

Retirement in Western Europe: Evidence from Ten European Countries.

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Abstract

This work seeks to investigate how various demographic factors, macroeconomic environment and the institutional design of the retirement system influence the probability of the early retirement in ten European countries. An empirical analysis is carried out by estimating the linear probability model for the SHARE 2004 dataset. The results show that females and healthy individuals are less likely to retire before the standard retirement age. It is also demonstrated that the generosity and actuarial neutrality of the social security systems are able to influence the early retirement of the older workers through encouraging those who choose to longer careers by higher amount of old-age pension benefits. Structural break test is also carried out to test whether the effects are different in the Northern, Central, and Southern Europe, and the hypothesis of the parameter vectors equality is rejected.

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Introduction

Due to the overall trend of population ageing and concerns regarding the social and economic impact of this phenomenon, the number of works dedicated to research related to the physical and mental health state and financial well-being of the older generations, as well as to the decisions they make during this period of their lives (the most important one being the decision to retire), significantly increased during the recent period. The possibility of increased social burden due to the higher share of retired population calls for a careful investigation of what and to what extent are the decisive factors in adopting the decision to quit, in order to form expectations, which could be used to optimize the pension system, as well as to provide more efficient financial planning for individuals.

Obviously, there is a huge variation on individual level explained by different factors, both personal, that affect that single individual (e.g., his or her lifestyle, income, family status, age, satisfaction from work, etc.), and those that have a common effect on the particular group of people (e.g., the quality of healthcare or the institutional design of the pension system in the given country). In this context, it is very important to collect the comprehensive data that would contain extensive information on the individual level. One such dataset is the Health and Retirement Study, which comprises information obtained every 2 years on more than twenty thousand individuals (aged 50 and over) from the US. After an extensive amount of research based on these data had been carried out, a similar project was recently also launched in Europe. However, it is different from the HRS in a way that might constitute a significant advantage over the US twin: SHARE dataset was collected from 10 different countries rather than from a single one, each having its own distinct institutional setting, traditions of intra-family and

intergenerational relations, and its own specific lifestyle. This additional heterogeneity might enhance our knowledge of the situation of the aged population, but, more importantly, better understand the underlying causal relationships, especially those have to do with the country specific factors, such as the institutional design of the pension system.

The purpose of this work is to take a close look at the old generation in Europe, carry out a comparative study based on the differences in the setup of the retirement systems across states, try to build and estimate an econometric model to analyze the relationship between the labor force participation of the elderly and a wide set of micro and macro level factors that are likely to affect it.

For the comparison purposes, we will group countries as Northern, Central European, and Southern: this division is quite natural and based on historic differences across the regions, which is reflected in the local traditions and institutional settings.

We will also make a comparison to the results provided by a range of papers that have recently contributed to this field, such as Fischer and Sousa-Poza (2006), Dorn and Sousa-Poza (2005), Lahey, Kim, and Newman (2004), Johnson (2001, 2000), Blondal and Scarpetta (1999), who carried out empirical investigations on the micro and macro level, and found a significant effect of the demographic factors, institutional determinants and macroeconomic environment on the probability of retirement. We are going to carry out a similar estimation for the SHARE 2004 dataset, establish whether the results are going to be significantly different, and, if they are, try to propose some explanations for that difference. We are also going to compare the magnitude and

significance of particular effects across countries and regions in Europe and find some plausible reasons for this variation.

In the first chapter we describe the setup of the retirement systems in Europe and discuss the institutional determinants of the early retirement, such as the gross pension replacement rate, pension accrual rate, and pension wealth accrual rate. In the second chapter, we discuss the data collected through the SHARE 2004, describe the most important variables, such as the employment status, gender, age, and health conditions, and provide a cross-country and cross-regional comparison. In the third chapter, we build the econometric model that is going to be estimated, and in the fourth chapter, we report and analyze the empirical results for the whole set of observations and for the sub-samples of countries. We also compare them with the previous findings in this field and carry out a structural break test.

Chapter I. Overview of the institutional retirement determinants and pension systems in Western Europe

Since the middle of the 20th century there has been a noticeable downward trend in the average retirement ages in the developed countries. Blondal and Scarpetta (1999) report that while in the 1960s and 1970s in most of the OECD countries male population remained active until the age of 65 and above, by 1995 almost all the states (except Iceland) have seen a considerable decrease in the ages of retirement, up to as low as below 60 in some of them (Austria, Belgium, Luxembourg, the Netherlands, etc.). They also mention that while the female part of the population traditionally quits the labor force earlier, their retirement ages for women have generally followed the same patterns. These results remained robust to using different definitions of retirement. Blondal and Scarpetta (1999) applied Kaplan-Meier estimators to the European Union Labor Force Surveys to calculate the hazard functions for a range of countries. They found that the function that expresses the probability of exiting labor force at a particular age, conditional on being active up to that age, exhibits different age patterns for different countries, even for those having similar average retirement ages.

Why and at what age the older workers drop out of the labor force has been a subject for a number of studies: on the theoretical level, Johnson (2000), Mitchell and Fields (1982) argue that the labor supply is determined by the solution to the workers' utility optimization problem, where they are constrained by the trade-off between consumption and leisure. On the empirical level, both institutional and micro level determinants have received a lot of attention: Fallick (1996) and Farber (1993), for example have carried a number of empirical studies to show a significant role played by the sectoral affiliations and lower education levels of the older

workers, thus attenuating the effect of the age per se. Duval (2003), Johnson (2001, 2000), Blondal and Scarpetta (1999) point to the significant role played by the generosity and actuarial neutrality of the pension systems, as well as the early retirement opportunities. Also, the macroeconomic environment was found to be important by Fischer and Sousa-Poza (2006), Dorn and Sousa-Poza (2005b), Duval (2003), Blondal and Scarpetta (1999), who show that the level of national wealth, unemployment rate, degree of labor market protection all appear to influence the retirement decision.

The shape of the retirement system is undoubtedly among the most important factors that affect the labor force participation decision. There is a plentitude of factors of financial and legal nature that have to be taken into account when explaining the retirement decision, as they create a certain environment in which a particular individual finds himself or herself in his or her late years: the legal retirement age, amount of pension to be received, relative to the earnings of the working population, the prospects for continued labor force participation and receiving the retirement benefits at the same time, eligibility for the various non-employment benefit schemes, etc. all influence the likelihood of quitting the work. However, what is really important, the variation in the aforementioned factors across countries is strikingly huge, which provides a strong incentive for carrying out a cross-country study.

Generally, when speaking about the pension systems that exist nowadays in the Western Europe, one traditionally refers to the Bismarckian and the Beveridge systems, which both have a long history behind them. Even though in the course of years they came to be quite different from what they used to be, and the way a particular system is implemented can vary from

country to country, none of them existing in its pure form (basically, we usually encounter some combination of these two types), it is still useful to have them as the benchmarks, against which real world systems can be compared.

The Bismarckian system was introduced in the end of the 19th century in Germany in order to provide the means of subsistence for the aged population so that the standard of living comparable to that of active employment could be maintained: the workers paid the contributions and, depending on their amount, were eligible for a particular level of pension during their late years. This system gained popularity and quickly spread across the continent: today most of the countries in Central and Southern Europe, such as Germany, France, Belgium, Italy, Spain, Greece, Portugal, can be referred to as belonging to the Bismarckian type. It is also common to denote them as “systems of the insurance type” to emphasize that the obtained benefits are obtained as the result of and throughout an individual’s active working period, to ensure he has enough means once he quits the labor force. (Pension in the European Union, 2004) Such systems are funded through the contributions provided by both employers and employees, and the pension received is directly linked to the wages that were paid to this particular individual during the period he was employed.

The Beveridge system originated in the United Kingdom in the 1940s: it is characterized by the fact that the State guarantees a certain minimum benefit to each individual that resides in this particular country. This is why it is also often referred to as “the system of the universal type”. Obviously, the amount of funding raised through this kind of system rarely can be comparable to the wages one receives throughout his or her active working period. Therefore, in

countries where Beveridge system is implemented (the Scandinavian and Northern European states, the UK and Ireland) this minimum benefit is supplemented by the individual savings plans.

One should also note the difference in the way this system is implemented in the “Anglo-Saxon” and the Scandinavian countries: while in both the pension is paid at a flat rate and the system is unique and managed by the State, the former provide much less substantial benefits and cover a smaller share of population, thereby increasing the importance of the additional forms of funding. Besides, Scandinavian countries also rely on taxes as the source of funding for their pension systems.

Today it is common to speak of three pillars that make up a pension system. The first one is a minimum benefit provided by the state on the universal basis. The second one is represented by the different occupational schemes that are compulsory and presuppose funding by either companies or individuals (or both). (Appendix II Table 2) The third pillar is a voluntary contributions system where individuals contribute according to the custom made agreements with the private pension funds.

It should be noted that nowadays most of the developed countries provide the universal coverage for employees in the private and public sectors, as well as for the self-employed. For example, in Germany, despite the presence of voluntary coverage for the self-employed, the latter still seemed to prefer to join the pension system, leading to an increase in the overall coverage rate. (Borsch-Supan and Schnabel 1997) The mandatory occupational schemes are also

frequently met in Western Europe, where they are managed either in a centralized (by the government) or a decentralized way (by the branch or institutional agreements). In some of the countries (France, Greece, Sweden, the United Kingdom) such systems are of the defined benefit kind, i.e. the level of the pension benefits to be received due to participation in the mandatory occupation scheme is not directly dependent on the amount of the previous contributions, rather being established according to some pre-specified rules. At the same time, some of the countries (e.g. Denmark, Switzerland) have opted for the defined contribution type, where the pension rate is calculated on an actuarially neutral basis and is directly related to the amount of the contributions made.

The standard age of entitlement to public old-age pensions differs somewhat, although not greatly, across Europe, after a number of countries have revised their retirement policies in the sense of increasing the legal age of retirement and eliminating the gender differences. (Table 2) There are, however, cross-sectoral and cross-industry differences, as well as exceptions for the workers engaged in some particular type of activities (e.g., policemen, miners), related to the age at which they can legally retire and start receiving their pension benefits. (Blondal and Scarpetta 1999) The effect of the legally stipulated entitlement age on the labor force participation of the older workers might be stronger in the countries where the means testing has been introduced: verifying the amount of earnings for those who are already older than the official age of retirement, with the reduction of their benefits as the potential consequence of this testing, can represent a disincentive for the labor supply of the older cohorts. In case of the systems where there is some amount of additional income that can be earned without the consequent decrease in the retirement benefits, this effect will show through the lower number of working hours rather

than the decision of quitting the labor force. Seike (1989) showed a negative effect of the means testing in Japanese retirement system over the number of work hours for the older generations of workers. It has also been showed that drastic measures for those who opt to work after a certain age or lack of flexibility in choosing a particular number of work hours can lead to a shift of the older workers to the informal sector of the economy. (Walterskirchen 1991, for the case of Austria). Blondal and Scarpetta (1999) analyzed the hazard functions for a range of countries and found that the peak of the conditional probability often corresponds to the standard entitlement age (the UK, Ireland, Portugal) and the changes in the official retirement ages for females are associated with the shift in the hazard functions. However, they also found the function to have the spike before the standard age for some other countries (Austria, Finland, Germany, Luxembourg), suggesting the influence of some factors different from the age.

Table 1. Age of withdrawal from the labor force and official retirement age.

Country	Average age of withdrawal from the labor force in 2003 (Source, Eurostat)	Real official age of retirement
Austria	59.3	Men 65, Women 60
Belgium	58.5	Men 65, Women 62
Denmark	60.9	65
Finland	60.5	65
France	58.8	60
Germany	60.7	65
Greece	59.4	65
Ireland	62.4	65
Italy	59.9	Men 65, Women 60
Luxembourg	59.3	65
the Netherlands	62.2	65
Portugal	62.9	65
Spain	61.5	65
Sweden	63.2	65
United Kingdom	62.3	Men 65, Women 60

Source: Pension in the European Union, October 2004 - №13.

Pension replacement rate, i.e. the ratio of an individual's (or a given population's (average) pension in a given time period and the (average) income in a given time period (OECD Glossary of Terms, 2005), is another plausible determinant of the labor participation decision. The higher replacement rate would indicate the higher opportunity cost of remaining in the active working population relative to quitting the work force, and would thus provide an incentive for the retirement. While this is undoubtedly true for those who have already reached the pensionable age, this might not be the case for the younger cohorts who might use the potential rise in the social security benefits to increase their consumption or future wealth as opposed to the decision to reduce the labor supply. (Boskin and Hurd, 1978) Also, Blondal and Scarpetta (1999) suggest that the unexpected increase in the pension replacement rate is more likely to trigger the drop out of the labor force as more workers would find themselves having enough wealth accumulated and, hence, would be more inclined to opt for the increased leisure; similarly, the anticipated change would rather affect the consumption and savings profile of the workers who have not reached the age of entitlement to the publicly provided benefits. From the practical point of view, however, using the pension replacement rate presents a lot of difficulties related to the creation of an indicator that would account in some way for the variations in the individual (or household) earnings profile, different benefits provision schemes, cross-country and time differences. Moreover, given the huge variation in the legal and tax treatment of the retirement benefits and income earned, construction of the net replacement rate is even more troublesome, the reason why most of the time it is the gross rates that are chosen to be reported. Eurostat provides such data for a group of European countries. Blondal and Scarpetta (1999) report that over the period from 1961 to 1995 for some of the countries (Austria, Belgium, France, Germany, Ireland, Portugal) the replacement rates remained unchanged or went down,

while for the others (Denmark, Finland, Norway, Switzerland, etc.) rose by a significant amount. They also suggest that the replacement rates are higher among low-income earners, mostly due to the existence of the flat minimum benefits, and, therefore, find this to be partially responsible for the empirical tendency for early retirement in the bottom earners group. Just the opposite appears to be the case for the self-employed, whose pension replacement rates tend to rank as below average, and who usually stay active for a longer period of time.

Table 2. Gross Replacement Rates.

Country	Year		
	1961	1975	1995
Austria	79.5	79.5	79.5
Denmark	35.9	42.3	56.2
France	50	62.5	64.8
Germany	60.2	59.6	55
Greece			120
Italy	60	62	80
The Netherlands	32.2	48	45.8
Spain		50	100
Sweden	53.8	77.1	74.4
Switzerland	28.4	51.7	49.3

Source: Blondal and Scarpetta (1999).

The rate, at which the additional time period spent in the work force affects the amount of future pension benefits, could be another important predictor of the retirement decision. If the pension accrual rate is low, i.e. if the payoff to the continued employment in terms of the pension size is not high, this will decrease the opportunity cost of the retirement and will serve as an extra incentive to drop out of the labor force. As usual, there is a significant cross-country variation in how the state approaches this issue: according to Blondal and Scarpetta (1999), the accrual rates (Appendix II Table 3) range from very high in some countries (e.g., Germany) to zero in others (e.g., Sweden). Besides, the effect of the accrual rates might be distorted by the extent to which the unemployment is taken into account in the process of calculation of future

retirement benefits. Blondal and Scarpetta(1999) bring the example of Germany, where the influence of the accrual rate on the retirement decision is attenuated by the fact that for the consideration of the pension benefits the time spent out of the labor force is practically treated in the same way as being employed.

Another important indicator that might influence the decision to retire is the extent, to which the overall discounted amount of wealth accumulated from the pension benefits changes due to the early retirement. The pension wealth accrual rates are summarized in Appendix III Table 4: they represent the OECD estimates of total change in pension wealth that would result from postponing the retirement for 10 years from the age of 55 to the age of 65. It is worth mentioning that, as of 1995, none of the systems in the OECD countries compensates, through the corresponding increase in the pension rate, those who remain in the labor force well enough to offset the loss of the retirement benefits stemming from the shorter period of time, during which they are eligible to receive them. (Blondal and Scarpetta, 1999)

We are going to investigate the importance of the institutional determinants of retirement by including the pension replacement rate, pension accrual rate, and pension wealth accrual rate in the retirement probability model and estimating it on the SHARE dataset.

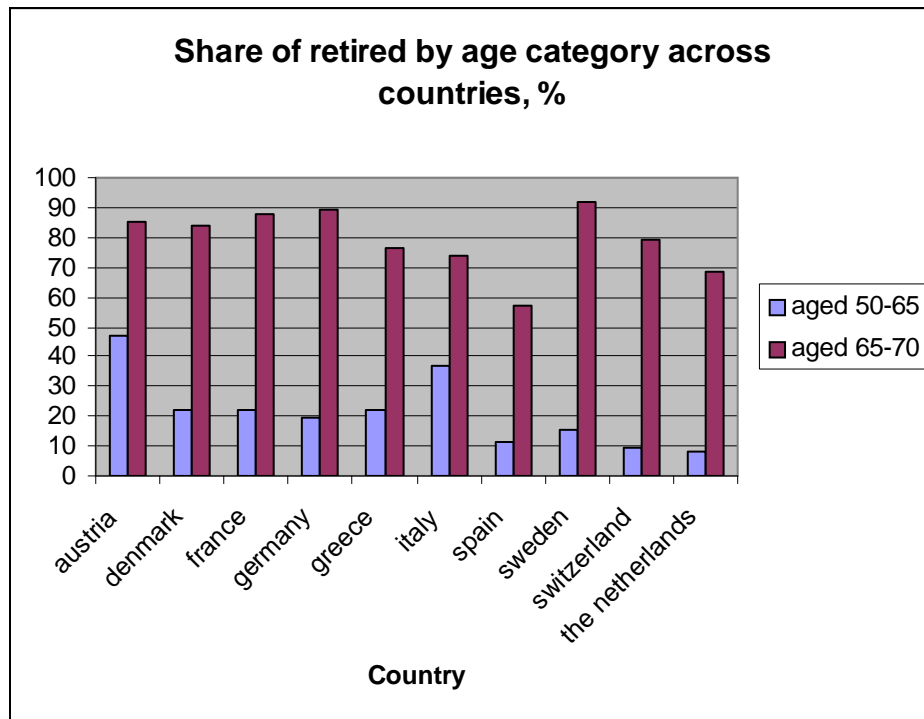
Chapter II. SHARE Data Description

There is a lot of information one needs to know about the older generations in order to formulate sensible policy advice: how many actually choose to quit the workforce and at what age? Is retirement gender specific? From where does the today's aged population draw its income and how does it compare to the earnings of the active population? Do old people tend to live close to their families and do they usually provide (or, possibly, receive) some support for (or from) them? What is their health status and is it significantly different when they are at retirement age as opposed to later periods of their life? Does the answer to all these questions crucially depend on the country of residence of the elder people?

The Survey of Health, Ageing and Retirement in Europe (SHARE) provides an extensive data set that allows to tackle the aforementioned questions. The information on 22777 individuals was collected in 2004 in Austria, Denmark, France, Germany, Greece, Italy, Spain, the Netherlands, Sweden, and Switzerland. The respondents in each country were asked to fill out a questionnaire that contained questions about their demographic characteristics (age, gender, marital status, number of children, etc.), working status and job satisfaction, financial well-being (amount and sources of earnings, financial assets held), health conditions, lifestyle (smoking and drinking habits), etc. One of the main virtues of this study is that it allows a cross-country comparison of the current situation of the 50+ generation in Western Europe. Unfortunately, only the first wave of the study is available so far, so it is not quite possible to track the dynamics at this point. The breakdown of the sample units according to gender and country of residence is listed in Appendix IV Table 5.

One of the key variables in the dataset is the respondent's work status: there is no unambiguous way to define retirement, and, moreover, by applying different definitions, one can arrive at different conclusions. Here we employ the OECD (1995) definition of retirement: the person is considered if he or she declared himself or herself retired, has been employed before, and has quitted the labor force by the moment of the interview. Also, this definition excludes the unemployed, those who are permanently sick or disabled, and those who perform household duties. One must note that this definition has nothing to do with being eligible for the social security benefits.

Figure 1.

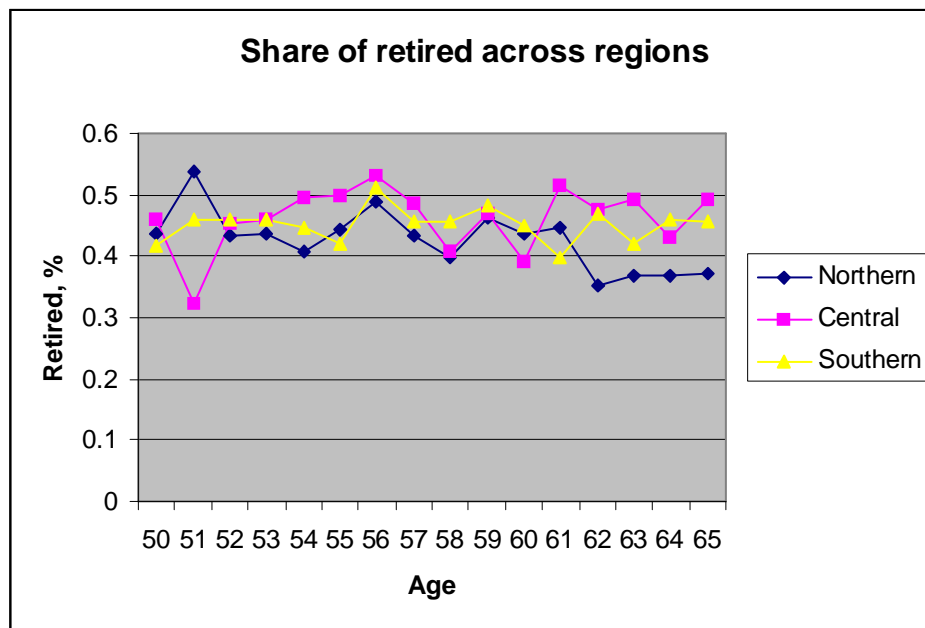


Source: Survey on Health, Retirement, and Ageing (2004).

As the standard age, at which one becomes entitled to the benefits provided by the social security system, is a strong determinant of the retirement decision, we will focus our attention on

those who are below this age: as it is clear from Figure 1, the share of retired among the respondents aged above 65, which is the standard entitlement age for most of the countries, is significantly higher than the percentage of those who had dropped out of the workforce before they became eligible for the old age benefits. One can notice the disparity between the age groups in Austria and Italy is not as high as in the rest of the countries: this could be partially explained, however, by the fact that in these countries the standard retirement age for females is 60, unlike in most other countries. In general, the Netherlands, Switzerland, Spain, and Sweden appear to have higher labor participation rates among the older workers. It is also worth noting that although the retirement rates seem to follow the same age pattern everywhere, there is a noticeable level difference once the workers approach the standard entitlement age: on the 62-65 interval, northern countries have lower share of workers quitting the workforce. (Figure 2)

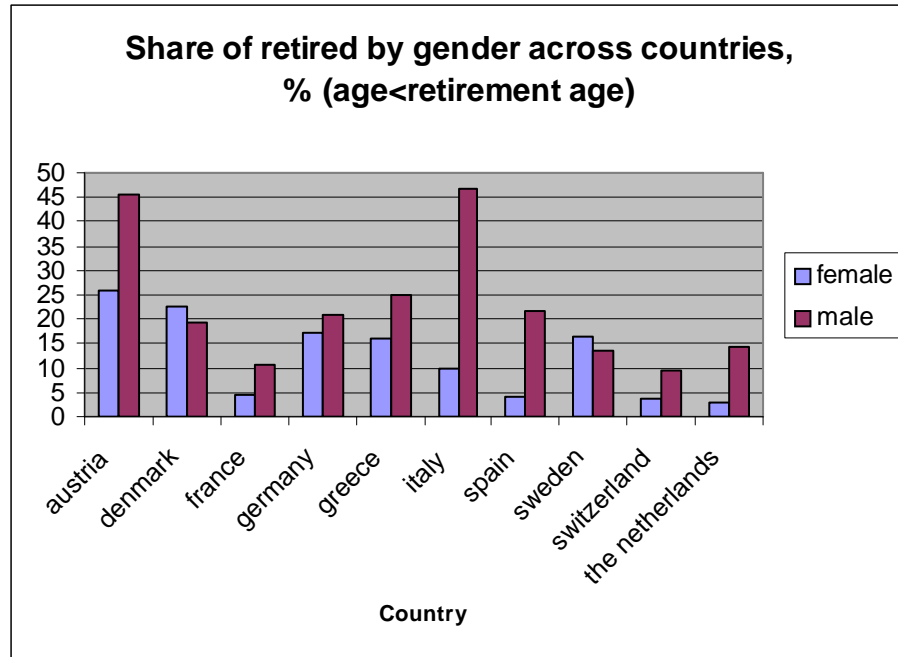
Figure 2.



Source: Survey on Health, Retirement, and Ageing (2004).

The retirement rates in the Central and Southern regions stay closer to each other, with the former being slightly higher, which might be due to the existence of relatively more generous early retirement benefit schemes in Austria and France.

Figure 3.

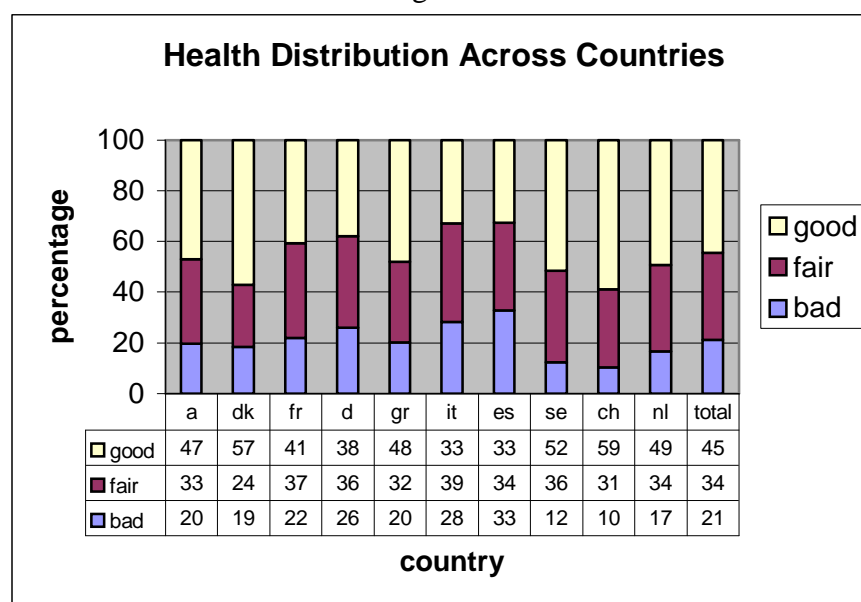


Source: Survey on Health, Retirement, and Ageing (2004).

Gender differences in the participation rates of older workers have been shown to be significant by a great number of empirical studies. (Fischer and Sousa-Poza 2006, Dorn and Sousa-Poza 2005, Roed and Haugen 2003) The data from SHARE only serves to confirm these findings as most of the countries exhibit much higher retirement rates for male than for female. (Figure 3) The only exception to this case is the Scandinavian countries, where the indicators for men and women are more or less balanced and the difference between genders is at its minimum, with the slightly higher labor participation rates for men. On the other hand, the highest gender disproportion in early retirement can be found in Spain, the Netherlands, and Italy, where the

share of women who have dropped out of the workforce is 4.5-5 times lower than the corresponding ratio for males. The cross-country comparison reveals that there is no clear regional pattern in early retirement for women: the Netherlands, Sweden, and Spain have the highest participation rates, while Austria and Denmark rank the last. On the other hand, the picture is somewhat different for men, where the regional variation is significant: the Mediterranean nations have clearly higher rates of retirement among older males than do the rest of the countries. Were it not for Austria, where the labor participation rate of elderly men is significantly lower, the numbers for the Central and Northern Europe would have stayed quite close.

Figure 4.

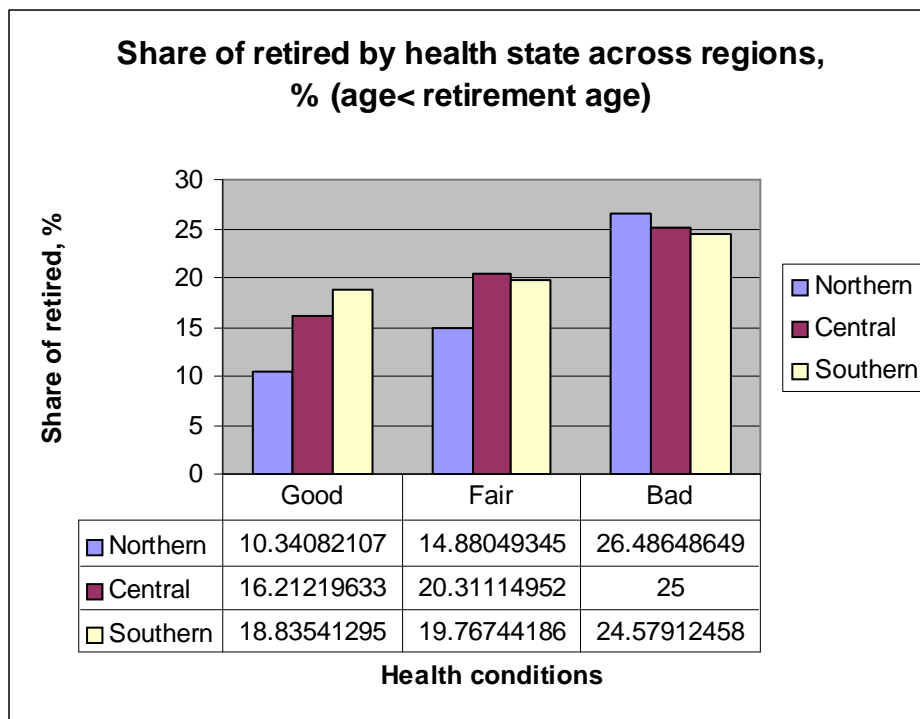


Source: Survey of Health, Ageing, and Retirement (2004).

The health state of the individual has been found to be an important predictor of his or her decision to retire. Thus, Bound, Schoenbaum, Stinebrickner, and Waidmann (2000) used the data from the Health and Retirement Study to simulate the retirement decision and found a significant role of the health, economic resources, and the way these interact in labor supply

decision making for older males. Also, similar results can be found in Lahey, Kim, and Newman (2004), Haider and Loughran (2001), Dwyer and Mitchell (1999) In our dataset the interviewees were asked to evaluate their own health conditions and report them as being either “very good”, “good”, “fair”, “bad”, or “very bad”. Overall distribution from the SHARE shows that only every fifth individual described his general health conditions as being bad or very bad. This number does not differ significantly across countries, even though Scandinavia and Switzerland appear to have lower than average shares of the individuals with the bad or very bad health state.

Figure 5.



Source: Survey of Health, Retirement, and Ageing. (2004)

It is, however, of interest to look how this number is correlated with the retirement. For all country groups there is a clear and self-explanatory trend of lower participation rates for the individuals in worse health conditions, as they appear to attribute more value to leisure. From the cross-country comparison perspective, there is no significant difference for the those who have

reported to have problems with health, but the Northern countries exhibit lower retirement rates for those who are in fair or good health conditions.

Other right hand side variables include household size, the marital status, education and having an individual retirement account. The summary table for these predictors can be found in the Appendix I Table 1.

Chapter III. Estimation strategy

To determine the magnitude and significance of the effects of different factors in predicting the early retirement, we estimate the probability model in linear and non-linear specifications. Availability of the micro data allows to rule out the problem of the bias caused by using the aggregate level data: averaging across individuals could sometimes distort the effect of particular variables on the individual levels. This is the so-called ecological fallacy problem (Robinson 1950): using the aggregated data to analyze of the outcome on the individual level might result in estimates not reflecting the true effect of the particular determinant at the individual level. Blondal and Scarpetta (1999) and Johnson (2001) mention possible endogeneity problem that could result from regressing the labor participation rate on the country specific macro level indicators. We first estimate the model for the whole sample, with and without country specific variables, and then divide the countries into groups and run the regression for each of them in part. We also carry out the structural break (Chow) test to see whether there is a significant difference in the estimates for the sub-samples of countries.

We group the countries according to the range of factors that reflect the institutional differences in how the retirement systems are set up, as well as the historical variation in intra-family, inter-generational and gender relations. The division into Northern (Denmark, the Netherlands, Sweden), Southern (Greece, Italy, Spain), and Central Europe (Austria, France, Germany, Switzerland) is not done on purely geographical principles, rather the similarity of the pension policies and traditional factors were taken into account.

We use SHARE 2005 data to include the variables that reflect the demographic characteristics on the individual level: age, gender, marital status, health state, the educational attainment of the respondent, the amount of financial assets held (including the bank account, the individual retirement accounts, etc.), and the household size. We also use the country specific macro variables, such as the GDP and unemployment, and the institutional determinants, such as the pension replacement rate, pension accrual rate, and pension wealth accrual rate.

Unlike Sosa-Souza (2006), who investigated the decision to retire by constructing a model where variables take on values corresponding to the moment when the decision was taken, we do not trace explanatory variables back to the moment of retirement because for most of our right hand side variables (e.g., health status) we only have data for the year when the respondent filled out the questionnaire. Rather, we concentrate on the expectations regarding the effect of the sociodemographic and institutional factors on the individual's work status.

The econometric model we employ to estimate the probability of being retired is

$$\text{Prob}(\text{retired}_i = 1 | \mathbf{x}_i) = f(\boldsymbol{\beta}\mathbf{x}_i),$$

where \mathbf{x}_i – is the vector of the explanatory variables. We use the linear specification as the basic one, as it is simpler and easier to interpret, but also carry out the estimation in the gaussian specification to compare the results.

Chapter IV. Empirical results

The results from running a regression on the sample of the respondents aged 50-65 are summarized in the Table 6: the left and the right panels include the estimates for the models with and without the institutional and macro level variables. We notice that most of the demographic controls appear to be strong predictors for the employment status. Country specific macro variables are also statistically significant, although the particular values of some of the estimates could be considered quite puzzling, which we are going to discuss below. The results of estimating the model in the probit specification do not appear to be different from the point of view of the statistical significance and the direction of the effect and are reported in the Appendix IV Table 6.

Table 6. OLS estimation.

Variable	Coefficient	Std. Error	Prob.	Coefficient	Std. Error	Prob.
C	80.462	2.311	0.000	87.894	2.433	0.000
FEMALE	-0.100	0.009	0.000	-0.088	0.009	0.000
HEALTHGOOD	-0.031	0.010	0.002	-0.038	0.010	0.000
HEALTHBAD	0.096	0.016	0.000	0.099	0.016	0.000
HSIZE	-0.007	0.004	0.123	-0.013	0.005	0.006
SINGLE	0.059	0.014	0.000	0.052	0.014	0.000
YRBIRTH	-0.041	0.001	0.000	-0.043	0.001	0.000
IRA	-0.135	0.012	0.000	-0.110	0.014	0.000
HIGHER	0.009	0.009	0.347	-0.024	0.011	0.024
GDP				-0.079	0.006	0.000
UNEMPL				-0.042	0.003	0.000
REPLACE				-0.011	0.001	0.000
ACCRUAL				-0.007	0.001	0.000
WEALTHACC				-0.036	0.003	0.000
Number of obs.	7346			6434		
R-squared	0.223			0.291		

The coefficient on FEMALE shows that on average females are 8% less likely to be retired, when compared to the males having similar demographic characteristics and being from

the same institutional environment. This result is in line with the previous studies that also suggest lower labor participation rates for women: Dorn and Sousa-Poza (2005), Roed and Haugen (2003) obtained similar results for the micro level data in Switzerland and Norway, correspondingly. Also, Fischer and Sousa-Poza (2006) found a statistically significant relation between gender and the decision to retire.

Health conditions too appear to be a strong determinant of the retirement status: the coefficients on “good” and “bad” health state dummies are significant and have expected directions of the effect. This finding, hardly surprising, confirms the earlier results of Lahey, Kim, Newman (2004), Haider and Loughran (2001), Dwyer and Mitchell (1999), and many others, which point to a statistically significant relation between health and retirement in the US. Individuals that have problems with health attribute higher value to leisure and, therefore, are more likely to retire. Also, on the demand side, Benitez-Silva (2000) shows that older people in good physical and mental health have higher chances of being employed. However, Dhaval, Rashad, and Spasojevic (2006) suggest that the correlation might actually imply the opposite direction of the effect: they use the data from the 6 waves of HRS to show that physical and mental health appear to decline after the retirement. McNamara (2003) also points to the social context (particularly, the social clock, the interdependence of family and work trajectories, and the role of institutions in shaping inequalities) in which the relation between health and retirement takes place.

Household size appears to be insignificant in predicting the retirement: one of the explanation might be fact that while most of the households (about two thirds) include one or

two people, the marital status is already included in the model and accounts for some of the effect that household size could have had. On the other hand, living with a partner or a husband increases the probability of retirement: first, this allows for sharing some of the fixed costs (e.g., rental and utility payments), and, second, it might be enough to have just one working person in the household. For example, Lahey, Kim, Newman (2004) report a significant effect of having an employed spouse on the retirement decision. Also, remaining employed could be important for older single workers for the psychological reasons, as it would allow them to be socially involved, have active lifestyle, and alleviate the negative effect of loneliness from staying at home. Although Fischer and Sousa-Poza (2006) report the insignificant effect of the marital status alone, they find the interaction of female dummy and marital status to be a strong predictor of the retirement, suggesting a higher probability of early retirement for married women. Other micro level studies (Roed and Haugen 2003, Holtman et al 1994) show significant effect of being married on the retirement decision.

The age of the respondent appears to be positively related to his or her work status (the negative sign in the table is explained by the fact that the year of birth is used instead of the age). The retirement becomes more likely as the individual approaches the standard age of entitlement to pension benefits. Lahey, Kim, Newman (2004) also report significant effect of the age on the decision to quit the job. However, Fischer and Sousa-Poza (2006) show that the probability of the dropping out of the workforce decreases as the employee approaches the standard pensionable age.

The negative sign of the individual retirement account dummy could be explained by the fact that some of the contracts stipulate the progressive profile of the pension payments with respect to the time spent employed, thus discouraging older workers from quitting the work in their late years. On the other hands, inclusion of other financial asset variables did not result in the statistically significant effects.

The level of education attained does not seem to be correlated with the retirement: this somewhat contradicts the results of Fischer and Sousa-Poza (2006), Holtman et al (1994), who showed that the education level of the worker is positively associated with the decision to retire. However, they found a significant result for “being educated beyond the primary school”, while the education dummy in our model reflects the effect of having earned a university degree, as opposed to obtaining just secondary or professional education, where the difference might not be as clear-cut. Also, in the probit specification, the education is significant in our model too, but it has a negative sign, implying that those with higher educational attainment tend to retire earlier.

Putting in institutional and macro variables appears to produce statistically significant results and increase the coefficient of determination, although one notes that the estimates for the micro variables appear to robust to their inclusion. There is a statistically significant negative relation between the level of national wealth and the retirement: other things equal, richer countries appear to have higher labor participation rates among elderly people. This finding is opposite to those of Duval (2003) and Johnson (2000), who suggest that higher level of national income affects the trade-off between consumption and leisure faced by individuals in the direction of increasing willingness to give up some wealth in order to enjoy more free time. Also,

Dorn and Sousa-Poza (2005) find a positive effect of the GDP growth rate on the voluntary retirement, and remark that this could be the result of having accumulated enough wealth earlier than expected. However, Fischer and Sousa-Poza (2006) report the results that are similar to ours and argue that, on the supply side, a possible explanation to this fact has to do with the relative magnitude of the substitution and income effect, where the former prevails, and, on the demand side, explain the negative association between the GDP and the probability of being retired by higher demand for older workers, stimulated by the increased level of production. Also, Johnson (2000) mentions that, once unemployment is controlled for, labor participation rates have procyclical dynamics, moving along the GDP growth rates.

The coefficient of on gross pension replacement rates is statistically significant, but has an unexpected negative sign, thus contradicting the theory that predicts that higher size of pension, relative to the working wage, provides a disincentive for participation in the work force and stimulates early retirement. We suspect that the reason for this might be the fact that the countries where the early retirement rates are traditionally high, are also those that try to redesign their pension provision system, particularly increase the sensitivity of the pension size to the age of retirement, a fact that might have been captured by our estimates.

Unemployment rate is reported to have negative influence over the probability of early retirement: this is a somewhat unexpected result, as previous studies provided evidence for the positive linkage between the unemployment and probability of participating in the active workforce. Particularly, Blondal and Scarpetta (1999), Duval (2003), Johnson (2000, 2001) carried out cross-country studies to find a negative effect of the unemployment on labor

participation rates, while Roed and Haugen (2003), Dorn and Sousa-Poza (2005b) report the same outcome at the micro level, suggesting the demand side explanation of firms forcing the older workers out of the labor force.

The pension accrual rate and pension wealth accrual rate are found to have a significant effect over the probability of being retired. This is in line with the previous studies (Blondal and Scarpetta 1999, Johnson 2000, 2001; Fischer and Sousa-Poza 2006), which have shown that the lower the decrease in the pension wealth from working for several additional years, the lower the probability that the individual will quit the work prematurely. These findings are extremely important from the point of view of the policy advice, as they show that the increase in the labor force participation of the older workers in Europe can be achieved through the appropriate stimulation, by providing more benefits to those who choose longer working careers relative to those who prefer to retire earlier.

. Table 7. OLS estimation for the groups of countries.

Variable	Northern			Central			Southern		
	Coef.	Std. Error	Prob.	Coef.	Std. Error	Prob.	Coef.	Std. Error	Prob.
C	72.245	4.653	0.000	101.171	3.479	0.000	64.087	3.480	0.000
FEMALE	0.021	0.016	0.190	-0.075	0.014	0.000	-0.202	0.016	0.000
HEALTHGOOD	-0.079	0.020	0.000	-0.019	0.016	0.211	-0.009	0.017	0.588
HEALTHBAD	0.263	0.039	0.000	0.059	0.026	0.022	0.057	0.022	0.009
HSIZE	0.002	0.011	0.864	-0.013	0.007	0.062	-0.007	0.007	0.283
SINGLE	0.077	0.026	0.004	0.075	0.020	0.000	0.024	0.023	0.317
YRBIRTH	-0.037	0.002	0.000	-0.052	0.002	0.000	-0.033	0.002	0.000
IRA	-0.125	0.017	0.000	-0.073	0.031	0.019	-0.033	0.055	0.553
HIGHER	-0.015	0.019	0.441	-0.015	0.016	0.340	0.037	0.023	0.108
Num. of obs.	2763			1818			2765		
R-squared	0.190			0.266			0.299		

We also run the regression for each of the country groups in part. It has to be noted that, in general, the retirement systems are quite specific and there is no single way to break them into

groups according to theoretically established criteria. The main motivation to use the region as the grouping factor was the fact that such division would account for the historical similarities of the pension systems evolution and the way in which the early retirement is treated, as well as for the proximity of local customs and traditions. The Scandinavian pension systems, as well as the one in the Netherlands, tend to incorporate to a greater extent the features of the Beveridge system, as they have been developing along the same lines after the end of the World War II. They are characterized by the unified, but state decentralized management, universal coverage, fixed benefits and are financed by taxes. (Pension in the European Union 2004) At the same time, the Southern and the Central Europe countries are treated differently mostly due to the disparity in the mentality and the family values. Also, the summary report of the initial results based on 2004 SHARE dataset and published by Mannheim Research Institute for the Economics of Aging shows that people in Scandinavian countries tend to live further away from their parents than people in the Mediterranean, that old people in the Northern Europe usually provide support for younger generations, while the opposite is true for the Southern Europe. Also, it is mentioned that in the Northern countries people are more active and likely to undertake some voluntary work, and that despite the fact that the Northerners appear to be richer and healthier, their consumption levels and life longevity are actually lower than in the Southern Europe. We report the results of the estimation in the Table 7.

We notice that the coefficients on the year of birth are significant and close in the magnitude of the effect in all three regions. Also, it is common that the individuals in the bad or very bad health conditions are more likely to be retired, while being in the better than average health state only affects retirement in the Northern countries. Females are less likely to be retired

than males with the same characteristics in the Central and Southern countries, while in the North the gender differentials do not appear to be significant. Being married and having an individual retirement account positively affects the probability of being out of the workforce in the Northern and Central Europe and it is not significant in the southern countries. Household size and education do not appear to be correlated with the one's work status, and are near significant for the central and southern regions, correspondingly.

Table 8. Chow breakpoint test.

F-statistic	14.81141	Probability	0.000000
Log likelihood ratio	262.8309	Probability	0.000000

We check the stability of the coefficients across regions by carrying out structural breakpoint (Chow) test. The results suggest that the hypothesis of the equal parameter vectors is rejected, therefore suggesting that the regional specificity influences the effect exerted by the sociodemographic factors on the retirement status. However, caution must be exercised when interpreting the results of this test, as its validity depends on the assumption of the homoskedasticity, which is not likely to be satisfied in our case, where a great deal of the individual heterogeneity can be expected. In this case, the Chow test will tend to over-reject the null, and the probability of the type II error will depend on how heterogeneous the variation is. (Greene 2003)

Conclusion

The problem of the labor force participation of the elderly people has become of topical importance in the recent decades, since the population ageing is an inevitable demographic process and the existing social security systems, in their current shape, are not going to be able to support an increasing burden of the benefits provision to the retired workers. Most of the pension systems in Western Europe have not changed considerably since the end of the World War II and, therefore, failed to account for the new realities of the falling birth rates, increased labor participation of women, distorted family values, technological progress, economic liberalization and emerging global market. (Pension in the European Union 2004) These challenges have called for the urgent need to re-design the social security systems as their generosity cannot be maintained any more on a sustainable basis. It is clear that increased participation of the older generations in the workforce is unavoidable, if the contradictory goals of providing for the high living standards of the aged people and preserving the balance in the re-distribution of funds in the society are to be met. However, there is still a debate over the way in which this stimulation of the labor force participation of the elderly can be accomplished: the discouragement of the early retirement through lowering pensions, raising the standard age of entitlement to publicly provided benefits, and reconsidering the amount of funds allocated for those who are unemployed, ill, or on maternity leave are going to be extremely painful and will have to face strong opposition in the society. (Pension in the European Union 2004)

In such conditions, it is extremely important to understand the relations that underlie the workforce participation of those who approach the retirement age. This work seeks to elucidate, through the use of a rich set of the micro level data, the correlation between the individual's

work status and his or her sociodemographic characteristics and institutional factors, specific to the country he resides in. We find a statistically significant effect of the gender, health conditions, marital status, education, involvement in the individual pension schemes on the probability of being retired and provide a range of estimates that measure the corresponding degree of association. Even more importantly, from the point of view of the policy advice, we confirm the previous findings in this field that show that the pension accrual rate and the pension wealth accrual rate appear to play an important role in the retirement, and thus suggest to implement the actuarially neutral schemes that would offer the higher pension rates to those who choose to postpone the retirement. Another important issue that has to be taken into consideration in the process of reforming the retirement system is that of the region specificity. We notice that although some factors appear to be equally significant and have a similar magnitude of the effect everywhere, the structural break test rejects the hypothesis of the coefficients stability across the regions.

However, we also point to a number of limitations of the analysis that has been carried out. Due to the character of the dataset, it is hard to model the retirement decision, as for most of the variables the data is available only as of the interview date, and it is not possible to trace them back to the moment when the decision was made. Therefore, we are likely to come across the problem of endogeneity: for instance, some of the reported effect of pension and wealth accrual rates on the retirement could be explained by the fact that those countries that historically face higher early retirement rates are also more likely to modify their pension provision systems in a way that would stimulate longer working careers, i.e. by changing the age pattern of defining the pension size and wealth accumulation. There have also been contradictory results on the interaction of the retirement decision and health conditions, as the latter could actually affect

one's health after he or she has already quitted the workforce. This is why it would be desirable to use the panel data, that would help to track the evolution of the various factors and their interaction over time in order to partial out the actual causal effect, and we see this to be the natural continuation of the study undertaken in this work.

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Appendix I

Table 1. Summary Results for the Key Variables.

	Mean	Median	Maximum	Minimum	Std. Dev.	Observations
ACCRUAL	6.55	10.00	12.00	0.00	5.36	6434
GDP	24.23	24.90	27.95	21.50	1.85	6434
GENDER	0.52	1.00	1.00	0.00	0.50	6434
HEALTHBAD	0.14	0.00	1.00	0.00	0.35	6434
HEALTHGOOD	0.54	1.00	1.00	0.00	0.50	6434
HIGHER	0.55	1.00	1.00	0.00	0.50	6434
HSIZE	2.47	2.00	9.00	1.00	1.08	6434
IRA	0.12	0.00	1.00	0.00	0.32	6434
REPLACE	63.08	64.80	81.20	43.30	14.80	6434
RETIRED	0.23	0.00	1.00	0.00	0.42	6434
SINGLE	0.17	0.00	1.00	0.00	0.38	6434
UNEMPL	7.99	8.00	11.00	4.40	2.28	6434
WEALTHACC	-2.43	-1.40	0.00	-7.90	2.46	6434
YRBIRTH	1947.30	1947	1954	1940	4.15	6434

Variable description.

RETIRED	1 if retired, 0 otherwise
FEMALE	1 if female, 0 otherwise
HEALTHGOOD	1 if health conditions good or very good, 0 otherwise
HEALTHBAD	1 if health conditions bad or very bad, 0 otherwise
HSIZE	number of people in the household
SINGLE	1 if single, 0 if has spouse or partner
YRBIRTH	year of birth
IRA	1 if has individual retirement account, 0 otherwise
HIGHER	1 if has higher education, 0 otherwise
GDP	country's gdp
UNEMPL	country's unemployment rate
REPLACE	gross pension replacement rate (relative to earnings)
ACCRUAL	pension accrual rate (increase in pension from working for additional 10 more years)
WEALTHACC	pension wealth accrual rate (loss in the total discounted amount of pension benefits resulting from the postponement of the retirement from the age of 55 to 65)

Appendix II

Table 2. The second pillar in the Western Europe.

Country	Year	Coverage ratio for salaried employees	Importance of 2nd pillar in pension
Austria	2001		
Belgium	1999	35%	12.80%
Denmark	1998	82%	25 to 35%
Finland	1999		4%
France	1999		1.70%
Germany	1999		7%
Greece			
Ireland	2001	46.80%	25 to 35%
Italy	2001	Private sector: 13.8% Public sector: 0	
Luxembourg			
The Netherlands		91% in 2001	About 40%
Portugal	2000		4.20%
Spain	2001	32% individual 36% occupational	
Sweden	2001	About 90%	
United Kingdom	2000-2001	44%	About 40%

Source: Pension in the European Union, October 2004 - №13.

Table 3. Increase in old-age pensions for a 55 year-old male by working for 10 more years in 1995. (percentage point increase in the synthetic replacement rate)

Country	Pension accrual rates
Austria	12
Denmark	1
France	12
Germany	11
Greece	25
Italy	10
The Netherlands	9
Spain	0
Sweden	0
Switzerland	11

Source: Blondal and Scarpetta (1999).

Appendix III

Table 4. Cumulated pension wealth accruals for singles on average wages.
(relative to annual earnings)

	Postponing retirement from 55 to 64		Postponing retirement from 55 to 69	
	1967	1995	1967	1995
United States	-0.8	-1.2	-1.9	-2.5
Japan	-1	-2.8	-2.1	-3.9
Germany	-0.4	-1.4	-2.9	-3.4
France	-0.2	-1.4	-1.2	-3.7
Italy	-3	-7.9	-4.5	-11.8
United Kingdom	-0.6	-0.5	-1.4	-1.5
Canada	1.5	-0.6	-0.1	-1.6
Australia	0	0	-0.8	-0.9
Austria	-3.1	-3.4	-6.5	-7
Belgium	0.2	-2.3	-2.3	-5
Denmark	0	0	-0.6	-0.8
Finland	0	-2.2	-1.3	-4.9
Ireland	-0.5	-1.4	-0.6	-2.6
Netherlands	-0.9	-1.3	-2.3	-2.9
New Zealand	0	-1.4	-0.5	-2.3
Norway	-0.3	-1.5	-0.3	-3.3
Portugal	-0.5	-0.4	-3.8	-3.7
Spain		-1.4		-5.9
Sweden	0.9	-1.8	0	-3.3
Switzerland	0.2	0	-0.7	-1.5

Source: Blondal and Scarpetta (1999).

Appendix IV

Table 5. SHARE 2004 summary statistics.

Gender	Country										
	a	dk	fr	d	gr	it	es	se	ch	nl	TOTAL
Female											
<i>Count</i>	1166	947	1048	1635	1241	1427	1415	1643	542	1621	12685
<i>% within country</i>	58.71	54.68	56.89	54.14	57.94	55.76	58.50	53.57	53.66	54.03	55.69
Male											
<i>Count</i>	820	785	794	1385	901	1132	1004	1424	468	1375	10088
<i>% within country</i>	41.29	45.32	43.11	45.86	42.06	44.24	41.50	46.43	46.34	45.83	44.29
Don't know											
<i>Count</i>	0	0	0	0	0	0	0	0	0	4	4
<i>% within country</i>	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.13	0.02
Total	1986	1732	1842	3020	2142	2559	2419	3067	1010	3000	22777
	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
	8.72	7.60	8.09	13.26	9.40	11.24	10.62	13.47	4.43	13.17	100.00

Source: Survey of Health, Ageing, and Retirement in Europe (2004).

Table 6. Probit estimation.

Variable	Coefficient	Std. Error	Prob.	Coefficient	Std. Error	Prob.
C	311.877	9.605	0.000	385.438	11.801	0.000
GENDER	-0.375	0.037	0.000	-0.340	0.042	0.000
HEALTHGOOD	-0.136	0.041	0.001	-0.208	0.047	0.000
HEALTHBAD	0.333	0.054	0.000	0.373	0.059	0.000
HSIZE	-0.038	0.020	0.066	-0.094	0.026	0.000
SINGLE	0.226	0.053	0.000	0.188	0.062	0.003
YRBIRTH	-0.160	0.005	0.000	-0.191	0.006	0.000
IRA	-0.635	0.072	0.000	-0.551	0.081	0.000
HIGHER	0.011	0.038	0.780	-0.156	0.051	0.002
GDP				-0.357	0.032	0.000
UNEMPL				-0.188	0.013	0.000
REPLACE				-0.052	0.005	0.000
ACCRUAL				-0.037	0.007	0.000
WEALTHACC				-0.174	0.015	0.000
Num. of obs.	7346			6434		