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Early Retirement: Free Choice or Forced Decision?

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Abstract: Early retirement is usually explained as a supply-side phenomenon where workers' retirement decision is primarily based on an assessment of future streams of wages and pension payments from public and private sources. However, early retirement can also arise from firm's profit maximization: particularly as a response to adverse demand shocks, firms can actively use wage and pension structures to force workers into early retirement. This paper analyzes voluntary and involuntary early retirement based on international microdata covering 19 industrialized countries. The portion of the early retirees who assess their retirement as involuntary varies considerably among countries, from 9% up to 62%. Rising unemployment and a rigid employment protection legislation contribute to a high share of forced early retirement, suggesting that firms use early retirement to reduce staff during economic recessions and as a means to circumvent employment protection legislation. Moreover, the empirical results suggest that generous early retirement provisions of public old-age insurances do not only make voluntary early retirement more attractive for individuals, but also induce firms to force more employees into early retirement.

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Early Retirement: Free Choice or Forced Decision?

1. Introduction

The trend toward earlier retirement has been one of the most important labor market developments in the past fifty years. During this period, participation rates of older workers have fallen in virtually all OECD countries. The decrease in labor market participation implies considerable economic costs, particularly through social security benefit payments and a lower tax base.

A large body of economic literature has analyzed early-retirement behavior from a labor-supply perspective. According to this literature, workers' retirement decision is based on an assessment of future streams of wages and pension payments from public and private sources. The optimal retirement date is chosen in order to maximize a worker's future expected utility. Examples for such life-cycle retirement models are the contributions by Burkhauser (1979), Mitchell and Fields (1982), Burtless (1986), and Gustman and Steinmeier (1986). An important theoretical prediction of this theory is that earlier and more generous availability of public old-age benefits will increase the incidence of early exits from the labor force because early retirement becomes a more attractive choice for the individuals. Indeed, international comparisons such as those by Blöndal and Scarpetta (1998) or Duval (2003) find that early retirement is more prevalent in countries with more generous early retirement regulations. Furthermore, Gruber and Wise (1999) show for various countries that retirement tends to take place around the age when early retirement benefits can be claimed.

The effects of labor demand on early retirement have received far less attention. Classical theory predicts that the firms should pay their workers their marginal product and should have no incentive to induce early retirement. Although Lazear (1979) does not explicitly address the issue of early retirement, his analysis provides both a supply- and demand-side explanation of the institution of mandatory retirement. In his moral hazard model, employers and employees agree to a contract that pays younger workers wages below their VMP (value of marginal product), and older workers more than their VMP. Due to moral hazard, such contracts assure that workers' lifetime VMP is larger than in the absence of such contracts. However, a necessary condition for such payment schemes is mandatory retirement, i.e., a date at which a worker is no longer entitled to receive a wage greater than his VMP. Stern (1987, 1994) shows that, if a worker's position affects utility and/or productivity, then a firm

can induce its workers to retire before their marginal product equals their reservation wage. In essence, older workers have better jobs which are more productive and provide the most position utility. Retirement of an older worker implies that a younger worker can be promoted, thus becoming more productive, enjoying greater position utility and, as a result, requiring lower wages in order to remain at the firm. Hutchens (1999) develops an implicit contract model in which early retirement also arises out of firms' profit maximization behavior. Firms actively use wage and pension structures to influence or even determine workers' retirement decisions. Particularly, as a response to adverse demand shocks, firms choose to direct workers toward early retirement. Social security benefits can thus act like a form of unemployment insurance, effectively subsidizing workforce reductions by lowering the cost to the firm of shedding older workers. In fact, the option of continuing work might be so restricted by firms that workers no longer perceive their early retirement as an individual choice, but as a forced decision. In accordance with the supply-side theory, the model by Hutchens (1999) also predicts that higher early retirement benefits increase the incidence of early retirement. However, this is not caused by the fact that more workers choose to retire early, but by the fact that firms increasingly push workers into early retirement. In other words, generous social security provisions for early retirement might have the undesirable effect of reducing employment and creating involuntary early retirement instead.

Although sufficient anecdotal evidence on the importance of the phenomenon of involuntary early retirement exists (e.g. Schmähl 2003 for the case of Germany), we are not aware of empirical studies that document the extent and determinants of involuntary early retirement. This is particularly true in a cross-national setting - a setting that is essential when trying to assess the role national regulations (e.g. in the field of social security or employment protection legislation) on early retirement behavior. The main contribution of this paper is to provide international evidence on the extent to which early retirement is involuntary and on the factors that influence the ratio of voluntary to involuntary early retirement. This is done by analyzing a unique international microdata set covering 19 countries. Our results show that the extent to which early retirement is involuntary varies greatly among countries. While rising unemployment rates and strict employment protection legislations increase the share of involuntary retirements among the early retirees, more generous social security systems do not lead to a higher portion of voluntary early retirements.

The paper is structured as follows: Section 2 summarizes both a basic life-cycle model of supply-side retirement and Hutchens' (1999) model of demand-side-driven retirement. This

model is particularly illustrative for explaining the reasons for involuntary early retirement. Section 3 defines and describes early retirement in an international context. Section 4 discusses the data and methodology used in this study. Section 5 presents the results of the analysis on the voluntary and involuntary retirement and section 6 concludes.

2. The Classical Life-Cycle Model and Hutchens' Implicit Contract Model

In a review of the early literature on the retirement decision, Mitchell and Fields (1982) summarize the basic structure of supply-side models of retirement that use a life-cycle framework. A worker has a utility U which is a positive function of the lifetime consumption vector C and the lifetime leisure vector L : $U=U(C,L)$. Consumption increases with income Y , where income depends on earnings (E_1, E_2, \dots, E_R) until retirement at time R and on pension benefits $(P_{R+1}, P_{R+2}, \dots, P_T)$ in the remaining years of life: $Y=Y(E_1, E_2, \dots, E_R, P_{R+1}, P_{R+2}, \dots, P_T)$.

The public and/or private pensions P_t are an increasing function of the retirement date R and an aspect of working W that increases pension benefits: $P_t= P_t(R,W)$ for all periods t . W can be an aspect of work such as years of employment or contributions to a pension plan, and it is a nondecreasing function of lifetime labor H : $W=W(H)$. The lifetime labor supply vector H and the lifetime leisure vector L sum up to a constant time endowment c . Consequently, total life-cycle utility can be expressed as

$$(1) \quad U = U \{ C [E_1, \dots, E_R, P_{R+1}(W(L), R), \dots, P_T(W(L), R)], L \}$$

The worker maximizes utility by choice of a labor supply path H , which specifies the retirement date R . $H=c-L$ is an increasing function of the lifetime streams of earnings E , pensions P , and possible other explanatory variables X : $H=H(E, P, X)$.

Some predictions of this theory with regard to the choice of the retirement date are

1) An exogenous and uniform increase of public or private pensions lowers the retirement age due to equally directed substitution and wealth effects.

2) If the present value of lifetime pension benefits falls when retirement is delayed, the worker has an incentive to retire earlier. In an extreme case, the pension benefits of all periods

t might not increase with additional work, i.e., $\frac{\delta P_t}{\delta H} = \frac{\delta P_t}{\delta W} * \frac{\delta W}{\delta H} = 0$.

3) An exogenous increase of the worker's earnings has ambiguous effects on the choice of retirement. The resulting wealth effect suggests an earlier retirement, but the substitution effect favors a later retirement. However, if the worker starts with an exogenous level of

wealth A and his consumption C depends positively on A , an increase in wealth unambiguously leads to an earlier retirement.

We will test the effects of wealth and of the early retirement provisions of public social security on early retirement in the empirical section of the paper.

The supply-side approach to retirement has proved very valuable in explaining many empirical observations related to retirement. Moreover, one can accommodate further aspects of the retirement decision in more sophisticated versions of the life-cycle model.¹ The limitation of this class of models is, however, that the behavior of the employer is often only treated in a somewhat cursory way.

A different approach that highlights the employer's decisions is the model proposed by Hutchens (1999). He developed an implicit contract model of early retirement with two actors: a risk neutral firm and risk-averse worker. Worker and firm enter a three-period contract. The worker is employed in the first period, either employed or early retired in the second period, and nonemployed in the third period. Employment status is only uncertain in the second period. Early retirement in the second period depends on product-demand shocks. It occurs when the marginal product of labor is less than the marginal value of nonmarket time.

Workers live for two periods and have an exogenous probability s of surviving to the third period. A worker's lifetime utility is the sum of utility in the three periods (with no discounting). A worker who is employed has utility $U(w_i)$, where w_i is the wage in period i . A nonemployed individual has utility $U(b_i + g_i + z_i)$, where b_i is a period i private pension payment, g_i is a old-age pension payment of the government's social security program and z_i is the period i consumption value of home production. The period values of z_i are $z_1 = 0$, $z_3 = z_m$, and z_2 , which is only revealed at the beginning of the second period and has a distributed $f(z_2)$ for $0 \leq z_2 \leq z_m$. Letting p_2 denote the probability that the worker is employed in period 2, and initially assuming that social security benefits are only paid in the third period, then the expected utility in the three periods is as follows:

¹ Extended models can for instance include investment decisions (e.g. Kingston 2000) or family considerations (e.g. Gustman and Steinmeier 2000).

$$\begin{aligned}
EU &= \sum_{i=1}^3 EU_i \\
(2) \quad EU_1 &= U(w_1) \\
EU_2 &= \int_z [p_2 U(w_2) + (1-p_2)U(b_2 + z_2)] f(z_2) dz_2 \\
EU_3 &= s[U(b_3 + g_3 + z_m)]
\end{aligned}$$

The worker has two possible marginal products, $\theta(H)$ and $\theta(L)$ with $\theta(H) > \theta(L) \geq 0$ and $\theta(L) < z_m$. The first-period and the last-period marginal product is $\theta(H)$ and $\theta(L)$, respectively; the lower marginal product in period three due to aging. The second-period marginal product is uncertain and depends on the demand for the firm's product which determines the firm's second-period technology and hence the extent to which the worker's skills will match the technology.

Workers and firms negotiate a three-period contract over wages, private pensions, and employment probabilities. Note that workers' risk aversion and the desire for consumption smoothing will assure that a firm will enter into a three-period contract with a worker and thereby raising its profits.

Assuming that at the time of contract negotiation there is a 0.5 probability that the second period marginal product is $\theta(L)$, the firm's expected period i profit π_i can be denoted as follows:

$$\begin{aligned}
(3) \quad \pi &= \sum_{i=1}^3 \pi_i \\
\pi_1 &= \theta_1(H) - w_1 \\
\pi_2 &= 0.5 \sum_{\theta_2=\theta(L)}^{\theta_H} \int_z \{ [\theta_2 - w(\theta_2, z_2)] p(\theta_2, z_2) - b(\theta_2, z_2) [1 - p(\theta_2, z_2)] \} f(z_2) dz_2 \\
\pi_3 &= -sb_3
\end{aligned}$$

The firm chooses the variables w_1 , $w(\theta_2, z_2)$, $p(\theta_2, z_2)$, $b(\theta_2, z_2)$, and b_3 to maximize its total profit subject to the constraint that the worker's total expected utility must not be smaller than the (exogenous) utility that he could obtain from a job elsewhere in the market. The result of the firm's profit maximization is that a worker is employed in the second period if the value of the marginal product exceeds the worker's value of home production:

$$(4) \quad \begin{aligned}
&\text{If } \theta_2 \geq z_2, \text{ then } p(\theta_2, z_2)=1 \\
&\text{If } \theta_2 < z_2, \text{ then } p(\theta_2, z_2)=0
\end{aligned}$$

An important point to notice in this model is that wages, pensions and future social security benefits do not enter into the early retirement decision. As the retirement decision depends only on marginal product exceeding the worker's value of home production, this model differs

fundamentally from common labor-supply models. Furthermore, early retirement is the result of a firm's profit maximization.

Hutchens (1999) extended his analysis by including a social security system that provides early retirement benefits g_2 that are paid in the second period. Actuarial adjustments of social security benefits are represented by specifying the second-period social security benefit as $g_2 = g_3 - \Delta$. If there is no actuarial adjustment, then $\Delta=0$ and if the system is actuarially fair, then $g_2 + sg_2 = s(g_2 + \Delta)$, i.e., $\Delta = g_2/s$. As the third-period social security benefits depend on second period employment status, so does third-period private pensions. Let b_3^1 and b_3^0 be the third-period private pensions for individuals that were employed and early retired in the second period, respectively. Moreover, a tax $2t$ is levied on wages (but not on social security and private pension payments) with employer and worker both paying t . The individual's expected utility is now as follows:

$$\begin{aligned}
 EU &= \sum_{i=1}^3 EU_i \\
 EU_1 &= U[(1-t)w_1] \\
 (5) \quad EU_2 &= 0.5 \sum_{\theta_2=\theta(L)}^{\theta_H} \int_z \left\{ p(\theta_2, z_2) U[(1-t)w_2] + [1-p(\theta_2, z_2)] U[b(\theta_2, z_2) + g_2 + z_2] \right\} f(z_2) dz_2 \\
 EU_3 &= 0.5 \sum_{\theta_2=\theta(L)}^{\theta_H} \int_z s \left\{ p(\theta_2, z_2) U[b_3^1 + g_2 + \Delta + z_m] + [1-p(\theta_2, z_2)] U[b_3^0 + g_2 + z_m] \right\} f(z_2) dz_2
 \end{aligned}$$

The firm's problem is as before with the exception that the payroll tax is now included, i.e. wage payments are multiplied by $(1+t)$:

$$\begin{aligned}
 \pi &= \sum_{i=1}^3 \pi_i \\
 \pi_1 &= \theta_1(H) - w_1(1+t) \\
 (6) \quad \pi_2 &= 0.5 \sum_{\theta_2=\theta(L)}^{\theta_H} \int_z \left\{ [\theta_2 - w(\theta_2, z_2)(1+t)] p(\theta_2, z_2) - b(\theta_2, z_2)[1-p(\theta_2, z_2)] \right\} f(z_2) dz_2 \\
 \pi_3 &= 0.5 \sum_{\theta_2=\theta(L)}^{\theta_H} \int_z s \left\{ -p(\theta_2, z_2) b_3^1 - [1-p(\theta_2, z_2)] b_3^0 \right\} f(z_2) dz_2
 \end{aligned}$$

With $t=0$, the solution to the profit maximization is an employment probability for the second period which is characterized by

$$(7) \quad \begin{aligned}
 &\text{If } \theta_2 \geq z_2 + g_2 - \Delta s, \text{ then } p(\theta_2, z_2)=1 \\
 &\text{If } \theta_2 < z_2 + g_2 - \Delta s, \text{ then } p(\theta_2, z_2)=0
 \end{aligned}$$

If actuarial adjustment is not full, i.e. $\Delta < g_2/s$, then an increase in social security benefits for early retirees raises the probability of early retirement. The reason for this is that early

retirement benefits allow firms to reduce its second-period private pensions, which in turn reduces the costs of early retirement and thereby increasing the incident of early retirement. If full actuarial adjustment takes place, then payment of social security benefits to early retirees does not affect early retirement. Note that the level of early retirement that results from the solution (7) is not efficient, since the firm will send employees into early retirement even if their labor product is larger than the marginal value of home consumption. It can also be easily shown that a payroll tax that is levied on earnings but not on pensions will further increase early retirement, because the firms profit when employing the worker will decrease, while the profit in case of early retirement remains unaffected.

This model gives rise to the following hypothesis which will be tested in the empirical part of the paper:

- 1) A higher level of public early retirement benefits g_2 leads to more early retirement by subsidizing the firms' workforce reductions.
- 2) A low actuarial adjustment Δ of the pensions also contributes to more early retirement.
- 3) Product-demand shocks induce firms to send employees into early retirement because they decrease workers' labor product θ_2 .

While Hutchens' (1999) model explicitly models the firm's behavior, it does not take into account that firms also have the possibility to lay off workers - a practice often encountered in reality. We therefore propose a further hypothesis:

- 4) In countries with a rigid employment protection legislation, firm-driven early retirements are more widespread since layoffs are not a readily available alternative for reducing staff.

The comparison of these hypothesis with the predictions of the supply-side theory as described above shows several similarities. In particular, generous early retirement provisions of the social security system are expected to increase early retirement according to both theories. A strength of Hutchens' (1999) model is that it explicitly models how product-demand shocks and the resulting desire of firms to reduce staff affect the employment opportunities of a worker. While supply-side models could in theory accommodate variations in the wages offered to workers, the review article by Hurd (1990) points out that this aspect is often neglected, at least in empirical analysis: "Assuming that the worker could choose hours and years of work freely at the preretirement wage, which is the only one observed for that worker, leads to the incorrect conclusion that the worker retired because of a shift in the position or shape of his indifference curves, when, in fact, he retired because of unobserved employment constraints." (Hurd 1990, p. 597). One aspect of the retirement decision that is

better reflected by the supply-side models than in the Hutchens (1999) model is the fact that a worker can hardly be "forced" into early retirement in the sense that he is not allowed to search for another job. If there is not only one, but several firms, and if the product-demand shocks affect only some of these firms, the worker might still find a job at attractive conditions. At least in many European countries, however, there is evidence that older employees face considerable difficulties in finding employment. In a comprehensive review of empirical studies from various European countries, Taylor (2001) concludes that employers' attitudes and policies toward older employees imply a considerable age discrimination in the labor market, for instance by setting age limits in recruiting.² Consequently, workers exceeding a certain age no longer have attractive employment options with other firms. In such cases, Hutchens' (1999) one-firm model would be applicable.

3. Data and Definitions

Before discussing early retirement in more depth, it is useful to clearly define the concept of "retirement" which can have quite different meanings. According to OECD (1995), three broad definitions of retirement can be distinguished: (i) being a recipient of a public or private old-age pension, regardless of the current employment status; (ii) being out of the labor force, regardless of the reason for ceasing work and no matter whether an old-age pension is being drawn; or (iii) having a self-described status of retired, regardless of employment status and receipt of a pension. These definitions of retirement can easily be transformed into definitions of early retirement if the retirement takes place prior to the individual reaching the legally defined standard retirement age.

In this paper, early retirement is defined based on a combination of the second and third concept. In other words, retirement is a self-declared state and only individuals who are out of the labor force are considered to be retirees.

The international comparison of voluntary and involuntary early retirement is conducted using data from the 1997 International Social Survey Program (ISSP). The ISSP is a continuing annual program of cross-national collaboration which started in 1985. The data are collected by independent institutions in the participating countries using the same questionnaire. The topics of the annual surveys change from year to year. In 1997, 34,835

² Constraints to the employment of older workers can also stem from regulations of the social security system. For instance, firms in Switzerland have to pay contributions to mandatory private pension funds and the contribution rates increase with the worker's age (see Dorn and Sousa-Poza 2003).

individuals were interviewed on "Work Orientations", covering issues on work content and organization as well as general attitudes towards work and leisure. Our analysis includes the following 19 countries: Canada, Cyprus, Denmark, France, Germany, Great Britain, Hungary, Italy, Japan, the Netherlands, New Zealand, Norway, Poland, Portugal, Slovenia, Spain, Sweden, Switzerland, and the USA.³

As laid out above, the ISSP data allows us to identify individuals who (i) were no longer working and who (ii) assessed their own status as being early retired. Importantly, all early retired persons had to state that they either "*retired early - by choice*" or "*retired early - not by choice*". This information is used to define a dichotomous dependent variable having a value equal to one if the respondent retired early in an involuntary manner ("not by choice"), and equal to zero if early retirement was voluntary ("by choice"). This variable is analyzed with a series of probit models. The analysis will cover the early retirement of individuals aged 45 to 64 who retired between 1983 and 1997. This broad definition allows for a reasonable sample size of 651 early retirees in the multivariate analysis. *Table A1* in the appendix summarizes the corresponding explanatory variables.⁴

In addition to the ISSP variables, our analysis includes variables referring to general economic and social security characteristics of the different countries. These macro-level variables are included to test the theoretical predictions that were discussed in section 2 of this paper. Wealth level as a supply-side determinant of early retirement is represented by a country's real GDP per capita in the year of an individual's early retirement. The data is taken from Penn World Tables (Heston et al. 2002). Product demand shocks, which can trigger early retirement in the framework of Hutchens (1999), are characterized by the increase of the unemployment rate between the year before the retirement and the year of retirement. The data sources for this variable and for the OECD Employment Protection Legislation Index⁵ for the year 1990 are OECD (1999) and (2004b), respectively.

³ Six developing countries from Asia and Eastern Europe were excluded from the analysis because the data set contained very few early retirement observations for these countries.

⁴ The main advantage of the ISSP data is that it allows us to identify voluntary and involuntary early retirement in an international setting and on a micro-data level. The limitation of the data is that it is only cross-sectional. We can therefore not identify specific characteristics of individuals' pre-retirement jobs such as occupation. Moreover, it is not possible to readily compare early retired individuals to people who did not retire early since the identification of persons belonging to the latter group is difficult given the lack of information on previous working status (see also Dorn and Sousa-Poza 2005 for a further discussion of this issue).

⁵ The index refers to the strictness of employment protection for regular employment and is based on a variety of criteria including notice period, amount of severance pay, and definition of unfair dismissal.

There are two main characteristics of old-age pensions systems that supposedly affect early retirement. First, the expected old-age pension replacement rate at a given age measures the expected pension income as a percentage of the earnings just prior to retirement. The replacement rate can thus be interpreted as an indicator for the generosity of an old-age pension system.⁶ Second, the decrease in accumulated pension wealth accrual measures the reduction in expected lifetime pension income that results from postponing retirement. Such a decline in pension wealth accrual is equivalent to an implicit tax on continued work and is characteristic for a pension system that is actuarially unfair. In an actuarially neutral pension system, pension wealth accrual is invariant to the retirement age. Our models include variables for the average old-age pension gross replacement rate between age 60 and 65 and for the decrease in accumulated pension wealth accrual when postponing retirement from age 55 to 64. These variables take into account both public social security pensions and mandatory private pensions. The data are taken from Duval (2003, p. 39) and Blöndal and Scarpetta (1998, p. 65), respectively.⁷

4. Incidence of Involuntary Early Retirement

The incidence of involuntary early retirement varies considerably among countries, as shown in *table 1*. In the USA and in Denmark, only one out of ten early retirees has involuntarily moved into retirement. Other countries with very low rates of forced early retirement are Canada, Japan, and Norway. Conversely, involuntary early retirement seems to be the rule rather than the exception in some continental European countries. In Germany, Portugal, and Hungary, more than half of all early retirements are involuntary.

Table 1 around here (Note: tables are included at the end of the document)

⁶ In a life-cycle framework with certain restrictive conditions, the level of public pensions should have no effect on the choice of a retirement date. This is the case if contributions to the pension system are perceived as savings, if pension benefits paid equal the amount of contributions paid, and if the interest rate equals the rate of growth of total wages.

⁷ Duval (2003) computed the pension replacement rates are a synthetic indicator based on six individual cases with different wage levels and different marital status. Pension wealth accruals reported by Blöndal and Scarpetta (1998) are computed based on singles with average wages. The macro-level variables are summarized in *table A1* in the appendix. Note that some of the OECD variables are not available for four countries in our sample (Cyprus, Hungary, Poland, Slovenia). The multivariate analysis will hence be restricted to the remaining 15 countries.

Clearly, these large differences in the incidence of involuntary early retirement call for an explanation. Based on the theory of Hutchens (1999), we would expect that a large extent of company-driven early retirements may be the cause for involuntary retirements. This hypothesis will be tested in section 5.

Research on the self-declared motives for early retirement also suggests that, apart from the desire to leave work and company restructurings, poor health is among the most important causes for early retirement (see Burtless and Quinn (2000) for the United States and Dorn and Sousa-Poza (2004) for Switzerland). At least some of the retirees who leave the labor force due to poor health might assess their retirement as involuntary. While our data does not allow us to control for individual health, it does not seem very plausible that major differences in health levels among the countries in our sample should exist. Therefore, public health can hardly explain the large inter-country variance in the proportion of involuntary early retirements.

There might, however, be one exception to this rule. According to Szalai (1991), retirement in Hungary - the country with the highest ratio of involuntary early retirement in our sample - has predominantly been caused by poor health, which is widespread among workers. Szalai (1991) argues that this is because the previous state economy had many jobs with physically demanding and sometimes hazardous working conditions. Indeed, the high ratios of involuntary early retirement across all Eastern European countries in the sample suggest that the economic structures between 1983 and 1997, which covered both a period of state economy and the transition to a market economy, have led to a pattern of early retirement different to those in Western European or North American countries. A relatively low standard of living even for well-educated individuals implied that few people had the financial resources that facilitate a voluntary early retirement. Moreover, it is plausible that the economic transition that took place in Eastern Europe in the 1990s produced a large number of company-driven forced early retirements in the course of privatizations and reorganizations of state-owned companies. The high incidence of involuntary early retirement in Eastern Europe can hence possibly be explained by economic circumstances that led to a high number of retirements for health and company reasons, while the probability of voluntary early retirements was low.

However, even when focusing on a more homogeneous sample of countries with well-established industrialized market economies, as we will do in the econometric analysis in section 5, large differences in the incidence of involuntary early retirement remain.⁸

In addition to the incidence of involuntary early retirement, *table 1* also contains a measure for the general prevalence of early retirement (both voluntary and involuntary) in the respective countries. This measure is the ratio of early retirees per active worker in the age group 45 to 69. Again, large international differences can be observed. In Hungary, Slovenia, and Spain, this early retirement ratio exceeds 0.3, while there are less than 0.1 early retired persons per active worker in the United States, Japan, or Norway.

Table 2 around here

Table 2 reports the correlations between involuntary early retirement, early retirement ratios, and labor force participation rates. It is not surprising that there is a highly significant negative correlation between the early retirement ratio and the labor force participation rates of older persons (age 55 to 64), because a high incidence of early retirement has often been identified as a cause for low participation rates. A striking result, however, is the significant and relatively sizable positive correlation between the percentage of involuntary early retirement among early retirees and the number of early retirees per worker. Countries with a large proportion of involuntary early retirement also tend to have lower participation rates. These results accentuate the empirical importance of involuntary early retirement, and they establish a link between the relative proportion of involuntary early retirement among early retirees, which will be analyzed in section 5, and the overall incidence of early retirement and labor force participation.

5. Determinants of Involuntary Early Retirement

We estimate a series of probit models that analyze the determinants of the probability that an early retirement was involuntary. The sample contains observations referring to early retired persons from 15 OECD member countries.⁹ It includes individuals who went into early

⁸ Countries excluded from the analysis are Cyprus, Hungary, Slovenia, and Poland, for which some of the OECD data is not available.

⁹ Canada, Denmark, France, Germany, Great Britain, Italy, Japan, Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, Switzerland, and the USA.

retirement between 1983 and 1997 and at ages between 45 and 64. Weights are adjusted to give every country the same weight in the total sample. Furthermore, the Moulton (1990) problem that is associated with estimating the effects of macro-level variables on micro units is taken into account by clustering standard errors by countries using the standard technique described by Froot (1989).

The main focus of the analysis is on the impact of various social security and labor market variables on involuntary early retirement. Notably, we are interested to see whether the results provide support for the presence of demand-side early retirement as proposed by Hutchens (1999). In the framework of this theory, we would expect that favorable early retirement provisions of social security systems (represented by high pension replacement rates and decreasing pension wealth accruals) and adverse economic conditions (represented by increasing unemployment rates) lead to company-driven early retirements, which tend to be involuntary from a worker's perspective. Furthermore, we hypothesize that a more strict employment protection legislation might encourage companies to use forced early retirement as a means of reducing staff.

Conversely, a pure supply-side explanation of early retirement that abstracts from demand-side effects would, all else being equal, predict that a higher level of wealth and favorable early retirement provisions increase the number of persons who voluntarily choose early retirement.

Table 3 shows probit estimations of the determinants of involuntary early retirement. Apart from social security and labor market characteristics, the estimated models (I) to (IV) also control for the socio-demographic factors gender, marital status, and age at retirement, as well as for the year of retirement.

Table 3 around here

Model (I) in *table 3* considers the impact of the socio-demographic variables and national wealth on the probability that an early retirement was involuntary. Gender and marital status do not have significant effects when we allow for a gender-specific impact of marriage by including an interaction term between gender and marriage.¹⁰ We also estimated the models

¹⁰ Several empirical studies such as Pozzenbon and Mitchell (1989) or Peracchi and Welch (1994) have found that married women tend to retire earlier than married men, possibly because "married women appear to value nonwork years highly" (Pozzenbon and Mitchell 1989, p. 20).

(II) to (IV) for both genders separately, but found no gender-specific impact of the institutional variables.¹¹

It is not surprising that early retirements at age 45 to 59 are more often involuntary than retirements at age 60 to 64. A voluntary early retirement only becomes an attractive option once an individual has had enough time to accumulate a sufficient level of private and public pension wealth to fund consumption in old age. The variables for retirement years do not show a clear trend in the proportion of involuntary early retirement, although the share of forced early retirement in 1995 to 1997 is significantly larger than in 1983 to 1985.

An increasing level of wealth is, according to Burtless and Quinn (2000), the most powerful explanation for the trend to earlier retirement that most industrialized countries experienced during the past 50 years, because voluntary early retirement have become more affordable. In the international sample, we find that higher national wealth levels are indeed associated with a larger share of voluntary early retirement.

Model (II) adds the two variables referring to the generosity of the early retirement provisions of the public (or mandatory private) old-age pensions. In accordance with the supply-side theory of retirement, a higher pension gross replacement rate tends to increase the share of voluntary early retirement (this effect is, however, just insignificant at 10%-level). Conversely, a high decrease in pension wealth accrual between age 55 and age 64, which indicates an actuarially unfair pension system, is associated with a larger share of involuntary retirement. This result is at odds with a pure supply-side perspective of early retirement that explains the positive impact of generous social security systems on early retirement solely with larger incentives for a voluntary retirement. Instead, this finding lends support to the theory of Hutchens (1999) which states that favorable early retirement provisions (such as little actuarial adjustment to early retirement benefits) increase the inclination of firms to force workers into early retirement.

In model (III), the impact of labor market conditions on involuntary early retirement is considered. The proportion of involuntary retirement is significantly higher in years with increasing unemployment rates. Note also that for the case of Switzerland, Dorn and Sousa-Poza (2004) have shown that there is parallel movement of the unemployment rate and the portion of early retirement that is due to company reorganizations. Such findings are consistent with the theory of Hutchens (1999) according to which firms promote early

¹¹ The gender-specific results are not shown here because they yield little additional insights. These results are available from the authors upon request.

retirement when they are confronted with adverse demand shocks, such as in an economic recession.

One aspect that is not fully covered by this theory, however, is the question why companies should prefer the option of forced early retirement to layoffs, although an early retirement program (that possibly includes extraordinary pension payments to retirees) can be costly. Certainly, forced early retirements are often better accepted than layoffs by a company's employees, labor unions, and the public. But apart from these considerations, in some countries, early retirements may, due to strict employment protection legislation, be the only feasible option for reducing (senior) staff. This hypothesis is indeed supported by the results of model (III) which show a positive impact of the OECD employment protection legislation index on the share of involuntary early retirement.

A specific example of an early retirement practice that reacts to employment protection legislation is Germany's "59 provision" (see, e.g., Schmähl, 2003): because of legal difficulties to layoff older workers, employers offer severance packages to workers who "agree" to give up their jobs. The jobless older individuals then first receive unemployment benefits for at least a year before moving into early retirement at age 60, when unemployed people become entitled to public old-age pensions. This example documents how a relatively rigid employment protection legislation (and generous early retirement provisions of the social security system) can lead to an increased use of forced early retirement by companies in order to circumvent this law.

In model (IV), where both social security and labor market variables are included, employment protection legislation and the change of the unemployment remain significant positive determinants of forced early retirement with almost unchanged coefficient values. These results support the notion of demand-side effects on early retirement as predicted by Hutchens (1999). The impacts of the social security variables on the proportions of involuntary and voluntary early retirement still provide an ambiguous picture, with high replacement rates favoring voluntary and actuarially unfair pension systems leading to more involuntary early retirement. Of the two variables, it is now only the first one that is statistically significant at the 10%-level, while a Wald test of joint insignificance can only be rejected at the 10%-level.

6. Conclusions

In microeconomic theory, early retirement is usually interpreted as a supply-side phenomenon. Increasing wealth and favorable early retirement provisions of public old-age insurances have been identified as causes for early retirement. The fact that a large share of early retirees perceive their retirement as being "not by choice", or involuntary, is difficult to reconcile with purely supply-side explanations. Surprisingly, very few models that explicitly integrate a demand-side perspective can be found in the literature. A noteworthy exception is the theory of Hutchens (1999) which presents a model of a firm that uses social security early retirement benefits as a form of unemployment insurance. The model predicts that, in order to reduce staff during economic recessions, companies force individuals into early retirement.

This paper provides an empirical analysis of the impact of social security and labor market characteristics on involuntary early retirement in 15 countries. The results support the notion that involuntary early retirements are an empirically important phenomenon. In some countries, including Germany and Portugal, the portion of early retirees who have not retired by choice is at fifty percent or even higher. Moreover, this percentage tends to be particularly high in countries with low labor market participation rates of older persons.

The empirical analysis shows that increasing unemployment rates and high levels of employment protection legislation encourage involuntary early retirement. This suggests that companies use forced early retirements to reduce staff during economic slowdowns and they make increased use of this measure if it allows them to circumvent rigid employment protection legislation.

While there is considerable previous evidence that more generous early retirement features of social security systems increase the incidence of early retirement, their effect on the proportion of *involuntary* early retirement is by no means trivial: high replacement rates seem to be associated with more voluntary, and actuarially unfair pension systems with involuntary early retirement. These results are consistent with the interpretation that more generous early retirement features of social security systems can lead to an increase in both voluntary and involuntary early retirements, as individuals face stronger incentives to choose an earlier retirement date, while firms take advantage of the favorable public retirement provisions by forcing more individuals into early retirement.

In conclusion, the empirical analysis suggests that, apart from voluntary retirement (which can conveniently be explained by the classic labor-supply models of retirement), some countries are also confronted with a high incidence of involuntary early retirement. In our

opinion, demand-side models such as the one by Hutchens (1999) is better suited for explaining such observations. Clearly, early retirement research in these countries should take into account that early retirement is not always the result of a free choice between attractive options, but sometimes the consequence of a forced decision that is strongly influenced by employers' behavior.

Moreover, the results can shed a new light on the welfare effects of generous early retirement provisions of social security systems and more rigid employment protection legislations: while these regulations are intended to be beneficial for workers, they also increase the risk that workers will be forced into early retirement by their employers.

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Tables

Table 1: Involuntary Early Retirements as a Percentage of all Early Retirements and Early Retirees per Worker

Country	Percentage of Involuntary Early Retirement	Early Retirees per Worker, age group 45-69
Hungary	62.1%	0.342
Portugal	54.2%	0.165
Germany	50.0%	0.183
Slovenia	46.3%	0.344
France	41.0%	0.081
Poland	40.4%	0.269
Sweden	37.5%	0.093
Spain	32.5%	0.328
Great Britain	28.9%	0.247
Italy	28.6%	0.174
New Zealand	26.2%	0.109
Switzerland	20.5%	0.118
Cyprus	17.1%	0.175
Netherlands	16.7%	0.300
Japan	15.9%	0.033
Norway	13.0%	0.062
Canada	12.2%	0.196
United States	9.4%	0.080
Denmark	8.8%	0.132

Source: Based on ISSP 1997 data. Countries are sorted by the first data column.

Table 2: Correlations between Ratio of Involuntary Early Retirement, Early Retirees per Worker, and Labor Force Participation Rate

	Ratio of Involuntary Early Retirement	Early Retirees per Worker	Labor Force Participation Rate (age 55-64)
<i>Pearson Correlation</i>			
Ratio of Involuntary Early Retirement	1.000 (n=19)	0.461** (p=0.047, n=19)	-0.518** (p=0.033, n=17)
Early Retirees per Worker		1.000 (n=19)	-0.728*** (p=0.001, n=17)
Labor Force Participation Rate (age 55-64)			1.000 (n=17)
<i>Kendall's Tau-b Correlation</i>			
Ratio of Involuntary Early Retirement	1.000 (n=19)	0.287* (p=0.068, n=19)	-0.529*** (p=0.003, n=17)
Early Retirees per Worker		1.000 (n=19)	-0.324* (p=0.070, n=17)
Labor Force Participation Rate (age 55-64)			1.000 (n=17)

Sources: Ratio of Involuntary Early Retirement and Early Retirees per Worker based on ISSP 1997 data, Labor Force Participation Rates based on OECD (2004a). ***/** denote significance at the 10%/5%/1%-level. Note that the OECD data does not contain participation rates for Cyprus and Slovenia.

Table 3: Probit estimations of the determinants of involuntary early retirement in 15 countries

Dependent Variable: Involuntary Early Retirement (=1 if early retirement was involuntary, =0 if early retirement was by choice)								
	Model (I)		Model (II)		Model (III)		Model (IV)	
Intercept	0.716	(0.501)	0.869*	(0.501)	0.143	(0.655)	0.304	(0.693)
Female	-0.171	(0.305)	-0.190	(0.310)	-0.160	(0.298)	-0.175	(0.308)
Married	-0.130	(0.190)	-0.144	(0.192)	-0.167	(0.185)	-0.162	(0.191)
Female x Married	-0.183	(0.340)	-0.180	(0.348)	-0.177	(0.335)	-0.179	(0.345)
Retirement age 55-59	0.475***	(0.124)	0.488***	(0.136)	0.473***	(0.116)	0.498***	(0.128)
Retirement age 50-54	0.613***	(0.183)	0.602***	(0.191)	0.676***	(0.195)	0.677***	(0.207)
Retirement age 45-49	0.612**	(0.267)	0.579**	(0.263)	0.691**	(0.273)	0.694**	(0.285)
Early retired in 1995-1997	0.527*	(0.280)	0.574**	(0.280)	0.539*	(0.302)	0.566*	(0.322)
Early retired in 1992-1994	0.145	(0.256)	0.153	(0.246)	0.036	(0.246)	0.038	(0.254)
Early retired in 1989-1991	0.280	(0.268)	0.317	(0.263)	0.281	(0.269)	0.291	(0.276)
Early retired in 1986-1988	-0.051	(0.339)	-0.020	(0.346)	-0.017	(0.320)	0.004	(0.363)
Real GDP p.c. (year of retirement)	-0.090***	(0.015)	-0.098***	(0.014)	-0.072***	0.019	-0.078***	0.022
Average pension gross replacement rate (age 60-65)			-0.340	(0.213)			-0.373**	(0.180)
Decrease of pension wealth accrual (age 55 to age 64)			0.064***	(0.020)			0.037	(0.024)
Change of unemployment rate (year of retirement)					0.115**	(0.048)	0.118***	(0.046)
OECD employment protection legislation index					0.099**	(0.043)	0.099*	(0.056)
Number of observations	651		651		651		651	
Log pseudo-likelihood	-331.208		-329.563		-327.494		-326.732	
Wald tests for joint insignificance								
Pension gross replacement rate = pension wealth accrual = 0			12.97***				5.24*	
Average unemployment rate = Employment protect. legislation = 0					10.65***		10.70***	

Notes: The reference person is male, has an intermediate education and has retired between age 60 and 64 and between the years 1983 to 1985. Standard errors are clustered by country and shown in parenthesis. Observations are weighted with federalistic weights that give each country the same weight in the total sample. The Wald statistics have Chi-square distributions with 2 degrees of freedom. */**/** denotes significance at the 10/5/1-percent level.

Appendix

Table A1: Definitions of explanatory variables

Variable name or variable group	Values and description, data source
Female	1, if respondent is a female / 0, otherwise. Source: ISSP 1997.
Married	1, if respondent is married / 0, otherwise. Source: ISSP 1997.
Female x Married	1, if respondent is female and married / 0, otherwise. Source: ISSP 1997.
Retirement age 55-59	1, if respondent retired at age 55-59 / 0, if respondent retired at age 45-54 or 60-64. Source: ISSP 1997.
Retirement age 50-54	1, if respondent retired at age 50-54 / 0, if respondent retired at age 45-49 or 55-64. Source: ISSP 1997.
Retirement age 45-49	1, if respondent retired at age 45-49 / 0, if respondent retired at age 50-64. Source: ISSP 1997.
Early retired in 1995-1997	1, if respondent retired at in 1995-1997 / 0, if respondent retired in 1983-1994. Source: ISSP 1997.
Early retired in 1992-1994	1, if respondent retired at in 1992-1994 / 0, if respondent retired in 1983-1991 or in 1995-1997. Source: ISSP 1997.
Early retired in 1989-1991	1, if respondent retired at in 1992-1994 / 0, if respondent retired in 1983-1988 or in 1992-1997. Source: ISSP 1997.
Early retired in 1986-1988	1, if respondent retired at in 1992-1994 / 0, if respondent retired in 1983-1985 or in 1989-1997. Source: ISSP 1997.
Real GDP p.c. (year of retirement)	National real GDP per capita in K USD in year of retirement. Source: Penn World Tables (Heston et al. 2002).
Average pension gross replacement rate (age 60 to age 65)	Average gross pension income from public schemes and mandatory private occupational schemes between age 60 and age 65 for a person who retired at age 60 in 1989, as a multiple of pre-retirement income. Computed as an average of six cases with three different income levels and two marital statuses. Source: OECD (Duval 2003, p. 39).
Decrease of pension wealth accrual (age 55 to age 64)	Decrease in total pension wealth by continuing work from age 55 to age 65, as a multiple of the income at age 55. Computed based on singles with average wages. Source: OECD (Blöndal and Scarpetta 1999, p. 65).
Change of unemployment rate (year of retirement)	Change of the national unemployment rate between the year before retirement and the year of retirement. Source: OECD (1999).
OECD employment protection legislation index	OECD index for rigidity of employment protection legislation in 1990. Higher values represent a stricter legislation. Source: OECD (2004b).