



Netspar Panel Papers

Pilar García-Gómez, Hans-Martin von
Gaudecker and Maarten Lindeboom

Health, Disability and Work: Patterns for the Working Age Population



The background of the page is white with a series of thin, black, curved lines that sweep across the page from the top left towards the bottom right, creating a sense of movement and depth.

Pilar García-Gómez, Hans-Martin von
Gaudecker and Maarten Lindeboom

Health, Disability and Work: Patterns for the Working Age Population

PANEL PAPER 17



Netspar

Network for Studies on Pensions, Aging and Retirement

Colophon

Panel Papers is a publication of Netspar
January 2010

Editorial Board

Henk Don (Chairman) – Erasmus University Rotterdam
Jan Marc Berk – Dutch Central bank (DNB)
Bernard ter Haar – Ministry of Finance
Jan Koeman – Ministry of Social Affairs and Employability
Peter Kooreman – Tilburg University
Niels Kortleve – PGGM
Albert Mentink – AEGON
Joos Nijtmans – Interpolis
Alwin Oerlemans – Cordares
Rick van der Ploeg – Oxford University
Hens Steehouwer – ORTEC
Marno Verbeek – Erasmus University Rotterdam

Design

Bladvulling, Tilburg

Printing

Printing Office Tilburg University

Editorial address

Netspar
Tilburg University
PO Box 90153
5000 LE Tilburg
Phone +31 13 466 2109
info@netspar.nl
www.netspar.nl

No reproduction of any part of this publication may take place without permission of the authors.

CONTENTS

<i>Preface</i>	7
<i>Abstract</i>	11
<i>1 Introduction</i>	12
<i>2 Health, Disability and Work</i>	15
2.1 <i>The relationship between health, disability and work</i>	15
2.2 <i>Trends in health and disability</i>	20
2.3 <i>Exploratory analyses based on Dutch data</i>	22
<i>3 Disability Insurance</i>	27
3.1 <i>US evidence</i>	27
3.2 <i>The Dutch Disability Insurance scheme in recent years</i>	30
3.2.1 <i>The system until 2005: The WAO</i>	30
3.2.2 <i>Trends in the WAO</i>	31
3.2.3 <i>The system since 2006: WIA</i>	36
3.3 <i>WAJONG: The Dutch Assistance Scheme for Young Disabled</i>	39
<i>4 Discussion, conclusions, and avenues for future research</i>	42
<i>References</i>	47
<i>Summary of discussion</i>	52

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 benefitted 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

Affiliations

Pilar García-Gómez: Erasmus University Rotterdam and Netspar

Hans-Martin von Gaudecker: VU University Amsterdam and Netspar

Maarten Lindeboom: VU University Amsterdam, IZA, and Netspar

Acknowledgements

This research was funded by Stichting Instituut GAK and Netspar. The authors would like to thank Amco Wiering for excellent research assistance and Philip de Jong, Rob Euwals, and Jan-Maarten van Sonsbeek for useful comments regarding the Dutch Disability Insurance system. An anonymous referee and seminar and conference participants at the Netherlands Bureau for Economic Policy Analysis (CPB) and at the Netspar Annual Conference "Rethinking Retirement" (particularly our discussants Daniel van Vuuren, Katherine Carman, and Wim Groot) provided many comments that greatly helped to improve upon the paper.

HEALTH, DISABILITY AND WORK: PATTERNS FOR THE WORKING AGE POPULATION

Abstract

The Netherlands has been very successful in raising the participation rate of older workers in the past decade, and recent policies are expected to lead to further increases. The scope for the success of these policies has in part been determined by participation rates of the middle aged, for whom poor health is arguably the most important reason for labor force exits. Understanding the relation between health, work and disability insurance programs is therefore of the utmost importance for policymakers. This paper summarizes the evidence on how population health translates into limited work ability, and into enrolment in disability insurance. After reviewing the recent Dutch experience, the paper provides some exploratory analyses of novel cohort-level data, closing with some remarks targeted at policymakers.

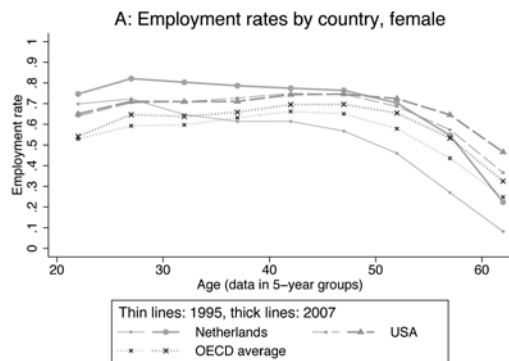
1 Introduction

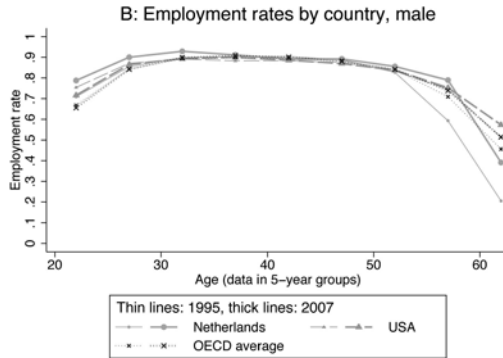
Most developed countries are currently encouraging later retirement in order to mitigate adverse effects of an ageing population. As demonstrated by Figure 1, the Netherlands has been very successful in raising the participation rate of older workers in the past decade. Various measures mainly targeting the abolishment of work disincentives have boosted employment rates of individuals up to their late fifties above the OECD average. Recent policies are expected to lead to further increases in the participation rates of older workers. The scope for their success is in part determined by participation rates of the middle aged. Figure 1 also shows that labor force participation rates continue to fall rapidly after age 45: in 2007, for example, they were 89% for men in their late forties and less than 60% for men in their late fifties.

In the European context of labor demand it is unlikely that individuals who left the labor force years earlier will be induced to return by policies focusing on incentives to work. Understanding the sources of the relatively early drop in employment rates of middle-aged and older workers is thus of crucial importance in order to repeat the success of earlier policies.

Poor health is arguably the most important reason for very premature labor force exits. Abundant evidence demonstrates a positive relationship between health and labor market status. But the relation is complicated by all kinds of factors typically encountered in applied work, which we briefly illustrate in Figure 2. These factors include reverse causality (work conditions impact health), simultaneous determination of health and

Figure 1: Employment rates by country and age in 1995 and 2007 (Source: OECD)

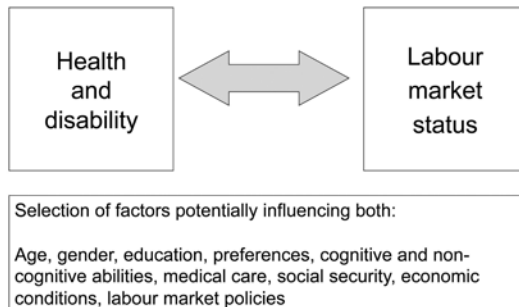




work outcomes (among other things, preferences and cognitive ability drive health investment and labor supply decisions), measurement error (there is no single good measure of health), and certain omitted variables that are difficult to observe (such as good measures of education). These obstacles lead to the somewhat paradoxical situation that despite a great number of studies, clear-cut policy recommendations are hard to formulate.

This paper thus summarizes the existing evidence from the developed world and provides some dedicated analyses for the Netherlands. Section 2.1 reviews the findings of the international literature on the relationship between health, limitations to engaging in activities of daily living, and employment. Most of the literature is descriptive, but some careful studies support common sense and demonstrate that part of the observed relationship between health and work is indeed due to poor

Figure 2: Relations between the key variables



health leading to lower labor force participation rates. While one may be led to think that the problem will be ameliorated because ever-increasing longevity implies similar decreases in morbidity, Section 2.2 demonstrates that these trends do not always go hand-in-hand. The contemporaneous situation in the US is the most prominent counterexample. The final part of Section 2 then assesses trends in health and work for the Netherlands. While overall trends in population health are positive, the analysis clearly shows that there is hardly any potential for raising employment rates among healthy (non-disabled) 50 year olds.

The most obvious link between health and labor market status is provided by disability insurance programs. This is particularly the case in the Netherlands, which had one of the most generous systems in the world for many years (Banks et al., 2009). It is important to distinguish between the concept of disability that limits work (which is the focus of Section 2) and enrolment in a disability insurance (DI) scheme. In an ideal world of perfect information, the two would be the same. What drives a wedge between the two are mainly difficulties in observing health status. Section 3.1 reviews the US evidence demonstrating that the distinction between the two concepts is important indeed. For example, DI applications and admissions show a strong comovement with the business cycle, highlighting the fact that it is often an alternative pathway into early retirement. Because of the prominence of the DI system in the Dutch context and recent major reform efforts, we devote the longest section (3.2) of the paper to the DI system in the Netherlands and a separate section to the scheme for the young disabled (Section 3.3). We describe the most important changes in the Dutch DI scheme over the last fifteen years and relate these to developments in the enrolment of prime-aged workers. We conclude that policy measures taken around the turn of the century might have been more effective than previously realized, but that it is too early for a final verdict on the most recent reforms. Section 4 discusses the relevance of our findings and those of the literature for policies that aim to increase labor market participation rates of older workers.

2 Health, Disability and Work

This section first reviews the international evidence on the relationship between health, disability (limited work ability) and work. After then examining the evidence on trends in health and disability, the section goes on to describe trends in health and disability in the Netherlands, and explores how labor market status in the Netherlands varies with health status.

2.1 The relationship between health, disability and work

A wealth of evidence shows that health and labor are positively related, and that ill health indeed seems to be negatively related with all the labor outcomes (i.e., wages, earnings, labor force participation, hours worked, retirement, job turnover and benefit packages) (see Currie and Madrian, 1999). Studies have traditionally focused on older workers and retirement transitions. Quite a number of studies (Bound et al., 1999; Au et al., 2005; Disney et al., 2006; Hagan et al., 2006; Rice et al., 2006; Zucchelli et al., 2007) focus on individuals older than 50 and show that decreases in health status have explanatory power for retirement decisions. Riphahn (1999) finds that health shocks increase the probability of unemployment by 84% and the probability of dropping out of the labor force by 200% for individuals aged 40 to 59 in Germany. Smith (2004) finds that for individuals older than 50 who suffer a health shock there is a 15% decrease in the probability of working; he states that although this effect diminishes over time, it remains substantially high, at nearly 4% five years after the shock.

Although it is clear that health plays a major role in retirement decisions, there is no consensus regarding its relative importance, as compared to financial incentives. The reasons for this dispute include difficulties in measuring health and the joint determination of health and work (Lindeboom, 2006). Nevertheless, some studies have analyzed the associations between health and financial incentives and different pathways into economic inactivity. Banks et al. (2007) find that financial incentives are important determinants of transitions into retirement for men aged 50 to 59 in the UK, while poor health plays a more important role in transitions into other types of inactivity. Similarly, Kerkhofs et al. (1999) show for the Netherlands in the early nineties that health is

dominant in explaining transitions into DI and UI, but that financial incentives are more important in transitions into early retirement. Considerably fewer studies describe the associations between health and labor market outcomes among middle-aged individuals. The existing studies, however, seem to agree that the relationship between health and employment is stronger than that between health and wages. For example, Luft (1975) finds that the average disabled man aged 18 to 64 suffers a 37% reduction in yearly earnings, which is the result of a reduction in both wages and participation. Decomposing this difference, Luft shows that the difference in wages is almost entirely explained by composition effects (i.e., differences in education or age between the well and sick populations). In contrast to this, the participation decision appears to be driven mainly by disability. Similar conclusions are reached by Mitchell and Burkhauser (1990), who analyze the effects of arthritis, one of the most common chronic diseases, and by Ettner et al. (1997), who explore the effects of several psychiatric disorders. The latter study finds that among psychiatric disorders, major depression and drug dependence show the strongest association with labor market participation. More recently, Pelkowski and Berger (2004) examine the association between temporary and permanent illness and labor market outcomes using retrospective information from the US Health and Retirement Survey. Their results show that while a temporary health problem is not significantly associated with labor market outcomes, a permanent health condition is associated with a reduction in earnings of around 50%. By far the largest portion of this reduction is driven by the likelihood that the individual works in the first place – and not by the wages or the hours worked. They also analyze whether the magnitude of the effects varies with the age of onset, and show that the adverse effects peak when the individuals are in the middle of their working lives (women aged 30 to 40 and men aged 40 to 49). For the UK, Berthoud (2008) finds employment rates of around 76% for those without a condition, whereas the participation for those with a health condition is only 29%.

Very few studies analyze the association between ill health and transitions into employment. Stewart (2001) examines Canadian data on the association between health limitations and the type and amount of activity that individuals can undertake at work. She finds that individuals with impaired health have a lower probability of leaving unemployment and thus experience longer unemployment spells. Böheim and

Taylor (2000) use British data to analyze transitions from unemployment to part-time work, self-employment and economic inactivity. Their results show that the existence of a health condition that limits the type or amount of work observed before an unemployment spell is associated with a doubled exit rate from unemployment into economic inactivity. García Gómez et al. (forthcoming) analyze the role of mental and physical health in exits out of and entries into employment. They find that while physical health is an important determinant of both transitions, mental health is mostly associated with transitions out of employment.

More recently, several authors have moved beyond association studies and have set out to uncover transmission mechanisms. In order to unravel the causal effect of health status on labor market outcomes, independent variation in health is needed. Two recent studies used accidents as unforeseen sudden changes in health to identify the causal effect of health shocks on labor market outcomes. Using Danish register information, Møller Danø (2005) analyzes the effects of having a road accident that requires hospitalization on annual employment rates up to six years after the accident occurs. Figure 3 shows how the probability of employment evolves from three years before the road accident to six years after. The employment rate of injured men is seen to decrease sharply around 10% after the accident – and it does not recover to the level of the comparable group after six years. Somewhat surprisingly, the employment probability of injured women does not decrease. Møller

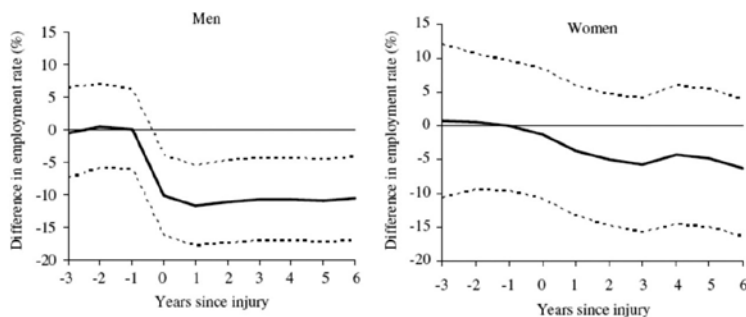


Figure 3: Effect of a road accident requiring hospitalization on employment in Denmark (Source: Møller Danø (2005))

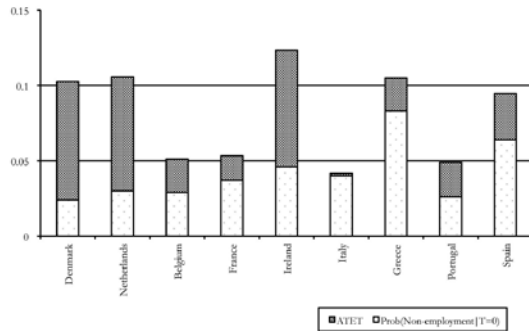
Danø (2005) argues that the difference may be explained by the higher percentage of women having jobs in the public sector.

Lindeboom et al. (2007) confirm the existence of long-run effects of an accident on labor outcomes using British data. While they show that having an accident does not have a direct effect on employment if the individual's health status remains unchanged, their results do indicate that accidents increase the probability of the onset of a disability by 172% in the short run, and that some effects can also be observed in the long run. In addition, they find that the onset of a disability at age 25 reduces the employment rate at age 40 by around 14 percentage points. This is about two-thirds of the gap between the employment rate of disabled and non-disabled workers. The remaining one-third of the employment gap is due to differences in background characteristics. They also find that the effect of a disability on employment is larger for males and for low-educated workers. For these groups, virtually the entire employment gap between disabled and non-disabled workers is due to the effect of the disability on employment.

Similar results are reported by Lechner and Vazquez-Alvarez (2004) for Germany using self-reported information on the assessed degree of disability. They show that becoming disabled (an assessed disability between 30% and 89%) reduces the probability of being in employment by around 9%, and reduces their earnings by 16%, which translates into a difference in annual disposable income amounting to somewhere between 1% and 5%.

García Gómez and López Nicolás (2006) examine how a health shock (defined in terms of the deterioration in self-assessed health) affects the probability of continuing working and the transition to different states for the Spanish population. They show that workers in good health who suffer a health shock are around 5% less likely to remain in employment and 3.5% more likely to become inactive. They also find higher effects for men than for women. García Gómez (2008) extends the analysis to other European countries (Belgium, Denmark, Ireland, Italy, Greece, Netherlands, Portugal and Spain), and shows that a health shock decreases the probability of employment in all countries but France, Italy and Greece. The largest effects are found in Ireland, Denmark and the Netherlands. The probability of becoming inactive is higher after a health shock, and in Denmark and the Netherlands individuals also transition into unemployment. Figure 4 shows the probability of non-employment

Figure 4: Effect of a health shock on employment across European countries (Source: García Gómez (2008))



of these individuals had they not suffered a health shock (lower part of the bars) and their actual probability of non-employment (entire bars) in each of the countries. It can be seen that the probability of non-employment for these individuals in Denmark and the Netherlands had more than tripled. García Gómez argues that some of the differences across countries can be attributed to differences in social security arrangements.

The literature thus confirms the intuition that health deterioration worsens the labor outcomes of young, middle-aged, and old workers, and that many effects do not vanish over time. The evidence shows that workers after a health shock have an increased transition probability from employment to economic inactivity, from where the outflow back to employment is close to zero (OECD, 2003). Cross-national comparisons suggest that the institutional setting (such as the specifics of the DI and UI program) is important in this regard. It would be of interest to follow individuals who leave the workforce after a health shock for a longer time. Such an investigation would reveal to which state these individuals transition once their health status improves and/or the benefits expire, and would show how specifics of the DI and UI programs in the countries influence these re-employment rates. The literature also points out gender and education differences, suggesting that job types and workplace characteristics may also play a crucial role. Further research is needed to provide insights into the policy targeting groups in order to improve the work opportunities of the less-able individuals. Since this is beyond the scope of this paper, we now explore Dutch data in order to gauge the scope of such policies.

2.2 Trends in health and disability

There is a large (epidemiological) literature on trends in health and disability of the 65+ age group. For middle-aged workers the literature is less abundant. Kaye et al. (1996) examine the trends in disability in the US over the period 1970–1994. They define disability as “limitations in activity due to chronic health conditions”. They find that the proportion of the US population with a disability has risen during these years. This was primarily due to an increase in the share of elderly (65+) people in the population. The disability rate of the old is about twice the rate of people in the older working ages (45–65) and four times the rate of the younger working ages (18–44). The trends in the disabilities for the different age categories were roughly constant during the period considered.

Crimmins et al. (1999) examine whether health and ability to work at older ages (50–69) improved over the period 1983–1992. They note that besides health also the job context, work environment and policies affecting work and disabilities (such as the Americans with Disabilities Act, ADA) are important for the prevalence of work disability. They find that self-reported ability to work increased among persons older than 60 years. This trend is most significant for workers who are out of the labor force, suggesting that retiring earlier for non-health reasons became more prevalent in that period. Indeed, they find that the prevalence of cardiovascular diseases among the 60+ group declined for the retired, but not for those who are still at work. They attribute part of this trend to increased educational levels. However, educational increases can explain the lower prevalence rates, but not necessarily the lower level of reported disability from these diseases. Perhaps changes in the structure and demand of jobs as well as implementation of policies like the ADA in 1990 may have been important. With regard to people in their fifties, they find no improvement in health and the ability to work.

Bhattacharya et al. (2008) decompose trends in disability among working-age populations in the US between 1984 and 1996. They aim to separate two factors driving observed trends: The prevalence of chronic diseases and the fraction of disabled individuals among those with a chronic condition. They find that disability increased among 30 and 45 year olds and decreased for 60 year olds. The increase for the younger age group was due partly to a higher prevalence of chronic disease (40%) and partly to changes in disability prevalence among those with a

condition (60%). Among the 60 year olds, disability rates fell even though the prevalence of chronic conditions increased. This means that disability prevalence among those with a chronic condition has fallen substantially for the 60 year olds. They further show that the rising prevalence of obesity has been an important source of the rise in disability prevalence.

Lakdawalla et al. (2004) use 1984–2000 NHIS data to track disability trends. They find that reported disability has risen for younger Americans, especially those aged 30–49. This cannot be explained by changes in the composition of the population as disability was rising for whites and non-whites, for those inside and outside the labor market and for all education groups. They suggest some possible explanations for rising disability levels: obesity, technological advances in medicine and changing DI laws. Obesity seems to be the most associated with the trends observed in the data.

van de Kamp et al. (2008) examine self-perceived health in 1992 and in 2002 for men and women aged 55–64. They examine the extent to which a possible shift can be attributed to demographic factors, lifestyle factors and objective health. They find that the younger cohort (born 1938–1947) more frequently rates their health as excellent or poor than does the older cohort (1928–1937). For other measures, the younger cohort fares clearly worse. There is a higher prevalence of chronic illnesses, functional limitations and depressive symptoms. Although we present somewhat different figures below in Section 2.3, our results indicate that also for the Netherlands, increases in life expectancy do not necessarily imply improvements in the health conditions of the surviving population. It is interesting to note that the younger cohort was either born or was very young during the Second World War. Other studies based on the Dutch starvation winter (in Dutch, *hongerwinter*) under German Occupation at the end of World War II showed significant long-run effects on adult morbidity (Ravelli et al., 1998; Roseboom et al., 2001). Kerkhofs and Lindeboom (1997) examine health profiles of 43–63 year olds in 1993. They find that health as measured by the Hopkins Symptoms Checklist was worse for cohorts born in the Second World War.

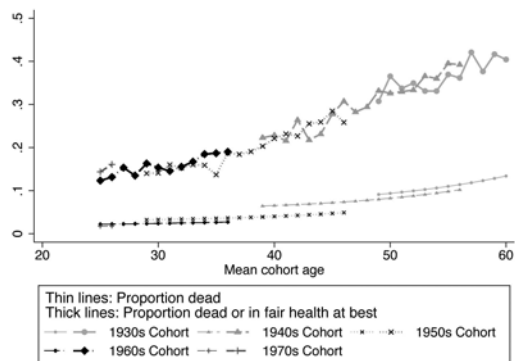
Visser et al. (2005) also examine the lifestyle of men and women aged 55–64, between 1992 and 2002. They find that obesity rates of 55–64-year-old males and females increased between 1992 and 2002 (9.5% versus 18.4% for males and 20.5% versus 27.5% for females). Alcohol consumption rates also increased (11.7% to 15.7% for males and

11.1% to 19.5% for females), and activity levels diminished by about 20% between 1992 and 2002. This suggests that at least part of the above-mentioned differences in health may be driven by differences in lifestyle. The literature summarized in this section shows that increases in longevity do not necessarily translate into decreases in morbidity. Studies from the United States show that, in fact, the prevalence of both chronic conditions and disabilities are increasing among the cohorts whose members are up to 50 years of age now. The Dutch evidence is scarce and less clear-cut. Before proceeding to some analyses on our own, we look at the literature linking health and disability to labor market outcomes.

2.3 Exploratory analyses based on Dutch data

Somewhat similar to van Kippersluis et al. (2009), we describe trends in health and disability in the Netherlands, using a health and general-purpose household survey made available by Statistics Netherlands. (This is described in detail in the Appendix.) Having about 20 years of data available, we describe the health experiences of cohorts defined by gender and birth decade. In doing so, it is important to take mortality into account. For example, Lakdawalla et al. (2004) note that an explanation of rising disability rates among younger cohorts might be found in advances in medical technologies that allow frail individuals to live longer than without such progress. We therefore include cumulative mortality rates directly in our graphs, using data from the Human Mortality Database (HMD, 2009).

Figure 5: Fraction deceased or in bad health by cohort and age (Source: Gezondheids-enquête / POLS, own calculations. Also see the Appendix)



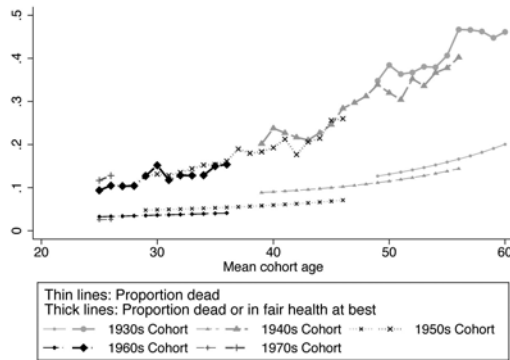
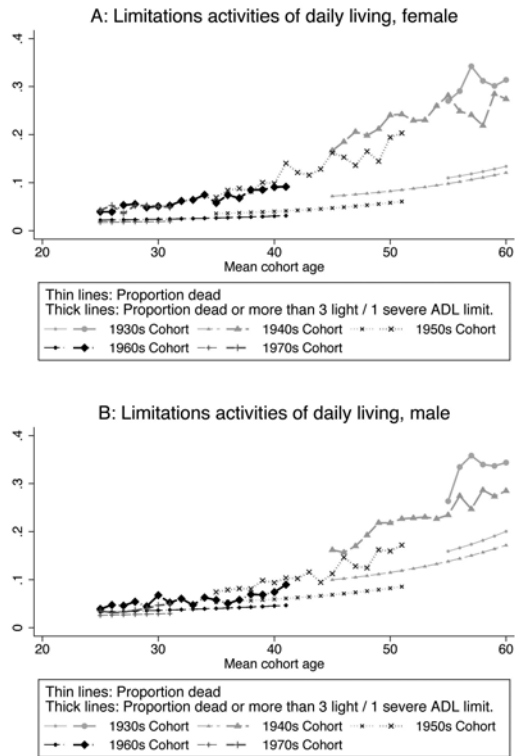


Figure 5 depicts a dichotomized version of self-assessed health (the response to the self-assessed health question is fair, variable or poor) for different age groups and cohorts. The thin lines present the cumulative fraction of deceased individuals. The secular improvements in mortality are immediately apparent. The most remarkable improvement can be seen between the cohorts born before and after 1950. Those born until immediately after the Second World War have much higher mortality rates at any given age. The fraction of those deceased at age 50 can be as high as 9% for females and 13% for males. At age 60, 20% of the entire cohort of males is deceased. Furthermore, the fraction of individuals in the bad health category increases from around 10% at age 25 to more than 40% at age 60 (males). No clear differences in self-reported health can be found for the different cohorts.

Figure 6 reports the fraction of people with a disability. A disability is defined as an impairment that limits the activities of daily living (ADL). The variable we use is an indicator that equals one if an individual has more than three light limitations or more than one severe limitation (for details, see the Appendix). While this variable does not directly measure work disability, it is of immediate importance and does not suffer from the fact that the answers to direct work disability questions often depend on the respondent's profession. The figures indicate that disabilities show up at relatively young ages and that at around the age of 50 already more than 20% of the population has limiting conditions. The US pattern of rising disability rates among younger cohorts does not appear to be true for the Netherlands. If anything, we find the opposite pattern – particularly among the older cohorts in our sample. This is different from

Figure 6: Fraction deceased or with a limitation in ADLs by cohort and age (Source: Gezondheids-enquête / POLS, own calculations. Also see the Appendix)



the results in van de Kamp et al. (2008), although the cohort definitions do not align perfectly. Another explanation might be the different samples used. Not accounting for mortality would not change the pattern found in our data.

Figures 7 and 8 show individuals' labor market status according to their self-reported health and to whether or not they suffer from some kind of limiting health condition, respectively (both health variables as defined before). Those with worse self-reported health and those with limiting conditions have much lower employment rates. More specifically, of the 50-year-old males who report being in variable health, at best only about 40% are at work. For 40-year-old men, the employment rate is around 60%. For females these numbers are lower. The most important feature of the graph is that employment rates are very close to one for

men in good health / without a disability well into their fifties. In other words, the potential for increasing the participation rates in these groups is very low. Bad health remains the chief culprit for non-participation, and policies can focus on these groups. With regard to females, one may also speculate that the dramatic rises in employment rates cannot continue much longer without improving the employment prospects of those with a health problem. Having established these patterns for the Dutch context, we now turn to the labor market institution that is most frequently cited as the prime reason for labor outflow of workers with health problems: the disability insurance program.

Figure 7: Fraction working by self-reported health status, cohort and age (Source: Gezondheids-enquête / POLS, own calculations. Also see the Appendix)

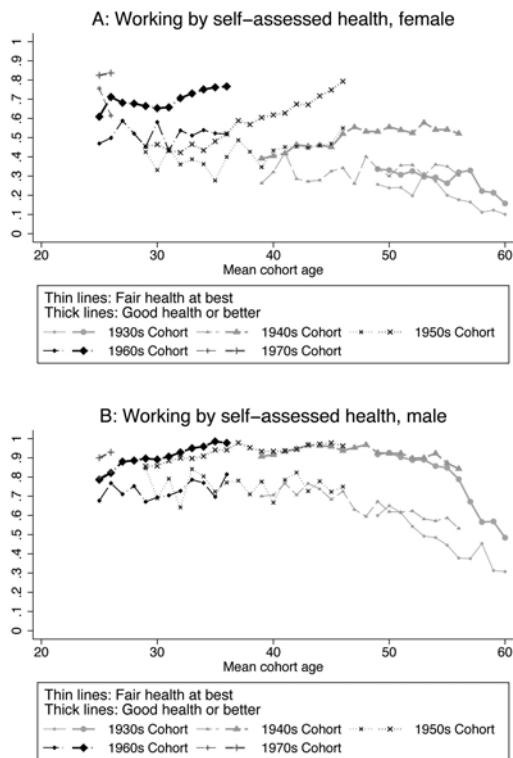
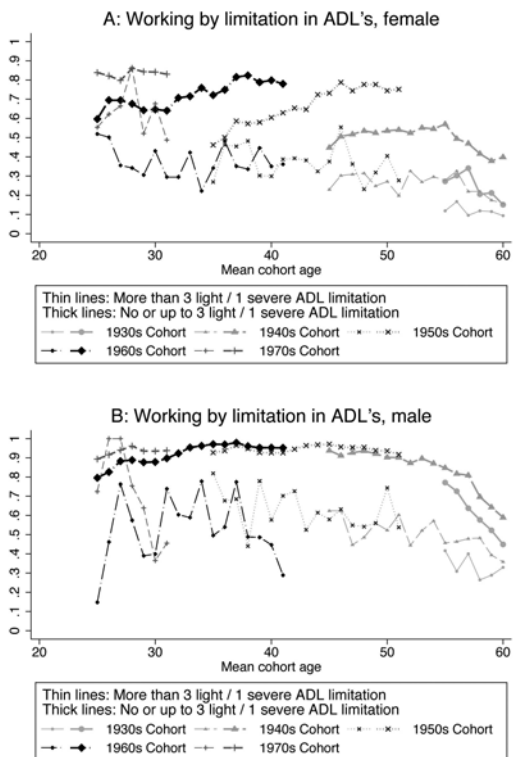


Figure 8: Fraction working by limitation in ADLs, cohort and age
 by limitation in ADLs, cohort and age
 (Source: Gezondheids-enquête / POLS, own calculations. Also see the Appendix)



3 Disability Insurance

This section focuses on the enrolment in DI schemes as the most important exit route from employment for individuals with health limitations. We first review the US evidence, demonstrating that other factors apart from health are important in explaining DI enrolment. The longest section is then devoted to the Dutch DI scheme and its reforms over the last 15 years, with a separate section describing the scheme for the young disabled. The section ends with some descriptive evidence on the effects of these reforms.

3.1 US evidence

Most of the DI literature comes from the US. About 80% of the working-age population in the US is insured against the risk of being unable to work because of physical or mental disability by the Social Security Disability Insurance program (SSDI) program. In 1985, about 2.2 percent of the working-age population received SSDI benefits. Since then, this number has almost doubled. The employment rate of the working-age population with a limiting health condition fell from 80% in 1970 to 60% in the beginning of the 1990s, whereas the employment rates of their counterparts without a limiting condition remained constant (Bound and Waidmann, 2002; Bound and Burkhauser, 1999).

Both Bound and Burkhauser (1999) and Autor and Duggan (2006) look at the factors that are responsible for the growth in SSDI rates. Autor and Duggan (2006) consider four possible factors:

1. changes in the DI screening process;
2. rising financial incentives to apply for DI;
3. changes in labor force participation that increased the size of the insured population;
4. changes in health and the age structure of the population.

The liberalization of the screening process in 1984 followed restrictions in the eligibility criteria of the DI application process. Prior to 1984, eligibility depended on an applicant's objectively verifiable medical condition that had to exceed a minimum threshold. The 1984 liberalization enlarged the medical criteria with an applicant's ability to function in the setting of a work place. Furthermore, the legislative changes required that evidence of the applicant's own healthcare provider should be taken

into account, provided that this was not at odds with other medical evidence (Autor and Duggan, 2006). This led to greater scope for appeals. In the years prior to the reform, about 84% of the initial awards were strictly based on medical criteria. By the year 2000, this number had fallen to merely 40%. Moreover, a shift in the importance of diagnosis groups was observed in the past decades: the number of new awardees with musculoskeletal disorders (most prominently: low-back pain and arthritis) and mental disorders grew by 323 percent between 1983 and 2003, whereas the corresponding increase in cancers and heart diseases was only 30% (Autor and Duggan, 2006). Autor and Duggan (2003) also show that DI replacement rates have increased considerably in the past decades, particularly for low-wage earners. The DI benefit depends on past earnings and on a wage index that is based on the mean wage growth in the entire economy. Since low-wage workers faced lower-than-average wage growth in this period, their replacement rates increased considerably. The real value of the medical care program for disabled workers has increased substantially. The survey of Bound and Burkhauser (1999) contains a summary of the literature on the relationship between SSDI benefit generosity and SSDI application rates. They conclude that increases in SSDI benefit levels have led to strong increases in SSDI applications. Following up on the above, Autor and Duggan (2003) find that DI application and recipiency rates of low-skilled workers became two to three times as responsive to aggregate demand shocks. This finding is line with Stapleton et al. (1998), who show that recessions contributed in an important way to the growth in SSDI. Indeed, structural changes in the labor market may have affected the employment opportunities for low-skilled workers – and this may also have led to an increase in the SSDI rolls (Black et al., 2002).

Duggan and Imberman (2006) examine the role of population characteristics. They find that the ageing of the population can explain only a small fraction of the increase in the DI rates. This is largely because the baby-boom generation has yet to reach the ages in which inflow into DI is most prevalent. Furthermore, the importance of ageing in itself is undermined by the strong growth in DI rates for all age categories. Duggan and Imberman (2006) find that the growth in DI rates was much higher for women than for men. In the period 1984–2004, a 41% increase in male DI receipts compares to an increase of 151% among females. This is not due to the secular increases in female labor supply: the increased

number of women in the labor force can explain only about a sixth of the total increase in DI receipt among women.

For the population under scrutiny, underlying health is not a likely factor to explain the increase in the DI program. Duggan and Imberman (2006) consider trends in self-reported health and find that for adults aged 50–64, health has increased substantially on average. Bound and Burkhauser (1999) find that the proportion of the working-age population reporting a health limitation is in the order of 9–11%, and that this has been constant in the three decades prior to their article. There are two things to note, however. First, average health is a poor statistic if only the lower extreme matters for DI inflows. Second, in light of the findings of Lakdawalla et al. (2004) and Bhattacharya et al. (2008), it is not unlikely that this may change for future cohorts.

Like any other insurance, DI is subject to moral hazard. These programs are therefore likely to affect labor supply decisions of older and younger workers and are likely to interact with other programs of the Social Security and Welfare system. Schmidt and Sevak (2004) examine whether reforms to the AFDC program (Aid to Families with Dependent Children) affected the caseloads of the Supplementary Security Income (SSI) program. The SSI is a means-tested program that provides a basic minimum income for those who are unable to work due to disability. They find that females in states that have aggressively pursued welfare reform were about 22% more likely to receive SSI benefits. Kreider and Riphahn (2000) argue that the decision to apply for SSDI benefits also depends on employment opportunities and on unemployment insurance benefit levels. Riphahn (1999) finds evidence for substitution between disability programs, unemployment programs and early retirement programs. Kerkhofs et al. (1999) also find this for the Netherlands. These studies confine themselves to older workers. More recently, Koning and van Vuuren (2007) examine the degree of substitution between DI and UI schemes in the Netherlands. Examining the period 1993–2002, they find that about 3% of all dismissals took place via DI. This implies that about a quarter of all DI enrolments observed in their sample represent hidden unemployment. They found no evidence for reverse substitution of disabled persons ending up in UI. This may have changed recently in light of the changes in the Dutch DI program since 2003. We describe these changes and some consequences for DI inflow below.

3.2 The Dutch Disability Insurance scheme in recent years

3.2.1 The system until 2005: The WAO

Much of the discussion in this section follows the papers by de Jong (2008) and de Jong et al. (forthcoming). Up to 2006, the WAO ('Wet arbeidsongeschiktheid') law was in effect, and covered all employees. Any illness or injury entitled an employee to enter DI after a mandatory waiting period. Since 1996, the Dutch Civil Code stipulated that the employer had to pay 70% of the gross wage because of a sickness or an illness, irrespective of its cause. However, collective bargaining agreements ensured that sick workers received 90% to 100% of their net salary. As of 2004, the mandatory waiting period was extended from one year to two years. The two-year waiting period applied to every employer – irrespective of firm size. The majority of the firms therefore chose to insure the sick-pay liability with private insurance companies. The employers furthermore contracted with an occupational health service to prevent and manage sickness absenteeism.

As of April 2002, the gatekeeper protocol became effective. This protocol legally specified the responsibilities of a sick employee, his/her employer and the company doctor. The protocol mandated a structured approach to early intervention in cases of sickness. After a maximum of six weeks of absence, the company doctor had to make a preliminary assessment of medical cause and functional limitations, and then give a prognosis regarding work resumption. On the basis of this information, the employer and worker together would draft a vocational rehabilitation plan in which they specified an aim (resumption of current/other job under current / accommodated conditions) and the steps needed to reach that aim. They appointed a case manager, and fixed dates at which the plan should be evaluated, and modified if necessary. The rehabilitation plan had to be ready in the eighth week of sickness. It was binding for both parties, and any one party was allowed to summon the other in the case of suspected negligence. After 13 weeks of employee absence, the employer was required to report the sick employee to the National Social Insurance Institute (NSII, Uitvoering Werknemersverzekeringen), which was only a administrative obligation. From this moment on the worker was added to the administrative database of the NSII.

After 87 weeks of employee sickness, the NSII sent a Disability Insurance application form to the sick employee. Disability Insurance

claims had to have been delivered before the 92nd week of sickness. Claims were considered admissible only if they were accompanied by a rehabilitation report, containing the original rehabilitation plan, and an assessment as to why the plan had not (yet) resulted in work resumption. If the report was delayed, incomplete, or proved that the reintegration efforts were insufficient, then the claim would not be processed. Depending on the seriousness of the negligence, the caseworker could return the reintegration report and give the employer the opportunity to complete it, or the caseworker could start a sanction procedure against the employer. A sanction usually implied that the employer was obliged to continue providing sick pay for some additional months.

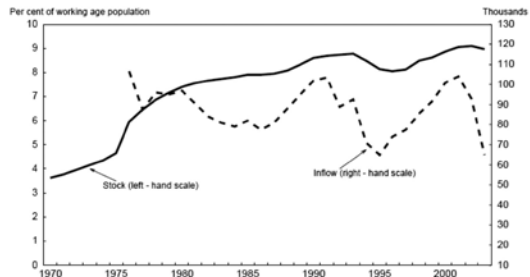
The degree of disability in the WAO was assessed by considering a worker's residual earning capacity, defined by potential earnings with his or her functional limitations as a fraction of pre-disability earnings. The degree of disability is the complement of the residual earning capacity, and was measured in seven classes, ranging from a 15% to a 100% loss. When an employee was considered fully disabled by the NSII, 70% of pre-disability earnings were replaced. If assessed as partially (15% – 80%) disabled, the replacement rate was correspondingly lower. The size of DI benefits and their unlimited duration (until pension age 65) made DI a more attractive option than UI.¹ The WAO was financed by employer premiums. In 1998, experience rating ("the polluter pays") was introduced. For every worker awarded a DI benefit, his or her firm's contribution rate increased. Conversely, the rate was lowered if the firm hired a DI recipient.

3.2.2 Trends in the WAO

Figure 9 shows the number of individuals collecting DI benefits as a percentage of the working-age population and the number of inflows

1 The DI benefit period is cut in two chronologically linked parts. The first is a short-term wage-related benefit replacing 70% of before-tax earnings, when an employee is assessed as fully disabled. The duration of this wage-related benefit depends on age at the onset of disability. It varies from zero for those under age 33 to six years for those whose disability started at age 58 or beyond. The second part is a so-called follow-up benefit with a lower income base. This earnings base is the minimum wage plus a supplement depending on age at onset according to the formula: $0.02 \times [\text{age at onset} - 15] \times [\text{wage} - \text{minimum wage}]$. Most collective bargaining agreements covered the gap between the lower benefits in the follow-up period and the wage-related benefits in the initial period of disability.

Figure 9: Stock and inflow into the WAO
(Source: de Jong et al. (forthcoming))

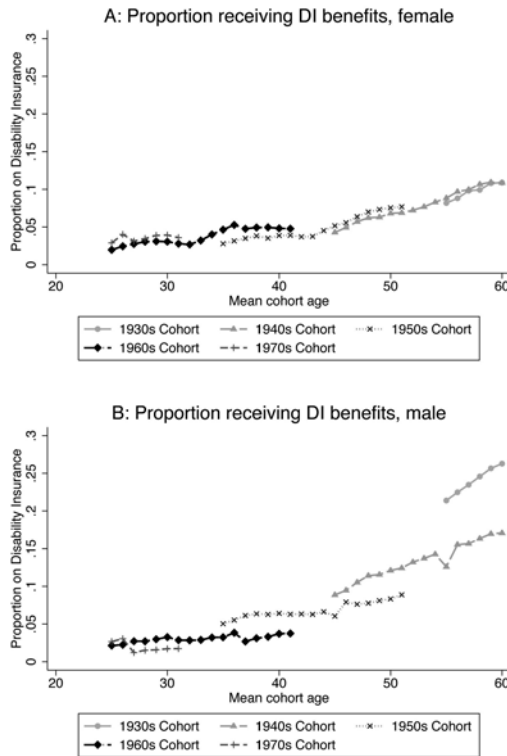


into DI. The figure shows a sharp increase in the percentage of individuals collecting DI benefits in the seventies and eighties, with the number of beneficiaries increasing from 475,000 in 1976 to 921,000 in 1993. During the nineties, the disability definition was narrowed and benefit generosity reduced. This stemmed the inflow into DI. Furthermore, between 1994 and 1996 part of the stock of beneficiaries was reexamined using the new, more stringent, eligibility rules. As a result, the number of benefit terminations grew sharply and, on balance, led to a 7% drop in the number of beneficiaries (to 855,000 in 1996). From then on, the numbers started growing again (reaching 979,000 in November 2002), approaching the politically contentious level of one million disabled.

DI inflow rates decreased strongly in the period 2001–2006. Research indicates that about half of the reduction in the inflow rate was due to the introduction of the gatekeeper protocol (de Jong et al., 2005). An important element of this protocol was the introduction of stricter screening of DI applications. de Jong et al. (forthcoming) find that the stricter screening of the DI application files reduced the number of disability insurance applications. They find evidence for direct effects of stricter screening on work resumption during the period of sickness absence and for self-screening by potential disability insurance applicants. Furthermore, stricter screening does not appear to have resulted in spillover effects on the inflow into unemployment insurance. This result is in line with findings for the US (Parsons, 1991). Koning (2004) argues that the introduction of experience rating of the DI premiums may also have contributed to the sharp decline.

The numbers above include partial WAO beneficiaries. Two-thirds of partial-benefit awardees worked. For them, and for their employers, the benefit acted as a wage subsidy. Data of the NSII suggest that partial

Figure 10: Fraction receiving DI benefits by cohort and age
(Source: Statistics Netherlands Microdata (IPO), own calculations)

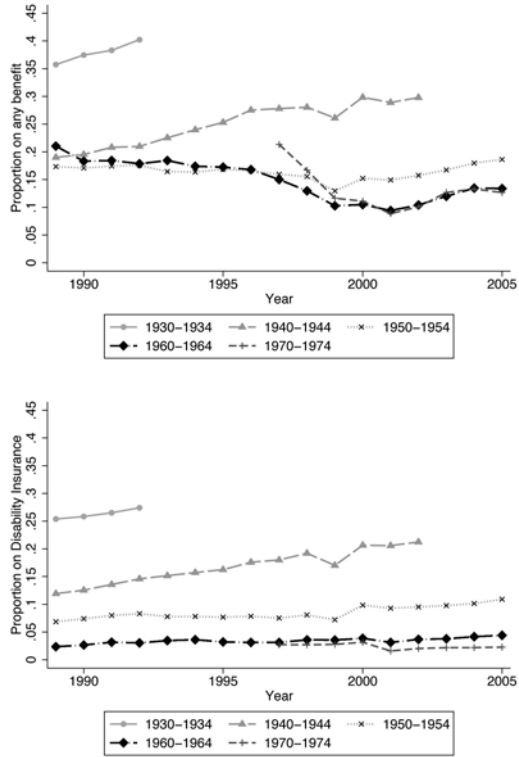


beneficiaries differed from full beneficiaries in many respects: They were older, better schooled, more often male, married and main breadwinner, had a longer tenure with their current employer and worked in large, financially healthy firms. In short, Dutch partial beneficiaries were socially and economically better off. It is also suggested that partial benefits were often used to offer older employees easier work conditions, and that they acted as a partial early retirement scheme.

Figure 10 shows the proportion of cohorts on disability rolls.² First consider the picture for males (Panel B). As expected, the proportion of

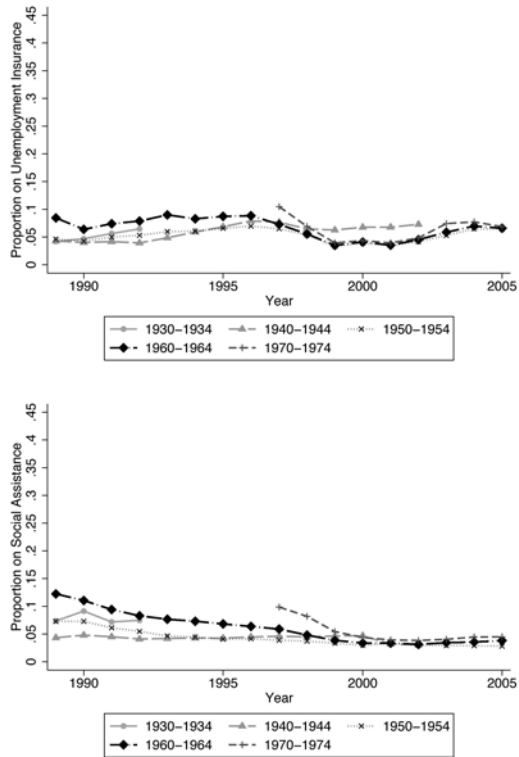
2 The proportions are derived from the 1989–2005 IPO (Inkomens Panelonderzoek) data, which are based on tax registers. Comparison at the micro level with the 1998–2005 SSB_A0 (derived from the DI administrative records) reveals that these are likely to be (slight) underestimations.

Figure 11: Fraction of men receiving Social Security Benefits by cohort and year
 (Source: Statistics Netherlands Microdata (IPO), own calculations)



beneficiaries increases with age. The slope is particularly pronounced for the 1930s cohort, whose late working life fell into a recession, suggesting DI as an exit route from the labor market (see also Black et al. 2002). Very large cohort effects are immediately apparent, with older cohorts having significantly higher rates of representation on the DI rolls. This is likely to reflect both the institutional changes that we have just described and the work conditions that shifted away from physically strenuous work for a great deal of the working population. A sizable fraction of relatively young individuals were already on DI benefits – although it is reassuring to note that this fraction decreases for younger cohorts.³ Unfortunately,

3 It also contains persons who became disabled before reaching their working ages. These are covered by a special program that we describe in Section 3.3.



the pre-2000 IPO data do not allow us to discriminate between various DI programs.

Except for the age gradient, the picture for women (Panel A) is completely different and reflects the large increases in female labor force participation among younger cohorts (see Figure 1). Conditional on age, younger cohorts always have higher proportions of beneficiaries than do older cohorts. For those born in 1960 and later, we already observe higher beneficiary rates for women than for men – which is not much of a surprise, given the substantial female labor participation rates and the gender differences in health and disability observed above and elsewhere (Case and Paxson, 2005).

Figure 11 gives us another look at the effect of business cycles on alternative insurance mechanisms and exit rates from the labor market.

Because of the large secular changes for females, we limit ourselves to men. We use a five-year definition of cohorts and show only every other cohort for legibility reasons. Panel A depicts the fraction of beneficiaries receiving benefits from disability insurance, unemployment insurance, or general social assistance (in Dutch, *bijstand*). For the younger cohorts, the number of benefit recipients was highest in the early and mid-nineties (which was a recession period) and declines subsequently. For older cohorts, it rises almost unambiguously with age. What is interesting now is the breakdown on the three types of benefits that can be seen from Panels B–D. For the 1930–1934 and the 1940–1944 cohorts, the bulk of both the stock and the increase in benefits is comprised of disability insurance. The recipients appear to have left the labor market for good, even if economic conditions had improved. The fraction of unemployment insurance recipients of the 1940–1944 cohort, however, experienced at least a small drop in the late 1990s, without a similar increase in social assistance benefits. For younger cohorts, most earnings insurance went through unemployment benefits and social assistance, which strongly moves with the business cycle. A tentative conclusion from the graphs that still awaits a formal analysis (although the job-search literature and the much lower incentives for DI recipients compared to UI recipients are suggestive) might thus be that DI has had a much more permanent effect on labor force participation than UI has had.⁴

3.2.3 The system since 2006: WIA

The WIA regime started in 2006 and has two different types of benefits: the IVA benefit for full and permanent disability and the WGA benefit for partial or temporary disability. The distinction depends importantly on the severity and persistence of the disability. The degree of disability is determined by a disabled worker's (residual) earnings capacity. This earnings capacity is derived by considering the earnings from any job commensurate with one's residual earnings capacity, relative to the current earnings. The degree of disability is then defined as the complement. A claimant is awarded an IVA benefit if the capacity loss is 80% or more, and if, in addition, there is no potential for any degree of recovery. An IVA benefit is 75% of previous gross earnings. A worker is

4 The analyses for the older cohorts have to be taken with a grain of salt since we do not see early retirement benefits in these graphs.

awarded a WGA benefit if the capacity loss is between 35% and 80% or is more than 80%, but with prospect of recovery. The WGA benefit is cut in two chronologically linked parts: a short-term wage-related benefit and a follow-up benefit. The wage-related benefit replaces 70% of the difference between the pre-disability wage and the new wage if the worker remains at work, or 70% of the pre-disability wage if the worker does not work. The level of the follow-up wage is determined by the extent to which a disabled worker uses his/her residual earnings capacity. The WGA benefit does not change if the full work capacity is used, and it is lower when only part of the residual work capacity is used. This underlines the emphasis on work in the current WIA program.

How does the introduction of the new DI program affect application and employment? The new DI program has now been underway for a few years and already some trends are visible (source information: the NSII). The preliminary results show a dramatic fall in the number of applications. The number of WIA assessments in 2006–2008 was in the order of 35,000 cases per year, which is well below the approximately 100,000 cases that were assessed in the old WAO system in the years 2000–2002. Of the some 35,000 WIA applications, about 55% were awarded a benefit; the rest (45%) of the applications were denied (less than 35% loss in earnings capacity). Of those who were awarded, about 20% received an IVA benefit (full and permanent disability) and about 80% obtained a WGA benefit (partial and/or temporary disability). About 60% of the latter group, in turn, consists of workers who are fully disabled, but for whom there was still some prospect for work in the future. These cases include severe diagnostic categories such as cancer, stroke and neurological diseases. It is therefore not unlikely that a substantial fraction of these cases will be awarded an IVA.

Although the employment effects are difficult to assess directly, they can be substantial, as it appears that the substantive drop in applications has not translated into higher unemployment rates. Some facts that may influence the employment effects of the WIA are worth mentioning. First, note that at this point we can only assess the effects of the program in the first few years. It is unclear how much of the decline in current applications will eventually lead to more applications in the future and how much of these applications will concern permanent and complete disabilities. Also, the observation has been made in past decades and in many countries that changes in economic conditions have strongly

influenced the DI application rate and growth of the DI program. The next few years will be the ultimate test for the new system, when the effects of the current crises are expected to translate themselves into lower employment rates. Second, of those who have been awarded a partial WGA benefit, only about 60% are working. This is slightly higher than the employment rate of workers in the WAO (55%), but it means that among the partially disabled the employment rates are relatively low. Third, around 45% of the WIA applications are denied, but recent research (Regioplan, 2006) shows that about 60% of these denials subsequently applied for a UI benefit. The UI application rate is higher for smaller firms and differs per sector. Those who are denied benefits do have health problems, and in the longer run one could expect these to show up in new WIA, UI or Welfare applications. It should be noted however, that more updated information from Slotboom and van Horssen (2009) indicates that the employment rate among the denials increased in the last year.

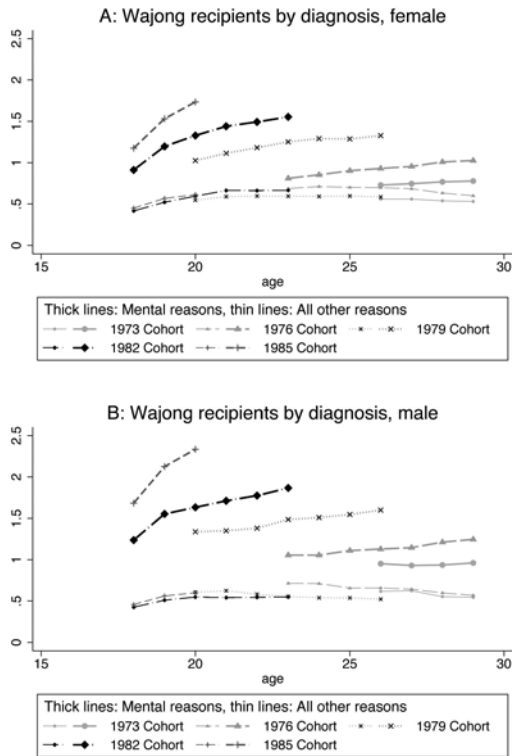
Two groups deserve special mention in the current context of Dutch Disability Insurance policy: the so-called “vangnetters” (safety net) group and the WAJONG. The latter group consists of individuals who became disabled before age 18; these will be discussed in a separate subsection below.

The “vangnetters” are workers who at the time of the WIA application do not have an employer. This includes people on temporary contracts who lost their job in the preceding two years (the sick and unemployed), workers from employment agencies, but also disabled at work with a so-called no-risk label.⁵ This group is about 15% of the labor force and yet constitutes 40% of the total number of WIA applications. Interestingly, about 50% of the WIA applications of “vangnetters” are denied (Uitvoering Werknemersverzekeringen, 2008b).⁶ This implies a WIA application risk that is four times higher than that of their counterparts with an employer. de Jong et al. (2008) find that “vangnetters” are more often single, have lower education, are more often non-Dutch and have

5 These are workers with an employer for whom the sick pay is considered an undue burden or who would face difficulties when (re-)entering the labor market because their disabilities induce a financial risk to their employers.

6 Considering the fact that opportunity costs of applying are low for the unemployed, this does not seem very surprising.

Figure 12: Fraction receiving WAJONG benefits by diagnosis, cohort and age
(Source: Statistics Netherlands Microdata (SSB_A0), own calculations)



much lower incomes prior to the WIA application. In short: those with a poor socio-economic position.

3.3 WAJONG: The Dutch Assistance Scheme for Young Disabled

Because of the work requirements imposed by the DI system, individuals who became disabled in their childhood or youth and never had a chance to work cannot access this system. A special program, known by the acronym WAJONG (Wet arbeidsongeschiktheidsvoorziening jonggehandicapten), was introduced in 1976. The scheme is financed from general tax revenue and currently pays a benefit of 75% of the minimum wage in case of a work impairment that is greater than 80% (lower levels of work impairment have no relevance in practice). A successful application requires proof that the disability was present on

the individual's 17th birthday, or before his or her 30th birthday if he or she was involved in an educational program at the time of onset. As the DI system, the program is administered by the NSII.

Recently, large increases in program participation have been observed. The number of beneficiaries, which surpassed 150,000 in 2006, is projected to grow to 400,000 and beyond (van Sonsbeek and Gradus, 2006). Consequently, the future of the WAJONG has been hotly debated (Besseling et al., 2007; Suijker, 2007; Uitvoering Werknemersverzekeringen, 2007, 2008a; Tweede Kamer der Staten-Generaal, 2008; OECD, 2008; Koning, 2009). Figure 12 shows participation rates by cohort and diagnosis for the years 1999–2005. The percentage receiving WAJONG benefits due to mental reasons rose dramatically for every cohort, while the percentage receiving benefits for all other reasons remained constant at about half a percent. Benefits granted on the basis of mental problems already surpass 2% among those who are merely 20 years of age in 2005.

There are a variety of reasons cited for this (Suijker, 2007; Besseling et al., 2007; Uitvoering Werknemersverzekeringen, 2007), three of which recur most prominently:

1. Substitution effects due to the reform of the General Social Assistance Scheme (Wet Werk en Bijstand, WWB) in 2004, which shifted fiscal responsibility for this scheme to municipalities.
2. An increase in the number, and a shift in the type, of conditions in the population.
3. Increased awareness of the program and better cooperation between specialised educational institutions (Praktijkonderwijs, PRO and Voortgezet Speciaal Onderwijs, VSO) and the NSII / the municipalities.

To the best of our knowledge, there have been no attempts to formally quantify the different mechanisms. From an analysis of hospitalizations by diagnosis, we can practically exclude the possibility that the proportion of individuals with serious mental disorders has increased recently. This is in line with NSII's own analysis (Uitvoering Werknemersverzekeringen, 2007), which finds that 85% of the WAJONG awards in 2006 were based on mostly (mild) mental problems and developmental deficits, such as low levels of cognitive functioning or autism. In our view, this means that the WAJONG program is now more a substitute for general social assistance, rather than a substitute for DI – which renders the first- and third channels rather useless to look at

in isolation. Considering the focus of this paper, we limit ourselves to two brief points.

First, the last paragraph suggests that the current institutional setup is inefficient, as noted before by the OECD (2008) and Koning (2009): With different institutions (municipalities, NSII / federal government) bearing the financial burden of different programs, program selection will often not be based on the applicants' abilities. Second, the recent developmental literature in economics (Cunha et al., 2006; Cunha and Heckman, 2007; Heckman and Masterov, 2007; Cunha and Heckman, 2008; Heckman, 2008) and its ancestors in psychology teach us that many such cases are preventable by early intervention in families of low socio-economic status. A number of programs are active in the Netherlands that target early childhood health and development. Among them are the Nurse-Family-Partnership (VoorZorg) for young mothers with little education; a program to foster parenting skills in difficult circumstances (Stevig Ouderschap); an adaption of the US High/Scope Perry Preschool Project (Schweinhart et al., 1993, 2005) that aims to improve the learning environment in various ways from age three onwards (Kaleidoscoop); and several others. These projects are too recent to warrant an evaluation of their benefits during adulthood, but outcomes at earlier ages are encouraging. An expansion of these programs seems like the safest bet to raise the productive capacity at the lower end of future cohorts' skill distribution.

4 Discussion, conclusions, and avenues for future research

Employment and participation rates of older workers start to decline rapidly after age 45. This paper has highlighted the importance of health in explaining the age-related decline in employment and participation rates. The epidemiological literature on trends in health shows us that increases in longevity do not necessarily translate into decreases in morbidity. Studies from the United States demonstrate that, in fact, the prevalence of both chronic conditions and disabilities are increasing among the cohorts whose members are up to 50 years of age now. The Dutch evidence is less conclusive on the issue. Our own analysis has found decreases in the prevalence of disabilities for younger cohorts and constant self-reported health, both conditional on age. So there is no reason to expect rising numbers of persons on disability rolls because of worsening underlying population health in the near future. However, even if these results were taken at face value, they might not extrapolate to those who have just reached adulthood. The recent increase in enrolment in the WAJONG and other programs paints a different picture for these cohorts, at least for non-physical reasons.

A huge literature has shown that there is a strong association between health and disabilities, on the one hand, and earnings and employment, on the other. This was summarized above in Section 2.1, and one stylized fact is that the correlation is stronger for employment than for earnings. An important avenue for future research is to explore the mechanisms behind this pattern. For example, firms largely protect their workers' earnings from idiosyncratic shocks to firm output (Guiso et al., 2005). Similarly, firms might protect earnings (to some extent) from workers' individual productivity declines resulting from worsening health conditions. Worker-firm matches may dissolve and new employment may be difficult to find if health drops below a minimal level. A further necessary condition for this mechanism to be relevant is the absence of complete markets. If markets were complete, then risk-averse individuals would insure themselves against all idiosyncratic risk. Labor economists have recently explored new approaches of life-cycle welfare measurement under partial insurance, where individuals' earnings evolve stochastically. Health shocks are likely to be behind a substantial amount of the uncertainty, but so far they have hardly been considered as a driving force. There is now a substantial literature that estimates

life-cycle earnings as a stochastic process (MaCurdy, 1982; Meghir and Pistaferri, 2004) and derives the welfare implications for economic agents (Blundell and Preston, 1998; Blundell et al., 2008) under different insurance designs. Low et al. (forthcoming) show for the US that employment risk has a much larger influence on (permanent) earnings than productivity risk has. The graphs that appear in Section 2 suggest that a large part of permanent employment risk may be due to health reasons and disability insurance. The components of Figure 11 suggest that a permanent exit from the labor force through DI may be a substitute for a transitory absence via UI. It would be of great interest to bring these literatures together and derive the welfare implications of different insurance schemes. Low and Pistaferri (2008) have taken a first step in this direction, which seems to be an extremely fruitful approach that may ultimately lead to better design of insurance mechanisms such as DI, UI, or general social assistance.

The preceding paragraph takes the perspective that health shocks are inevitable and lays out a research agenda on the design of insurance schemes. But health, of course, is malleable to some extent – and one may also question the potential benefits of better population health in terms of employment. Figures 7 and 8 show that this is the most important path to further increase employment of middle-aged men. Of the 50– (40–) year-old males who report the worse health category, only about 40% (60%) are at work. In sharp contrast to this, employment rates of men in good health / without a disability are very close to the rates of those well into their fifties. In other words, the potential of increasing the participation rates in these groups is very low. Bad health remains the chief culprit for non-participation, and policies aimed at increasing the employment rate of middle-aged workers should therefore focus on these.⁷ For females, one may also speculate that the spectacular rises in employment rates evident from Figures 7 and 8 cannot continue much longer without improving the employment prospects of those with a health problem. In order to design efficient public policy measures, it is very important to understand the precise causal pathways for the low employment prospects of those with health problems. While the answer

7 For workers nearing retirement age, financial incentives become more important as well. In terms of explaining retirement decisions in these age groups, the relative weight of health reasons and financial incentives remains one of the largest open research questions.

seems obvious at first sight (we must improve their health, although this is certainly no easy task), the problem is subtler because those in poor health differ in important ways from those in good health. We are only just beginning to understand the quantitative importance of direct and indirect effects (Lindeboom et al., 2007). There is a lot of room for research in this area, and all conclusions that we draw in the next paragraph will therefore be somewhat tentative.

Background characteristics are important for employment rate differences between disabled and non-disabled workers, but studies also indicate that direct effects of the disability on employment are important. Cross-national studies also indicate that the impact of a disability varies considerably over countries. This may be related to differences in employment structure, to measures that aim to reduce the employment effects of a disability, but also to social security institutions like the DI system. Indeed, US studies have shown that changes in the generosity and accessibility of the DI program have had strong effects on labor force participation rates – and the Dutch experience suggests similar patterns. The very recent experience in the Netherlands is an interesting case in this respect. From the point of view of an international comparison, the system was transformed from what probably was the most lenient program with easy access in the OECD to a much more stringent program where only the severely and permanently disabled qualify for permanent benefits. Accordingly, DI rates have fallen dramatically in the past years, accompanied by substantial increases in the participation rates of 50+ workers. Given the current state of economic research, the Netherlands' DI system now probably comes close to state-of-the-art.

Nevertheless, it remains to be seen whether the positive impact on employment and participation rates will also hold for the future. A substantial share of the WIA applicants with severe conditions is currently given a full but temporary WGA benefit. It is likely that a large share of this group will eventually be labeled as permanently disabled. Vulnerable groups remain, also within the current system. For instance, those who are awarded partial benefits or those who are denied benefits still have health limitations. Increasing employment prospects for these groups is essential, and many measures have been taken already in this respect. Again, the reforms are too recent as to permit an evaluation at this point. A number of them, however, are focused on employers, which is irrelevant for the increasingly large group of "vangnetters". Another

problematic group are the “wajongers”, but we have argued above that most of them should not be viewed as DI cases but rather fall within the scope of general social assistance. Finally, the pressure on the DI system (as measured in terms of the number of applications) will likely increase substantially during the currently unfolding economic crisis, constituting a critical test for the effectiveness of recent measures.

A Definition of Variables

The data used in Section 2.3 stem from the Gezondheidsenquête (1983–1996) and its successor, the ‘Permanente Onderzoek Leefsituatie’ (POLS, 1997–2005). The data are a repeated cross section administered by the Dutch Statistical Office. Annual sample sizes are in the range of 7,000 to 11,000 observations, yielding average cell sizes of around 630 persons in Figures 5 and 6. In Figures 7 and 8, cell sizes are obviously smaller, and sometimes considerably so (i.e. for the young in poor health or with a disability, where prevalence is low). The datasets come with standard sampling weights, which we use to construct all of our figures.

Self-Assessed Health The variable is derived from a standard question on how the respondent would rate his or her health in general. Answers are given on the following response scale (this scale changed in 2001, which is why we use data only for the 18 years until 2000):

1. Very good.
2. Good.
3. Fair.
4. Variable
5. Poor.

We dichotomise the variable in “good health” (top two categories) and “bad health” (bottom two categories).

Activities of Daily Living We use eight questions derived from the OECD long-term disability questions (McWhinnie et al., 1982). These questions have been consistently asked from 1989 onwards, yielding 17 years of data. The questions include whether the respondent is able to

1. follow normal conversations with three or four other persons,
2. follow normal conversations with another person,
3. read ordinary newspaper,
4. recognize the face of another person from four meters,

5. bite and chew on hard foods,
6. carry an object of five kilograms for ten meters,
7. bend down while standing to pick up a shoe,
8. walk for 400 meters without resting.

For each of these questions, answers could be given on the following scale: "no problem / light problem / medium problem / severe problem". We give these categories the scores "0 / 1 / 2 / 3" and, for the purposes of the above analyses, define the cutoff for suffering from a disability for a score of at least 4.

Labor Force Status Whether an individual is reported to be working or not in the survey.

References

- Au, Doreen Wing Han, Thomas F. Crossley, and Martin Schellhorn, "The Effect of Health Changes and Long-Term Health on the Work Activity of Older Canadians," *Health Economics*, 2005, 14 (10), 999–1018.
- Autor, David H. and Mark G. Duggan, "The Rise in the Disability Rolls and the Decline in Unemployment," *Quarterly Journal of Economics*, 2003, 118 (1), 157.
- ___ and ___, "The Growth in the Social Security Disability Rolls: A Fiscal Crisis Unfolding," *Journal of Economic Perspectives*, Summer 2006, 20 (3), 71–96.
- Banks, James, Arie Kapteyn, James P. Smith, and Arthur van Soest, "Work Disability is a Pain in the ****, Especially in England, the Netherlands, and the United States," in David Cutler and David A. Wise, eds., *Health in Older Ages: The Causes and Consequences of Declining Disability Among the Elderly*, 2 ed., Chicago, IL: University of Chicago Press, 2009, pp. 251–294.
- ___, Carl Emmerson, and Gemma Tetlow, "Healthy Retirement or Unhealthy Inactivity: How Important Are Financial Incentives in Explaining Retirement?," January 2007. Mimeo, Institute for Fiscal Studies, London.
- Berthoud, Richard, "Disability Employment Penalties in Britain," *Work, Employment & Society*, March 2008, 22 (1), 129–148.
- Besseling, Jan, Branko Hagen, Saskia Andriessen, Annelies te Peele, Matty Crone, Lucy Kok, and Edwin de Vos, "Toename Gebruik Ondersteuning Voor Jongeren Met Een Gezondheidsbeperking," March 2007. TNO Rapport No. 385, available at www.tno.nl.
- Bhattacharya, Jayanta, Kavita Choudhry, and Darius N. Lakdawalla, "Chronic Disease and Severe Disability among Working-Age Populations," *Medical Care*, January 2008, 46 (1), 92–100.
- Black, Dan, Kermit Daniel, and Seth Sanders, "The Impact of Economic Conditions on Participation in Disability Programs: Evidence from the Coal Boom and Bust," *American Economic Review*, 2002, 92 (1), 27–50.
- Blundell, Richard W. and Ian Preston, "Consumption Inequality and Income Uncertainty," *Quarterly Journal of Economics*, 1998, 113 (2), 603–640.
- ___, Luigi Pistaferri, and Ian Preston, "Consumption Inequality and Partial Insurance," *American Economic Review*, 2008, 98 (5), 1887–1921.
- Bound, John and Richard V. Burkhauser, "Economic Analysis of Transfer Programs Targeted on People with Disabilities," in Orley C. Ashenfelter and David Card, eds., *Handbook of Labor Economics*, Vol. 3, Elsevier, 1999, chapter 51, pp. 347–3528.
- ___ and Timothy Waidmann, "Accounting for Recent Declines in Employment Rates among Working-Aged Men and Women with Disabilities," *The Journal of Human Resources*, Spring 2002, 37 (2), 231–250.
- ___, Michael Schoenbaum, Todd R. Stinebrickner, and Timothy Waidmann, "The Dynamic Effects of Health on the Labor Force Transitions of Older Workers," *Labour Economics*, June 1999, 6 (2), 179–202.
- Böheim, René and Mark P. Taylor, "Unemployment Duration and Exit States in Britain," 2000. University of Essex, Institute for Labour Research Discussion Paper 00/50.
- Case, Anne and Christina Paxson, "Sex Differences in Morbidity and Mortality," *Demography*, May 2005, 42 (2), 189–214.

- Crimmins, Eileen M., Sandra L. Reynolds, and Yasuhiko Saito, "Trends in Health and Ability to Work among the Older Working-Age Population," *Journal of Gerontology, Series B*, 1999, 54B (1), S31-40.
- Cunha, Flavio and James J. Heckman, "The Technology of Skill Formation," *American Economic Review*, 2007, 97 (2), 31-47.
- ___ and ___. "Formulating, Identifying and Estimating the Technology of Cognitive and Noncognitive Skill Formation," *Journal of Human Resources*, October 2008, 43 (4), 738-782.
- ___, ___, Lance Lochner, and Dimitriy V. Masterov, "Interpreting the Evidence on Life Cycle Skill Formation," in Eric Hanushek and Finis Welch, eds., *Handbook of the Economics of Education*, Vol. 1, Elsevier, 2006, pp. 697 - 812.
- Currie, Janet and Brigitte C. Madrian, "Health, Health Insurance and the Labor Market," in Orley C. Ashenfelter and David Card, eds., *Handbook of Labor Economics*, Vol. 3, Part 3, Elsevier, 1999, chapter 50, pp. 3309 - 3416.
- de Jong, Philip, "Recent Changes in Dutch Disability Policy," September 2008. Mimeo, University of Amsterdam.
- de Jong, Philip, Carlien Schrijvershof, and Theo Veerman, "Vangnetters en profil," 2008. APE astri report.
- de Jong, Philip, Maarten Lindeboom, and Bas van der Klaauw, "Screening Disability Insurance Applications," *Journal of the European Economic Association*, forthcoming.
- ___, Vincent Thio, and Heleen Barteling, "UWW als poortwachter," 2005. APE report 127.
- Disney, Richard, Carl Emmerson, and Matthew Wakefield, "Ill Health and Retirement in Britain: A Panel Data-Based Analysis," *Journal of Health Economics*, July 2006, 25 (4), 621-649.
- Duggan, Mark and S. Imberman, "Why Are the Disability Rolls Skyrocketing? The Contribution of Population Characteristics, Program Changes and Economic Conditions," in David Cutler and David A. Wise, eds., *Health in Older Ages: The Causes and Consequences of Declining Disability among the Elderly*, University of Chicago Press, 2006.
- Ettner, Susan L., Richard G. Frank, and Ronald C. Kessler, "The Impact of Psychiatric Disorders on Labor Market Outcomes," April 1997. NBER Working Paper 5989.
- García Gómez, Pilar, "Institutions, Health Shocks and Labour Outcomes across Europe," January 2008. Documento de Trabajo 2008-01 FEDEA.
- ___ and Angel López Nicolás, "Health Shocks, Employment and Income in the Spanish Labour Market," *Health Economics*, 2006, 15, 997-100.
- ___, Andrew M. Jones, and Nigel Rice, "Health Effects on Labour Market Exits and Entries," *Labour Economics*, forthcoming.
- Guiso, Luigi, Luigi Pistaferri, and Fabiano Schivardi, "Insurance within the Firm," *Journal of Political Economy*, 2005, 113 (5), 1054-1087.
- Hagan, Ronald, Andrew M. Jones, and Nigel Rice, "Health and Retirement in Europe," October 2006. HEDG Working Paper 06-10.
- Heckman, James J., "Schools, Skills, and Synapses," *Economic Inquiry*, 2008, 46 (1), 1-11.
- ___ and Dimitriy V. Masterov, "The Productivity Argument for Investing in Young Children," *Review of Agricultural Economics*, 2007, 29 (3), 446-493.
- HMD, "Human Mortality Database," 2009. <http://www.mortality.org>.

- Kaye, H. Stephen, Mitchell P. LaPlante, Dawn Carlson, and Barbara L. Wenger, "Trends in Disability Rates in the United States, 1970-1994," Technical Report, National Institute on Disability and Rehabilitation Research 1996.
- Kerkhofs, Marcel and Maarten Lindeboom, "Age Related Health Dynamics and Changes in Labour Market Status," *Health Economics*, 1997, 6 (4), 407-423.
- ___, ___, and Jules Theeuwes, "Retirement, Financial Incentives and Health," *Labour Economics*, June 1999, 6 (2), 203-227.
- Koning, Pierre W. C., "Estimating the Impact of Experience Rating on the Inflow into Disability Insurance in the Netherlands," August 2004. CPB Discussion Paper 37.
- ___, "Herbezinning op onderkant arbeidsmarkt," *Economisch Statistische Berichten*, January 2009, 94 (4551), 24-25.
- ___ and Daniel J. van Vuuren, "Disability Insurance and Unemployment Insurance as Substitute Pathways," *Applied Economics*, 2007, pp. 1-14.
- Kreider, Brent and Regina T. Riphahn, "Explaining Applications to the US Disability System: A Semiparametric Approach," *The Journal of Human Resources*, Winter 2000, 35 (1), 82-115.
- Lakdawalla, Darius N., Jayanta Bhattacharya, and Dana P. Goldman, "Are the Young Becoming More Disabled?," *Health Affairs*, 2004, 23 (1), 168-176.
- Lechner, Michael and Rosalia Vazquez-Alvarez, "The Effect of Disability on Labour Market Outcomes in Germany: Evidence from Matching," February 2004. CEPR Discussion Paper 4223.
- Lindeboom, Maarten, "Health and Work for Older Workers," in Andrew M. Jones, ed., *The Elgar Companion to Health Economics*, Cheltenham, UK: Edward Elgar Publishing, 2006, chapter 3, pp. 26-35.
- ___, Ana Llana Nozal, and Bas van der Klaauw, "Health Shocks, Disability and Work," November 2007. Netspar Discussion Paper 11/2007-026.
- Low, Hamish and Luigi Pistaferri, "Disability Risk, Disability Insurance, and Life-Cycle Behavior," October 2008. Mimeo, University of Cambridge and Stanford University.
- ___, Costas Meghir, and Luigi Pistaferri, "Wage Risk and Employment Risk over the Life Cycle," *American Economic Review*, forthcoming.
- Luft, Harold S., "The Impact of Poor Health on Earnings," *The Review of Economics and Statistics*, 1975, 57 (1), 43-57.
- MaCurdy, Thomas E., "The Use of Time Series Processes to Model the Error Structure of Earnings in a Longitudinal Data Analysis," *Journal of Econometrics*, January 1982, 18 (1), 83-114.
- McWhinnie, J. R., P. Törnudd, D. Ås, and C. Pelli, *Measuring Disability OECD Social Indicator Development Programme, Special Studies*, 5 ed., Paris: OECD Publishing, 1982.
- Meghir, Costas and Luigi Pistaferri, "Income Variance Dynamics and Heterogeneity," *Econometrica*, 2004, 72 (1), 1-32.
- Mitchell, Jean M. and Richard V. Burkhauser, "Disentangling the Effect of Arthritis on Earnings: A Simultaneous Estimate of Wage Rates and Hours Worked," *Applied Economics*, 1990, 22 (10), 1291-1309.
- Møller Danø, Anne, "Road Injuries and Long-Run Effects on Income and Employment," *Health Economics*, 2005, 14 (9), 955-970.

- OECD, *Transforming Disability into Ability: Policies to Promote Work and Income Security for Disabled People*, Paris: OECD Publishing, 2003.
- ___, *Sickness, Disability and Work: Breaking the Barriers (Vol. 3): Denmark, Finland, Ireland and the Netherlands*, Paris: OECD Publishing, 2008.
- Parsons, Donald O., "Self-Screening in Targeted Public Transfer Programs," *Journal of Political Economy*, 1991, 99 (4), 859.
- Pelkowski, Jodi Messer and Mark C. Berger, "The Impact of Health on Employment, Wages, and Hours Worked over the Life Cycle," *The Quarterly Review of Economics and Finance*, February 2004, 44 (1), 102–121.
- Ravelli, A. C. J., J. H. P. van der Meulen, R. P. J. Michels, C. Osmond, D. J. P. Barker, C. N. Hales, and O.P. Bleker, "Glucose Tolerance in Adults after Prenatal Exposure to Famine," *The Lancet*, 1998, 351 (9097), 173–177.
- Rice, Nigel, Jennifer Roberts, and Andrew M. Jones, "Sick of Work or Too Sick to Work? Evidence on Health Shocks and Early Retirement from the Bhps," December 2006. HEDG Working Paper 06–13.
- Riphahn, Regina T., "Income and Employment Effects of Health Shocks a Test Case for the German Welfare State," *Journal of Population Economics*, August 1999, 12 (3), 363–389.
- Roseboom, Tessa J., Jan H. P. van der Meulen, Anita C. J. Ravelli, Clive Osmond, David J. P. Barker, and Otto P. Bleker, "Effects of Prenatal Exposure to the Dutch Famine on Adult Disease in Later Life: An Overview," *Molecular and Cellular Endocrinology*, December 2001, 185 (1–2), 93–98.
- Schmidt, Lucie and Purvi Sevak, "AFDC, SSI, and Welfare Reform Aggressiveness: Caseload Reductions Versus Caseload Shifting," *Journal of Human Resources*, July 2004, XXXIX (3), 792–812.
- Schweinhart, Lawrence J., Helen V. Barnes, and David P. Weikart, *Significant Benefits: The High/Scope Perry Preschool Study through Age 27*, Ypsilanti, MI: High/Scope Press, 1993.
- ___, W. Steven Barnett, and Clive R. Belfield, *Lifetime Effects: The High/Scope Perry Preschool Study through Age 40*, Ypsilanti, MI: High/Scope Press, 2005.
- Slotboom, S. T. and C. van Horsen, "35-min op weg naar werk: De arbeidsmarktpositie van 35-minners vanaf 2006," February 2009. Regioplan report nr. 1760.
- Smith, James P., "Unraveling the SES–Health Connection," *Population and Development Review*, 2004, 30, 108–132.
- Stapleton, David C., Kevin A. Coleman, Kimberly A. Dietrich, and Gina A. Livermore, "Econometric Analyses of DI and SSI Application and Award Growth," in Kalman Rupp and David C. Stapleton, eds., *Growth in Disability Benefits Explanations and Policy Implications*, Kalamazoo, MI: W. E. Upjohn Institute for Employment Research, 1998.
- Stewart, Jennifer M., "The Impact of Health Status on the Duration of Unemployment Spells and the Implications for Studies of the Impact of Unemployment on Health Status," *Journal of Health Economics*, September 2001, 20 (5), 781–796.
- Suijker, Frans W., "Verdubbeling van de Instroom in de Wajong: Oorzaken en Beleidsopties," 2007. CPB Netherlands Bureau for Economic Policy Analysis, CPB Document 156.

- Tweede Kamer der Staten-Generaal, "Wijziging van de Wet arbeidsongeschiktheidsvoorziening jonggehandicapten in verband met het bevorderen van de participatie van jonggehandicapten door werk en arbeidsondersteuning," November 2008. Memorie van Toelichting. Kamerstukken 31780, no. 3.
- Uitvoering Werknemersverzekeringen, "De groei van de Wajonginstroom," October 2007. Kenniscahier 07-01.
- ___, "De participatiemogelijkheden van de Wajonginstroom," May 2008. Kenniscahier 08-01.
- ___, "UWV kwartaal rapportage, 1e kwartaal 2008," 2008.
- van de Kamp, K., A. W. Braam, and D. J. H. Deeg, "Verschuiving Van De Ervaren Gezondheid Van 55-64-Jarigen Tussen 1992/'93 En 2002/'03. Verklarende Factoren," Tijdschrift voor Gerontologie en Geriatrie, 2008, 39 (5).
- van Kippersluis, Hans, Owen O'Donnell, Eddy van Doorslaer, and Tom van Ourti, "Socioeconomic Differences in Health over the Life Cycle in an Egalitarian Country," January 2009. Tinbergen Institute Discussion Paper TI 2009-006/3.
- van Sonsbeek, Jan-Maarten and Raymond H. J. M. Gradus, "A Microsimulation Analysis of the 2006 Regime Change in the Dutch Disability Scheme," Economic Modelling, 2006, 23, 427-456.
- Visser, M., S. M. F. Pluijm, M. H. L. van der Horst, J. L. Poppelaars, and D. J. H. Deeg, "Leefstijl Van 55-64-Jarige Nederlanders in 2002/'03 Minder Gezond Dan in 1992/'93," Nederlands Tijdschrift voor Geneeskunde, 2005, 149, 2973-2978.
- Zucchelli, Eugenio, Anthony Harris, Andrew M. Jones, and Nigel Rice,

SUMMARY OF DISCUSSION

By Hanka Vonkova

Health, Disability and Work: Patterns for the Working Age Population

By Pilar García-Gómez, Hans-Martin von Gaudecker and Maarten Lindeboom

Chairman: Henk Don

Discussants: Gijsbert van Lomwel (Achmea)

Marc Koopmanschap (Erasmus Medical Center, Netspar)

Netspar Panel: October 13, 2009

The first discussant of the paper, **Gijsbert van Lomwel**, started by recognizing the importance of the topic for several departments of his employer, insurance company Achmea. His first comment was that *although the policy relevance is clear, policy implications are not*. He was impressed by the literature overview, but was missing suggestions about how to further improve work possibilities for less able people.

He also pointed out that the paper does not contain *discussion of the Dutch reforms of 2004*, which extended the deferment period to two years. This means that employer has to pay the wage of their disabled employees for two years instead of one year. Mr. van Lomwel argued that this reform might have caused a big part of the 71 % decrease of DI inflow observed in the first years of the new millennium.

In his next comment Mr. van Lomwel pointed out that national *attitude towards disability matters*. The attitude of, say, Americans towards residual disability is much tougher, so it is more difficult to get a disability status in the USA than in the Netherlands. Social norms play a great role in this process.

In his last comment, Mr. van Lomwel returned to the question of policy implications and emphasized that *much more evidence and research is needed*. He suggested lifestyle interventions, disease management and stricter screening as possible measures that should be investigated.

The second discussant, **Marc Koopmanschap**, started by pointing out that, for good or bad, the paper is *rather exploratory and descriptive, without focus on a particular research question*.

Thereafter, Mr. Koopmanschap focused on *possible confusions in discussing health, general disability, work disability and receiving disability benefits*. He argued that terms "health" and "disability" are used interchangeably in the paper, although they are different concepts. He mentioned studies, which show that self-assessed health and morbidity can behave differently and studies that suggest shifts in relationship between health and disability. Also general disability does not automatically lead to disability to work. He also discussed problems inherent to the multidimensional concept of health.

In his next comment, Mr. Koopmanschap advocated a greater role of *mental capital* in the disability discussion. He defined mental capital as the state of mental well-being, which allows a worker to transform human capital into productivity. He suggested more investments in the mental capital of young people as a preventive measure against DI and WAJONG enrollment. He also stressed the importance of working conditions of people of all ages, in terms of team spirit, deadlines and general work stress level.

As for *policy recommendations*, Mr. Koopmanschap suggests more flexibility in working patterns at older ages, mental capital programs for children and adolescents and further work on financial incentives. As for *research recommendations*, determinants of work disability and return to work should be analyzed, with emphasis on health, personal characteristics, workplace characteristics and parameters of the social insurance system

In the **response to the discussants**, the authors recognized that there is a *difference between general and work disability*, pointing out the extreme case of Stephen Hawkins. The authors still prefer using general disability, since people's stated work disability is strongly influenced by their work status. As an answer to this, Mr. Koopmanschap suggested using other than self-reported measures of work disability. The authors still argued that work disability is a difficult concept, as it strongly depends on the type of job in question. Furthermore, they were limited by the available data.

The authors also reacted to the comment about *lacking policy implications*. They argued that concentrating on policy implications would lead to a very different paper. Also, given the state of research in this field, it is very difficult to make conclusion that would not be very fragile. Mr. van Lomwel answered that they still should have tried to inform the readers about conclusions you can make based on the literature and also conclusions you may not make. Henk Don argued that there surely are some conclusions you can make, for example that early intervention in childhood helps in preventing disability. The authors agreed that there are huge differences between the treated and untreated groups in these programs, but the results are still incomplete. Mr. van Lomwel then called for a list of stylized-facts in this research area.

PUBLICATIONS IN THE PANEL PAPERS SERIES

1. *Saving and investing over the life cycle and the role of collective pension funds*
Lans bovenberg , Ralph Koijen, Theo Nijman and Coen Teulings
2. *What does behavioural economics mean for policy? Challenges to savings and health policies in the Netherlands*
Peter Kooreman and Henriëtte Prast
3. *Housing wealth and household portfolios in an aging society*
Jan Rouwendal
4. *Birth is the sessenger of death – but policy may help to postpone the bad news*
Gerard van den Berg and Maarten Lindeboom
5. *Phased and partial retirement: preferences and limitations*
Arthur van Soest and Tunga Kantarci
6. *Retirement Patterns in Europe and the U.S.* (2008)
Arie Kapteyn and Tatiana Andreyeva
7. *Compression of morbidity: A promising approach to alleviate the societal consequences of population aging?* (2008)
Johan Mackenbach, Wilma Nusselder, Suzanne Polinder and Anton Kunst
8. *Strategic asset allocation* (2008)
Frank de Jong, Peter Schotman and Bas Werker
9. *Pension Systems, Aging and the Stability and Growth Pact* (2008) Revised version
Roel Beetsma and Heikki Oksanen
10. *Life course changes in income: An exploration of age- and stage effects in a 15-year panel in the Netherlands* (2008)
Matthijs Kalmijn and Rob Alessie
11. *Market-Consistent Valuation of Pension Liabilities* (2009)
Antoon Pelsser and Peter Vlaar
12. *Socioeconomic Differences in Health over the Life Cycle: Evidence and Explanations* (2009)
Eddy van Doorslaer, Hans van Kippersluis, Owen O'Donnell and Tom Van Ourti
13. *Computable Stochastic Equilibrium Models and their Use in Pension- and Ageing Research* (2009)
Hans Fehr
14. *Longevity risk* (2009)
Anja De Waegenare, Bertrand Melenberg and Ralph Stevens
15. *Population ageing and the international capital market* (2009)
Yvonne Adema, Bas van Groezen and Lex Meijdam
16. *Financial Literacy: Evidence and Implications for Consumer Education* (2009)
Annamaria Lusardi and Maarten van Rooij
17. *Health, Disability and Work: Patterns for the Working-age Population* (2009)
Pilar García-Gómez, Hans-Martin von Gaudecker and Maarten Lindeboom

HEALTH, DISABILITY AND WORK: PATTERNS FOR THE WORKING AGE POPULATION

The Netherlands has been very successful in raising the participation rate of older workers in the past decade, and recent policies are expected to lead to further increases. Understanding the relation between health, work and disability insurance programs is therefore of the utmost importance for policymakers. Pilar García-Gómez (Erasmus University Rotterdam and Netspar), Hans-Martin von Gaudecker (VU University Amsterdam and Netspar) and Maarten Lindeboom (VU University Amsterdam, IZA, and Netspar) summarize in this paper the evidence on how population health translates into limited work ability, and into enrolment in disability insurance. After reviewing the recent Dutch experience, the paper provides some exploratory analyses of novel cohort-level data, closing with some remarks targeted at policymakers.

