The Impact of health on wages: Evidence for Europe

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SUMMARY

This paper analyses the effects of health on wages in sixteen European countries using production frontier methodology. It is assumed that workers have a potential income/productivity which basically depends on their human capital, but due to several health problems, situations could exist where workers fail to reach their potential income frontier. The estimation of a true-random-effects model allows us to conclude that the potential hourly wage of workers is significantly influenced by their level of education and their job experience. However, health problems, especially those strongly influencing work activities, contribute towards an individual not attaining the potential income which would otherwise be guaranteed by their human capital endowment. Suffering a strong limitation reduces gross wage per hour by 6.1%. This wage reduction is also observed in the case of a weak limitation, but here the wage difference with respect to workers without any limitation is 2.6%. Additionally, other factors, such as being a woman, the economic cycle or having a temporary contract, appear to distance an individual from their wage frontier.

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1. INTRODUCTION

Since the early 70's of the last century, economists have detected evidence of the negative effect which health problems exert on workers' incomes. For example, in the case of the United States, persons with disabling health effects which influenced their work performance perceived annual income which was 37% inferior to their corresponding healthy counterparts [1]. These negative effects are related with a lower labour participation, a lower number of working hours and lower than average wages. Focusing on the aspect of wages, this supports the hypothesis that a health problem which limits the performance of a worker in a particular job, affects negatively his/her productivity in said job and hence, their working income. It is important to point out that the bad health of an individual does not always reduce their income from work, the latter only being affected by those problems which suppose a limitation in the specific task being undertaken by the worker (for example, a severe aphony may not reduce the productivity or the wages of a carpenter but yes, those of a teacher). In this sense, when analysing the impact of health problems on wages, it is necessary to have information on those illnesses that limit a worker´s performance as opposed to information regarding general health problems. As will be seen further on, this is the type of information that will be used in our study.

Furthermore, the present paper addresses the analysis of health effects on wages using methodology to estimate production frontiers. We assume that workers have a potential wage/productivity mainly dependent on their human capital. Likewise, this can be of two types: regulated training and on-the-job training. The first, relates to the individual's level of education, and the second to working experience and the type of occupation (hence, for example, an individual with university studies in engineering could be working as a qualified service-sector worker, and it is through exercising this job that he improves his productivity and obtains better wages, independent of his level of studies). We assume that the total human capital endowment of the individual is what determines his/her potential or maximum income (wage frontier). But not everybody will reach the latter frontier. The job market presents imperfections, mobility and information barriers, which situate workers outside their potential wage frontiers. What factors determine the distance of wages to their potential value? Amongst others, it is worthwhile highlighting four types of factors. Firstly, gender, when discrimination exists. Secondly, the type of contract, when a dual labour market exists and temporary workers receive

worse treatment from a contractual standpoint (workers' rights, ease of dismissal…) than those with permanent contracts. Thirdly, the economic cycle. As shown by the recent economic crisis, the excess supply of workers resulting from the fall in the demand for work has led to significant wage reductions for the most vulnerable collectives (unskilled workers in declining sectors), thereby increasing the distance of the latters' wages from their potential level. Lastly, health problems which suppose a limitation on the specific activity performed by the individual are accompanied by a drop in productivity which could also contribute to distancing wages from their potential value.

Based on the foregoing, the central objective of our research consists in estimating wage frontiers for various European countries, in tandem elaborating efficiency indices which allow measuring by how much wages really perceived differ from their potential values, thereby granting a more prominent role in the estimation to the health problems experienced by workers.

The structure of the paper is as follows. Section two develops the theoretical framework. Section three goes on to describe the database used and the frontier functions of various European countries are estimated using the data from the *European Union Statistics on Income and Living Conditions* (EU-SILC) for the period 2008-2011. Lastly, the fourth section summarises the principal conclusions of our research.

2. THEORETICAL FRAMEWORK

The seminal works of [2], [3], [4], [1] y [5] analyse the relationship between health and wages focusing on two main reasons: a) lower productivity linked to poor health; b) workers suffering from poor health could be subject to discrimination in the form of lower wages even when they are equally productive as their fellow workers [6]. Following these papers, numerous studies have analysed and contrasted the fact that any type of health problem reduces the probability of finding employment and those that do work earn less than their healthy counterparts (see [7] or [8] for a revision of the literature).

When studying the factors that affect productivity and wages, the human capital endowment of workers serves as the fundamental element in a competitive labour market ([9] [10], [11], [12]. Traditionally, human capital is proxied in the literature by two variables which contribute towards increasing worker productivity and consequently,

wages: formal education (human capital of a general nature) and work experience (a more specific type of human capital). Formal education can be measured via a combination of fictitious variables which represent different levels of education, the hope being that wages grow in line with an increase in education. With respect to work experience, this bears a parabolic relationship with wages. That is, wages increase with work experience until reaching a maximum where they start to fall. The reason for said profile, proven in the majority of studies, is that work experience (on-the-job training) initially allows individuals to increase their productivity beyond the capabilities acquired via education. However beyond a certain age (representing a determined number of years of experience), human capital accumulates at a lesser pace to its depreciation, permitting a possible fall in workers' income. In order to contrast this hypothesis both the variable experience and its corresponding square are included in estimations, the expected sign being positive for the former and negative for the latter (the coefficient being less in the case of experience squared). But not only the years of experience serve to proxy the work training of an individual. An individual can have acquired a determined level of training, but in practice, may in fact be undertaking a task at an inferior or simply different level (a university student can work as a shop assistant or somebody trained as a bricklayer could become the manager of a small construction company). For this reason, the type of occupation undertaken by an individual (manager, professional, skilled worker…) acts as an additional proxy of their specific capital endowment.

All the variables mentioned, determine the potential productivity per worker and thus, his/her wage frontier (that is, the maximum wages obtainable given their human capital endowment). However, in practice, the wages actually received by individuals may be some distance from their potential level for a variety of reasons, linked to market imperfections (discrimination by gender or type of contract), the vagaries of the economic cycle, and health problems. In Spain, for example, various studies find wage differences in favour of workers with permanent contracts as opposed to temporary ones (see for example, [13] and [14] and males as opposed to females ([15], [16], [17], [18]). In the first case, the extraordinary importance of seniority payments, both in companies (due to collective bargaining) as well as the Public Administration (based on norms related to triennials and similar pay complements), tend to increase the income of permanent workers above that of temporary workers, even though these payments are not a result of productivity differences between the former and the latter. Furthermore, the observation

that men command higher wages than women is a fact generally confirmed in Europe, which supports the existence of a greater or lesser degree of wage discrimination by gender. In tandem, a sufficiently intense economic crisis such as that suffered by Europe in recent times serves to fuel a significant wage reduction for the majority of workers with respect to their potential level, due to the tensions which the high level of unemployment exerts upon the labour market.

As regards health, seminal studies [3], [4], [1], [5], have analysed how the existence of a health problem which limits a worker's normal activity affects wages in a significant way. Hence, various studies have introduced health in the Mincer equation for the purpose of analysing its impact on wages. In this sense, [6] perform quantile regressions with information obtained from the *Panel Study of Family Dynamics* of Taiwan using cross-sectional data in order to construct a wage-estimated regression which contains health, education, and work experiences among others. To do this, they take self-assessed health as the proxy for health. Considering various specifications of the Mincer equation by way of OLS, probit and logit models, [20] use data for Greece in 2008, distinguishing between three types of individuals, healthy (non-impaired) people, health-impaired people with work limitations and health impaired people with no work limitations. The results indicate that wage discrimination exists against health impaired employees with both work and non-work limitations. One advantage of the data used is that it offers a wide list of personnel and professional characteristics for the individuals. Nevertheless, numerous unobservable factors can affect the level of wage such as market conditions, unions, individual unobservable skills, precision of observable skills, etc. [20]. As acknowledged by [8], the best strategy for facing these non-observed factors is based on benefiting from the advantages of panel data. Accordingly, [21] estimate a Generalised Least Squares model with panel data from the *British Household Panel Survey*. To analyse the effect of self-assessed general and psychological heath on hourly wages, [22] estimates a fixed and random effects panel data model for 14 European countries using information from the *European Community Household Panel* (ECHP) to analyse the effects of health (self-assessed health and chronic illness) on men and women. In general, the result obtained by these articles is that the better the health of a worker, the greater his/her expected productivity and, hence, the higher his/her wage.

The objective of this paper is to contribute to the literature which analyses the effect of health on wages, by estimating a wage frontier for the Mincer equation which offers some advantages vis-à-vis the more standard wage functions. Although Mincer-type wage frontiers have already been estimated in the literature (see [19] for a revision of the literature), we propose here to introduce a health variable in order to analyse how the latter can explain why workers attain inferior wages to those that would have been obtained given their human capital endowment (potential wage). That is to say, we propose the estimation of a wage frontier which defines the maximum wages attainable by a worker given their human capital (a Mincer-type function frontier). At the same time, the proposed model incorporates a set of variables which explain the loss in productivity and wages of workers (that is, the distance to their potential wage) resulting from health problems among other factors. The identification of the determining factors of said losses in productivity poses serious challenges in terms of the model to be used [23]. Various studies such as, for example [24], [25]), reveal that inadequate modelling can seriously affect the results obtained. More precisely, if the inefficiency is heteroscedastic and correlated with a series of exogenous variables, but it is erroneously assumed to be homoscedastic, then all the properties (parameters) of the wage function estimated are biased. The models proposed by, amongst others, [26], [27] or [28], try to tackle this problem by allowing technical inefficiency to depend upon a series of exogenous variables which can vary over time.

To our knowledge, this is the first paper that addresses the relationship between health and wages using a frontier analysis, and as such, constitutes the main contribution of this research. Moreover, the present paper attempts to tackle the unobservable heterogeneity between workers by estimating a worker-level panel model based on the true-random-effects model proposed by [29] for panel data.

3. DATA AND ESTIMATES

3.1. Data

The database used for the present research is from the *European Union Statistics on Income and Living Conditions* (EU-SILC) for the period 2008-2011 elaborated by Eurostat. This data panel offers information on work income, hours of work, personal characteristics, working and living conditions and the health of workers in different

European countries. Using the panel information, we have been able to elaborate the gross wage per hour of a worker, as well as several human capital variables (levels of education, experience and type of occupation)[1]. Also available is information on personal (such as gender) and work (type of contract) characteristics. With respect to health, this is measured by way of a set of three fictitious variables which reflect the degree of the health problem limiting the work activity of the individual. The three variables are: "strong lim" (which takes value 1 if an individual indicates that he is strongly limited in an activity due to his state of health); "weak lim" (which takes value 1 if an individual indicates simply that he is limited in an activity due to his state of health); and "no limitation" (proposed as the reference category)[2]. Moreover, the effect of the economic cycle is introduced using the inter-annual variation in GDP corresponding to the last quarter of each year for the period 2008-2011 (IVGDP). Note that this period corresponds to the worse years of the recent economic crisis. By using this variable it is possible to ascertain how the crisis affects the levels of efficiency in the labour market when wages are established (that is, how it influences the distance of the wages received by workers in relation to their potential levels). Finally, to be taken into account is the fact that the availability of panel data can serve to correct the unobservable heterogeneity of workers. In that sense, we note that this panel data is unbalanced. Some individuals are observed over four years in the sample, but others are observed over periods of less than four years[3]. All individuals in the sample remain as wage earners throughout the period. Individuals disappear from the sample at the time they go into a situation of unemployment or inactivity, because in those cases we are unable to ascertain their wages. However, the fact that they are sick is not a problem for the sample given that sick workers continue receiving sick leave payments (these amounts being included in the gross total annual remuneration of workers used to compute the wage per hour).

All of these variables are defined in Table A1 of the Appendix. Table A2 presents the descriptive statistics of the model variables for the sixteen countries considered in our

[1] It is worth noting that the sample is composed solely by wage-earner workers, with self-employed being excluded. Besides, wages are computed at constant prices (real wages) taking 2015 as the base year.

[2] Since we are estimating a Mincer wage equation our analysis focuses only on workers who are in the labour market. Therefore, these results cannot be extrapolated to individuals who, because of their strong health limitations, are outside the labour market.

[3] The presence of an individual in a particular year is controlled by means of yearly dummy variables: D_{2008}-D_{2011}.

research: Austria, Belgium, Denmark, Slovakia, Spain, Finland, France, Greece, Italy, Luxembourg, Norway, Poland, Portugal, United Kingdom, Romania and Sweden. Note that appreciable differences exist between the labour forces of the different European countries. For example, in terms of level of studies, the percentage of workers with university studies varies between 15.9% for Portugal and 45.8% for Finland. In general, this percentage is greater in the Northern European countries (Norway, Denmark, Sweden) than in those of the South (Greece, Italy, Portugal), with the exception of Spain which is closer to the Nordic nations. There are also significant differences in terms of the type of contract. In general, the percentage of permanent workers is around 90%; nevertheless, countries like Spain (77.9%), Poland (73.3%), Greece (75.7%) and, specially, the United Kingdom (61.9%), are notable for their high proportion of temporary workers. With respect to state of health, the great majority of workers (about 90%), indicate that they do not suffer any health problems which limit their activity, although in countries such as Finland, Slovakia and Denmark this figure is reduced to around 80%. Finally, great differences exist with respect to the intensity of the drop in GDP, highlighting particularly the negative rates of countries like Greece, Portugal and Spain.

3.2. The estimates

As already mentioned, in this research we estimate a wage frontier for various countries following the *true-random-effects* model of [29]. This model is preferred to the *true-fixed-effects* model in the presence of panel data where as is our case, the number of individuals is relatively large compared with the length of the panel. Specifically, a parametric stochastic frontier model will be used[4]. The stochastic frontier assumes that the deviation between observed and potential wage has two components: a symmetrical error term which captures the effect of variables which are not controlled by the individuals, measurement errors and/or other statistical noise; and a second term which is assumed to capture the *degree of inefficiency*, situating a worker below their potential frontier and because of this it is necessary to specify an asymmetrical distribution for this second error term.

[4] It is possible to distinguish between deterministic and stochastic frontiers. The deterministic frontier assumes that any deviation from the frontier is due to inefficiency, while the stochastic frontier incorporates the statistical noise. Hence, in deterministic frontiers any measurement error and any other source of stochastic variation in the dependent variable are attributed to inefficiency. Moreover, given that the number of individuals is very large, it is not possible to perform the Housman test to contrast whether the model is of a fixed or random effects nature.

In particular, the Mincer wage frontier will be defined as a function which relates wage to the human capital of workers:

$$\ln W_{it} = \alpha_0 + \alpha_{ex} Ex_{it} + \alpha_{exx} Ex_{it}^{\ 2} + \alpha_{ed} D_{ed} + \alpha_{oc} D_{oc} + \sum_{t=2008}^{2011} \alpha_t D_t - u_{it} + v_{it} \quad (1)$$

where W is gross wage per hour; i represents individuals and t time (t=2008…2011); D_{ed}, D_{oc} and D_t are *dummies* for education, occupation and time respectively; and Ex is work experience. Lastly, u represents the distance to the frontier which follows the distribution $u_{it} \approx N^{+}(0, \sigma_u^2)$; and v_{it} is the random disturbance term which follows the distribution $v_{it} \approx N(0, \sigma_v^2)$

Expression (1) is the function to be estimated. Additionally, in this study we propose the application of the model developed by [24], [26] and [30], where the error component u_{it} follows a normal distribution with a mean equal to 0 and a variance σ_u^2, the latter depending on a series of explanatory variables represented by the vector z. That is:

$$\sigma_u^2 = g(z, \delta) \quad (2)$$

where δ is a vector of the coefficients of the variables to be estimated. This specification permits modelling a non-constant variance error (with heteroscedasticity) as a function of a set of socio-economic variables which explain the distance to the wage frontier. More precisely, in our research the variables that are characterised by vector z are: gender, type of contract (temporary or permanent); economic cycle and health limitations.

Given the heterogeneity among the different countries, we estimate a wage equation frontier separately for each country in order to capture, in the best possible way, the process of generating wages of each one. However, as far as the effect of health status on wages is concerned, there may be regulations about sick leave payments that affect workers differently according to their occupation, type of company, etc. The key question here is that those factors are mainly unobserved or difficult to measure. This would imply that the estimation of wage equations may suffer from omitted variables, leading to a potential bias. However, these specific characteristics of workers, even if they are unobserved, do not pose an econometric problem for our model, since the methodology we apply (a panel data at individual level using the Greene true-random-effects model), allows us to capture unobservable heterogeneity at an individual (worker) level.

To summarise, the present study proposes the estimation of the system of equations represented by (1) and (2), which will jointly resolve the objective of approximating the potential wage of each individual given their human capital and explaining the difference between said wage potential and that really being received (distance to the wage frontier). Once equations (1) and (2) have been estimated, this distance is calculated through the so-called *Technical Efficiency Indices* (*TE*) by way of the following expression:

$$ET = exp\ (-\ u) \qquad (3)$$

In this way, we guarantee that ($0 < ET \leq 1$). Thus, if *ET* takes the value of 1 the individual will be situated on his/her wage frontier, whilst if it achieves a value less than 1 this will imply that his/her wage is inferior to the potential wage, given the human capital endowment. The further away index *ET* is from the value unity, the greater the distance of the worker from his/her frontier (for more details, see for example, [23]).

The results of our estimates are shown in Tables 1 and 2. In general, the coefficients of the explanatory variables are statistically significant and bear the expected sign. Starting with the estimation of the frontier function which shows the effect of the human capital variables on the wage logarithm, as expected work experience has a parabolic effect on wages for nearly all the countries (a positive coefficient and with a negative and lesser absolute value coefficient for experience squared)[5]. On the other hand, we also observe that, in general, wages increase in line with the increase in studies ("primary or less" being the reference category). In nearly all the countries, the greatest increase in wages with respect to the reference category is achieved by an individual with university studies (with the exception of Finland, where the greatest positive effect corresponds to post-secondary non-university studies). With respect to the type of occupation, we also see that wages increase (compared to the reference category of "unskilled" work), for all of the remaining categories (with some exceptions, for example, skilled agricultural workers in Spain, Italy, Austria and France who earn an inferior wage)[6]. In the estimation of the frontier we have also controlled for the year of each observation via a set of dummy variables (the reference category is the "year 2008").

[5] For example, the maximum wage is reached after 38.4 years of experience in the case of Spain. For the case of Norway the experience squared is not statistically significant. On the other hand, in the case of the United Kingdom we have used worker age instead of work experience as a specific *proxy* of human capital, given that the variable for work experience is not available in the majority of cases in the database.

[6] The same is true, for example, in the case of France for workers in the service sector and operators.

It is worth noting that, despite the intensity of the crisis that commenced in 2008, some countries experienced a progressive increase in real wages (in constant prices) until 2010 (Spain and Luxembourg) or 2011 (Denmark and Slovakia)[7]. Nevertheless, real wages did not significantly increase in Austria; seeing a reduction over the whole period 2009-2011 in Finland, France, Greece and the United Kingdom (countries whose labour markets reacted more quickly to the drop in demand generated by the crisis). In other cases, wage adjustment occurs only during two years (Poland) or during only one (Belgium, Italy, Norway, Portugal, Sweden and Romania)[8].

In general, we conclude that the wage frontier is explained by the effect of the variables which represent the human capital of individuals. Nevertheless, labour market imperfections prevent workers from obtaining the potential wages which guarantee their training. The results of the model (Equation 2) indicate that being a man and holding a permanent contract are factors which contribute to reducing the distance with respect to the frontier in nearly all the countries (women with temporary contracts earn less than their potential wage)[9]. Both results reflect the existence of discrimination processes in the labour market. On the other hand, in some countries the reductions in the rate of growth of GDP observed for the period 2008-2011 have contributed towards increasing the distance between the wages perceived with respect to potential ones (the negative sign for the variable IVGDP). In other words, the crisis has led to an increase in the inefficiency of the labour market in those countries which have suffered most (as in Spain, Portugal and Greece)[10]. Nevertheless, in the United Kingdom, Denmark, Finland, Slovakia and Norway no effect is observed (the variable IVGDP is not statistically significant), and even in countries like Sweden, Italy, Romania, Luxembourg and France, this variable presents a positive sign.

As regards our main objective, the effect of health limitations on wages, the distance between perceived wage and the frontier increases significantly when the worker suffers health problems which limit in either a strong or a weak way their work activity

[7] For example, in the Spanish case the internal devaluation process occurred mainly from 2012 onwards, coinciding with the application of the labour reform.
[8] The case of Romania must be highlighted where the estimate only incorporates the information corresponding to the years 2008 and 2009, given that the database did not offer information on this variable in the years 2010 and 2011.
[9] Nevertheless, in countries like Denmark and Portugal the gender effect is not statistically significant. The exception for Denmark was also found in the study by [31].
[10] The same occurs in Austria, Belgium and Poland.

(the reference category is that without limitations). In the majority of countries, the effect of strong limitations is greater than in the case of weak limitations (Spain, Belgium, Norway and Portugal). In other cases, only strong limitations appear relevant, but not the weak ones (the United Kingdom, Sweden, France and Poland); or the weak ones as opposed to the strong ones (Greece).[11] Finally, a group of countries exist where these limitations are not statistically significant (in the case of Finland, Denmark, Austria, Italy, Luxembourg and Romania).

Table 2 shows the technical efficiency indices, *TE*, obtained via equation (3). The mean of these indices for the sixteen countries analysed is 0.78, that is, on average workers are receiving 78% of their potential gross wage per hour and, therefore, given their human capital, they could obtain 22% more remuneration. By gender, male wages are systematically greater than females in all the countries analysed. On average, men are 19 percentage points below their potential wage whereas for women said difference increases to 26%. Hence, the wage differential by gender is 7%. Moreover, significant differences exist in wages depending on whether or not the contract is permanent or temporary. Systematically and as already mentioned in the analysis of the Mincer equation estimated, workers with a permanent contract earn more than those on a temporary contract, namely, 17% more.

As regards the relationship between health and wages, workers with no type of limitation earn 78.2% of their potential wage whereas with a strong limitation this percentage is reduced to 72.1%. Therefore, suffering a strong limitation reduces gross wage per hour by 6.1%. This wage reduction is also observed in the case of a weak limitation, but here the wage difference with respect to the reference group (those without any limitation) is 2.6%.

If we undertake an analysis by countries, Denmark and UK are the countries that, on average, are closer to their potential salary. For these countries, if we analyse the situation of workers who have some type of limitation in terms of work performance, we see that the differences are not very high with respect to those that do not have any health limitation. Thus, workers with a strong limitation in Denmark earn 1.2% less than healthy workers. This difference is reduced to 0.5% for workers with a weak limitation. A similar

[11] For the case of Greece, strong limitation is not statistically significant. This may be due to the small number of Greek workers who have a strong limitation in the sample used (see Table A2).

situation can be observed for the UK. The workers earn 5.3% and 1.6% less if they have a strong and weak limitation respectively. However, the results are different if we analyse the countries where workers are farthest away from their potential salary, in our sample Norway, Sweden and Poland. In this case, it is observed that, in general terms, workers who have health limitations that affect their work activity are far more distant from their potential salary than those who do not have health limitations. For example, workers with strong health constraints in Norway, Sweden and Poland earn 17.8%, 10.9% and 7.2% less respectively, than those without such limitations, while weak-limit workers earn 7.3%, 2.8% and 3.4%, respectively.

In summary, from the analysis carried out in this research, we deduce that the limitations for the performance of labour activities seem to affect wages negatively in most of the countries analyzed, and that this effect is larger the greater the limitation[12].

4. CONCLUSIONS

The model used in this research has allowed us to analyse the differences in wages/productivity resulting from the different human capital endowments of the workers of various European countries, at the same time helping to explain the losses in wages (inefficiency) of the workers as a function of several personal and relevant job characteristics. With this aim in mind, we have estimated a wage equation frontier separately for each country to capture, in the best possible way, the process of wage generation of each one. Moreover, and in order to control for those factors unobserved or difficult to measure, we have used panel data at worker level using the Greene true-random-effects model that allows us to capture unobservable heterogeneity at an individual level.

The results indicate that the potential wage per hour of workers (their wage frontier) is significantly and positively influenced by their educational level and displays a parabolic relationship in terms of the number of years of work experience (the

[12] Others studies present a different approach analyzing the effect of health on the probability of participating in the labour market ([32], [33] and [34]). In this case, and as [32] points out: "this creates a selection problem as the decision to participate in the labour market is likely to be non-randomly determined and this is unlikely to be fully covered by observable factors". Because of this, they tackle this selection problem by applying a Heckman procedure.

relationship bearing an inverted U form). These results, consistent with traditional theory, are confirmed for nearly all the countries analysed.

Furthermore, the model estimated allows us to analyze the factors influencing the factors influencing the fact that workers do not attain their potential wage given their human capital endowment. The results indicate that certain characteristics, such as being a woman or possessing a temporary contract, distance an individual from their wage frontier. On the other hand, the recent economic crisis has increased the inefficiency of the wage-setting mechanism in some countries, particularly those of Southern Europe (Spain, Greece and Portugal). That is, the falls in GDP in these countries have resulted in significant increases in the distances between perceived wages as compared to their potential values.

We have considered the influence of workers' health problems in achieving or not their potential wages. According to the technical efficiency indexes calculated and for all the countries analyzed, the workers suffering from some type of limitation motivated by health issues (both strong and weak), attain lower wages than they would otherwise have obtained, *ceteris paribus*, in the absence of said limitation. More precisely, having a weak limitation for the purpose of undertaking work implies (on average) a wage which is 2.6% lower than that obtained by a worker not suffering any kind of limitation. In the case of workers suffering from a strong limitation, the loss in potential wage increases to 6.1%. That is to say, health limitations to work activity contribute, *ceteris paribus*, towards an individual not attaining the potential wages guaranteed by his/her human capital endowment. Moreover, the results also show that in those countries where the difference between potential and observed wages is generally greater, workers' wages are the most affected by health limitation issues.

In conclusion, and although in quantative terms the factors which distance individuals from their potential wage in the most significant way are related to gender discrimination (being a woman reduces potential wage by 7% compared to men) and with the type of contract (temporary workers earn on average 17% less tan permanent staff), health problems are also relevant when explaining wage differences and, thus, they need to be taken into account when analyzing the latter.

The results obtained can have important implications in terms of economic policy. Without doubt, governments should continue fighting towards maximizing the reduction

in gender discrimination as well as trying to regulate those contract types which cause temporary workers to be penalized excessively at remuneration levels when compared with permanent staff, all of this with a view to obtaining an optimum wage-setting mechanism. But in order, to fully achieve this objective, we have also seen that they need to take into consideration the implications of health policies particularly as regards labour markets. In other words, the health problems of the population end up affecting wages, thereby contributing towards more pronounced inefficiencies in the labour market. Promoting health prevention campaigns for the most incapacitating illnesses, the implementation of more resources in companies to guarantee better health and work security, will serve to contribute towards, not only, a better level of general health for the population, but also the generation of a more efficient wage-setting mechanism.

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TABLE 1. STOCHASTIC MINCER FUNCTION FRONTIER ESTIMATED (I)
(Dependent Variable: log of gross wage per hour)

	AUSTRIA			BELGIUM			DENMARK			SLOVAKIA			SPAIN			FINLAND		
	Coef.	**t**	**Prob**	**Coef.**	**t**	**Prob**	**Coef.**	**t**	**Prob**	**Coef.**	**t**	**Prob**	**Coef.**	**t**	**Prob**	**Coef.**	**t**	**Prob**
Exp	0.03	19.45	0.00	0.02	15.93	0.00	0.03	9.81	0.00	0.02	13.29	0.00	0.02	21.30	0.00	0.03	12.51	0.00
(Exp)^2	0.00	-12.45	0.00	0.00	-9.20	0.00	0.00	-6.09	0.00	0.00	-11.07	0.00	0.00	-12.75	0.00	0.00	-8.40	0.00
Secondary1	0.11	1.65	0.10	0.06	2.91	0.00	0.22	1.88	0.06	-0.03	-0.29	0.78	0.04	3.76	0.00	-0.02	-0.34	0.73
Secondary2	0.32	4.99	0.00	0.13	6.08	0.00	0.30	2.65	0.01	0.05	0.47	0.64	0.15	11.61	0.00	0.11	1.62	0.11
Postsecnou	0.45	6.91	0.00	0.16	5.18	0.00	0.32	1.32	0.19	0.08	0.83	0.41	0.19	4.81	0.00	0.26	2.37	0.02
University	0.58	8.87	0.00	0.34	14.41	0.00	0.44	3.84	0.00	0.24	2.49	0.01	0.24	17.65	0.00	0.15	2.20	0.03
Managers	0.34	14.29	0.00	0.22	10.27	0.00	0.49	10.67	0.00	0.55	20.12	0.00	0.60	22.77	0.00	0.71	19.08	0.00
Professionals	0.34	15.22	0.00	0.19	10.52	0.00	0.40	10.53	0.00	0.39	16.70	0.00	0.62	38.80	0.00	0.56	16.27	0.00
Technicians	0.21	11.57	0.00	0.14	8.18	0.00	0.20	5.83	0.00	0.33	16.94	0.00	0.33	20.46	0.00	0.35	10.84	0.00
Clerks	0.17	9.07	0.00	0.09	5.51	0.00	0.14	3.52	0.00	0.22	9.69	0.00	0.18	12.32	0.00	0.30	7.87	0.00
Services	0.02	1.15	0.25	0.01	0.79	0.43	0.09	1.90	0.06	0.05	2.40	0.02	0.05	3.48	0.00	0.07	2.17	0.03
Skilled agr.	-0.16	-2.79	0.01	-0.06	-0.88	0.38	0.06	0.62	0.54	0.15	2.04	0.04	-0.07	-2.05	0.04	0.01	0.10	0.92
Skilled ind.	0.06	3.41	0.00	0.03	1.56	0.12	0.07	1.76	0.08	0.26	12.70	0.00	0.12	8.75	0.00	0.11	3.09	0.00
Operators	0.04	1.90	0.06	0.04	1.71	0.09	0.09	1.87	0.06	0.24	11.26	0.00	0.12	8.10	0.00	0.17	4.46	0.00
Armed forces	0.12	1.70	0.09	0.18	1.60	0.11	0.31	2.34	0.02	0.63	7.04	0.00	0.41	10.09	0.00	0.48	3.95	0.00
No reply occupation	0.14	3.99	0.00	0.14	5.12	0.00	0.27	7.65	0.00	0.14	2.03	0.04	0.13	2.39	0.01			
D_{2009}	0.01	0.52	0.605	-0.02	-1.45	0.15	0.02	1.79	0.074	0.13	17.77	0.00	0.04	5.33	0.00	-0.05	-3.96	0.00
D_{2010}	-0.01	-0.72	0.472	-0.01	-0.70	0.48	0.03	2.17	0.03	0.17	24.30	0.00	0.02	3.33	0.00	-0.05	-4.10	0.00
D_{2011}	-0.01	-1.01	0.314	-0.07	-5.43	0.00	0.03	2.55	0.011	0.19	26.26	0.00	-0.04	-5.25	0.00	-0.04	-3.74	0.00
constant	2.11	31.94	0.00	2.52	88.50	0.00	2.45	20.29	0.00	0.85	8.60	0.00	1.90	113.95	0.00	2.32	31.23	0.00
ET determinants																		
Permanent	-1.45	-17.94	0.00	-2.21	-27.05	0.00	-2.59	-10.45	0.00	-1.53	-23.75	0.00	-1.36	-32.25	0.00	-1.63	-16.75	0.00
Man	-0.51	-8.47	0.00	-0.59	-8.81	0.00	0.03	0.31	0.75	-0.45	-8.74	0.00	-0.40	-9.86	0.00	-0.26	-3.37	0.00
IVGDP	-0.15	-5.61	0.00	-0.16	-5.41	0.00	0.03	1.54	0.12	0.01	0.91	0.37	-0.03	-1.81	0.07	0.01	0.84	0.40
Strong lim	0.21	1.26	0.21	0.47	2.34	0.02	0.31	1.56	0.12	0.86	6.61	0.00	1.14	7.55	0.00	0.05	0.22	0.83
Weak lim	-0.08	-0.97	0.33	0.27	2.63	0.01	-0.05	-0.43	0.67	0.33	5.67	0.00	0.13	2.08	0.04	0.09	1.05	0.29
constant	-0.98	-11.50	0.00	-0.72	-8.37	0.00	-0.87	-3.48	0.00	-1.47	-22.19	0.00	-1.55	-33.18	0.00	-1.49	-14.90	0.00
Nº observations	12,339			10,738			4,758			14,064			23,642			6,833		

TABLE 1. STOCHASTIC MINCER FUNCTION FRONTIER ESTIMATED (II)
(Dependent Variable: log of gross wage per hour)

	FRANCE			GREECE			ITALY			LUXEMBURG			NORWAY		
	Coef.	**t**	**Prob**	**Coef.**	**t**	**Prob**	**Coef.**	**t**	**Prob**	**Coef.**	**t**	**Prob**	**Coef.**	**t**	**Prob**
Exp	0.02	18.91	0.00	0.04	20.69	0.00	0.03	26.57	0.00	0.03	20.34	0.00	0.01	3.85	0.00
$(Exp)^2$	0.00	-9.25	0.00	0.00	-12.11	0.00	0.00	-14.71	0.00	0.00	-9.45	0.00	0.00	-1.02	0.31
Secondary1	0.06	3.74	0.00	0.04	1.64	0.10	0.06	4.08	0.00	0.11	7.99	0.00	-0.08	-1.87	0.06
Secondary2	0.09	6.26	0.00	0.14	6.33	0.00	0.20	13.82	0.00	0.21	16.15	0.00	0.06	1.44	0.15
Postsecnou	0.05	1.03	0.31	0.17	6.20	0.00	0.24	10.54	0.00	0.22	7.26	0.00	0.16	2.82	0.01
University	0.31	17.68	0.00	0.32	12.50	0.00	0.41	23.96	0.00	0.42	22.85	0.00	0.23	5.56	0.00
Managers	0.29	14.91	0.00	0.64	14.79	0.00	0.57	25.49	0.00	0.60	22.99	0.00	0.43	10.07	0.00
Professionals	0.25	14.29	0.00	0.69	24.53	0.00	0.53	31.52	0.00	0.62	27.62	0.00	0.31	7.12	0.00
Technicians	0.07	5.01	0.00	0.42	15.42	0.00	0.37	27.46	0.00	0.38	20.11	0.00	0.28	6.80	0.00
Clerks	0.00	0.23	0.82	0.27	10.42	0.00	0.28	20.31	0.00	0.22	10.97	0.00	0.15	3.12	0.00
Services	-0.12	-7.71	0.00	0.14	5.49	0.00	0.12	8.26	0.00	-0.03		0.10	0.11	2.69	0.01
Skilled agr.	-0.14	-4.55	0.00	0.28	4.31	0.00	-0.07	-1.96	0.05	-0.07	-1.53	0.13	-0.01	-0.10	0.92
Skilled ind.	-0.01	-0.35	0.73	0.13	5.43	0.00	0.11	8.20	0.00	-0.03	-1.79	0.07	0.18	3.98	0.00
Operators	-0.05	-2.91	0.00	0.21	6.96	0.00	0.18	11.93	0.00	-0.01	-0.65	0.52	0.16	3.35	0.00
Armed forces	0.01	0.31	0.76	0.44	9.20	0.00	0.50	16.51	0.00	0.17	2.17	0.03	0.94	6.21	0.00
No reply occupation	0.39	18.23	0.00							-0.91	-1.68	0.09	0.21	3.51	0.00
D_{2009}	-0.02	-4.10	0.00	-0.03	-3.70	0.00	0.01	1.27	0.20	0.02	3.64	0.00	0.00	0.37	0.71
D_{2010}	-0.02	-3.05	0.00	-0.07	-8.51	0.00	0.01	1.95	0.05	0.02	2.25	0.02	-0.05	-5.13	0.00
D_{2011}	-0.01	-2.16	0.03	-0.13	-13.24	0.00	-0.02	-2.87	0.00	0.00	-0.19	0.85	0.08	8.10	0.00
constant	2.33	118.23	0.00	1.62	57.82	0.00	1.92	95.86	0.00	2.39	113.71	0.00	3.08	58.34	0.00
ET determinants												-1.64			
Permanent	-1.99	-54.72	0.00	-1.72	-25.84	0.00	-2.08	-50.96	0.00	-2.24	-35.07	0.00	-2.01	-22.24	0.00
Man	-0.79	-24.64	0.00	-0.37	-5.61	0.00	-0.42	-12.46	0.00	-1.09	-21.77	0.00	-0.62	-10.53	0.00
IVGDP	0.06	5.69	0.00	-0.03	-2.94	0.00	0.05	5.70	0.00	0.03	5.04	0.00	0.02	0.75	0.45
Strong lim	0.69	8.71	0.00	0.10	0.34	0.73	-0.17	-1.45	0.15	0.06	0.48	0.63	1.72	8.87	0.00
Weak lim	0.07	1.45	0.15	0.28	1.87	0.06	-0.08	-1.54	0.12	0.05	0.69	0.49	0.57	5.57	0.00
constant	-0.45	-12.19	0.00	-1.74	-19.47	0.00	-0.56	-13.18	0.00	-0.46	-6.93	0.00	-0.21	-2.24	0.03
Nº observations	31,814			9,630			28,872			16,850			8,708		

TABLE 1. STOCHASTIC MINCER FUNCTION FRONTIER ESTIMATED (III)
(Dependent Variable: log of gross wage per hour)

	POLONIA			PORTUGAL			ROMANIA			SWEDEN			UK		
	Coef.	**t**	**Prob**	**Coef.**	**t**	**Prob**	**Coef.**	**t**	**Prob**	**Coef.**	**t**	**Prob**	**Coef.**	**t**	**Prob**
Exp	0.03	22.70	0.00	0.03	15.96	0.00	0.01	6.02	0.00	0.03	9.86	0.00	0.04	13.98	0.00
$(Exp)^2$	0.00	-14.73	0.00	0.00	-10.09	0.00	0.00	-3.71	0.00	0.00	-6.58	0.00	0.00	-12.19	0.00
Secondary1	-0.08	-1.54	0.12	0.15	8.75	0.00	0.06	0.44	0.66	0.04	0.72	0.47	-0.09	-3.72	0.00
Secondary2	0.13	5.74	0.00	0.29	14.02	0.00	0.18	1.39	0.16	0.07	1.35	0.18	0.00	-0.01	1.00
Postsecnou	0.12	3.86	0.00	0.36	7.83	0.00	0.31	2.32	0.02	0.20	3.49	0.00	0.06	0.31	0.76
University	0.44	16.78	0.00	0.88	29.80	0.00	0.48	3.63	0.00	0.28	5.24	0.00	0.22	10.70	0.00
Managers	0.76	30.20	0.00	0.17	5.83	0.00	0.78	11.93	0.00	0.27	6.66	0.00	0.46	21.89	0.00
Professionals	0.60	26.82	0.00	0.25	8.61	0.00	0.61	12.35	0.00	0.17	4.67	0.00	0.44	19.52	0.00
Technicians	0.42	19.99	0.00	0.14	7.02	0.00	0.42	11.07	0.00	0.13	3.68	0.00	0.33	15.29	0.00
Clerks	0.25	11.08	0.00	0.08	4.48	0.00	0.31	7.14	0.00	0.05	1.52	0.13	0.19	9.16	0.00
Services	0.08	4.05	0.00	0.00	-0.15	0.88	0.10	2.86	0.00	0.10	2.87	0.00	0.00	-0.11	0.92
Skilled agr.	0.08	1.23	0.22	-0.05	-1.23	0.22	0.00	-0.04	0.97	-0.07	-0.88	0.38	0.04	0.61	0.54
Skilled ind.	0.23	12.18	0.00	-0.01	-0.47	0.64	0.21	6.31	0.00	0.00	0.06	0.96	0.19	7.68	0.00
Operators	0.31	15.80	0.00	0.03	1.67	0.09	0.21	5.94	0.00	0.00	-0.03	0.98	0.04	1.68	0.09
Armed forces	0.76	12.46	0.00	0.13	1.38	0.17	0.79	6.54	0.00	0.15	1.51	0.13			
No reply occupation	-0.06	-0.52	0.60							0.09	1.36	0.17			
D_{2009}	0.06	7.45	0.00	-0.03	-4.23	0.00	-0.07	-5.66	0.00	0.00	0.00	1.00	-0.13	-9.68	0.00
D_{2010}	-0.14	-16.17	0.00	0.00	0.29	0.77				-0.09	-7.51	0.00	-0.15	-9.35	0.00
D_{2011}	-0.06	-5.82	0.00	-0.01	-1.14	0.26				0.04	3.13	0.00	-0.24	-14.39	0.00
constant	0.72	25.51	0.00	1.36	52.90	0.00	0.29	2.22	0.74	0.22	2.45	0.00	1.83	29.69	0.00
ET determinants															
Permanent	-1.55	-38.37	0.00	-1.98	-29.19	0.00	-1.49	-5.40	0.00	-2.25	-25.58	0.00	-0.49	-4.20	0.00
Man	-0.27	-6.81	0.00	-0.04	-0.69	0.49	-0.96	-7.32	0.00	-0.98	-14.85	0.00	-0.73	-8.35	0.00
IVGDP	-0.04	-1.76	0.08	-0.07	-4.71	0.00	0.05	3.23	0.00	0.02	2.32	0.02	-0.01	-0.53	0.59
Strong lim	0.52	3.62	0.00	0.37	1.72	0.09	1.07	1.28	0.20	0.97	5.74	0.00	0.76	4.02	0.00
Weak lim	0.08	1.16	0.25	0.35	4.20	0.00	0.18	0.77	0.44	-0.10	-0.82	0.41	0.17	1.39	0.16
constant	-1.09	-10.95	0.00	-1.59	-22.94	0.00	-1.55	-5.48	0.00	0.22	2.45	0.01	-2.63	-29.13	0.00
Nº observations	22,225			8,872			3,684			6,888			15,394		

TABLE 2: TECHNICAL EFFICIENCY INDICES (TE)

	Country mean	Woman	Man	No lim	Weak lim	Strong lim	Temporary	Indefinite
AUSTRIA	0.779	0.746	0.808	0.780	0.778	0.751	0.625	0.797
BELGIUM	0.817	0.789	0.845	0.821	0.790	0.777	0.635	0.836
DENMARK	0.827	0.813	0.845	0.827	0.822	0.815	0.584	0.831
SLOVAKIA	0.787	0.745	0.830	0.796	0.760	0.713	0.671	0.802
SPAIN	0.780	0.748	0.809	0.783	0.762	0.701	0.685	0.807
FINLAND	0.798	0.764	0.832	0.801	0.783	0.789	0.655	0.815
FRANCE	0.751	0.719	0.782	0.755	0.736	0.683	0.600	0.781
GREECE	0.774	0.733	0.808	0.775	0.746	0.756	0.636	0.818
ITALY	0.767	0.732	0.796	0.768	0.761	0.766	0.576	0.796
LUXEMBOURG	0.782	0.735	0.819	0.785	0.767	0.764	0.578	0.804
NORWAY	0.744	0.693	0.789	0.752	0.679	0.574	0.524	0.762
POLAND	0.735	0.708	0.758	0.738	0.704	0.666	0.637	0.770
PORTUGAL	0.756	0.716	0.796	0.763	0.713	0.705	0.631	0.787
ROMANIA	0.812	0.765	0.847	0.814	0.788	0.680	0.717	0.815
SWEDEN	0.727	0.686	0.774	0.732	0.704	0.623	0.541	0.748
UK	0.821	0.790	0.855	0.824	0.808	0.771	0.796	0.837
Mean	**0.779**	**0.743**	**0.812**	**0.782**	**0.756**	**0.721**	**0.631**	**0.800**

APPENDIX

Definitions of the variables and descriptive statistics

TABLE A1: VARIABLE DEFINITIONS

Dependent variable

Log of gross wage per hour	Logarithm of the quotient of gross total annual remuneration of workers in constant prices and the number of hours worked per year. In order to compute the wage per hour we use the gross remuneration measured by means ot variables PY010G and PY020G from the EU-SILC. Specifically, this variable is defined as the total remuneration, in cash or in kind, payable by an employer to an employee in return for work done by the latter during the income reference period. It includes the Gross employee cash or near cash income (PY010G) plus the Gross non-cash employee income (PY020G), but the employers' social insurance contributions (PY030G) are not included. It must be notice that gross total annual remuneration also includes sick leave payments.

Independent variables

Total work experience

Exp	Total number of years of work experience per worker
(Exp)^2	Square of total number of years of work experience per worker

Education level (according to the International Standard Classification of Education-ISCED 1997)

Primary or less	Dummy variable which takes value 1 if the individual has primary studies or less and 0 in the remaining cases
Secondary1	Dummy variable which takes value 1 if the individual has lower secondary studies and 0 in the remaining cases
Secondary2	Dummy variable which takes value 1 if the individual has upper secondary studies and 0 in the remaining cases
Postsecnou	Dummy variable which takes value 1 if the individual has post-secondary non-university studies (eg: Higher Level Training Cycle) and 0 in the remaining cases

University	Dummy variable which takes value 1 if the individual has university studies and 0 in the remaining cases
Type of occupation (ISCO-88)	
Managers	Dummy variable which takes value 1 if the individual is a director or manager and 0 in the remaining cases
Professionals	Dummy variable which takes value 1 if the individual is a technician, professional, scientist, intellectual and 0 in the remaining cases
Technicians	Dummy variable which takes value 1 if the individual is a technician or support worker and 0 in the remaining cases
Clerks	Dummy variable which takes value 1 if the individual is accounting or administrative staff and 0 in the remaining cases
Services	Dummy variable which takes value 1 if the individual is a service worker and 0 in the remaining cases
Skilled agr.	Dummy variable which takes value 1 if the individual is qualified agricultural worker and 0 in the remaining cases
Skilled ind.	Dummy variable which takes value 1 if the individual is a qualified industrial worker and 0 in the remaining cases
Operators	Dummy variable which takes value 1 if the individual is an installation and machinery operator and 0 in the remaining cases
Armed Forces	Dummy variable which takes value 1 if the individual belongs to the Armed Forces and 0 in the remaining cases
Unskilled	Dummy variable which takes value 1 if the individual is an unskilled worker (elementary occupations) and 0 in the remaining cases
No reply occupation	Dummy variable which takes value 1 if the individual does not give their occupation and 0 in the remaining cases
Year	

D_{2008}	Dummy variable which takes value 1 if the observation is of the year 2008 and 0 in the remaining cases
D_{2009}	Dummy variable which takes value 1 if the observation is of the year 2009 and 0 in the remaining cases
D_{2010}	Dummy variable which takes value 1 if the observation is of the year 2010 and 0 in the remaining cases
D_{2011}	Dummy variable which takes value 1 if the observation is of the year 2011 and 0 in the remaining cases
Type of contract	
Permanent	Dummy variable which takes value 1 if the individual has a permanent contract and 0 in the remaining cases
Gender	
Man	Dummy variable which takes value 1 if the individual is a man and 0 if a woman
Cycle	
IVGDP	Inter-annual variation in GDP at market prices corresponding to the last quarter of each year (Percentage). We refer to the Volume Chain-Linked Index (data corrected for seasonal and calendar effects)
Health Limitations	
Strong lim	Dummy variable which takes value 1 if the individual has health problems which strongly limit his/her professional activity for at least 6 months (including chronic illness) and 0 in the remaining cases
Weak lim	Dummy variable which takes value 1 if the individual has health problems which weakly limit his/her professional activity for at least 6 months (including chronic illness) and 0 in the remaining cases

No limitation	Dummy variable which takes value 1 if the individual has no health problems which limit his/her professional activity or they do not answer this question and 0 in the remaining cases

TABLE A2: DESCRIPTIVE STATISTICS (I)

	AUSTRIA		BELGIUM		DENMARK		SLOVAKIA		SPAIN		FINLAND	
	Mean	*De. St.*	*Mean*	*De. St.*	*Mean*	*De. St.*	*Mean*	*De. St.*	*Mean*	*De. St.*	*Mean*	*De. St.*
Log of gross wage per hour	2.762	0.631	2.887	0.528	3.196	0.484	1.276	0.523	2.289	0.603	2.834	0.604
Exp	20.352	11.255	18.906	11.290	22.474	11.577	20.153	11.542	19.106	11.399	20.582	11.931
$(Exp)^2$	540.88	484.22	484.89	478.90	639.10	536.94	539.36	476.89	495.01	508.69	565.96	516.84
Primary or less	0.005	0.067	0.046	0.211	0.005	0.075	0.0005	0.022	0.125	0.331	0.009	0.094
Secondary1	0.136	0.342	0.140	0.347	0.142	0.349	0.028	0.165	0.239	0.427	0.101	0.301
Secondary2	0.536	0.498	0.340	0.473	0.434	0.495	0.719	0.449	0.231	0.421	0.420	0.493
Postsecnou	0.125	0.330	0.031	0.173	0.000	0.028	0.018	0.134	0.006	0.078	0.010	0.100
University	0.197	0.398	0.441	0.496	0.416	0.493	0.233	0.423	0.396	0.489	0.458	0.498
Managers	0.055	0.229	0.069	0.253	0.044	0.205	0.053	0.224	0.024	0.155	0.109	0.312
Professionals	0.114	0.318	0.209	0.407	0.196	0.397	0.127	0.333	0.180	0.384	0.213	0.409
Technicians	0.210	0.407	0.164	0.370	0.350	0.477	0.241	0.428	0.101	0.302	0.180	0.384
Clerks	0.153	0.360	0.182	0.386	0.083	0.275	0.096	0.295	0.146	0.353	0.067	0.250
Services	0.148	0.355	0.093	0.291	0.040	0.197	0.128	0.334	0.166	0.372	0.172	0.377
Skilled agr.	0.005	0.075	0.003	0.060	0.007	0.086	0.005	0.075	0.011	0.107	0.016	0.126
Skilled ind.	0.132	0.338	0.091	0.288	0.082	0.274	0.148	0.355	0.120	0.326	0.104	0.305
Operators	0.058	0.234	0.061	0.241	0.052	0.223	0.126	0.332	0.096	0.295	0.067	0.251
Unskilled	0.106	0.308	0.100	0.300	0.063	0.243	0.068	0.252	0.139	0.346	0.063	0.243
Armed forces	0.002	0.053	0.000	0.028	0.003	0.057	0.002	0.045	0.009	0.094	0.005	0.076
No reply occupation	0.012	0.109	0.022	0.148	0.075	0.263	0.001	0.037	0.002	0.051	0	0
D_{2008}	0.127	0.333	0.123	0.329	0.105	0.306	0.125	0.331	0.136	0.343	0.093	0.291
D_{2009}	0.237	0.425	0.235	0.424	0.221	0.415	0.231	0.421	0.237	0.425	0.197	0.398
D_{2010}	0.338	0.473	0.340	0.474	0.335	0.472	0.330	0.470	0.336	0.472	0.374	0.484
D_{2011}	0.296	0.456	0.299	0.458	0.338	0.473	0.312	0.463	0.289	0.453	0.334	0.471
Permanent	0.899	0.300	0.906	0.291	0.983	0.127	0.889	0.313	0.779	0.414	0.892	0.309
Man	0.535	0.498	0.511	0.499	0.451	0.497	0.499	0.500	0.528	0.499	0.494	0.500
IVGDP	0.803	1.232	1.074	1.281	-0.074	2.606	1.123	3.425	-1.191	1.339	0.496	4.339
Strong lim	0.023	0.152	0.018	0.135	0.039	0.195	0.025	0.157	0.010	0.100	0.025	0.156
Weak lim	0.130	0.336	0.086	0.281	0.140	0.347	0.176	0.381	0.090	0.286	0.179	0.383
No limitation	0.846	0.360	0.894	0.306	0.819	0.384	0.797	0.401	0.899	0.300	0.795	0.403
Nº of observations	12,339		10,738		4,758		14,064		23,642		6,833	

TABLE A2: DESCRIPTIVE STATISTICS (II)

	FRANCE		GREECE		ITALY		LUXEMBURG		NORWAY		POLAND	
	Mean	*De. St.*	*Mean*	*De. St.*	*Mean*	*De. St.*	*Mean*	*De. St.*	*Mean*	*De. St.*	*Mean*	*De. St.*
Log of gross wage per hour	2.509	0.725	2.694	1.128	2.493	0.646	3.006	0.702	3.193	0.670	1.233	0.711
Exp	19.111	11.613	16.802	10.213	18.236	10.194	18.129	10.824	20.120	11.904	18.369	11.641
(Exp)^2	500.09	490.26	386.62	398.83	436.49	431.36	445.84	449.80	546.54	519.05	472.95	473.98
Primary or less	0.064	0.246	0.119	0.323	0.060	0.238	0.241	0.428	0.020	0.141	0.057	0.233
Secondary1	0.117	0.322	0.090	0.286	0.279	0.448	0.107	0.309	0.122	0.328	0.007	0.086
Secondary2	0.468	0.499	0.365	0.481	0.451	0.497	0.325	0.468	0.386	0.486	0.609	0.487
Postsecnou	0.001	0.037	0.074	0.261	0.038	0.191	0.014	0.120	0.034	0.181	0.057	0.233
University	0.347	0.476	0.351	0.477	0.170	0.376	0.311	0.463	0.436	0.495	0.267	0.442
Managers	0.063	0.243	0.022	0.148	0.022	0.147	0.048	0.215	0.121	0.326	0.051	0.220
Professionals	0.140	0.347	0.180	0.385	0.101	0.302	0.178	0.383	0.180	0.384	0.182	0.385
Technicians	0.204	0.403	0.105	0.307	0.219	0.413	0.207	0.405	0.269	0.443	0.126	0.332
Clerks	0.124	0.330	0.163	0.369	0.160	0.367	0.104	0.306	0.061	0.240	0.079	0.270
Services	0.124	0.329	0.172	0.377	0.124	0.330	0.103	0.305	0.162	0.369	0.126	0.332
Skilled agr.	0.018	0.135	0.008	0.090	0.012	0.110	0.009	0.096	0.007	0.088	0.006	0.077
Skilled ind.	0.099	0.299	0.138	0.341	0.144	0.351	0.139	0.346	0.088	0.284	0.192	0.394
Operators	0.086	0.281	0.072	0.259	0.103	0.304	0.063	0.243	0.060	0.238	0.131	0.337
Unskilled	0.106	0.308	0.112	0.316	0.096	0.295	0.141	0.348	0.030	0.171	0.098	0.297
Armed forces	0.012	0.110	0.023	0.151	0.014	0.118	0.002	0.052	0.002	0.047	0.005	0.071
No reply occupation	0.019	0.138	0	0	0	0	0.000	0.007	0.013	0.117	0.000	0.029
D_{2008}	0.224	0.417	0.172	0.377	0.140	0.347	0.234	0.423	0.229	0.420	0.123	0.329
D_{2009}	0.249	0.432	0.272	0.445	0.252	0.434	0.244	0.429	0.249	0.432	0.224	0.417
D_{2010}	0.275	0.447	0.341	0.474	0.336	0.472	0.278	0.448	0.271	0.444	0.336	0.472
D_{2011}	0.249	0.432	0.212	0.409	0.270	0.444	0.242	0.428	0.249	0.432	0.315	0.464
Permanent	0.830	0.375	0.757	0.428	0.867	0.338	0.902	0.296	0.925	0.263	0.733	0.442
Man	0.502	0.500	0.547	0.497	0.555	0.496	0.563	0.496	0.537	0.498	0.527	0.499
IVGDP	0.329	1.674	-6.240	3.570	-0.705	2.227	0.661	4.477	-0.003	1.260	3.898	0.986
Strong lim	0.030	0.172	0.009	0.098	0.018	0.133	0.028	0.165	0.014	0.120	0.013	0.115
Weak lim	0.100	0.300	0.035	0.184	0.095	0.293	0.093	0.291	0.068	0.252	0.072	0.260
No limitation	0.868	0.337	0.954	0.207	0.886	0.317	0.878	0.326	0.916	0.276	0.913	0.281
Nº of observations	31,814		9,630		28,872		16,850		8,708		22,225	

TABLE A2: DESCRIPTIVE STATISTICS (III)

	PORTUGAL		ROMANIA		SWEDEN		UK	
	Mean	*De. St.*	*Mean*	*De. St.*	*Mean*	*De. St.*	*Mean*	*De. St.*
Log of gross wage per hour	1.757	0.682	0.735	0.538	2.825	0.757	2.655	0.654
Exp	21.569	12.655	18.042	10.610	22.160	12.575	43.392	12.670
$(Exp)^2$	625.38	596.48	438.05	410.45	649.20	595.30	2,043.4	1,106.8
Primary or less	0.427	0.494	0.005	0.070	0.018	0.135	0.071	0.257
Secondary1	0.218	0.413	0.099	0.299	0.054	0.227	0.106	0.308
Secondary2	0.189	0.392	0.638	0.481	0.474	0.499	0.451	0.498
Postsecnou	0.005	0.071	0.058	0.234	0.061	0.239	0.0006	0.025
University	0.159	0.365	0.199	0.399	0.390	0.488	0.371	0.483
Managers	0.024	0.155	0.018	0.133	0.048	0.215	0.152	0.359
Professionals	0.105	0.306	0.145	0.353	0.223	0.416	0.142	0.349
Technicians	0.097	0.296	0.154	0.361	0.231	0.421	0.138	0.345
Clerks	0.110	0.313	0.068	0.251	0.081	0.273	0.152	0.359
Services	0.182	0.385	0.147	0.355	0.179	0.383	0.175	0.380
Skilled agr.	0.017	0.130	0.005	0.068	0.006	0.081	0.006	0.078
Skilled ind.	0.195	0.396	0.226	0.418	0.097	0.296	0.064	0.245
Operators	0.096	0.295	0.144	0.351	0.092	0.289	0.063	0.242
Unskilled	0.165	0.372	0.085	0.279	0.033	0.180	0.108	0.310
Armed forces	0.004	0.068	0.008	0.090	0.002	0.051	0	0
No reply occupation	0	0	0	0	0.003	0.057	0	0
D_{2008}	0.111	0.314	0.338	0.473	0.132	0.339	0.158	0.365
D_{2009}	0.233	0.423	0.662	0.473	0.243	0.429	0.236	0.425
D_{2010}	0.326	0.469	0	0	0.333	0.471	0.345	0.475
D_{2011}	0.327	0.469	0	0	0.290	0.453	0.261	0.439
Permanent	0.802	0.398	0.971	0.168	0.898	0.301	0.619	0.486
Man	0.504	0.500	0.565	0.496	0.465	0.498	0.479	0.500
IVGDP	-1.216	2.004	-2.518	5.015	1.389	4.803	0.195	2.329
Strong lim	0.016	0.127	0.004	0.064	0.026	0.161	0.020	0.143
Weak lim	0.126	0.332	0.058	0.233	0.067	0.251	0.080	0.271
No limitation	0.856	0.350	0.938	0.241	0.905	0.292	0.900	0.301
Nº of observations	8,872		3,684		6,888		15,394	