



Netspar Panel papers

Arie Kapteyn and Tatiana Andreyeva

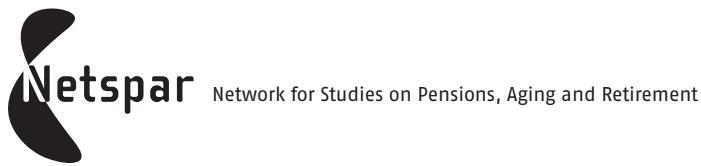
Retirement patterns in Europe and the U.S.



Arie Kapteyn and Tatjana Andreyeva

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PREFACE

Netspar stimulates debate and fundamental research in the field of pensions, aging and retirement. The aging of the population is front-page news, as many baby boomers are now moving into retirement. More generally, people live longer and in better health while at the same time families choose to have fewer children. Although the aging of the population often gets negative attention, with bleak pictures painted of the doubling of the ratio of the number of people aged 65 and older to the number of the working population during the next decades, it must, at the same time, be a boon to society that so many people are living longer and healthier lives. Can the falling number of working young afford to pay the pensions for a growing number of pensioners? Do people have to work a longer working week and postpone retirement? Or should the pensions be cut or the premiums paid by the working population be raised to afford social security for a growing group of pensioners? Should people be encouraged to take more responsibility for their own pension? What is the changing role of employers associations and trade unions in the organization of pensions? Can and are people prepared to undertake investment for their own pension, or are they happy to leave this to the pension funds? Who takes responsibility for the pension funds? How can a transparent and level playing field for pension funds and insurance companies be ensured? How should an acceptable trade-off be struck between social goals such as solidarity between young and old, or rich and poor, and individual freedom? But most important of all: how can the benefits of living longer and healthier be harnessed for a happier and more prosperous society?

The Netspar Panel Papers aim to meet the demand for understanding the ever-expanding academic literature on the consequences of aging populations. They also aim to help give a better scientific underpinning of policy advice. They attempt to provide a survey of the latest and most relevant research, try to explain this in a non-technical manner and outline the implications for policy questions faced by Netspar's partners.

Let there be no mistake. In many ways, formulating such a position paper is a tougher task than writing an academic paper or an op-ed piece.

The authors have benefited from the comments of the Editorial Board on various drafts and also from the discussions during the presentation of their paper at a Netspar Panel Meeting.

I hope the result helps reaching Netspar's aim to stimulate social innovation in addressing the challenges and opportunities raised by aging in an efficient and equitable manner and in an international setting.

Henk Don

Chairman of the Netspar Editorial Board

EXECUTIVE SUMMARY

We discuss the interrelation between retirement, financial incentives, health, and saving for retirement. There is great variation in retirement patterns across countries, and at least three explanations have been put forward: (1) differences in preferences for leisure, (2) institutional constraints, largely determined by labor unions in (mis-guided) attempts to reduce unemployment by encouraging early retirement, and (3) financial incentives created by pension plans and Social Security provisions. Although each of these explanations has merit, there is little doubt that financial incentives play a major role in explaining the observed differences in retirement behavior across countries and individuals. In addition to these explanations, we discuss and explore the role of health in retirement decisions. In developed countries people tend to live longer than ever, yet retire at increasingly younger ages. It turns out that a 'work horse' model of human capital and investment in health developed by Grossman (1972) can explain these trends. It illustrates why people with more human capital are healthier (i.e. invest more in health) and retire later. At the same time the improvements in population health explain a trend towards earlier retirement, essentially because a larger health endowment has a similar effect to having more wealth at the beginning of life, which changes the work-leisure trade-off in the direction of more leisure.

To illustrate the effects of health and of financial incentives we estimate a model of retirement across 12 European countries and the U.S. Based on the estimated model we simulate some policy changes involving improved health at later ages and changing financial incentives and eligibility ages. All simulated policy changes have noticeable effects in at least some countries. For instance, if we assign U.S. retirement replacement rates to other countries, labor force participation in countries with low participation in the 60–64 age bracket goes up by approximately 5 percentage points on a base of about 30%. Increasing early and normal retirement ages generally has larger effects. Once again considering the 60–64 age bracket, we find that an increase of both early and normal

retirement ages by 2 years leads to increases up to 10 percentage points and more. Disability programs are an important alternative exit route into retirement. Incentives clearly matter here as well. For instance, replacing the Swedish benefits by U.S. benefit levels would increase labor force participation in the 60–64 age bracket in Sweden by 14 percentage points. In the U.K. and the Netherlands in the same age bracket participation would increase by 10 percentage points. As noted before, health is an important determinant of retirement. A counterfactual simulation that assigns good health to all workers, suggest that work place accommodation and health improvements can increase labor force participation in the 60–64 age bracket by up to 5 percentage points.

Generally the effects of policy changes vary widely across countries. This is not surprising. If a country has a low early retirement age, then changing that age may be expected to have more effect than when the retirement age is high. Similary, in a country with a restrictive disability policy, lowering disability benefits is not likely to have much of an effect, whereas in a country with generous policies the effects may be huge, as our results indicate.

RETIREMENT PATTERNS IN EUROPE AND THE U.S.

1. introduction

Looking at retirement patterns across developed countries in the last several decades one is struck by two facts. The first one is that generally trends since the early 1980s have been in the direction of earlier retirement while life expectancy has been upward trending (see Figures 1-2). The result of this paradoxical development has been an increasing pressure on sustainability of old age income provisions in many parts of the developed world. The second striking observation is the dramatic variation across countries in the average age of retirement. This fact provides a tool for better understanding of the first phenomenon. If we know why there are such large differences across countries in retirement behavior, we will be better equipped to understand changes over time and where they are coming from.

Several studies over the last decade have aimed at explaining differences in retirement patterns across developed countries. Probably the most famous examples are the studies directed by Jonathan Gruber and David Wise (1999, 2004, 2005, 2007) that provided convincing evidence on the importance of financial incentives for explaining retirement behavior. Other studies include Duval (2003) and OECD (2005, 2007). Here we update and extend this research partly by adding countries not covered in the Gruber and Wise studies and partly by paying more attention to non-financial incentives to retire such as health.

One of the main obstacles in trying to learn from differences across countries is the paucity of cross-nationally comparable data. This makes it often difficult to ascertain if the observed differences are real or just the result of different variable definitions, measurement approaches, or sampling schemes. Only recently a unique collection of comparable national data on older people across European countries and the United States has become available. Specifically, the Survey of Health, Aging and Retirement in Europe (SHARE) released its first wave of rich individual data on adults ages 50 and older in 2004. Following identical protocols in 11 European countries, this study offers ideal data for performing cross-country

analyses in Continental Europe. The measures in the SHARE dataset are also comparable with measures from both the U.S. Health and Retirement Study (HRS), a widely used dataset to study issues of older Americans, and the English Longitudinal Study of Aging (ELSA), a source of data on people aged 50 and over living in England. In fact, SHARE was modeled after the HRS and ELSA to ensure comparability across the datasets, so that the three sources are indispensable for studying cross-country differences in behavior and well-being of older individuals on both sides of the Atlantic.

The remainder of the paper is structured as follows. Section 2 provides further background and a discussion of the literature. Section 3 describes the data and discusses our (very simple) analytical methods. Section 4 presents results of our analysis and next presents a number of simulations illustrating how policies can affect retirement behavior. Section 5 concludes.

2. Background and literature review

In many countries, the observed large increases in average life expectancy (see Figures 1–2) and reductions in the average retirement age have moved the topic of the financial viability of national pension systems to the forefront of the policy agenda. In anticipation of pension revenues falling short of pension obligations, many countries have put forward and sometimes implemented reform proposals to secure the financial balance of their public pension programs. Figures 3–4 show employment rates of men and women aged 55–64 in several European nations and the U.S. For men in many countries, we observe a reversal of a downward trend in employment that existed until roughly the mid-1990s. For women, the trend in most countries appears to be rising, at least partly reflecting a cohort effect by which younger generations exhibit higher participation rates than older ones. The reversal of the trend for men may however represent the effect of changes in policies.

Perhaps the most striking aspect of the presented patterns is the large variation in employment rates across countries. Some considerable literature has attempted to explain national differences in labor supply. Roughly speaking, three –not mutually exclusive– explanations have been put forward. The first explanation points at the importance of financial incentives; the work by the Gruber and Wise group (Gruber and Wise 1999, 2004, 2007) squarely falls into this category. Along with a couple of other studies (Duval 2003; Nickell 2004), the Gruber-Wise projects evaluate the link between provisions of social security programs and national employment patterns. Another stream of research on economic rewards and labor force participation includes theoretical and empirical explanations that relate differences in labor supply across countries to the variation in marginal tax rates (Prescott 2004; Davis and Henreksson 2004). The key feature of all studies focusing on the financial explanation of differential labor supply across countries is that they view the substitution effect (rather than the income effect) as the dominant factor in shaping choices of the representative individual in the income-leisure trade-off.

A second explanation points at differences in preferences or culture that lead people across countries to make different choices between income and leisure. Olivier Blanchard's research is the most prominent example of this strand of literature. He argues that the disparity in labor supply between Europe and the U.S. is due primarily to different utility functions between the two regions. Europeans have taken their increased

productivity and income in the form of more leisure rather than income, whereas Americans have instead preferred to increase consumption. Blanchard shows that most of the decrease in hours worked per capita over the last several decades in Europe has reflected a decline in hours worked per full-time worker rather than increases in unemployment or lower participation rates. This suggests a voluntary choice of workers that comes primarily from preferences and increasing income and to a smaller extent from rising tax distortions (Blanchard 2004).

A third explanation of different employment rates across countries points at the role of institutions, including the power of unions. Labor market regulations advocated by unions in declining European industries, such as work sharing policies, sought a reduction in hours worked to address the unemployment problem. The role of European unions that pursued policies like 'work less, work all' and similar labor market regulations is suggested to be the primary contributor to much lower working hours per person in Europe than in the U.S. The work sharing policy does not appear to have raised employment but to have influenced leisure patterns in society through a social multiplier effect. The increasing returns to leisure in the number of people enjoying more work-off hours may explain why Europeans today work much less than Americans (Alesina et al. 2005).

Below we discuss the labor supply literature (and more specifically retirement) following these three main lines of explanation. In our opinion, a discussion of retirement patterns cannot be complete without considering the role of health. Retired individuals often give poor health as the primary reason for why they exited the labor force (authors' estimates based on the SHARE data). At first sight this is paradoxical, as health seems to have improved substantially over the last three or four decades (cf. Figures 1-2) while at the same people have retired at increasingly younger ages. We conclude the next section with a suggested explanation of this paradox.

2.1 Financial incentives

Numerous studies have documented that –at least until recently– workers are leaving the labor force at increasingly younger ages (Gruber and Wise 1999; CEIES 2002). This trend has been observed along with a rise in real earnings as well as declines in the average length of the working year (Diamond 2005). Increased private income and higher public spending

can maintain and even raise consumption levels at reduced hours of work. In a static neoclassical model of labor supply this would happen if leisure were a normal good and the income effect of higher real wages dominated the substitution effect. In reality, there may be considerable heterogeneity across individuals with some choosing to enjoy more leisure and others favoring more consumption. Furthermore, incentives faced by individuals tend to be much more intricate than represented by a simple leisure-consumption trade-off with a linear budget constraint.

One of the most well-known examples of the literature on financial incentives and retirement is a set of studies directed by Jonathan Gruber and David Wise (1999, 2004, 2005, 2007). This stream of research provides nationally comparable data on social security systems and labor force participation patterns in twelve industrialized countries, and investigates the links between the two. Using the same analytic format, the participating studies describe social security incentives to retire in each country and document their strong relationship with the proportion of older people out of the labor force. The standardized analytic approach allows for comparison of retirement incentives across countries in addition to the country-specific analysis of retirement determinants. The Gruber-Wise studies emphasize that social security programs often create strong incentives to leave the labor force. In particular, their findings suggest that: (1) There is close correspondence between the eligibility age for early and normal retirement benefits and departure from the labor force; (2) There is often a substantial tax burden on work past the social security early retirement age; (3) Disability and unemployment programs in some countries are effective mechanisms to provide early retirement benefits before standard and early retirement age, and (4) There is large cross-country variation in the tax burden on work, which affects incentives to withdraw from the labor force and retirement patterns (Gruber and Wise 1999, 2005).

Using micro-simulation of retirement incentives in the second project phase, the Gruber-Wise studies estimate the effect of one year of continued work on future benefits under various incentives of social security systems. Separate empirical analyses from 12 countries show consistently that the retirement incentives inherent in most social security programs are strongly linked to withdrawal from the labor force, independent of cultural differences across countries. Employees in countries that may be very different along several dimensions react similarly to social security

incentives. The magnitude of the program effects on retirement decisions varies across countries, but the effects are substantial in all of them (Gruber and Wise 2004, 2005).

The Gruber-Wise studies also consider the fiscal implications of program reforms to extend labor supply of older workers, such as increasing the age at which one becomes eligible for early retirement benefits. The estimated financial consequences of reforms in social security provisions on net program costs are substantial. For example, savings from the illustrative program changes could reach about 1% or more of GDP in some countries. In terms of current program costs, the effects vary between 20% and 40% (Gruber and Wise 2005).

In addition to the Gruber-Wise group, the major role of economic rewards in determining retirement behavior is documented in a stream of studies that consider the effect of taxes on market work activity. For example, Prescott (2004) argues that the bulk of differences in labor supply across time and the G-7 countries is due to differences in tax systems, in particular, the effective marginal tax rates on labor income. The argument that taxes explain virtually all of U.S./Europe differences in market work time relies on assumptions about parameter values in Prescott's dynamic model of investment and labor supply. The model with one production sector and a simple labor-leisure choice for the representative household assumes a utility function with logarithmic preferences over consumption and leisure. This assumption ensures high elasticity of labor supply, which some other researchers argue does not square with most existing estimates of labor supply elasticities, particularly for male workers (Alesina et al. 2005; Blanchard 2004). If taxes were the only differential between Europe and the U.S., labor supply elasticities would have to be much higher than those observed empirically (Alesina et al. 2005).

The view that tax rate differences across developed countries are the key determinant of the significant national variation in labor supply receives support in other empirical work. Using a panel of rich countries, Davis and Henreksson (2004) show large supply responses to taxes. In particular, they estimate that higher tax rates on labor income and consumption expenditures lead to less work in the market sector, an increase in work time in the household sector, a larger underground economy, and lower value added and employment in industries which employ low wage unskilled workers. Labor and consumption taxes could have multiple

substitution effects between home and market production, legal and underground economic activity (Davis and Henreksson 2004). The primary role of taxes in causing differences in labor supply between Sweden and the U.S. is also found in a study that integrates non-market production activity into the analysis of taxes and employment (Olovsson 2004).

Another strand of the literature on economic incentives and labor force participation, however, suggests that tax rate differentials explain only a modest share of international differences in labor supply. Econometric estimates based on panel data attribute up to a third of the decrease in hours worked per capita in Europe to the evolution of tax rates during the last 30 years. For example, an increase of 10 percentage points in payroll, income and consumption tax rates could reduce overall labor market input by about 2% of the working age population (Nickell 2004). This research relates the key role in labor supply disparities across countries to social security systems, which provide support to non-working groups, including the disabled, unemployed and early retirees.

Further complementing the Gruber-Wise studies and focusing on OECD countries, several empirical analyses have estimated the effects of pension policies on retirement behavior. One analysis considered how old-age pension systems and other social transfer programs affected retirement behavior of older male workers in 22 OECD countries (Duval 2003). This study compares the implicit tax rate on continued work – a multi-dimensional measure of different aspects of retirement incentives in old-age pension and early retirement schemes¹. There is substantial variation across countries in implicit tax rates on continued work, especially at greater ages. Countries with high replacement rates also tend to have large implicit taxes on continued work. Overall, implicit taxes are relatively significant in most of Continental Europe compared with Japan, English-speaking and Nordic countries. For example, the range of implicit tax rates on continued work over the next 5 years at age 65 is above 70% in France, Spain and Italy, whereas it is less than 20% in the US, Canada and Japan (Duval 2003).

Based on descriptive data and econometric estimates, Duval's study concludes that implicit taxes on continued work have notable effects on

¹ The implicit tax rate reflects a change in the present value of expected pension payments or payments obtained through early pathways into retirement (disability, unemployment, special early retirement schemes), which the individual would receive from working one more year.

the withdrawal of older men from the labor force. There are also differences by age in the origin of these effects. For example, social transfer programs are more important than old-age pension policies for men aged 55–59 who can use them as de facto early retirement mechanisms. Retirement behavior of older men is also subject to liquidity and/or customary effects. Social interaction might motivate people to retire at 'accepted' or customary ages, or individuals may be unable to borrow to retire before pension benefits are available (Duval 2003).

Another comparative analysis of retirement incentives embedded in pension policies develops cross-nationally comparable indicators for evaluating public pension policies across 30 OECD countries (OECD 2005; 2007). These studies go beyond comparative analyses of retirement systems presented before by not only developing comprehensive policy indicators and measures to characterize pension systems across countries, but also providing case studies for each OECD country with a summary of its pension system and detailed country-specific results. The studies focus on the key features of national pension systems and estimate future pension entitlements for workers starting their career today. To assess the future impact of current pension policies, the analysis employs several indicators of pension promises across OECD countries: replacement rates, pension wealth, pension level, and pension eligibility age. Estimates are provided on both a gross and net basis, accounting for taxes and social security contributions for workers and pensioners (OECD 2005; 2007).

Another cross-national study of economic rewards and retirement considers the personal tax treatment of older adults and its implications for retirement patterns in nine OECD countries (Keenay and Whitehouse 2003). Differences in taxes between pensioners and workers can be an important policy tool to support the retired. Although the value of tax concessions and their links to income vary across countries, the tax burden is on average 10 percentage points lower for pensioners than for workers. The authors conclude that the role of tax and social security contributions in shaping retirement incentives is important in cross-country comparisons of financial motives to retire, particularly due to its variation across countries.

There is also a segment of research that concentrates on international differences in market work depending on labor market characteristics. An example of differential labor supply responses to financial incentives across countries is a choice of hours worked depending on the earnings

distribution in the country. Workers have stronger incentives to gain promotion and to advance in the distribution of earnings when earnings are more unequally distributed, and the same extra work pays off more than under a more equal distribution of economic rewards. Higher marginal benefits of extra work generate more hours worked, as reflected in greater hours worked by Americans as compared to Germans (Bell and Freeman 2000). Because earnings inequality is considerably lower in Germany than in the U.S., a lower return to hours worked could be a weaker motivation for German workers to provide more labor.

Finally, another substitution effect relates the employment gap between Americans and Europeans to greater marketization of home production in the U.S. Researchers suggest substitutability between home and market work by which Europeans balance reductions in market work time by increasing time spent in home production rather than taking more leisure (Freeman and Schettkat 2001). This view, albeit disputed, proposes that Europeans work overall as much as Americans and do not take more leisure. The analysis of time-use data for women in Germany and the U.S. reveals that a lower tax wedge and wider wage dispersion in the U.S. makes market work relatively more attractive for American women than their peers in Germany. A choice in favor of market work vs. home production is more rewarding for high-wage earners whose share is larger among women in the U.S. The higher opportunity cost of time leads more American women to prefer market work to home production (Schettkat 2001).

Altogether, there is little doubt that financial incentives matter a great deal in explaining differences across countries in employment rates and retirement patterns. Studies differ however in what part of total observed variation in labor supply they ascribe to purely financial incentives.

2.2 Preferences

A popular view of the labor supply literature explains international differences in employment by long-standing cultural norms that form attitudes toward work. Different preferences, social and cultural perceptions imply different utility functions in Europe and the U.S. Olivier Blanchard's research is the main example of the cultural explanation of the international employment gap (Blanchard 2004). In particular, Europeans are suggested to take increased productivity in the form of more leisure rather than income and higher consumption as in the U.S.

With roughly similar productivity levels between the two regions, stronger preferences for more leisure vis-à-vis income in Europe can account for the observed reduction in hours worked among European workers over the last 30 years.

Blanchard argues that a decrease in market work in Europe is a voluntary choice of workers. He decomposes the change in hours worked into the change in hours per worker, employment rates and participation rates across European countries. Based on decompositions, most of the decrease in hours worked per capita over the last several decades in Europe reflects a decline in hours worked per full-time worker rather than increases in unemployment or decreases in participation rates. For example, France had a 23% decrease in hours per worker, 7% growth in unemployment and 7% increase in participation over 1970–2000, and such a decomposition is representative of other European countries (Blanchard 2004).

Blanchard also decomposes the change in hours worked into hours for part-time and full-time employees. Because some of the increase in part-time employment may not have been voluntary (e.g., 20% of part-time workers in Europe said they could not get full-time jobs in 2000), Blanchard tests the hypothesis of the voluntary source of reduced work hours in Europe. Again, he finds that the decrease in hours worked per worker is due primarily to the decline in hours worked per full-time worker rather than an increased proportion of part-time employees. In particular, full-time employees worked on average 45.9 hours weekly in 1970 vs. 38.3 hours in 2001. It is unlikely that such a notable reduction in hours worked over 30 years was an involuntary choice by workers.

The voluntary choice however may originate from different sources. Blanchard suggests two explanations: the interaction between preferences and increased productivity (a stronger income than substitution effect), and the result of increasing financial distortions faced by workers, primarily tax distortions. The estimate of how much each factor has contributed to the decrease in hours worked depends on the analytic assumptions. The theory that implies stronger income than substitution effects and utility functions with inelastic labor supply will assign a significant but secondary role of tax distortions in decreasing hours worked by European wage earners. Blanchard concludes that empirical evidence gives stronger support to the dominant role of preferences and suggests only some effect of taxes. This theory however cannot explain an example

of Ireland, which had a 25% decrease in hours worked per worker and only a minor rise in the average tax rate (3%) over 1970–2000.

2.3 Institutional arrangements

The third strand of the labor supply literature is most vividly represented by work of Alesina, Glaeser and Sacerdote (2005). Their theory relates a decrease in hours worked in Europe and the attendant U.S.–Europe employment gap to the effects of labor market regulations imposed by European unions in the 1970s and 1980s. The evolution of working hours in Europe is suggested to root in the power of unions, which is much stronger in Europe than the U.S. Researchers explain greater union density and power in Europe by political conditions (e.g., American federalism vs. proportional representation, which is more common in Europe)². The importance of unionization and labor market regulation increased markedly with the structural shocks of the 1970s and 1980s (Blanchard 2004). Under the slogan 'work less, work all', unions in declining European industries advocated a policy of work sharing that sought to reduce work hours to increase employment. The advocacy of powerful unions was essential to implementing a number of labor market regulations, including union contracts and labor regulation pension laws. These policies however do not seem to have achieved the intended goal of lower unemployment (Kapteyn et al. 2004).

Using a panel of countries and following Davis and Henreksson (2004), Alesina and colleagues find that the effects of taxes on labor supply disappear when they control for unionization or labor market regulation (Alesina et al. 2005). Using U.S. data, they show that the effect of union status on vacation and hours worked across American states is at least as large as the attendant impact of taxes. Overall, they find convincing evidence for the dominant role of labor market regulation and unionization in explaining why Europeans today work much less than Americans. For example, legally mandated holidays account for at least 80% of the gap in weeks worked between Europe and the U.S., and 30% of the differential in total labor supply between the two regions (Alesina et al. 2005). Another potential factor explaining a decrease in hours worked in Europe is the effect of generous European pension systems. This reduces

² Generally, Alesina and Glaeser (2004) proposed that American politics is less friendly to the left than European politics because of American racial fractionalization and European political instability (the result of two world wars).

participation amongst older workers, which might have contributed to the overall decline in hours worked in Europe.

The policies endorsed by unions in Europe may have had an indirect effect on labor supply through changes in the returns to leisure. There might be positive externalities in the consumption of leisure, implying the existence of a social multiplier (Glaeser et al. 2003). People enjoy leisure more when their friends, relatives and social groups also take longer hours off of work. The returns to leisure are increasing in the number of people who do not work. Acting through a social multiplier, labor market regulation policies seemed to have affected leisure patterns in European societies. Europeans have been taking more leisure, thereby increasing the returns to leisure time for each other (Alesina et al. 2005).

The social multiplier hypothesis explains why Europeans have a stronger preference for leisure and, according to Blanchard's theory, preferred to take their increased productivity in the form of less work. The argument of cultural predilection of Europeans for leisure does not appear to square well with the fact that Europeans worked as much as Americans in the 1960s. Cultural preferences perhaps do not change in such a short period of history, although this remains to be tested³. Notice that in 1960, European countries were less affluent than the U.S. Thus a preference to consume greater productivity in the form of leisure becomes more visible when European productivity catches up with that of the U.S.

Changes in returns to leisure and incentives to take more leisure may also be a result of large-scale union initiatives and labor market regulatory reforms. As policy changed in the last 30 years, so did the returns to leisure with an attendant increase in leisure time in Europe. One form in which leisure can be taken is through early retirement.

2.4 Health and retirement

There is little doubt that individuals in developed countries are healthier than in the past, as illustrated for instance by the secular trends in life expectancy⁴. At the same time there is a tendency to retire at earlier ages,

³ Of course, culture is not the only possible explanatory variable for a diversion of preferences since the sixties. Any variable that affects preferences and has changed since the sixties is a potential candidate for explaining the differences.

⁴ We are not focusing on morbidity here as the increased prevalence of certain chronic conditions might reflect true increased rates of illnesses (perhaps due to growth in unhealthy behaviors like poor diet and physical inactivity related to obesity). How-

as discussed above. Paradoxically, when asked about reasons for retirement, a frequently encountered answer is bad health. For example, 23.5% of the SHARE respondents who retired before the standard retirement age in their countries reported own ill health as a reason for retirement (other reasons could be reported too). In contrast, only 5.3% of this group said they retired to spend more time with family and 1.5% to retire at the same time as their spouses. Although failing health is a plausible reason to retire, it is hard to believe that work conditions nowadays are more strenuous than they were in the past. Since moreover health in the population is improving, one would expect health to play less of a role in retirement decisions.

There are various obvious mechanisms that relate health to retirement. First of all, as mentioned, failing health may lead one to retire (e.g., McGarry 2004). This clearly implies a negative correlation between health and retirement status. If this were the only mechanism at play then one would expect the increase in population health to be accompanied by an upward trend in retirement ages.

A second pathway through which health and retirement are connected is the influence that retirement status may have on health. It is not *a priori* clear which way the relation will be. Retirement may be beneficial, because one is relieved of the stress and effort that work implies. On the other hand, retirement is a major life event, which in itself creates stress and may reduce health. Moreover, many people have part of their social contacts at work and retirement may therefore lead to social isolation. The question whether retirement is good or bad for health remains largely unsettled. Dave, Rashad, and Spasojevic (2006) find a negative effect of retirement on health, using six waves of the HRS. The problem with their analysis remains however that it is essentially impossible to find good instruments that are plausibly exogenous. Thus the contemporaneous negative correlation between health and retirement may still be due to unobserved factors that both affect health and retirement, even after controlling for many observables. Also the literature reviewed by Dave, Rashad, and Spasojevic (2006) is inconclusive. Perhaps the most convincing approach to studying the relation between retirement and health is to

ever, it may also reflect better detection of previously undiagnosed chronic conditions as well as changes in diagnostic thresholds (e.g., hypertension), so trends in actual morbidity due to some chronic conditions are unclear. On balance, there is little doubt that people enjoy considerably more healthy life years than in the past.

exploit variation in laws and regulations across countries and use these as instruments for retirement in models explaining health. Coe and Zamarro (2007) take this approach and appear to find a somewhat positive effect of retirement on health.

A third reason why retirement and health may be linked has been advanced by Bound (1991) under the heading of justification bias: respondents in surveys may cite their health as a justification for not working anymore. Whether this is an important mechanism is unclear. The evidence does not seem strong (see. Dwyer, Sabatini and Mitchell 1999).

A fourth reason why health and retirement may be linked is the change in time use. Being retired implies more time available for exercise, which may have a positive effect on physical health. On the other hand, there is evidence of fairly substantial weight gain after retirement, which suggests either a reduction in physical activity or an increase in food intake or both (Dave et al. 2006).

Within economics, an obvious framework for studying the relation between health and retirement is the well-known Grossman model (Grossman 1972) in which individuals derive utility from consumption and health, but where health also influences earnings. Over the years several variants of the basic Grossman model have been proposed. To address the paradox mentioned above, the papers by Wolfe (1985) and by Galama, Kapteyn, Fonseca, and Michaud (2008) are relevant. In both papers, variants of the basic Grossman model are presented that include a retirement decision. Within the human capital framework of the Grossman model a couple of implications emerge. First of all, individuals with lower human capital (and hence lower earnings capacity) have fewer resources to invest in health and hence will draw down their health faster than those with higher human capital. Thus we expect individuals with higher incomes to be healthier than individuals with lower education (Case and Deaton 2005). The higher earnings capacity of these individuals also induces them to work longer, as has been observed in many studies. Yet, at the same time secular improvements in health have an income effect that reduces work effort and hence explains trends in early retirement.

2.5 *Pension reforms in OECD countries*

Since the early 1990s, many OECD countries have engaged in intense reform efforts targeting pension provision. Although the types of reform

measures taken varies across countries, many proposed and implemented arrangements have focused on increasing the role of the private sector in the pension world. Another important feature of the reforms has been their general tendency to lower benefits. Raising work incentives to encourage people to work longer was one important motive for pension reforms. The countries differed in the reforms scope with some 17 OECD countries implementing major pension changes that affected every standard full-career worker, and 13 countries aiming at less significant changes, which targeted specific population groups (e.g., changing retirement ages only for women) or some benefits (e.g., changes in benefits for early or late retirement).

Across all countries, the major elements of pension reforms included increasing eligibility age (e.g., changes in early, normal retirement ages and equalizing eligibility ages for men and women), increasing incentives for continuing work (e.g., bonuses for retirement after the normal pension age), changes in the benefits calculation (e.g., extending the period of earnings measurement or changes in qualifying conditions), changes in the valorization or pre-retirement indexation of past earnings (e.g., changing the weights of wage and price inflation), introducing defined-contribution (DC) schemes (changing the balance between public and private pensions), linking benefits to life expectancy and/or financial sustainability (e.g., through DC), changes in the indexation of pensions (e.g., moving towards partial or full indexation to prices), changes in pension contribution rates, and pre-funding of public pensions (establishing public pension reserves). For further details on pension reforms in OECD countries and their distributional, financial, structural impact, including a by-country analysis, we refer to the extensive OECD review on the subject (OECD 2007).

3. Data and methods

Our first empirical resource is the Survey of Health, Aging and Retirement in Europe (SHARE), which is a multi-disciplinary collection of nationally representative data on individuals aged 50 and older living in communities in Continental Europe. The baseline 2004 SHARE study included data from 11 countries with a balanced representation of the different European regions from Scandinavia (Denmark and Sweden) through Central Europe (Austria, France, Germany, Switzerland, Belgium, The Netherlands) to the Mediterranean (Spain, Italy and Greece). In 2005–2006, SHARE extended by adding a sample from Israel (not part of our analysis).

The primary advantage of this cross-national data set is that it collects data using a standard protocol, research setting and measures across all participating countries. Another unique feature of SHARE is its detailed information on many aspects of older individuals' lives, which few other large data sets have. These include health (e.g., self-reported health, grip strength, physical and cognitive functioning, health behaviors, health care use), psychological conditions (e.g., mental health, well-being, life satisfaction), socio-economic status (e.g., work activity, job characteristics, income, wealth and consumption, housing, education), and social support (e.g., social networks, volunteer activities). Designed after the role models of the US Health and Retirement Study (HRS, see below) and the English Longitudinal Study of Aging (ELSA), SHARE will be collecting data on older individuals over time. This paper uses data from the first wave collected in 2004. The longitudinal aspect of the future SHARE will be particularly valuable for research as more waves become available.

The survey was administered by means of computer assisted personal interviews (CAPI) of participants drawn from probability samples in all participating countries. The sampling plan followed a complex probabilistic multistage design to produce estimates representative of the non-institutionalized population aged 50 and above in each country. The response rate varied by country but on average was 61% for households and 85% for individuals within participating households. A detailed description of the SHARE data and methodology was published elsewhere (Borsch-Supan et al. 2005).

The SHARE Release II sample included 28,517 respondents from 11 European countries (not including Israel). We impose several restrictions on the sample used for analysis. First, we exclude respondents younger than the age of 50 (981 observations or 3.4% of the original sample, typically

spouses of the primary respondents). The second exclusion (327 observations) is for data with missing or incomplete age or job status responses. Due to these selections 27,239 individuals remain eligible for the analysis (12,444 men and 14,795 women). For some analyses we lose observations due to missing values for some variables.

For the United States, we use the 2004 wave of the HRS, a representative sample of the US population over 50 with a similar multi-disciplinary questionnaire as SHARE. The HRS, conducted by the University of Michigan, started in 1992 as a national longitudinal study of the non-institutionalized population born in the period 1931–1941 (i.e., aged 51–61 at the baseline) and their spouses, all reinterviewed biannually. In 1998, the HRS was combined with cohorts of older participants from its complement Assets and Health Dynamics Among the Oldest Old (AHEAD) that began as a longitudinal survey of people ages 70 and older in 1993. The Children of the Depression (birth cohorts of 1924–1930) and the War Baby (people born 1942–1947) sub-samples were added to the HRS in 1998. Finally, the Early Baby Boomers (born during 1948–1953) have been added in 2004 making the HRS a national panel survey of more than 22,000 Americans over the age of 50.

The surveys use a mixture of modes with most new interviews conducted in-person and most reinterviews by phone. Wave-specific overall response rates for the HRS have improved from 81.7% in 1992 to close to 90% at later waves, specifically 87.8% in 2004. The survey has a complex sample design and oversamples Blacks, Hispanics, and residents of Florida. Details on the HRS methodology and the 2004 Wave are available elsewhere (Heeringa and Connor 1995; NIA 2007).

The HRS 2004 sample includes 20,129 participants. We excluded 841 respondents under the age of 50 (4.2% of the original sample) to construct our HRS sample of 19,288 respondents (8,185 men and 11,103 women). Similar to SHARE, we lose a small number of observations in some analyses due to missing data.

For comparability with the SHARE and HRS 2004 datasets, we use the ELSA data for England from Wave 2 fielded over 2004–2005. ELSA is a longitudinal study of the non-institutionalized English population aged 50 and above and their partners. The sample of about 12,000 respondents

was drawn from households that participated in the Health Survey for England (HSE) in 1998, 1999 and 2001. The baseline ELSA Wave 1 interviews were conducted in 2002–2003. The Wave 2 ELSA interviewed core members (age-eligible participants from the ELSA Wave 1) and their partners even if these partners were no longer living with core members. Response rates varied by module, but the overall response rate for core members in Wave 2 was 82%. ELSA has a complex sample design and provides survey weights for core sample members only. Other respondents (non-sample members such as core, new or younger partners) have a survey weight of zero⁵. Many ELSA modules closely parallel questionnaires of HRS and SHARE. Details on the ELSA methodology were published elsewhere (Banks et al. 2006; Calderwood et al. 2004; Marmot et al. 2003).

The ELSA Wave 2 sample includes 9,432 participants. Of these, 8,780 (93%) were eligible core members, which is the focus of our analysis. We excluded 261 participants under the age of 50 and 391 participants who were not core members. We further dropped 74 participants who had no job status data. Our ELSA sample thus includes 8,706 participants (3,902 men and 4,804 women).

3.1 Outcomes

The primary outcome of interest is the current employment status of adults aged 50 and older. We define the employment status of the SHARE respondents based on one of six categories describing their current job situation: retired, employed or self-employed (including working for family business), unemployed, permanently sick or disabled, and homemaker⁶. We perform a check of the job status data by comparing it to responses to a set of employment-related questions such as 'In your main/secondary job are you an employee, civil servant or self-employed?' For respondents who did not specify their occupation in the job status question, yet indicated employment in other questions, we use the latter to identify such respondents as employed. We follow the same protocol for classifying job status in the ELSA and HRS data. One exception is partial retirement, which is selected as a separate category in the HRS but not

⁵ The data for partners serves as supplementary information on the ELSA core members.

⁶ We excluded 78 SHARE respondents who selected 'other' as their responses about current job status and which could not be re-categorized based on responses to other questions about job situation.

ELSA and SHARE employment status questions. We classify partly-retired in the HRS data as employed/self-employed.

3.2 Explanatory variables

The independent variables are policy measures evaluating financial, social and other incentives to retire across countries. We focus explicitly on the policy markers expected to affect retirement decisions through their links to pension benefits. There are various routes from employment into non-employment. For instance, in some countries receiving disability benefits may act as *de facto* retirement. Unemployment may also be a bridge to formal retirement. We concentrate on determinants of employment and by default equate non-employment with retirement. In modeling pension policies across countries, we make use of indicators published in a 2007 OECD report (*Pensions at a Glance: Public Policies Across Countries*, OECD 2007). The pension models presented in the OECD report include all mandatory pension schemes for private-sector employees irrespective of whether they were public or private. The OECD analytic models include systems with near-universal coverage if they cover at least 90% of employees. Voluntary, occupational pensions with coverage below 90% (a common source of retirement income in Canada, Denmark, the US and UK) are not taken into account. Mandatory personal pensions of the defined contribution type, also known as 'individual accounts', are included, as well as means-tested benefits for retirees. Pertinent to pension schemes in some countries, specific pension entitlements for civil servants, the self-employed and agricultural workers are excluded in the OECD pension models. For further details on the structure, coverage, and economic and financial assumptions underlying the calculation of nationally comparable pension entitlements we refer to OECD 2007.

We select four indicators to compare pension entitlements across countries and describe their effect on retirement patterns: the net replacement rate⁷, generosity of work disability benefits⁸, early and standard retirement age. As data on the generosity of work disability benefits is not available for Greece and Switzerland, we estimate models

7 Defined as the individual net pension benefits as a share of net pre-retirement earnings, taking into account personal income taxes and social security contributions paid by workers and pensioners, Source: OECD 2007.

8 Defined as the relative average personal income of disabled persons working over disabled persons not working, late 1990s. Source: OECD Employment Outlook, 2003.

with and without this variable to account for missing data in the two countries. Ideally we would also have liked to include measures of accrual of pension wealth, but they are not available for multiple countries.

The OECD data provide country indicators of net replacement rates for full-career workers by gender at different levels of individual earnings. Since we do not observe earnings for those who are already non-employed and there is no reasonable approach to calculating individual replacement rates, we assign everyone the net replacement rate corresponding to the average earner of his or her gender in the country.

A variety of individual level variables are included as explanatory variables in the estimation. We focus on two domains: health and socio-demographics. Our primary measure of health is based on subjective self-reports of general health status using the US categorization on a five-point scale from 'Poor' to 'Excellent'. We code responses 'Poor' or 'Fair' as one and other categories as zero to construct a measure of poor health. Since it is well-known that response scales tend to vary across countries (e.g. Kapteyn et al. 2007), we also construct a measure of health based on responses normalized within each country. For this variable we take the mean of the poor/fair health dummy by gender and country and divide an individual response (a one or zero) by the country and gender specific mean. We denote this constructed variable as 'normalized poor health'. Whereas the first variable may suffer from incomparability across countries, the second normalized variable essentially takes out any true cross-country differences in the level of health. We choose therefore to use both health variables, acknowledging that neither is perfect. As we shall see later, both variables contribute significantly to the explanation of retirement.

We include a set of standard socio-demographic covariates in the retirement models: age, educational achievement (secondary and tertiary education, primary or no education is the reference category), gender, and marital status (married and living together with a spouse or registered partnership).

3.3 Analytic strategy

The primary purpose of this paper is to describe how pension incentives affect retirement patterns across European countries and the U.S. We relate cross-national differences in the number of retirees to a limited number of incentive indicators, while controlling for differences in socio-

demographics and non-economic factors like health. We have pooled the SHARE data across all countries. To account for the complex sampling design and obtain nationally representative estimates, we use individual sampling weights when presenting sample statistics in all three datasets. We will present both descriptive statistics and the results of a slightly more complicated econometric model.

3.4 Modeling retirement

The data we are using are cross-sectional and represent a snapshot of the retirement status of individuals. Whether one is retired or not today is the result of decisions made in the past. We suggest a relatively straightforward approach to modeling current retirement status as a result of past decisions in the form of a discrete hazard model. Start at some initial date (time 0), for example, when an individual turns 50. The probability that this individual will be observed working at that date is denoted by $q_0 \equiv 1 - \pi_0$ so that π_0 is the probability of observing an individual not working at time 0. The probability that the individual retires at the beginning of next year (year 1, i.e. at age 51) is denoted by π_1 ; the probability that the individual retires at the beginning of year 2 (at age 52) is π_2 ; for year i (age $50 + i$) the probability is π_i .

Assuming that retirement is an absorbing state, i.e. that one does not 'unretire', the probability of observing an individual in the labor force in year 1 is equal to $(1 - \pi_0)(1 - \pi_1)$, or more generally for year i :

$$\prod_{j=0}^i (1 - \pi_j) \quad P_i \equiv \prod_{j=0}^i (1 - \pi_j) \quad \text{where } P_i \text{ represents the probability}$$

. Define that this individual is observed in the state of working at age $50 + i$. What remains to be done is to find a reasonable parametrization of π_i . For π_0 we take the fraction of 50-year old individuals who are not working. For $\pi_i, i > 0$ we specify $\pi_i = \Phi(x'\beta)$ where $\Phi(\cdot)$ is the normal cumulative distribution function. The vector x includes age, gender, marital status, education, self-reported health, whether one's age is equal (or greater than) the early retirement age in a country, and whether one's age is equal (or greater than) the standard retirement age in a country. We also include a measure of the national generosity of disability benefits. The effects of eligibility for early or standard retirement are interacted with net replacement rates. Thus we allow for the fact that early retirement may be more attractive if the net replacement rate is higher. The problem however

is that we only have one replacement rate measure per country (and gender). Thus we take the country/gender replacement rate at standard retirement age as a proxy for the replacement rate at early retirement. As mentioned before, measures of accrual rates were not available for all countries, so we left those out.

4. Results

4.1 Descriptive analysis

Tables 1–2 summarize the occupational distribution of our sample across countries for men and women. We report labor force statistics for the age range with most cross-country variation: ages 50–59 (Table 1) and ages 60–64 (Table 2). The distribution of employment data among the 60–64 year olds is particularly illustrative of large cross-country differences in when and how Europeans and Americans exit the labor force. For example, the percentage of retired men aged 60–64 in Austria is almost three-fold the retirees' share among their peers in England, Sweden and Switzerland (85% vs. 30%) and two-thirds above the one in Germany and Spain (85% vs. 52%). The gap in retirement rates is particularly striking given that these countries have the same standard retirement age of 65 for men.

High rates of disability in the pre-retirement age group are likely to indicate that disability programs in such countries are used as a device of early retirement. An illustrative example is the population of the Netherlands younger than 65 who report particularly high rates of disability (e.g., 15% men and 18% women vs. the SHARE average of 5% and 4% for 60–64 year old men and women). The disability-related social schemes in the Netherlands have been historically known as generous in benefits and relatively loose on eligibility requirements. As they cover people below the age of 65, it is not surprising that disability rates for Dutch men aged 65 and older decline to the level of the sample mean⁹. We also find particularly high work disability rates in England among men under the age of 65 and women under 60, which correspond to old-age retirement eligibility ages in the country. As there is no early retirement eligibility in the UK, the disability scheme may be serving as an alternative exit to retirement. In contrast to the Netherlands and England, some countries have very low rates of disability for all age groups. The prevalence of work disability in Greece and Italy is around or less than 1% for men and women ages 50–59. This is likely to reflect stringent public policies regarding disability social programs in these countries. At the same time

⁹ Disability benefits in The Netherlands run out at age 65 and get replaced by retirement benefits. Although this does not prevent individuals from calling themselves disabled, one suspects that this will lead many of them to no longer call themselves disabled, but rather retired.

virtually zero disability rates among the 60–64 year olds in France (for men and women) and Austria (for women) reflect the fact that this population is eligible to normal old-age retirement (i.e., at the age of 60).

Rates of unemployment in the pre-retirement age group are the highest in Germany and Denmark and for women in Belgium (around 9–12%), whereas Greece and Italy have unemployment rates at the minimum of the SHARE range. It is therefore unlikely that social schemes for either disability or unemployment play a role in early retirement exit routes of the Italians and Greeks. In contrast, unemployment schemes are perhaps used as alternative early retirement paths in Germany. Unemployment-related social programs can be another channel through which people can bridge the gap between old-age retirement and exit from the labor force prior to the normal retirement age.

Tables 3–4 provide descriptive cross-country estimates of how health status differs between retired and employed people. Similar to the employment status tables, we stratify country-specific results on the percentage of people reporting poor/fair health by gender and age. Regardless of age, we find the healthiest people among the employed. Table 3 shows substantial cross-country variation in health among individuals aged 50–59. In the countries with low retirement rates those few who are retired appear to be in particularly poor health (e.g., Denmark, Germany, Sweden, and the US). In contrast, the countries with low retirement but high disability rates, such as the Netherlands and England, have the least healthy people among the disabled whereas a small group of retirees reports better than average health (results not presented). The estimates for the countries with high retirement rates among the 50–59 year olds (Austria, Italy) do not have a clear health gradient.

Health may be an important factor in early retirement in the countries where the use of unemployment- or disability-related social schemes as de facto early retirement mechanisms is relatively common (e.g., Germany, the Netherlands, England). The percentage of people in poor health among the unemployed in Germany and disabled in the Netherlands and England is consistently above the average (data not shown). In general, 60–64 year olds (Table 4) who remain employed are on average healthier than their peers in all countries. Given heterogeneity in pension policies across countries, such consistent findings on health suggest that health status is likely to play an important role in determining retirement

behavior, yet the importance of health may vary by country depending on pension and other social policies in place.

4.2 Empirical results of model estimation

Tables 5 and 6 contain the results of estimating the model introduced in Section 3.5. We present two variants. In Table 5 we present a variable representing the generosity of disability benefits measured as the income earned by individuals with a work disability relative to the income of individuals who have a disability and no earnings (see OECD 2007). Thus a larger number means a less generous disability system. Since this variable is not available for Switzerland and Greece, we also estimate a model with this variable excluded. See Table 6.

The model is essentially a discrete hazard model of staying in work. Therefore a positive coefficient of a variable means that a larger value of this variable makes it less likely that an individual will leave the labor force. We observe that being female, being married, being in poor or fair health increase the likelihood that at any given age one leaves the labor force. Notice that both the normalized and non-normalized variables are statistically significant. Age itself has a clear effect also; with increasing age, transitions out of work become more likely.

For understanding the effects of policy, we focus on the generosity of disability benefits and replacement rates at early or normal retirement. More generous disability benefits make an exit from the labor force more likely, as is clear from Table 5. We have interacted early and normal retirement age with the replacement rate, upon the notion that retirement becomes particularly attractive when benefits for which one becomes eligible are generous. One would expect that individuals who are at or above early retirement age are more likely to exit and the more so if benefits are more generous. We observe that not all effects are individually significant, but they are jointly highly significant. The interpretation of the joint effects of reaching the early or normal retirement age and the effect of the replacement rate is somewhat subtle. Replacement rates vary from 40 (per cent) to 110. So for instance, in Table 5 we observe that the interaction of reaching the normal retirement age with the replacement rate has a coefficient equal to $-.03$, while the effect of reaching the normal retirement age equals 0.35 . This means that even at the lowest replacement rate of 40, the effect of reaching the normal retirement age is equal to $.35 - 40 * .03 = -.85$. If the replacement rate goes up 100, the

effect of reaching the normal retirement age equals $.35 - 100 * .03 = -2.65$. The joint effect of reaching the normal or early retirement effect and the replacement rate is always negative, i.e. reaching one of these retirement ages induces exit from the labor force. We observe that in Table 5, the effect of the net replacement rate at the early retirement age is slightly positive (i.e. has a counter intuitive sign). But even there we note that at the highest observed replacement rate of 110, the effect of reaching the early retirement rate is equal to $-1.35 + 110 * .01 = -.25$. So even in these circumstances the effect of reaching the early retirement age has a negative effect on labor market participation.

The effects of the replacement rates appear rather modest. Most likely this reflects the crudeness of the measures as determinants of individual incentives to retire, rather than that they are really of limited importance. Clearly it would be preferable to include individual incentives in the model, but such an exercise is beyond the current somewhat illustrative purposes of our modeling.

It appears from both Tables 5 and 6 that once one is beyond normal retirement age, replacement rates have an adverse influence on the probability of exit. One should keep in mind that this is a simple model in which we have not accounted explicitly for heterogeneity in tastes. The individuals still working after the normal retirement age are a relatively small and selective group. Those who are sensitive to the generosity of retirement benefits most likely have already left the labor force. Below we present some simulations that illustrate the effect of retirement age and benefit generosity on labor force participation across ages.

4.3 Model simulations

To get a better feel for the role of various policy variables we present some simple simulations. These are presented in Tables 7 and 8. In both tables the first column represents the labor force participation observed in the data. The second column presents labor force participation as predicted by the model. The third column presents outcomes where we assign the U.S. replacement rate to all countries. The fourth column gives results of raising both early and normal retirement ages by two years. The fifth column gives the effects of only raising the normal retirement age by 2 years. The sixth column is different across the two tables. In Table 7 it represents the effects of assigning all countries the work disability generosity

(or rather lack of it) of the U.S., while in Table 8 it represents results of assuming that no one is in poor or fair health.

A comparison of the data with the base simulation in both Tables 7 and 8 shows that the model does a reasonable job of explaining differences across countries, but with some notable exceptions. In particular the low participation rate in the 60–64 age bracket in Austria is largely unexplained by the model. In general one would not expect the rather crude aggregated incentive measures that we have used to fully capture many of the intricacies within a country. It underlines the somewhat illustrative nature of our analysis. For the purpose of understanding the policy effects one should compare the remaining columns of the table with the bases simulation column. We will moreover mostly concentrate on the age category 60–64, as this is where most of the action is. Assigning the US replacement rate has substantial effects in Austria, The Netherlands (but only in the model excluding the measure of generosity of disability benefits), Spain (but only in the model including the disability measure), Italy, France, and Greece.

Changing early and normal retirement ages also has a very substantial effect in many countries. The countries where the effects are largest, are Austria, the Netherlands, Belgium, and, especially, France. These are generally the countries where currently labor force participation in the 60–64 age bracket is lowest. Italy is a remarkable exception in that it has low labor force participation among the 60–64 old, yet the increase in retirement ages has only a modest effect. We note however that for Italy the model does a poor job in reproducing the low labor force participation in this age group. Table 8, shows sizeable effects for both Greece and Switzerland.

The next column considers the effect of only raising the normal retirement age. It is of particular interest to compare the effects of this simulation with the effects of raising both early and normal retirement ages. For most countries, raising the normal retirement age only reduces labor force participation in the 60–64 age bracket compared to the simulation where both retirement ages are increased, often by a substantial amount (on the order of 5 or 6 percentage points). Countries where the difference is small include England, Austria, and Denmark.

Considering the effect of health in Table 8, we observe that in all countries the effects are non-negligible; usually on the order of 3 or 4 percentage points in the 60–64 age group. This suggests that improving

health or workplace accommodation for individuals in less than perfect health may be an instrument to increase labor force participation at older ages.

Finally, consider the effect of disability benefits in Table 7. The incentive effects of disability benefits on labor force participation appear to be spectacular. For instance, in Sweden replacing the Swedish benefits by U.S. benefits would increase labor force participation in the 60–64 age bracket by 14 percentage points. In the U.K. and the Netherlands in the same age bracket participation would increase by 10 percentage points. These results underline the fact that in some countries disability programs offer an alternative exit route out of the labor force.

5. Concluding remarks

We have highlighted substantial differences in retirement across the twelve European countries and the United States. Not only do we see large differences in the number of individuals retired across age groups, we also find that alternatives to retirement may play important roles in some countries and be negligible in other nations. For instance, in the age group 60–64 we observe that 15 percent of Dutch men and 18 percent of Dutch women report to be permanently sick or disabled, while the same percentage is below one in Italy and France. This is clearly related to the availability of generous Disability Insurance schemes in The Netherlands, and there appears an obvious case of substitution between different income maintenance programs.

In our simple discrete hazard model of retirement we find that generosity of disability benefits, replacement rates and eligibility for early or normal retirement all have significant effects on the propensity to leave employment. Health variables also play an important role in individual decisions.

Although the use of the SHARE, HRS and ELSA data is an advantage compared to earlier studies, there are a number of elements still missing. In particular, we can exploit only crude measures of incentives faced by individuals near retirement age. These measures are essentially aggregates that can only be approximations of individual incentives to retire or stay in the labor force. Yet, we find that these proxies do a reasonable job in explaining some broad retirement patterns across countries. Our approach to the comparability of health measures is also quite simple, as we attempt to normalize individual self-reports of general health using a national average of poor/fair health status. All three datasets exclude institutionalized population providing us with a selective sample of the general population ages 50 and above. However, given that the share of institutionalized population is likely to be very low in all countries (e.g., it is 1.4% in the general US population based on the U.S. 2000 Census), we believe this selection has no significant implications for our study. Taking these caveats into account, we do find clear effects of financial incentives, health and institutional arrangements on retirement behavior.

As has been stressed repeatedly, the analysis in this paper is mainly meant to be descriptive. The data presented in this paper add to the growing literature on the importance of financial incentives in the retirement decision. We also find a clear effect of health on choices to leave the

labor force. Whether bad health leads to formal retirement or to a different non-employment state like disability or unemployment appears to be a function of the institutional set-up in the country. There are different ways to leave the labor force and policy largely shapes which exit route an individual will take and when.

Policy recommendations

This paper discusses various aspects of retirement behavior and how that behavior is influenced by incentives and personal circumstances. We stress the interrelation between financial incentives, saving, and health. To the extent that the sustainability of old age pension systems is at stake, there are a number of policy options. Some of these are conventional and have been discussed many times in both academic papers and public debate. Others may be more novel, but perhaps also less easy to implement.

1. Financial incentives

Various reforms are conceivable. The most important one is to remove actuarially unfair benefit schemes. This can take various forms:

- a. Adjust pension benefits so that the benefit of an extra year of work is at least equal to the extra contribution made. In technical terms, make sure that pension accrual is positive; in our empirical work, we have not been able to quantify the effect of such policies directly, because our macro indicators did not include measures of pension accrual. Some insight can be gleaned from the simulations that varied replacement rates. The effects of replacement rates appear to be substantial: on the order of 5 percentage points in the 60–64 age category.
- b. Raise eligibility ages for pension benefits; perhaps index the eligibility age by life expectancy; our simulations suggest that these changes may have effects exceeding 10 percentage points in the 60–64 age group.
- c. Introduce Defined Contribution pensions, so that benefits are a function of one's contribution (and of the return on investment). This automatically leads to actuarial adjustment of benefits when one retires later.
- d. Consider the incentive effects of replacement rates. The simulations carried out in this paper showed effects on the order of 5 percentage points in the 60–64 age group.

2. The role of health

Both theoretical and empirical work suggests that individuals with less human capital depreciate their health capital faster than individuals with more human capital. This may take the form of accepting less healthy jobs in order to earn higher wages. This is an entirely rational choice given the constraints one is facing. This leads to at least three policy options:

- a. Improve education in order to raise human capital. Thus education policy is retirement policy (and health policy).
- b. Make jobs healthier. The fewer unhealthy jobs exist, the more limited are the options for individuals to run down their health in return for higher wages. Our simple simulations suggest a potential benefit of 5 percentage points in the 60–64 age group.
- c. Health promotion should be an important part of the public health agenda in the aging populations. Individual choices of diet, physical activity and smoking behavior have social consequences in terms of the nation's health and its effect on retirement.

3. Tailor policy to a country's situation

The simulations show that a policy can have very different effects in different countries. This reflects the difference in initial conditions. In some countries a change in normal or early retirement age may be effective, in other countries, it may be the replacement rate of pension accrual that is most crucial.

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Appendix: Tables and figures

Table 1: Current occupation status by country among individuals aged 50–59, %

	MEN				
	Retired	Employed/ self-employed	Unemployed	Permanently sick/ disabled	Home- maker
Austria	20.5	67.1	8.0	4.0	0.4
Belgium	15.7	67.4	6.6	9.6	0.7
Denmark	6.9	77.6	12.2	2.9	0.3
France	12.5	72.5	7.1	7.1	0.7
Germany	3.9	76.5	12.5	6.8	0.4
Greece	14.0	82.3	2.5	0.7	0.6
Italy	30.9	61.3	5.8	2.1	0
Netherlands	3.7	79.0	4.0	12.7	0.6
Spain	12.0	73.2	6.8	7.9	0
Sweden	6.7	84.2	5.5	3.6	0
Switzerland	0.9	89.2	3.7	4.9	1.3
<i>Total SHARE</i>	12.8	72.8	7.9	6.1	0.4
England	9.2	76.1	2.0	11.4	1.3
US	11.6	79.6	3.2	3.8	1.9
	WOMEN				
	Retired	Employed/ self-employed	Unemployed	Permanently sick/ disabled	Home- maker
Austria	28.6	42.2	6.8	2.6	19.8
Belgium	9.7	44.6	12.5	8.1	25.2
Denmark	8.6	74.3	9.4	5.5	2.2
France	7.3	61.9	6.5	4.5	19.8
Germany	3.5	64.9	10.4	3.9	17.3
Greece	15.6	36.3	2.3	0	45.8
Italy	11.8	35.9	3.2	0.4	48.7
Netherlands	0.7	49.8	3.3	10.2	36.1
Spain	3.1	38.7	7.4	3.9	46.9
Sweden	10.8	78.1	3.3	5.9	1.8
Switzerland	1.7	67.3	3.5	6.0	21.6
<i>Total SHARE</i>	7.1	52.9	6.8	3.8	29.4
England	7.4	64.0	1.8	8.6	18.2
US	11.5	69.6	2.6	5.2	11.0

Note: Data weighted to be nationally representative.

Table 2: Current occupation status by country among individuals aged 60–64, %

	MEN				
	Retired	Employed/ self-employed	Unemployed	Permanently sick / disabled	Home- maker
Austria	85.2	10.6	1.8	2.4	0
Belgium	63.9	19.3	7.3	8.5	0.9
Denmark	50.2	46.3	0.9	2.6	0
France	73.6	17.2	6.4	2.2	0.5
Germany	51.9	31.7	9.5	6.6	0.2
Greece	49.3	44.8	3.9	2.0	0
Italy	71.9	22.1	4.4	1.6	0
Netherlands	52.7	25.4	5.3	15.2	1.5
Spain	52.1	32.8	8.9	6.2	0
Sweden	29.9	59.3	3.5	7.4	0
Switzerland	31.3	57.4	1.3	9.3	0.7
Total SHARE	59.1	28.8	6.7	5.1	0.3
England	34.1	48.0	2.8	12.8	2.3
US	34.8	60.7	1.1	2.9	0.4
	WOMEN				
	Retired	Employed/ self-employed	Unemployed	Permanently sick / disabled	Home- maker
Austria	78.5	3.2	0.5	0	17.8
Belgium	47.6	12.5	6.4	3.1	30.5
Denmark	65.4	23.3	1.3	6.6	3.5
France	53.5	19.5	4.7	0.9	21.3
Germany	51.9	17.1	3.4	3.4	24.2
Greece	27.9	14.9	3.1	0.7	53.4
Italy	59.0	6.0	0.4	1.2	33.3
Netherlands	13.4	14.8	1.1	17.6	53.1
Spain	10.4	15.3	5.7	6.5	62.1
Sweden	31.7	55.1	5.5	5.1	2.6
Switzerland	28.2	37.6	3.0	4.5	26.7
Total SHARE	45.9	15.9	3.1	3.5	31.6
England	51.5	25.0	0	4.4	19.1
US	35.2	46.5	0.9	5.2	12.2

Note: Data weighted to be nationally representative.

*Table 3: Percentage of people with poor/fair health,
individuals aged 50-59*

	MEN			WOMEN		
	Any employ- ment status	Retired	Employed/ self- employed	Any employ- ment status	Retired	Employed/ self- employed
Austria	25.7	45.1	16.8	18.2	19.3	10.0
Belgium	19.9	18.8	12.6	20.2	30.9	10.1
Denmark	19.9	56.1	12.9	17.9	58.9	7.3
France	19.7	19.1	13.4	22.2	15.8	15.9
Germany	24.7	40.7	14.6	24.6	47.6	16.7
Greece	11.9	24.5	8.2	18.6	23.3	12.7
Italy	19.2	26.1	12.1	32.0	31.5	15.4
Netherlands	19.5	7.7	11.5	23.4	20.0	11.5
Spain	23.9	52.7	12.8	30.3	57.1	17.2
Sweden	6.9	36.6	3.7	12.7	51.5	4.7
Switzerland	9.5	0	3.7	11.7	0	8.0
<i>Total SHARE</i>	<i>20.7</i>	<i>29.8</i>	<i>12.5</i>	<i>24.9</i>	<i>31.6</i>	<i>14.6</i>
England	23.7	16.5	14.7	22.6	25.9	14.2
US	22.2	49.7	14.9	23.3	45.3	15.3

Note: Data weighted to be nationally representative.

*Table 4: Percentage of people with poor/fair health,
individuals aged 60–64*

	MEN			WOMEN		
	Any employ- ment status	Retired	Employed/ self- employed	Any employ- ment status	Retired	Employed/ self- employed
Austria	24.3	25.7	5.6	21.9	22.1	0
Belgium	18.9	13.9	10.2	25.0	21.2	2.9
Denmark	18.2	25.1	5.8	27.3	28.8	5.4
France	27.5	29.3	15.1	27.3	31.4	11.7
Germany	38.1	41.5	24.5	36.1	31.2	27.3
Greece	16.9	15.8	12.8	24.8	22.3	21.8
Italy	31.1	29.1	26.6	39.5	36.7	28.5
Netherlands	24.6	17.9	14.9	24.9	21.1	16.7
Spain	33.8	31.9	30.1	42.1	59.4	27.1
Sweden	11.3	22.4	3.6	13.3	27.0	4.7
Switzerland	13.4	21.7	2.4	17.9	15.8	12.1
<i>Total SHARE</i>	<i>30.6</i>	<i>31.0</i>	<i>20.1</i>	<i>33.3</i>	<i>32.1</i>	<i>19.5</i>
England	24.9	25.9	13.1	27.2	27.0	14.8
US	23.3	32.7	14.9	25.7	32.4	14.8

Note: Data weighted to be nationally representative.

*Table 5: Estimation results for a simple dynamic retirement model***Version 1: Including work disability**

Variable	Coefficient	Standard Error	Z-value
Generosity of disability benefits	0.16	0.01	11.64
Female	-0.16	0.01	-12.59
Married / partnership	-0.04	0.01	-3.22
Secondary Education	0.07	0.01	5.32
Tertiary Education	0.22	0.01	14.65
Poor or fair health	-0.27	0.05	-5.83
Poor or fair health, normalized	-0.03	0.01	-2.38
Intercept	4.00	0.04	109.75
Age	-0.04	0.00	-136.89
Early retirement age * net replacement rate	0.01	0.00	2.12
Early retirement age	-1.35	0.22	-6.09
Normal retirement age * net replacement rate	-0.03	0.00	-10.36
Normal retirement age	0.35	0.19	1.85
Older than early retirement age * net replacement rate	-0.01	0.00	-2.99
Older than early retirement age	0.13	0.14	0.95
Older normal retirement age * net replacement rate	0.01	0.00	4.03
Older than normal retirement age	-0.50	0.15	-3.36
Number of observations: 50,157; log-likelihood: -18468.26			
*The table presents estimates of the model described in Section 3 with the generosity of disability benefits included (excluding Greece and Switzerland that did not have data for this measure). The model explains the probability that at a given age an individual will keep working. So a negative coefficient for a variable implies that this variable increases the likelihood of leaving the labor force.			

*Table 6: Estimation results for a simple dynamic retirement model:
Version 2: Excluding work disability**

Variable	Coefficien t	Standard Error	Z-value
Female	-0.14	0.01	-12.95
Married / partnership	-0.06	0.01	-4.67
Secondary Education	0.08	0.01	6.43
Tertiary Education	0.24	0.01	18.37
Poor or fair health	-0.19	0.04	-4.66
Poor or fair health, normalized	-0.05	0.01	-3.99
Intercept	3.94	0.02	182.21
Age	-0.04	0.00	-118.03
Early retirement age * net replacement rate	-0.00	0.00	-1.68
Early retirement age	-0.69	0.14	-5.20
Normal retirement age * net replacement rate	-0.02	0.00	-7.30
Normal retirement age	-0.57	0.14	-4.18
Older than early retirement age * net replacement rate	-0.01	0.00	-7.66
Older than early retirement age	0.58	0.08	6.89
Older than normal retirement age * net replacement rate	0.01	0.00	4.08
Older than normal retirement age	-0.63	0.11	-5.95
Number of observations: 51,160; log-likelihood: -19,066.95			
*The table presents estimates of the model without the generosity of disability benefits for all 13 countries. It explains the probability that at a given age and individual will keep working. A negative coefficient for a variable implies that this variable increases the likelihood that an individual will leave the labor force.			

Table 7: Simulation results for retirement model (with work disability generosity)

				U.S. replacement rate	Early and Normal retirement ages plus 2	Normal retirement age plus 2	U.S. Disability benefits
	Age group	Data	Simulated base				
England	lt 60	69.1%	64.9%	64.9%	64.9%	64.9%	69.6%
	60-64	35.6%	39.7%	37.5%	42.0%	42.0%	49.0%
	65+	4.4%	4.5%	4.2%	6.3%	6.0%	8.3%
Austria	lt 60	60.6%	70.0%	70.0%	70.0%	70.0%	73.3%
	60-64	7.5%	30.3%	41.1%	37.4%	37.4%	35.5%
	65+	1.1%	3.0%	6.4%	5.6%	5.1%	4.8%
Germany	lt 60	81.6%	70.0%	70.0%	70.0%	70.0%	73.5%
	60-64	30.6%	42.0%	41.8%	46.1%	42.0%	50.5%
	65+	2.5%	6.0%	6.9%	8.4%	8.0%	10.0%
Sweden	lt 60	85.7%	73.8%	73.8%	73.8%	73.8%	80.1%
	60-64	62.2%	40.9%	40.4%	46.2%	40.9%	54.2%
	65+	2.5%	4.0%	5.6%	6.3%	5.9%	9.0%
Netherlands	lt 60	66.5%	57.0%	57.0%	57.0%	57.0%	61.6%
	60-64	23.1%	28.6%	27.8%	33.7%	28.6%	38.7%
	65+	1.4%	0.5%	4.0%	2.7%	2.3%	1.3%
Spain	lt 60	58.5%	54.0%	54.0%	54.0%	54.0%	56.3%
	60-64	31.0%	27.2%	26.6%	31.6%	27.2%	32.5%
	65+	2.1%	1.1%	3.9%	2.6%	2.3%	1.8%
Italy	lt 60	48.8%	52.2%	51.7%	54.6%	52.2%	55.7%
	60-64	14.4%	24.1%	25.4%	25.8%	24.1%	30.7%
	65+	2.6%	1.9%	4.3%	3.8%	3.5%	3.4%
France	lt 60	75.8%	76.2%	76.2%	76.2%	76.2%	80.0%
	60-64	24.5%	12.4%	16.4%	30.6%	29.4%	17.4%
	65+	0.7%	3.3%	4.1%	3.0%	4.9%	5.7%
Denmark	lt 60	86.6%	77.8%	77.8%	77.8%	77.8%	83.7%
	60-64	35.4%	51.0%	51.0%	51.0%	51.0%	64.4%
	65+	3.0%	1.1%	3.1%	4.6%	4.0%	2.7%
Belgium	lt 60	65.7%	58.5%	58.5%	58.5%	58.5%	61.5%
	60-64	22.5%	29.7%	29.9%	36.7%	32.1%	35.8%
	65+	1.1%	3.9%	5.1%	4.3%	4.2%	6.4%
United States	lt 60	69.4%	64.3%	64.3%	64.3%	64.3%	64.3%
	60-64	38.9%	41.7%	41.7%	46.0%	41.7%	41.7%
	65+	9.4%	8.8%	8.8%	9.9%	9.7%	8.8%

Table 8: Simulation Results for a Dynamic Retirement Model (no work disability)

	Age group	Data	Simulated base	U.S. replacement rate	Early and Normal retirement ages plus 2			Normal retirement age plus 2	No poor health
					66.1%	66.1%	66.1%		
England	lt 60	69.1%	66.1%	66.1%	66.1%	66.1%	66.1%	68.5%	
	60-64	35.6%	38.7%	37.5%	43.2%	43.2%	43.2%	42.9%	
	65+	4.4%	5.0%	4.2%	6.7%	8.1%	8.1%	6.3%	
Austria	lt 60	60.6%	69.6%	69.6%	69.6%	69.6%	69.6%	72.1%	
	60-64	7.5%	32.9%	38.2%	39.1%	39.1%	39.1%	36.2%	
	65+	1.1%	2.7%	5.3%	5.8%	5.3%	5.3%	3.6%	
Germany	lt 60	81.6%	70.4%	70.4%	70.4%	70.4%	70.4%	72.6%	
	60-64	30.6%	44.7%	44.9%	48.4%	44.7%	44.7%	50.8%	
	65+	2.5%	8.2%	9.3%	10.7%	10.9%	10.9%	11.2%	
Sweden	lt 60	85.7%	75.7%	75.7%	75.7%	75.7%	75.7%	78.0%	
	60-64	62.2%	46.9%	47.9%	51.2%	46.9%	46.9%	50.4%	
	65+	2.5%	7.3%	10.0%	10.1%	10.2%	10.2%	8.0%	
Netherlands	lt 60	66.5%	58.4%	58.4%	58.4%	58.4%	58.4%	60.4%	
	60-64	23.1%	29.2%	34.7%	35.2%	29.2%	29.2%	33.0%	
	65+	1.4%	1.4%	7.1%	3.7%	3.4%	3.4%	1.8%	
Spain	lt 60	58.5%	53.3%	53.3%	53.3%	53.3%	53.3%	55.4%	
	60-64	31.0%	25.4%	29.0%	29.9%	25.4%	25.4%	29.9%	
	65+	2.1%	1.6%	5.0%	3.0%	2.9%	2.9%	2.3%	
Italy	lt 60	48.8%	51.6%	52.2%	54.1%	51.6%	51.6%	54.1%	
	60-64	14.4%	27.5%	31.5%	27.6%	27.5%	27.5%	32.4%	
	65+	2.6%	3.1%	6.4%	5.3%	5.3%	5.3%	4.6%	
France	lt 60	75.8%	76.3%	76.3%	76.3%	76.3%	76.3%	78.2%	
	60-64	24.5%	11.3%	14.9%	30.7%	32.4%	32.4%	13.0%	
	65+	0.7%	3.0%	4.1%	2.8%	6.1%	6.1%	4.0%	
Denmark	lt 60	86.6%	80.0%	80.0%	80.0%	80.0%	80.0%	82.5%	
	60-64	35.4%	57.0%	57.0%	57.0%	57.0%	57.0%	62.1%	
	65+	3.0%	1.4%	4.2%	5.7%	5.7%	5.7%	1.7%	
Greece	lt 60	61.1%	62.3%	62.3%	62.3%	62.3%	62.3%	63.7%	
	60-64	33.2%	29.4%	36.8%	36.9%	29.4%	29.4%	32.5%	
	65+	2.7%	0.7%	7.0%	3.0%	2.6%	2.6%	0.9%	
Switzerland	lt 60	81.6%	74.3%	74.3%	74.3%	74.3%	74.3%	75.7%	
	60-64	53.1%	48.5%	49.0%	54.3%	51.6%	51.6%	52.1%	
	65+	5.5%	5.5%	7.3%	6.7%	8.1%	8.1%	6.3%	
Belgium	lt 60	65.7%	58.2%	58.2%	58.2%	58.2%	58.2%	60.1%	
	60-64	22.5%	31.6%	33.1%	37.5%	34.1%	34.1%	34.7%	
	65+	1.1%	5.1%	6.8%	5.8%	5.9%	5.9%	6.4%	
United States	lt 60	69.4%	61.5%	61.5%	61.5%	61.5%	61.5%	63.6%	
	60-64	38.9%	37.8%	37.8%	40.8%	37.8%	37.8%	42.1%	
	65+	9.4%	7.5%	7.5%	8.7%	9.1%	9.1%	9.3%	

Figure 1: Trends in life expectancy at birth for men in selected countries

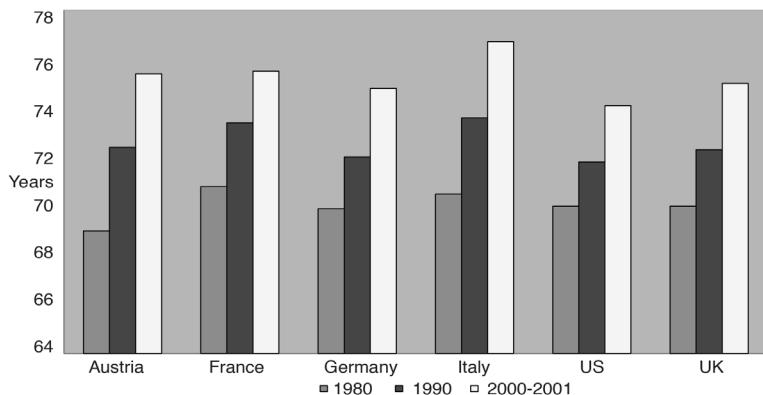
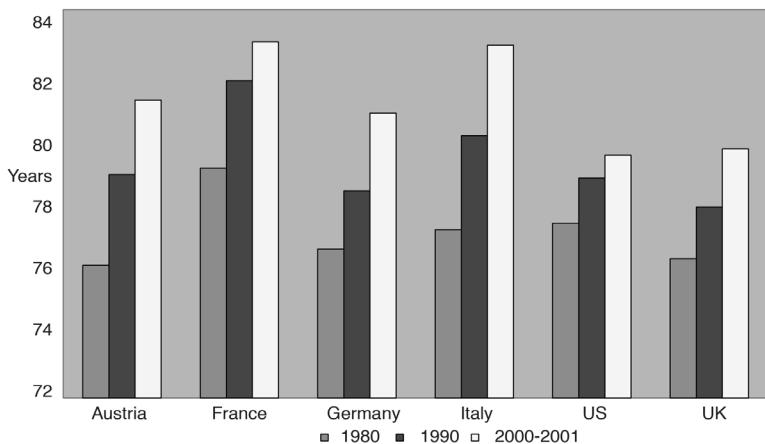
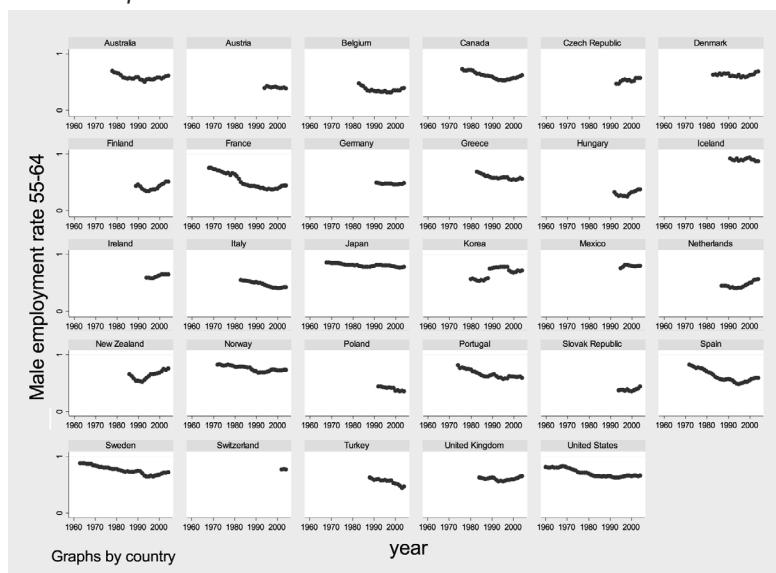


Figure 2: Trends in life expectancy at birth for women in selected countries



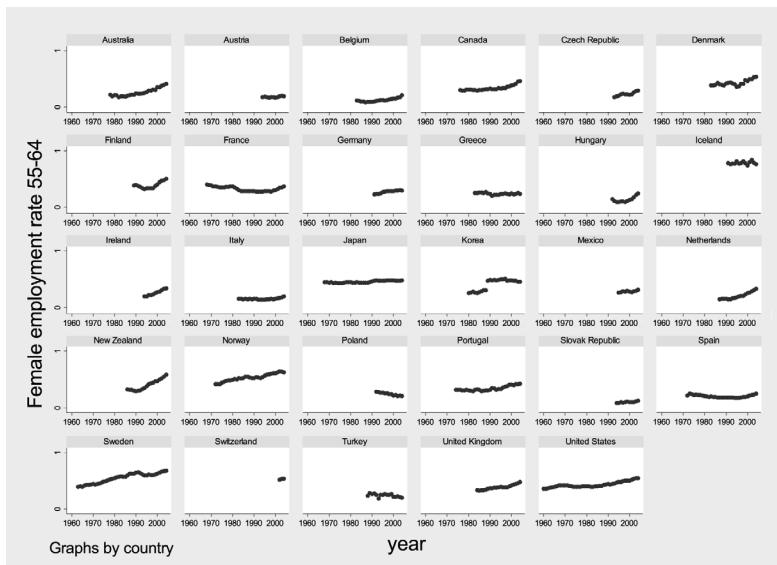
Sources: UNECE Statistical Division, Health for All Database, WHO/Europe, 2002

Figure 3: Employment rates for men aged 55–64 across Europe and the US¹⁰



10 Figures 3 and 4 are taken from Kalwij et al. (2007)

Figure 4: Employment rates for women aged 55–64 across Europe and the US



SUMMARY OF DISCUSSION

By David Vonka

Retirement Patterns in Europe and the U.S.

By Arie Kapteyn and Tatiana Andreyeva

Chairman: Henk Don

Discussants:

Rob Euwals (CPB – Netherlands Bureau for Economic Policy Analysis)

Adrie Moons (Ministry of Social Affairs and Employment)

Netspar Panel: April 23, 2008

The first discussant of the paper, **Rob Euwals**, started by recognizing the importance of the issue taken up by the paper for the policy discussion in the Netherlands. He presented a graph showing that since 2005 the participation of 55–64 year olds increased much more than expected by the prediction of the CPB. He stated three possible channels in which policy can influence early retirement behaviour. Firstly, it can work through the income effect. But the income effect is relatively small, a Euro taken from the pension fund of a worker will make him want to earn 10–20 extra cents. Secondly, Euwals mentioned the price effect, which is empirically much stronger. He discussed the removal of the VUT early retirement scheme, which used to impose a huge implicit tax on earning of those who were eligible. Thirdly, social norms and interdependent preferences (for example preference to stop working when one's spouse or friends do) play a role in early retirement decisions.

In the methodological part of his commentary, Euwals discussed how to measure the impact of financial incentives on early retirement. He argued for the use of natural experiments and microeconomic data for serious research. Still, he recognized an advantage of macroeconomic data, which implicitly include the fact that financial incentives influence everyone in the society and not only a few individuals.

Euwal's final point concerned the health-retirement puzzle. We observe decreasing participation rates, while state of health and life

expectancy increase. A possible explanation is that improved health leads to higher productivity, which leads to higher wage and (via income effect) lower labor supply. The problem is that this line of reasoning assumes a very strong income effect. Euwals suggests that not individual, but collective actions and institutions are responsible for this observed income effects.

The second discussant, **Adrie Moons**, emphasizes that the labor force participation of 55–64 years olds increased distinctly in all European countries but Portugal in the last decade. He wonders whether anything but the recent reforms can have triggered this upward trend.

His first observation concerns the post-reform net replacement rates that K&A used in their estimations. The decrease in these rates as a result of the reforms does not necessarily explains the recent increase of employment. The post-reform net replacement rates are highly theoretical because it is assumed that the reforms are already fully implemented, ignoring the frequently long transition periods. He calls attention to the need of profiles of net replacement rates, which would reflect the implicit tax on working longer that individuals near retirement currently experience.

In his second observation he criticizes that K&A used the theoretical post-reform replacement rates as proxies for individual replacement rates. He claims that this leads to an underestimation of the real financial incentives. That in its turn means that reforms according to the model must be drastic to reach small employment changes. He calls for detailed profiles of net replacement rate levels and changes, to be added to the rich SHARE data.

Further he suggests that more attention should be given to the demand side of the labor market. Especially the wage-productivity gap should be taken into account. This gap could be analysed with the wage-data already in SHARE on the same way as Kapteyn and Van Soest revealed the wage-productivity gap at the lower end of the labor market.

As a policy conclusion he is not convinced that actuarial neutrality of pension systems is sufficient to raise the employment substantially. The level of net replacement rates might also be very important.

Arie Kapteyn agreed that the labor force participation increase since 1995 means that the reforms have worked. He demonstrates this on the example of the USA, where no reforms happened and the labor force participation changed very little.

To the comment of Rob Euwals on the value of natural experiments Arie Kapteyn answered that international comparison is a kind of a natural experiment.

He agreed with Adrie Moons that an incentive module in SHARE would be very interesting, though rather difficult to implement.

To the health-participation puzzle of Rob Euwals he noted that health is partly endogenous. People can decide to 'sell' some of their health by taking an unhealthy job. He recognizes this as a policy concern, also because this can lead to disability.

As for demand side of the economy, Arie Kapteyn considers it very hard to add employers' data to the SHARE panel. He also notes that the productivity-age relationship is sector specific.

Arie Kapteyn also agreed that the income effect of better health is one of the mechanisms that lead to the positive relationship between earlier retirement and longer life.

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RETIREMENT PATTERNS IN EUROPE AND THE U.S.

In this paper various aspects of retirement behavior and how that behavior is influenced by incentives and personal circumstances are discussed. More specifically, the researchers stress the interrelation between retirement, financial incentives, saving, and health. There is great variation in retirement patterns across countries, and the researchers explore the role of health in retirement decisions. In developed countries people tend to live longer than ever, yet retire at increasingly younger ages. On the one hand it can be illustrated why people with more human capital are healthier and retire later. On the other hand the improvements in population health explain a trend towards earlier retirement. Based on an estimated model, some policy changes involving improved health at later ages and changing financial incentives and eligibility ages are simulated. All simulated policy changes have noticeable effects in at least some countries. It turns out that health is an important determinant of retirement.

