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An Economic Analysis of Obesity in Europe: Health, Medical Care and Absenteeism Costs

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Abstract

Obesity is not only a health but also an economic phenomenon with potentially important direct and indirect economic costs that are unlikely to be fully internalized by the obese. In the US, obesity prevalence is the highest among OECD countries and the issue has long been the focus of policy debate and academic research. However, European obesity rates are rising and there is still a lack of economic analysis of the obesity phenomenon in Europe. This paper attempts to fill in this gap by using longitudinal micro-evidence from the European Community Household Panel to assess the importance of several costs of obesity in nine EU countries. The analysis provides nationally comparable estimates of the costs of obesity in terms of health, use of health care services and absenteeism.

JEL Classification: I12; I18

Keywords: Obesity; Demand for health care; Absenteeism

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1. Introduction

The United States has the largest incidence of obesity among OECD countries and adult obesity rates in this country reached 31.1% for men and 33.2% for women in the period 2003-2004 (Ogden et al., 2006). Moreover, US obesity rates are today two times higher than in the early 1970s (Cutler et al., 2003). It is therefore not surprising that obesity has long been at the centre of health policy debate and the focus of academic research in the US (Cutler et al., 2003, Chou et al., 2004). In contrast, in Europe obesity has only become a growing concern for health policymakers in recent years: during the 2002 EU "Obesity Summit" held in Copenhaguen, health ministers of the EU recognised the significance of the threat posed by obesity and set the stage for new strategies to emerge. According to the International Obesity Taskforce (2002, 2003), obesity has become a pan-European epidemic and although significant differences in obesity prevalence exist between European countries, recent reports by the World Health Organization (WHO, 2006) indicate that obesity levels based on measured data already range from 13% to 23%. Moreover, the WHO has predicted that, if no action is taken, approximately 20% of adults and 10% of children and adolescents in the WHO European Region will be obese by 2010 (WHO, 2006).

Comparative studies analysing the costs of obesity from an economic perspective in European countries are rare, probably due to the lack of suitable data at the individual level. The only exceptions are, to the best of my knowledge, Michaud et al. (2007) and Andreyeva et al. (2007), who concentrate exclusively on the elderly population (aged 50 and above) and focus on the analysis of obesity correlates (such as socioeconomic status) and the health consequences of obesity, respectively. However, as pointed out by Finkelstein et al. (2005), obesity is not only a health but also an economic phenomenon, and it entails important economic costs. Apart from being recognised as a disease by the WHO (2000), obesity is also a substantial risk factor for chronic non communicable diseases, which lead to both direct medical costs and indirect costs related to morbidity and mortality which reduce efficiency through, for instance, lost days of work. These costs are likely not to affect just the obese but also non-obese individuals who bear the costs of others' obesity through public programs, risk pooling and other channels. Moreover, since the seminal work of Hamermesh and Biddle (1994) the relationship between labour market outcomes and physical appearance has been widely documented and recent studies focusing on obesity have shown that weight lowers wages for both men and women in Europe (Brunello and d'Hombres, 2007) and for white women in the US (Cawley, 2004).

This paper adds to the existing literature by supplying a cross-national perspective and providing nationally comparable estimates of the health, medical and absenteeism costs associated with obesity across European countries. To this purpose, data are used from the European Community Household Panel, a longitudinal micro-level database that provides comparable information on obesity for the adult population in nine EU countries. It is found that in all countries analysed obesity is negatively associated with self reported health, especially for women. This relationship appears to be stronger in Northern and Central European countries, where it also turns out that there is more awareness about the health risks associated with obesity than in Mediterranean countries. Regarding the use of health care services, obesity is shown to be positively associated with the demand for both general practitioner and specialist services, being this relationship more robust for the demand for general practitioner services. Extending beyond medical costs, one could reasonably expect obesity to increase employees' absent episodes. Obesity and absenteeism are indeed positively associated but it is shown that, after controlling for a wide set of individual and job characteristics, being obese does not significantly increase the amount of absent episodes in most countries. It is also found that the obesity-absenteeism link fully operates through the impact of obesity on health, since the absenteeism costs of obesity are dramatically reduced and become statistically insignificant in all countries when health indicators are included in the analyses.

The remainder of the paper proceeds as follows. Section 2 describes the data set used. Section 3 analyses the consequences of obesity on health and attempts to quantify its impact on the demand for health services. Section 4 investigates the link between obesity and absenteeism. Section 5 provides some concluding comments.

2. Data

The individual-level data used in the analysis are from the European Community Household Panel (ECHP), a standardized multi-purpose annual longitudinal survey carried out in all 15 countries of the European Union between 1994 and 2001. The ECHP not only contains a wide range of economic and socio-demographic information both at the household and the individual level, but it also includes questions related to health status and the use of health services. Moreover, since it was centrally designed and coordinated by the Statistical Office of the European Commission (Eurostat) a good level of comparability across countries and over time is ensured.[1]

In order to measure body fatness, the Body Mass Index (BMI) is used. BMI is the standard measure of fatness in epidemiology and medicine and is calculated as weight in kilograms divided by height in meters squared. It is also the measure used by the World Health Organization (2000) and the National Institutes of Health (1998) to provide a clinical classification of weight status for adults: below 18.5 is underweight, between 18.5 and 25 is healthy or normal, between 25 and 30 is pre-obese and over 30 is obese.[2]

ECHP respondents were asked to report their height and weight during the period 1998-2001 in the following nine countries: Denmark, Belgium, Ireland, Italy, Greece, Spain, Portugal, Austria and Finland. Hence, the analyses are restricted to adults between 15-75 years of age in these nine countries during the period 1998-2001. The ECHP self-reported

[1] For further details on the ECHP, see Peracchi (2002).

[2] The pre-obese category is often referred to as overweight although this term technically refers to all those with a BMI of 25 or above, including the obese.

data on height and weight are used to construct the BMI of each respondent and indicators of whether he or she is obese, pre-obese, underweight or in a healthy weight range.

It must be acknowledged that self-reported anthropometric variables may contain measurement error with heavier persons more likely to underreport their weight. Constrained by the lack of suitable datasets containing *both* objective measures of weight and height and socioeconomic and demographic information, several authors working with US data[3] have addressed this problem by using information on the relationship between true and reported values from the Third National Health and Nutrition Examination Survey (NHANES III) to correct for reporting error.[4] Unfortunately, it is not possible to implement such correction procedure in the context of this study, as there is not a pan-European dataset comparable to NHANES III from which one could estimate country-specific relationships between true and reported values of height and weight.

While it is reassuring that Cawley (2000), Lakdawalla and Philipson (2002) and Zagorsky (2005) all find very similar results when replicating their analyses without correcting for reporting errors, the validity of cross-country comparisons based on the ECHP ultimately relies on the assumption that the degree of misreporting is the same across countries. In order to assess the validity of this assumption, in Table 1 I compare aggregate obesity rates based on objective measures that have been pulled together in the WHO Global Database on Body Mass Index[5] with the most comparable figures that could be derived using the ECHP self-reported information on height and weight.

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[3] See, for instance, Cawley (2000, 2004), Lakdawalla and Philipson (2002), Chou et al. (2004) and Zagorsky (2005).

[4] The NHANES III, conducted in 1988-94, surveyed a nationally representative sample of the US population and contains both actual weight and height from direct physical examinations and self-reported weight and height.

[5] One of the criteria for entering survey data in the WHO Global Database is the use of appropriate equipment and standard measurement techniques. See http://www.who.int/bmi/index.jsp.

The correlation coefficient between the ECHP and the WHO Global Database measures of obesity prevalence is notably high: 0.76 ($p<0.05$) for men and 0.96 ($p<0.01$) for women. Spearman rank correlation coefficients are very similar: 0.75 ($p<0.05$) for men and 0.94 ($p<0.01$) for women. Moreover, if countries are ranked according to their obesity rates, the top five countries from both data sources are the same for women and the same happens with four out of the top five countries for men. These results are very encouraging, especially given that figures included in the WHO Global Database are derived from different national surveys that vary in terms of sampling procedures and, as can be seen from Table 1, the age ranges and periods of data collection do not perfectly match between the two sources.

Finally, note that the ECHP obesity rates displayed in Table 1 are close, but do not necessarily exactly match those corresponding to the samples used in the analyses that follow, since the samples on which they are based have been, for the sake of comparison, specially selected to mimic the characteristics (age ranges, year of data collection) of the surveys used by the WHO Global Database. For detailed figures on obesity prevalence based on ECHP data, see Sanz-de-Galdeano (2005) and García and Quintana-Domeque, 2007).

3. Health, Health Care Demand and Obesity

The health consequences of obesity have been documented in numerous epidemiological studies[6] and range from an increased risk of premature death to several non-fatal but debilitating complaints that have deleterious impacts on quality of life, such as knee osteoarthritis, respiratory problems, pregnancy complications, menstrual irregularities and infertility. The more life-threatening, chronic health problems associated with obesity

[6] See WHO, 2000 and National Institutes of Health, 1998 for extensive reviews and references.

include diabetes, coronary heart disease, hypertension, gallstone disease and certain types of cancer, such as colon, endometrial and breast cancer.

Moreover, in a recent study for the US, Sturm (2002) shows that obesity appears to have a stronger association with the occurrence of chronic medical conditions and increased health care and medication spending than smoking or problem drinking has. All this evidence demonstrates the relevance of obesity treatment and prevention in maintaining and improving health and quality of life.

From an economic perspective, overweight and obesity have, through their associated health problems, a substantial impact on health care spending. Direct health care costs include preventive, diagnostic, and treatment services related to overweight and obesity (for example, physician services and medications). Recent evidence for the US suggests that the annual medical expenditures of obese adults are 37% higher than expenditures of healthy-weight individuals (Finkelstein et al., 2003a). Moreover, Wolf and Colditz (1998) and Finkelstein et al. (2003b, 2004) estimate that the aggregate annual obesity-attributable medical costs in the US are between 5% and 7% of annual health care expenditures.

Evidence on the health and medical costs of obesity is clearly scarcer for Europe and mostly based on macroeconomic data that are aggregated at the country level or, at most, disaggregated by gender and age group (International Obesity TaskForce, 2002). This study attempts to fill in this gap by taking advantage of the individual-level and homogeneous information provided by the ECHP, which, in addition, allows one to separately assess the impact of obesity on the demand for general practitioner and specialist services. This is a relevant distinction, as different institutional set ups regarding the role of general practitioners (GP) and specialists (SP) could lead to different responses of the demand for each type of physicians' services to health conditions such as obesity. Moreover, when dealing with the rise in obesity, health policy makers may find it useful to know whether the strength of the association between health care demand and obesity depends (or not) on the type of medical services demanded (GP or SP visits).

3. 1. Obesity and Health

While the ECHP does not incorporate questions on the prevalence of different specific conditions, it does, however, contain some more general information on health related issues. Respondents are asked to evaluate their own health status, whether they have any chronic physical or mental health problem, illness or disability and whether they are hampered in their daily activities by any condition. This information is used to construct three binary indicators for the probability of being in bad/very bad health, suffering from a chronic condition and being hampered in daily activities.

An important issue that must be considered when estimating the impact of obesity on health is reverse causality: bad health may lead to an increase in weight, either directly or by reducing physical activity. This would result in an overestimation of the detrimental impact of obesity, even if the evidence from randomized trials in the United States indicates that there is a causal effect of obesity on health and suggests that reverse causality is unlikely to entirely explain the observed obesity-health association.[7] In line with this evidence, Andreyeva et al. (2007) analyse the health consequences of obesity for the elderly and find their results to be robust to the inclusion of physical activity controls, concluding that the relationship bewteen poor health and obesity does not merely reflect the lack of physical activity of those already in bad health.

Instead, I take advantage of the panel nature of the ECHP and in order to avoid reverse causality from health to weight status I use lagged values of the obese, pre-obese and underweight indicators, which are predetermined variables (in the usual econometrics sense). This identification strategy has the additional advantage that it may better capture the impact of obesity if the health consequences of excess weight are not immediate. However, the inclusion of lagged weight indicators does not deal with the problem that estimates of the impact of lagged obesity on the ECHP health indicators may still be biased

[7] Randomized trials of obesity reduction therapies indicate that weight loss reduces the risk of hypertension and diabetes. See, for instance, Bray, Ryan and Harsha (2003).

in the presence of unobserved individual fixed effects potentially correlated with both health and obesity. In other words, health and obesity may be very persistent over time due to, for instance, unobserved frailty, genetic factors, differences in discount rates, or health attitudes. To address this additional issue, I follow Mundlak (1978) and Chamberlain (1980) and allow the unobserved heterogeneity (c_i) to be arbitrarily correlated with the observed explanatory variables (x_{it}) by assuming a conditional normal distribution with linear expectation and constant variance. More specifically, I model the unobserved heterogeneity as a linear function of the average of the time-variant covariates over the sample period, assuming that:

$$c_i \mid x_i \sim \text{Normal}\left(\psi + \bar{x}_i \xi, \sigma_a^2\right) \tag{1}$$

, where $\bar{x}_i$ is the average of x_{it}, $t = 1,\ldots T$ and σ_a^2 is the variance of a_i in the equation $c_i = \psi + \bar{x}_i \xi + a_i$.[8] While this assumption is restrictive in that it specifies a distribution for c_i given x_i, at least it allows for some dependence between c_i and x_i.[9] Wooldridge (2001)

[8] More flexible specifications for the unobserved heterogeneity that relax the linearity assumption by including interactions and higher order terms have been tried, yielding similar results.

[9] In order to overcome the potential endogeneity of individuals' weight status Cawley (2000, 2004) uses the BMI of a biologically related family member as an instrument. There are three main reasons why I do not follow this strategy. The first reason is related to data limitations. The ECHP allows one to find out if respondents are biologically related to each other but since it is a panel of adults (individuals younger than 15 are not interviewed) doing so would require to drop a large fraction of the households (all those without biologically related members). Brunello and D'Hombres (2007) have done it, ending up with an average sample reduction of 50%, although the magnitude of this decrease widely varies by country (for instance, it is beyond 70% in Finland and around 40% in Italy and Spain). My own calculations confirm these figures. This would have represented an important problem for this study, since not only this sample selection is non-random (individuals in the restricted sample are younger, less educated, have lower average pay and belong to bigger households) but it also affects countries differently: the probability of being included in the restricted sample is larger in Southern Europe, where household size is larger and family ties are stronger, than

refers to this more general version of the random effects probit model as Chamberlain's random effects probit model.

Before concentrating on the obtained results, it is important to discuss how the self-reported nature of the health indicators used may influence them. Since different individuals may understand the same questions in different ways, cross-country differences in the impact of obesity on health could be at least partially explained by differences in response scales across countries (King et al., 2004). In spite of this problem, there is evidence that self-rated health is a strong predictor of objective health outcomes like mortality, even after the inclusion of numerous specific health status indicators and other relevant covariates.[10]

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in Northern Europe. This would have seriously hampered the nationally representative nature of my estimates and their cross-country comparability.

Second, as Cawley (2004) explicitly acknowledges, IV techniques have not been used to estimate coefficients on the indicator variables for clinical weight classification because there are three indicators for weight classification in a single regression (obese, pre-obese and underweight dummies, normal weight is the omitted category) but only one instrument, the biological family member's BMI. Instead, IV estimation is used when including BMI rather than weight status indicators as regressors. This is a relevant problem in this study since results of RESET tests for linearity indicate that the hypothesis of linearity of outcomes in BMI is rejected at standard levels of testing.

Finally, using the BMI of a biologically related family member as an instrument for individuals' BMI relies on the identifying assumption that the family members' BMI only affects the outcomes under study through its impact on the individual's BMI. The problem is that, as Cawley (2004) recognizes, the genes determining the family member's BMI may be responsible for other factors determining the outcome of interest. This event may not be very likely when analyzing labour market outcomes, as Cawley does in his papers (although it could be the case that the genetic component associated with the family member's BMI is also related to factors such as willingness to delay gratification or other unobserved characteristics also determining labour market outcomes), but it seems much more likely to be an issue when looking at health-related outcomes, as I do.

[10] See Idler and Benyamini (1997) for a review.

Moreover, as pointed out by Wooldridge (2001), measurement error is an issue only when the variables on which data are collected differ from the variables that influence decisions by individuals, families, firms, and so on. In fact, self-reported health measures have been shown to be strong determinants of important labour market outcomes (Dwyer and Mitchell, 1999) health risk behaviours (Clark and Etilé, 2002) and health care demand (Windmeijer and Santos Silva, 1997), even after accounting for endogeneity issues.

I estimate random effects probit models under assumption (1) for each of the available health indicators and separately by country and gender.[11] In addition to the obese, underweight and pre-obese indicators,[12] the following covariates are included: age, age squared,[13] household size, marital status, education level, household income quintiles, year dummies and labour market status indicators.[14]

Average partial effects of obesity on the three available health indicators are reported in Table 2, with the corresponding robust standard errors displayed in round brackets. Additionally, and in order to facilitate cross-country comparisons, the effects of obesity on the probability of being in bad/very bad health (health outcome 1), being hampered in

[11] The hypotheses that all coefficients are equal across countries and gender were tested and generally rejected at the 5 percent significance level, so regressions are estimated separately by country and gender.

[12] Results of RESET tests for linearity indicate that the hypothesis of linearity of health outcomes in BMI is rejected at standard levels of testing. Given this evidence, models are estimated using indicator variables for clinical weight classification.

[13] I have also tried using indicator variables for different age groups instead of age and its square, obtaining very similar results.

[14] Labour market outcomes are likely to be determined by health (Dwyer and Mitchell, 1999), so I include lagged values rather than contemporaneous values of the labour market status indicators. Alternatively, all models have been re-estimated excluding labour market status from the set of regressors, obtaining very similar results.

daily activities (health outcome 2) and suffering from a chronic condition (health outcome 3) are also expressed (in square brackets) as a percentage of the corresponding sample means of each of the outcome measures, displayed in Appendix Table A.1. Note that, for the sake of brevity and given that the focus of this study is on the costs of obesity, only average partial effects and percent variations associated with the obese indicator variable are reported. However, the underweight and pre-obese indicators are always included among the regressors and normal or healthy weight is the reference category.

It is worth noting several features that are common across countries. First, as expected, being obese is positively associated with the probability of being in bad or very bad health, suffering from a chronic condition and being hampered in daily activities due to illness for both men and women. Moreover, this effect is always statistically significant at standard levels of testing with a few exceptions for men.[15] Second, the evidence also reveals that in most cases the estimated effects of obesity are significantly larger for women than for men. This is consistent with the evidence that women in most communities report more illness and distress than men (WHO, 1998b) and use more medical care than men (Sindelar, 1983).

Regarding cross-country comparisons, it seems unlikely that obesity is more detrimental for individuals' objective health status in some countries than in others. While the absolute prevalence of some obesity-related diseases has been shown to be higher among certain minority populations in the US (Kumanyika, 1993), the relative risk of any particular disease (i.e. whether the risk is slightly, moderately or greatly increased for an obese person as compared with a lean person) is fairly similar throughout the world (WHO, 2000). However, given that the health indicators used are self-reported, country variations in the obtained results may reveal interesting patterns related to cultural factors and, more

[15] The exceptions are Greek, Italian, Belgian and Danish men, for whom the average partial effect of obesity on the probability of being in bad or very bad health is positive but statistically insignificant. The same happens with the probability of being hampered in daily activities for Danish men.

specifically, to cross-country differences in terms of health attitudes and habits, risk aversion and awareness of health risks associated with obesity and/or an unhealthy diet.

In line with this idea, the evidence presented in Table 2 suggests that the detrimental impact of obesity on self-reported health is often significantly bigger in Central and Northern Europe than in Mediterranean countries. For instance, in Finland being obese increases the probability of reporting bad/very bad health among women by 4.6 percentage points, which represents a 100% increase when measured against the corresponding sample mean; analogous figures for Portuguese and Greek women are smaller: 21.8% and 35.8%, respectively, being these differences statistically significant. This North-South pattern generally holds for the three outcomes considered and spearman rank correlations between the estimated obesity effects associated with each of them are high and statistically significant.[16]

Cutler and Glaeser (2006) argue that variations in health-related behaviours could in principle be explained by factors such as differences in discount rates or in differing health information or beliefs. Actually, Cutler and Glaeser (2005) find that differences in beliefs about the harms of smoking are the most important factor explaining why Europeans smoke more than Americans. In order to assess whether these explanations can account for the cross-country differences previously obtained, I use an additional data source: the Eurobarometer, conducted on behalf of the European Commission in order to monitor the public opinion in the European Union.[17] In particular, I use the Special Eurobarometer surveys number 59.0 (carried out in 2003) and 64.3 (carried out in 2005), which allow one to identify individuals who often eat low fat foods, rarely think about the long term

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[16] Spearman rank correlation coefficients between the estimated impacts of obesity on each of the three health outcomes (displayed in Table 2) are: 0.70 ($p<0.01$) for health outcomes 1 and 2, 0.77 ($p<0.01$) for health outcomes 1 and 3 and 0.87 ($p<0.01$) for health outcomes 1 and 3.

[17] For detailed information on the Standard and Special Eurobarometer Surveys, see http://www.gesis.org/en/data%5Fservice/eurobarometer/index.htm.

consequences of diet on health, believe that chances of getting heart disease are affected by diet, think that their weight is too high, changed what they eat or drink in the past three years to lose weight or stay healthy (which can be considered as proxies of individuals' health habits and information about the health risks associated with obesity and/or an unhealthy diet), wear a seat belt when in the car, have functioning smoke detectors at home and have taken a first aid course (which can be interpreted as proxies for discount rates or the value of life). These data are used to derive statistics for each country's population of 15-75 individuals by gender.

Figure 1 shows the relationship between four of the indicators listed above and the estimated impacts of obesity on self perceived bad health (in %) from Table 2. The graphs in the first row show that both the percentage of individuals who believe that the chances of getting heart disease depend on diet, and the percentage of individuals who changed diet in the past three years to lose weight or to stay healthy are generally higher in countries where the estimated impact of obesity on self-reported health is higher. Spearman rank correlations between these variables, displayed at the bottom of each graph, are high and statistically significant at the 5% level.

The graphs in the second row of Figure 1 explore the relationship between the consequences of obesity on self-reported health and individuals' time preference, proxied by the percentage of individuals who usually wear a seat belt in the car and the percentage of individuals who have taken a first aid course. As previously hypothesized, both proxies for discount rates are significantly associated, in the expected direction, with the estimated consequences of obesity on self-reported health.[18]

[18] Very similar results are obtained when using the rest of the indicators previously outlined. As for the correlations between these variables and the estimated impact of obesity and the other two health outcomes, they are always positive but sometimes not statistically significant at standard levels of testing.

Although these results should be interpreted with some caution given the small number of observations per country, the evidence presented suggests that there are interesting North-South patterns in the way obesity affects individuals' self-perceived health, possibly linked to differences in beliefs about the harms of obesity and discount rates or the value of life. According to the results obtained, Northern European individuals seem to be more informed about the health consequences of obesity and/or value the future more than their Southern European counterparts.

3. 2. Obesity and Health Care Demand.

The negative impact of obesity on health is likely to be translated into higher medical costs. In this section, I estimate models for the demand for health care in terms of the number of visits to the doctor. More specifically, the ECHP records the number of times respondents visited a general practitioner (GP) and a specialist (SP) in the past 12 months. The empirical strategy followed is analogous to the one described in the previous section,[19] although now random effects negative binomial models are used in order to account for the count nature of the dependent variables.[20]

On top of the lagged weight status indicators, control variables that are included in the demand equations are, age, age squared, marital status, education, employment status,

[19] Note that reverse causation is less likely to be a problem now than when analyzing the impact of obesity on health. However, it may still arise if individuals' BMI were potentially responsive to the advice received during physician visits. Hence, weight status indicators remain lagged in the health care demand equations.

[20] Because the overdispersion tests carried out for all countries and estimated equations provide strong evidence of overdispersion, the negative binomial model is preferred to the Poisson model.

income indicators and year dummies. This choice of regressors is broadly in line with previous empirical studies on the determinants of the demand for health care.[21]

Tabla 3 displays the estimated average partial effects of obesity on GP and SP visits (models 1 and 2, respectively) as well as their associated standard errors (in round brackets) and magnitudes expressed as percent variations (in square brackets) in order to facilitate cross-country comparisons. Given the negative association between health and obesity, the demand for health services is generally expected to be higher among obese individuals.[22] The results for model 1 confirm this prior, indicating that obese individuals' number of visits to the GP are always higher than those of their healthy-weight counterparts in all countries analysed and for both men and women. Moreover, these differences are always statistically significant and the magnitudes of the estimated effects are relatively large, ranging from 3.6% for Italian men to 25.6% for Finnish men. The evidence for SP visits (model 2) also indicates that obesity is always positively associated with health care demand. The estimated obesity effects for women are always statistically significant (with the exception of Danish women), while the results for men are clearly less conclusive, being only statistically significant for Austrian and Belgian men.

As far as cross-country differences are concerned, there is an important aspect of health care systems that may influence how responsive health care demand is to a specific condition (such as obesity): the gate-keeping role of GPs. In six out of the nine countries under study (Finland, Portugal, Spain, Italy, Ireland, Denmark), GPs act as gate-keepers

[21] See, for instance, Jiménez-Martín et al. (2002), where ECHP data are also used and Windmeijer and Santos Silva (1997).

[22] Not surprisingly, since obesity is expected to increase the demand for health services through its effects on health, coefficient estimates on the obesity dummy variable are no longer statistically significant when including health indicators in the regressions. However, it is important to exclude variables that *result* from weight status, since these are likely to capture a portion of the obesity effect I am trying to estimate.

while in the remaining three countries (Austria, Greece, Belgium) there is no referral system (WHO, 2004). Within a referral system, the number of visits to the GP (SP) associated with a specific condition is likely to be higher (lower) than in countries where GPs don't (do) act as gate-keepers. The results for GP visits mildly match these expectations: the estimated effects of obesity on both women's and men's GP visits are among the lowest for Austria and Belgium, where there is no referral system. However, in Greece there is no referral system either and the associated obesity effects are not small relative to the other countries. Further research in this area would certainly benefit from the availability of data on more countries and years, such that more variability in terms of the features of health systems could be observed.

4. Obesity and Absenteeism

The increase in medical expenditures is not the only economic cost associated with obesity. Obesity is also expected, through its impact on health, to lead to decreased productivity, restricted activity and worker absenteeism. Previous research based on US data suggests that obese employees are significantly more likely to be absent from work than their healthy-weight counterparts,[23] although the estimated magnitude of this gap varies across studies. However, to the extent of my knowledge, the obesity-absenteeism relationship has not been explored in European countries. Understanding such relationship is interesting, given that the US and Europe differ not only in terms of their health systems but also regarding their labour market institutions.

In this Section I attempt to fill in this gap by using the ECHP information on the number of days that workers were absent from work during the last four working weeks because of illness or other reasons. This question is only asked to individuals who work at least 15 hours per week, so the analysis is restricted to this sample. A random effects negative binomial model for the number of absent episodes is estimated and, apart from the weight

[23] See, for instance, Wolf and Colditz (1998) and Tucker and Friedman (1998).

categories, independent variables include the following individual and job characteristics: age, age squared, usual hours of work, indicator variables for marital status, education, industry, occupation, tenure, establishment size, temporary contract and year dummies. This is the standard set of regressors that, when available, are typically included in absenteeism studies (Barmby et al., 2002, Ichino and Riphahn, 2004).

As before, lagged rather than contemporaneous values of the weight indicators are included in order to avoid reverse causation. This might be an issue too in the context of absenteeism if sickness-related absent episodes are associated with reduced activity, which in turn may lead to an increase in BMI.

Table 8 displays average partial effects of obesity on absenteeism, their associated robust standard errors (in round brackets) and magnitudes expressed as a percentage of the corresponding mean number of absent episodes (in square brackets).[24] The results for women indicate that, as expected, obesity is always positively associated with absenteeism. However, the estimated impact of obesity is only statistically significant at the 5% level for Finnish women, while it is marginally significant at the 10% level for women in Portugal, Spain and Denmark. Among these four countries where obesity significantly increases absenteeism for women, the magnitude of the estimated effects are biggest in Portugal and Spain, where being obese rather than being in a healthy-weight range increases the amount of women's absent episodes by 78% and 74%, respectively. Nevertheless, in the remaining five countries the effect of interest is clearly far from being significant at standard levels of testing for women and, as far as men are concerned, obesity does not significantly increase absent episodes in any of the countries analysed.[25]

[24] Appendix Table A.3. reports the mean number of absent episodes for the samples used in this analysis.

[25] One reasonable concern regarding the lack of significance of the obesity indicator in most of my absenteeism regressions could be that it might be driven by BMI underreporting. However, this does not seem to be the case since among those four countries where obesity is statistically significant for

Previous research on the determinants of absenteeism indicates that absent episodes are unlikely to solely be a response to a medical condition (obesity, in the case of this study). Instead, absenteeism is likely to be influenced by institutional factors such as the generosity of sickness insurance schemes (which reduces the absenteeism costs faced by workers in terms of forgone income) as well as the level of employment protection enjoyed by workers and the generosity of unemployment benefit systems (which reduce the expected cost of work absence to the employee either by making it more difficult to sanction absenteeism or by reducing the effective cost of this sanction).[26] Consistent with these predictions, Portugal and Spain are among the OECD countries with most stringent employment protection legislations (OECD, 2004), while Denmark has the most generous unemployment benefits and Finland's degrees of both unemployment insurance and employment protection are around the average levels of the countries considered (OECD, 2004 and Nickell et al., 2005).

However, it is not possible to fully explain the results in terms of differences in labour market institutions, as the evidence for men indicates that obese men's amount of absent episodes is not significantly different from that of their healthy-weight counterparts in any of the countries analysed and the same happens for women in five out of the nine countries under study.

It should be noted that the absenteeism measure provided by the ECHP includes absent episodes due to illness *and* any other reason so it is not possible to isolate the impact of obesity on illness-related episodes.[27] If this were positive, as suggested by most previous

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women, we have Finland (significant at the 5% level) and Spain (marginally significant at the 10% level), where the degree of underreporting actually seems to be higher (rather than lower) than in most of the other countries according to Table 1.

[26] See, for instance, Ichino and Riphahn (2004) and Bonato and Lusinyan (2004).

[27] However, it is worth noting that the average partial effects of obesity on absenteeims are dramatically reduced and become statistically insignificant in all the countries and groups of employees analysed when health variables are included in the regressions. This is suggestive that

studies, my results would imply that obese men (and, in most countries, obese women) tend to compensate their sickness-related absent episodes by reducing absenteeism due to any other reason (e.g. pure shirking).

The evidence presented on obesity and absenteeism also relates to the obesity wage gap documented in the labour economics literature. The negative association between weight and wages has been rationalised as the consequence of reduced productivity and/or discrimination.[28] If absenteeism is considered as a reliable proxy for productivity, then my results would suggest that, at least for men, discrimination is most likely the cause of the negative relationship between obesity and wages. Detailed data on the nature and reasons of each absent episode, combined with rich information on employment and household characteristics would be particularly useful to provide further evidence on this issue.

5. Conclusion

While the US is still the OECD country with the highest obesity rate and most available research on obesity is based on US data, the prevalence of obesity is increasing worldwide (WHO, 1998a). This paper uses homogeneous data from the 1998-2001 waves of the European Community Household Panel to assess the health, medical and absenteeism costs of the obesity epidemic in nine European countries: Denmark, Belgium, Ireland, Italy, Greece, Spain, Portugal, Austria and Finland.

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whenever obesity significantly affects absenteeism, it does so through its deleterious impact on employees' health.

[28] Another potential explanation is reverse causality: low wages may cause obesity if fattening foods are relatively cheaper or if poor labour market outcomes lead to depression and depression leads to weight gain (Cawley, 2000, 2004). However, after accounting for reverse causality by using instrumental variable methods previous studies still find that weight lowers wages for both men and women in Europe (Brunello and d'Hombres, 2007) and for white women in the US (Cawley, 2004).

Several interesting results stand out. First, in all countries analysed obesity and self reported health are negaively associated, especially for women. This relationship appears to be stronger in Northern and Central European countries than in Mediterranean countries. Second, consistent with the evidence on the obesity-health link, it is found that obesity is positively associated with the demand for general practitioner and specialist services. This relationship, however, appears to be more robust for the demand for general practitioner services, since the impact of obesity on the amount of specialist visits is often not statistically significant for men. Finally, regarding the relationship between obesity and absenteeism, the evidence indicates that being obese does not significantly increase the amount of absent episodes for most of the groups of employees analysed. While obese women in four out of the nine countries under study are found to be absent from work more often than healthy-weight women, no significant effect is found for men.

Overall, the results of this paper may contribute to a better understanding of the costs of obesity in Europe and provide useful information for the design of strategies for improving the prevention of obesity and limiting its impact on individuals. However, it is worth noting that while most of this study has focused on the health and economic costs of obesity, the design of a successful strategy for preventing and managing the obesity epidemic will require the combination of multidisciplinary inputs and the consideration of environmental, cultural and behavioural factors.

References

Andreyeva, T., P. C. Michaud and A. van Soest (2007). "Obesity and health in Europeans ages 50 and above". *Public Health*. 121(7): 497-509.

Barmby, T. A., M. G. Ercolani and J. G. Treble (2002). "Sickness absence: an international comparison". *Economic Journal*. 112: F315-F331.

Bonato, L. and L. Lusinyan (2004). "Work absence in Europe". *IMF Working Paper*. WP/04/193.

Bray, G. A., D. H. Ryan and D. W. Harsha (2003). "Diet, weight loss and cardiovascular disease prevention." *Current treatment options in cardiovascular medicine.* 5: 259-269.

Cawley, J. (2000). "Body weight and women's labor market outcomes." NBER Working Paper No. 7841.

Cawley, J. (2004). "The impact of obesity on wages." *Journal of Human Resources*. 39(2): 451-74.

Chamberlain, G. (1980). "Analysis of covariance with qualitative data". *Review of Economic Studies*. 47: 225-238.

Chou, S.-Y., M. Grossman and H. Saffer (2004). "An economic analysis of adult obesity: results from the Behavioral Risk Factor Surveillance System." *Journal of Health Economics.* 23: 565-567.

Clark, A. and F. Etilé (2002). "Do health changes affect smoking: evidence form British panel data". *Journal of Health Economics*. 21: 533-562.

Cutler, D. M., E. L. Glaeser and J. M. Shapiro (2003). "Why Have Americans Become More Obese?" *Journal of Economic Perspectives.* 17(3): 93-118.

Cutler, D. and E. Glaeser (2005). "Why do Europeans smoke more than Americans?" NBER Working Paper No. 12124.

Cutler, D. and E. Glaeser (2006). "What explains differences in smoking, drinking and other health-related behaviours?" *American Economic Review*. 95(2): 238-242.

Brunello, G. and B. d'Hombres (2007). "Does body weight affect wages? Evidence from Europe". *Economics and Human Biology*. 5: 1-19.

Dwyer, D. S. and O. S. Mitchell (1999). "Health problems as determinants of retirement: are self-rated measures endogenous?" *Journal of Health Economics*. 18: 173-193.

Finkelstein, E. A., I. C. Fiebelkorn and G. Wang (2003a). "National medical spending attributable to overweight and obesity: how much and who's paying?" *Health Affairs* (Web Exclusive). W3-219-W3-226.

Finkelstein, E. A., I. C. Fiebelkorn and G. Wang (2003b). "State-level estimates of annual medical expenditures attributable to obesity?" *Obesity Research*. 12(1): 18-24.

Finkelstein, E. A., C. J. Ruhm and K. M. Kosa (2005), "Economic causes and consequences of obesity". *Annual Review of Public Health*. 26: 239-57.

García, J. and C. Quintana-Domeque (2007). "Obesity, employment and wages in Europe", in K. Bolin and J. Cawley (Eds.). *The Economics of Obesity*. 17: 189-219. Amsterdam: Elsevier.

Hamermesh, D. S., and J. E. Biddle (1994). "Beauty and the labor market." *American Economic Review*. 84(5): 1174-94.

Ichino, A. and R. Riphahn (2004). Absenteeism and employment protection: three case studies. *Swedish Economic Policy Review*. 11(1): 95-114.

Idler, E.L. and Y. Benyamini (1997)."Self-rated health and mortality: a review of twenty-seven community studies". *Journal of Health and Social Behavior*. 38(1): 21.37.

International Obesity TaskForce. 2002. "Obesity in Europe. The case for action." Available at www.iotf.org/media/euobesity.pdf.

International Obesity TaskForce. 2003. "Obesity in Europe – 2. Waiting for a green light for health?" Available at http://www.iotf.org/media/euobesity2.pdf.

Jiménez-Martín, S., J. M. Labeaga and M. Martínez-Granado. (2002). "Latent class versus two-part models in the demand for physician services across the European Union". *Health Economics.* 11(4): 301-321.

King, G., C. J. L. Murray, J. A. Salomon and A. Tandon (2004). "Enhancing the validity and cross-cultural comparability of measurement in survey research". *American Political Science Review*. 98(1): 191-207.

Kumanyika, S. K. (1993). "Special issues regarding obesity in minority populations". *Annals of Internal Medicine.* 119: 650-654.

Lakdawalla, D. and T. Philipson (2002). "The growth in obesity and technological change: a theoretical and empirical examination". NBER Working Paper No. 8946.

Michaud, P. C., T. Andreyeva and A. van Soest (2007). "Cross-country variations in obesity patterns among older Americans and Europeans". RAND Working Paper No. WR-495.

Mundlak, Y. (1978). "On the pooling of time series and cross section data". *Econometrica*. 46: 69-85.

National Institutes of Health. 1998. Clinical guidelines on the identification, evaluation and treatment of overweight and obesity in adults: the evidence report. Available at http://www.nhlbi.nih.gov/guidelines/obesity/ob_gdlns.pdf.

Nickell, S., L. Nunziata and W. Ochel. (2005). "Unemployment in the OCED since the 60s. What do we know? ". *Economic Journal.* 115: 1-27.

OECD. 2004. "Employment outlook". Paris: OECD.

Ogden, C. L. et al. (2006). "Prevalence of overweight and obesity in the United States, 1999-2004". *Journal of the American Medical Association*. 295(13): 1549-1555.

Peracchi F. (2002), "The European Community Household Panel: A review." *Empirical Economics.* 27:63-90.

Sanz-de-Galdeano, A. (2005). "The obesity epidemic in Europe". IZA Discussion Paper No. 1814.

Sindelar, J. L. (1983), "Differential use of medical care by sex." *Journal of Political Economy*. 90(5): 1003-19.

Sturm, R. (2002). "The effects of obesity, smoking, and drinking on medical problems and costs. Obesity outranks both smoking and drinking in its deleterious effects on health and health costs." *Health Affairs.* 21(2): 245-53.

Tucker, L. A. and G. M. Friedman. (1998). "Obesity and absenteeism: an epidemiologic study of 10,825 employed adults". *American Journal of Health Promotion*. 12(3): 202-7.

US Department of Health and Human Services. 2001. "The Surgeon General's call to action to prevent and decrease overweight and obesity." Available at http://www.surgeongeneral.gov/topics/obesity/calltoaction/toc.htm.

Windmeijer, F. A. G. and J. M. C. Santos Silva (1997). "Endogeneity on count data models: an application to demand for health care." *Journal of Applied Econometrics*. 12(3): 281-294.

Wolf, A.M. and G.A. Colditz (1998) "Current estimates of the economic cost of obesity in the United States." *Obesity Research*. 6(2): 173-5.

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

World Health Organization. 2006. "10 things you need to know about obesity". WHO European ministerial Conference on Counteracting Obesity. Available at http://www.euro.who.int/Document/NUT/ObesityConf_10things_Eng.pdf.

World Health Organization. 2004. "Snapshots of health systems. The state of affairs in 16 countries in summer 2004". Available at http://www.euro.who.int/document/e85400.pdf.

World Health Organization. 2000. "Obesity: preventing and managing the global epidemic". WHO Technical Report Series No. 894. Available at http://whqlibdoc.who.int/trs/WHO_TRS_894.pdf.

World Health Organization. 1998a. "World health report, life in the 21st century: a vision for all". Available at http://www.who.int/whr/1998/en/whr98_en.pdf.

World Health Organization. 1998b. "Gender and health". WHO Technical Paper, Reference WHO/FRH/WHD/98.16.

Zagorsky, J. L. (2005). "Health and wealth: the late-20th obesity epidemic in the U.S.". *Economics and Human Biology*. 3: 296:313.

Table 1. Prevalence of Obesity in the European Community Household Panel (ECHP) and the WHO Global Database

	WHO(1)			ECHP(2)		
	Period	Age range	Obesity, %	Period	Age range	Obesity, %
Women						
Finland	2000-2001	30-100	23.5	2000-2001	30-92	16.48
Austria	1999	25-64	13.7	1999	25-64	11.78
Portugal	1997	15-100	9	1998	17-89	10.12
Spain	1998	35-74	29	1998	35-74	17.43
Greece	2001-2002	18-89	15.4	2001	18-89	10.47
Italy	2002	18-100	8.3	2001	18-92	7.90
Ireland	1998	18-100	9	1998	18-89	8.36
Belgium	2001	15-100	11	2001	16-92	10.19
Denmark	1995-1997	50-64	13.5	1998	50-64	10.64
Men						
Finland	2000-2001	30-100	21.2	2000-2001	30-92	14.69
Austria	1999	25-64	9.7	1999	25-64	9.77
Portugal	1997	15-100	9	1998	17-89	8.91
Spain	1998	35-74	24.8	1998	35-74	17.21
Greece	2001-2002	18-89	20.2	2001	18-89	10.02
Italy	2002	18-100	8.7	2001	18-92	9.13
Ireland	1998	18-100	12	1998	18-89	8.33
Belgium	2001	15-100	10.3	2001	16-92	11.85
Denmark	1995-1997	50-64	15.1	1998	50-64	14.35

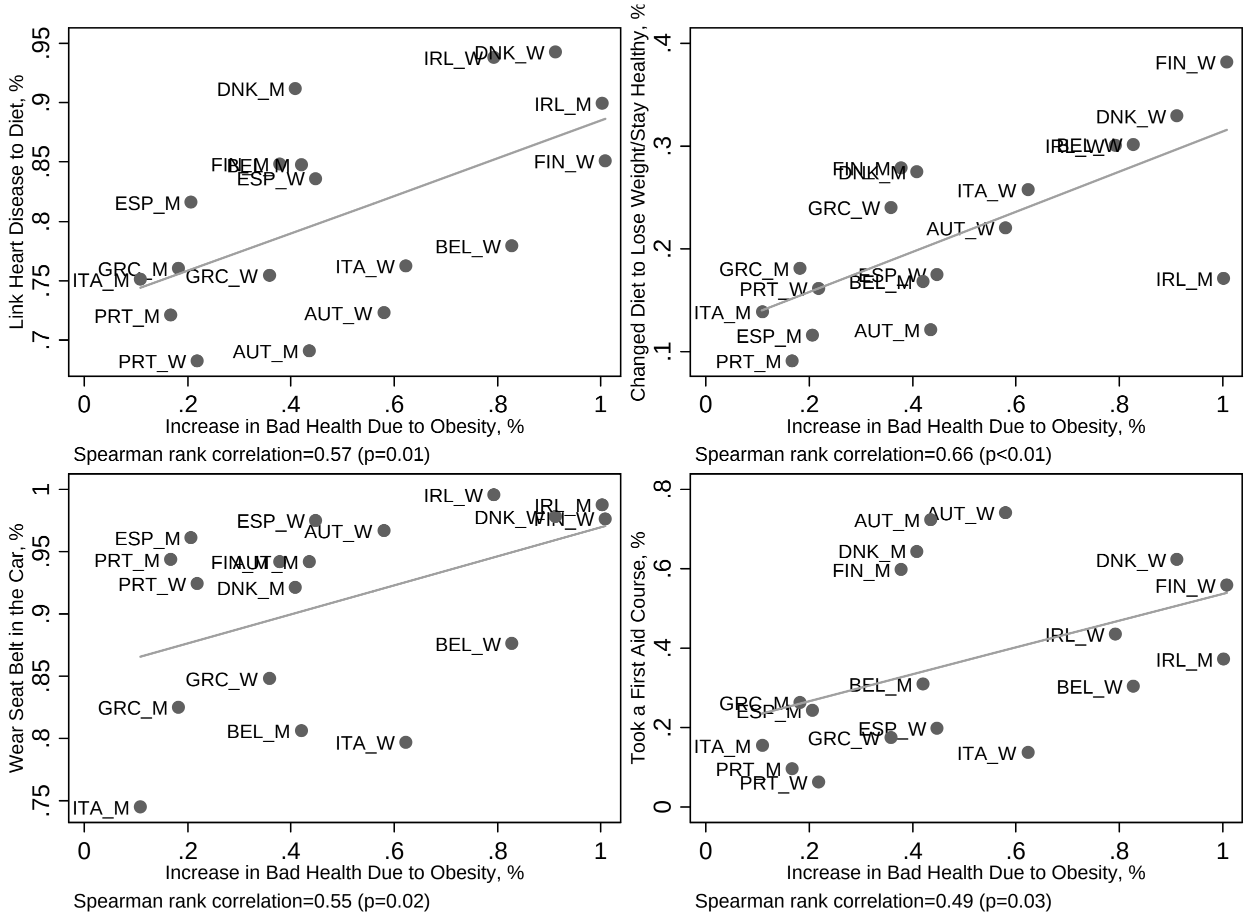
Note: (1) World Health Organization, WHO Global Database on Body Mass Index. Source: http://www.who.int/bmi/index.jsp. (2) Author's calculations based on ECHP data

Table 2. The Health Consequences of Obesity

	(1) Bad/Very Bad Health				(2) Hampered in Daily Act.				(3) Chronic condition			
	Women		Men		Women		Men		Women		Men	
Finland	0,046	***	0,016	*	0,114	***	0,043	**	0,147	***	0,092	***
	(0,008)		(0,008)		(0,018)		(0,018)		(0,020)		(0,021)	
	[1,008]		[0,378]		[0,415]		[0,174]		[0,373]		[0,250]	
Austria	0,033	***	0,023	**	0,073	***	0,064	***	0,086	***	0,077	***
	(0,009)		(0,010)		(0,016)		(0,016)		(0,017)		(0,018)	
	[0,580]		[0,435]		[0,471]		[0,445]		[0,481]		[0,456]	
Portugal	0,046	***	0,025	**	0,038	***	0,026	**	0,050	***	0,026	*
	(0,011)		(0,011)		(0,012)		(0,013)		(0,013)		(0,014)	
	[0,218]		[0,168]		[0,163]		[0,140]		[0,196]		[0,125]	
Spain	0,044	***	0,014	**	0,059	***	0,027	***	0,069	***	0,044	***
	(0,007		(0,007)		(0,009)		(0,009)		(0,011)		(0,011)	
	[0,448]		[0,206]		[0,409]		[0,224]		[0,339]		[0,237]	
Greece	0,025	***	0,011		0,033	***	0,021	*	0,037	***	0,022	*
	(0,007)		(0,008)		(0,010)		(0,011)		(0,010)		(0,012)	
	[0,358]		[0,182]		[0,216]		[0,155]		[0,231]		[0,151]	
Italy	0,059	***	0,008		0,058	***	0,019	**	0,069	***	0,019	**
	(0,009)		(0,007)		(0,009)		(0,008)		(0,010)		(0,009)	
	[0,623]		[0,109]		[0,638]		[0,227]		[0,656]		[0,189]	
Ireland	0,016	**	0,022	**	0,043	***	0,032	*	0,053	***	0,066	***
	(0,007)		(0,009)		(0,016)		(0,018)		(0,019)		(0,021)	
	[0,792]		[1,002]		[0,319]		[0,226]		[0,276]		[0,340]	
Belgium	0,038	***	0,015		0,062	***	0,026		0,066	***	0,046	**
	(0,010)		0,010)		(0,017)		(0,017)		(0,018)		(0,020)	
	[0,828]		([0,420]		[0,453]		[0,218]		[0,377]		[0,275]	
Denmark	0,052	***	0,016		0,124	***	0,058	***	0,105	***	0,111	***
	(0,015)		(0,011)		(0,026)		(0,022)		(0,028)		(0,029)	
	[0,912]		[0,408]		[0,525]		[0,340]		[0,282]		[0,357]	

Note: Random effects probit models under assumption (1) in the text are separately estimated by country and gender. Average partial effects. *** Statistically significant at the 1% level. ** Statistically significant at the 5% level. * Statistically significant at the 10% level. The dependent variables take value 1 if the respondent declares to have bad or very bad health (model 1), suffer from a chronic condition (model 2), be hampered in her daily activities by any condition (model 3) and value 0 otherwise. Standard errors are reported in round brackets and percent variations are reported in square brackets. Additional control variables are: age, age squared, household size, marital status, education level, household income quintiles, year dummies and labour market status indicators. Weight and labour market status indicators are lagged. On top of the obesity indicator, for which results are displayed, all specifications include the pre-obese and underweight indicators (healthy weight is the omitted category). Sample sizes for women are: 7813 (Finland), 7528 (Austria), 14611 (Portugal), (Spain), 12279 (Greece), 19075 (Italy), 6184 (Ireland), 6300 (Belgium), 4720 (Denmark). Sample sizes for men are: 7765 (Finland), 7189 (Austria), 13449 (Portugal), (Spain), 11366 (Greece), 18563 (Italy), 5885 (Ireland), 5545 (Belgium), 4686 (Denmark).

Figure 1: Health Beliefs and Habits, Discount Factors and the Consequences of Obesity on Self-Reported Health Across Europe



Note: The countries are: Finland (FIN), Austria (AUT), Portugal (PRT), Spain (ESP), Greece (GRC), Italy (ITA), Ireland (IRL), Belgium (BEL) and Denmark (DNK). _M stands for men and _W stands for women.

Table 3: Obesity and the Demand for Health Services.

	GP Visits				SP Visits			
	Women		Men		Women		Men	
Finland	0,527	***	0,461	***	0,414	***	0,639	
	(0,103)		(0,096		(0,153)		(0,612)	
	[0,227]		[0,256]		[0,327]		[0,794]	
Austria	0,286	***	0,278	***	0,427	***	0,373	***
	(0,060)		(0,066)		(0,119)		(0,139)	
	[0,059]		[0,073]		[0,166]		[0,242]	
Portugal	0,305	***	0,193	***	0,221	*	0,198	
	(0,055)		(0,042)		(0,130)		(0,124)	
	[0,088]		[0,086]		[0,142]		[0,214]	
Spain	0,278	***	0,163	***	0,639	***	0,335	
	(0,052)		(0,051)		(0,157)		(0,226)	
	[0,068]		[0,059]		[0,344]		[0,274]	
Greece	0,248	***	0,134	*	0,774	***	0,030	
	(0,075)		(0,074)		(0,212)		(0,192)	
	[0,123]		[0,093]		[0,413]		[0,023]	
Italy	0,326	***	0,128	***	1,425	***	0,205	
	(0,058)		(0,053)		(0,342)		(0,234)	
	[0,067]		[0,036]		[0,908]		[0,219]	
Ireland	0,521	***	0,388	**	0.551	**	0,559	
	(0,133)		(0,129)		(0.276)		(0,416)	
	[0,135]		[0,144]		[0.732]		[1,032]	
Belgium	0,308	***	0,273	***	0,346	**	0,822	**
	(0,068)		(0,066)		(0,149)		(0,338)	
	[0,061]		[0,070]		[0,142]		[0,530]	
Denmark	0,241	***	0,424	***	0,159		1,221	
	(0,077)		(0,127)		(0,485)		(0,931)	
	[0,073]		[0,210]		[0,127]		[1,493]	

Note: Random effects negative binomial models are separately estimated by country and gender. Average partial effects. *** Statistically significant at the 1% level. ** Statistically significant at the 5% level. * Statistically significant at the 10% level. The dependent variables measure the number of times the individual visited the GP (model 1) and the SP (model 2) in the past 12 months. Standard errors are reported in round brackets and percent variations are reported in square brackets. Additional control variables are: age, age squared, marital status, education, employment status, income indicators and year dummies. Weight indicators are lagged. On top of the obesity indicator, for which results are displayed, all specifications include the pre-obese and underweight indicators (healthy weight is the omitted category). Sample sizes for women are: 7811 (Finland), 7507 (Austria), 14613 (Portugal), 14895 (Spain), 12185 (Greece), 19004 (Italy), 6171 (Ireland), 6255 (Belgium), 4720 (Denmark). Sample sizes for men are: 7759 (Finland), 7211 (Austria), 13477 (Portugal), 14280 (Spain), 11202 (Greece), 18471 (Italy), 5870 (Ireland), 5489 (Belgium), 4672 (Denmark)

Table 4. Obesity and Absenteeism

	Women		Men
Finland	1,139	**	0,513
	(0,495)		(0,407)
	[0,567]		[0,537]
Austria	0,452		-0,034
	(0,337)		(0,223)
	[0,599]		[-0,045]
Portugal	0,734	*	0,048
	(0,389)		(0,192)
	[0,787]		[0,081]
Spain	0,780	*	0,117
	(0,446)		(0,168)
	[0,745]		[0,175]
Greece	0,389		-0,207
	(0,358)		(0,166)
	[0,572]		[-0,387]
Italy	0,244		0,227
	(0,413)		(0,204)
	[0,227]		[0,367]
Ireland	0,420		0,279
	(0,341)		(0,243)
	[0,453]		[0,590]
Belgium	1,066		0,247
	(1,127)		(0,590)
	[0,509]		[0,217]
Denmark	1,069	*	0,093
	(0,591)		(0,297)
	[0,583]		[0,104]

Note: Random effects negative binomial models are separately estimated by country and gender. Average partial effects. *** Statistically significant at the 1% level. ** Statistically significant at the 5% level. * Statistically significant at the 10% level. The dependent variable measures the number of times the worker was absent from work during the last four working weeks because of illness or other reasons. Standard errors are reported in round brackets and percent variations are reported in square brackets. Additional control variables are: age, age squared, usual hours of work, indicator variables for marital status, education, industry, occupation, tenure, establishment size, temporary contract and year dummies. Weight indicators are lagged. On top of the obesity indicator, for which results are displayed, all specifications include the pre-obese and underweight indicators (healthy weight is the omitted category). Sample sizes for women are: 1759 (Finland), 2560 (Austria), 4685 (Portugal), 3846 (Spain), 2399 (Greece), 4308 (Italy), 2241 (Ireland), 1046 (Belgium), 1484 (Denmark). Sample sizes for men are: 1795 (Finland), 3740 (Austria), 6097 (Portugal), 6483 (Spain), 3720 (Greece), 6573 (Italy), 2790 (Ireland), 1108 (Belgium), 1874 (Denmark).

Appendix Table A.1. Sample Means of Health Indicators by Country and Gender

	Bad/Very Bad Health		Hampered in Dail Act.		Chronic Condition	
	Women	Men	Women	Men	Women	Men
Finland	0,045	0,042	0,274	0,249	0,394	0,369
Austria	0,056	0,054	0,154	0,143	0,178	0,169
Portugal	0,210	0,147	0,235	0,188	0,255	0,208
Spain	0,098	0,069	0,144	0,120	0,205	0,185
Greece	0,069	0,062	0,152	0,134	0,159	0,145
Italy	0,094	0,074	0,090	0,083	0,105	0,103
Ireland	0,020	0,022	0,134	0,142	0,194	0,194
Belgium	0,045	0,036	0,138	0,121	0,175	0,168
Denmark	0,057	0,040	0,235	0,172	0,372	0,313

Appendix Table A.2. Sample Means of Health Care Use Variables by Country and Gender

	GP Visits		SP Visits	
	Women	Men	Women	Men
Finland	2,323	1,798	1,265	0,804
Austria	4,806	3,801	2,578	1,544
Portugal	3,475	2,252	1,559	0,924
Spain	4,091	2,762	1,856	1,221
Greece	2,007	1,448	1,874	1,287
Italy	4,899	3,570	1,570	0,932
Ireland	3,861	2,702	0,752	0,542
Belgium	5,041	3,873	2,440	1,552
Denmark	3,290	2,018	1,249	0,818

Note: GP visits and SP visits measure the number of times the individual visited the GP and the SP, respectively, in the past twelve months.

Appendix Table A.3. Sample Means of Absent Episodes by Country and Gender

	Women	Men
Finland	2,009	0,956
Austria	0,754	0,759
Portugal	0,932	0,599
Spain	1,047	0,673
Greece	0,681	0,535
Italy	1,073	0,619
Ireland	0,926	0,472
Belgium	2,094	1,137
Denmark	1,834	0,890

Note: Absent episodes are measured as the number of times the worker was absent from work during the last four working weeks because of illness or other reasons.

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