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THE IMPACT OF INSTITUTIONS ON FIRMS' REJUVENATION POLICIES: EARLY RETIREMENT WITH SEVERANCE PAY VERSUS SIMPLE LAY-OFF.

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The Impact of Institutions on Firms' Rejuvenation Policies: Early Retirement with Severance Pay versus Simple Lay-off. A Cross-European Analysis*

Abstract: Early retirement of workers is used by firms as means to rejuvenate their workforces. In principle, workers can either simply be laid off or can be offered an early retirement option combined with a financial bonus. However, dismissing masses of older workers may be detrimental to social peace and stability and damage the firm's reputation, while entry into early retirement with a severance pay at least maintains the semblance of a worker's voluntary decision. Cross-national analyses of this topic using micro data are, however, widely missing. Using the SHARE (Survey of Health, Aging and Retirement in Europe) data set, this paper fills this gap by investigating to what extent institutional factors such as the generosity of the pension system and strong unions influence firms' rejuvenation policies. Stronger unions appear to lead to a higher likelihood of receiving a severance pay, as does a more generous pension system. In contrast, a higher decrease in wealth accrual leads to a higher probability of simple lay-off. It is concluded that the current reforms which aim at lowering the replacement rate and employment protection will most probably lead to more dismissals of older workers without severance pay.

Keywords: Early Retirement, Involuntary Early Retirement, Severance Pay, Social Security, Pensions, Employment Protection, Unions

JEL classification: J14, J21, J22, J26

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1 Introduction

In times of economic hardship and fierce international competition, it is vital to companies to maintain a high level of efficiency in their production. Older workers are, however, generally perceived as less productive compared to their younger colleagues, leading to an economic incentive to rejuvenate the workforce. Such rejuvenation may become the more urgent the stronger a firm is exposed to international competition. Indeed, FISCHER & SOMOGYI (2009) show for a panel of OECD countries from 1985–2003 that economic globalization lowers the employment protection of workers, which they view as a consequence of employers' lobbying activities. In most European countries, however, protection of workers against individual or mass dismissals creates a legal obstacle to a simple 'firing' policy. Thus, employment protection legislation through strong unions might well impact producers' choice of rejuvenation policies (see also DREHER & GASTON, 2007).

Not only strong unions, but also the institutional setting of the old-age pension system may have an impact on the means by which producers try to rejuvenate their work forces. A generous old-age pension system and early retirement scheme, reducing the income loss associated with ceasing work, might ease worker's decision to leave the firm voluntarily and well prior to legal retirement age. Potentially, offering severance pays may then not be necessary as additional financial incentives to leave the firm. Instead, the 'golden handshake' may rather financially compensate for an ungenerous pension system that punishes early withdrawals from the labor force. Thus, it is conjectured that the institutional setting of the old-age pension system might equally affect firms' rejuvenation policies.

For these reasons, knowing how institutional determinants affect producers' rejuvenation choices can help understand some potential side-effects of governments' efforts to reform the pension system and to deregulate the labor market. The decision to either fire a worker or to offer a severance pay for her voluntary and premature withdrawal is also influenced by a variety of additional factors, including not only the employee's personal and job characteristics, but also the

general condition of the national economy – which this study takes equally into account. In the focus of this analysis, however, are those institutional determinants of rejuvenation policies the shape of which is subject to the discretion of policy-makers.

This paper is among the first to analyze the institutional determinants of firms' rejuvenation policies across Europe – in particular whether workers' early retirement decisions have been induced by a severance pay or not. Using a cross-section of microdata of persons aged 50 and older in 10 European countries collected in 2005 (SHARE) that contains individual employment histories of about 7000 early retirees, it is possible to construct a pseudo-micro panel at the individual level and a country panel at the aggregate level, both from 1960 to 2004. At the individual level, a rich set of personal and job-related characteristics is included. The panel structure at the aggregate level allows exploiting the variation of macroeconomic and institutional factors both over time and across countries, making it possible to account for unobserved country heterogeneity and to draw convincing policy conclusions.[1]

The rest of this paper is organized as follows: Section 2 briefly reviews the theoretical (and empirical) context of how labor market institutions determine a firm's rejuvenation policy, while section 3 describes the micro data and the institutional measures. Section 4 introduces the empirical model, while section 5 presents the empirical results. The paper concludes with some policy recommendations.

2 Theoretical Context and Own Contribution

2.1 Theoretical Context and Hypotheses

Prior to empirically analyzing the institutional factors that influence employer's choice between two alternative rejuvenation policies, some theoretical argu-

[1] The importance of accounting for unobserved country heterogeneity for obtaining unbiased results is shown in e.g. FISCHER (2010).

ments need to be discussed. From an economist's perspective, this paper focuses on the demand side of the labor market, namely the employer's choice of either offering a severance pay to induce voluntary retirement or exercising a simple lay-off policy. Most past empirical studies on the causes of early retirement have emphasized the labor-supply-side aspect (e.g. BLÖNDAL & SCARPETTA, 1999; DUVAL, 2003), namely the economic incentives for workers to retire early. Only a few empirical contributions deal with the demand-side aspect of early retirement, based on the ground-laying theoretical work of LAZEAR (1986), and none of them investigates the firm's choice between alternative rejuvenation policies.

Demand-side arguments

The old-age pensions system might play the role of an unemployment insurance and 'subsidize' the company's own costs of financing premature retirement. Building on this view, HUTCHENS' model (1999) predicts that more firms send their older workers into early retirement when social security and pension system benefits are generous. Indeed, several cross-country studies are in support of this view: DUVAL (2003) finds in OECD countries more generous early retirement routes negatively associated with male labor force participation rates, while FISCHER & SOUSA-POZA (2009b) show for 10 European countries that a more generous and actuarially neutral ordinary old-age pension system increase the probability of early retirement[2]. Analogous results were obtained in various country-specific studies using individual data (for an overview, see GRUBER & WIESE 2002).[3] All these studies, however, do not distinguish between different types of early retirement, in particular that with severance pay from that without it. More generous early retirement systems make it financially attractive for workers to retire early – consequently, they are more likely to accept their premature dismissal. Thus, fewer companies can be expected to offer older workers an early re-

[2] These findings are corroborated by similar cross-national analyses of labor market participation rates of the older population – for men, see BLÖNDAL & SCARPETTA (1999) and JOHNSON (2000); for women, see JOHNSON (2001). For a correlation analysis based on 11 industrialized countries, see GRUBER & Wise (1998).

[3] Even though the effect the pension accrual rate on labor supply is in economic theory ambiguous (MITCHELL & FIELDS, 1984, LAZEAR, 1986), the empirical evidence is – up to now – clear-cut.

tirement with severance pay as opposed to a prematurely fire them when the national pension system is generous. Consequently, it can be stated:

Hypothesis 1: A generous pension system lowers the probability of retiring early with severance pay.

The protection of the labor force through strong unions against dismissals or downward adjustments of wages might equally impact firms' retirement policies. BLÖNDAL & SCARPETTA (1999) argue that a higher degree of employment protection leads to stronger labor market rigidities making the realization of age-adjusted wage schemes more difficult. Consequently, a stricter protection of older workers against such adjustments reinforces the incentive for employers to rejuvenate their workforce. In this light, stronger unions trigger a higher need for producers to send their older workers into early retirement. However, a simple lay-off policy is equally prevented by stronger unions, which leaves the firms with the sole option to 'induce' workers to choose early retirement schemes.[4]

In this context, WASMER (2006) conjectures that in countries with strong employment protection managers who wish to rejuvenate their work force choose harassments and other forms of working environment deterioration to lower workers' job satisfaction, in order to make them quit their jobs 'voluntarily'. Indeed, in an empirical micro analysis on well-being of Canadian workers he shows that stronger employment protection, which varies across Canadian provinces, leads to more stress among workers and other forms of mental ill-being. That job satisfaction is a driver of workers' health has also been shown by FISCHER & SOUSA-POZA (2008, 2009a) for both the German Household Panel as well as for a European cross-section of micro data (SHARE 2005).[5] In case a firm chooses the

[4] According to the authors, this is particularly the case in the presence of adverse demand shocks which reduces the number of firms willing to offer positions to older workers. In that case, workers prefer retiring early over staying unemployed.

[5] A positive association of labor protection legislation with the probability of an employee assessing her premature withdrawal as 'involuntary' as opposed to 'voluntary' is reported in DORN & SOUSA-POZA (2007). However, in this study 'involuntary' refers to a situation with general re-employment constraints rather than to employer's behavior.

'harassment'-strategy to overcome strong employment protection laws, it is not necessary to use additional financial incentives. Thus, one may hypothesize:

Hypothesis 2: Strong unions lower the probability of retiring early with severance pay.

However, strong unions may well protect workers against harassment and working environment deterioration. In that case, producers' only means to rejuvenate their workforce is to induce early retirement by offering costly a 'severance pay' to the worker, which she might accept or not. Supporting evidence for this hypothesis might be the cross-country study by BLÖNDAL & SCARPETTA (1999) that found that union density increases the labor market participation of older workers, potentially reflecting the larger wage bargaining power of unions, leading to more favorable labor market conditions for older workers. However, up to now there is a research void on the effects of employment protection on the probability of retiring early with severance pay as opposed to being laid off. Thus, one may also conjecture:

Hypothesis 3: Strong unions increase the probability of retiring early with a severance pay.

Supply-side arguments

Turning briefly to the supply side in the labor market, from the worker's perspective both employment protection and pension-system generosity might equally influence their decision whether to depart early or not: A generous welfare and pension system might make it financially more attractive to 'retire' early instead of continuing work (DUVAL, 2003). Indeed, international empirical studies with country panels found that more generous unemployment or social security benefits cause a lower labor force participation rate of older males (DUVAL 2003; BLÖNDAL & SCARPETTA 1999). With more generous pension systems one will probably observe less early retirements with severance pay, as in such systems the income loss caused by an early retirement is only moderate. Thus, the conjecture from the supply-side perspective is equivalent to *Hypothesis 1*.

Hypothesis 1 (repeated): Generous pension systems decrease the probability of retiring early with severance pay.

From a supply-side point of view, stronger unions and employment protection create obstacles against forced early retirement through simple lay-off. However, strong unions may also cause wage rigidities that decreases re-employment opportunities of older workers (JOHNSON 2000; DUVAL 2003). In such case, it is rational for workers to retire prematurely only if substantial severance pays are made. Thus, the supply-side perspective also supports *Hypothesis 3*.

Hypothesis 3 (repeated): Strong unions increase the probability of retiring early with severance pay.

3 Data

To investigate into the institutional determinants of early retirement decisions, the (conditional) probability of early retirement with severance pay is viewed as a function of a country's contemporaneous macroeconomic situation and institutional setting, as well as of worker's personal and job characteristics at the same time.

3.1 The SHARE Data on Early Retirement

In this study, the 2005 cross-sectional SHARE data is employed, drawn from a random sampling of 22,000 persons over 50 years of age in 10 European countries (Austria, Denmark, France, Germany, Greece, Italy, the Netherlands, Spain, Sweden, and Switzerland). Following OECD (1995), a retired person is defined as follows: a person who (1) self-assesses her employment status as retired and (2) who is factually out of the labor force. This means that the person (2a) reports to have 'ever done paid work' and (2b) is able to indicate the year when she terminated her last job. About half the respondents (about 10,000 persons) assess their current job situation as 'being retired'.[6] The reader should note that this definition

[6] Alternative occupational status categories include being 'unemployed', '(self-)employed', 'permanently sick or disabled', 'being a homemaker' or 'other current job situation'.

of retirement is *not* based on objective criteria such as the receipt of old-age pension payments, and thus excludes self-reported unemployed, housekeeping and disabled persons from the 'retired'.[7] The 2005 SHARE data records recall information on respondents' social and economic situation at the time of their retirement decisions, namely gender, marital status, year of retirement, level of education (6 categories), type of employment (4 categories), hierarchical position in the firm (6 categories), tenure, and firm size (7 categories).

For this analysis the sample of early retirees is drawn in the following way: The data do not directly identify those who have retired early. Information, however, is available on the final year of the interviewee's employment. An *early retiree* is defined as a retired person who withdrew from the active labor force before she reached her legal age of pension payment eligibility. The SHARE information on individual employment histories allows the calculation of the respondent's age at the year of her retirement. Data on the general legal regular retirement age in the 10 SHARE countries from 1960 on, differentiated by gender, was obtained from BLÖNDAL & SCARPETTA (1999) and DUVAL (2003), replicated in Table A1 of the Appendix.[8] The analysis is restricted to those who have been in dependent employment in their last job, excluding those who were self-employed: Only dependently employed are, in principle, eligible to early retirement with severance pay.

Of the 9,000 retirees in the SHARE dataset, 1500 were self-employed in their last job. There are approximately 6000 dependently employed who retired early (past the age of 48).[9] Roughly 3600 of them are male, while 2400 are female, possibly reflecting lower female participation rates in those age groups. The age at the

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[7] Alternative definitions focus on the receipt of pension payments, irrespective of employment status, or on those persons out of the labor force, that is including also the disabled and housewives (see OECD 1995). This definition follows the approach in DORN & SOUSA-POZA (2007).

[8] This definition of legal retirement age does not differentiate by type of job or industrial sector.

[9] In principle, this definition of early retirement as premature departure from the active labor force includes also young women who ceased work in order to take care of their children. To avoid their inclusion, we restrict the sample to premature departure of workers aged 49 years or older.

time of early retirement ranges from 49 to 66, with a mean of 58 life years (median: 59 years) and a standard deviation of four years. Graph 1 displays the distribution of the individual's *retirement age* in the sample of early retirees; obviously, there is a strong tendency to retire at the age of 60, the age at which in many countries early retirement benefits become first available (GRUBER & WISE, 1998).

Fig. 1 Distribution of Retirement Age of Early Retirees

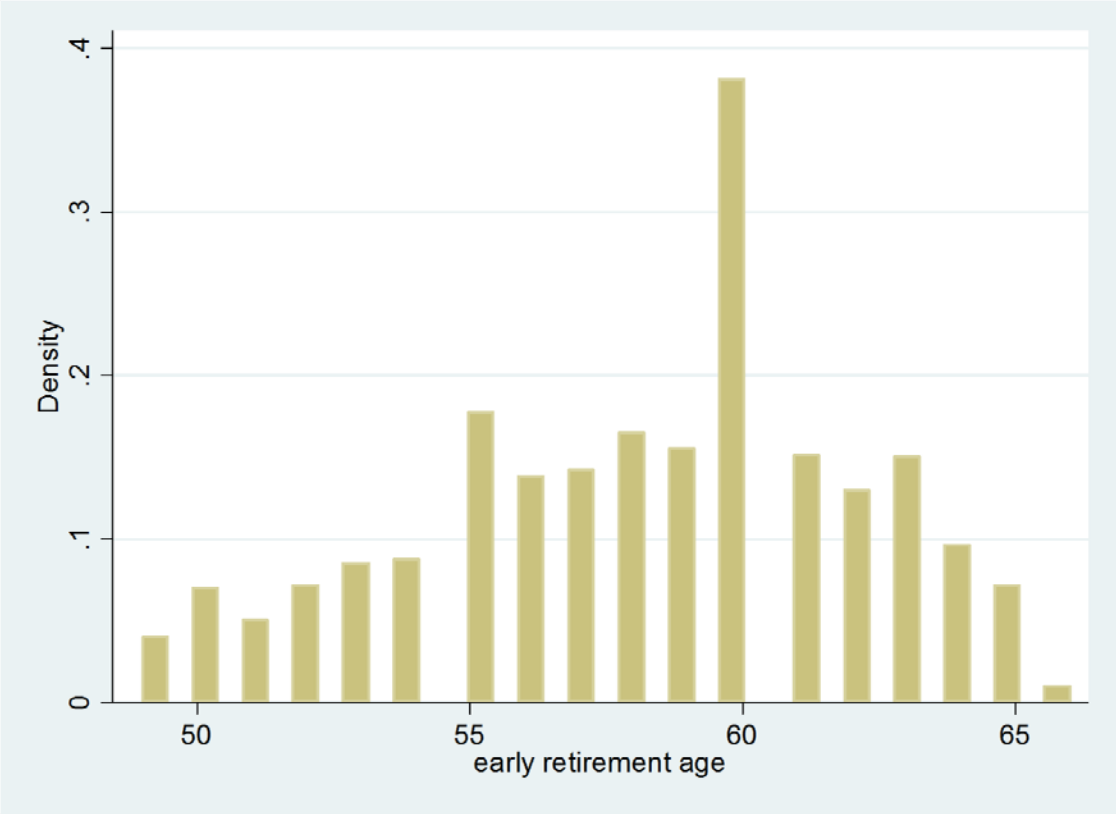
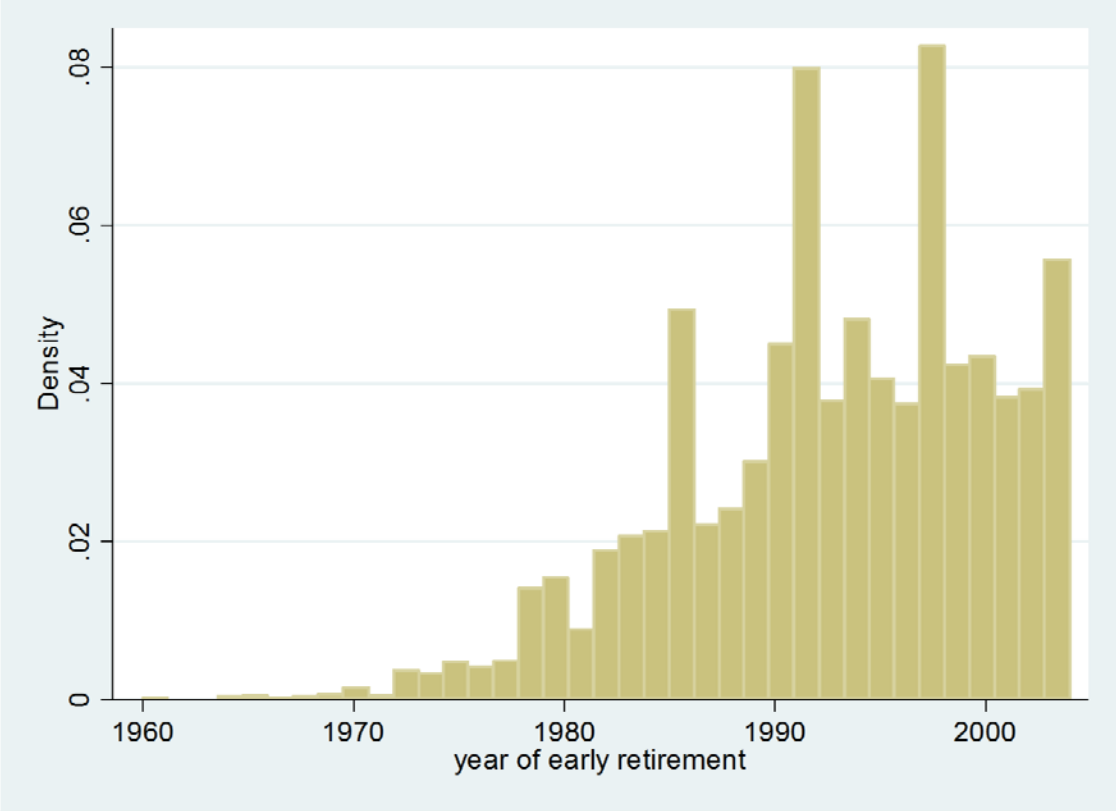


Table 1 describes the distribution of the *year of retirement* in the sample of previously dependently employed, but now early retired workers, to whom the institutional and macroeconomic variables in the empirical analysis refer. The year of retirement ranges from the minimum of 1960 up to the maximum of 2004. The average retirement year is 1992, with a standard deviation of roughly 7 years, and the median is 1994, which indicates a distribution slightly skewed to the left. Graph 2 displays the distribution of the year of early retirement in the sample. Possibly due to natural selection out of the sample through death, only a few cases of early retirement are observable during the 1960ies.

Fig. 2 Distribution of Retirement Year of Early Retirees



However, even though individual retirement decisions took place in different years between 1960 and 2004, each person with her specific employment history is observed only *once*. Thus, the SHARE data, a cross-section of presently retired persons older than 50 years in 2004, gives rise to repeated, but unbalanced annual cross-sections of individual's *past* early retirement decisions from 1960 to 2004 – a so-called pseudo-panel. However, at the country level, to which the institutional variables of interest refer, a common time-series cross-section of early retirement country-years is obtained, equally covering the years 1960 to 2004.

3.2 Reasons for Early Retirement

In the SHARE data, all persons assessing their employment status as 'retired' (and consequently all 'early retired') had to state the main reason for their retirement. The 11 possible causes range from those related to family situation, health problems, up to legal eligibility to pension payments and early retirement benefits. Table 1 presents an overview of the 11 causes for early retirement.

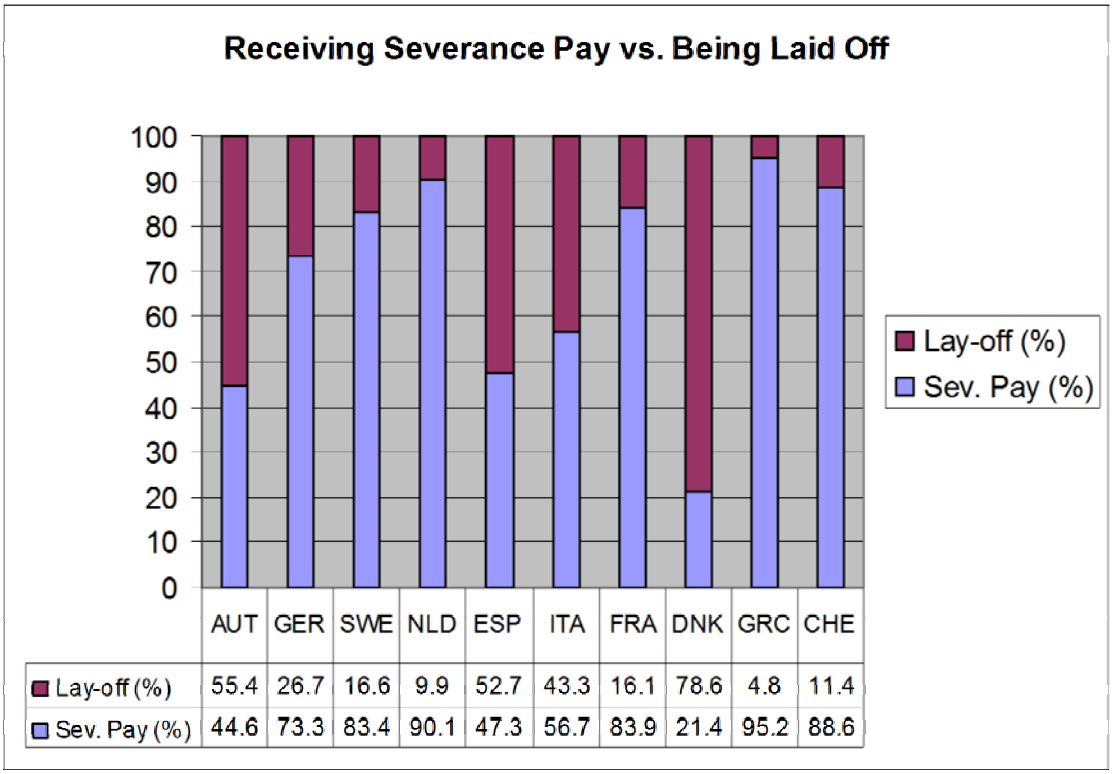
Tab. 1 Causes for Early Retirement across Europe

Causes	Cause number	Percentage
Became eligible for public pension	1	39.47%
Became eligible for private occupational pension	2	9.97%
Became eligible for a private pension	3	2.37%
Was offered an early retirement option (with special financial bonus)	4	19.59%
Was made redundant (for financial reasons)	5	8.81%
Own ill health	6	19.95%
Ill health of relative or friend	7	1.74%
To retire at same time as spouse or partner	8	2.16%
To spend more time with family	9	3.97%
To enjoy life	10	6.01%
Other reason for retirement	11	3.25%

In this study, the two causes of interest is early retirement with severance pay (cause number 4, "firms offered early retirement option with a special financial bonus") as opposed to early retirement caused by lay-off (cause number 5, "firms made retiree redundant"). Table 1 clearly shows the importance of company-induced early retirement decisions: Among the early retirees, more than 28% linked their premature departure to an employer-related cause and not to institutional (pension system) or personal reasons (health, family). Only about 9% claim that they have been made redundant by their employers. Altogether, about 1,600 interviewees, roughly 30% of all early retirees, state a company-related reason of their early retirement decisions: about 1,130 persons state to have been offered a severance pay, while about 500 claim that they had been laid off by their employers.

Graph 3 gives an illustration of the shares of company-driven retirement decisions averaged over the observational period 1960-2004, based on the values of Table 1. The share of those having been made redundant is depicted in the upper column in dark red, while the share of those having received severance pay is symbolized by the lower blue column. The small table in Graph 3 presents rounded percentages. Considerable variation across countries is observed.

Fig. 3 Redundancy vs. Severance Pay (in %) in 10 European Countries, 1960-2004



	AUT	GER	SWE	NLD	ESP	ITA	FRA	DNK	GRC	CHE
Lay-off (%)	55.4	26.7	16.6	9.9	52.7	43.3	16.1	78.6	4.8	11.4
Sev. Pay (%)	44.6	73.3	83.4	90.1	47.3	56.7	83.9	21.4	95.2	88.6

3.3 Pension System Characteristics

The institutional factors of interest are the characteristics of the pension system and the degree of employment protection, approximated by union density. Thus, these variables of interest do not only vary across countries but also over time, and are matched individually with each respondent's retirement year. As institutional factor that describes the pension system at the time of early retirement we employ the (1) 'average gross replacement rate' and (2) the 'decrease in pension wealth accrual', also called the 'implicit tax' on continuing work, obtained from DUVAL (2003) and BLÖNDAL & SCARPETTA (1999), respectively. The 'average gross replacement rate' variable (DUVAL 2003) measures the dimension of pension system generosity, as it reflects the rate by which the last gross wage is translated into pension benefits, expected for the next 5 years by a potential retiree at the age 60, when retiring according to the regular retirement pension system. The 'decrease in pension wealth accrual' attempts to measure the phenomenon that the continuation of work beyond a certain age is 'punished' by a relative decline in future net pension income (GRUBER & WISE 1998). The 'decrease in

pension wealth accrual' is obtained from BLOENDAL & SCARPETTA (1999) and measured as the cumulated decrease in pension wealth accruals (expressed in absolute terms) when a single with an average wage postpones her retirement from 55 to 65 years of age in a specific year. It is measured at two points in time only, 1967 and 1995, so that missing values have to be linearly interpolated. A pension system is neutral in terms of pension wealth accruals if this 'implicit tax on continuing work' is zero, - thus, when it neither creates incentives to work beyond the regular retirement date nor to retire prematurely. Table 2 presents an overview of these pension system characteristics, while detailed definitions are presented in Table A3 of the Appendix, and descriptive statistics in Table A4.[10]

Tab. 2 Definition of Pension System Generosity Variables

Average replacement rate	Expected gross replacement rate (over the next 5 years) at age 60 in regular retirement pension system, by which the last gross wage is translated into pension benefits. Data made available by courtesy of Mr. Duval, OECD (DUVAL, 2003). For Denmark and Greece, this information was unavailable. Values range from 0% to 80%.
Decrease in wealth accrual	Cumulated decrease in pension wealth accruals in year of retirement through postponing retirement from 55 to 65 years of age. Obtained from Table III.6, BLÖNDAL & SCARPETTA (1999, p. 65). For Greece and Spain, this information was (partly) unavailable. Values range from -0.2 to 7.9

Notes: Excerpt of Table A3 of the Appendix.

3.4 Unions and Protection of Employment

In this analysis, a measure of union density is used that approximates workers' protection against (unjustified) dismissals and harassment.[11] Union density measures the extent of union membership in the national labor force (in percent-

[10] Unfortunately, no sufficiently long time-series data on the generosity of early retirement schemes are available. However, it is a common observation that pension systems that are generous toward regular retirees are also generous toward early retirees.

[11] We abstained from using the index of Employment Protection Legislation (EPL), provided by OECD (2004), as it ranges from 1985 to 2003 only and is not available for some countries in the SHARE data. See DREHER & GASTON (2007) and FISCHER & SOMOGYI (2009) for an application.

age). Data on union density is available for the countries in the SHARE data from the *Economic Outlook* 2004, chapter 3 (OECD 2004). This variable is available for the years 1980, 1990 and 2000; through interpolating the missing values, 'union density' covers the years 1980 to 2004. In all countries in the SHARE data, contracts negotiated with unions are also applied to non-union workers, sometimes stipulated in administrative regulations, but equally on a voluntary basis. Consequently, the coverage of union contracts exceeds the number of union members by far. As OECD 2004 shows, union coverage has been fairly stable over time, while union density has been quite volatile (see Table 3). In the context of this analysis, union density is to be viewed as measure of unions' bargaining power in negotiations with employer (organizations), and, thus, the strength of employment protection.

In the countries that form the SHARE data (mostly Western Europe), unions constitute the most important wage-setting organization, shaping their labor markets institutions (e.g. BLÖNDAL & SCARPETTA 1999). For these reasons, many empirical studies employ union density as measure of unions' wage bargaining power, approximating employment protection; in international trade contexts, union density is also often used to approximate workers' wage gap (for examples, see DREHER & GASTON 2007; FISCHER & SOMOGYI 2009). In this sample, union density (in percentages) ranges from 7% to 80%, with a mean of 36%, and a standard deviation of 23%. Table 3 provides an overview of the development of union density in the 10 SHARE countries, while Table A3 presents its exact definition. In general, trade union density has been continuously declining in the last two decades – with the exception of Belgium, Denmark, Finland, and Sweden, where it remained unchanged. These are the countries in which unemployment benefits are administered by unions and their affiliated institutions ('Ghent system'). This heterogeneity in union density development over time is accounted for by estimating models that exclude union density as determinant. See Table A4 of the Appendix for descriptive statistics.

Tab. 3 Trade Union Density 1980-2000

	Trade Union density (in %)		
Country	1980	1990	2000
Austria	57	47	37
Denmark	79	75	74
France	18	10	10
Germany	35	31	25
Greece	39	32	27
Italy	50	39	35
Netherlands	35	25	23
Spain	7	11	15
Sweden	80	80	79
Switzerland	31	24	18

Source: OECD (2004, Table 3.3, p. 145).

3.5 Control Variables

Condition of the Economy

Country controls also include those macroeconomic factors that may be correlated with the institutional variables of interest. For example, richer countries may afford a more generous pension system and stronger employment protection, while high unemployment rates may create incentives for politicians to raise the implicit tax on continuing work to combat general unemployment by rejuvenating the work force at the aggregate level. In the early retirement literature, unemployment is often viewed as an important determinant as it may create a disincentive for older workers to seek employment after they have been laid off, rather choosing the early retirement route (e.g. BLÖNDAL & SCARPETTA 1999; WALKER 1985; see also FISCHER & SOUSA-POZA, 2009a, for a discussion). The unemployment rate, obtained from the OECD, is included in some models to account for a country's general economic condition.[12] See Table A3 in the Appendix for variable definitions and sources, and Table A4 for descriptive statistics.

[12] In the regression samples, GDP and unemployment rate show a considerable correlation between -0.5 and -0.7. See also footnote 10.

Person-specific controls

Worker's socio-demographic and workplace-related characteristics are measured at the year of her retirement, including gender, marital status, education, age, tenure with current employer, size of firm, supervisory power, and industrial sector (public administration, state-owned industry, private industry), all obtained from the SHARE data. The SHARE data do not include information on the last wage or respondent's health status prior to early retirement.[13] Descriptive statistics and variable definitions are presented in Tables A2 and A4 of the Appendix.

4 Model and Methodology

This paper investigates the institutional determinants of two alternative modes of retiring early (assuming that at an unobserved earlier stage the decision to retire early has already been made). The empirical model views the probability of retiring early with severance pay (as opposed to being simply laid off) of individual *i* in country *s*, $P(y_{is\ ret\_year} = 1|x_{is\ ret\_year})$, as a function of contemporaneous institutional factors (vector $z_{s\ ret\_year}$) in country *s* and individual characteristics $x_{is\ ret\_year}$. All dependent and explanatory variables are observed only once, namely in worker's actual retirement year *ret_year*. This function is estimated as a standard Logit model, in which the dependent variable takes on the value '1' if the retired person *i* departed prematurely with severance pay, and '0' if she was simply made redundant by her employer.

$$P_{is\ ret\_year}(y_{is\ ret\_year} = 1|x_{is\ ret\_year}) = \Lambda(\alpha + \beta x_{is\ ret\_year} + \gamma z_{s\ ret\_year} + \varepsilon_{is\ ret\_year}) \quad (1)$$

Vector $x_{is\ ret\_year}$ contains socio-demographic and workplace-related characteristics of the retiree at the year of her retirement, including gender, marital status, education, age, tenure with current employer, size of firm, the degree of supervisory power, and industrial sector (public administration, state-owned industry, or private industry). The vector of country controls, $z_{s\ ret\_year}$, includes the set of institutional variables of interest in country *s* at the year of retirement *ret_year*, namely

[13] For the importance of earnings for early retirement behavior in the US, see PERACCHI & WELCH (1994).

union density, generosity of the pension system, and the implicit tax on continuing work. As macroeconomic controlling factor the unemployment rate is added, equally measured at the time of retirement.[14] Thus, at the country level, with a variation of individuals' years of retirement from 1960 to 2004 in 10 European countries, the classic panel structure of institutional and macroeconomic variables is given that can be exploited in the usual fashion. An individual-specific error term $\varepsilon_{is\ ret\_year}$ completes the model. Clustering at the country-year level ensures that standard errors are corrected for within-group correlation and robust to heteroscedasticity (MOULTON 1990). In other words, the Moulton procedure corrects the calculated standard errors of the macro-estimates for the fact that institutions vary only across countries and years, but are identical for all individuals of the same country who retire in one specific year.[15] Λ denotes the logistic cumulative distribution function.[16] This model is estimated with a Logit estimation - intuitively, the Logit model chooses the coefficient vectors α, β and γ to fit the best possible curve to the data given this functional form.

The baseline model simply pools the available individual- and country-level data, disregarding the pseudo-panel structure at the micro level and the panel structure at the macro level ('pooled'). The second model adds country fixed effects and time fixed effects. Country fixed effects take account of time-invariant, but unobserved heterogeneity across countries, such as e.g. cultural traits, people's response behavior, and political institutions, the omission of which might bias the coefficient vectors α, β, and γ.[17] Time fixed effects take account of common macro-economic and political circumstances shared by all countries in the sample at the same point in time, such as e.g. the world-wide economic business cycles, financial market crises, terrorist attacks, etc. In the third and fourth model vari-

[14] A preliminary analysis (available on request) suggests that GDP per capita is never significant and too highly correlated with the unemployment rate to be included in the model.

[15] When clustering one assumes that the number of clusters approaches infinity. The country-year level clusters comprise all individuals with identical retirement year in the same country, yielding up to 200 clusters.

[16] The logistic distribution is similar to a normal distribution except for that its tails are 'fat'.

[17] For a discussion and an example, see FISCHER (2010).

ants, the robustness of the findings is tested to assuming (1) a time trend variable (in place of the time fixed effects) and (2) country-specific time trends that allow for heterogeneity in the unobservable macroeconomic and institutional development.

Previous cross-national studies focus on the institutional determinants of early retirement in a more general sense, not differentiating between the different reasons for early retirement, or even between several types of company-induced withdrawals. Most of them employ country-level data on labor force participation rates, making their results potentially biased due to endogeneity[18] and ecological fallacy[19]. Their approach also restricts the number of controlling variables to ensure a sufficiently large degree of freedom in the regressions (e.g. DUVAL 2003; JOHNSON 2000, 2001; BLÖNDAL & SCARPETTA 1999). In contrast, in this study micro data on individual decision-making is combined with country-level circumstantial factors, avoiding the ecological fallacy problem regarding the micro-determinants, and mitigating the endogeneity problem with respect to the institutional and macro-economic factors.

5 Empirical results

5.1 Individual Determinants of Early Retirement

Table 4 presents the estimation results for the individual and work-place characteristics at the time of retirement of individual *i* for the probability of retiring with severance pay as opposed to being made redundant prematurely. Column 1 presents the pooled model, while columns 2 to 4 take into account the panel structure at the country level in various forms: all models include country fixed effects. In addition, the model in column 2 adds time fixed effects, the one in column 3 employs a joint time trend, while the one in column 4 includes country-specific

[18] For discussion, see e.g., JOHNSON (2001), BLÖNDAL & SCARPETTA (1999).

[19] The ‚ecological fallacy' alludes to the fact that the analysis of individual decision-making at an aggregate level might produce reversed associations. See ROBINSON (1950) for a famous example.

time trends. The increase in the Pseudo R^2 as goodness of fit measure between columns 1 and 2 suggests that country and time fixed effects should not be omitted from the final specification. Overall, Table 4 suggests that the early retirement impact of person-specific determinants are rather robust to whether and how the panel structure at the country level is accounted for.

Only a few of the tested person- and workplace-specific factors appear to influence the probability of retirement with severance pay, as statistically significant coefficient estimates indicate. This probability increases in tenure, on the one hand, and the worker's age at the year of retirement, on the other. Clearly, the older a worker is, the less costly it is for the employer to pay the loss-in-earnings-compensating severance pay to induce her early retirement. Further, the longer a worker stays with a firm (tenure), the better networked she is, and the stronger she is protected by unions and employment protection laws, both preventing her lay-off. The significant effect of 'post-secondary education' appears to be driven by employees in three countries only and should be taken with caution (reference category: 'no education').

Employees with an important supervisory position are also more likely to retire early with a 'golden handshake', as opposed to being simply dismissed by their employers, (between 25 and 199 supervisees, reference category 'no supervision'). Also those who are employed by larger firms (firm size > 500 employees) have equally a higher probability of retiring with a severance pay, as one would expect (reference category is 'firm size less than 5 persons'). On the one hand, the financial burden of severance pay is more easily borne by larger firms (implying larger revenue, market power, and profit). On the other hand, employees in management positions often have negotiated special work contracts that stipulate the option of premature departure with a 'golden handshake'. Finally, persons employed by the government or in state-owned industries are more likely to depart early with a severance pay, as compared to their colleagues who work in the private industry (reference group). Possibly, workers in the public sector enjoy special protection through unions, or they profit from special employment regulations that apply to the government sector only.

Not relevant to the type of company-induced early retirement appears to be gender – when controlling for retirement age – otherwise men are more likely to retire with a severance pay. Put differently, working until old age pays off in terms of severance pay, and male employees are more likely to do that than women. Also irrelevant appears to be education, defined by the OECD ISCED 1997 scale, having controlled separately for respondent's supervisory position, tenure, and gender. Having a small supervisory power exerts an insignificant effect as does being a single, solitaire worker. The insignificance of having supervisory power over more than 200 persons (as opposed to those who supervised 25 to 199 persons) is possibly driven by the rather low number of observations in this category. The effects of small and medium firm sizes are rather inconsistent, and, in tendency, rather insignificant. Finally, being married appears not to be of relevance for the probability of early retirement with severance pay.

With the focus of this analysis on the institutions that determine the means by which companies trigger early retirement, from now on results for person- and workplace-specific determinants will not be reported any more, even though they are kept as controls in all empirical models that follow. As Table 4 suggests, the individual determinants are rather insensitive to how time effects are accounted for. From now on, consistently country and time fixed effects will be included throughout.

Tab. 4 Individual Determinants of Early Retirement with Severance Pay

	(1)	(2)	(3)	(4)
Female	-0.231	-0.327	-0.326	-0.350*
	[1.29]	[1.57]	[1.64]	[1.73]
Married	-0.138	-0.154	-0.130	-0.158
	[1.02]	[1.03]	[0.88]	[1.06]
Log (age of retirement)	8.267***	5.883***	5.740***	5.821***
	[7.43]	[4.32]	[4.34]	[4.34]
Primary School	0.240	-0.029	0.028	-0.008
	[0.72]	[0.06]	[0.06]	[0.02]
Secondary I	0.251	-0.169	-0.124	-0.115
	[0.70]	[0.36]	[0.27]	[0.26]
Secondary II	0.391	0.088	0.114	0.112
	[1.11]	[0.18]	[0.24]	[0.24]
Post Secondary	2.582**	2.183*	2.191*	1.979*
	[2.39]	[1.88]	[1.91]	[1.84]
Tertiary I or II	0.301	-0.080	-0.016	0.030
	[0.77]	[0.15]	[0.03]	[0.06]
Tenure (years)	0.029***	0.037***	0.036***	0.037***
	[4.72]	[5.74]	[5.66]	[5.72]
Firm size 6 – 15	0.531**	0.433	0.458	0.509*
	[2.11]	[1.55]	[1.64]	[1.77]
Firm size 16 – 24	0.405	0.502	0.406	0.433
	[1.43]	[1.51]	[1.32]	[1.38]
Firm size 25 – 199	0.527**	0.445	0.466*	0.482*
	[2.14]	[1.63]	[1.76]	[1.79]
Firm size 200 – 499	0.482	0.433	0.436	0.426
	[1.64]	[1.36]	[1.40]	[1.36]
Firm size > 500	0.843***	0.914***	0.840***	0.868***
	[3.18]	[3.16]	[2.95]	[3.00]
Supervision 1 – 5 persons	0.248	0.020	0.015	0.028
	[1.10]	[0.09]	[0.06]	[0.12]
Supervision 6 – 15 persons	0.350	0.172	0.126	0.103
	[1.46]	[0.67]	[0.50]	[0.39]
Supervision 16 – 24 persons	0.175	0.002	0.015	0.105
	[0.52]	[0.01]	[0.05]	[0.31]
Supervision 25 – 199 persons	0.894***	0.726**	0.671**	0.663**
	[2.81]	[2.13]	[2.04]	[2.05]
Supervision > 200 persons	0.393	0.001	-0.001	-0.006
	[0.80]	[0.00]	[0.00]	[0.01]
State industry	0.593***	0.483***	0.479***	0.465***
	[3.61]	[2.81]	[2.86]	[2.61]
Civil servant	1.232***	0.917***	0.976***	1.108***
	[3.86]	[2.74]	[3.19]	[3.43]
Country FE	no	yes	yes	yes
Time structure	no	FE	Overall time trend	Country-specific trends
Observations	1437	1436	1437	1437
Pseudo R2	0.1305	0.2238	0.1968	0.2182
Clusters	210	209	210	210

Notes: Dependent variable: Probability of retiring early accompanied by a severance pay, as opposed to being simply laid off by the employer. Logit estimation with standard errors clustered at the country-year level. '*', '**', '***' denotes significance at the 10, 5, and 1 percent level, respectively. Reference person is male, unmarried, with no completed primary school education, working in the private sector, in a small firm (1 – 5 persons), with no supervisory power (0 persons).

5.2 Institutional factors

Table 5 displays the correlation matrix for the institutional determinants, the significance levels and the number of observations on which these correlations are based. Obviously, more generous pension systems (measured by the replacement rate) are also less actuarially neutral, thus 'punishing' continuing work until the legal retirement age (ρ = 0.21). On the other hand, stronger unions appear to go parallel with an actuarially less neutral pension system (ρ = 0.12). Thus, in tendency, in countries with stronger unions workers are shielded against premature und unfair dismissals, while the pension system sets contrasting economic incentives to stop work prematurely. This is counteracted by the pension system generosity in terms of replacement rate which correlates negatively with union density (ρ = -0.10). Due to missing observations for some institutional variables, regression sample sizes depend on which institutional variables are included in the model; later various combinations of these institutional variables of interest are tested.

Tab. 5 Correlation of Institutional Variables

	Replacement rate (at age 60)	Decrease in wealth accrual	Union Density
Replacement rate	1		
Significance level	-		
Obs.	1372		
Decrease in wealth accrual	0.2135	1	
Significance level	0.0000	-	
Obs.	1293	1361	
Union density	-0.1019	0.1214	1
Significance level	0.0002	0.0000	-
Obs.	1344	1335	1408

Table 6 displays the results when the institutional factors and the unemployment rate are included in the baseline model of Table 4. All models control for person-specific determinants, country and time fixed effects (as in Table 4, not reported). The institutional and macroeconomic factors are added in a step-by-step procedure. Model 1 augments the baseline model with the measure of union strength, while models 2 and 3 add the pension system variables. Models 4 and 5 test the

sensitivity of previous estimates to the inclusion of the unemployment rate. Models 6 and 7 present results when pension system factors are included only, thus omitting the macroeconomic control and union density.

Turning to the empirical findings, throughout all models 1 to 5, a higher union density appears to lead to a higher probability of early retirement with a substantial severance pay. This finding is in line with *Hypothesis 3*. Obviously, stronger unions lead to stricter employment protection at the national or the firm level, protect long-tenured and older employees against dismissals and, thus, constitute an obstacle to employers' lay-off policy. In other words, strong unions increase employers' costs of choosing 'dismissals' as rejuvenation policy, making them offer severance pays to induce voluntary early retirement of older workers.

Similarly, higher replacement rates, the measure of generosity of the pension system, appear to trigger a higher likelihood of retiring with a substantial severance pay (models 2 to 7). This effect is largely robust to the inclusion or exclusion of other macroeconomic and institutional factors (models 4 to 7). Contradicting *Hypothesis 1*, a more generous pension system does not appear to lead to less early retirement with severance pay. Possibly, firm's cost-benefit analysis may suggest that payment of a severance pay is the smaller costs as compared to trying to fire the older worker and then having to keep her anyway. From the worker's perspective, severance pay should compensate for the (accumulated) financial loss through early retirement. Thus, this finding may support the general view that a more generous pension system works as a subsidy for the firm's rejuvenation policy, lowering worker's demand for severance pay, and thus making severance pays more financially feasible to the firm, and more likely.[20]

On the other hand, a larger decrease in pension wealth accrual leads to a lower probability of retiring with a 'golden handshake'. Models 3, 5, and 7 suggest that the higher the implicit tax on continuing work, the less likely it is that workers are

[20] This finding does not imply that the generosity of the pension system had no likelihood increasing effect on choosing a dismissal policy (*Hypothesis 1*). The estimate can also be interpreted that its increasing impact on choosing the severance pay is larger (in absolute terms) than its increasing effect on choosing dismissal policies.

offered a financial premium for their early, voluntary departure, rather increasing the probability of simply being made redundant. This finding is in support of *Hypothesis 1*. From a worker's perspective, a larger decrease implies a less neutral pension system toward early retirement, implying higher opportunity costs of *not* ceasing work prematurely. From an employer's view, increasing opportunity costs of continuing work makes it less necessary to provide financial incentives for voluntary early retirements and more likely that workers simply accept being 'laid-off'.

Turning to the macroeconomic control, no significant relation between unemployment and the type of company-induced early retirement is observable (models 4 and 5).[21] This result is perfectly in line with my research question that distinguishes between two types of producer-induced early retirement options, rather than trying to analyze worker's choice between early retirement, becoming unemployed, or continuing work. Focusing on worker's choice between these two ways of retiring early only is, in a sense, conditional on the firm's decision to rejuvenate and to eliminate the older workers from its workforce, which has been made at an earlier stage, and thus is not subject to my empirical analysis (see also the model discussion in 4). For this reason, in this specific context the so-called 'discouragement effect' is absent, which is caused by worsening labor market and re-employment conditions (e.g. BLÖNDAL & SCARPETTA 1999; WALKER 1985).

[21] Significance of the unemployment rate is only observed when pension system characteristics are excluded from the model, which suggests that they are designed in response to the general macroeconomic condition.

Tab. 6 Institutional Determinants of Early Retirement with Severance Pay

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Unemployment rate				-0.048	-0.057		
				[1.19]	[1.50]		
marginal effect				-0.008	-0.008		
Union density (%)	0.061*	0.053	0.254***	0.042	0.242***		
	[1.67]	[1.39]	[4.45]	[1.03]	[4.22]		
marginal effect	0.009	0.008	0.035	0.006	0.032		
Replacement rate		0.057***	0.042**	0.044**	0.029	0.031**	0.019
		[3.41]	[2.56]	[2.22]	[1.55]	[2.46]	[1.34]
marginal effect		0.008	0.006	0.006	0.004	0.005	0.002
Decrease in wealth accrual			-1.177**		-1.106**		-1.058***
			[2.27]		[2.16]		[2.60]
marginal effect			-0.162		-0.152		-0.152
Person-specific factors	yes	yes	yes	yes	yes	yes	yes
Country FE	yes	yes	yes	yes	yes	yes	yes
Time FE	yes	yes	yes	yes	yes	yes	yes
Observations	1405	1341	1268	1341	1268	1367	1278
Pseudo R2	0.2157	0.2229	0.2322	0.2236	0.2332	0.2271	0.2275
Clusters	184	165	150	165	150	187	159

Notes: Dependent variable: Probability of retiring early accompanied by a severance pay, as opposed to being simply laid off by the employer. Logit estimation with standard errors clustered at the country-year level. '*', '**', '***' denotes significance at the 10, 5, and 1 percent level, respectively. 'Marginal effect' denotes the marginal effect evaluated at the sample mean. Reference person is male, unmarried, with no completed primary school education, working in the private-sector, in a small firm (1 – 5 persons), with no supervisory power (0 persons).

For assessing the quantitative effects and relative importance of these institutional factors, marginal effects have been calculated. They indicate the change in percentage points that the event 'early retirement with severance pay' takes place for a one-unit increase in the variable of interest. Taking model 3 as fully specified model (which lacks any bias caused by omitted institutional variables) the largest effect is observable for the implicit tax on continuing work (-0.162), followed by union density (0.035), and then by the replacement rate (0.006), the measure of pension system generosity. An increase in union density by one percentage point increases the probability of retiring with a severance pay by 3.5 percentage points, while an equal-sized rise in the replacement rate increases the event probability by only roughly 0.5 percentage points. In contrast, a one-

percentage-point increase in the decrease of pension wealth accrual (measured in absolute terms) decreases the likelihood of retiring with a severance pay by 16.2 percentage points. Given the actual variation of decrease in pension wealth accrual from about 0 to only 8 in the sample, this marginal effect does not appear unrealistic. As model 5 shows, the inclusion of the (then insignificant) unemployment rate leaves the previously observed marginal effects largely unaffected.

6 Conclusion

In a world of increasing exposure to economic globalization, producers may have a strong economic incentive to induce masses of employees to withdraw prematurely in order to rejuvenate their work forces and to stay competitive. However, from a national perspective, the generation of such masses of early retirees may impose a threat to the stability of the social security systems, in particular, and social peace, in general. Firms that face the choice between laying-off workers, forcing them into early retirement, and, alternatively, offering a severance pay to make them retire voluntarily, may, with respect to their short-term profit maximization, prefer a simple cost-saving redundancy policy. But from a societal perspective, departures with severance pay may be preferred over simple dismissals as they ease worker's financial loss and prevent 'socialization' of these losses through the welfare or pension systems – for, after all, relieving poverty among the elderly has to be borne by the (employed) taxpayers.

For these reasons, it may be interesting for policy makers to know whether the pension system and the employment protection by strong unions have an influence on producer's choice between these two alternative rejuvenation policies. This study provides the first cross-country study on the institutional determinants of early retirement with severance pay as opposed to being laid off. This empirical analysis employs the SHARE 2005 data on about 10,000 pensioners, of which about 6,000 retired early from their last dependent employment. The information on their individual employment histories enables to identify institutional effects in a combined micro-macro panel from 1960 to 2004.

This study uses measures of pension system and labor market characteristics that are rather crude insofar as they reflect general institutional characteristics rather than the specific personal circumstances of each retiree (e.g. an individual-specific replacement rate). Nevertheless, this analysis provides first interesting insights, calling for more research in this field. It shows that stronger unions and a more generous pension system (in terms of replacement rate) make it more likely that early retirement is induced by a severance pay. This finding is in line with the hypothesis that unions protect employment and prevent dismissals of older workers. This result also supports the view that generous pension systems subsidize firm's rejuvenation policy, as it decreases the financial amount of necessary compensating severance pay. Finally, a larger 'implicit tax on continuing work' appears to lead to more workers having been simply laid-off. Possibly, such pension system punishes continuing work beyond the point of early retirement so harshly that it generates economic disincentives for workers to resist their redundancy anyway.

Nowadays, in overaging Western countries we are all faced with future cuts in the public pension system payments, which lower the replacement rate by which the last gross wage is translated into pension benefit payments. Also, during the last years the forces of globalization have led to a decline in union density, and lowered employment protection of workers in regular employment (DREHER & GASTON 2007; FISCHER & SOMOGYI 2009). A parallel development is that politicians plan to make the pension system more actuarially neutral in order to keep labor market participation of older workers high.

According to my analysis, two of these developments – weaker unions and lower replacement rates – will increase the likelihood that firms use a simple 'firing' strategy to rejuvenate their work forces, while an actuarially more neutral system would have the opposite effect. It is possible that the general societal development, though, is rather to decrease replacement rates (through increasing legal retirement ages) than to make the pension system more neutral, which may be more difficult to find a majority for. The actual development over last years, but also the general evolution since the late 80ies lends support to the view that national pension systems have become less generous and employment protection

has been lowered, while there is little evidence for pension systems having become more actuarially neutral.

A final assessment of these developments, however, can only be made when taking their total effect on the early retirement probability into account. FISCHER & SOUSA-POZA (2009a) have shown that a less generous system leads to a lower probability of early retirement, as opposed to continuing work. On the one hand, we are all faced with the societally positive effect of less pension system generosity that increases labor force participation rate of the older population and thus lowers the financial burden on the younger workers. On the other hand, less pension system generosity may lower welfare through more early retirements forced through dismissals rather than induced through severance pays, as this study suggests. Thus, less pension system generosity may generate permanent income losses for retirees and foster old-age poverty. Weighting the positive against the negative effects, from a societal point of view the direction of the total welfare effect depends not only on the share of older workers in the population, but also on the shape of the welfare function, namely the weight by which different societal groups account for national well-being. It hinges on these assumptions whether it can be simply concluded that an increase in dismissals of older workers in the near future was only a relatively small negative side effect of necessary pension reforms our societies have to bear. Otherwise, counteracting reforms of labor market regulations need to be discussed.

Appendix

Tab. A1 Entitlement Ages for the Public Old-age Pension System

Country	Male				Female			
	1961	1975	1995	2003	1961	1975	1995	2003
Austria	65	65	65	65	60	60	60	60
Germany	65	65	65	65	65	65	65	65
Sweden	67	67	65	65	67	67	65	65
Netherlands	65	65	65	65	65	65	65	65
Spain	65	65	65	65	65	65	65	65
Italy	60	60	62	65	55	55	57	65
France	65	65	60	60	65	65	60	60
Denmark	67	67	67	65	67	67	67	65
Greece	65	62	62	65	60	57	57	65
Switzerland	65	65	65	65	63	62	62	63

Source: BLÖNDAL & SCARPETTA (1999, Table III.1). Values of 2003 are taken from DUVAL (2003, Table 1).

Tab. A2 Definition of Person-specific Variable

Early retirement	1 if retirement age is below the legal pension age, 0 otherwise
Early retirement with severance pay	1 if early retirement was linked to a financial bonus (severance pay), 0 if early retiree was dismissed
female	1 if gender is female, 0 otherwise
Married	1 if person was married or with partner at the time of retirement, 0 otherwise. Variable constructed using information of retirement year/current marital status, year of separation or death of partner
No completed primary school	Reference category
Primary School	1 if person attended an institution of primary education, 0 otherwise
Secondary I	1 if person attended an institution of secondary I education, 0 otherwise
Secondary II	1 if person attended an institution of secondary II education, 0 otherwise
Post Secondary	1 if person attended an institution of post-secondary education, not leading to a tertiary degree, 0 otherwise
Tertiary I or II	1 if person attended an institution of tertiary I or II education, 0 otherwise
log(retirement age)	Logarithm of age at retirement year. Retirement age is calculated as retirement year minus year of birth.
Tenure (Years in last job)	Number of years worked with the last employer before retirement
Firm size	Categorical variable, based on firm size information given by employees and civil servants.
Firm size 1 – 5	Reference category
Firm size 6 – 15	1 if firm size is between 6 persons and 15 persons, 0 otherwise
Firm size 16 – 24	1 if firm size is between 16 and 24 persons, 0 otherwise
Firm size 25 – 199	1 if firm size is between 25 and 199 persons, 0 otherwise
Firm size 200 – 499	1 if firm size is between 200 and 499 persons, 0 otherwise
Firm size > 500	1 if firm size is more than 500 persons, 0 otherwise
Supervision	Categorical variable, based on information of the number of supervisees in the last job.
Supervision 0	Reference category
Supervision 1 – 5 persons	1 if persons had managerial power over 1 to 5 persons in her last job, 0 otherwise
Supervision 6 – 15 persons	1 if persons has managerial power over 6 to 15 persons in her last job, 0 otherwise
Supervision 16 – 24 persons	1 if persons has managerial power over 16 to 24 persons in her last job, 0 otherwise
Supervision 25 – 199 persons	1 if persons has managerial power over 25 to 199 persons in her last job, 0 otherwise
Supervision > 200 persons	1 if persons has managerial power over 200 persons in her last job, 0 otherwise
Private industry	1 if person was employed in the private industry, 0 otherwise. Reference category
Civil servant	1 if persons was a civil servant in her last job, 0 otherwise
State industry	1 if person was employed in the state industry in her last job, 0 otherwise

Tab. A3 Definition of Macro Variables

Average replacement rate	Expected gross replacement rate (over next 5 years) at age 60 in regular old-age pension system, averaged across six different life situations (3 earnings levels - 60%, 100% and 140% of average earnings - and 2 marital status - single or married with dependent spouse of same age). For most countries, values from 1990 – 1999 and 2003 are available, for some even earlier time series starting in the late sixties. Values for 2004 have been replaced by values of 2003. From 2000 to 2002 and else were feasible missing values in all countries replaces by linear interpolation. Data made available by courtesy of Mr. Duval, OECD. For Denmark and Greece this information was not available.
Decrease in wealth accrual	Cumulated pension wealth accruals for singles on average wages, 1967 and 1995, (Table III.6, BLÖNDAL & SCARPETTA, 1999, p.65.) in year of retirement, for postponing retirement from 55 to 65 years of age. For Greece (both years) and for Spain (1967) this information was not available. Between 1967 and 1995, missing values have been replaced by linear interpolation. From 1995 on, values of the year 1995 have been used.
Unemployment rate	Unemployment rates from the OECD, gaps filled with WDI data. For Austria and the Netherlands time series data are largely replaced with WDI to ensure data comparability (Austria) and the greatest possible time series (Greece, Netherlands). Also use of non-standardized rates to ensure maximum length of time series. Some gaps have been filled with linearly interpolated data, where no other data sources were available, particularly for Spain between values in the mid-sixties and first measurements in the early seventies. For many countries, data before the 80ies or even nineties were not available.
Union Density	Union density is defined as the percentage of union members in the national labor force (in percentage). Obtained from chapter 3 of the Economic Outlook 2004 (OECD 2004).

Tab. A4 Descriptive Statistics

Variable	Obs.	Mean	Std. Dev.	Min	Max
female	1440	0.31	0.46	0.00	1.00
married	1440	0.56	0.50	0.00	1.00
Log (retirement age)	1440	4.06	0.06	3.89	4.45
Primary School	1439	0.22	0.41	0.00	1.00
Secondary I	1439	0.22	0.42	0.00	1.00
Secondary II	1439	0.33	0.47	0.00	1.00
Post Secondary	1439	0.02	0.15	0.00	1.00
Tertiary I or II	1439	0.17	0.38	0.00	1.00
Tenure (years in last job)	1438	26.39	11.82	0.00	57.00
Firm size 6 – 15	1440	0.15	0.36	0.00	1.00
Firm size 16 – 24	1440	0.11	0.32	0.00	1.00
Firm size 25 – 199	1440	0.32	0.46	0.00	1.00
Firm size 200 – 499	1440	0.13	0.34	0.00	1.00
Firm size > 500	1440	0.19	0.39	0.00	1.00
Supervision 1 – 5 persons	1440	0.15	0.36	0.00	1.00
Supervision 6 – 15 persons	1440	0.12	0.33	0.00	1.00
Supervision 16 – 24 persons	1440	0.04	0.21	0.00	1.00
Supervision 25 – 199 persons	1440	0.09	0.28	0.00	1.00
Supervision > 200 persons	1440	0.02	0.15	0.00	1.00
State industry	1440	0.23	0.42	0.00	1.00
Civil servant	1440	0.12	0.32	0.00	1.00
Unemployment rate	1436	8.22	4.46	0.43	24.12
Union density	1408	36.34	23.67	7.00	80.00
Replacement rate	1372	49.71	24.93	0.00	80.00
Decrease in pension wealth accrual	1361	1.79	1.48	-0.22	7.90

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