in previous research. The support for the expected relation will thus consist more of assumptions and expectations.

We expect the unemployment history of an employee to resemble the work mentality or job commitment of this individual employee. This relation is based upon the fact that companies, as mentioned earlier, are inclined to lay off employees who do not have the correct work mentality and are absent more often. For example in recessions companies are more likely to lay off absence-prone workers (Lusinyan and Bonato, 2007). Since employees with previous unemployment history can be expected to be laid off by their previous employer. As such it could be assumed that employees with unemployment history have a lesser work mentality and are absent more. A lower work mentality could for example stem from the fact that the employee does not like his job, or that he does not like to work in general and thus exerts less effort to attend work.

### **2.5. Country differences**

So far merely determinants are which were found, and are expected, to have a significant relation with employee absenteeism. But as mentioned in the introduction, also differences in absence rates and behaviour are found between countries. Lusinyan and Bonato (2007) find that, despite that the factors are common for all countries and employees, there are wide differences between countries. A reason for these differences could be that people behave differently in different countries because other factors are of influence due to institutional differences. Institutional differences can be described as the sum of the policies, legislation and country characteristics. The previous theories for the determinants can still be valid but the institutional factors also provide incentives to the individual and they include them in their behaviour.

Lusinyan and Bonato (2007) and Prins and De Graaf (1986) both conduct a research comparing the absence behaviour between European countries. Lusinyan and Bonato (2007) compared eighteen European countries where Prins and De Graaf (1986) only compared Belgium, Germany and The Netherlands. Despite the difference in the number of included countries they

find similar relations between institutional factors and absenteeism. In order to give an example of what kind of aspects institutional factors can consist of, some factors will be discussed.

Incentives stemming from a country's insurance system may have a strong impact on absence behaviour (Lusinyan and Bonato, 2007). Lusinyan and Bonato (2007) and Prins and De Graaf (1986) both found that the magnitude of sickness benefits and rigidity of qualifying conditions were related to employee absenteeism. They indicated that moral hazard problems tend to arise when insurance becomes too generous. Prins (1990) underlines this relation with the proof that the less restrictive policy and procedures, concerning sickness absence and work disability, in the Netherlands were responsible for both a higher incidence and a longer duration of sickness absence. Further it was also expected that when the health insurance system is less publicly funded, the rate of absence would also be lower. When employers or companies are obliged to pay for at least part of the costs of the health insurance or sick leave entitlements they tend to monitor absence behaviour better. In the Netherlands costs were shifted from the government to the employers which resulted in a drop of the absence rates (Lusinyan and Bonato, 2007).

Besides health insurance aspects, both unemployment protection and unemployment insurance are found to be of influence. Both reduce the expected cost of work absence to the individual employee, either by making it more difficult to sanction absenteeism or by reducing the effective cost of the sanction, which can result in more absence behaviour (Lusinyan and Bonato, 2007; Prins and De Graaf, 1986). Other examples of influential institutional differences found concerned a country's unemployment rate, labour force participation and normal working hours. Behrend (1959) proved that with higher rates of unemployment, the threat of layoffs becomes greater which results in an even stronger decrease in absenteeism. Bergendorf et al. (2004) found that high sickness absence reflects high labour force participation, particularly for women. Lusinyan and Bonato (2007) found evidence that a lower number of normal working hours, for example negotiated by labour unions, had a decreasing influence on a country's absence rates.

# 3. Data and Methodology

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## 3.1. Data

The data used for this research is conducted from the European Community Household Panel (ECHP). The survey is under the supervision of the Statistical Office of the European Union (Eurostat) and was designed to provide fully comparable data on life and economic conditions of the residents of these European countries. The ECHP is a standardized longitudinal survey which was carried out yearly, from 1992 to 2001, across the EU-15 countries. This research uses data from the most recent wave.

## 3.2. Selection and creation of variables

### 3.2.1. Absenteeism

The most common forms of defining employee absenteeism are absence and sickness absence. The main difference is the matter in which they are measured. Sickness absence, as defined by Whitaker (2001), is absence from work that is attributed to sickness by the employee and accepted as such by the employer. Brooke and Price (1989) described absenteeism in their research as the non-attendance of employees for scheduled work (Gibson, 1966; Johns, 1978; Jones, 1971; Brooke and Price 1989). For our research we adapt the definition of Brooke and Price (1989). This definition distinguishes absenteeism from other forms of non-attendance that are arranged in advance (e.g. vacations) and specifically avoids judgements of legitimacy associated with absent events that are implied by distinctions between ‘voluntary’ and ‘involuntary’ non-attendance or classifications such as sick leave (Brooke and Price, 1989). Behrend (1959) described voluntary absence as the practice of workers failing to report for work on some slight excuse or other, or none at all. It is very difficult to measure voluntary and involuntary non-attendance separately, mainly because employees try to cover it up. No distinction will be made between them.

To measure the dependent variable *Absent*, question PE038 is used: “Please think of the last 4 working weeks, not counting the holiday weeks. How many days were you absent from work because of illness or other reasons?”. Since we will focus on the risk for an employee to be absent this variable is recoded into a dichotomous variable with ‘was absent’ (1) and ‘was not absent’ (0).

The explanation of the independent variables will be done according to the different groups. The original questions from all the variables and a complete list of the constructed variables (Table 1) can be found in the appendix.

### 3.2.2. Demographics

Three demographical variables are used in the analysis. *Male* is constructed by recoding gender into a binary variable which distinguishes between ‘male’ (1) and ‘female’ (0). Education is measured according to the highest level of education finished; completed third level of education, completed second stage of secondary education and completed less than second stage of secondary education. These variables were transformed into the dummy variables *Education high*, *Education medium* and *Education low*. Age is a continuous variable and since we expect a non-linear relationship between age and absenteeism this variable is divided into age groups which are then converted into dummies; *age*  $\leq 20$ , *age 21-30*, *age 31-40*, *age 41-50*, *age 51-60* and *age*  $\geq 60$ .

### 3.2.3. Health

*Hampered* is recoded into a binary variable. The answer options which resembled that the respondent was slightly or severely hampered are recoded into ‘hampered’ (1) and the respondent who was not hampered is recoded into (0). Self-assessed health is also converted into the binary variable *Health good* where health status options fair, bad and very bad are recoded into ‘0’ and good and very good into ‘1’. Smoking consists of five answer options which are recoded to three dummy variables; *Smokes*; *Smoke stopped*; *Smoke never*. The current smokers are classified as ‘smokes’, the respondent who used to smoke as ‘smoke stopped’ and the respondents who have never smoked as ‘smoke never’. *BMI* is a continuous variable and is also added as such. In order to test for the U-shaped effect, *BMI-squared* is constructed.

### 3.2.4. Household characteristics

The answer possibilities for the question from which *Children* is constructed consists of two parts; household types without dependent children and household types with dependent children. According to this division, the variable *Children* is recoded into ‘dependent children’ (1) and ‘no dependent children’ (0). *Looking after* or taking care of others is recoded into a binary variable from the question whether looking after others is part of the respondents daily activities. The respondents who indicated that they looked after others are recoded into a ‘1’ and those who did not as a ‘0’. Relationship status is recoded into the binary variable *Cohabitation*: ‘living together as a couple’ (1) or ‘not living as a couple’ (0). *Household size* is a continuous variable and is also

used as such. For the formation of *Income rest* or other household income the question concerning ‘Total net personal income from work’ is subtracted from ‘Total net household income’. These income questions are filled out according to last year’s income. Since the income variables are also not yet filled out in Euro’s, *Income rest* is subject to exchange rates but also to differences in purchasing power. In order to make the variable internationally comparable it is divided by the 2001 Purchasing Power Parity (PPP)<sup>1</sup> and the individual exchange rates to convert all currencies into the Euro. For the countries Finland and France the values of Personal income is filled out in gross amounts. To control for this aspect the amounts are multiplied by the average percentage of net income (1 minus the taxes of the average worker<sup>2</sup>). Because income is filled out in absolute numbers, the values are very high in comparison to the other variables. In order to get better interpretable results *Income rest* was divided by 1000, so each unit change stands for an additional or reduction of 1000 Euros.

### 3.2.5. Job characteristics

Job satisfaction is a variable which combines the degree of satisfaction of five different job aspects that all have been proven to be related to absenteeism. Satisfaction concerning the following job aspects is used; Earnings, Security, Type of work, Number of working hours and Working conditions. All satisfaction aspects were first converted into binary variables. The different degrees of dissatisfaction are classified as ‘not satisfied’ (0) and the different degrees of satisfaction as ‘satisfied’ (1). These five variables were then combined to form the continuous variable *Job satisfaction*, where the value resembles the number of job aspects this employee is satisfied about. *Permanent contract* is a binary variable where ‘permanent’ (1) resembles the respondents with a permanent contract and ‘non-permanent’ (0) the respondents with fixed- or short-term contracts, no contracts or other working arrangements. ‘Total net personal income from work’ was used for *Income personal*, in order to make it internationally comparable this variable is constructed in the same matter as *Income rest*. Supervisor or job status is formed into a binary variable with ‘non-supervisory’ (0) and intermediate and supervisory recoded into ‘supervisory’ (1). *Company sector* is also recoded into a binary variable with ‘public sector’ (0) and ‘private sector’ (1). The unemployment history of a respondent is resembled by ‘unemployment’ where a ‘1’ classifies the respondents who were unemployed for at least month before they started working and a ‘0’ means that they were not unemployed. *Full-time contract*

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<sup>1</sup> Source: OECD Country Statistical Profile (2001)

<sup>2</sup> Source: OECD Country Statistical Profile (2001)

characterizes the respondents with a ‘part-time contract’ (0) or a ‘full-time contract’ (1). *Tenure* is a continuous variable which is constructed by subtracting the year in which the interview is conducted (‘Year interview’) from the year in which the employee started working for his current job (‘Start year’). *Tenure* resembles the number of years a respondent has been working for his current company. Before this subtraction ‘Start year’ had to be recoded into usable values; 2979 into 1979 up to 2986 into 1986. The dummy variables for company size are formed by recoding the numbers of employees of company into four size groups. The dummy group *Company small* contains the respondents working for a company with 0 to 20 employees. *Company medium* resembles the group working for a company with 21 to 100 employees and *Company large* has between 101 and 500 employees. *Company giant* is the largest dummy category and resembles the respondent working for a company with more than 500 employees.

### 3.2.6. Country

In order to test for the separate country influences dummy variables were constructed from the question ‘Country’ for all the selected countries.

## 3.3. Dataset construction

The original total dataset consists also of respondents who do not work or have missing values for the dependent variable. In order to create a usable sample, several observations had to be deleted. The question concerning the self-defined ‘Main activity status’ (PE002) asks respondents if they are: working unemployed or inactive. The respondents who did not fill out that they were working were excluded from the dataset. Finally also the observations which had missing values for the dependent variable were excluded from the dataset.

Other variables still had missing values spread across the observations. This caused serious data loss because those observations were automatically excluded when testing. To keep a large and usable dataset for Europe as a whole and for the separate countries, the missing values were recoded into 0’s. In order to keep the dataset capable of providing trustworthy answers, dummy variables were constructed to control for the missing values; ‘non-missing’ (0) and ‘missing’ (1). This construction has been made for the following variables; *Education; Hampered; Health feel; BMI; Smoke; Relationship status; Household size; Children; Income personal; Income rest; Job satisfaction; Company size; Job status; Unemployment; Company sector; Tenure; Type contract; Contract duration.*

After filtering the original dataset and construction of variables, 247.095 respondents, divided over eleven countries, are included into the model. The following eleven countries were selected for study, in alphabetical order: Austria (16.975 respondents), Belgium (11.858 respondents), Denmark (12.142 respondents), Finland (17.216 respondents), France (24.113 respondents), Greece (25.120 respondents), Ireland (12.514 respondents), Italy (35.507 respondents), The Netherlands (24.816 respondents), Portugal (35.482 respondents) and Spain (31.352 respondents).

### 3.4. Descriptive analysis

The descriptive analysis of the variables can be found in Table 2. In the column observations, the original number, without the recoded missing values, of observations is shown. These original numbers of observations show that six variables have a high number of missing values. For the variables *Household size*, *Children*, *Income rest* and *Tenure* approximately half of the observations were missing and *Supervisor* and *Permanent* miss close to a quarter of the values. Even so, these variables still provide us with over 120.000 observations over Europe. Even without controlling for the missing this is a large number of observations to use for testing a model. The variables concerning smoking and BMI also miss approximately a quarter of the values, but these missing values can almost all be allocated to The Netherlands and France since these variables were not filled out in these countries.

The mean of the binary variable provides insight into the percentage of the respondents where a '1' is observed. Since not only the overall mean is included but also the means for respondents who were absent and respondents who were not absent, we can compare these for differences. The mean of the dependent variable tells us that 13.7%, 33.738 respondents, were absent during the reference period. The variable *Male* shows that male employees tended to be absent less during this period compared to female employees. The mean for *Male* in the group who reported absent was lower than in the overall mean. While not all variables provide such distinct differences we find large differences for the variables *Hampered*, *Health good*, *Smokes*, *Smoke never*, *Looking after*, *Income rest*, *Company Small* and *Tenure*. *Hampered*, *Health good*, *Looking after*, *Company small* and *Tenure* show means which indicate their hypothesized effects could be expected. *Smokes*, *Smoke never* and *Income rest* indicate towards contradictory effects. For example, stemming from the descriptive analysis, current smokers could be expected to be absent less than respondents who never smoked. It can also be noticed that, since most of the

continuous variables have rather low means compared to the maximum, the highest observed values are outliers.

The mean of the country dummies shows the difference in absence rates in the countries, these differences can also be found in Graph 1. *Denmark, The Netherlands, Belgium, Greece and Finland* have an above average absence rate. *Denmark* is found to have the highest rate, while *Italy* and *Austria* have the lowest rate of employee absenteeism of the included countries. These differences provide a first proof that absence rates vary widely across countries and that one may expect that maybe the governments and companies in Italy and Austria have found a better solution towards the problem of employee absenteeism.

### 3.5. Empirical model

The model for the chance of an employee for being absent is based upon the effects of latent variables. Latent variables are variables that are not directly measured but are inferred from variables that are observed. We assume that an underlying propensity to be absent generates the observed state. Although we cannot directly observe the propensity, at some point a change in the latent variable results in a change in what we observe, namely, whether an employee is absent (Long and Freese, 2006). Because of the binary aspect of the dependent variable a Binary Regression Model will be used. Two of the most widely used models in the case of binary dependent variables are probit and logit (Hahn and Soyer, 2005). According to Gill (2001) and Greene (1997) it does not make any difference which is chosen, since both models will exert the same outcomes. For testing this model a probit analysis (1) will be conducted.

$$(1) \quad P(y = 1|x_n) = P(y^* > 0|x_n) = \Phi(x_n' \beta)$$

In the pooled model all the determinants are included except for the reference dummies of the dummy variables. The age effect is tested by comparing the age groups against the youngest age group. The dummy variable of this group, up to the age of 20, is thus excluded from the model. For the educational dummies the group consisting 'finished third level of education' and for the company size the group consisting 'over 500 employees', are excluded from the model. Within the country dummies Denmark is taken as reference country since Denmark has the highest rate of absence among its respondents.

Because the binary regression model is nonlinear, the magnitudes of the coefficients of the determinants cannot be interpreted. The probit model is only capable in telling if a significant

relationship exists and whether it is a positive or negative relation. In order to be able to interpret the individual influence of the determinants on the outcome, we use the marginal effects method of the probit model. This method solves our problem of uninterpretable magnitudes since it calculates the effects at the means of the variables. In our model we use discrete (2) and continuous (3) independent variables which are measured differently.

(2) Discrete<sup>3</sup>  $\Phi(y^* = 1|x_n = 1, \bar{x}_n) - \Phi(y^* = 1|x_n = 0, \bar{x}_n)$

(3) Continuous<sup>4</sup>

$$\frac{\delta\Phi(y^* = 1|x_n)}{\delta(x_n)} = \beta\Phi(\beta_0 + \beta_n\bar{x}_n)$$

To correct for the influence of outliers we replace the traditional standard errors with robust standard errors. Finally additional Wald-tests will be performed for the separate categories in order to test if the included variables are jointly significant. This will show if the categories separately indeed have explanatory value. This test may also provide information whether the impact of the different categories differ among each other.

In case the marginal effects of the individual country dummies are significantly different from Denmark, there is proof that country characteristics affect absenteeism rates. In order to further investigate these differences we will test the pooled model for each country separately. We assume that these separate models will provide us with evidence concerning the differences per country more specifically. The results are expected to show whether the marginal effects of determinants differ in magnitude for countries, but also whether the model can be applied in each country. A result may be that, while the pooled model shows much significance for Europe, the model has to be adjusted to more specified aspects of a country, because of insignificant results.

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<sup>3</sup> The included discrete variables are; *Male, Age 21-30, Age 31-40, Age 41-50, Age 51-60, Age ≥60, Education low, Education medium, Hampered, Health good, Smoke all, Smoke stopped, Looking after, Living together, Children, Company small, Company medium, Company large, Supervisor, Unemployed, Private sector, Permanent, Full-time, The Netherlands, Belgium, France, Ireland, Italy, Greece, Spain, Portugal, Austria and Finland.*

<sup>4</sup> The included continuous variables are; *BMI, BMI<sup>2</sup>, Household size, Income rest, Job satisfaction, Tenure and Income personal.*

# 4. Results

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## 4.1. Pooled model

The results of the first model, the pooled model, can be found in Table 3. The marginal effects show the magnitude of the impact of this single variable, in case of a unit change in this variable. For example the marginal effect of *Male* shows that a unit change in the variable *Male* (from a 0 to a 1) lowers the chance for being absent with -0.0316 or -3.16%.

As explained before the variables are divided over the groups demographics, health-, household- and job characteristics. The discussion of the results will be done in the same matter. The outcomes of the Wald-tests are all shown to be significant (Table 4). According to the significance of these Wald-tests it can be concluded that the variables are jointly significant. They are jointly making a significant contribution to the prediction of the model and should thus be included in the model.

### 4.1.1. Demographics

The demographic variables all show the expected results and are significant at a 1% level. With exception of the dummy variable resembling who finished the second stage of secondary level education. We find that a male employee is 3.16% less likely to be absent compared to a female employee. The different age groups clearly show that the chance for being absent becomes relatively smaller with an increasing age. For example, a respondent aged 51 has a 7.20% lower chance for being absent than a respondent aged 20. A negative gradient upwards from the lowest age category has been found. Despite the decreasing chance with age for being absent, this relationship is not linear. The slope is not monotonic decreasing as the highest age group, older than 61, shows a higher marginal effect than the group aged between 51 and 60. The education dummies show that a respondent who finished an educational degree lower than secondary education, has a 0.95% higher chance for being absent than a respondent who finished a third level of education. The insignificant result of the group respondents, who finished a secondary level education, shows that this group does not exert different absence behaviour than respondents which finished a third level of education. It can be stated that respondents with the higher levels, secondary or third, of education have a smaller chance for being absent than respondents with less than secondary education.

### 4.1.2. Health

All health variables show that ill health is associated with higher rates for being absent. We find that a respondent who is hampered by health restrictions in his daily activities, is expected to have a 9.20% higher chance for being absent than a respondent who is not hampered. Similar results are shown by self-assessed health. A respondent who assesses his health as good or very good is 8.54% less likely to be absent than a respondent who assesses his own health as fair, bad or very bad. Also both lifestyle factors, BMI and smoking act more or less as expected. BMI-squared provides evidence at a 10% level of a quadratic relation with absenteeism. However, the expected positive marginal effect of the influence of BMI could be assumed as non-existing since the marginal effect is 0.00%. An obese respondent, BMI of 35, for example does have a noticeable higher chance (0.00%) for being absent than a respondent with normal weight, BMI of 25. The marginal effect of smokers on the other hand shows clear results again. While the descriptive analysis suggested otherwise, current smokers, but also previous smokers, are found to have a higher chance for being absent, than a respondent who never smoked. A current smoker has a 3.5% higher chance and a previous smoker a 2.47% higher chance for being absent. This shows that stopping with smoking decreases a respondent's chance for being absent compared to a respondent who never smoked.

### 4.1.3. Household characteristics

We find striking outcomes for household characteristics. The first striking result in this model is the negative relation between the size of a household and absenteeism. The model shows that a respondent living in a household of six is 0.63% less likely to be absent than a respondent living in a household of three. The other striking result is that the effect of having dependent Children<sup>5</sup> is found to provide insignificant results. This relation shows that having dependent children itself does not provide clear results for employee absence overall. Gender should be taken into account when determining what impact having dependent children has for a respondent on the chance for being absent. On the other hand, we find that looking after children or other persons has the

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<sup>5</sup> A possible explanation for this outcome, since earlier research clearly showed different results, could be that the cause lies in the fact that both male and female effect are taken into account. Earlier research showed that females tend to be more absent in case of children while this result does not always hold for males. In order to see if this explanation holds for Europe as a whole, an interaction variable between Gender and Children was constructed which provided support for this explanation. Males with children are significantly less often (-1.7%) absent than males without or women with or without children. And the variable *Children* (0.5%) now also shows a significant expected positive relation. This shows that children have a positive relation with the chance of absence of female.

expected relation with the chance for being absent. When a respondent looks after other persons than himself he has a 1.95% higher chance for being absent. Respondents who are living together with a partner, also show to have a 1.59% expected higher chance for being absent than respondents who live alone. Despite the positive result for living together, the effect of other household income is found to be negative. A respondent who has access to an additional household income of 10.000 Euros shows to have a 0.30% lower chance for being absent than a respondent who does not receive this extra income.

#### **4.1.4. Job characteristics**

Most of the aspects in this group exert the expected outcome, only the relation between having a permanent contract and absenteeism is unexpected. Further we find job status, whether the respondent is a supervisor or intermediate, and tenure of a respondent not to have a significant effect on explaining the chance for being absent. The insignificant results of these aspects tells us that no clear differences in absence behaviour are found for respondents with a different job status or tenure. These determinants thus do not provide additional explanatory value when calculating an employee's chance for being absent. Job satisfaction on the other hand shows significant results. Taking into account the continuous character of job satisfaction, we find that a respondent, who is satisfied about more aspects of his job, is less likely to be absent. For example if a respondent is satisfied with four job aspects, he is 1.6% less likely to be absent than a respondent who is satisfied with two different job aspects. Also the two contract characteristics show significant results. Full-time employed respondents have an expected 1.19% higher chance for being absent than part-time employed respondents. Respondents with permanent contracts however, have an unexpected 0.84% lower chance for being absent than respondents with a non-permanent contract.

The relation found for personal labour income is again as expected. A respondent with a higher income has a relative lower chance for being absent. For example, a respondent who has a labour income of 50.000 Euro has a 0.2% lower chance for being absent, than a respondent earning a labour income of 30.000 Euro. Previous unemployment also shows the expected positive relation with absenteeism. A respondent who was unemployed prior to his current job has a 1.09% higher chance for being absent compared to a respondent who was not previously unemployed. Furthermore, both the researched company characteristics have the expected relation with absence behaviour. A respondent working in a privately-owned company has a 1.78% lower chance for being absent than a respondent working in a publicly-owned company. Respondents

working in small and medium companies, the companies with 0 to 100 employees, have a significant lower chance of absence compared to respondents working in companies with more than 500 employees. To specify, a respondent working in a small company, 1 to 20 employees, has a 2.46% lower chance and a respondent working in a medium company, 21 to 100 employees, has a 0.67% lower chance for being absent. The insignificant result of respondents working in a company with a size between 100 and 500 employees compared to respondents working in the largest company size, over 500 employees, means that they do not show significant different behaviour for absence. It can be stated that respondents working in smaller companies are less likely to be absent.

#### **4.1.5. Country**

In the pooled model the data of all the included European countries are taken into account. To research whether the results differ per country, country dummies are included. As expected we find the chance of a respondent being absent to be lower in all the other countries compared to Denmark. The wide range of marginal effects shows that the differences are not directly because of demographics, health-, household- or job characteristics, but are because of institutional differences. These institutional differences can influence the effect of the different determinants, which eventually results in different outcomes. With a negative marginal effect of 11.85% Italy has the largest difference with Denmark. Greece has the smallest difference with a negative marginal effect of 3.84%.

In order to further investigate these differences the designed model is also tested for all the separate countries. The results of these models will show whether the different determinants behave differently or the same over all the involved countries. The results will also provide the magnitude of explanatory value of the individual determinants, overall or within a country, compared to the other determinants. These models will be discussed in the next section.

#### **4.2. Country models**

The outcomes of the separate country models can be found in Table 5a and Table 5b. The descriptive outcomes of these models are shown in Table 6a and Table 6b. All the models, the pooled and the country models, prove according to the Wald-tests that they are jointly significant and provide significant predictions. Nevertheless differences can be noticed in the pseudo- $R^2$ . The pseudo- $R^2$  is the correlation between the predicted and observed values of an outcome and indicates how well the model can predict the outcome. According to the magnitude of the

pseudo-R<sup>2</sup> the model is best predicted in Denmark (8.90%) and Austria (8.85%). The other country models show values between 5.00% and 8.00%. Greece (2.22%) however, shows the lowest pseudo-R<sup>2</sup>, which indicates that the model has a worse prediction rate in Greece compared to the other countries. Like the Wald-tests for the country models as a whole, we find the different groups to be jointly significant over all the countries at a 1% level. Except for Ireland where the Wald-test for household characteristics shows an insignificant result. These outcomes prove that, except for household characteristics in Ireland, the groups are all making a significant contribution to the prediction of the model and should be included.

#### 4.2.1. Demographics

The gender effect is negative in each country, only the magnitude differs. We find the largest difference between males and females in Denmark (-6.80%) and the smallest effect is found in Portugal (-1.19%). The chance of a male employee being absent compared to a female employee is thus more than five times smaller in Denmark than in Portugal. The different age groups were, except for Greece, compared to youngest negatively related to absenteeism in each country. Again many differences can be spotted in the magnitude of the marginal effects. Denmark has the highest effects and Italy the lowest effects of older respondents compared to respondents aged up to 20. The positive relation in Greece states that younger employees are less absent than older employees. The marginal effects in most other countries show a gradient indicating that as employees get older, they are absent less. For France, Ireland, Greece and Austria no clear gradient can be found due to ambiguous results for the age groups. Belgium shows insignificant results, except for the group respondents aged 41 to 50.

The variables concerning the education differ over the different countries and not all results are significant. In Denmark, The Netherlands, Belgium and Finland we find a contradicting result indicating that respondents with a higher educational attainment are more likely to be absent more often. France, Ireland, Italy, Greece, Spain and Portugal show results indicating the effect that respondents with lower educational attainment are absent more often. In most countries both the educational variables are significant. However, for secondary level of education the result is not significant in The Netherlands, Italy and Spain. The result of lower than secondary level of education is insignificant in Belgium and France. In the countries where both education variables are significant, they show a diminishing gradient towards the highest level of education. To clarify, respondents with a third level education differ the most, positively or negatively related, from respondents with a lower than secondary level of education. The insignificant results

indicate that respondents with the educational level in question, were not found to behave differently compared to the respondents with the third level of education.

#### **4.2.2. Health characteristics**

Unexpectedly Greece shows a negative relation between absenteeism and a person who is hampered by health in his daily activities. All the other countries have a significant positive relation. Despite the similarities in the relationship, the magnitudes vary widely over the countries. The highest marginal effect is found in The Netherlands (15.97%) and the lowest in Denmark (3.76%). Self-assessed health is found to be significant negatively related in all the countries. Like for hampered the magnitudes differ widely. Denmark (-15.80%) shows the highest marginal effect for this determinant and Portugal (-3.85%) shows the smallest. The rest of the countries have high values, all surrounding the -10.00%. Except Spain, that has a value of -13.52%. For both previous determinants, Spain is rated among the highest countries regarding the marginal effects.

The significant results of BMI-squared prove the quadratic relation with absenteeism. While we expected U-shaped relations, only Austria and Ireland provide those. Greece, Spain and Portugal show results for inverted U-shaped relations. Although the marginal effects of BMI-squared seem rather small, Ireland has with 0.04% the highest effect, the quadratic effect has to be taken into account. An obese respondent, BMI of 35, has a 4% higher chance in for being absent in Ireland than a respondent with normal weight, BMI of 25. As expected, both the respondents who smoke and those who used to smoke show a higher chance for being absent compared to respondents who never smoked. Except for stopped smokers in Spain and Austria and current smokers in Ireland, which have insignificant results. Where most countries have marginal effects around 2.00% for smokers compared to respondents who never smoked, Denmark (6.16%), Greece (7.24%) and Finland (6.19%) have much higher values. Same applies for the marginal effects of the respondents who stopped smoking. In all the countries with significant values for both smoke variables, the results show that it has a positive effect for smokers to stop smoking. The marginal effect of respondents who stopped smoking is lower than those who smoke.

The values for the determinants concerning BMI and smoking are missing for The Netherlands and France since they were not filled out by any of the respondents of the countries concerned.

#### **4.2.3. Household characteristics**

The variables of household characteristics do not show much significance. Having dependent children is only found to be significant in Greece (-4.07%) and in this country it even has a

negative relation with absenteeism. Like in the pooled model household size has negative relationships with absenteeism. The effect of household size is only found to be significant in Denmark (-1.98%), The Netherlands (-1.73%) and Portugal (-0.31%). These countries thus show that having a larger household lowers a respondent's chance for being absent. Looking after children or other persons other than the respondent himself shows a positive relation in Denmark, The Netherlands, France, Spain and Finland. A negative relation is found in Austria. The marginal effects for respondents looking after other persons, compared to respondents not looking after other persons, are close to 2.00% in four countries. Denmark (11.64%) and Finland (9.06%) show much higher values. We also find that respondents who are living together as a couple have a significant higher chance for being absent in Belgium, France, Italy and Portugal compared to respondents not living as a couple. Among those four countries no striking differences concerning the magnitude are found, all have a marginal effect of approximately 2.00%. In contrast to the expected relations found for respondents who are living together as a couple, the marginal effect of other household income, only shows the expected result in Denmark of the five countries in which it is significant. Belgium, France, Spain and Austria all show a negative relation between absenteeism and other household income. The magnitude of the marginal effects are rather small and do not differ much over the different countries.

#### **4.2.4. Job characteristics**

The magnitudes, but also the sign of the relationships between the determinants of job characteristics and absenteeism are found to differ much over the countries. Only the determinants concerned with a respondent's job satisfaction, his/her unemployment history and whether he/she works in a privately-owned company show clear results. A more satisfied respondent has a lower probability for being absent in nine countries. Italy shows a negative relation and Spain an insignificant relation. The largest marginal effect is found Denmark (-2.70%) and the smallest in Italy (-0.22%). The marginal effect of a respondent's unemployment history is found to be significant in Denmark, The Netherlands, Belgium, Italy, Ireland and Greece. The expected positive relation for unemployment history is shown in all six countries. Denmark has the highest (5.69%) and Italy (0.51%) the lowest marginal effects. Of the determinants for company characteristics especially the sector a company has unilateral results. However, also the size of the company shows rather similar results. The negative effect of a respondent working in a privately- or publicly-owned company is significant in Denmark, The Netherlands, France, Ireland, Greece, Spain and Austria. The highest marginal effect for this relation was found in Greece (-3.93%) and the lowest in The Netherlands (-1.38%). The effects

of company size are different for each size group. We find that all the countries, except for Ireland, show that respondents working in small- and medium-sized companies have a lower chance for being absent. The marginal effects for working in a small, 1 to 20 employees, company are significant in Denmark, The Netherlands, Ireland, Italy, Greece, Spain, Portugal and Finland. For working in a medium, 21 to 100 employees, sized company, the effects are significant in Denmark, Belgium, Ireland, Italy, Greece and Portugal. All company sizes in Greece and the medium company size in Belgium show a positive relation, but in the other countries we only find negative relations. Italy (-1.92% for small and -1.10% for medium) has the lowest values for the marginal effects and Portugal (-8.11% for small and -4.98% for medium) the highest. The effect on absence behaviour of working in a large company, 101 to 500 employees, compared to working in a giant company shows mixed results. We find a positive relation in The Netherlands, France, Greece and Spain but a negative relation in Denmark, Ireland, Portugal and Finland. Greece (6.67%) has the highest marginal effect and The Netherlands (1.50%) the lowest.

Both the contract characteristics, permanent and full-time contracts, show mixed relations with absenteeism. The effect of a respondent having a permanent contract compared to a non-permanent contract is significant in eight countries. This determinant is negatively related in The Netherlands, Ireland, Greece, Spain and Austria and positively in Denmark, Belgium and France. The effect of having a full-time job compared to a part-time job is found to be significant in Denmark, The Netherlands, Belgium, France, Greece, Portugal and Finland. Only Greece and Portugal show a negative relation. The determinants concerning permanent contract and full-time contract show the highest marginal effects in Denmark (4.31% and 8.30% respectively) and the lowest in France (1.18% and 1.34% respectively).

The determinants concerning whether a respondent has a supervisory job, has longer tenure and his personal income from work show little significance, but also very mixed outcomes. We find the marginal effect of a respondent with a supervisory or intermediate job, compared to a respondent in a non-supervisory job, to be significant in four countries. Portugal and Italy show a positive relation and Belgium and Spain a negative relation. No large differences are found in the magnitudes of the marginal effects. Italy (1.14%) has the lowest and Belgium (-2.94%) the highest. The marginal effects concerning the tenure of a respondent are only significant in Belgium, Greece and Finland. While a negative relation was expected, only Belgium has this relation. The marginal effects of this determinant are also rather small and differ little. Greece

(0.27%) has the highest and Finland (0.11%) the lowest value. The determinant personal income from work is only significant in four countries, positively related in Greece and Portugal and negatively in Denmark and Finland. Although the marginal effects are also rather small they are quite different. The highest effect in Belgium (-0.4%) is ten times as large as the lowest effect in Portugal (0.04%). For Belgium this effect shows that a respondent with an income of €40.000 is 4.00% less likely to be absent than a respondent with an income of €30.000.

The results in the pooled model show that, except for other household income and permanent contract, the significant determinants behave as was expected from the literature. The country models show that the determinants in the groups demographics and health characteristics act mostly similar across all countries, except for some unexpected results. The determinants of household characteristics do not have much significance over the countries. However, the significant relations found indicate similar behaviour in the different countries. The variables in job characteristics on the other hand, show more differences in behaviour and significance across countries. Respondents had, for example, similar and significant behaviour towards determinants concerning job satisfaction, unemployment history and company sector. But little consistency in behaviour was, for example, found for determinants concerning permanent contract, large company size, job status and personal income. Also the number of significant relations found for several determinants differed widely. Where job satisfaction shows significance in ten countries tenure is only significant in three.

Besides the determinants, the models also display differences amongst each other. While several countries like Ireland and Austria show many similarities to the results of the pooled model and much consistency with the expectations from previous literature, Greece seems to be an outlier. Despite the many significant relations in the model, Greece displays results which indicate that its inhabitants have very different absence behaviour compared to the other countries. The results in Greece also do not show much consistency with the beforehand expected relations.

# 5. Discussion

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The review of research literature provided useful determinants for the construction of a model on calculating the chance of an individual employee for being absent. The combination of these determinants in one large model offers new insights in the existing literature, since a model with such a variety of determinants was not yet tested before. Due to this broad selection this model is able to control for most of the aspects which influence the behaviour of an employee, such as household or job characteristics. The results of this model therefore provide a better indication of the individual explanatory power of these determinants in comparison to previous research. The differences between the country models prove that institutional factors are of influence.

The discussion of the results will combine previous literature with the results from the models in order to find explanations for differences between expectations and results. These explanations will also be used in the search for the institutional factors causing the different results between the countries.

A difficulty arises since some institutional factors cannot be allocated to a single determinant. For example, institutional factors as generosity of the insurance system and degree in which the health benefits system is publicly organized were proven to influence absence behaviour overall.

## 5.1. Demographics

The results provide clear evidence that female employees have a higher chance for being absent than male employees. Despite the attribution of this effect to family responsibilities by many researchers, evidence is provided for the existence of other influences, since most aspects of care taking are controlled for. Geurts, Kompier and Grundemann (2000) provide an additional explanation for the negative relation. Supported by Gimeno, Benavides, Amick III, Benach and Martinez (2004) they suggest that female absenteeism could also partly derive from the differences of job characteristics between male and female employees. The National Institute of Social Science (Van der Giezen, 2000) state that women typically hold different kinds of jobs and work in different kinds of sectors than men and that these differences largely explain their higher absence. This relation may be interesting to explore further in future research. The differences in the magnitude of the marginal effects over the countries may be related to the countries' participation rates. As the proportion of female employees in the workforce is

relatively larger, the chance of a higher absence rate for a country is also likely to be larger, since female employees are absent more.

Despite the ambiguous earlier findings related to the effect of an employee's age on absence, a negative relation is found. The gradients in most countries show that older employees tended to be less absent than younger employees. In order to find a reason for the contradicting research, and to find an explanation for the positive relation in Greece, the included variables in those researches were reviewed. This comparison of included variables could not provide any new insights since the models showing the different results were controlling for similar variables. Although the model controls for chronic illness and self-assessed health, it may be possible that the opposite effects in Greece and ambiguous effects in Austria, France and Ireland are present because we miss another health variable. Or it may be that the health effects are much larger in those countries since almost all explanations for a positive effect concern the relation between bad health and older age. With the help of the MISSOC<sup>6</sup> database, a test was performed whether differences in difficulties or costs, such as lost wages, arising from being absent could be the reason. The Spearman rank test found no support for the positive relation. A final explanation to consider stems from the nature of the dependent variable. Absent is defined as a binominal variable and does not control for the duration of absence.

There are small and insignificant relations between the education and the absence of an employee in the pooled model. This could be explained by the ambiguous results showed by the different countries in their individual models. In the countries where education was found to be significantly related to absenteeism the marginal effects are of a relative high magnitude. While the education variables do not have the same relation in all of the countries, the variables provide explanatory value in the countries separate for calculating the chance for an employee to be absent. In Denmark, The Netherlands, Belgium and Finland a negative relation was found while France, Ireland, Italy, Greece, Spain and Portugal have a positive relation. Only Austria does not provide significant results. This proves the existence of a relationship but since previous research only found a negative relation between the level of education and absenteeism the positive outcomes may provide incentives for further research. A cause that may be considered as an

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<sup>6</sup> MISSOC (2004). We looked at differences in reporting for absence and conducted a Spearman rank correlation between the sickness benefits, resembling the percentage of normal wage a respondent receives when absent, and absenteeism and a positive relation was found at a 1% significance level. Since Greece, Austria, France and Ireland are amongst the countries with the lowest percentages of benefits, this relation does not provide additional explanatory value.

explanation for the ambiguous results is the proportion in which the different educational groups are represented (Table 7). The division of the educational levels shows that while one country has a large proportion of third level educated respondents, another country has almost none. This can cause differences in the calculated marginal effects.

## 5.2. Health characteristics

The results for the influence of self-assessed health and whether employees are hampered on absenteeism are overall significant. Although high differences in magnitude of marginal effects are found between the different countries. These differences could originate from mentality of residents but another explanation could be found in the healthcare policies of these countries. For example each country allocates its own percentage of the gross domestic product to health expenditure. It may be expected that countries with a higher expenditure invest more in improving the health of their inhabitants. According to the Spearman rank correlation<sup>7</sup> a negative relation is found between health expenditure and absenteeism. Another institutional difference may be that some countries are more striving towards the integration or reintegration of chronically ill or disabled people. A larger share of chronically ill or disabled employees could result in differences of the marginal effect. A final explanation may come from country regulations concerning work conditions. It could be expected that in countries with more strict regulations about safety in the workplace less employees get injured or ill from their work.

The results of BMI can be noticed as rather striking with the previous literature. All previous research showed clear results for employees with underweight and overweight having a higher chance for being absent. We find such U-shaped relations but we also find inverted U-shaped relations. Despite these unexpected results the quadratic relation of BMI has been proven in all the countries with a significant relation. The only explanation found in the literature that may explain the unexpected results is provided by Sanz-de-Galdeano (2007). She stated that it must be acknowledged that self-reported anthropometric variables may contain measurement errors with heavier persons more likely to underreport their weight. While BMI showed some unexpected results, the relation between smoking and absenteeism is clear and as expected. The negative relation between smoking and absenteeism has often been proven and can be assigned to the fact that smoking is bad for a person's health. Although the results show that employees who stop smoking have a higher chance for being absent this chance is relatively lower than for employees who are current smokers. This relation could be explained with the assumption that

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<sup>7</sup> Spearman's rho = -0.0262 and independency of health expenditure and absent is significant at 1%.

employees who stop smoking choose to stop because they are proactive taking care of their health. They are more health minded and thus taking better care of themselves. This reduces their chance for being absent but does not immediately eliminate the sustained negative effects of previous smoking.

### **5.3. Household characteristics**

While the family or household characteristics of employees were expected to provide clear and significant influence on the absence behaviour, the results of these variables in the models show different. A Wald-test showed that these variables did not provide additional explanatory value for the model of Ireland. Despite the low number of significant variables, large differences could be found. These differences may partly be explained by the employment and/or participation rate of the countries. It could be assumed that countries with a higher participation rate have a larger number of households where both the partners and/or parents work. Since only working individuals are included into the model, it is possible that these respondents have partners at home taking care of the family. This relation could also explain the overall low number of significant outcomes because when the respondent does not has to solve familiar issues he/she will be less influenced by the work/family conflict. Following this assumption it may provide an insight in the unexpected negative relations between the household size and presence of dependent children. It could also be assumed that when an employee has more persons to take care of this employee will feel a higher degree of responsibility towards them and thus be inclined to exert more effort and be absent less. The inclusion of a non-working or maybe even a part-time working partner may provide new insights in later research. As explained in footnote 5, the insignificance of the presence of dependent children, in the pooled and country models, can be explained by the fact that gender plays a crucial role. The interaction variable in the pooled model shows a clear positive result for the assumption that female absenteeism is affected by the presence of dependent children, where this does not hold for male. A similar interaction variable for the relation between household size and gender did not give significant results. For the effect of other household income these assumptions do not provide much explanation. According to previous research and assumptions a positive relation is expected, but despite the little significance mostly negative effects are shown. No explanation could be found in the literature for this relation, but it may be possible that persons with higher other household income have a higher spending. According to the budget constraint such behaviour leads to a higher need of income.

#### 5.4. Job characteristics

According to the Wald-tests, the determinants of job characteristics as a group provide much explanatory value on absence behaviour. However, individual determinants do not show similar results. Although previous studies found clear relations and effects for the determinants, this study shows contradictory and ambiguous results. These differences could be an indication for differences in a country's institutional setting.

Job satisfaction is an example of a determinant which shows similar patterns across all countries. All countries, except for Spain, provide evidence for a negative relation between job satisfaction and absenteeism. Despite significant results in only half the countries, unemployment history also proves to have a clear relation with absenteeism. The solely positive relation indicates that previous unemployment could indeed be an indicator of previous work attitude or absence behaviour. The differences in significance and magnitude between countries could stem from the fact that this study does not control for the degree of employment protection and unemployment rates of the involved countries. Higher degrees of protection make it more difficult to lay off employees for reasons of absence rates or work attitude. The assumption can be made, that when a country has a high rate of unemployment, relatively more employees with good previous behaviour are among those unemployed. Table 8 and Table 9 show the degrees of protection and unemployment rates for the individual countries. Although no direct conclusion can be drawn from these tables, they clearly show that the countries with the insignificant outcomes have the highest degrees of employment protection. Using a spearman rank test, an attempt is made to find a significant relation between both institutional aspects and unemployment history. The degree of protection<sup>8</sup> is negatively correlated with unemployment history, which indicates that with a higher degree of protection, the effect of unemployment history declines. For unemployment rates<sup>9</sup>, a significant positive relation is found, indicating a diminishing marginal effect for unemployment history when the unemployment rate increases. Another factor what may be important to control for, when using unemployment history, is whether a person was unemployed by choice since in such scenarios other rules apply.

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<sup>8</sup> Spearman's rho = -0.1249 and independency of degree of protection and unemployment history is significant at 1%.

<sup>9</sup> Spearman's rho = 0.01624 and independency of unemployment rate and unemployment history is significant at 1%.

Despite many significant results, the contract characteristics show ambiguous relations. The characteristic whether an employee has a permanent or non-permanent contract, has an unexpected negative result in the pooled model. The determinant permanent contract, again, shows mostly negative results for the country models. The relation between a permanent contract and absenteeism is mainly based upon the effect of job security. Hence, a country's degree of protection may explain for some of the differences found between the involved countries. Including a proxy for this institutional factor may provide more conclusive results. The other contract characteristic concerning the relation between full-time employment and absenteeism shows the expected positive relation in most of the results. However, we find a negative relation twice. It could be argued that the negative relation may stem from the fact that female employees have a part-time job more often. This is shown in Table 10. Another reason may be that part-time employees more often have children. The model does take these characteristics into account though. It is supposed that a reason for this unexpected relation must be sought elsewhere, but no further explanation was found in the literature. A relation may come from the reason choosing for part-time employment. When an employee chooses not to work full-time, it could be due to lower job commitment (e.g. not liking his/her job or jobs in general). Another reason may be that a part-time employee conducts other activities in his/her spare time, like having an own company or another part-time job. In the latter cases the behaviour of the employee may be expected resemble the behaviour of a full-time employee.

The results of the relation whether an employee works in a privately- or publicly-owned company are solely negative. This was anticipated for, but for further research it may be useful to research the assumptions made in the literature review, such as job security and secondary contract conditions, more extensively. Such research can provide evidence whether the basis for this relation must be sought elsewhere. Another aspect that may partly explain the differences between the sectors could be the negative relation between absenteeism and obliged company contribution to the costs of sick leave entitlements. Privately-owned companies can be assumed to be more inclined to reduce such costs since it will negatively influence profits. Publicly-owned companies experience such incentives in a lesser manner, since they do not have profit as first priority. The other company characteristic also showed many significant and quite similar results. Except for medium-sized companies in Belgium, and for both small- and medium-sized companies in Greece, all the other countries, with significant results, have a negative result for the small- and medium-sized companies. Large-sized companies, 101 to 500 employees, show ambiguous results. Reviewing the size characteristic as a whole in the individual countries, it is

difficult to distinguish one specific gradient over the dummies. The company size effect is found to be U-shaped in Greece and Ireland, where the effects in Ireland, are always negative and positive in Greece. Denmark shows an inverted U-shaped relation with solely negative effects. In The Netherlands, Italy, Spain, Portugal, and Finland, a diminishing negative effect is found. In The Netherlands and Spain it even switches into a positive effect for dummy for the company size of 101 to 500 employees. The existing literature does not provide much support for an explanation of these differences between the countries. The ambiguous results for large company size may be explained that the size-effect diminishes as companies get larger. An assumption can be made that the behaviour of employees within companies with 100 to 500 employees and companies with more than 500 employees is similar. The positive effects of working in small and medium companies in Greece and Belgium may partly be explained by the statement of Barham en Begum (2005); larger companies have better organized absence policies and regulations which results in lower absence rates.

Despite clear outcomes in previous research, no apparent relation is found between absenteeism and a possible supervising role of the employee. These unclear results could be related to the hierarchy of companies. ‘Intermediate supervisory’ and ‘supervisory’ cover all the supervisory functions within a company. Since an employee can be a supervisor and be supervised at the same time, the direct effect of this hypothesized relation could be influenced. Another reason for these results may stem from the fact that the designed model controls for the influence of the level of education, where previous research did not. It could be assumed that employees with a higher education work as a supervisor more often. Table 11 shows that employees with a higher degree of education have a higher chance of working as a supervisor. 37.9% of third level educated employees works as a supervisor, against 18.0% of the employees with a less than secondary education. The significant positive correlation<sup>10</sup> between education and job status provides further evidence for the relation between these determinants.

The tenure of an employee does not provide much explanatory power either. Tenure is insignificant in the pooled model and for individual models, except for three countries. Even though a negative relation was expected, these inconclusive results are not entirely unexpected. In previous research tenure showed to be a determinant with positive and negative results and was hypothesized even so. These contradictory effects could be the reason for the insignificant

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<sup>10</sup> Spearman’s rho = 0.1775 and independency of education and job status is significant at 1%.

and inconclusive results. The negative relation stemmed from job commitment and lay-off selection. As lay-off possibilities are related to job protection this effect could explain some country differences. However, Ercolani and Treble (2002) and Drago and Wooden (1992) predicted a positive relation. Barmby, Ercolani and Treble (2002) based their expectation upon the fact that employees with longer tenures may believe their jobs to be secure and the cost of an absence to be accordingly lower. Drago and Wooden (1992) expect that, given a positive savings rate, tenure should be positively associated with net assets. As explained before, net assets are expected to have a positive relationship with absenteeism. Another possible explanation for the positive relation could be job characteristics or profession. Certain jobs require more manual labour or expose an employee to more risks than other jobs. The longer an employee works in such an environment, the higher his/her chance of getting physical complaints or injuries will be which can result in higher absence rates. Examples of professions with high and low physical demands are respectively construction workers and clerks. Personal income from work also shows ambiguous results and little significance. Even though a negative effect was assumed, a positive effect can be explained. When an employee receives an income which surpasses his budget constraint (thus income is more than he/she needs or spends) he/she is less directly dependent upon income. Leisure may become more valuable and this employee may be inclined to be absent. The support for this explanation is similar to the theoretical support for the effect of additional household income. It may also provide some explanation for the insignificant outcomes, since the variable could be affected in opposite directions.

## 6. Conclusion

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At the start of this research on employee absenteeism its effect on a nation's economy was known. However, the research conducted towards explaining the underlying factors of absence behaviour was inconclusive. Although the influence of the determinants included in this research and more were examined in earlier research they were not yet tested in a broad perspective. Their relation with absenteeism was tested by researching the effect of determinants of a specific category on absence behaviour. As a result different results were found when determinants from a different category were included. The lack of models in which these determinants were controlled for indirect effects, resulted in the fact that it was not possible to prove the influence of a specific determinant. In addition to the lack of such models, also little cross country comparisons on the differences in absence behaviour had been done. Country absence rates were found to differ. Still most country comparisons did not exceed comparing country characteristics, such as employment rates or employee age with absence rates. Despite the found and hypothesized differences in absence rates between countries, a model searching for explanations for these differences was not yet constructed.

The pooled model provides a new insight due to the fact that it shows much consistency with the existing literature, although the variety and combination of determinants is wider than most research before. Although not all determinants show the expected results, strong significance is found for the constructed model as a whole and the individual determinants. The pooled model thus proves that it can be used as a tool for calculating the chance of an employee being absent. While the pooled model shows its use for calculating the chance for being absent for Europe as a whole, the standardized model does not provide similar results for all the individual countries. The differences in significance and the opposite results between the pooled model and the other countries, show that different aspects between countries, which are not covered by this model, influence absence behaviour. Despite the significance of the model in each country, it cannot be widely applied without further adjustments or controlling. The large differences in the magnitudes of the marginal effects show that certain determinants have larger explanatory power in some countries compared to others, as well as the determinants which have more explanatory power on absence behaviour overall. Although the sometimes dissimilar relations, the determinants concerning gender, age, education, chronic illness, self-assessed health, BMI, smoking, job satisfaction, unemployment, company characteristics and contract characteristics,

are shown to have much significant influence on absenteeism overall. Other determinants concerning looking after others, relationship status, children, household size, other household income, personal income, tenure and job status show less significant influence over the individual countries.

### **6.1. Policy implications**

The costs of absenteeism are enormous for companies and governments. It is assumable that they are very eager to create policies which decrease these rates and accompanying costs. It has been proven that many different determinants influence absence behaviour and that these determinants behave differently per country.

These outcomes can be used in order to try to decrease absenteeism. Companies and governments can influence a specific determinant for an employee as such that its chance for being absent, according to this model, will decrease. A government could for example use this model by determining where they could improve their current policy by looking at the institutional differences with the countries with lower marginal effects. Institutional differences may ensure that employees behave differently or react less strong to these determinants. When governments use such a comparison method they are able to learn from each other and exchange specific knowledge in their struggle against absenteeism since many country differences seem to stem from institutional differences. Regarding to the absence rates I would recommend countries to look at the countries with the lowest absence rates. However, by combining these rates with the model, I recommend that these countries compare their policies and regulations with Portugal. Portugal has the third lowest absence rate and a high number of significant determinants which mostly behave as expected. This combination makes Portugal a country with explanatory value for countries with higher absence rates.

Companies are required to act according to the policies a government makes, however they are able to search for their own opportunities to lower their absence rates within these policies. A company is mostly only able to influence absence behaviour through the determinants of job characteristics. They can use this model for searching for the determinants which provides them with the best or at least satisfactory results. A company, could for example, use this model to assess the chance of an applicant for being absent in the future, by which a company is able to filter high risk employees. Since this is illegal, a company could try to create a company climate in which it hedges against determinants within their grasp to change. In case of problems with

moral hazard, due to for example a generous health insurance system, a company could monitor better or make contracts more strict. A company could also, in case the presence of dependent children plays a large role in absence behaviour, start with providing a company day care centre. Reviewing the results of job characteristics I would recommend companies to take the determinants concerning job satisfaction, previous unemployment and full-time or part-time contract into account. A company is well able to exert influence on these determinants and according to the country models they show the most similar relationships with absenteeism which decreases the likelihood of undesirable outcomes.

## **6.2. Limitations**

This research tried to test the determinants of absenteeism as thoroughly as possible, but it has its limitations. Most limitations which were encountered when conducting this research originated from the dataset. While this data stems from an internationally comparable survey, a survey provides a problem with objectivity. Since a respondent provides answers to the questions himself, it cannot be stated with certainty that these answers were all true and objective. Another problem with the survey was that this survey was not constructed solely to provide answers for this research or the absenteeism issue in general. The questions were formed to serve a more general purpose and often had to be recoded in order to attain usable data. When adjusting the data and combining respondents' answers the problem of misinterpretation becomes larger. The biggest limitation to our research we encountered concerned the missing answers of respondents. Despite the fact that the respondents were obliged to fill out the entire survey, many blank entries existed. These missing data were the cause that certain, in previous research proven, influential determinants were excluded. Besides excluding determinants these missing values also resulted in the construction of many dummy variables controlling for the missing values. Also a limitation concerning the dependent variable was found. When testing and searching for absenteeism it would be wise to include a proxy for the season the survey is conducted in, since there are large differences between the absence rates over the seasons, which could disrupt the outcomes. A final limitation to this research is that I was not able to include institutional data in such a manner that the constructed model could control for their influences.

## **6.3. Recommendations**

For future research I highly recommend to include proxies for the institutional aspects. Including them into the model and controlling them is expected to provide a clearer result concerning the

country differences of the current determinants. Another point for further research concerns the dependent variable. In this research we constructed a model in which absenteeism is used as a binominal variable. This binominal variable shows whether a respondent was absent during the past four weeks, but it does not show whether this respondent was absent for fifteen days or only one day. Constructing a model where absenteeism is used as a continuous variable may provide new insights into determinants associated with long-term absence since in this study no distinction between long-term and short-term can be made. Besides controlling for institutional differences, the constructed model could be improved by adding variables concerning the type of job or more specific job characteristics into the model, since these could have an effect on absenteeism. A solution for improving the outcomes and explanatory power of the household characteristics may be the inclusion of a variable which controls for the character of the household. The work/family conflict affects a dual earners household differently than it affects a household where one partner stays at home.

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# Appendix

## Tables

**Table 1**

Variable	Description
Absent	Dependent variable = 1 if respondent was absent during past 28 days, 0 otherwise
Male	1 if male, 0 otherwise
Age $\leq 20$	1 if respondent is younger than 20, 0 otherwise
Age 21-30	1 if respondent is aged between 21-30, 0 otherwise
Age 31-40	1 if respondent is aged between 31-40, 0 otherwise
Age 41-50	1 if respondent is aged between 41-50, 0 otherwise
Age 51-60	1 if respondent is aged between 51-60, 0 otherwise
Age $\geq 60$	1 if respondent is older than 60, 0 otherwise
Education low	Education level: 1 if low, 0 otherwise
Education medium	Education level: 1 if medium, 0 otherwise
Education high	Education level: 1 if high, 0 otherwise
Hampered	1 if hampered by health in daily activities, 0 otherwise
Health good	1 if personal health as good or very good, 0 otherwise
BMI	Continuous variable
BMI <sup>2</sup>	Variables BMI squared
Smoke all	Smoke: 1 if smokes and stopped smoking, 0 otherwise
Smoke stopped	Smoke: 1 if stopped smoking, 0 otherwise
Smoke never	Smoke: 1 if never smoked, 0 otherwise
Looking after	1 if respondent looks after others, 0 otherwise
Living together	1 if living together as couple, 0 otherwise
Household size	Continuous variable
Children	1 if dependent children present, 0 otherwise
Income personal	Continuous variable (in €1000.-)
Income rest	Continuous variable (in €1000.-)
Job satisfaction	Continuous variable (number of different satisfaction aspects)
Company small	1 if respondent works in company with 1-20 employees, 0 otherwise
Company medium	1 if respondent works in company with 21-100 employees, 0 otherwise
Company large	1 if respondent works in company with 100-500 employees, 0 otherwise
Company giant	1 if respondent works in company with 500+ employees, 0 otherwise
Supervisor	1 if respondent is supervisor, 0 otherwise
Unemployed	1 if respondent was unemployed before job, 0 otherwise
Private sector	1 if respondent works in company in private sector
Permanent	1 if respondent has permanent contract, 0 otherwise
Tenure	Continuous variable (working years)
Full-time	1 if respondent works full-time, 0 otherwise
Denmark	1 if resident of Denmark, 0 otherwise
The Netherlands	1 if resident of The Netherlands, 0 otherwise
Belgium	1 if resident of Belgium, 0 otherwise
France	1 if resident of France, 0 otherwise
Ireland	1 if resident of Ireland, 0 otherwise
Italy	1 if resident of Italy, 0 otherwise

Greece	1 if resident of Greece, 0 otherwise
Spain	1 if resident of Spain, 0 otherwise
Portugal	1 if resident of Portugal, 0 otherwise
Austria	1 if resident of Austria, 0 otherwise
Finland	1 if resident of Finland, 0 otherwise

**Table 2**

Variable	Observ.	Mean			St. Dev.	Min.	Max.
		Overall	Absent	Not absent			
Absent	247095	0.137	1.000	0.000	0.343	0	1
Male	247095	0.591	0.527	0.601	0.492	0	1
Age ≤20	247095	0.036	0.037	0.036	0.187	0	1
Age 21-30	247095	0.236	0.235	0.236	0.424	0	1
Age 31-40	247095	0.257	0.283	0.253	0.437	0	1
Age 41-50	247095	0.262	0.247	0.264	0.440	0	1
Age 51-60	247095	0.172	0.162	0.173	0.377	0	1
Age ≥60	247095	0.037	0.035	0.037	0.189	0	1
Education low	246674	0.487	0.483	0.487	0.500	0	1
Education medium	246674	0.308	0.308	0.308	0.462	0	1
Education high	246674	0.206	0.210	0.205	0.404	0	1
Hampered	246825	0.088	0.184	0.073	0.283	0	1
Health good	245326	0.790	0.689	0.806	0.408	0	1
BMI	195196	24.948	25.129	24.920	3.837	10.24	87
BMI <sup>2</sup>	195196	637.132	647.448	635.541	211.948	104.84	7569
Smoke all	197649	0.466	0.405	0.476	0.499	0	1
Smoke stopped	197649	0.151	0.159	0.150	0.358	0	1
Smoke never	197649	0.383	0.436	0.374	0.486	0	1
Looking after	247095	0.285	0.344	0.275	0.451	0	1
Living together	246309	0.714	0.740	0.710	0.452	0	1
Household size	131709	3.397	3.274	3.417	1.411	1	13
Children	130437	0.535	0.530	0.536	0.499	0	1
Income rest	131331	18.270	17.210	18.445	16.593	0	545.65
Job satisfaction	241536	3.710	3.568	3.732	1.490	0	5
Company small	221177	0.519	0.465	0.528	0.500	0	1
Company medium	221177	0.233	0.249	0.231	0.423	0	1
Company large	221177	0.134	0.153	0.131	0.340	0	1
Company giant	221177	0.114	0.133	0.111	0.317	0	1
Supervisor	193467	0.248	0.242	0.249	0.432	0	1
Unemployed	219881	0.252	0.248	0.252	0.434	0	1
Private sector	243894	0.756	0.715	0.762	0.430	0	1
Permanent	193549	0.835	0.823	0.837	0.371	0	1
Tenure	122766	9.096	8.599	9.178	8.110	0	23
Full-time	242641	0.913	0.901	0.915	0.281	0	1
Income personal	247095	15.403	15.012	15.465	13.948	0	1031.19
Denmark	247095	0.049	0.101	0.041	0.216	0	1
The Netherlands	247095	0.100	0.131	0.096	0.301	0	1
Belgium	247095	0.048	0.056	0.047	0.214	0	1
France	247095	0.098	0.078	0.101	0.297	0	1

Ireland	247095	0.051	0.041	0.052	0.219	0	1
Italy	247095	0.144	0.085	0.153	0.351	0	1
Greece	247095	0.102	0.151	0.094	0.302	0	1
Spain	247095	0.127	0.099	0.131	0.333	0	1
Portugal	247095	0.144	0.102	0.150	0.351	0	1
Austria	247095	0.069	0.043	0.073	0.253	0	1
Finland	247095	0.070	0.114	0.063	0.255	0	1

**Table 3**

Variable	Marginal effects
Male	-0.0316***
Age 21-30	-0.0272***
Age 31-40	-0.0390***
Age 41-50	-0.0674***
Age 51-60	-0.0720***
Age ≥60	-0.0631***
Education low	0.0095***
Education medium	-0.0006
Hampered	0.0920***
Health good	-0.0854***
BMI	0.0035***
BMI <sup>2</sup>	0.0000*
Smoke all	0.0350***
Smoke stopped	0.0247***
Looking after	0.0195***
Living together	0.0159***
Household size	-0.0021**
Children	-0.0037
Income rest	-0.0003***
Job satisfaction	-0.0080***
Company small	-0.0246***
Company medium	-0.0067***
Company large	0.0027
Supervisor	0.0025
Unemployed	0.0109***
Private sector	-0.0178***
Permanent	-0.0084***
Tenure	0.0001
Full-time	0.0119***
Income personal	-0.0001*
The Netherlands	-0.0841***
Belgium	-0.0647***
France	-0.1098***
Ireland	-0.0791***
Italy	-0.1185***
Greece	-0.0384***
Spain	-0.1004***
Portugal	-0.1140***
Austria	-0.0994***
Finland	-0.0419***

\*\*\* significant at 1% level; \*\* significant at 5% level; \* significant at 10% level

**Table 4**

Descriptives	Values
Observations	247095
Wald Chi-squared	13497.11***
R-squared	0.0716
Log pseudo-likelihood	-91442.86
AIC	0.741
Likelihood ratio (58)	14113.19
Groups	Chi-squared values
Demographics	1147.25***
Health	5331.07***
Home	302.38***
Work	854.24***
Country	5397.79***

\*\*\* significant at 1% level; \*\* significant at 5% level; \* significant at 10% level

**Table 5a**

Variable	Marginal effects					
	Denmark	Netherlands	Belgium	France	Ireland	Italy
Male	-0.0680***	-0.0354***	-0.0510***	-0.0343***	-0.0368***	-0.0310***
Age 21-30	-0.0192	-0.0274*	-0.0117	-0.0102	-0.0181*	0.0043
Age 31-40	-0.0869***	-0.0135	-0.0556	-0.0326**	-0.0305***	-0.0053
Age 41-50	-0.1613***	-0.0832***	-0.0824**	-0.0581***	-0.0714***	-0.0249**
Age 51-60	-0.1883***	-0.0823***	-0.0367	-0.0433***	-0.0547***	-0.0446***
Age ≥60	-0.1867***	-0.0999***	-0.0257	-0.0719***	-0.0772***	-0.0454***
Education low	-0.0324**	-0.0631***	-0.0010	0.0031	0.0296***	0.0125**
Education medium	-0.0174*	-0.0730	-0.0266***	0.0199***	0.0243***	0.0043
Hampered	0.0376***	0.1597***	0.0971***	0.0966***	0.1178***	0.1481***
Health good	-0.1580***	-0.0979***	-0.1063***	-0.0831***	-0.0616***	-0.0414***
BMI	-0.0033		-0.0010		-0.0142**	0.0016
BMI <sup>2</sup>	0.0002		0.0000		0.0004***	0.0000
Smoke all	0.0616***		0.0283***		-0.0022	0.0252***
Smoke stopped	0.0421***		0.0163*		0.0321***	0.0231***
Looking after	0.1164***	0.0220***	0.0049	0.0212***	0.0004	0.0040
Living together	0.0181	-0.0006	0.0191**	0.0178***	0.0110	0.0297***
Household size	-0.0198**	-0.0173***	-0.0025	0.0033	-0.0045	0.0001
Children	0.0109	0.0093	0.0016	0.0067	0.0148	-0.0001
Income rest	0.0009*	-0.0002	-0.0012***	-0.0011***	0.0000	-0.0001
Job satisfaction	-0.0270***	-0.0242***	-0.0150***	-0.0076***	-0.0145***	0.0022***
Company small	-0.0476***	-0.0267***	-0.0076	0.0165	-0.0287***	-0.0192***
Company medium	-0.0316**	0.0027	0.0433***	0.0399	-0.0387***	-0.0110**
Company large	-0.0400***	0.0150**	0.0142	0.0640**	-0.0222**	0.0066
Supervisor	-0.0156	-0.0035	-0.0294***	-0.0003	0.0035	0.0114***
Unemployed	0.0569***	0.0285***	0.0249***	0.0073	0.0127*	0.0051*
Private sector	-0.0361***	-0.0138**	-0.0076	-0.0277***	-0.0175***	-0.0002
Permanent	0.0431***	-0.0302***	0.0358***	0.0118*	-0.0247***	0.0002
Tenure	-0.0013	-0.0007	-0.0017***	0.0003	0.0005	0.0002
Full-time	0.0830***	0.0348***	0.0261**	0.0134*	-0.0032	0.0078
Income personal	-0.0040***	0.0001	0.0000	0.0000	0.0001	-0.0002

\*\*\* significant at 1% level; \*\* significant at 5% level; \* significant at 10% level

**Table 5b**

Variable	Marginal effects				
	Greece	Spain	Portugal	Austria	Finland
Male	-0.0190***	-0.0233***	-0.0119***	-0.0206***	-0.0547***
Age 21-30	0.1220***	-0.0394***	-0.0335***	-0.0494***	-0.0392*
Age 31-40	0.1213***	-0.0428***	-0.0450***	-0.0591***	-0.0549***
Age 41-50	0.1353***	-0.0650***	-0.0529***	-0.0559***	-0.1218***
Age 51-60	0.1104***	-0.0745***	-0.0603***	-0.0581***	-0.1291***
Age ≥60	0.1680***	-0.0813***	-0.0488***	-0.0439**	-0.1082***
Education low	0.0353***	0.0129***	0.0270***	0.0071	-0.0291***
Education medium	0.0200**	0.0058	0.0168**	0.0008	-0.0193**
Hampered	-0.0527***	0.1423***	0.0839***	0.0860***	0.0860***
Health good	-0.0808***	-0.1355***	-0.0385***	-0.1118***	-0.0992***
BMI	0.0086**	0.0065**	0.0053***	-0.0093**	0.0053
BMI <sup>2</sup>	-0.0002**	-0.0001**	-0.0001**	0.0002**	-0.0001
Smoke all	0.0724***	0.0243***	0.0134***	0.0178***	0.0619***
Smoke stopped	0.0348***	0.0070	0.0107**	0.0043	0.0505***
Looking after	0.0058	0.0211***	0.0050	-0.0089*	0.0906***
Living together	0.0036	0.0005	0.0202***	0.0045	0.0133
Household size	0.0054	0.0029	-0.0031*	-0.0045	-0.0035
Children	-0.0407***	0.0021	-0.0035	-0.0057	-0.0162
Income rest	0.0000	-0.0005***	0.0002	-0.0006***	0.0002
Job satisfaction	-0.0055***	0.0007	-0.0143***	-0.0041*	-0.0061**
Company small	0.0578***	-0.0252***	-0.0813***	-0.0080	-0.0608***
Company medium	0.0490***	-0.0043	-0.0500***	0.0043	-0.0172
Company large	0.0667***	0.0208***	-0.0390***	-0.0070	-0.0365***
Supervisor	0.0059	-0.0129***	0.0271***	-0.0019	0.0049
Unemployed	0.0277***	0.0014	0.0035	0.0083	0.0032
Private sector	-0.0393***	-0.0260***	0.0032	-0.0247***	-0.0100
Permanent	-0.0344***	-0.0297***	-0.0024	-0.0222**	0.0064
Tenure	0.0027***	0.0001	-0.0003	0.0001	0.0011*
Full-time	-0.0626***	0.0073	-0.0196***	0.0013	0.0549***
Income personal	0.0009***	0.0002	0.0004**	-0.0002	-0.0011***

\*\*\* significant at 1% level; \*\* significant at 5% level; \* significant at 10% level

**Table 6a**

<b>Descriptive</b>	<b>Denmark</b>	<b>Netherlands</b>	<b>Belgium</b>	<b>France</b>	<b>Ireland</b>	<b>Italy</b>
Observations	12142	24816	118585	24113	12514	35507
Wald Chi-squared	1168.39***	1664.43***	660.83***	1260.24***	701.48***	1011.17***
R-squared	0.089	0.0737	0.0644	0.0756	0.0815	0.0513
Log pseudo-likelihood	-6554.43	-10760.43	-4884.90	-7707.92	-3983.96	-9428.51
AIC	1.087	0.870	0.832	0.643	0.644	0.534
Likelihood ratio	1281.42 (45)	1711.15 (37)	673.04 (46)	1259.92 (40)	706.59 (42)	1019.70 (44)
<b>Groups</b>	<b>Chi-squared values</b>					
Demographics	270.79***	245.56***	113.21***	157.34***	116.51***	196.59***
Health	297.71***	1028.42***	249.96***	797.23***	323.62***	700.17***
Home	145.11***	35.96***	37.76***	83.99***	9.47	118.35***
Work	251.46***	271.37***	187.60***	167.96***	237.05***	101.09***

\*\*\* significant at 1% level; \*\* significant at 5% level; \* significant at 10% level

**Table 6b**

<b>Descriptive</b>	<b>Greece</b>	<b>Spain</b>	<b>Portugal</b>	<b>Austria</b>	<b>Finland</b>
Observations	25120	31352	35482	16975	17216
Wald Chi-squared	534.6***	1673.24***	1279.53***	939.85***	958.2***
R-squared	0.0222	0.0807	0.0557	0.0885	0.0555
Log pseudo-likelihood	-12407.13	-9754.63	-10657.92	-4486.72	-8627.64
AIC	0.991	0.625	0.603	0.534	1.007
Likelihood ratio	562.57 (37)	1713.31 (42)	1256.31 (39)	871.76 (42)	1014.14 (43)
<b>Groups</b>	<b>Chi-squared values</b>				
Demographics	66.32***	194.29***	101.79***	99.27***	204.85***
Health	100.73***	1284.30***	553.78***	516.07***	430.55***
Home	27.54***	47.32***	38.03***	44.36***	176.40***
Work	187.77***	264.24***	512.71***	173.71***	144.90***

\*\*\* significant at 1% level; \*\* significant at 5% level; \* significant at 10% level

**Table 7**

	<b>Less than secondary level educ.</b>	<b>Secondary level educ.</b>	<b>Third level educ.</b>	<b>Total</b>
Austria	1,734	6,364	4,044	12,142
Belgium	24,372	36	408	24,816
Denmark	2,239	4,089	5,530	11,858
Finland	13,463	2,858	7,371	23,692
France	4,238	5,494	2,782	12,514
Greece	15,250	15,866	4,391	35,507
Ireland	11,107	9,186	4,827	25,120
Italy	14,681	6,643	10,028	31,352
Netherlands	26,859	4,893	3,730	35,482
Portugal	3,026	12,414	1,535	16,975
Spain	3,075	8,064	6,077	17,216
Total	120,044	75,907	50,723	246,674

**Table 8**

	<b>Employment protection rates</b>		
	<b>All</b>	<b>Regular</b>	<b>Temporary</b>
Austria	2.21%	2.92%	1.50%
Belgium	2.18%	1.73%	2.63%
Denmark	1.50%	1.63%	1.38%
Finland	2.02%	2.17%	1.88%
France	3.05%	2.47%	3.63%
Greece	3.50%	2.25%	4.75%
Ireland	0.93%	1.60%	0.25%
Italy	2.01%	1.77%	2.25%
Netherlands	2.12%	3.05%	1.19%
Portugal	3.67%	4.33%	3.00%
Spain	3.05%	2.61%	3.50%

Source: OECD (2001)

**Table 9**

	<b>Unemployment rates</b>		
	<b>All</b>	<b>Male</b>	<b>Female</b>
Austria	3.60%	3.20%	4.20%
Belgium	6.60%	5.90%	7.50%
Denmark	4.50%	4.10%	5.00%
Finland	9.10%	8.70%	9.70%
France	8.30%	7.00%	9.90%
Greece	10.70%	7.20%	16.10%
Ireland	3.90%	4.00%	3.80%
Italy	9.10%	7.10%	12.20%
Netherlands	2.20%	1.80%	2.80%
Portugal	4.00%	3.20%	5.10%
Spain	10.40%	7.50%	14.80%

Source: OECD (2001)

**Table 10**

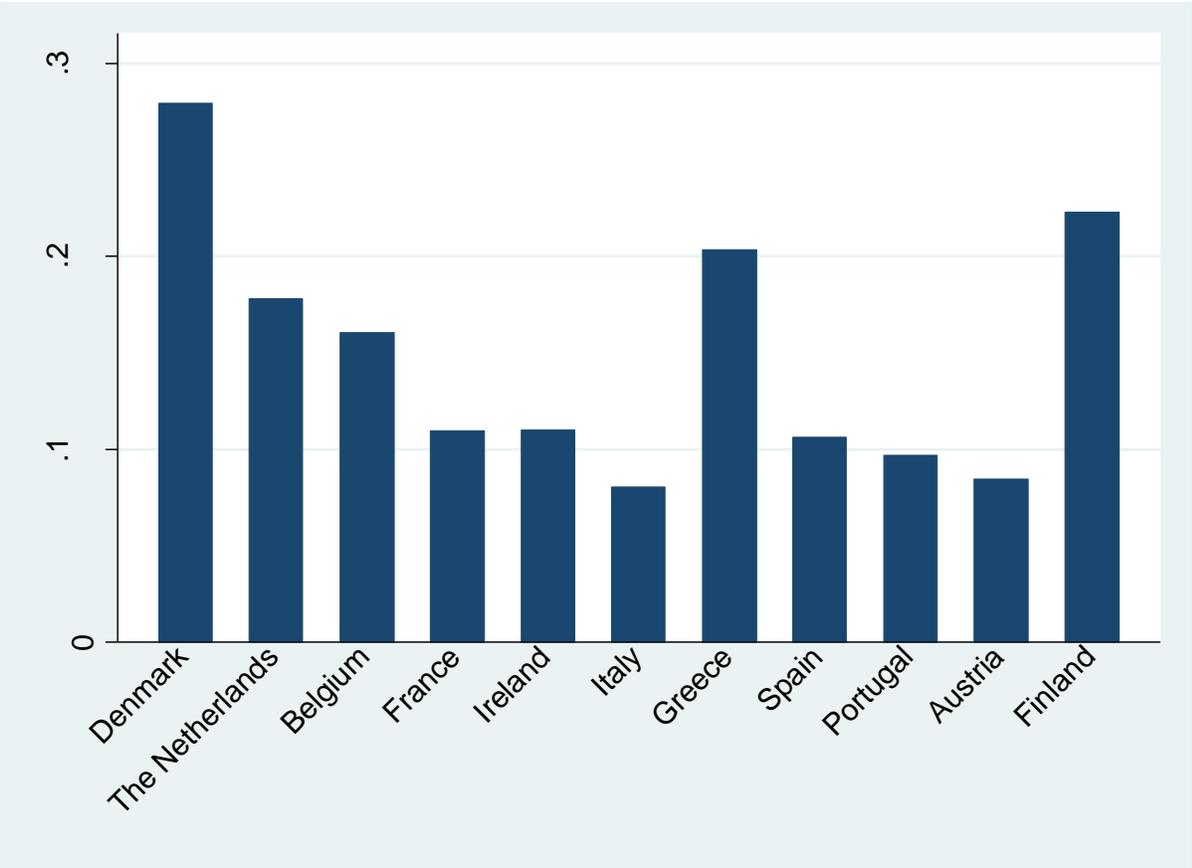
Gender vs Full-time	<b>Part-time</b>	<b>Full-time</b>	Total
<b>Female</b>	<b>16.927</b> (17.1%)	<b>82.053</b> (82.9%)	98.980 (100.0%)
<b>Male</b>	<b>4.112</b> (2.9%)	<b>139.549</b> (97.1%)	143.661 (100.0%)
Total	21.039	221.602	242.641

**Table 11**

Education vs Job status	<b>Non-supervisory</b>	<b>Supervisory</b>	Total
<b>Less than secondary educ.</b>	<b>75.752</b> (82.0%)	<b>15.979</b> (18.0%)	88.731 (100.0%)
<b>secondary education</b>	<b>45.324</b> (74.5%)	<b>15.474</b> (25.5%)	60.798 (100.0%)
<b>Third level of education</b>	<b>27.052</b> (62.1%)	<b>16.493</b> (37.9%)	43.545 (100.0%)
Total	145.128	47.946	193.074

# Graphs

Graph 1



## Original survey questions

### Absent

**PE038 PLEASE THINK OF THE LAST 4 WORKING WEEKS, NOT COUNTING HOLIDAY WEEKS. HOW MANY DAYS WERE YOU ABSENT FROM WORK BECAUSE OF ILLNESS OR OTHER REASONS?**

*Codes Labels*

- 0 none
- 1-28
- 8 not applicable
- 9 missing

### Age

**PD003 AGE**

*Codes Labels*

- survey year 1993+I
- 84+I 84+I years or older
- 15 to 83+I age of the individual
- 8 not applicable
- 9 missing

### Male

**PD004 SEX**

*Codes Labels*

- 1 Male
- 2 Female
- 8 not applicable
- 9 missing

### Education

**PT022 HIGHEST LEVEL OF GENERAL OR HIGHER EDUCATION COMPLETED**

*Codes Labels*

- 1 Recognised third level education (ISCED 5-7)
- 2 Second stage of secondary level education (ISCED 3)
- 3 Less than second stage of secondary education (ISCED 0-2)
- 8 Still at school (only upto wave 4)
- 9 missing

### Hampered

**PH003A ARE YOU HAMPERED IN YOUR DAILY ACTIVITIES BY ANY PHYSICAL OR MENTAL HEALTH PROBLEM, ILLNESS OR DISABILITY? (ALL PERSONS)**

*Codes Labels*

- 1 Yes, severely
- 2 Yes, to some extent
- 3 No
- 8 not applicable
- 9 missing

## Health good

### PH001 HOW IS YOUR HEALTH IN GENERAL?

#### *Codes Labels*

- 1 Very good
- 2 Good
- 3 Fair
- 4 Bad
- 5 Very bad
- 8 not applicable
- 9 missing

## BMI

### PH022 BODY MASS INDEX

#### *Codes Labels*

- 000.00 - 999.99
- 8 not applicable
- 9 missing

## Smoke

### PH016 DO YOU SMOKE OR DID YOU EVER SMOKE?

#### *Codes Labels*

- 1 Smoke daily
- 2 Smoke occasionally
- 3 Do not smoke, used to smoke daily
- 4 Do not smoke, used to smoke occasionally
- 5 Never smoked
- 8 not applicable
- 9 missing

## Children

### HD006A HOUSEHOLD TYPE (ECONOMICAL TYPOLOGY)

#### *Labels Codes*

Households without dependent children

- 1 1-person household : Male under 30
- 2 1-person household : Male aged 30-64
- 3 1-person household : Male aged 65 or more
- 4 1-person household : Female under 30
- 5 1-person household : Female aged 30-64
- 6 1-person household : Female aged 65 or more
- 7 2 adults without dependent child with at least one person aged 65 or more
- 8 2 adults without dependent child with both under 65
- 9 Other household without dependent children

Households with dependent children

- 10 Single parents with 1+ dependent child
- 11 2 adults with 1 dependent child
- 12 2 adults with 2 dependent children
- 13 2 adults with 3 or more dependent children
- 14 Other household with dependent children
- 8 not applicable
- 9 Missing

## Looking after

**PR006 DO YOUR PRESENT DAILY ACTIVITIES INCLUDE, WITHOUT PAY, LOOKING AFTER CHILDREN OR OTHER PERSONS WHO NEED SPECIAL HELP BECAUSE OF OLD AGE, ILLNESS OR DISABILITY ?**

*Codes Labels*

- 1 Yes, looking after children
- 2 Yes, looking after a person (who needs help because of old age, disability or illness) other than a child
- 3 Yes, looking after a child and a person (who needs help because of old age, disability or illness) other than a child
- 4 Not looking after any person
- 8 not applicable
- 9 missing

## Living together

**PD008 COHABITATIONAL STATUS**

*Codes Labels*

- 1 Living in a couple (married or unmarried)
- 2 Not living in a couple
- 8 not applicable
- 9 missing

## Household size

**HD001 HOUSEHOLD SIZE (TOTAL NUMBER OF HOUSEHOLD MEMBERS AT PRESENT)**

*Codes Labels*

- 1-96 Number of persons in the household
- 8 not applicable

## Personal income

**PI110 TOTAL NET INCOME FROM WORK (NET, NC, TOTAL YEAR PRIOR TO THE SURVEY)**

*Codes Labels*

- 0 to 9999999990 Amount in National Currency
- 8 not applicable
- 9 missing

## Additional Household income

**HI100 TOTAL NET HOUSEHOLD INCOME (DETAILED, NC, TOTAL YEAR PRIOR TO THE SURVEY)**

*Codes Labels*

- 1 to 9999999990 Amount in National Currency
- 8 not applicable
- 9 missing

## Satisfaction job earn

**PE031 HOW SATISFIED ARE YOU WITH YOUR PRESENT JOB IN TERMS OF EARNINGS?**

*Codes Labels*

- 1 not satisfied
- 2 ...
- 3 ...
- 4 ...

5 ...  
6 fully satisfied  
-8 not applicable  
-9 missing

### Satisfaction job securities

**PE032 HOW SATISFIED ARE YOU WITH YOUR PRESENT JOB IN TERMS OF JOB SECURITY?**

*Codes Labels*

1 not satisfied  
2 ...  
3 ...  
4 ...  
5 ...  
6 fully satisfied  
-8 not applicable  
-9 missing

### Satisfaction type of work

**PE033 HOW SATISFIED ARE YOU WITH YOUR PRESENT JOB IN TERMS OF TYPE OF WORK?**

*Codes Labels*

1 not satisfied  
2 ...  
3 ...  
4 ...  
5 ...  
6 fully satisfied  
-8 not applicable  
-9 missing

### Satisfaction number of working hours

**PE034 HOW SATISFIED ARE YOU WITH YOUR PRESENT JOB IN TERMS OF NUMBER OF WORKING HOURS?**

*Codes Labels*

1 not satisfied  
2 ...  
3 ...  
4 ...  
5 ...  
6 fully satisfied  
-8 not applicable  
-9 missing

### Satisfaction working conditions

**PE036 HOW SATISFIED ARE YOU WITH YOUR PRESENT JOB IN TERMS OF WORKING CONDITIONS /ENVIRONMENT?**

*Codes Labels*

1 not satisfied  
2 ...  
3 ...

- 4 ...
- 5 ...
- 6 fully satisfied
- 8 not applicable
- 9 missing

### Permanent

#### **PE024 WHAT TYPE OF EMPLOYMENT CONTRACT DO YOU HAVE IN YOUR MAIN JOB?**

##### *Codes Labels*

- 1 permanent employment
- 2 fixed-term or short-term contract
- 3 casual work with no contract
- 4 some other working arrangement
- 8 not applicable
- 9 missing

### Supervisor

#### **PE010 JOB STATUS – CURRENT JOB (PERSONS IN PAID EMPLOYMENT AS MAIN ACTIVITY)**

##### *Codes Labels*

- 1 supervisory
- 2 intermediate
- 3 non-supervisory
- 8 not applicable
- 9 missing

### Private sector

#### **PE009 CURRENT JOB IN PRIVATE OR PUBLIC SECTOR?**

##### *Codes Labels*

- 1 private sector, including non-profit private organisations
- 2 public sector, including para-statal
- 8 not applicable
- 9 missing

### Full-time

#### **PE005C MAIN JOB: FULL-TIME / PART TIME**

##### *Codes Labels*

- 1 Full-time job
- 2 Part-time job
- 8 not applicable
- 9 missing

### Unemployment

#### **PU001 PERSON HAS EVER BEEN UNEMPLOYED FOR 1 MONTH OR LONGER BEFORE FIRST JOB OR BUSINESS**

##### *Codes Labels*

- 1 Yes
- 2 No
- 8 not applicable
- 9 missing

## Year interview

### **HG014 YEAR OF INTERVIEW FOR THE HOUSEHOLD QUESTIONNAIRE**

#### *Codes Labels*

1994 to 2002 Year of the interview

-8 not applicable

-9 missing

## Start year

### **PE011 YEAR OF START OF CURRENT JOB**

#### *Codes Labels*

1981 to 2002 year of start

2980 started in 1980 or before

2981 started in 1981 or before

2982 started in 1982 or before

2983 started in 1983 or before

2984 started in 1984 or before

-8 not applicable

-9 missing

## Company size

### **PE008 NUMBER OF REGULAR PAID EMPLOYEES IN THE LOCAL UNIT IN CURRENT JOB**

#### *Codes Labels*

1 None

2 1-4

3 5-19

4 20-49

5 50-99

6 100-499

7 500 or more

-8 not applicable

-9 missing

## Country

### **COUNTRY COUNTRY CODE**

#### *Codes Labels*

1 Germany (original ECHP survey)

2 Denmark

3 The Netherlands

4 Belgium

5 Luxembourg (original ECHP survey)

6 France

7 United-Kingdom (original ECHP survey)

8 Ireland

9 Italy

10 Greece

11 Spain

12 Portugal

13 Austria

14 Finland

15 Sweden

## Main activity

### PE002 MAIN ACTIVITY STATUS – SELF-DEFINED (REGROUPED)

#### *Codes Labels*

1 normally working (15+ hours / week)

2 unemployed

3 inactive

-8 not applicable

-9 missing