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ESSAYS ON WORKING HOURS

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CONTENT

01
INTRODUCTION

1.1 Motivation

Over the last few decades the average length of the workweek in several Western countries has declined or at best remained unchanged (Boeri and Van Ours, 2008). However, the diversity in working hours has mostly increased (Wooden et al. 2009). The literature shows an obvious decline in the proportion of employees reporting working a traditional 40-hour workweek, and noticeable increases in the proportion of employees reporting either relatively short workweeks (less than 30 hours) or relatively long workweeks (50 hours or more) (e.g., Green 2001; Jacobs and Gerson 2004; Wooden et al. 2009). The literature is also suggestive of differences in trends of working hours among different groups of workers (e.g., Blundell et al. 2011). For example, while the average weekly working hours in the UK decreased from 38.5 to 36.5 hours over the period 1983-2013, women witnessed a minor increase in their average workweek from 30.2 to 31.5 hours (OECD 2014). This increase was more pronounced for women who are 55 years or older as their average workweek increased from 27.7 to 30.1 hours over the same period of time (OECD 2014).[1]

In this thesis, we cast light on various aspects that play a role in determining workers' working hours and on the implications of working hours on several labour market outcomes (e.g., wages, retirement age) and health outcomes. According to neoclassical economic theory, working hours are determined mainly by market processes. However, market failures usually occur due to conflicting preferences of workers and employers or institutional restrictions (Boeri and Van Ours 2008). For example, employers' discrimination against vulnerable workers such as ethnic minority groups, females and older workers could negatively affect labour market outcomes (including working hours) of these groups (e.g., Åslund and Rooth 2005; Cornelissen and Jirjahn 2012; Kaushal et al. 2007; Rabby and Rodgers 2009). In addition, policy interventions can also play a role in the determination of the labour supply of particular groups of workers (Boeri and Van Ours 2008). For example, to deal with the ageing of the population, policy makers in several Western countries take measures to stimulate older workers to stay longer in the labour market. These policies include the abolition of early retirement schemes, increasing the mandatory retirement age, strengthening legislation which prohibits age discrimination in hiring, promotion, or firing, and allowing older workers to reduce their working hours in the years before they fully retire (Gruber and Wise 1998; Duval 2003; Kangas et al. 2010; Mastrobuoni 2009; Staubli and Zweimüller 2012; Machado and Portela 2012).

Working hours have several implications on workers' health and wages. The literature shows that working for too long hours has negative consequences for physical and psychological health as well as for subjective well-being (Cooper and Marshall 1976; Blake et al. 1996; Cox et al. 2000; Godin and Kittel 2004; van Vegchel et al. 2005; Bender and Theodossiou 2014; van der Doef 1999; de Jonge et al. 2000; Hammen 2005; Schiffrin and Nelson 2010). However, working for few hours (e.g., part-time) is associated with a pay penalty (e.g., Hirsch 2005; Manning and Petrongolo 2008; Mumford and Smith 2009; Connolly and Gregory 2010).

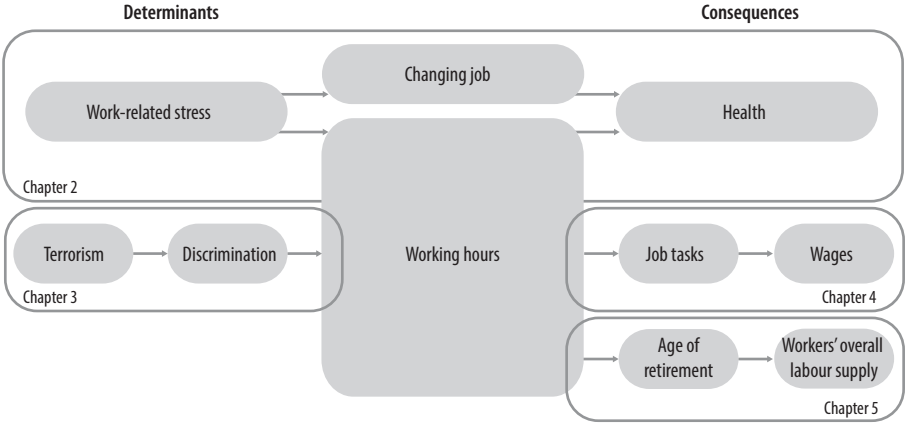
1 OECD (2014), OECD Stat, (database). doi: 10.1787/data-00285-en (Accessed on October 19 2014)

1.2 Aim

The aim of this thesis is to investigate various determinants of working hours for different groups of workers as well as the relationship between working hours and labour and health outcomes. More specifically, the thesis consists of four specific questions on working hours articulated in the conceptual framework shown in Figure 1.1:

1. Do workers respond to work-related stress by decreasing their working hours? And does this reduce the stress they perceive at work and improve their health?
2. Does a decrease in perceived integration due to the terrorist attacks of Muslim fundamentalists negatively affect employment and working hours of Muslim immigrants?
3. Do changes in the job tasks of part-time and full-time workers explain the decrease in the part-time pay penalty?
4. Do retirement schemes allowing for gradual retirement increase the labour supply of older workers measured by total number of working hours?

Figure 1.1
The conceptual framework of the thesis



1.3 Outline and main results

The thesis consists of four chapters which deal with different determinants and implications of working hours. Chapter 2 investigates the negative effects of long working hours on work-related stress, how workers manage to reduce this stress by reducing their working hours or switching jobs, and the implications of stress reduction on health outcomes. Chapter 3 investigates the effect of the terrorist attacks that Europe witnessed over the period 2004-2005 on the integration of Muslim immigrants in the Netherlands using subjective as well as objective measures of integration such as working hours. Chapter 4 deals with the part-time pay penalty and investigates to what extent the pay penalty of part-time workers decreased over time due to a convergence in computerization and job tasks between part-time and

full-time workers employed within the same occupation. Chapter 5 investigates gradual retirement as a retirement option that provides older workers the opportunity to remain in the labour market while working fewer hours. In this chapter, we study the effect of having the option of gradual retirement on workers' labour supply. Chapter 6 concludes.

Chapter 2: Working hours adjustments to work-related stress and health outcomes
The first study investigates the labour supply adjustments to work-related stress and the effect of these adjustments on workers' stress and health. An increasing body of literature shows that higher levels of job responsibility and longer working hours have short- and long-term effects on work-related stress (Boyce and Oswald 2012; Johnston and Lee 2013), and that work-related stress has a negative impact on worker's physiological and psychological health (Cooper and Marshall 1976; Blake et al. 1996; Cox et al. 2000; Godin and Kittel 2004; van Vegchel et al. 2005; Bender and Theodossiou 2014) as well as workers' subjective well-being (van der Doef 1999; de Jonge et al. 2000; Hammen 2005; Schiffrin and Nelson 2010). The literature also shows that work-related stress has a significant impact on workers' quitting intentions and absenteeism from work (Leontaridi and Ward 2002). There is, however, little economic research on how workers respond to stress by adjusting their actual labour supply (i.e., reducing their working hours or switching jobs) and on the role these adjustments play in reducing workers' level of work-related stress, and hence, improving their health.

In this chapter, we study the labour supply adjustments to work-related stress using data from the German Socio-Economic Panel (SOEP). We find that work-related stress is associated with negative health outcomes as well as absenteeism from work, and that workers adjust to stress by reducing working hours or changing jobs. However, these labour market adjustments are gender specific: while men are more likely to respond to stress by changing jobs, women are more likely to reduce their working hours as a response to work-related stress. We further find that both labour supply adjustments to work-related stress indeed are associated with reduced stress and improved health.

Chapter 3: Terrorist attacks, integration and working hours of Muslim immigrants
This study investigates to what extent labour market outcomes such as employment and working hours of a minority group are negatively affected by discrimination by the majority. For this purpose we study the effect that a series of fundamentalist-Islamic terrorist attacks in Europe had on the labour market outcomes of Muslim immigrants in the Netherlands as well as their perceived integration. Using a difference-in-difference approach we show that while employment and working hours of Muslims were not negatively affected by the attacks, their perceptions about being integrated in the country were negatively affected.

Remarkably, it is the highly skilled Muslims whose perceived integration is affected most negatively due to the attacks. The increase in geographic segregation of low-skilled Muslims might have been a buffer that mitigated the effect of the terrorist attacks on their perceived integration as they could have obtained more social support from being in a community of the same ethnic background. The decline in perceived integration of highly skilled Muslims could be explained by their higher expectations on integrating in the host country. We finally show that perceived integration is significantly associated with the intention to permanently re-migrate to the country of origin. This suggests that discrimination as a

response to the terrorist attacks could have a negative impact on the prospective stay of the most productive Muslim immigrants in the host country, which could have negative economic implications for the knowledge economy of Western societies.

Chapter 4: Job tasks, computer use, and the part-time pay penalty

This study deals with the part-time pay penalty for female workers who are employed in low- and medium-skilled occupations. Several studies addressed the wage penalty for part-time workers and showed that working on a part-time basis is associated with a wage penalty (e.g., Hirsch 2005; Manning and Petrongolo 2008; Mumford and Smith 2009; Connolly and Gregory 2009). However, as these studies use cross-sectional data they do not analyse the changes in the wage gap between part-time and full-time workers over time. In this chapter we build on the task-based framework that considers occupations bundles of tasks (e.g., computer use, reading and writing, etc.). We find that in the United Kingdom differences in job tasks and computer use between part-time and full-time workers within occupations decreased significantly over the period 1997-2006. We show that the convergence in computer use between part-time and full-time workers within occupations explains a large share of the decrease in the part-time pay penalty. However, the lower part-time pay penalty is also related to lower wage returns to reading and writing which are performed more intensively by full-time workers. Conversely, the increasing returns to influencing tasks (i.e., managerial tasks) have increased the part-time pay penalty despite the convergence in the importance of influencing tasks between part-time and full-time workers. Relative changes in the input and prices of computer use and job tasks together explain more than 50 percent of the decrease in the part-time pay penalty. The findings of this chapter show that a task-based approach offers a highly relevant framework to analyse changes in the labour market position of part-time workers.

Chapter 5: Gradual retirement and labour supply

In this study, we investigate the labour supply preferences of older workers. Most Western countries are experiencing a steep increase in the share of elderly persons in the population and a decline in the share of the prime working-age population (OECD 2006), which places substantial pressure on public finance (Gielen 2009). Therefore, policy makers have taken several measures that encourage older workers to stay longer in the labour market. One of the policies adopted in several countries is increasing older workers' flexibility in working hours by giving them the opportunity to reduce their working hours before they fully retire. In the literature this is labelled as gradual retirement (Kantarci and Van Soest 2008). This chapter uses the stated preferences approach to study the impact of gradual retirement on workers' age of retirement and total labour supply. The empirical findings of the chapter suggest that introducing the option of gradual retirement induces workers to retire one year later on average. However, total labour supply seems to decrease when workers have the option of gradual retirement because the positive labour supply effect of the increasing age of retirement is cancelled out by the reduction in working hours. Highly stressed and less satisfied workers stay relatively longer in the labour market under gradual retirement than low-stressed (and job satisfied) workers. The effects of changes in retirement income, either in terms of changing the price of leisure or in terms of income associated with the chosen age of retirement, are lower under gradual retirement than under regular retirement.

02

LABOUR SUPPLY ADJUSTMENTS TO WORK-RELATED STRESS AND HEALTH OUTCOMES[1]

1 This chapter is based on joined work with Thomas Dohmen and Didier Fouarge. We thank the participants of the PhD AiO Seminar at Maastricht University for their valuable comments.

2.1 Introduction

An expanding body of literature shows that higher levels of stress have a negative impact on individuals' physiological and psychological health (Cooper and Marshall 1976; Blake et al. 1996; Cox et al. 2000; Godin and Kittel 2004; van Vegchel et al. 2005; Bender and Theodossiou 2014) as well as on subjective well-being (van der Doef 1999; de Jonge et al. 2000; Hammen 2005; Schiffrin and Nelson 2010). The literature also shows that (work-related) stress is associated with absenteeism from work (Leontaridi and Ward 2002), thus affecting productivity. There is, however, little research in economics on how workers respond to stress by adjusting their actual labour supply (e.g., by reducing working hours or switching jobs) and the role these adjustments play in reducing their level of work-related stress, and hence, improving their health. In this chapter we study labour supply adjustments in response to perceived work-related stress and investigate how these adjustments affect workers' subsequent stress and health.[2]

We use data from the German Socio-Economic Panel (SOEP) that contains a validated measure of work-related stress in the waves 2006 and 2011: the Effort-Reward Imbalance (ERI) model by Siegrist (1996).[3] First, we document the relationship between working conditions and work-related stress and health outcomes. We then study labour market adjustments in reaction to work-related stress. Our findings indicate that workers adjust to work-related stress by either changing jobs or reducing working hours while there is no evidence on responding to work-related stress by exiting the labour market. This adjustment is gender specific: while men are more likely to respond to work-related stress by changing jobs, women are more likely to reduce their working hours because it is more common for women to work part-time (Booth and Van Ours 2013). We further provide evidence that labour supply adjustments in response to work-related stress are indeed associated with reduced stress and improved health. Reducing stress seems to be important for improving health, as the data indicate that work-related stress is associated with negative health outcomes and absenteeism from work.

The literature identifies two major frameworks to study the relationship between working conditions and well-being of workers (Johnston and Lee 2013). The 'Job Demand-Control' model by Karasek (1979) suggests that workers in jobs with high levels of demand (e.g., high pace, effort or volume) and low levels of control (e.g., lack of decision autonomy and high monotony) suffer the most in terms of reduced well-being. The second framework, Siegrist's (1996) 'Effort-Reward Imbalance' (ERI) model, suggests that work-related stress is an outcome of the imbalance between work effort (e.g., demands of the job) and work rewards (e.g., salary, promotion prospects, and job security).

An increasing number of studies builds on either of these frameworks to study the relationship between work-related stress and health. For example, Van Vegchel et al. (2005)

2 The study by Leontaridi and Ward (2002) is most closely related to our chapter. They used data from the International Social Surveys Program (ISSP) in 15 OECD countries and showed that individuals reporting to experience at least some stress in their current position are 10-14% more likely to have intentions to quit or be absent from work than those without any job stress. However, Leontaridi and Ward (2000) did not investigate whether these intentions result in actual separations, nor do they study whether labour supply adjustments can serve to reduce stress levels.

3 See also Siegrist et al. (2009).

reviewed 45 empirical studies of the ERI model and showed that high levels of job demand and low levels of job rewards are associated with negative physical and psychological health outcomes. Similarly, Sparks et al. (1997) found a negative association between working hours and physiological and psychological health outcomes. Falk et al. (2013) provided experimental evidence that perceptions of unfair pay cause stress, as measured by heart rate variability. Promotions – that result in higher levels of responsibility and longer work hours – have been shown to lead to a deterioration in psychological health (Boyce and Oswald 2012) and to have a significant impact on stress and mental health, with estimates suggesting deteriorations up to two years after receiving a promotion (Johnston and Lee 2013). In addition, empirical studies indicate that working time mismatches (Wooden et al. 2009; Iseke 2013) and commuting time (Stutzer and Frey 2008) have negative implications on subjective well-being.[4]

The outline of the chapter is as follows. The next section describes the data and the variables used in the analyses. Section 2.3 investigates the correlates and the health implications of work-related stress. Section 2.4 discusses the labour supply adjustments to work-related stress and investigates to what extent they can reduce stress. Finally, Section 2.5 summarizes the findings and concludes.

2.2 Data and descriptive statistics

Our data come from the German Socio-Economic Panel (SOEP) which is an annual representative panel survey of private households and persons living in Germany. The data provide detailed information on demographics, job characteristics, and earnings collected mainly using face-to-face interviews (Wagner et al. 2007). We use data from the 2006 and 2011 waves, which contain a validated measure of work-related stress (Siegrist et al. 2009), and information from intermediate waves about the labour market outcomes of the 2006 respondents. The measure of work-related stress is based on the ERI scale developed by Siegrist (1996). Table 2.A1 in the Appendix lists the various items of the scale. For each item, respondents had to indicate whether they strongly agree, agree, disagree or strongly disagree to the respective statement. We re-scaled the items such that higher scores reflect higher levels of stress and then calculated the average of these items. To facilitate interpretation we standardised the measure to a mean of 0 and a standard deviation of 1.

The analyses pertain to full-time and part-time employees aged 18 to 65. We exclude the self-employed, apprentices, interns and students as well as workers with marginal jobs (i.e., jobs that pay a monthly wage lower than 400 Euros).[5] The sample is further restricted to respondents who provide full information on all variables included in the analyses. As a result of these restrictions, the final sample consists of 9,374 observations for 4,687 individuals for whom we have complete information over the two waves of 2006 and 2011

4 There is also related literature that investigates the relationship between job dissatisfaction and intentions to quit. For example, Freeman (1978), Ward and Sloane (2000), Clark (2001), Kristensen and Westergård-Nielsen (2004), Delfgaauw (2007), Lévy-Garboua et al. (2007) and Böckerman and Ilmakunnas (2009).

5 This was the legal threshold over the period from April 2003 to January 2013. As from January 2013, the threshold is 450 Euros.

about work-related stress and other explanatory variables.[6] To investigate the relationship between labour supply adjustments and stress reduction as well as health improvement, we focus on the 2006 respondents (8,720 observations) and analyse their subsequent labour supply adjustments within a period of two years (short term) and five years (medium term). We investigate three possible labour supply adjustments. (1) Job change: in each wave respondents are asked whether they have changed their jobs or started a new one over the past wave. We create a dummy variable that takes the value 1 if the respondent changed his/her job in the next two (five) years, and 0 otherwise. (2) Reducing working hours: we generate a dummy variable that takes the value 1 if the worker reduced his/her contractual working hours in the next two (five) years, and 0 otherwise.[7] (3) Transition out of employment: measured by a dummy variable that takes the value 1 if the worker exits the labour market in the next two (five) years, and 0 otherwise.

We use subjective and objective health measures, such as the number of doctor visits, and self-reported diseases (such as, diabetes, asthma, heart attacks, etc.). We also relate work-related stress to absenteeism from work due to sick leave. For this, we use two indicators. First, we use the subjective question *'Were you sick from work for more than six weeks at one time last year?'*. We create a dummy variable that takes the value 1 if the worker answered yes in any of the two (five) subsequent years, and 0 otherwise. Second, we use the number of days workers call in sick in the next two (five) years as asked in the question *'How many days were you not able to work because of illness?'.* Table 2.A2 in the Appendix provides descriptive statistics for the variables included in the regression analyses.

2.3 Correlates of work-related stress

Before studying the labour supply adjustments to work-related stress and their role in improving workers' health, we first investigate the correlates of work-related stress and describe the relationship between work-related stress and health. Table 2.A3 in the Appendix shows the relationship between various working conditions (i.e., working hours, multitasking, commuting, whether employment is permanent or temporary) and work-related stress. Column 1 shows OLS estimates while Column 2 provides the estimates from the Fixed-Effects (FE) model.[8] As reported in previous research (e.g., Boyce and Oswald 2012; Johnston and Lee 2013), the table shows that longer working hours are positively associated with higher levels of work-related stress. Multi-tasking, which is measured by the number of tasks workers perform in the job (Snower and Goerlich 2013), is also positively related to work-related stress.[9] People who have a temporary contract report higher levels of stress

6 The number of observations differs across the model specifications as we chose to work with the maximum possible number of observations in each model. However, running the analysis for a consistent number of observations gives similar results.

7 As a robustness check, we replicated the analysis using the change in actual working hours and got qualitatively similar results.

8 Since we have two waves of data, this amounts to a first difference model.

9 To get information on this item, we use the 2006 data from the BIBB/IAB dataset that include information on employees' qualification and career history, as well as information on job tasks, and job skill requirements (Spitz-Oener 2006; Rohrbach-Schmidt and Tiemann 2013). We create an index of multitasking for each 3 digit occupation which is the average number of tasks performed by workers in these occupation (Snower and Goerlich 2013). We merge this indicator to our dataset using occupational codes.

than workers with a permanent job. The relationship between commuting (measured by a dummy variable that takes the value 1 if the respondent's current job is not in the same city where he/she lives, and 0 otherwise) and work-related stress is positive, but not statistically significant in the FE model.[10] The table also shows that men are significantly less stressed at work than women.

To investigate the health consequences of work-related stress, Table 2.1 shows fixed-effects estimates of the relationship between work-related stress and subjective health (Column 1)[11] and number of doctor visits within the last three months (Column 2). The table shows that there is a positive and significant relationship between work-related stress and the two measures of health status. This is in line with studies reporting negative health implications of work-related stress (e.g., Boyce and Oswald 2012; Johnston and Lee 2013). To document the health consequences of work-related stress, we report OLS estimates for the relationship between eight diseases listed in the 2011 wave of the SOEP and work-related stress in Table 2.A4 in the Appendix. The estimates are based on separate regressions for each disease. The table shows that work-related stress is positively and significantly related to asthma, heart disease, migraine, high blood pressure, and depression.[12]

Table 2.2 shows the marginal effects based on the probit estimation for the relationship between work-related stress and absenteeism from work estimated by the probability of calling in sick from work as well as the OLS estimations for the number of days of sick leave in the next two and five years. The analyses are based on the answers of 2006 panel respondents. We find that stress is associated with a significantly higher probability of calling sick as well as with more days of sick leave. One standard deviation increase in work-related stress is associated with 0.5 percentage points increase in the likelihood to be sick from work for more than six weeks over the next two (five) years, and is associated with 2.4 (3.9) increase in the days of sick leave over the next two (five) years.[13]

Table 2.3 reports heterogeneity analyses for the relationship between stress and the probability of calling sick from work and the days of sick leave. Women, low-educated, and low-income workers are the most likely to respond to stress by calling sick and be absent from work for a larger number of days. The table further shows that the association between work-related stress and sick leave is more pronounced for married workers and workers with young children. This suggests that the combination of family-related obligations and work-related stress is associated with absenteeism from work.

These findings indicate that work-related stress generates costs for workers (in terms of bad health) and firms (in terms of absenteeism, i.e., productivity loss). Therefore, it is important to investigate whether there are remedies (i.e., channels through which work-related stress can be reduced) and whether workers use these channels.

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10 We obtain similar results when we use the distance commuted per week (number of commuting days per week * distance). We have also investigated the relationship between stress and close supervision using the question "Is your own performance regularly assessed by a superior as part of an agreed procedure?" which is available only in the 2011 wave. The regression shows that there is a significant relationship between close supervision and stress.

11 Subjective health is measured by the question "How would you describe your current health?. The answers are provided on a five-point scale that ranges from 1 "bad" to 5 "very good". We reversed the scale so that higher values indicate worse health.

12 The pattern is similar for both genders.

13 The table further shows that women, low-educated, and those with bad health are more likely to call in sick and take more days of sick leave.

Table 2.1

The relationship between work-related stress and subjective health measures, FE estimates

	(1)	(2)
VARIABLES	Bad health	Doctor visits
Work-related stress	0.115***	0.179***
	(0.013)	(0.062)
Age	0.012	0.136
	(0.029)	(0.135)
Age square	-0.000	0.000
	(0.000)	(0.001)
1 if married	0.033	0.156
	(0.038)	(0.178)
Children	-0.017	0.062
	(0.019)	(0.087)
Years of education	0.045	0.003
	(0.031)	(0.143)
Log income	0.015	-0.047
	(0.036)	(0.169)
Risk taking	-0.014**	-0.035
	(0.006)	(0.027)
Job satisfaction	-0.036***	-0.043
	(0.006)	(0.028)
Work experience	0.012	-0.139
	(0.022)	(0.105)
Work experience squared	0.000	0.001
	(0.000)	(0.001)
Constant	1.147*	-2.304
	(0.676)	(3.158)
Observations	9,374	9,374
R-squared	0.062	0.014
Number of individuals	4,687	4,687

Source: Fixed effects estimates based on own calculations from SOEP v29. Standard errors in parentheses ***p<0.01, **p<0.05, *p<0.1.

Table 2.2

The relationship between work-related stress and absenteeism from work

VARIABLES	(1) 1 if sick leave between 2006 and 2008	(2) 1 if sick leave between 2006 and 2011	(3) Days of sick leave between 2006 and 2008	(4) Days of sick leave between 2006 and 2011
Work-related stress	0.052**	0.050**	2.431***	3.924***
	(0.024)	(0.020)	(0.430)	(0.740)
1 if male	-0.038	-0.083*	-2.829***	-5.604***
	(0.055)	(0.045)	(0.988)	(1.700)
Age	0.035	0.080***	0.036	1.442**
	(0.024)	(0.020)	(0.417)	(0.719)
Age square	-0.000	-0.001***	-0.001	-0.019**
	(0.000)	(0.000)	(0.005)	(0.008)
Years of education	-0.051***	-0.036***	-0.743***	-1.118***
	(0.010)	(0.008)	(0.174)	(0.299)
Log income	-0.041	-0.086**	-0.217	-1.176
	(0.048)	(0.039)	(0.852)	(1.466)
1 if married	-0.017	-0.018	-2.112**	-4.575***
	(0.052)	(0.043)	(0.962)	(1.657)
Children	0.013	0.001	0.027	-1.094
	(0.028)	(0.023)	(0.497)	(0.856)
Working hours	-0.001**	-0.000	-0.009**	-0.014*
	(0.000)	(0.000)	(0.004)	(0.008)
Bad health	0.294***	0.254***	9.005***	15.232***
	(0.027)	(0.023)	(0.514)	(0.885)
Risk taking	0.016	0.000	0.142	0.226
	(0.011)	(0.009)	(0.192)	(0.331)
Job satisfaction	-0.001	0.000	-0.267	-0.474
	(0.002)	(0.002)	(0.196)	(0.325)
Work experience	-0.000	0.002	-0.006	0.615*
	(0.001)	(0.002)	(0.194)	(0.335)
Work experience square	0.000	0.000	0.006	-0.001
	(0.000)	(0.000)	(0.004)	(0.007)
Constant	-0.512	-1.385***	60.603***	77.334***
	(0.499)	(0.416)	(8.329)	(14.339)
Observations	8,720	8,720	8,720	8,720
R-squared	0.043	0.051	0.063	0.066

Source: Own calculations based on SOEP v29. Estimates are based on data from the 2006 wave. Columns 1 and 2 report the average marginal effects based on probit estimations evaluated at the mean of explanatory variables reported. Columns 3 and 4 report the OLS estimations. Standard errors in parentheses ***p<0.01, **p<0.05, *p<0.1.

Table 2.3

Heterogeneity analysis for the relationship between work-related stress and absenteeism from work

VARIABLES	(1) 1 if sick leave between 2006 and 2008	(2) 1 if sick leave between 2006 and 2011	(3) Days of sick leave between 2006 and 2008	(4) Days of sick leave between 2006 and 2011
A) Gender				
Female:				
Stress	0.109***	0.088***	3.579***	5.352***
	(0.033)	(0.028)	(0.686)	(1.160)
Male:				
Stress	0.002	0.005	1.486***	2.746***
	(0.004)	(0.005)	(0.539)	(0.946)
B) Age				
Young:				
Stress	0.054	0.061*	2.086***	2.392**
	(0.038)	(0.032)	(0.511)	(0.937)
Old:				
Stress	0.055**	0.043*	2.607***	4.841***
	(0.027)	(0.023)	(0.642)	(1.079)
C) Education				
Low education:				
Stress	0.057**	0.064***	2.697***	4.514***
	(0.025)	(0.022)	(0.582)	(0.979)
High education:				
Stress	0.057	0.012	2.084***	2.778**
	(0.046)	(0.036)	(0.599)	(1.100)
D) Income				
Low income:				
Stress	0.085***	0.064**	3.185***	4.391***
	(0.030)	(0.025)	(0.637)	(1.068)
High income:				
Stress	0.020	0.032	1.367**	2.989***
	(0.034)	(0.028)	(0.574)	(1.022)
E) Marital status				
Unmarried:				
Stress	0.055	0.046	1.451**	1.916
	(0.038)	(0.032)	(0.679)	(1.207)
Married:				
Stress	0.058**	0.054**	2.990***	5.045***
	(0.027)	(0.023)	(0.553)	(0.936)
F) Children				
No children:				
Stress	0.036	0.033	1.776***	2.504***
	(0.028)	(0.023)	(0.488)	(0.814)
Children:				
Stress	0.101***	0.083***	2.431***	3.229***
	(0.038)	(0.031)	(0.535)	(0.877)

Source: Own calculations based on SOEP v29. Estimates are based on data from the 2006 wave. Columns 1 and 2 report the average marginal effects based on probit estimations evaluated at the mean of explanatory variables reported. Columns 3 and 4 report the OLS estimations. Standard errors in parentheses ***p<0.01, **p<0.05, *p<0.1. Controls include age, age square, years of education, subjective health, marital status, children, income, risk attitude, working hours, job satisfaction, work experience, and type of contract. Standard errors in parentheses. ***p<0.01, **p<0.05, *p<0.1.

2.4 Labour supply adjustments to work-related stress

To study workers' labour supply adjustments to work-related stress, we relate workers' reported stress in 2006 to the probability of (1) job change, (2) reduction in working hours, and (3) transition out of employment within a time period of two and five years.[14] Table 2.4 shows the marginal effects based on the probit estimation of the relation between work-related stress and each of these labour supply adjustments.[15] The table shows that work-related stress is associated with a higher likelihood of changing jobs and of decreasing the number of working hours. A one standard deviation increase in work-related stress is associated with 3.6 (4.9) percentage points increase in the likelihood to switch jobs in two (five) years, and is associated with 4.5 (4.7) percentage points increase in the likelihood to reduce working hours in two (five) years. However, the transition out of employment is unrelated to work-related stress.[16]

Table 2.5 documents the heterogeneity among subgroups of workers in the labour supply adjustment to work-related stress. The table shows that the response to work-related stress is gender specific. Men are more likely to respond to stress by changing jobs, while women are more likely to reduce their working hours in response to stress. There are two possible explanations for why the response to work-related stress is different between the two genders. Firstly, women are more geographically constrained than men in their opportunities to change jobs (Manning 2003). Therefore, they have fewer opportunities than men to change jobs when they encounter work-related stress.[17] Secondly, it has been suggested that part-time jobs are more easily available for women than for men (Paull 2008), and that women report higher levels of life satisfaction when employed on a part-time basis (Booth and van Ours 2008; Gash et al. 2010). The table further shows that highly-educated workers are more likely to change jobs in response to stress than low-educated workers. This could be because the latter have fewer labour market opportunities. Low-income workers are more likely to reduce their working hours when stressed than high-income workers mainly because part-time employment is usually a characteristic of low-skilled occupations that usually pay less on an hourly basis (Manning and Petrongolo 2008).[18]

14 Selection due to panel attrition is a potential problem in this analysis, we try to reduce its magnitude by replicating the short-run analysis for the sample who appeared in the next two years. This gives similar results to the estimation on the smaller sample who kept on appearing in the next five years.

15 We use probit estimations and report marginal effects across the chapter. However, replicating the analysis using linear probability models gives qualitatively similar results.

16 We also estimated the relationship between work-related stress and occupational change measured as a change in the 3 digit occupation over the next two (five) years. We get qualitatively similar results to those obtained when estimating the relationship between stress and job switch if the latter is measured by a subjective question.

17 Manning (2003) show that women with domestic responsibilities are restricted in the distance they can travel to work.

18 To investigate whether this difference between low-income and high-income workers is driven by gender differences in adjustments to work-related stress, we re-estimated the analysis for the low-income and high-income subgroups after accounting for the interaction between gender and work-related stress. The pattern remains the same which suggests that our finding that low-income workers are more likely to reduce their working hours in response to work-related stress is not driven by gender differences.

Table 2.4

Labour market adjustments to work-related stress, probit estimates

VARIABLES	(1) 1 if job switch between 2006 and 2008	(2) 1 if job switch between 2006 and 2011	(3) 1 if hours decreased between 2006 and 2008	(4) 1 if hours decreased between 2006 and 2011	(5) 1 if exited labour market between 2006 and 2008	(6) 1 if exited labour market between 2006 and 2011
Work-related stress	0.036*	0.049***	0.045***	0.047***	-0.001	0.001
	(0.020)	(0.019)	(0.017)	(0.016)	(0.002)	(0.003)
1 if male	0.029	-0.001	-0.219***	-0.195***	-0.050***	-0.093***
	(0.043)	(0.039)	(0.035)	(0.035)	(0.006)	(0.007)
Age	0.025	0.045**	0.040***	0.084***	0.000***	0.000***
	(0.019)	(0.018)	(0.015)	(0.015)	(0.000)	(0.000)
Age square	-0.000**	-0.001***	-0.000**	-0.001***	0.019***	0.025***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.006)	(0.007)
1 if married	-0.009	-0.015	0.058*	0.073**	0.003	-0.002
	(0.042)	(0.039)	(0.034)	(0.034)	(0.003)	(0.004)
Children	0.006	0.010	0.032*	-0.010	-0.000	-0.001
	(0.022)	(0.020)	(0.018)	(0.018)	(0.001)	(0.001)
Years of education	0.039***	0.042***	0.004	-0.001	-0.019***	-0.020***
	(0.008)	(0.007)	(0.006)	(0.006)	(0.005)	(0.006)
Log income	-0.330***	-0.296***	-0.140***	-0.104***	-0.009***	-0.015***
	(0.037)	(0.034)	(0.032)	(0.032)	(0.003)	(0.004)
Working hours	-0.000	0.000	0.004***	0.004***	-0.024***	-0.040***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.002)	(0.003)
Bad health	0.036	0.066***	-0.038**	-0.004	-0.000	-0.000
	(0.023)	(0.022)	(0.019)	(0.019)	(0.001)	(0.001)
Risk taking	0.052***	0.032***	-0.003	-0.001	-0.004***	-0.008***
	(0.009)	(0.008)	(0.007)	(0.007)	(0.001)	(0.002)
Job satisfaction	-0.077***	-0.073***	0.013	0.024***	-0.005	-0.006
	(0.010)	(0.009)	(0.008)	(0.008)	(0.004)	(0.004)
Work exp.	-0.035***	-0.034***	-0.015**	-0.008	0.000**	0.000***
	(0.009)	(0.008)	(0.007)	(0.007)	(0.000)	(0.000)
Work exp. Sq.	0.001**	0.001***	0.000	0.000	-0.001	0.001
	(0.000)	(0.000)	(0.000)	(0.000)	(0.002)	(0.003)
Constant	-0.288	-0.545	-2.292***	-3.135***	-0.050***	-0.093***
	(0.364)	(0.343)	(0.304)	(0.301)	(0.006)	(0.007)
Observations	8,669	8,669	8,669	8,669	8,669	8,669
Pseudo R-squared	0.073	0.090	0.084	0.091	0.053	0.079

Source: own calculations based on SOEP v29. The table is based on data from the 2006 wave and shows marginal effects based on probit estimations evaluated at the mean of explanatory variables. Standard errors in parentheses ***p<0.01, **p<0.05, *p<0.1.

Table 2.5

Heterogeneity analysis for the labour market adjustments to work-related stress, probit estimates

VARIABLES	(1) 1 if job switch between 2006 and 2008	(2) 1 if job switch between 2006 and 2011	(3) 1 if hours reduction between 2006 and 2008	(4) 1 if hours reduction between 2006 and 2011	(5) 1 if out of labour market between 2006 and 2008	(6) 1 if out of labour market between 2006 and 2011
A) Gender						
Female:						
Stress	0.013**	0.017**	0.022***	0.029***	0.005	0.010*
	(0.006)	(0.007)	(0.004)	(0.005)	(0.004)	(0.006)
Male:						
Stress	0.029***	0.039***	0.015***	0.014**	-0.001	-0.002
	(0.005)	(0.006)	(0.005)	(0.006)	(0.003)	(0.003)
B) Age						
Young:						
Stress	0.017***	0.022***	0.020***	0.021***	0.003	0.007**
	(0.004)	(0.005)	(0.005)	(0.006)	(0.002)	(0.003)
Old:						
Stress	0.013***	0.018***	0.018***	0.021***	0.000	0.001
	(0.002)	(0.002)	(0.004)	(0.004)	(0.001)	(0.002)
C) Education						
Low education:						
Stress	0.014***	0.018***	0.016***	0.018***	0.003*	0.004*
	(0.003)	(0.003)	(0.004)	(0.004)	(0.002)	(0.002)
High education:						
Stress	0.019***	0.024***	0.017***	0.019***	-0.000	0.003
	(0.004)	(0.004)	(0.006)	(0.006)	(0.002)	(0.003)
D) Income						
Low income:						
Stress	0.016***	0.020***	0.024***	0.027***	0.003	0.004
	(0.003)	(0.004)	(0.005)	(0.005)	(0.002)	(0.003)
High income:						
Stress	0.014***	0.020***	0.013***	0.014***	0.001	0.004*
	(0.003)	(0.003)	(0.004)	(0.005)	(0.002)	(0.002)
E) Marital status						
Unmarried:						
Stress	0.014***	0.019***	0.019***	0.021***	0.002	0.005*
	(0.004)	(0.004)	(0.005)	(0.006)	(0.002)	(0.003)
Married:						
Stress	0.014***	0.020***	0.018***	0.021***	0.002	0.003
	(0.002)	(0.003)	(0.004)	(0.004)	(0.002)	(0.002)
F) Children						
No children:						
Stress	0.015***	0.018***	0.019***	0.022***	0.002	0.003
	(0.002)	(0.003)	(0.004)	(0.004)	(0.002)	(0.002)
Children:						
Stress	0.015***	0.025***	0.015**	0.018**	0.000	0.004
	(0.005)	(0.006)	(0.007)	(0.008)	(0.003)	(0.003)

Source: own calculations based on SOEP v29. Estimates are based on data from the 2006 wave and represent marginal effects based on probit estimations evaluated at the mean of explanatory variables. Standard errors in parentheses ***p<0.01, **p<0.05, *p<0.1. Controls include age, age square, years of education, subjective health, marital status, children, income, risk attitude, working hours, job satisfaction, work experience, and type of contract. Standard errors in parentheses ***p<0.01, **p<0.05, *p<0.1.

To investigate to what extent adjusting labour supply is associated with a reduction in work-related stress, Table 2.6 shows the relationship between job change (Column 1) and decrease in working hours (Column 2) after 2006 and reduction in work-related stress measured in 2011, i.e., up to five years later. Column 3 accounts for both job change and reduction in working hours.[19] The table shows that job change and hours decrease are associated with a decrease in work-related stress. This suggests that both behavioural responses are associated with reduced work-related stress.[20]

As Table 2.1 showed that work-related stress is associated with negative health outcomes, a logical question now is whether a reduction in stress (e.g., attained through labour supply adjustments) is associated with better health outcomes later in life. Table 2.7 shows the marginal effects based on the probit estimation for the relationship between stress reduction over the five year period from 2006 to 2011 and improvement in subjective health as assessed by the change in subjective health question between both years (Column 1) and the decrease in the number of doctor visits (Column 2). The table shows that stress reduction is indeed generally associated with better subjective health outcomes.

2.5 Concluding remarks

In this chapter we first showed that work-related stress is negatively associated to health outcomes and absenteeism from work. We then investigated short- and medium-term labour supply adjustments to work-related stress and their potential to reduce work-related stress. While the chapter does not tackle the endogeneity problem associated with individuals' unobserved heterogeneity in the willingness and the possibility to switch jobs and/or reduce working hours, the chapter makes use of the panel structure to study future consequences of work-related stress which has not yet been done in the literature. Workers respond to work-related stress by switching jobs and/or reducing working hours. These adjustments are gender-specific. While men are more likely to respond to stress

19 We have also estimated a model in which we accounted for the interaction between job change and hours reduction to estimate the effect of changing hours within a new job. The model does not show significant differences between changing hours within the same job or within a new job.

20 A causal interpretation of this relationship would require that labour supply adjustments to work-related stress are exogenous. Potentially, however, such labour supply adjustments might be endogenous as workers could differ in their willingness and ability to switch jobs and/or reduce working hours in response to work-related stress. In particular, the willingness and ability to change one's labour supply depends on one's alternative outside the current job, such as ones' level of employability, the labour demand in alternative relevant jobs, the matching technology, geographic location, etc. To deal with this potential endogeneity problem would require the use of an Instrumental Variables (IV) approach. Identification hinges on the availability of a valid exclusion restriction: a variable that affects the propensity to switch jobs (or reduce working hours) but does not have a direct effect on work-related stress. Such IVs are difficult to find, and we tried measures of self-reported employability and over-employment as potential instruments capturing workers' outside options but did not find these variables to be convincing IVs. One way to proceed in future research is to collect new data on better instrumental variables from administrative sources to deal with the endogeneity issue. For example, the share of the unemployed in a field of study and/or in detailed geographic area can be used as an instrument for switching jobs (as of yet, such data is not available to us, but expect to gain access in the near future). The level of unemployment affects workers' outside options and their ability to switch jobs. Although it could negatively affect work-related stress, it is plausible to assume that its effect on work-related stress is indirect and takes place through the channel of having limited outside options. The share of part-time workers in an occupation can also be used as an instrument for reducing working hours. Workers' constraints in working hours affect their ability to reduce working hours, but it has indirect effects on work-related stress (only through the inability to reduce working hours).

by switching jobs, women usually respond to stress by reducing their working hours. We further presented evidence suggesting that these adjustments are potentially effective in reducing work-related stress and improving health.

Table 2.6

The relationship between labour supply adjustments and stress reduction, probit estimates

	1 if stress decreased between 2006 and 2011		
VARIABLES	(1)	(2)	(3)
1 if job switch between 2006 and 2011	0.159***		0.157***
	(0.044)		(0.044)
1 if hours reduction between 2006 and 2011		0.177***	0.176***
		(0.039)	(0.039)
Male	0.005	0.020	0.020
	(0.045)	(0.045)	(0.045)
Working hours	0.001***	0.000**	0.000**
	(0.000)	(0.000)	(0.000)
Age	0.017	0.013	0.017
	(0.023)	(0.023)	(0.023)
Age square	-0.000	-0.000	-0.000
	(0.000)	(0.000)	(0.000)
Married	0.093**	0.089**	0.089**
	(0.043)	(0.043)	(0.043)
Children	-0.021	-0.020	-0.021
	(0.023)	(0.023)	(0.023)
Years of education	0.016*	0.019**	0.017**
	(0.008)	(0.008)	(0.008)
Log income	-0.058	-0.070*	-0.053
	(0.042)	(0.042)	(0.042)
Bad health	0.007	0.000	0.003
	(0.024)	(0.024)	(0.024)
Risk taking	-0.017*	-0.016*	-0.017**
	(0.009)	(0.009)	(0.009)
Job satisfaction	-0.084***	-0.090***	-0.085***
	(0.010)	(0.010)	(0.010)
Work experience	-0.003	-0.004	-0.002
	(0.010)	(0.010)	(0.010)
Work experience square	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)
Constant	-0.141	0.043	-0.143
	(0.454)	(0.451)	(0.454)
Observations	5,013	5,013	5,013
Pseudo R-square	0.033	0.035	0.036

Source: own calculations based on SOEP v29. Estimates show average marginal effects based on probit estimations evaluated at the mean of explanatory variables reported. Controls include age, age square, years of education, subjective health, marital status, children, income, risk attitude, working hours, job satisfaction, work experience, and type of contract. Standard errors in parentheses. ***p<0.01, **p<0.05, *p<0.1.

Table 2.7

The relationship between stress reduction and health improvement, probit estimates

VARIABLES	(1) 1 if better health between 2006 and 2011	(2) 1 if doctor visits decreased between 2006 and 2011
1 if stress decreased between 2006 and 2011	0.169***	0.078**
	(0.047)	(0.036)
1 if male	-0.004	0.100**
	(0.057)	(0.044)
Age	-0.087***	-0.019
	(0.029)	(0.023)
Age square	0.001***	0.000
	(0.000)	(0.000)
1 if married	-0.014	-0.096**
	(0.056)	(0.044)
Children	0.001	0.038*
	(0.030)	(0.023)
Years of education	0.025**	-0.003
	(0.010)	(0.008)
Log income	0.048	-0.101**
	(0.055)	(0.041)
Bad health	0.955***	0.089***
	(0.034)	(0.024)
Risk taking	0.011	0.012
	(0.012)	(0.009)
Work experience	0.001	0.002
	(0.003)	(0.004)
Work experience square	-0.000	-0.000
	(0.000)	(0.000)
Constant	3.760***	1.222***
	(0.567)	(0.445)
Observations	5,008	4,995
Pseudo R-square	0.108	0.010

Source: own calculations based on SOEP v29. Estimates show average marginal effects based on probit estimations evaluated at the mean of explanatory variables reported. Standard errors in parentheses. ***p<0.01, **p<0.05, *p<0.1.

Appendix

Table 2.A1

Items of the Effort-Reward Imbalance Scale

- ERI1 I have constant time pressure due to a heavy work load
- ERI2 I have many interruptions and disturbances while performing my job
- ERI3 Over the past few years, my job has become more and more demanding
- ERI4 I receive the respect I deserve from my superior or a respective relevant person
- ERI5 My job promotion prospects are poor
- ERI6 I have experienced or I expect to experience an undesirable change in my work situation
- ERI7 My job security is poor
- ERI8 Considering all my efforts and achievements, I receive the respect and prestige I deserve at work
- ERI9 Considering all my efforts and achievements, my job promotion prospects are adequate
- ERI10 Considering all my efforts and achievements, my salary/income is adequate
- OC1 I get easily overwhelmed by time pressures at work
- OC2 As soon as I get up in the morning I start thinking about work problems
- OC3 When I get home, I can easily relax and 'switch off' work
- OC4 People close to me say I sacrifice too much for my job
- OC5 Work rarely lets me go, it is still on my mind when I go to bed
- OC6 If I postpone something that I was supposed to do today I'll have trouble sleeping at night

Table 2.A2
Descriptive statistics

VARIABLE	Mean	Std. Dev.
Work-related stress	0.00	1.00
Changes in labour supply:		
Change job in two years	0.07	0.26
Change job in five years	0.11	0.31
Reducing working hours in two years	0.19	0.40
Reducing working hours in five years	0.24	0.44
Economic inactivity in two years	0.03	0.14
Economic inactivity in five years	0.05	0.20
Absenteeism and sick leave:		
Sick from work in two years	0.03	0.18
Sick from work in five years	0.06	0.24
Days of sick leave in two years	6.43	22.79
Days of sick leave in five years	12.76	38.30
Other variables:		
Age	43.71	10.71
1 if male	0.49	0.48
1 if married	0.62	0.48
Number of children	0.58	0.85
Years of education	12.88	2.82
Log income	2.61	0.53
Subjective health	3.55	0.84
Working hours	40.29	10.65
Evaluation by a supervisor	0.36	0.48
Risk taking (10 point scale)	4.81	2.10
Years of work experience	17.48	11.14

Source: own calculations based on SOEP v29.

Table 2.A3
Correlates of work-related stress

	(1)	(2)
	OLS	FE
VARIABLES	Work-related stress	
Working hours	0.002***	0.001***
	(0.000)	(0.000)
Multitasking	0.025***	0.024*
	(0.007)	(0.013)
Commuting	0.043**	0.059
	(0.020)	(0.036)
Temporary contract	0.351***	0.325***
	(0.082)	(0.087)
1 if male	-0.164***	
	(0.026)	
Age	0.046***	0.009
	(0.012)	(0.033)
Age square	-0.001***	-0.001***
	(0.000)	(0.000)
Years of education	0.022***	0.077**
	(0.005)	(0.034)
Log income	-0.138***	-0.119***
	(0.025)	(0.043)
1 if married	0.036	0.074*
	(0.024)	(0.043)
Children	-0.014	-0.032
	(0.013)	(0.021)
Risk taking	-0.034***	-0.015**
	(0.004)	(0.006)
Work experience	0.013**	0.046*
	(0.005)	(0.025)
Work experience squared	-0.000	0.000
	(0.000)	(0.001)
Observations	9,374	9,374
R-squared	0.064	0.042
Number of individuals		4,687

Source: own calculations based on SOEP v29. Standard errors in parentheses ***p<0.01, **p<0.05, *p<0.1.

Table 2.A4

The relationship between work-related stress and several diseases, probit estimations

VARIABLES	(1) Diabetes	(2) Asthma	(3) Heart disease	(4) Cancer	(5) Apoplectic stroke	(6) Migraine	(7) High blood pressure	(8) Depression
Work-related stress	0.031	0.091***	0.070***	0.012	0.017	0.131***	0.092***	0.262***
	(0.027)	(0.023)	(0.027)	(0.030)	(0.057)	(0.022)	(0.017)	(0.022)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	8,132	8,132	8,132	8,132	8,132	8,132	8,132	8,132
Pseudo R square	0.096	0.019	0.072	0.049	0.096	0.063	0.106	0.088

Source: own calculations based on SOEP v29. Estimates are based on data from the 2011 wave and represent marginal effects based on probit estimations evaluated at the mean of explanatory variables. Standard errors in parentheses ***p<0.01, **p<0.05, *p<0.1. Controls include age, age square, years of education, subjective health, marital status, children, income, risk attitude, working hours, job satisfaction, work experience, and type of contract. Standard errors in parentheses ***p<0.01, **p<0.05, *p<0.1.

03

TERRORISM AND THE INTEGRATION OF MUSLIM IMMIGRANTS[1]

1 This chapter is joined work with Andries de Grip. We acknowledge the comments and suggestions of Marion Collewet, Denis de Crombrugghe, Jan Feld, Maria Paula Gerardino, Olivier Marie, Jeffrey Nugent, Nicolas Salamanca, and Maria Zumbuhl, as well as participants of the Economic Research Forum (ERF) 19th annual conference in Kuwait, the 2013 "Migration: Global Development, New Frontiers" conference at the University College London (UCL), the 16th IZA European Summer School in Labor Economics in Buch/Ammersee, Germany, the DUHR research seminar at Maastricht University, Brown bag seminar at IZA, Bonn, and the 26th annual conference of the European Association of Labour Economists (EALE), Ljubljana, Slovenia.

3.1 Introduction

An emerging body of economic literature deals with the impact of fundamentalist Islamic terrorism on the different outcomes of Muslim immigrants (e.g., Cornelissen and Jirjahn 2012; Gautier et al. 2009; Goel 2010; Hanes and Machin 2012; Johnstan and Lordan 2011; Kaushal et al. 2007; Shannon 2012). The literature shows increasing discrimination against Muslims as a result of terrorism (Gautier et al. 2009; Goel 2010; Hanes and Machin 2012), as well as negative impacts of this discrimination on Muslim immigrants' health (Johnston and Lordan 2011) and labour market outcomes (Dávila and Mora 2005; Kaushal et al. 2007).[2] However, there are few studies on the impact of fundamentalist Islamic terrorist attacks on the integration of Muslim immigrants in Western societies.

This chapter assesses the relationship between terrorism and the integration of Muslim immigrants, using subjective measures of integration. The chapter investigates to what extent these subjective measures of integration could reveal more than objective measures such as labour market outcomes and geographic segregation, which are affected by various other determinants. For this purpose, we exploit a unique panel dataset that oversampled immigrants in the Netherlands, with detailed information on their attitudes and feelings towards their host country. The dataset consists of two waves. The first wave was collected during the years 2002–2003, while the second wave was collected over the period 2006–2007. Between the two waves, Western Europe witnessed the first and most violent wave of Islamist terrorism since September 11, 2001 (Bakker 2006). This began with the Madrid bombings on the 11th of March 2004, which were shown to have been directed by an Al Qaeda-affiliated group, killing 191 people and injuring 1,841.[3] The wave ended with the London bombings on the 7th of July 2005, which were committed by four Islamist suicide bombers, raised in the United Kingdom, leaving 52 people dead, as well as the four bombers, with over 700 injured.[4]

In this period, the Netherlands was also heavily affected by this wave of radical Islamic terrorism when Theo van Gogh, a famous Dutch film director, TV interviewer, and writer, was murdered on the 2nd of November 2004 by a young man of Moroccan origin who had recently converted to radical Islam.[5] This attack received enormous media attention and triggered nationwide outrage against Muslims (Gautier et al. 2009). In the weeks following the murder, there were several attacks on mosques and other Islamic institutions in the Netherlands (Gautier et al. 2009). The survey *Leefsituatie Allochtone Stedelingen* collected data on city dwellers of various ethnic minorities in the Netherlands directly after the murder of Theo van Gogh and asked their opinions on the murder's influence on the relationship

2 The effects of terrorism on Muslim immigrants' labour market outcomes in the literature are, however, not clear-cut. While some studies find that terrorism negatively affects the labour market outcomes of Muslim immigrants (e.g., Dávila and Mora 2005; Kaushal et al. 2007), other studies find little or no evidence (e.g., Åslund and Rooth 2005; Braakmann 2010; Shannon 2012). Others find negative effects for particular groups of Muslims, such as the young (Rabby and Rodgers 2009, 2010) and low skilled (Cornelissen and Jirjahn 2012).

3 See http://news.bbc.co.uk/2/shared/spl/hi/guides/457000/457031/html.

4 Detailed coverage of the 2005 London attacks can be found at the BBC website at http://news.bbc.co.uk/2/hi/in_depth/uk/2005/london_explosions/default.stm.

5 With the exception of some terrorist conspiracies and threats, there were no high-profile terrorist attacks in Europe from 11 September 2001 to 10 March 2004 (Nesser 2008). According to the Global Terrorism Database (2012), the three attacks listed above were the most significant Islamic terrorism attacks in Europe. For extensive details on fundamentalist Islamic terrorism in Europe over this period, see Bakker (2006, pp. 3–4).

between Muslims and non-Muslims. The great majority of the respondents, both native and foreign, reported that the murder had affected this relationship, and 20% of the respondents of Moroccan origin and 13% of the respondents of Turkish origin reported that their lives, as well as those of their families, had been affected by the murder (Gijsberts 2005).

We analyse changes in Muslim immigrants' integration in the Netherlands relative to those for non-Muslim immigrants before and after the attacks, using subjective measures of integration.[6] We find that Muslim immigrants' integration into Dutch society declined much more than that of non-Muslim immigrants following the terrorist attacks. This pattern is robust to the inclusion of a large set of controls, such as socio-demographics, employment status, share of the respondent's ethnic group in the municipality, and length of stay in the Netherlands. The pattern is also robust after controlling for selection bias. Since our data consist of only two waves, it is difficult to attribute the decline in the integration pattern of Muslims solely to discrimination associated with terrorism. Other factors might affect the speed at which different immigrant groups integrate. To check this possibility, we exploit the relatively long timeframe during which the data were collected in the first wave and use the timing of interviews to estimate whether a declining trend in the integration of Muslims, relative to non-Muslims, is already observed prior to the terrorist attacks. This analysis shows no evidence of a decline in Muslim immigrants' integration before the terrorist attacks, suggesting that it was the terrorist attacks that caused the change in the integration pattern of Muslim immigrants in the Netherlands.[7]

To show the relevance of subjective measures in assessing the effect of terrorist attacks on the level of immigrant integration, we also estimate the effect of terrorist attacks on objective measures of immigrant integration: the labour market outcomes and geographic segregation of Muslim immigrants. Similar to other studies that find no strong evidence of negative labour market outcomes due to terrorism (e.g., Åslund and Rooth 2005; Braakmann 2010; Shannon 2012), we find that neither unemployment nor working hours are negatively affected by the attacks. However, we find that the geographic concentration of Muslim immigrants increased after the attacks. The latter is in line with the findings of Gautier et al. (2009) that housing prices in Amsterdam declined in neighbourhoods with a large share of Muslim immigrants after the murder of Theo van Gogh.[8] Our analyses on the heterogeneous effects of the terrorist attacks show that low-educated Muslims are affected slightly more

6 Traditional measures of integration (e.g., language use, importance of religion, attitudes towards intra-marriage) were not available in the two waves of data. However, given that the social integration process of foreign minorities can take generations, assessing changes in immigrants' integration over a short period of time would be difficult using these traditional measures of integration. Our measures represent the basis of the integration process and could therefore capture immigrants' integration potential. Georgiadis and Manning (2013) show that immigrants who are treated with respect and who feel tolerated by natives are more likely to identify with the host country.

7 This, however, does not exclude the possibility that other events which took place between the two waves of the panel could have affected the strong decline in the integration of Muslims. Two major events could have played a role in this respect. First, in September 2004, Member of Parliament Geert Wilders formed a new political party – the *Partij Voor de Vrijheid* (PVV), or Party for Freedom – with strong opinions against Muslim immigrants. Second, in March 2006, a new immigration law was introduced with stricter requirements for immigrants coming into the country with the purpose of family reunification/formation, including a civic integration exam in Dutch. Given the data, we cannot disentangle the negative impact of the terrorist attacks from the impact of these two events. However, both events can clearly be placed in the context of the changing cultural climate against Muslim immigrants in the Netherlands.

8 Opposed to Gautier et al. (2009) who studied the effect of terrorism on Muslim immigrants at the neighbourhood level, we show changes in geographic segregation of Muslims using data at the individual level. One advantage

negatively in terms of labour market outcomes and get more geographically segregated, while highly educated (as well as employed, language proficient, and less religious) Muslims are affected most negatively with respect to their perceived integration. Moreover, we find that perceived integration is negatively associated with migrants' intention to return to their native country. This emphasizes the economic relevance of perceived integration of migrants as it is the most productive immigrants who perceive the strongest decline in integration.

The remainder of the chapter is organized as follows. Section 3.2 discusses the literature. Section 3.3 describes the data and variables used in the chapter. Section 3.4 explains the empirical strategy, reports the results of the data analyses, and describes the robustness checks. Finally, Section 3.5 summarises the findings and concludes the chapter.

3.2 Related studies

3.2.1 Terrorism and discrimination

The economic literature identifies two major types of discrimination: taste-based discrimination (Becker 1957) and statistical discrimination (Arrow 1973; Phelps 1972). Becker's theory of taste-based discrimination provides a plausible framework for our analysis. If members of the majority group are prejudiced against a minority group, the former will prefer not to interact with the latter (Cornelissen and Jirjahn 2012). Hence, as a consequence of the terrorist attacks, locals might have developed a (greater) distaste for Muslims, one that induces them to reduce their interaction with Muslims, ignore them, or commit hate crimes against them in the extreme case. This distaste increases the level of perceived discrimination by Muslim immigrants and decreases their integration within the host country. The concept of taste-based discrimination is closely related to in-group preference. Shayo and Zussman (2011) find evidence for this in-group preference bias by showing that Palestinian terrorist attacks in Israel have a significant impact on judicial in-group bias in small claims courts, where the assignment of a case to an Arab or Jewish judge is random.

Recent studies exploit exogenous shifts in natives' ethnic preferences to study taste-based discrimination. Moser (2012) uses data from opera programs, census records on first names, and food purchases in the United States to show that World War I created a preference shock against German Americans. The author uses this shock to ethnic preferences to identify the effects of taste-based discrimination in the application for seats on the New York Stock Exchange: The war more than doubled the probability that German applicants would be rejected relative to Anglo-Saxons. In a similar vein, Michaels and Zhi (2010) find that deterioration in the attitudes of Americans towards the French in 2002–2003 due to different stances on the war on Iraq had a significantly negative effect on the trade volume between the two countries.

Guryan and Charles (2013) show that loss of trust could be a "root cause" of discrimination. This loss of trust could explain the change in perceptions of the native population towards Muslims. Due to the salience of terrorist attacks, terrorism could have negatively affected

of our approach is the ability to study heterogeneous treatment effects of the impact of terrorism on Muslim immigrants.

mutual trust between natives and Muslim immigrants and therefore increased the perceived discrimination of Muslims; that is, the natives' perception that Muslim immigrants are dangerous and the Muslims' perception that natives are prejudiced against them could have been enhanced by the terrorist attacks.[9]

3.2.2 Impact of terrorism on Muslim immigrants

The exogeneity of terrorism has been exploited in the literature to study the impact of fundamentalist Islamic terrorist attacks on Muslim immigrants. For example, Kaushal et al. (2007) study the impact of September 11 on the labour market outcomes of Muslims in the United States and show that it was associated with a temporary 9–11% decline in earnings, though it did not significantly affect the employment and hours worked of Arab and Muslim men. However, Rabby and Rodgers (2009) find that the employment–population ratios and hours worked of young Muslim men in particular decreased significantly in the United States after September 11. Cornelissen and Jirjahn (2012) show that September 11 negatively affected the earnings of low-skilled Muslim workers in Germany, especially those employed in small and medium-sized firms. However, other studies do not find any impact of terrorism on the labour market outcomes of Muslims in Sweden (Åslund and Rooth 2005) or Canada (Shannon 2012). In the United Kingdom, the pattern is less clear-cut. While Braakmann (2010) finds no evidence of negative labour market outcomes for Muslims after September 11 and the July bombings, Rabby and Rodgers (2010) find a decrease in the employment of young Muslim men relative to non-Muslim immigrants after the July bombings and a weak association between September 11 and the employment of Muslim immigrants.

The impact of terrorism on the health outcomes of Muslim immigrants has also been investigated. Johnston and Lordan (2011) find evidence of increased blood pressure, cholesterol levels, BMI, and self-assessed general health for Muslims relative to non-Muslims as a result of September 11. The underlying mechanism described in these studies is increased discrimination against Muslims due to the anger caused by terrorism. Gautier et al. (2009) show strong evidence of this discrimination by documenting a decline in housing prices in Amsterdam neighbourhoods with a large share of Turks and Moroccans following the assassination of Theo van Gogh.[10] Furthermore, hate crimes against Asians and Arabs increased immediately in England after September 11 and the July bombings (Hanes and Machin 2012). The impact that large-scale fundamentalist Islamic terrorist attacks have on discrimination is not limited to the country in which the attacks take place. For example, Schüller (2012) shows that September 11 resulted in a significant increase in negative attitudes towards immigration and decreased concerns over xenophobic hostility among the native German population.

While the integration of Muslim immigrants into Western societies has started to receive considerable attention in the economic literature (e.g., Arai et al. 2011; Battu and Zenou 2010; Bisin et al. 2008, 2011; Georgiadis and Manning 2011, 2013; Manning and Roy 2010), no studies have used a panel structure to estimate changes in the integration of Muslim immigrants

9 In this case, statistical discrimination could be an additional mechanism to explain the change in attitudes towards Muslims.

10 More general geographical implications of terrorism have been addressed by Gleaser and Shapiro (2002), who study the impact of terrorism on "urban form" and find a positive but weak effect of terrorism on cities such as Jerusalem and London.

over time and account for unobserved heterogeneity. Goel (2010) estimates changes in perceptions of discrimination among Muslims following September 11. The author uses a set of interviews conducted before and after September 11 to estimate how Muslim-looking immigrants to Australia perceive intolerance relative to other immigrants. She finds that Muslim-looking immigrants report higher intolerance and discrimination than other immigrants.[11] Gold and Klor (2012) exploit variations across U.S. states in the number of hate crimes against Muslims in the wake of September 11 and show that September 11 had long-term effects on intermarriage, fertility, female labour force participation, and English proficiency among Muslim immigrants. The authors argue that a major goal of terrorist attacks is to induce a backlash against Muslim immigrants to radicalize moderate supporters who live in the same country as the perpetrators. In addition to this strategic objective for terrorism, the literature discusses several other political objectives such as changing standpoints of governments (Kydd and Walter 2006), or switching political attitudes of locals leftwards (Gould and Klor 2010), in addition to economic objectives such as causing large movements of capital across countries (Abadie and Gardeazabal 2008).

3.2.3 Subjective versus objective measures of integration

Labour market outcomes could provide objective measures for the integration of immigrants in host countries; however, they fail to measure discrimination in the highly regulated European markets (Åslund and Rooth 2005; Cornelissen and Jirjahn 2012). Furthermore, immigrants generally participate in networks of the same ethnic minority. Participation in these networks is usually associated with positive labour outcomes. Dustmann et al. (2009) show evidence of the existence and productivity of referral-based job search networks of ethnic minority workers. Casey and Dustmann (2010) find evidence that immigrants who actively participate in ethnic networks are more likely to find jobs through informal referrals. This suggests that the identification of immigrants with their home country, as opposed to the host country, is positively associated with labour market outcomes. Countervailing mechanisms could explain why, overall, evidence of the impact of terrorism on the labour market outcomes of Muslims is mixed.

The geographic segregation of migrant groups provides another objective measure of integration. The dislike of Muslims due to terrorist attacks could make natives move out of municipalities with high concentrations of Muslims, while Muslims could be more eager to move to such areas to obtain social support from being in a community of the same ethnic or religious background. Both scenarios will lead to higher levels of segregation of Muslim immigrants.

Subjective measures of integration could potentially reveal more than objective outcomes. The perceived discrimination of Muslim immigrants could increase due to the terrorist attacks, even if they are not personally affected by this discrimination in objective (direct) ways. The rise in hate crimes against Muslims in the wake of the terrorist attacks could be a basis for increased perceived discrimination (Johnston and Lordan 2012). In

11 Goel's (2010) results are based on a cross section of recently arrived immigrants (the second wave of a longitudinal survey of immigrants to Australia), making it difficult to account for unobserved immigrant heterogeneity. In addition, the measures used in that study are limited to binary perceptions of intolerance and discrimination in Australia. Our study differs in that it goes one step further, beyond perceptions of fair/unfair treatment, and assesses changes in immigrants' feeling at ease with natives and attitudes towards living in the host country.

addition, everyday discriminatory experiences (which arguably increase after the terrorist attacks) such as being stopped by the police, verbal attacks, or disrespectful treatment in public particularly increase the likelihood of one's perception of belonging to a discriminated minority (Brüß 2008). Georgiadis and Manning (2013) show that immigrants' feeling of disrespect and intolerance by natives has negative implications on their identifying with the host country.

While the impact of terrorist attacks on objective outcomes is expected to be more pronounced for low-skilled immigrants (Cornelissen and Jirjahn 2012), discrimination is more likely to be perceived by highly skilled immigrants because of their high expectations of integration in the host country. Banerjee (2008) indeed finds that immigrants' perceived discrimination is not related to objective measures of income inequity. She shows that, in workplace settings, long-term immigrants and highly skilled immigrants perceive discrimination more than new immigrants and low-skilled immigrants because of their expectations of equitable treatment. The literature shows that perceived discrimination is negatively associated with both mental (Kessler et al. 1999) and physical health (Johnston and Lordan 2012) and has a negative impact on life satisfaction (Redman and Snape 2006).

3.3 Data and descriptive statistics

The Netherlands Kinship Panel Study consists of two datasets. The first dataset covers the Dutch native population, while the second oversamples immigrants from the four largest immigrant groups in the Netherlands: Turks, Moroccans, Surinamese, and Dutch Antilleans. The data were collected from 13 Dutch cities in which at least half of the immigrant population lives (Dykstra et al. 2005; 2012). We use data from the second dataset, which oversamples immigrants. The data panel structure consists of two waves. The first wave of data was collected between April 2002 and October 2003, while the second was collected between May 2006 and June 2007.[12] The dataset contains individual information about religion, age, ethnic group, employment status, marital status, year of immigration, whether or not the individual was born in the Netherlands, and so forth. Furthermore, we include information about the share of the individuals' own ethnic groups in the municipalities in which they live, drawn from Statistics Netherlands.[13]

The dataset also includes information about immigrants' attitudes towards integration. The respondents were asked eight questions on the extent to which they agree with each of the following statements: (1) "In the Netherlands foreigners have excellent opportunities"; (2) "The Dutch are hostile to foreigners"; (3) "In the Netherlands your rights as a foreigner are respected"; (4) "The Dutch are hospitable to foreigners"; (5) "In the Netherlands people are indifferent to foreigners"; (6) "Foreigners are treated fairly in the Netherlands"; (7) "Foreigners face many restrictions in the Netherlands"; and (8) "The Dutch are open to foreign cultures". The answers were given on a five-point scale, ranging from one ('strongly disagree') to five ('strongly agree'). Respondents were also asked about their appreciation of living in the

12 The long period over which the data were collected is due to the difficulty in reaching the target groups (Dykstra et al. 2005, 2012).

13 See the Statistics Netherlands website: http://statline.cbs.nl/StatWeb/

Netherlands – (9) "How do you like living in the Netherlands?" (with answers ranging from one, "very fine", to five, "very annoying") and their social experience with locals – (10) "Do you feel at ease in the company of Dutch people?" (with answers on a four-point scale, with one for "no, not at all", two for "no, not really", three for "yes, a little", and four for "yes, very much so").[14]

Our sample consists of 1,085 observations for which we have full information on all integration attitudes, demographics, and religion.[15] Of this set, 476 observations are for Muslim immigrants (160 in the first wave and 316 in the second wave) and 609 observations are for non-Muslim immigrants (309 in the first wave and 300 in the second wave). For 432 individuals (152 Muslims and 280 non-Muslims), data exist in both waves of the panel. Table 3.A1 in the Appendix provides an overview of the single items of integration, as well as the variables used in the study. The table shows that non-Muslim immigrants score significantly higher than Muslims in most of the integration items. In our sample, 56% of non-Muslims and 46% of Muslims are females. The share of second-generation respondents (i.e., those born in the Netherlands) is small (6% of the Muslims and 8% of the non-Muslims). This low share is due to the fact that the survey only includes individuals who are 18 years or older. Muslims are, on average, less educated than non-Muslims. In addition, they are less likely to have received education abroad or in the Netherlands than non-Muslims. While the majority of Muslims belong to the Turkish and Moroccan ethnic minorities, the majority of non-Muslims belong to the Surinamese and Dutch Antillean ethnic minorities. Geographic concentration in municipalities is higher for Muslim than for non-Muslim immigrants. Non-Muslims are more likely to be employed (63%) than Muslims (46%). In addition, a greater percentage of Muslims in our sample are married and have children.

Figure 3.1 shows the changes in the level of integration for both Muslim and non-Muslim immigrants between the two waves of the study (the integration items are standardized for ease of comparison). The figure shows that, between the two waves, integration measures declined for both groups. However, the decrease is much more pronounced among Muslims than among non-Muslims. Table 3.A2 in the Appendix summarises the changes and shows the difference-in-difference estimates of the integration items. The difference-in-difference coefficients show that the decline was more significant for Muslims than for non-Muslims in five out of the 10 measures of integration, namely, excellent opportunities for foreigners, fair treatment of foreigners in the Netherlands, Netherlands is open to foreign cultures, feeling at ease with Dutch natives, and appreciation of living in the Netherlands.

We use an integration index that is constructed by grouping the 10 individual items.[16] Following Kling et al. (2007), we estimate an index of the equally weighted averages of the z-scores of the 10 items. The z-scores are calculated by subtracting the control group (Non-Muslims) mean and dividing by the control group standard deviation. Therefore, for

14 The first eight items are used in the sociological literature as a measure of perceived acceptance by the host country (Huijnk et al. 2012). The scale for items (2), (5), (7), and (9) is reversed so that the higher the value, the better the outcome in terms of integration.

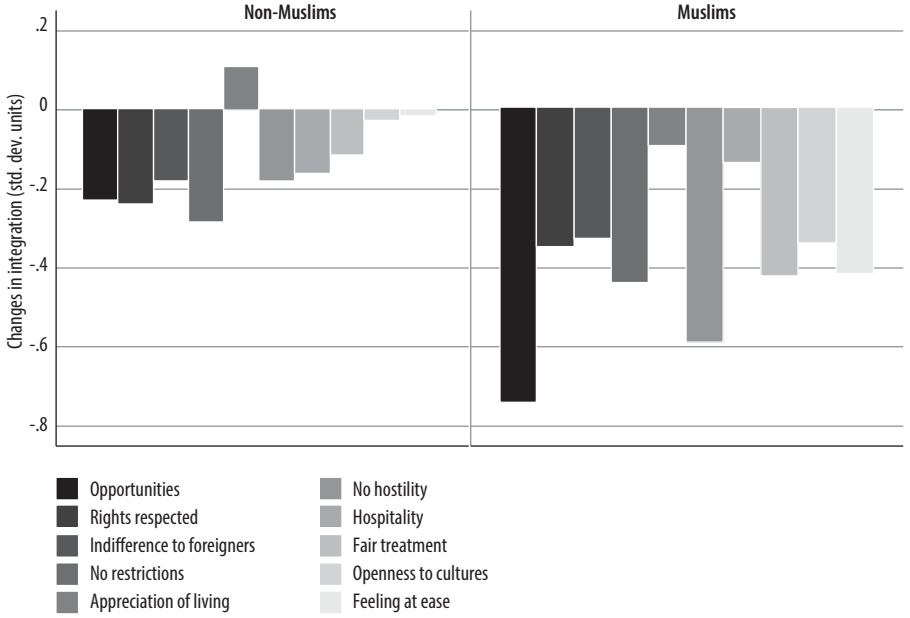
15 Running the analysis without sample restrictions yields similar results.

16 This has the advantage of reducing the likelihood of type I error (that the result for any single item is due to chance), as well as type II error (the risk of low statistical power) (Clingingsmith et al. 2009).

Non-Muslims in our sample, each item in the index has mean zero and standard deviation one.[17]

Figure 3.1

Changes in integration attitudes for Muslim and non-Muslim immigrants between the two panel waves.



3.4 Empirical model and analysis

3.4.1 Main analysis

To identify the effect of the terrorist attacks in Western Europe on the integration of Muslim immigrants, we estimate the following equation:

$$Y_{it} = \alpha + \beta_1 M_{it} + \beta_2 PA_t + \beta_3 [M_{it} * PA_t] + \beta_4 X_{it} + u_i + \varepsilon_{it}$$

where Y_{it} the integration level of immigrant *i* at time *t*, *M* is a dummy variable that takes the value one if the respondent is Muslim and the value zero if the respondent is non-Muslim, *PA* is a dummy variable that takes the value one if the observation is from the second wave of the study (after the terrorist attacks) and equals zero otherwise, the parameter β_3 for the

17 An alternative approach is to compute the average effect size across items within the integration index, using seemingly unrelated regression for the 10 items to estimate the covariance of the effects and then calculating the mean effect size for the 10 items in a second step (Clingingsmith et al. 2009; Kling et al. 2004). Since we use a consistent number of observations across the 10 items of integration and there are no regression adjustments, the two approaches give identical results (Kling et al. 2007). Without a consistent number of observations, the results would remain very similar. The advantage of the average z-score index used in this chapter is that it is much simpler to work with, especially when using panel data (Kling et al. 2007).

interaction between *M* and *PA* is our measure of change in Muslims' integration compared to that of non-Muslims, X_{it} is a set of controls, u_i is an individual fixed effect that we assume to be uncorrelated with the timings of the terrorist attacks, and ε_{it} is a time-varying error term.

Table 3.1

Change in the Integration of Muslim and non-Muslim immigrants after terrorist attacks (unbalanced panel data).

	Perceived integration	
	(1)	(2)
VARIABLES	RE	FE
Muslim	0.173*	
	(0.097)	
Post-attacks	-0.167***	-0.283***
	(0.048)	(0.073)
Muslim * Post-attacks	-0.270***	-0.320***
	(0.072)	(0.110)
Constant	-0.221	0.081
	(0.149)	(0.519)
Controls	Yes	Yes
Observations	1,085	1,085
Number of individuals	869	869

Note: RE= Generalised least squares with random effects, FE= Fixed Effects. Perceived integration is measured by an index of the equally weighted averages of the z-scores (based on mean and standard deviation of non-Muslim group) of the 10 integration items. Muslim is a dummy variable for being Muslim, post-attacks takes the value one if the observation is from the second wave (after terrorist attacks), and zero otherwise. Controls include gender, employment status, education, marital status, ethnic group, number of children, a dummy for being born in the Netherlands, a dummy for having had education in the Netherlands, length of stay in the Netherlands, length of stay squared, share of migrants with the same ethnic background in the municipality, and regional dummies. Standard errors in parentheses ***p<0.01, **p<0.05, *p<0.10.

We estimate both a fixed effects (FE) and a generalised least squares model with random effects (RE) clustered on personal identification. Table 3.1 shows the coefficients of the two models. Column 1 shows the FE model estimates and Column 2 shows the RE model estimates after controlling for a large set of control variables: ethnic group, gender, dummies for marital status and employment status, whether or not the respondent was born in the Netherlands, length of stay in the Netherlands, length of stay in the Netherlands squared, education level, whether or not the respondent received education abroad, whether or not the respondent received education in the Netherlands, the municipality in which the immigrant lives, the share of the respondent's ethnic minority in the municipality, and the number of children.[18] The table shows that perceived integration of Muslim immigrants in

18 In addition to the set of controls included in Table 3.1, we estimate a model that controls for the partner's birthplace, family income (available only in the first wave), fluency in Dutch, and speaking Dutch when communicating with their children (only available in the second wave). Although the number of observations declines sharply when these variables are included, the results are still robust. We also estimate a model in which we control for interaction between the survey wave and employment status, marital status, and education level to account for any possible differences between Muslims and non-Muslims in the changes of these variables over time. This

the Netherlands decreased significantly after the terrorist attacks relative to non-Muslim immigrants. This can be seen in the interaction coefficients between *Muslim* and *Post-attacks*, which are negative and statistically significant in the two columns.[19]

3.4.2 Selection bias

We acknowledge the potential for selection bias due to panel attrition in the dataset; out of the 469 respondents for whom we have information on integration and background characteristics in the first wave, only 216 continued to appear in the second wave. It is reasonable to assume that immigrants absent from the second wave of the sample would have reported lower integration than those who remained. Since Muslims' perceived integration would be affected by the terrorist attacks more than that of other immigrants, Muslims may also have been more likely to drop out of the study (or even leave the country). However, this panel attrition would lead to under-estimation of the decline in the integration of Muslim immigrants, accentuating the actual decrease in the integration pattern of Muslims.[20] To account for selection bias into the second wave, we replicate the analysis using a balanced sample made up of respondents for whom we have complete information in the two waves of the study. However, contemporaneous shocks could have affected participation in the second wave of the study. For example, as stated earlier, those most affected by the terrorist events may have been less likely to participate in the second wave of the survey (or may even have left the country). For this reason, even a balanced panel estimate may not truly reflect the actual change in Muslims' integration. To correct for this, we compute a Mills ratio using a selection variable that equals one if the individual is observed in the two waves of the study as our dependent variable in the selection equation. Table 3.A3 in the Appendix shows the estimates from the selection equation as a function of all independent variables, as well as a dummy variable that takes the value one if the number of missing items in the respondents' answers to all the questions in the first wave is above the median and zero otherwise.[21] This variable is used to satisfy the exclusion restriction, which is possible since the likelihood that a respondent will be absent from the second wave should be correlated with the number of questions the respondent did not answer in the first wave. That is, immigrants who answered fewer questions in the first wave should be more likely to drop out in the second wave. However, the number of missing answers should not be correlated with the timing of the terrorist attacks.

Table 3.2 shows the FE and RE model estimates from the balanced sample after accounting for the inversed Mills ratio and all the other relevant variables. The table shows results similar to those in Table 3.1. The coefficients of the inversed Mills ratio are not significant. This shows that selection bias does not drive our results. However, this assumes that the number of

model yields similar results. In the analysis presented in this chapter, the respondent's age is removed because of potential collinearity with length of stay in the Netherlands. However, adding the variable yields similar results.

19 To account for the possibility that the decrease in integration is affected by a different pattern of extreme answers for the integration questions by Muslim and non-Muslim immigrants, we re-estimate the model after removing the extreme answers. The results remain unchanged.

20 However, it could also be the case that non-respondents are busier than respondents and therefore do not show up in the second wave. In this case, the direction of the bias is difficult to determine a priori (Heffetz and Rabin 2013).

21 The median in the sample is 10 unanswered questions out of 97 asked in the first wave of the questionnaire. We re-estimated the analysis using the actual number of unanswered questions as an alternative to the dummy variable and found similar results.

missing answers in the first wave of the study is the only (substantive) reason for presence in the second wave. To better capture the bias, an ideal experiment would be to randomly assign respondents to participation in the second wave of the study and test whether the estimated impacts (including attrition) are similar in the treatment group (participants) and the control group (non-participants), that is, whether the three-way interaction between a dummy variable for above-median missing answers in the first wave, a dummy variable for being a Muslim, and a dummy variable for the post-attacks is statistically insignificant. Table 3.A4 in the Appendix shows that the three-way interaction term is not statistically significant, suggesting that there no evidence of selection bias in our analysis.

Table 3.2

Change in the Integration of Muslim and non-Muslim immigrants after terrorist attacks (balanced panel data).

	Perceived integration	
	(1)	(2)
VARIABLES	RE	FE
Muslim	0.034	
	(0.194)	
Post-attacks	-0.213***	-0.283***
	(0.061)	(0.069)
Muslim * Post-attacks	-0.318***	-0.321***
	(0.114)	(0.113)
Inverse Mill's ratio	-0.067	-0.322
	(0.160)	(2.824)
Constant	-0.012	0.264
	(0.315)	(2.026)
Controls	Yes	Yes
Observations	432	432
Number of individuals	216	216

Note: RE= Generalised least squares with random effects, FE= Fixed Effects. Perceived integration is measured by an index of the equally weighted averages of the z-scores (based on mean and standard deviation of non-Muslim group) of the 10 integration items. Muslim is a dummy variable for being Muslim, post-attacks takes the value one if the observation is from the second wave (after terrorist attacks), and zero otherwise. Controls include gender, employment status, education, marital status, ethnic group, number of children, a dummy for being born in the Netherlands, a dummy for having had education in the Netherlands, length of stay in the Netherlands, length of stay squared, share of migrants with the same ethnic background in the municipality, and regional dummies. Standard errors in parentheses ***p<0.01, **p<0.05, *p<0.1.

3.4.3 Possible trend prior to the terrorist attacks

Since our analysis begins after the September 11 attacks, the effect we find may be biased. As indicated above, some studies show that September 11 was associated with labour market discrimination against certain minority groups and changed attitudes towards immigrants not only in the United States, but also in other Western countries (e.g., Cornelissen and Jirjahn 2012; Goel 2010; Schüller 2012). Since fundamentalist Islamist terrorism affects the integration of Muslim immigrants, it is likely that the perceived integration of Muslim immigrants had

already been negatively affected by September 11 before our analysis started. However, the analysis above (Table 3.1) does not show strong evidence of differences in integration between Muslims and non-Muslims before the wave of terrorist attacks in which we are interested. Furthermore, even if Muslims are less integrated, this would make our point stronger, since this underestimates our coefficients on the decrease in Muslims' integration.

However, if a pattern of change in Muslim immigrants' integration began before the wave of terrorism of interest (i.e., before March 2004), this would imply that the change in Muslim immigrants' attitudes is not a result of the terrorist attacks but could, instead, be due to endogenous factors that affect the speed of integration differently for Muslim and non-Muslim immigrants. To account for the possibility that the negative trend in the integration pattern of Muslim immigrants pre-dates the terrorist attacks that hit Western Europe, we exploit the timing of interviews during the first wave of the dataset to analyse whether Muslims interviewed late in the first wave are less integrated than those interviewed earlier. If such a pattern is already observed before the terrorist attacks, it would be difficult to attribute the decline in the integration of Muslim immigrants to the terrorist attacks. Since the first wave of the data was collected over quite a long timeframe, a trend could be identified.

Figure 3.2 shows the trends in the integration of Muslim and non-Muslim immigrants in the two waves of the study. The graph shows that during the first wave of the survey, the integration of Muslims was increasing relative to that of non-Muslims. This suggests no pre-trend in the relative decline in the integration of Muslims.[22] The figure also clearly shows a drop in the integration for the two groups of immigrants between the two waves. During the second wave, the integration level of non-Muslims was increasing, which does not hold for Muslim immigrants.

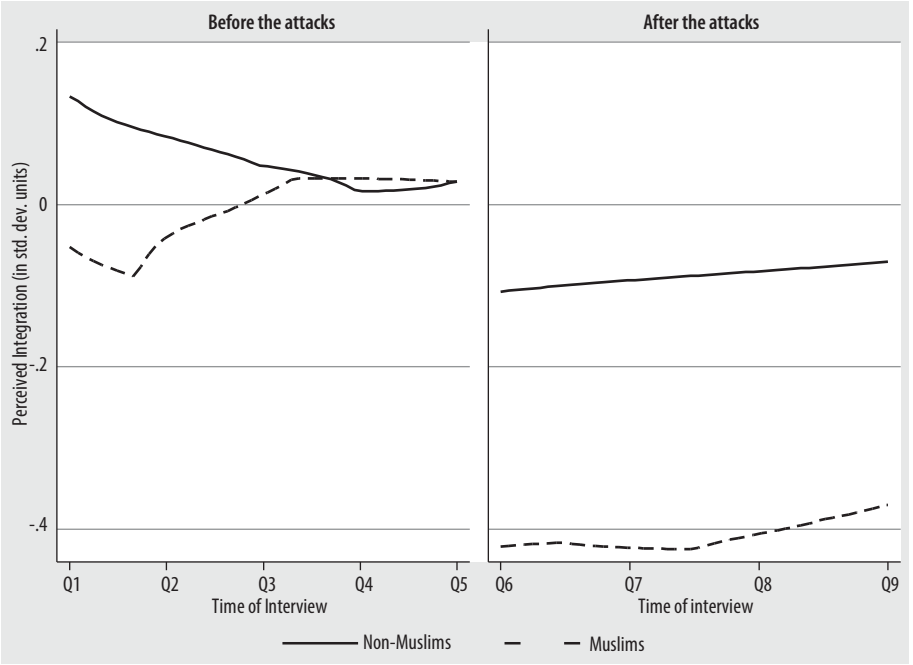
Table 3.A5 in the Appendix shows the coefficients for the regression of perceived integration on the times of the interviews, measured in year quarters, in the first wave (Column 1) and the second wave of the study (Column 2). The table shows that, after all relevant information is controlled for, the increasing pattern of integration for Muslims during the first wave as shown in Figure 3.2 is not significant, while the decreasing pattern of integration for Muslims compared to non-Muslims during the second wave is significant[23] This shows that the decline in Muslims' integration started in the 2004–2005 period of terrorist attacks.

22 A regression of the times of the interviews on all variables of interest shows no significant differences between Muslim and non-Muslim immigrants in the times of the interviews. This suggests that the trend is not driven by a non-random pattern in collecting the data.

23 The same pattern appears when we limit the analysis to individuals who participated in both panel waves.

Figure 3.2

Trends in the integration of immigrants before and after the terrorist attacks.



Note: The graph is based on an unbalanced panel of 448 observations before the attacks and 599 observations after the attacks. Time of interview is in year quarters. Q1= April-June 2002, Q2= July-Sep. 2002, Q3= Oct.-Dec. 2002, Q4=Jan.-March 2003, Q5=April-July 2003, Q6=June-Aug. 2006, Q7=Sep.-Nov. 2006, Q8= Dec. 2006-Feb. 2007, Q9=March 2007-May2007, The trend is similar when using a balanced sample of observations participating in the two waves of the study.

3.4.4 Heterogeneous effects

In this subsection, we study whether the attacks had a uniform impact across the entire group of Muslim immigrants or whether the impact varied across subgroups. We examine whether there is any heterogeneity in the decline of integration with respect to the pre-attacks covariates of gender, age, level of education, labour market status, language proficiency, and degree of religiosity. Table 3.3 shows the results of the FE and RE estimations from Table 3.1 for split samples by gender (Panel A), age (Panel B), education level (high vs. low education) (Panel C), labour market status (employed vs. unemployed) (Panel D), language proficiency (Panel E), and degree of religiosity (Panel F).[24]

24 We assess religiosity by the frequency the respondent reports for going to the mosque. We create a dummy variable for being religious that takes the value zero if the person hardly ever goes to the mosque and one if the respondent goes to the mosque frequently. We limit the analysis of this heterogeneity check to Muslims. Therefore, the coefficient for Post-attacks will capture the changes for less religious Muslims (Columns 1 and 3) and more religious Muslims (Columns 2 and 4). We also replicated the analysis while limiting the sample to men, because women (even the most religious) are less likely to go to the mosque than men are. The results do not change.

Table 3.3

Change in the Integration of Muslim and non-Muslim immigrants after the terrorist attacks. Heterogeneity by gender, age ,education, labour market status, language proficiency, and religiosity.

	Perceived integration			
	RE		FE	
VARIABLES	(1)	(2)	(3)	(4)
A) Gender	Men	Women	Men	Women
Muslim* Post-attacks	-0.333***	-0.188*	-0.338**	-0.257
	(0.101)	(0.110)	(0.152)	(0.175)
Observations	530	555	530	555
Number of Individuals	423	446	423	446
B) Age	Below 40	Above 40	Below 40	Above 40
Muslim* Post-attacks	-0.350***	-0.215**	-0.389**	-0.123
	(0.102)	(0.107)	(0.174)	(0.167)
Observations	491	590	491	590
Number of Individuals	417	468	417	468
C) Education	High	Low	High	Low
Muslim* Post-attacks	-0.537***	-0.087	-0.682***	-0.119
	(0.115)	(0.101)	(0.158)	(0.155)
Observations	429	481	429	481
Number of Individuals	328	366	328	366
D) Labour market status	Employed	Unemployed	Employed	Unemployed
Muslim* Post-attacks	-0.352***	-0.115	-0.433***	-0.026
	(0.096)	(0.112)	(0.135)	(0.163)
Observations	594	488	594	488
Number of Individuals	466	400	466	400
E) Language proficiency	Proficient	Non-proficient	Proficient	Non-proficient
Muslim* Post-attacks	-0.305***	-0.330	-0.428***	0.027
	(0.084)	(0.293)	(0.116)	(0.634)
Observations	808	262	808	262
Number of Individuals	631	225	631	225
F) Religiosity	Less religious	More religious	Less religious	More religious
Post-attacks	-0.720***	-0.447***	-1.058***	-0.447***
	(0.156)	(0.074)	(0.234)	(0.074)
Observations	126	345	126	345
Number of individuals	105	290	105	290

Note: Controls as in Table 3.1. Low education group is the group with elementary education, lower vocational, or lower secondary education. High education group is the group with intermediate vocational education, intermediate and upper general secondary, higher vocational education, or university education. Employed takes the value 1 if the individual was employed in the first wave, and 0 otherwise. Language proficiency is a dummy for being proficient in Dutch. Religiosity is a dummy variable that takes the value one if the Muslim respondent went to the mosque frequently, and 0 if the respondent hardly went to the mosque. For all variables of division, we use the pre-attacks level of the variable as a basis for the division. Robust standard errors in parentheses ***p<0.01, **p<0.05, *p<0.1.

The table shows that the decrease in the integration of Muslims is more pronounced for males and young, highly educated, employed, fluent, as well as less religious Muslims. These findings show that particularly Muslim immigrants with high potential for integration are affected more negatively. This could be explained in light of their expectations of integration in the host country. These groups of Muslims are more likely to expect to be dealt with similarly to natives (Banerjee 2008). Deviations from this expectation due to perceived discrimination may lead them to feel unintegrated in the host country. Moreover, those who are employed are more likely to encounter harassments and perceive discrimination because they more often interact with natives than those who are not employed, while those who are fluent are more likely to understand any verbal attacks in streets and in the media of the host country and, therefore, are more likely to perceive discrimination. Furthermore, the decrease in integration is more pronounced for less religious Muslims who already have higher potential for integration in the host country compared to more religious Muslims.

To check the possibility that selection bias into the second wave of the study could be driving these results, Table 3.A6 in the Appendix shows the heterogeneous treatment effects for observations that appeared in the two waves of the study after accounting for the inversed Mills ratio as well as other relevant controls. Despite the lower number of observations, the estimates are similar to those obtained from the whole sample.

3.4.5 Objective versus subjective measures of integration

In this subsection, we estimate the effect of the terrorist attacks on the Muslim immigrants' objective outcomes of unemployment, working hours, as well as geographic concentration.[25] Table 3.4 shows the difference-in-difference estimations. Columns 1 and 2 show the RE and FE estimates for unemployment, respectively; Columns 3 and 4 show the RE and FE estimates for working hours, respectively; and Columns 5 and 6 show the RE and FE estimates for geographic concentration of immigrants, respectively. Similar to Åslund and Rooth (2005) and Braakman (2010), the table shows that the labour market outcomes of Muslim immigrants were not negatively affected by the terrorist attacks. As mentioned above, labour market regulations and networking within ethnic minorities are possible explanations for not finding any effect of the terrorist attacks on the labour market outcomes of Muslims (Cornelissen and Jirjahn 2012).[26] However, the table shows that the geographic concentration of Muslim immigrants relative to non-Muslim immigrants significantly increased over time. The share of people with the same ethnic background increased by about 0.3 (0.2) percentage points for Muslims compared to non-Muslims after the attacks. Table 3.A7 in the Appendix shows the heterogeneous treatment effects for labour market outcomes and geographic concentration. The effect of terrorist attacks seems to be more pronounced for low-educated Muslims who witnessed a relative increase in unemployment (significant only at the 10% level) as well as a significant increase in geographic concentration.

The difference in the impact of terrorist attacks on geographic concentration between low-skilled and highly skilled Muslims could be due to the fact that low-educated immigrants who are more often unemployed are less constrained to move than highly educated

25 We could not use wages here since our dataset does not contain a consistent measure of labour income across the two waves of the study.

26 Similar patterns appear when we compare the labour market outcomes of Muslim immigrants to those of natives.

immigrants who are more likely to be employed. Moreover, low-skilled migrants usually participate in ethnic networks and find jobs through informal referrals (Casey and Dustman 2010; Damm 2009; Edin et al. 2003). This suggests that low-skilled Muslims might compensate the negative effects of terrorist attacks on unemployment by grouping together. Furthermore, the increase in geographic concentration of low-skilled Muslims after the attacks could be a buffer that mitigates the effect of terrorism on their integration as they could obtain social support from being in a community of the same ethnic background. This could explain why low-skilled migrants do not perceive discrimination as much as the highly skilled do.

Table 3.4

Terrorism and change in objective measures of integration

	Unemployment		Working hours		Geographic concentration	
	RE	FE	RE	FE	RE	FE
	(1)	(2)	(3)	(4)	(3)	(4)
Muslim	-0.047		-1.348		-0.001	
	(0.051)		(1.677)		(0.004)	
Post-attacks	0.003	-0.012	1.339*	0.989	0.001	0.001
	(0.023)	(0.034)	(0.777)	(1.061)	(0.001)	(0.001)
Muslim *Post- attacks	0.001	0.061	-1.180	-1.072	0.003***	0.002***
	(0.036)	(0.048)	(1.227)	(1.479)	(0.001)	(0.001)
Constant	0.120	0.182	46.551***	46.720***	0.021***	0.034***
	(0.078)	(0.234)	(2.680)	(4.356)	(0.006)	(0.003)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,085	1,085	580	580	1,085	1,085
Number of individuals	869	869	470	470	869	869

Note: RE= Generalised least squares with random effects, FE= Fixed Effects. Unemployment is a dummy variable that takes the value 1 if the respondent is unemployed, and 0 otherwise. Working hours refers to the actual working hours. Geographic concentration is the share of people with the same ethnic background in the municipality where the respondent lives. Controls include gender, employment status, education, marital status, ethnic group, number of children, a dummy for being born in the Netherlands, a dummy for having had education in the Netherlands, length of stay in the Netherlands, length of stay squared, and regional dummies. The working hours estimates are conditional on being employed. Replicating the analysis using a sample that included observations with zero working hours gives similar results. Standard errors in parentheses ***p<0.01, **p<0.05, *p<0.1.

3.4.6 Economic relevance of subjective measures of integration

Our findings show that terrorism has a negative effect on perceived integration of Muslim immigrants. To analyse the economic relevance of perceived integration, Table 3.5 shows the relationship between perceived integration and the intention to permanently return to the native country.[27] The table shows that perceived integration is negatively associated with the intention to permanently re-migrate to the country of origin. One standard deviation decline in perceived integration is associated with a 10% higher probability of intending to permanently leave the country. However, the objective measures of integration – unemployment and geographic concentration – are not significantly related to the intention

27 Respondents in the second wave of the survey were asked "Do you plan to go back to your country of origin for good?" 18 % of the respondents answered yes.

to re-migrate to the country of origin. This result suggests that this subjective measure of integration may better predict re-migration than objective aspects of integration do.

Table 3.5

OLS regression for the relationship between perceived integration and intention to return to native country.

	(1)
VARIABLES	Intention to return to native country
Perceived Integration	-0.096***
	(0.026)
Muslim	-0.020
	(0.080)
Unemployed	-0.075
	(0.055)
Female	0.011
	(0.034)
Born in NL	-0.047
	(0.067)
Married	-0.003
	(0.049)
Divorced	0.038
	(0.053)
Widowed	-0.039
	(0.090)
Number of children	0.005
	(0.010)
Length of stay in NL	0.004
	(0.005)
Length of stay in NL (squared)	-0.011
	(0.010)
Education in NL	0.017
	(0.042)
Educated	-0.010
	(0.038)
Education abroad	0.021
	(0.041)
Turkish	-0.055
	(0.097)
Moroccan	-0.064
	(0.104)
Surinamese	-0.073
	(0.066)
Geographic concentration	-0.011
	(0.009)
Constant	0.404***
	(0.127)
Regional dummies	Yes
Observations	616
R-squared	0.135

Note: this regression is based on data from the second wave of the survey. Intention to return to native country is measured by a dummy variable the takes the value one if the respondent is planning to go back to the country of origin for good, and zero otherwise. Standard errors in parentheses ***p<0.01, **p<0.05, *p<0.00.

3.5 Conclusion

In this chapter we use data from the Netherlands that oversample the four largest ethnic minorities in the country (Turks, Moroccans, Surinamese, and Dutch Antilleans) to analyse the integration patterns of Muslim and non-Muslim immigrants before and shortly after a violent wave of Islamist terrorist attacks hit Western Europe. The wave began with the Madrid bombings in March 2004 and extended to the London bombings in July 2005. The assassination of Theo van Gogh in Amsterdam by an Islamic fanatic of Moroccan origin took place in the middle of this wave, triggering nationwide outrage and increasing discrimination against Muslims in the Netherlands (Gautier et al. 2009).

We show that Muslim immigrants' perceived integration declined much more after the terrorist attacks than did that of non-Muslim immigrants. This pattern holds after including a large set of control variables and accounting for selection bias, and is not driven by any existing negative trend in the integration of Muslim immigrants prior to the attacks. Our findings suggest that perceived integration could potentially reveal more than objective measures of integration. We find that unemployment and working hours of Muslims are not negatively affected by the attacks. However, the geographic segregation of Muslim immigrants increased after the attacks. Our analyses on the heterogeneous effects of the terrorist attacks show that while the highly educated are affected most negatively with respect to their perceived integration, the low-educated became more geographically segregated. The decline in perceived integration of the highly skilled Muslim migrants can be explained in light of their higher expectations on integration in the host country compared to the low skilled. Meanwhile, the increase in geographic segregation of low-skilled Muslims after the attacks could be a buffer that mitigated the effect of terrorism on their perceived integration as they could have obtained social support from being in a community of the same ethnic background.

We further find that perceived integration is negatively associated with migrants' intention to return to their native country. This emphasizes the economic relevance of perceived integration of migrants. Given that those who arguably have strong potential for integration (i.e., the highly educated, employed, and less religious) are the ones who witness the greatest decline in perceived integration, these are the ones who are most likely to permanently re-migrate to their country of origin. This suggests that discrimination associated with terrorism could have a negative impact on the prospective stay of the most productive Muslim immigrants in the host country, which could have negative economic implications for the knowledge economy of Western societies.

Appendix

Table 3.A1

Descriptive statistics

VARIABLE	Non-Muslim	Muslim	P value
Integration items:			
Excellent opportunities for foreigners	3.11	3.04	0.318
No hostility against foreigners	3.45	3.21	0.000
Rights of foreigners are respected	3.36	3.25	0.062
Netherlands is hospitable to foreigners	3.45	3.07	0.000
People in the Netherlands are not indifferent to migrants	3.03	2.92	0.038
In the Netherlands fair treatment to foreigners	3.28	3.10	0.002
In the Netherlands foreigners are not restricted	3.21	2.68	0.000
The Netherlands is open to the foreign cultures	3.62	3.51	0.050
Feeling at ease with Dutch natives	3.51	3.14	0.000
Appreciation of living in the Netherlands	3.89	3.72	0.000
Demographic variables:			
Female	0.56	0.46	0.001
Age	42.66	42.24	0.585
Education (6 levels)	3.12	2.10	0.000
Education abroad	0.84	0.73	0.000
Education in the Netherlands	0.70	0.34	0.000
Born in the Netherlands	0.08	0.06	0.273
Length of stay in the Netherlands	22.22	21.32	0.145
Employment status:			
Employed	0.63	0.46	0.000
Unemployed	0.08	0.11	0.163
Housewife	0.09	0.20	0.000
Disabled	0.08	0.14	0.001
Student	0.06	0.03	0.027
Retired	0.07	0.07	0.971
Ethnic minority:			
Turkish	0.01	0.58	0.000
Moroccan	0.00	0.33	0.000
Surinamese	0.42	0.07	0.000
Dutch Antilleans	0.57	0.03	0.000
Share of ethnic group in municipality (geographic concentration)	0.04	0.05	0.000
Marital status:			
Never married	0.42	0.08	0.000
Married	0.30	0.77	0.000
Divorced	0.25	0.12	0.000
Widowed	0.04	0.03	0.844
Number of children	2.01	2.66	0.000

Table 3.A2

Difference in difference estimates of integration items before and after the terrorist attacks

VARIABLES	Non-Muslims		Muslims		Diff in diff
	Before	After	Before	After	
	N=309	N=300	N=160	N=316	
(1) Excellent opportunities for foreigners	3.24	2.98	3.60	2.76	-0.58***
	(1.08)	(1.16)	(1.09)	(1.18)	
(2) No hostility against foreigners	3.56	3.34	3.43	3.11	-0.1
	(0.81)	(0.97)	(0.96)	(0.94)	
(3) Rights of foreigners are respected	3.45	3.28	3.46	3.15	-0.14
	(0.84)	(0.98)	(0.92)	(1.06)	
(4) NL is hospitable to foreigners	3.59	3.31	3.36	2.93	-0.15
	(0.91)	(1.03)	(0.94)	(1.08)	
(5) People in NL are not indifferent to migrants	2.98	3.08	2.98	2.89	-0.19
	(0.90)	(0.90)	(1.01)	(0.91)	
(6) In NL fair treatment to foreigners	3.36	3.19	3.45	2.92	-0.37***
	(0.88)	(0.90)	(0.86)	(0.98)	
(7) In NL foreigners are not restricted	3.29	3.13	2.78	2.64	0.03
	(0.97)	(0.99)	(1.07)	(1.04)	
(8) The NL is open to the foreign cultures	3.67	3.57	3.76	3.38	-0.28**
	(0.85)	(0.93)	(0.82)	(1.03)	
(9) Feeling at ease with Dutch natives	3.52	3.51	3.32	3.06	-0.25***
	(0.60)	(0.65)	(0.72)	(0.80)	
(10) Appreciation of living in the Netherlands	3.90	3.88	3.89	3.63	-0.23**
	(0.75)	(0.72)	(0.79)	(0.93)	

Note: Diff in diff= (Muslim $_{after}$ - Muslim $_{before}$) - (non-Muslim $_{after}$ – non-Muslim $_{before}$). NL= the Netherlands. Standard deviations in parentheses
***p<0.01, **p<0.05, *p<0.1.

Table 3.A3
Probit estimations for selection bias

VARIABLES	(1) Participates in the two waves
Above-median missing answers	-0.883***
	(0.085)
Muslim	-0.156
	(0.103)
Unemployed	-0.461***
	(0.150)
Housewife	-0.083
	(0.141)
Disabled	-0.015
	(0.144)
Student	-0.464**
	(0.219)
Retired	-0.027
	(0.190)
Female	-0.118
	(0.092)
Born in NL	-0.005
	(0.190)
Married	-0.311**
	(0.123)
Divorced	-0.106
	(0.134)
Widowed	0.273
	(0.253)
Number of children	0.062**
	(0.027)
Length of stay in NL	0.021
	(0.014)
Length of stay in NL squared	-0.039
	(0.030)
Educated	0.032
	(0.027)
Educated in NL	-0.085
	(0.107)
Educated abroad	-0.019
	(0.117)
Geographic concentration	-0.021
	(0.014)
Observations	1,085

Standard errors in parentheses ***p<0.01, **p<0.05, *p<0.1.

Table 3.A4

Change in the integration of Muslim and non-Muslim immigrants after terrorist attacks controlling for selection

	Perceived integration	
	(1)	(2)
VARIABLES	RE	FE
Muslim	0.158	
	(0.101)	
Post-attacks	-0.183***	-0.309***
	(0.070)	(0.085)
Muslim *Post-attacks	-0.338***	-0.363**
	(0.116)	(0.145)
Above-median missing answers	-0.091	
	(0.062)	
Muslim *Above-median missing answers	0.027	
	(0.110)	
Post- attacks *Above-median missing answers	0.053	0.064
	(0.093)	(0.120)
Muslim *Post-attacks*Above-median missing answers	0.098	0.098
	(0.154)	(0.221)
Constant	-0.186	0.404
	(0.147)	(0.389)
Controls	Yes	Yes
Observations	1,085	1,085
Number of individuals	869	869

Note: See Table 3.1. *Above-median missing answers* is a dummy variable that takes the value one if the number of questions left unanswered in the first wave is above the median, and zero otherwise. Controls include gender, employment status, education, marital status, number of children a dummy for being born in the Netherlands, having had education in the Netherlands, length of stay in the Netherlands, and length of stay squares, share of migrants with the same ethnic background in the municipality, dummy for municipalities, and ethnic minority. Standard errors in parentheses ***p<0.01, **p<0.05, *p<0.1.

Table 3.A5

OLS estimates of trends in perceived integration before and after the attacks

	Perceived integration	
	(1)	(2)
VARIABLES	Before	After
Muslim	-0.223	0.861***
	(0.214)	(0.260)
Time of interview (in quarters)	-0.039	0.218***
	(0.040)	(0.046)
Muslim* Time of interview (in quarters)	0.098	-0.251***
	(0.061)	(0.061)
Constant	0.186	-1.501***
	(0.255)	(0.272)
Controls	Yes	Yes
Observations	448	599
R-squared	0.175	0.293

Note: Time of interview is measured in year quarters. The number of observations is slightly smaller as for 38 interviews we have no information on the timing. Controls include gender, employment status, education, marital status, ethnic group, number of children, a dummy for being born in the Netherlands, a dummy for having had education in the Netherlands, length of stay in the Netherlands, length of stay squared, share of migrants with the same ethnic background in the municipality, and regional dummies. Standard errors in parentheses ***p<0.01, **p<0.05, *p<0.1.

Table 3.A6

Change in the Integration of Muslim and non-Muslim immigrants after terrorist attacks. Heterogeneity by gender, age, education, labour market status, language proficiency, and religiosity (balanced sample)

	Perceived integration			
	RE		FE	
VARIABLES	(1)	(2)	(3)	(4)
A) Gender	Men	Women	Men	Women
Muslim* Post-attacks	-0.312*	-0.302	-0.336**	-0.261
	(0.170)	(0.186)	(0.158)	(0.178)
Observations	214	218	214	218
Number of Individuals	107	109	107	109
B) Age	Below 40	Above 40	Below 40	Above 40
Muslim* Post-attacks	-0.360*	-0.242	-0.343*	-0.118
	(0.188)	(0.169)	(0.185)	(0.170)
Observations	167	264	167	264
Number of Individuals	93	142	93	142
C) Education	High	Low	High	Low
Muslim* Post-attacks	-0.659***	-0.065	-0.697***	-0.144
	(0.169)	(0.155)	(0.166)	(0.156)
Observations	202	230	202	230
Number of Individuals	101	115	101	115
D) Labour market status	Employed	Unemployed	Employed	Unemployed
Muslim* Post-attacks	-0.437***	-0.112	-0.433***	-0.026
	(0.139)	(0.195)	(0.138)	(0.167)
Observations	256	176	256	176
Number of Individuals	128	88	128	88
E) Language proficiency	Proficient	Non-proficient	Proficient	Non-proficient
Muslim* Post-attacks	-0.415***	-0.291	-0.428***	0.027
	(0.113)	(0.430)	(0.116)	(0.634)
Observations	354	74	354	74
Number of Individuals	177	37	177	37
F) Religiosity	Less religious	More religious	Less religious	More religious
Post-attacks	-1.119***	-0.408***	-1.058***	-0.408***
	(0.333)	(0.117)	(0.260)	(0.117)
Observations	42	110	42	110
Number of individuals	21	55	21	55

Note: See Table 3.3. Controls as in Table 3 in addition to inverse Mill's ratio. Standard errors in parentheses ***p<0.01, **p<0.05, *p<0.1.

Table 3.A7

Change in unemployment, working hours, and geographic concentration after the terrorist attacks. Heterogeneity by gender, age, and education, FE estimates.

VARIABLES	Gender		Age		Education	
	Male	Female	< 40 age	>= 40 age	Low educ.	High educ.
	(1)	(2)	(3)	(4)	(5)	(6)
Unemployment						
Muslim*Post-attacks	0.095	-0.048	0.033	0.047	0.153*	0.018
	(0.065)	(0.059)	(0.061)	(0.069)	(0.083)	(0.049)
Observations	527	558	524	557	481	429
Number of individuals	423	450	448	442	366	328
Working hours						
Muslim*Post-attacks	-1.263	-3.561	-2.123	-0.010	-1.721	-1.117
	(1.884)	(2.193)	(3.302)	(1.799)	(1.953)	(2.147)
Observations	344	236	306	272	227	271
Number of individuals	277	194	265	223	178	210
Geographic concentration						
Muslim*Post-attacks	0.003*	0.003***	0.001	0.002***	0.003***	0.001
	(0.002)	(0.001)	(0.002)	(0.001)	(0.001)	(0.001)
Observations	527	558	524	557	481	429
Number of individuals	423	450	448	442	366	328

Note: See Table 3.4. Controls as in Table 3.4. Standard errors in parentheses ***p<0.01, **p<0.05, *p<0.00.

04

JOB TASKS, COMPUTER USE, AND THE DECREASING PART-TIME PAY PENALTY FOR WOMEN IN THE UK[1]

1 This chapter is joined with Andries de Grip and Didier Fouarge. We acknowledge the comments and suggestions of Francis Green, Daniel Hamermesh, Annemarie Künn-Nelen, Maria Zumbühl, the participants at the DUHR seminar meeting at Maastricht University, the annual INSCOPE Research for Innovation workshop at the University of Twente, the conference "Cognitive and Non-Cognitive Skills over the Life Cycle" at Maastricht University, the international conference "Inequalities, Skills, and Globalization" in Lille, France and the second international BIBB/IAB workshop T.A.S.K.S. 2 in Bonn, Germany.

4.1 Introduction

A large share of the female labour force in several OECD countries is employed on a part-time basis. In the UK, for example, more than 40 percent of the female labour force work part-time (Manning and Petrongolo 2008; Paull 2008). The employment of these part-time workers is characterised by relatively low levels of general and specific skills, restricted opportunities for improvement, and poor career prospects (e.g. Gallie et. al.1998; Gallie and Zhou 2011). In addition, they usually earn lower hourly wages than full-time workers (Ermisch and Wright 1993; Connolly and Gregory 2009). Manning and Petrongolo (2008) investigated the part-time pay penalty (PTPP) among female workers in the UK and showed that a large share of the PTPP is attributed to occupational segregation between part-time and full-time workers where part-time workers sort into relatively low-skilled occupations that pay less on hourly basis. However, recent years witnessed relative improvements in educational level as well as training participation of part-time workers compared to full-time workers (Gallie and Zhou 2011). Such an improvement in the skills should be accompanied by higher wages for part-time workers. In addition, technological changes and the widespread computer use in workplace, driven by declining prices of information technology (Autor et al. 2003), is expected to have affected part-time workers more than full-time workers, given that they have started with lower level of computer use. This could have changed the job content of part-time workers, relative to full-time workers, into more non-routine tasks that are complementary to computer use (Autor et al. 2003), and this could have increased the relative pay of part-time workers. However, the extent to which the pay of part-time workers has improved compared to full-time workers has not yet been investigated in the economic literature.

In this chapter we use data on employed women from the UK Skills Surveys which contain detailed data on wages, computer use, and the tasks performed by workers in their jobs over the period 1997-2006 to document a decrease in the PTPP, and to investigate the source of such a decrease. A decrease in the PTPP could be attributed to either changes in occupational structure between part-time and full-time workers in which part-time workers sort into relatively more high-skilled occupations that pay higher wages than occupations they sorted into in the past, or to improvements in computer technology that could have positively enhanced the relative productivity of part-time workers within occupations and made the non-routine tasks input of a part-time worker closer to the that of a full-time worker within an occupation. We examine the extent to which shifts in computer use and job tasks could explain changes in the PTPP. We limit the analysis to workers in low- and medium-skilled occupations because part-time workers hardly sort into high-skilled occupations (Manning and Petrongolo 2008), and because part-timers who sort in high-skilled occupations have human capital characteristics and job task profiles close to those of full-time workers and usually work as highly-specialized agency workers who get remunerated at a higher hourly rate than regular workers (Manning and Petrongolo 2008).[2]

Our empirical analyses show that there has been a decrease in the PTPP over the period 1997-2006. This decrease has been accompanied by a convergence in computer use and

2 We show, however, descriptive statistics for workers in high-skilled occupations.

influencing tasks between part-time and full-time workers.[3] The convergence in wages and job tasks has taken place mainly within occupations and was not due to changes in occupational segregation between part-time and full-time workers. Particularly, the convergence in computer use explains a substantial part of the decrease in the PTPP. Moreover, the change in the PTPP is also affected by changes in wage returns to job tasks performed more intensively by full-time workers. While the decreasing wage returns to reading and writing have decreased the PTPP, the increasing wage returns to managerial tasks have increased the PTPP despite the convergence in the input of managerial tasks between part-time and full-time workers. We find that relative changes in the input and prices of computer use and job tasks explain together more than 50 percent of the wage convergence between part-time and full-time workers in low- and medium-skilled occupations.

The remainder of the chapter is structured as follows. The next section discusses the related literature. Section 4.3 describes the data and the variables used. Section 4.4 documents the relative changes in wages, computer use and job tasks between part-time and full-time workers. Section 4.5 uses the Oaxaca-Ransom decomposition approach to investigate whether the changes in the PTPP, computer use, and job tasks take place within or across occupations. Section 4.6 investigates to what extent relative changes in computer use and job tasks explain the changes in the PTPP using the decomposition approach by Juhn, Murphy, and Pierce (1991). Finally, Section 4.7 summarizes the findings and concludes.

4.2 Related literature

In this chapter we build on the growing literature that emphasises the relevance of changes in job tasks as well as the literature on the PTPP. Among others, Acemoglou (1998), Autor et al. (2003), Garicano and Rossi-Hansberg (2006), Spitz-Oener (2006), and Snower and Görlich (2013) have used a task-based framework to study the impact of technological and organizational changes on skill demands and wage inequality. The task-based approach has the advantage of providing direct measures of job tasks at the individual level. It can, therefore, be used to give a comprehensive characterisation of changes in job content both across and within occupations, and to investigate the implication of these changes for earning gaps among different groups (Black and Spitz-Oener 2010).

The literature used this task-based approach to investigate recent changes in gender wage inequality, as well as gender differences in job tasks (e.g. Black and Spitz-Oener 2010; Lindley 2012). Black and Spitz-Oener (2010) used a task-based framework to investigate the implications of task polarisation for the job content of women in Germany. They showed that during the 1970s and the 1980s there was a concentration of women in occupations characterised by intensive routine tasks, and subsequently women experienced larger reductions in routine tasks than men. This led to greater job polarisation for women. Lindley (2012) studied the gender difference in the shifts in skill demands in the UK and

3 The convergence in these job tasks is in line with the findings of Gallie and Zhou (2011) who showed improvement in the educational level as well as training attainments for the UK female part-time relative to male full-time workers over the period 1992-2006.

showed that women lost out from technical change between 1997 and 2006 due to their lower math and literacy skills, as well as other skills required to undertake the tasks that are affected by technical change, particularly in highly-computerised industries like finance and manufacturing. However, these studies were all limited to full-time worker and ignored that in several advanced countries a large share of the female labour force works on a part-time basis (Booth and van Ours 2013).

Various studies investigated pay differences between part-time and full-time workers (e.g. Hirsch 2005; Manning and Petrongolo 2008; Mumford and Smith 2009; Connolly and Gregory 2009). The literature shows that being employed part-time results in a pay penalty (Ermisch and Wright 1993). Manning and Petrongolo (2008) showed that taking account of occupational segregation explains the PTPP to a large extent but not fully. There are, however, hardly any studies which investigate the impact of the differences in job content between part-time and full-time workers on the PTPP. One exception is the study by Hirsch (2005) who showed that the wage gap between part-time and full-time workers in the US could, to a large extent, be attributed to differences in job tasks between the two groups. The author used the O*NET data which provides detailed descriptions of occupations. He showed that part-timers have generally less verbal, mathematical, and problem solving tasks than full-timers and that the inclusion of information on job characteristics could partly explain the PTPP. However, as the O*NET data assign identical values to part-time and full-time workers in the same occupation, Hirsch (2005) could not disentangle the impact of occupational segregation on the PTPP from that of individual job tasks. Moreover, the relative change over time in computer use and job tasks of part-time workers and the associated change in the PTPP have not yet been addressed in the literature.

4.3 Data and descriptive statistics

For our analyses, we use data on female workers aged 20 to 60 years old from the 1997 and 2006 waves of the UK Skills Surveys. The UK Skills Surveys are repeated surveys that contain cross-sectional data on employment conditions, general skills, wages, as well as occupation, industry, and firm size. More importantly, the surveys contain detailed information on workers' computer use and job tasks. We exclude self-employed workers and use a consistent sample of cases with full information on demographics, job tasks, human capital, occupations, and wages (N=3,782).[4] Following Manning and Petrongolo (2008), we use the self-reported part-time status as our measure of part-time employment.[5] In our analysis we compare the shifts in wages, computer use, and job tasks between part-time and full-time workers. A worker's wage is assessed by the self-reported gross hourly wage. In case of not being directly quoted, this variable is calculated from the gross usual weekly pay divided by the weekly hours of work.

4 Replicating the analyses without sample restrictions gives similar pattern of results.

5 The subjective measure of part-time employment is closest to the legal definition of part-time employment (Manning and Petrongolo 2008). However, when we replicate our analysis using a commonly used measure of part-time employment based on working for less than 30 hours per week (e.g., Connolly and Gregory 2008; 2009; Mumford and Smith 2009), we get similar results.

We use two measures of computerisation. The first measure is a dummy variable that takes the value 1 if the worker uses a computer at work, and 0 otherwise. As a second measure for computerisation, we take the complexity of computer use. Computer users were asked to indicate the level of their computer use on a four-point scale (using several examples to explain the various levels). Just like Green (2012), we aggregated the lowest two levels to capture "low-level" computer use (e.g., email use, word processing, and their equivalents), and the upper two levels to capture "high-level" computer use (e.g., using statistical packages, programming, and their equivalents). The reference group is those who do not use computers at all (Green 2012).

Autor et al. (2003) have introduced the distinction between routine and non-routine tasks to study how computerisation substitutes for workers in performing routine tasks while it complements workers in performing non-routine tasks. However, the way job tasks are addressed in the UK Skills Surveys makes it difficult to make such a distinction between routine and non-routine tasks (Green 2012). Job tasks in the UK skills surveys are measured through a detailed list of questions in which respondents are asked to indicate the importance of every single task on a five-point scale ranging from "essential," to "not at all important/does not apply". We follow Green (2012) and group the 32 job tasks distinguished in the UK Skills Surveys into eight generic tasks: reading and writing, math, external communication, influencing (i.e., managerial tasks), self-planning, problem solving, physical tasks, and checking. We then calculate average scores from the responses to the eight items.[6] Details on the underlying job tasks are listed in Table 4.A1 in the Appendix.

As part-time workers are less likely to sort into high-skilled occupations (Manning and Petrongolo 2008), we divide the sample into (1) low- and medium-skilled occupations and (2) high-skilled occupations. We use the occupational classification by Elias and Mcknight (2001) as a basis for this division (see Table 4.A2 in the Appendix). The high-skilled occupations are the level 4 occupations. All other occupations (level 1-level 3) are referred to as the low- and medium-skilled occupations. Table 4.1 shows the difference in wages, computer use, and job tasks as well as other relevant variables between part-time and full-time workers. The table shows that there is a significant PTPP in the low- and medium-skilled occupations. However, there is a part-time pay premium in the high-skilled occupations. At both occupational-skill levels, full-timers score significantly higher than part-timers in all tasks, with the exception of physical tasks. However, the difference in job tasks between part-time and full-time workers in the low- and medium-skilled occupations is more pronounced than the difference in the high-skilled occupations. The table also shows that part-time workers are generally older, less educated, and less trained than full-time workers. In addition, they are more likely to be married and have children.

Table 4.2 shows the levels and changes in wages, job tasks, and other relevant variables between 1997-2006 for part-time and full-time workers in both the low- and medium-skilled occupations and the high-skilled occupations. In the low- and medium-skilled occupations, the table shows convergence between part-time and full-time workers in wages, computer use (particularly low level computer use), and various job tasks such as problem solving, self-

6 Despite the difficulty to classify all eight categories of tasks into clear-cut routine vs. non-routine groups, Green (2012) states that it is fairly clear that some of these categories can be safely classified as "non-routine" (e.g., Influencing, and self-planning). However, it is hard to identify a priori which tasks are "routine."

planning, and influencing. In the high-skilled occupations there are no significant differences in the relative changes in wages, computer use, and job tasks of part-time and full-time workers. However, the few observations of part-time workers in the high-skilled occupations makes it difficult to reach conclusive findings regarding relative changes in wages and job tasks. Therefore, we limit our further analyses to the low- and medium-skilled occupations.[7]

Table 4.1

Differences in wages, job tasks, and background characteristics between part-time and full-time workers

	Low and medium-skilled occupations			High-skilled occupations		
VARIABLE	FT	PT	FT-PT	FT	PT	FT-PT
Log wage	2.02	1.80	0.22***	2.54	2.62	-0.08*
Computer use	0.83	0.62	0.20***	0.98	0.95	0.03*
Low computing	0.79	0.59	0.20***	0.97	0.94	0.03*
High computing	0.50	0.15	0.35***	0.93	0.77	0.16**
Checking	3.41	3.04	0.37***	3.47	3.30	0.17**
Physical	1.80	1.89	-0.09	1.38	1.38	-0.01
Problem solving	2.75	2.28	0.48***	3.17	2.91	0.26***
Self-planning	3.02	2.51	0.50***	3.63	3.40	0.23***
Influencing	2.18	1.74	0.44***	3.04	2.84	0.21***
External comm.	2.66	2.57	0.10***	2.92	2.67	0.25***
Read and write	2.57	1.96	0.60***	3.16	2.96	0.20*
Math	1.76	1.24	0.52***	2.22	1.89	0.33***
Age	38.88	40.92	-2.04***	40.91	42.35	-1.44*
Married	0.41	0.61	-0.20***	0.50	0.73	-0.23***
Number of children	0.43	1.00	-0.57***	0.45	1.24	-0.80***
No qualification	0.27	0.47	-0.20***	0.08	0.08	0.00
Qualification level 1	0.08	0.11	-0.03*	0.02	0.04	-0.02*
Qualification level 2	0.27	0.24	0.03	0.06	0.09	-0.02
Qualification level 3	0.15	0.08	0.07***	0.11	0.10	0.01
Qualification level 4	0.23	0.09	0.14***	0.73	0.69	0.04
Work experience	18.26	18.67	-0.40	18.62	18.29	0.33
Trained	0.62	0.44	0.17***	0.79	0.79	0.00
Observations	1,700	1,304	3,004	614	164	778

***p<0.01, **p<0.05, *p<0.1. Qualification level 1 corresponds to GCSE grade D or lower, (national exams normally taken at age 16). Qualification level 2 refers to GCSE grade A-C or vocational equaivalent. Qualification level 3 denotes A-level qualifications or their vocational equivalents. Qualification level 4 referes to tertiary diplomas, bachelor's degrees and above.

7 The share of part-time workers decreased slightly to 44.38 percent in 2006 compared to 46.09 percent in 1997. The same pattern appears when we compare the share of part-time workers within occupations. This rules out the possibility that an increase in the number of part-time workers could be driving the convergence in computer use and job tasks.

Table 4.2

Change in part-time vs. full-time wages, job tasks, and background characteristics between 1997-2006

	Low and medium-skilled occupations							Highly-skilled occupations						
	FT			PT			Diff in diff.	FT			PT			Diff in diff
VARIABLES	1997	2006	ΔFT	1997	2006	ΔPT	ΔFT-ΔPT	1997	2006	ΔFT	1997	2006	ΔPT	ΔFT-ΔPT
Log wage	1.72	2.13	0.41***	1.45	1.94	0.48***	-0.08*	2.16	2.64	0.47***	2.39	2.68	0.29**	0.19
Computer use	0.78	0.84	0.06**	0.49	0.67	0.18***	-0.12***	0.96	0.99	0.03*	0.90	0.96	0.07	-0.04
Low computing	0.73	0.81	0.08**	0.48	0.64	0.17***	-0.09*	0.94	0.98	0.04*	0.88	0.96	0.08*	-0.04
High computing	0.44	0.53	0.08*	0.06	0.20	0.15***	-0.07	0.86	0.95	0.09*	0.57	0.82	0.25*	-0.16
Checking	3.40	3.41	0.01	2.90	3.09	0.20***	-0.18***	3.46	3.47	0.01	3.25	3.31	0.06	-0.05
Physical	1.70	1.83	0.14*	1.76	1.94	0.18**	-0.04	1.49	1.35	-0.14*	1.48	1.36	-0.12	-0.02
Problem solving	2.71	2.77	0.06	2.11	2.34	0.23**	-0.17*	3.24	3.16	-0.08	3.03	2.89	-0.15	0.06
Self-planning	2.88	3.07	0.19***	2.24	2.62	0.38***	-0.20*	3.56	3.64	0.08*	3.40	3.40	0.00	0.08
Influencing	2.04	2.23	0.19***	1.50	1.84	0.34***	-0.14*	2.99	3.06	0.07	2.97	2.81	-0.15	0.23
External comm.	2.57	2.69	0.12*	2.41	2.63	0.22***	-0.09	2.99	2.90	-0.10	2.68	2.66	-0.02	-0.08
Read and write	2.42	2.62	0.20***	1.77	2.04	0.27***	-0.07	3.09	3.18	0.10	2.95	2.96	0.01	0.09
Math	1.71	1.78	0.07	1.13	1.29	0.16*	-0.09	2.34	2.19	-0.15	2.03	1.86	-0.18	0.02
Age	37.08	39.53	2.46***	40.61	41.04	0.43	2.03*	38.59	41.48	2.89**	40.52	42.74	2.22	0.67
Married	0.44	0.40	-0.03	0.72	0.57	-0.15***	0.12**	0.51	0.49	-0.02	0.76	0.72	-0.04	0.02
Number of children	0.42	0.44	0.02	1.06	0.98	-0.08	0.10	0.51	0.43	-0.08	1.45	1.20	-0.25	0.17
No qualification	0.29	0.27	-0.02	0.57	0.44	-0.13***	0.11**	0.07	0.08	0.01	0.10	0.07	-0.03	0.04
Qualification level 1	0.07	0.08	0.01	0.09	0.12	0.03	-0.02	0.03	0.02	-0.02	0.00	0.05	0.05	-0.07*
Qualification level 2	0.35	0.24	-0.11***	0.23	0.24	0.01	-0.12**	0.10	0.05	-0.04*	0.03	0.10	0.06	-0.11*
Qualification level 3	0.11	0.17	0.05**	0.05	0.10	0.05**	0.01	0.12	0.11	-0.01	0.07	0.11	0.04	-0.05
Qualification level 4	0.18	0.25	0.07**	0.06	0.10	0.04*	0.03	0.68	0.74	0.06	0.79	0.67	-0.13	0.19*
Work experience	16.98	18.73	1.75**	17.98	18.94	0.96*	0.79	16.54	19.14	2.60**	15.28	18.94	3.66*	-1.07
Trained	0.60	0.63	0.03	0.40	0.46	0.06*	-0.03	0.80	0.79	-0.01	0.79	0.79	0.00	-0.01
Observations	455	1,245		370	934			121	493		29	135		

***p<0.01, **p<0.05, *p<0.1.

4.4 The convergence in wages, computer use, and job tasks

To estimate changes in the PTPP and changes in job tasks between part-time and full-time workers over the period 1997-2006, we use the following two equations:

$$W_i = \alpha + \beta_1 PT_i + \beta_2 Y2006_i + \beta_3 [PT_i * Y2006_i] + \beta_4 X_i + \varepsilon_i \quad (1)$$

$$T_i = \varphi + \gamma_1 PT_i + \gamma_2 Y2006_i + \gamma_3 [PT_i * Y2006_i] + \gamma_4 X_i + e_i \quad (2)$$

where W_i is the worker's log wage and T_i is the level of a specific task input. *PT* is a dummy variable that takes the value 1 if the worker is a part-timer, and 0 otherwise. *Y2006* is a dummy variable that takes the value 1 if the observation comes from the year 2006, and 0 otherwise. The interaction term between *PT* and *Y2006* is our measure of the change in the PTPP in equation (1) and the change in job task levels between part-time and full-time workers in equation (2). X_i is a set of control variables that includes worker's age, age squared, marital status, number of children, level of education, training participation, work experience, work experience squared, industry sector and occupational dummies. ε_i and e_i are error terms.

Table 4.3 shows the coefficient estimates of the change in the PTPP in the low- and medium-skilled occupations. Columns 1 and 2 show the estimates without and with controls, respectively. The table shows that there has been a significant convergence in wages between part-time and full-time workers in the low- and medium-skill occupations. The PTPP in these occupations decreased by about 8 percentage points (7 percentage points in the model with controls) between 1997 and 2006.[8]

Table 4.4 shows the coefficient estimates for the change in computer use and task inputs in low- and medium-skilled occupations. Controlling for all relevant controls, the table clearly shows that the importance of all job tasks is generally lower for part-time workers.[9] However, there has been a convergence in computer use, self-planning, and influencing tasks. To better identify the source of convergence in computer use we divided computer use into low computer use (Column 2) and high computer use (Column 3). In both estimates, the reference group is composed of workers who do not use computers in their job. The table shows that part-time workers' increase in computer use is driven by the increase in low-level computing tasks.[10]

8 There could be a selection bias associated with the endogeneity of the decision to work on part-time basis (Manning and Petrongolo 2008). We have therefore also estimated the model after controlling for selection using standard Heckman sample selection correction techniques. Following Ermisch and Wright (1993) and Manning and Petrongolo (2008) we use the number of children and marital status as our exclusion restrictions. The model gives qualitatively similar results to the OLS model (see Table 4.A3 in the Appendix). For an extensive discussion on the endogeneity problem of part-time employment, see Fernández-Kranz and Rodríguez-Planas (2011).

9 The descriptive statistics presented in Table 4.1 showed that physical tasks are more important for part-time workers. However, after including the controls the pattern changes.

10 Similar results are obtained when estimating an ordered probit model to explain the changes in the level of computer use.

Table 4.3

OLS estimation of change in the PTPP over the period 1997-2006 for low- and medium-skilled occupations

	(1)	(2)
VARIABLES	Log wage	Log wage
Part-timer	-0.267***	-0.095***
	(0.026)	(0.020)
Year 2006	0.407***	0.363***
	(0.020)	(0.015)
Part-timer*Year 2006	0.078**	0.070***
	(0.031)	(0.023)
Occupational dummies	No	Yes
Controls	No	Yes
Constant	1.722***	1.345***
	(0.017)	(0.101)
Observations	3,004	3,004
R-squared	0.267	0.621

Standard errors in parentheses ***p<0.01, **p<0.05, *p<0.1. Control variables include worker's age, age squared, marital status, number of children, level of education, training participation, work experience, work experience squared, public or private sector, sector of industry and occupational dummies.

Table 4.4

The change in job tasks and computer use for part-time workers relative to full-time workers over 1997-2006 in low and medium-skilled occupations.

VARIABLES	(1) Computer use	(2) Low-level computer	(3) High-level computer	(4) Checking	(5) Physical tasks	(6) Problem solving	(7) Self-planning	(8) Influencing	(9) External comm.	(10) Reading and writing	(11) Math
Part-timer	-0.137***	-0.129***	-0.091***	-0.291***	-0.142**	-0.290***	-0.356***	-0.374***	-0.168**	-0.205***	-0.210***
	(0.025)	(0.028)	(0.029)	(0.070)	(0.067)	(0.069)	(0.067)	(0.060)	(0.068)	(0.061)	(0.066)
Year 2006	0.056***	0.072***	0.045*	0.022	0.082*	0.003	0.097*	0.067	0.033	0.101**	0.043
	(0.019)	(0.022)	(0.023)	(0.052)	(0.050)	(0.052)	(0.050)	(0.045)	(0.051)	(0.046)	(0.049)
Part-timer*Year 2006	0.084***	0.066**	0.037	0.124	0.086	0.107	0.162**	0.161**	0.130*	-0.001	0.023
	(0.028)	(0.031)	(0.032)	(0.077)	(0.074)	(0.076)	(0.074)	(0.066)	(0.075)	(0.067)	(0.072)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Occupational dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Constant	0.536***	0.520***	0.378**	-0.313	-0.576*	0.033	-1.053***	-0.006	-0.002	-0.603**	-0.278
	(0.126)	(0.141)	(0.148)	(0.346)	(0.331)	(0.342)	(0.330)	(0.297)	(0.338)	(0.303)	(0.325)
Observations	3,004	2,618	1,174	3,004	3,004	3,004	3,004	3,004	3,004	3,004	3,004
R-squared	0.423	0.412	0.730	0.219	0.235	0.198	0.275	0.313	0.248	0.367	0.240

Standard errors in parentheses ***p<0.01, **p<0.05, *p<0.1. Control variables include worker's age, age squared, marital status, number of children, level of education, training participation, work experience, work experience squared, public or private sector, sector of industry and occupational dummies.

4.5 The source of convergence in wages, computer use, and job tasks

Recent literature on the PTPP has shown that occupational segregation explains a large share of the PTPP (e.g., Connolly and Gregory 2008; Manning and Petrongolo 2008). As part-time workers sort into relatively low-skilled occupations, which pay lower hourly wages, they earn less than full-timers (Manning and Petrongolo 2008). To check to what extent changes in occupational segregation could have explained the decrease in the PTPP in the low- and medium-skilled occupations, we decompose the relative changes in wages into changes that are due to changes in average wages within occupations (i.e., how much of the difference can be explained by the possibility that part-time and full-time workers experience different wage changes within occupations) and those that are due to occupational shifts in the employment of part-time and full-time workers across occupations. For this purpose, we use the Oaxaca- Ransom (1994) decomposition approach to apportion the change in the mean of wages over time for part-time and full-time workers. The decomposition of the mean shifts in wages between part-time and full-time workers is calculated as:

$$
\begin{aligned}
(\overline{W}_{2006} - \overline{W}_{1997})_{FT} - (\overline{W}_{2006} - \overline{W}_{1997})_{PT} \\
= [(J_{2006} - J_{1997})\hat{\lambda}^{*} + \{J_{2006}(\hat{\lambda}_{2006} - \hat{\lambda}^{*}) + (J_{1997})(\hat{\lambda}^{*} - \hat{\lambda}_{1997})\}]_{FT} \\
- [(J_{2006} - J_{1997})\hat{\lambda}^{*} + \{J_{2006}(\hat{\lambda}_{2006} - \hat{\lambda}^{*}) + (J_{1997})(\hat{\lambda}^{*} - \hat{\lambda}_{1997})\}]_{PT}
\end{aligned}
\tag{3}
$$

where $\overline{W}_{t\,PT}$ and $\overline{W}_{t\,FT}$ are the average wage in time period t for part-timers and full-timers, respectively. J_{2006} and J_{1997} are vectors containing occupational dummies and a constant term for the time periods 2006 and 1997, respectively. $\hat{\lambda}_{2006}$ and $\hat{\lambda}_{1997}$ are vectors with the slope parameters and the intercept for the time periods 2006 and 1997, respectively. $\hat{\lambda}^{*}$ is the non-discriminatory coefficient vector.[11] The terms $[(J_{2006} - J_{1997})\hat{\lambda}^{*}]_{PT}$ and $[(J_{2006} - J_{1997})\hat{\lambda}^{*}]_{FT}$ represent the part of the change in wages that is explained by occupational changes (i.e., across occupational changes), for part-time and full-time workers, respectively. The terms $[J_{2006}(\hat{\lambda}_{2006} - \hat{\lambda}^{*}) + (J_{1997})(\hat{\lambda}^{*} - \hat{\lambda}_{1997})]_{PT}$ and $[J_{2006}(\hat{\lambda}_{2006} - \hat{\lambda}^{*}) + (J_{97})(\hat{\lambda}^{*} - \hat{\lambda}_{1997})]_{FT}$ are the portion of the change in wages that is unexplained by changes in occupations (within occupation changes) for part-time and full-time workers, respectively.

Table 4.5 summarizes the coefficients of the decomposition. The table shows that most of the relative improvement in the part-time pay takes place within occupations. About 81 percent [(0.063/0.078)*100] of the change takes place within 2-digit occupations, and about 87 percent [(0.068/0.078)*100] takes place within 3-digit occupations. This implies that a great deal of the decrease in the PTPP in low- and medium-skilled occupations over the period 1997-2006 is not due to changes in occupational segregation between part-time and full-time workers, but rather due to an improvement in the wages of part-timers compared to that of full-timers within occupations.

11 The non-discriminatory coefficient is calculated by weighting the least squares estimates from the individual earnings equations as follows: $\hat{\lambda}^{*} = \Omega\hat{\lambda}_{2006} + (1-\Omega)\hat{\lambda}_{1997}$ where $\Omega = (\acute{J}_{2006}\,J_{2006} + \acute{J}_{1997}\,J_{1997})^{-1}(\acute{J}_{2006}\,J_{2006})$ where is the Oaxaca-Ransom weighting matrix.

Similarly, the relative improvement in computer use and job tasks for part-time workers can be broken into two components: (1) changes in the task composition within occupations, (2) changes in the distribution of part-time and full-time workers across occupations. The technological change hypothesis predicts that changes in tasks take place within occupations due to changes in the production process (Black and Spitz-Oener 2010). To identify the source of the change in computer use and job tasks, we again use the Oaxaca-Ransom (1994) decomposition approach, replacing log wages in equation (3) by computer use and job tasks.

Table 4.5

Oaxaca-Ransom decomposition of the change in the PTPP over the period 1997-2006

	(1) Within FT	(2) Within PT	(3) Within FT-within PT	(4) Across FT	(5) Across PT	(6) Across FT-across PT	(7) diff in diff*
2 digit occupations	0.367	0.430	-0.063	0.040	0.055	-0.015	-0.078
	(0.020)	(0.018)		(0.012)	(0.014)		
3 digit occupations	0.371	0.439	-0.068	0.035	0.045	-0.010	-0.078
	(0.020)	(0.018)		(0.012)	(0.015)		

*A negative sign means a decrease in the PTPP. In terms of Equation 3:
$(1) = [\, J_{2006}\,(\hat{\lambda}_{2006} - \hat{\lambda}^{*}) + (J_{1997})(\hat{\lambda}^{*} - \hat{\lambda}_{1997})\,]_{FT}$, $(2) = [\, J_{2006}\,(\hat{\lambda}_{2006} - \hat{\lambda}^{*}) + (J_{1997})(\hat{\lambda}^{*} - \hat{\lambda}_{1997})\,]_{PT}$, $(3) = (1) - (2)$, $(4) = [(J_{2006} - J_{1997})\hat{\lambda}^{*}]_{FT}$, $(5) = [(J_{2006} - J_{1997})\hat{\lambda}^{*}]_{PT}$, $(6) = (4) - (5)$, and $(7) = (3) + (6)$

Table 4.6 shows the results of this decomposition. The first panel presents the results when we decompose changes in the part-time/full-time gap in computer use and job tasks to within and across 2-digit occupation changes. The second panel presents results when we look at changes within and across 3-digit occupations.[12] Columns (1) and (2) show the within occupation changes for full-time and part-time workers, respectively. Column (3) shows the relative change within occupations between part-time and full-time workers by subtracting the changes within occupations for part-time workers (Column 2) from the changes within occupations for full-time workers (Column 1). Columns (4) and (5) show the changes in task inputs that are due to changes in the distribution of employment across occupations for full-time and part-time workers, respectively. Column (6) shows the relative change across occupations between part-time and full-time workers by subtracting the occupational changes of part-time workers (Column 4) from the occupational changes of full-time workers (Column 5). Column (7) shows the total change in the difference in tasks of part-time and full-time workers. The table shows that the largest changes come from task changes within occupations; particularly for part-time workers. This is consistent with the idea that technological changes have recently changed the task composition of part-time workers more than that of full-time workers.

12 Estimating the changes in the job tasks over industry dummies gives qualitatively similar results.

Table 4.6

Decomposition of the change in the task difference over the period 1997-2006

	(1) Within FT	(2) Within PT	(3) Within FT-Within PT	(4) Across FT	(5) Across PT	(6) Across FT-across PT	(7) Diff in diff*
A) 2 digit occupations							
Computer use	0.043	0.143	-0.100	0.02	0.039	-0.019	-0.119
	(0.003)	(0.026)		(0.012)	(0.018)		(0.035)
Checking	-0.009	0.15	-0.159	0.025	0.098	-0.073	-0.232
	(0.048)	(0.070)		(0.018)	(0.034)		(0.083)
Physical	0.105	0.155	-0.050	0.017	0.005	0.012	-0.038
	(0.048)	(0.055)		(0.029)	(0.026)		(0.082)
Problem solving	-0.009	0.102	-0.111	0.068	0.12	-0.052	-0.163
	(0.050)	(0.064)		(0.020)	(0.027)		(0.081)
Self-planning	0.109	0.251	-0.142	0.076	0.127	-0.051	-0.193
	(0.051)	(0.065)		(0.024)	(0.028)		(0.082)
Influencing	0.075	0.215	-0.140	0.124	0.129	-0.005	-0.145
	(0.047)	(0.052)		(0.022)	(0.028)		(0.075)
External communication	0.041	0.197	-0.156	0.092	0.035	0.057	-0.099
	(0.051)	(0.064)		(0.026)	(0.034)		(0.085)
Read and write	0.099	0.096	0.003	0.076	0.143	-0.067	-0.064
	(0.047)	(0.052)		(0.026)	(0.037)		(0.080)
Math	-0.007	0.069	-0.076	0.062	0.058	0.004	-0.072
	(0.051)	(0.052)		(0.024)	(0.026)		(0.080)
B) 3 digit occupations							
Computer use	0.05	0.124	-0.074	0.013	0.058	-0.045	-0.119
	(0.004)	(0.005)		(0.012)	(0.019)		(0.035)
Checking	0.001	0.17	-0.169	0.014	0.078	-0.064	-0.232
	(0.049)	(0.070)		(0.021)	(0.037)		(0.083)
Physical	0.114	0.184	-0.07	0.009	-0.024	0.033	-0.038
	(0.048)	(0.055)		(0.032)	(0.030)		(0.082)
Problem solving	-0.003	0.122	-0.125	0.062	0.1	-0.038	-0.163
	(0.050)	(0.064)		(0.022)	(0.030)		(0.081)
Self-planning	0.077	0.235	-0.158	0.109	0.144	-0.035	-0.193
	(0.052)	(0.066)		(0.026)	(0.030)		(0.082)
Influencing	0.077	0.218	-0.141	0.121	0.127	-0.006	-0.145
	(0.047)	(0.052)		(0.025)	(0.032)		(0.075)
External communication	0.011	0.177	-0.166	0.122	0.055	0.067	-0.099
	(0.052)	(0.062)		(0.029)	(0.041)		(0.085)
Read and write	0.077	0.118	-0.041	0.098	0.122	-0.024	-0.064
	(0.048)	(0.053)		(0.028)	(0.039)		(0.080)
Math	-0.018	0.007	-0.025	0.073	0.12	-0.047	-0.072
	(0.051)	(0.053)		(0.028)	(0.031)		(0.080)

* A negative sign means improvement in part-timers' task input relative to full-timers. In terms of Equation 5:

$(1) = [J_{2006}(\hat{\lambda}_{2006} - \hat{\lambda}^*) + (J_{1997})(\hat{\lambda}^* - \hat{\lambda}_{1997})]_{FT}$, $(2) = [J_{2006}(\hat{\lambda}_{2006} - \hat{\lambda}^*) + (J_{1997})(\hat{\lambda}^* - \hat{\lambda}_{1997})]_{PT}$, $(3) = (1) - (2)$, $(4) = [(J_{2006} - J_{1997})\hat{\lambda}^*]_{FT}$, $(5) = [(J_{2006} - J_{1997})\hat{\lambda}^*]_{PT}$, $(6) = (4) - (5)$, and $(7) = (3) + (6)$

4.6 Do relative changes in computer use and job tasks explain the convergence of the PTPP?

To estimate the extent to which convergence in computer use and job tasks between part-time and full-time workers explains the decrease in the PTPP, we use the decomposition approach by Juhn, Murphy, and Pierce (1991).[13] The advantage of this decomposition technique over any other similar technique (e.g., Oaxaca-Ransom decomposition) is its ability to decompose the explained changes in the PTPP into changes that are due to relative task changes between part-time and full-time workers (changes in quantity), and changes that are due to shifts in the wage returns to tasks (changes in prices). This technique has been used widely in the literature to study changes in gender wage differentials (e.g., Blau and Kahn 1992, 1997, Gupta et al. 2006). The change in the PTPP can initially be written as:

$$D_t \equiv \bar{W}_t^{FT} - \bar{W}_t^{PT} = (X_t^{FT} - X_t^{PT})\beta_t^{FT} + (\theta_t^{FT} - \theta_t^{PT})\,\sigma_t^{FT} \qquad (4)$$

where D_t is the difference in mean log wages ($\bar{W}_t$) in year *t* between full-time (FT) and part-time (PT) workers. X_t^{FT} and X_t^{PT} are vectors of mean computer use and job tasks in year *t* for full-time and part-time workers, respectively. β_t^{FT} is the OLS parameter estimates of computer use and job tasks at year *t* for full-time workers. σ_t^{FT} is the standard deviations of the residual of the wage equation of full-time workers. θ_t^{FT} is the standardized residual of the full-time wage regression, with mean 0 and variance 1.[14] $\theta_t^{PT} = (\bar{W}_t^{FT} - X_t^{PT}\beta_t^{FT})/\sigma_t^{FT}$ which reflects the wage a part-time worker would receive if her job tasks are rewarded at the same rate as a full-time worker's tasks are rewarded (deflated by the full-time worker's standardized residuals). Thus, the PTPP at a given point in time comprises an effect due to differences in observed tasks between part-time and full-time workers, weighted by the return received by full-time workers to these tasks, and an effect due to differences in the standardized residual, weighted by residual full-time inequality. Following the notation by Blau and Kahn (1992; 1994), the change in the PTPP can be rewritten as

$$D_{2006} - D_{1997} = (\Delta X_{2006} - \Delta X_{1997})\,\beta_{1997}^{FT} + \Delta X_{2006}\,(\beta_{2006}^{FT} - \beta_{1997}^{FT}) + (\Delta\theta_{2006} - \Delta\theta_{1997})\,\sigma_{2006}^{FT} + \Delta\theta_{2006}\,(\sigma_{2006}^{FT} - \sigma_{1997}^{FT}) \qquad (5)$$

Where Δ represents the difference between full-timers and part-timers in the mean of the variable following. The first and second terms of the right-hand side of the equation reflect the portion of the change that is explained by changes in computer use and job tasks. The first term is the observed change in quantity of tasks, which reflects changes in the PTPP that are due to observed changes in part-time/ full-time differences in the inputs of computer

13 To illustrate the relevance of the task-based approach in explaining the PTPP, we compare the PTPP remaining after controlling for job tasks to the PTPP that remains after accounting for occupational segregation. For this purpose, we estimate an earnings equation in which we regress log wage on a part-time dummy and insert job tasks, as an alternative to occupational dummies. As shown in Table 4.A4 in the Appendix, job tasks relate to workers' wages and explain the PTPP almost equally well as do occupational dummies. The advantage of job tasks over occupational dummies, would be that when studying change over time, job tasks will not only capture changes across, but also within occupations.

14 This means that $\theta_t^{FT} = e_t^{FT}/\sigma_t^{FT}$ where e_t^{FT} is the residual from the wage equation of full-timers in year *t*.

use and job tasks. The second term is the observed change in prices, which captures the contribution of changes in the rewards that the labour market attaches to computer use and job tasks of full-time workers. The third and fourth terms of the right hand side of equation (4) reflect the unexplained part in the Oaxaca-Ransom decomposition (1994). The change in the unexplained component can be divided in the "gap effect" (third term) which reflects the changes in the relative position of part-timers in the full-timers residual wage distribution and the "unobservable prices effect" (fourth term) which measures the change in the wage gap attributed to the change in the distribution of the full-time wage residuals, holding constant the mean part-time ranking in the full-time residual distribution.

Table 4.7 shows the estimates of the decomposition coefficients in low- and medium-skilled occupations. Column 1 shows the overall PTPP. Column 2 shows the portion of the PTPP that is explained by computer use and job tasks. Column 3 shows the unexplained portion of the PTPP. The table shows that the PTPP decreased from 26.7 log points in 1997 to 18.9 log points in 2006 which means a 7.8 log-points decrease in the PTPP. More than half (53.8 percent) [(0.042/0.078)*100] of the change in the PTPP can be explained by changes in computer use and job tasks. However, this portion is not solely due to an increase in part-timers' input of job tasks, it can also partly be due to changes in the task prices.

Table 4.7

The Juhn-Murphy-Pierce decomposition of the PTPP in low and medium-skilled occupations

	(1)	(2)	(3)
	Raw differential	Explained differential	Unexplained differential
PTPP 1997	0.267	0.172	0.094
PTPP 2006	0.189	0.130	0.058
PTPP2006- PTPP1997	-0.078	-0.042	-0.036

Estimates are obtained from regressions of log wages on computer use as well as job tasks. The change in the PTPP is calculated as $(W^{FT} - W^{PT})_{2006} - (W^{FT} - W^{PT})_{97}$. Therefore, a positive sign indicates an increase in the PTPP, and a negative sign indicates a decrease in the PTPP.

To investigate the share of the various tasks in the decrease of the PTPP, Table 4.8 shows the detailed estimates of the contribution of computer use and job tasks. The table divides the decomposition estimates of the explained portion of the decrease in the PTPP into a quantity effect (change in tasks inputs) and a price effect (change in task prices). Column 1 shows the overall explained contribution of computer use and job tasks in the decreased PTPP. Column 2 shows the portion of the contribution that is explained by changes in the quantity of computer use and job tasks. Column 3 is the portion that is explained by changes in the returns to computer use and job tasks. The table shows that more than 95 percent of the explained change in the decrease of the PTPP is due to changes in the overall quantity of computer use and job tasks [(0.040/0.042)*100], while less than 5 percent of the decrease in the PTPP is due to changes in the overall prices of job tasks [(0.002/0.040)*100].

Estimates from Column 1 show that joint changes in the quantity and prices of computer use and reading and writing reduced the PTPP over time. While joint changes in the quantity and prices of influencing increased the PTPP over time. Changes in checking, physical tasks, self-planning, external communication, and math seem not to have significantly affected

the change in the PTPP. Column 2 shows that particularly the convergence in the quantity of computer use between part-time and full-time workers explains a great deal of the decrease in the PTPP. While the convergence in the quantity of self-planning and influencing tasks between part-time and full-time workers explain only a small portion of the decrease in the PTPP. Column 3 shows that although the overall impact of changes in prices of tasks is small, there are large differences across the various job tasks. Changes in the prices of reading and writing lead to a convergence in the PTPP. Most of the PTPP-decreasing impact of reading and writing comes from changes in the prices. The changes in the prices of influencing and self-planning lead to a divergence in the PTPP. This divergence exceeds the effect of the convergence in the input of these tasks between part-time and full-time workers. This makes the overall impact of these tasks on the PTPP negative.

Table 4.8

The contribution of computer use and job tasks in the explained part of the PTPP in low and medium-skilled occupations

	(1) Overall explained changes	(2) Task changes (Quantity effects)	(3) Task Price changes (Price effect)
Computer use	-0.018	-0.024	0.006
Checking	0.003	0.002	0.002
Physical	0.001	0.003	-0.002
Problem solving	-0.006	-0.004	-0.002
Self-planning	0.004	-0.007	0.011
Influencing	0.011	-0.007	0.018
External comm.	0.001	0.003	-0.003
Read and write	-0.034	-0.006	-0.028
Math	-0.004	-0.001	-0.004
Total	-0.042	-0.040	-0.002

Overall explained change (1)= Task changes (2) + Task price changes(3). A positive sign indicates an increase in the PTPP, and a negative sign indicates a decrease in the PTPP.

The results from Table 4.8 indicate that shifts in job tasks explain a great deal of the improvement in part-time workers' pay. However, this improvement in pay is not merely due to changes in the input of job tasks by part-timers compared to full-timers. The increase in part-time workers' relative pay could also be partly explained by changes in the wage returns to particular tasks. On one hand, as wage returns to particular tasks which are more often done by full-timers have decreased over time (or have relatively decreased for full-timers compared to part-timers), these tasks became less important in explaining the PTPP than they were in the past. Consequently, even when a gap between part-timers and full-timers in these job tasks remains, the change in the returns to these job tasks can partly explain the lower PTPP. Reading and writing is a typical example of such job tasks. On the other hand, as wage returns to particular tasks which are more often done by full-timers have increased over time (or have relatively increased for full-timers compared to part-timers), these tasks became more important in explaining the PTPP than they used to be in the past.

Consequently, even when the gap between part-time and full-time workers in the quantity of these job task decreases, the change in the returns to these job tasks can negatively affect the PTPP. Influencing is an example of these job tasks.

4.7 Conclusion

This chapter documents recent changes in the part-time pay penalty (PTPP) for female workers in the UK over the period 1997 to 2006 and investigates to what extent the decrease of the PTPP could be driven by relative changes in computer use and job tasks by full-time and part-time workers. We find a decrease in the PTPP over the period 1997-2006 for female workers in the low- and medium-skilled occupations in the UK. This decrease has been accompanied by a convergence in the importance of computer use, self-planning, and influencing tasks between part-time and full-time workers. The convergence in computer use explains a substantial part of the decrease in the PTPP. Furthermore, the change in the PTPP is affected by changes in wage returns to job tasks performed more intensively by full-timers. While the decreasing returns to reading and writing have decreased the PTPP, the increasing returns to influencing have increased the PTPP despite the convergence in the influencing task input between part-time and full-time workers. Relative changes in the input and prices of computer use and job tasks together explain more than 50 percent of the wage convergence between part-time and full-time workers in low- and medium-skilled occupations.

This study is the first to apply the task-based approach to study the changes in the PTPP. However, our findings could not be interpreted in a causal way. There could be a reverse causality in which an increase in the wages of part-time workers (e.g., due to minimum wage legislations) has resulted in a decrease in the PTPP.[15] This could have led employers to make better use of their part-time workers by involving them in higher levels of computer use and job tasks. However, Manning and Petrongolo (2008) have shown that the PTPP for female workers in the UK was not affected by the introduction of the National Minimum Wage in 1999.

The findings of this chapter show that a task-based approach offers a highly relevant framework to analyse changes in the labour market position of part-time workers. A black box that remains is whether the changes we observe forced employers to hire part-time workers with higher educational attainments and/or better training, or because the same workers are doing more of computer use and other job tasks than they did in the past. Further studies should invest in panel data infrastructure to better identify the source of these changes in workers' job tasks.

15 This could be the case because part-time workers are more likely to be employed in occupations with the lowest levels of pay. Therefore, any policy changes that aim at reducing wage inequality could improve the relative position of part-timers even if that change is not directly targeted on them (Manning and Petrongolo 2008).

Appendix

Table 4.A1

The list of the job tasks in the UK Skills Survey (Green 2012)

Reading and writing
- Reading written information, e.g., forms, notices or signs
- Reading short documents e.g., Letters or memos
- Reading long documents e.g., Long reports, manuals, etc
- Writing material such as forms, notices or signs
- Writing short documents, e.g., Letters or memos
- Writing long documents with correct spelling/grammar

Math
- Adding, subtracting, multiplying or dividing numbers
- Calculations using decimals, percentages or fractions?
- More advanced mathematical or statistical procedures

External comm.
- Knowledge of particular products or services
- Selling a product or service
- Counselling, advising or caring for customers or clients
- Dealing with people

Influencing others
- Instructing, training or teaching people
- Persuading or influencing others
- Making speeches or presentations
- Planning the activities of others
- Listening carefully to colleagues

Self-planning
- Planning your own activities
- Organizing your own time
- Thinking ahead

Problem solving
- Spotting problems or faults
- Working out the cause of problems or faults
- Thinking of solutions to problems
- Analysing complex problems in depth

Physical tasks
- Physical strength e.g., carry, push or pull heavy objects
- Work for long periods on physical activities
- Skill or accuracy in using your hands or fingers
- Use or operate tools, equipment or machinery

Checking
- Noticing when there is a mistake
- Checking things to ensure that there are no errors
- Paying close attention to detail

Table 4.A2

Occupational level skill classification (Elias and McKnight 2001)

Level 1:
- Elementary trades, plant and storage related occupations
- Elementary administration and service occupations
- Textiles, printing and other skilled trades

Level 2:
- Administrative occupations
- Secretarial and related occupations
- Caring personal service occupations
- Leisure and other personal service occupations
- Sales occupations
- Customer service occupations
- Process, plant and machine operatives
- Transport and mobile machine drivers and operatives

Level 3:
- Managers and proprietors in agriculture and services
- Science and technology associate professionals
- Health and social welfare associate professionals
- Protective service occupations
- Culture, media and sports occupations
- Business and public service associate professionals
- Skilled agricultural trades
- Skilled metal and electrical trades
- Skilled construction and building trades

Level 4:
- Corporate managers
- Science and technology professionals
- Health professionals
- Teaching and research professionals
- Business and public service professionals

Table 4.A3

Heckman selection procedure to estimate changes in the PTPP over the period 1997-2006

	(1)	(2)
VARIABLES	Log wage	Log wage
part-timer	-0.105**	-0.100**
	(0.046)	(0.039)
2006.year	0.407***	0.357***
	(0.020)	(0.016)
part-timer#2006.year	0.083***	0.074***
	(0.031)	(0.023)
Occupational dummies	No	Yes
Controls	No	Yes
Constant	1.650***	0.886***
	(0.024)	(0.089)
Lambda	-0.111	-0.008
	(0.026)	(0.022)
Observations	3,004	3,004

Number of dependent children and marital status are used as exclusion restrictions. Controls variables include worker's age, age squared, marital status, number of children, level of education, training participation, work experience, work experience squared, public or private sector, sector of industry and occupational dummies. Standard errors in parentheses ***p<0.01, **p<0.05, *p<0.1.

Table 4.A4
OLS estimates for the part-time pay penalty

	Log wage			
	(1)	(2)	(3)	(4)
part-timer	-0.218***	-0.071***	-0.069***	-0.064***
	(0.016)	(0.014)	(0.014)	(0.014)
Checking				-0.002
				(0.009)
Physical tasks				-0.045***
				(0.007)
Problem solving				0.006
				(0.010)
Self-planning				0.052***
				(0.009)
Influencing				0.101***
				(0.010)
External comm.				-0.061***
				(0.008)
read and write				0.056***
				(0.010)
Math				-0.016**
				(0.008)
No computer use				Reference
Low-level computer				0.239***
				(0.019)
High-level computer				0.348***
				(0.027)
Controls	No	No	No	No
Occupations	No	2-digit	3-digit	No
Constant	2.019***	2.264***	2.264***	1.799***
	(0.010)	(0.046)	(0.046)	(0.018)
Observations	3,004	3,004	3,004	3,004
R-squared	0.061	0.356	0.368	0.315

Standard errors in parentheses ***p<0.01, **p<0.05, *p<0.1.

05

GRADUAL RETIREMENT AND LABOUR SUPPLY OF OLDER WORKERS: EVIDENCE FROM A STATED PREFERENCE ANALYSIS[1]

1 This chapter is based on joined work with Andries de Grip, Didier Fouarge, and Raymond Montizaan.

5.1 Introduction

In order to better face the growing challenges arising from ageing populations, many OECD countries have taken measures to stimulate older workers to postpone their labour market exit. These measures include, among others, the abolition of early retirement schemes, increases of the mandatory retirement age and strengthening of legislation which prohibits discrimination in hiring, promotion, or firing on the grounds of age (Gruber and Wise 1998; Duval 2003; Kangas et al. 2010; Mastrobuoni 2009; Staubli and Zweimüller 2012; Machado and Portela 2012). In addition, several European countries have introduced gradual retirement programs which aim to increase labour market participation of older workers.

The introduction of opportunities for gradual reduction of employees' working time at the end of their working careers aims to stimulate postponement of full-retirement along several routes (Gielen, 2007; Kantarci and Van Soest 2008). Firstly, gradual retirement may reduce the burden of work, and thereby reduce work-related stress and increase employee morale. It also gives workers the chance to benefit from social relations at work, while also providing time to develop leisure activities (Kantarci and Van Soest 2008). Secondly, gradual-retirement schemes create the possibility to make a smooth transition to retirement and avoid the pension shock following an abrupt transition from full-time work to full-time retirement. These schemes therefore increase the choice opportunities for older workers and thus may improve lifetime utility (Reday-Mulvey and Delsen 1996; Reday-Mulvey 2000). In both cases, we could expect that gradual retirement may motivate older workers to continue working part-time while they otherwise would have fully retired. The introduction of gradual retirement, however, can also lead to a reduction in the total labour supply of older workers when workers engage in early part-time retirement, while they otherwise would have chosen to continue to work on a full-time basis. The total effect on labour supply therefore depends on which of the two effects is larger, making the net effect of gradual retirement on total labour supply ambiguous.

In this chapter, we use a stated preference approach to study the impact of the introduction of gradual retirement on workers' age of retirement and total labour supply. We find that the introduction of gradual retirement induces workers to retire, on average, one year later. However, total labour supply decreases when workers have the gradual retirement option, because the positive effect of delayed retirement on labour supply is cancelled out by the working hours reduction before full retirement. We subsequently show that stronger financial incentives to postpone retirement (changes in the accrual rate in the pension scenario and reduction in pension income) significantly increase the expected retirement age. The impact of financial incentives is, however, substantially smaller when workers have access to gradual retirement. We finally show that the impact of the introduction of gradual retirement scenarios on the chosen age of retirement is strongly heterogeneous across groups of workers. The introduction of gradual retirement options particularly increases the expected retirement age and labour supply of workers who experience high levels of stress or are dissatisfied with their job.

This chapter complements the empirical literature on the impact of gradual and flexible pension plans on labour supply decisions (e.g., Gustman and Steinmeier 2004; Van Soest et al. 2006; Gielen 2009; Machado and Portela 2012; Kantarci and Van Soest 2013). Most previous

studies focused on actual retirement decisions and suggest that the introduction of gradual retirement schemes could indeed lead to a postponement of retirement, although the effects on the total labour supply are small or non-existent (e.g., Gustman and Steinmeier 2004; Gielen 2009; Machado and Portela 2012). However, since these studies focus on actual retirement decisions they do not identify all retirement options which were available to older workers, because the options that are not chosen cannot be observed, or because it is not even clear which options workers would have chosen when they had the opportunity to choose (Kantarci and Van Soest 2008, 2013). The latter is particularly problematic for gradual retirement plans, since it is often unclear whether employers offer such a plan, and, if they do, which trajectory of earnings and pension incomes a plan offers (Kantarci and Van Soest 2008). This especially holds because gradual retirement arrangements are often based on informal agreements negotiated between an employee and his/her employer (Hutchens 2010).

Only two studies on gradual retirement by Van Soest et al. (2006) and Kantarci and Van Soest (2013) have circumvented this problem by using a workers' stated preferences approach to capture a broader array of preference-driven behaviours than data on actual behaviours.[2] Both studies used a stated preference approach in which the retirement age (early, standard, or late), type of retirement (full vs. gradual) and the replacement rate are randomly varied across different respondents, after which respondents had to indicate which scheme would be most attractive to them. Van Soest et al. (2006) and Kantarci and Van Soest (2013) showed that many workers could be convinced to work part-time if they are given fair financial compensation, but also that many respondents are more likely to choose late retirement over partial retirement or early retirement. An explanation for their results is that respondents consider the level of pension income at the younger retirement ages to be insufficient and prefer to remain employed part-time or full-time to accrue additional pension rights.

We contribute to the existing literature on gradual retirement and labour supply in several ways. Firstly, the stated preference research design we apply allows us to jointly identify the impact of different gradual retirement scenarios and different financial incentives on the expected retirement age. This allows us to test the extent to which financial incentives affect the expected retirement age differently in a full-time and a gradual retirement framework. Secondly, the base scenario in our stated preference experiment is similar to the actual pension scheme of public sector workers in the Netherlands. This allows us to make more precise and realistic estimates of the effects of changes in financial incentives on the labour supply of older workers, compared to the effects reported in earlier studies. Finally, we go beyond previous studies by showing that the introduction of gradual retirement scenarios has strongly heterogeneous effects on the retirement decision of various groups of workers.

The outline of the chapter is as follows. The next section describes the data, the experimental design, and the variables used in the analyses. Section 5.3 investigates the relationship between gradual retirement and workers' age of retirement and labour supply, as well as the moderating effects of individual characteristics and financial incentives on

2 The stated preference has also been used by retirement studies which did not focus on gradual retirement (e.g., Van Soest and Vonkova 2014).

this relationship. Section 5.4 discusses preferences for gradual retirement. Finally, Section 5.5 summarizes the findings and concludes.

5.2 Data and experimental design

5.2.1 Data collection

We use matched administrative and survey data of Dutch public sector employees (*the ROA Public Sector Survey 2013*). The administrative data come from the Dutch pension fund for public sector employees (ABP) and contain detailed information on annual wage income, the number of years of pension contribution and establishment size. The survey was fielded online among 5,532 employees aged 35 and above, and contains questions on the personal and household background characteristics of the respondents, as well as several aspects of work and social life. The survey data were collected in two stages. In the first stage, a representative sample of 54,069 public sector employees born between 1946 and 1975 were approached by the pension fund by regular mail. They were asked to provide their e-mail address. In the second stage, we sent an e-mail containing the link to our web-based survey to the 12,636 employees who had provided their e-mail address. The invitation letter and the e-mail conveyed general information about the societal relevance of the study without any reference to the postponement of the eligibility age of the state pension. The survey asked detailed questions on retirement expectations, alternative sources of income after retirement, partner characteristics, job characteristics, and it included the stated preference experiment we utilize in this study to investigate the effects of the introduction of gradual retirement and financial incentives on retirement age and labour supply.

5.2.2 Experimental design

The stated preference experiment makes use of vignettes in which individuals are confronted with hypothetical pension scenarios. The stated preference experiment started with an introductory text explaining the topic, after which each individual was confronted with five scenarios presenting pension schemes that include a set of retirement ages and related replacement rates (in percentage of their current net income). Figure 5.A1 in the Appendix shows examples of the scenarios.

We designed nine different pension scenarios with different retirement ages and replacement rate combinations. Each respondent had to respond to the baseline scenario which only allows workers to retire full-time. This base scenario has actuarially fair accruals of 5%, and generates a 90% replacement rate upon retirement at the age of 67.[3] The other eight scenarios differ from one another in terms of the incentives for continued employment provided by the retirement scenario. We implement a price of leisure type of incentive (accruals of 7.5 or 10% for an additional year of labour), and a pension income

3 The replacement rates we implemented in the baseline scenario resemble those applied to an average public sector employee in the Netherlands at the time of the survey. At the moment of the survey, employees are entitled to a state old age pension of 90% replacement rate on their 67th birthday.

type of incentive (varying the age at which 100% net replacement rate is achieved). Four of these pension scenarios allow workers to choose their preferred age of full-time retirement, while the other scenarios allow for gradual retirement with a number of years of part-time employment before full-time retirement. Apart from the baseline scenario, each respondent was randomly given two regular and two gradual retirement scenarios.[4]

Table 5.1 shows the nine pension scenarios with their combinations of retirement age and replacement rate. Scenario 1 is the baseline scenario. It offers a replacement rate of 90% of the net wage if the individual chooses to retire at the age of 67. For each additional year of work, the replacement rate increases by 5%-points. Scenarios 2 and 3 increase the price of leisure incentive. For each additional year of work, the replacement rate increases by 7.5%-points and 10%- points for Scenarios 2 and 3, respectively. However, in these two scenarios the replacement rate remains at the level of 90% of the net wage if the individual chooses to retire at the age of 67. Scenarios 4 and 5 show the pension income incentive. While the two scenarios keep the increase in the replacement rate for each additional year of work at the level of 5%-points, they change the replacement rate at each year of retirement, regardless of the age of retirement. In Scenario 4 the replacement rate is 95% for retiring at 67, while in Scenario 5 it is 85% for retiring at that age.

Scenarios 6 to 9 introduce gradual retirement. In these scenarios, respondents work for two days a week for 50% of their current net wage, and 50% of their retirement pension so that their financial situation over the time of part-time employment is not affected. Across the different scenarios we manipulate the financial incentives for different gradual retirement ages. Scenarios 6 and 7 increase the price of leisure incentive. For each full-time-equivalent year of work, the replacement rate increases by 7.5%-points and 10%-points for Scenarios 6 and 7, respectively.[5] The replacement rate is 90% of the net wage if the individual chooses to retire at the age of 68. Scenarios 8 and 9 investigate the effect of the pension income incentive. The two scenarios keep the increase in replacement rate for each additional year of full-time-equivalent work at the level of 5%-points, however, they change the replacement rate at each year of employment, regardless of age of retirement. In Scenario 8 the replacement rate is 95% when workers retire at 68, while in Scenario 9 it is 85% when they retire at the same age. Within each scenario, respondents are asked which retirement age and associated replacement rate they prefer. This makes it possible to quantify how changes in financial incentives affect the gradual and full-time retirement age.

5.2.3 Descriptive statistics

Table 5.A1 in the Appendix shows summary statistics of respondents' background characteristics. The table shows that the majority of the respondents in our analysis is male employees who are above the age of 50, and highly-educated.[6] The table also shows that 28 % of the workers plan to go for gradual retirement, while 44% plan to retire after the age of 65. Figure 5.1 shows the distribution of retirement preferences across the different retirement

4 The order in which the scenarios were given is also random.

5 These figures are cut in half for each additional year of part-time employment.

6 Table 5.A2 in the Appendix reports the summary statistics for each of the retirement scenarios to check the randomization pattern. The table shows no significant differences in background characteristics across the different scenarios.

scenarios. The figure shows that the distribution of preferred retirement ages differs across regular and gradual retirement scenarios. While the largest frequency of retirement age in most regular retirement scenarios is at the age 65, respondents most frequently choose the age 66 for retirement in most gradual retirement scenarios. The figure further shows that retirement age is responsive to financial incentives and that within each level of financial incentives, retirement age is higher in gradual retirement than in regular retirement.

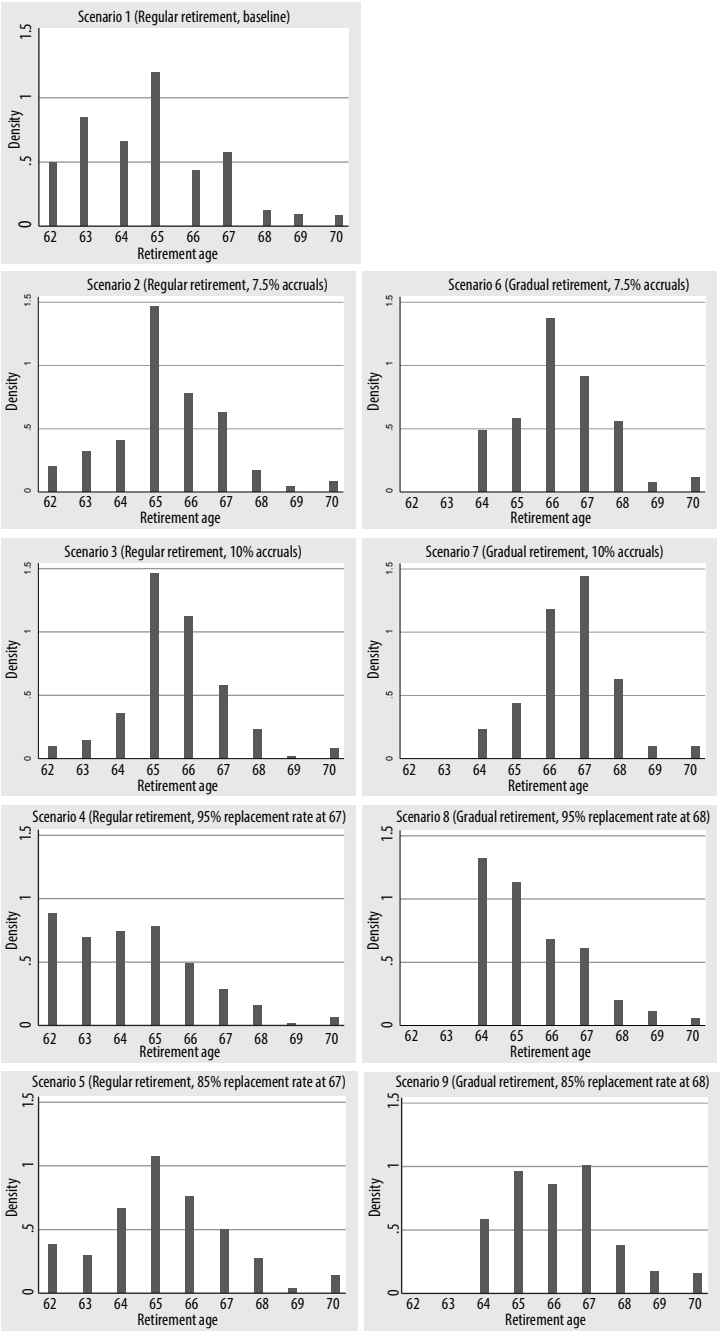
Table 5.1

Retirement scenarios

Retirement age	1	2	3	4	5
	Baseline	Price of leisure incentive		Pension income incentive	
Regular retirement	accruals: 5%; replacement rate: 90% at 67	accruals 7.5%; replacement rate: 90% at 67	accruals 10%; replacement rate: 90% at 67	accruals 5%; replacement rate: 95% at 67	accruals 5%; replacement rate: 85% at 67
62	65	52.5	40	70	60
63	70	60	50	75	65
64	75	67.5	60	80	70
65	80	75	70	85	75
66	85	82.5	80	90	80
67	90	90	90	95	85
68	95	97.5	100	100	90
69	100	105	110	105	95
70	105	112.5	120	110	100
Retirement age*		6	7	8	9
		Price of leisure incentive		Pension income incentive	
Gradual retirement		accruals 7.5%; replacement rate: 90% at 68	accruals 10%; replacement rate: 90% at 68	accruals 5%; replacement rate: 95% at 68	accruals 5%; replacement rate: 85% at 68
62-64		60	50	75	65
62-65		63.75	55	77.5	67.5
63-65		67.5	60	80	70
63-66		71.25	65	82.5	72.5
64-66		75	70	85	75
64-67		78.75	75	87.5	77.5
65-67		82.5	80	90	80
65-68		86.25	85	92.5	82.5
66-68		90	90	95	85
67-68		93.75	95	97.5	87.5
67-69		97.5	100	100	90
67-70		101.25	105	102.5	92.5

* Under gradual retirement scenarios, the first age is the age of starting work on part-time (gradual) basis, and the second age is the age of full retirement.

Figure 5.1
The distribution of retirement age preferences



5.2.4 Empirical approach

We estimate OLS models in which we regress the chosen age of retirement on characteristics of the retirement scenarios in the stated preferences experiment. We cluster the analysis on the personal identifier because each individual in the dataset reported a retirement age under five different retirement scenarios. Gradual retirement is coded as a dummy variable that takes the value 1 if the retirement scenario includes gradual retirement and 0 otherwise. Because gradual retirement in our experiment is defined to be working for two days a week, full-time-equivalent age of retirement is estimated to be 5 months for each additional year of gradual retirement.[7] We measure the price of leisure incentive by a continuous variable (*Accruals*) that takes the value 0 for scenario 1 (the actuarially-fair 5% accruals), the value 1 for scenarios 2 and 6 (7.5% accruals), the value 2 for scenarios 3 or 7 (10% accruals). Therefore, one point increase in *Accruals* represents the effect of a 2.5 percentage points increase in the price of leisure. We measure the pension income effect by a continuous variable (*income*) that takes the value 0 for Scenarios 5 and 9 (85% replacement rate), the value 1 for Scenario 1 (90% replacement rate), and the value 2 for Scenarios 4 and 8 (95% replacement rate). Therefore one point increase in pension income represents a 5%-points increase in the replacement rate. After the respondents were given the retirement scenarios, they were asked to rank the five retirement scenarios from most preferred (5) to least preferred (1).

We assess heterogeneous treatment effects using work-related stress and job satisfaction as a basis for the sample division. We measure work-related stress by the Effort-Reward Imbalance scale suggested by Siegrist (1996). Table 5.A3 shows the various items of the scale. For each of the items respondents were asked whether they strongly agree, agree, disagree or strongly disagree to each of the statements. When necessary we re-scaled items so that higher scores reflect higher levels of stress, and then calculated the average of these items. We then created a dummy for stress that takes the value 1 if the respondent's level of stress is above average and 0 otherwise. To assess job satisfaction, workers are asked to rank their job satisfaction on a scale from 0 "very dissatisfied" to 10 "very satisfied". We created a dummy variable that takes the value one if a worker's job satisfaction is above average and zero otherwise.

5.3 Gradual retirement, retirement age, and labour supply

5.3.1 Main analysis

Table 5.2 shows the relationship between gradual retirement and retirement age (Columns 1 and 2) and full-time-equivalent age of retirement (Columns 3 and 4). The table shows that gradual retirement is associated with about 11 to 13.7 months increase in retirement age. However, the table shows that on average workers retire 2.6 (or 4.1) months earlier under gradual retirement if we consider full-time-equivalent age of retirement instead of age of full-

7 Given that the gradual retirement option in the questionnaire referred to working two days per week, we consider that each additional year in the labour market would increase labour supply by (2/5=0.4 year) which is about 5 months.

time retirement. This suggests that the gradual retirement option has negative consequences on workers' overall labour supply because the effect of gradual retirement on extending the attachment to the labour market is outweighed by the reduction in weekly working hours in the years before full-time retirement. The table shows that 2.5%-points increase in accruals postpones the retirement age and the full-time equivalent age of retirement by about 5.3 months. However, the effect of accruals on postponing the full-time-equivalent age of retirement is lower by about one month for gradual retirement than for regular retirement. The table further shows that 5%-points increase in pension income decreases retirement age and full-time-equivalent age of retirement by about 5.6 months. This suggests that workers prefer to retire earlier if they receive a higher replacement rate. However, at any given level of pension income, gradual retirement is associated with relatively higher levels of labour supply than regular retirement. The findings of Table 5.2 show that while financial incentives either in the form of accruals or pension income affect people's preferred retirement age, their impact is lower under gradual retirement scenarios. This suggests that labour supply under gradual retirement scenarios is less responsive to changes in financial incentives. One explanation for this could be that flexibility in working hours play a greater role in determining labour supply than financial incentives. A second explanation could be that because changes in financial incentives under gradual retirement is lower than those under regular retirement (in absolute terms), workers become less responsive to these changes under gradual retirement.

Table 5.2

The relationship between gradual retirement and retirement age and full-time-equivalent age of retirement

	(1)	(2)	(3)	(4)
VARIABLES	Retirement age		Full-time-equivalent age of retirement	
Gradual retirement	1.140***	0.993***	-0.218***	-0.345***
	(0.011)	(0.019)	(0.011)	(0.019)
Accruals		0.443***		0.446***
		(0.009)		(0.009)
Gradual retirement*Accruals		-0.084***		-0.120***
		(0.011)		(0.011)
Pension income		-0.473***		-0.475***
		(0.011)		(0.011)
Gradual retirement*pension income		0.103***		0.110***
		(0.013)		(0.013)
Controls	Yes	Yes	Yes	Yes
Constant	65.291***	65.302***	65.281***	65.301***
	(0.065)	(0.068)	(0.065)	(0.068)
Observations	21,868	21,868	21,868	21,868
R-squared	0.114	0.159	0.021	0.071

Full-time-equivalent age of retirement estimated to be five months for each additional year of employment. Controls include age, gender, as well as dummies for randomization pattern of scenarios. Robust standard errors corrected for clustering on the individual level in parentheses ***p<0.01, **p<0.05, *p<0.1.

Table 5.3 summarises the average retirement age under each retirement scenario (Column 1) and the full-time-equivalent age of retirement (Column 2). The table shows that under regular retirement scenarios, the average retirement age (and full-time-equivalent age of retirement) in the baseline scenario is 64.7 years. Retirement age is about 7 months higher than the average age in the baseline scenario when the price of leisure incentive increases from 5 percentage points to 7.5 percentage points (Scenario 2). Retirement age increases by 3 more months to 65.6 years when the price of leisure incentive goes from 7.5% points to 10% percentage points (Scenario 3). An increase in pension income by 5 percentage points from 90% to 95% at the age of 67 reduces the age of retirement by 5 months to 64.3 years, while a decrease of in pension income by 5 percentage points to 85% increases the age of retirement by 6 months to 65.3 years.

Under each gradual retirement scenario, the retirement age is longer than average retirement ages under equivalent regular retirement scenarios. However, changes in full-time-equivalent ages of retirement are less pronounced. In the 7.5% points accruals scenario (Scenario 6), the age of retirement increases by 18 months to 66.3 years. However, the full-time-equivalent age of retirement increases only by two months to 64.9 years. Increasing the accruals even further to 10% percentage points (Scenario 7) increases the age of retirement by 22 months to 66.6 years, while it increases the full-time-equivalent age of retirement by only 5 months to 65.2 years. Retirement age in the 95% replacement scenario (Scenario 8) increases by about nine months to 65.5 years. However, it decreases the full-time-equivalent age of retirement by seven months to 64.2 years. While the age of retirement increases by about 17 months under the 85% replacement rate scenario (Scenario 9), this increase is only two months in terms of the full-time equivalent age of retirement. These estimates explain why the net effect of gradual retirement on worker' labour supply is negative.

Table 5.3

Individual retirement scenarios, retirement age, and full-time-equivalent age of retirement

Scenario	1	2	3	4	5
	Baseline	Price of leisure incentive		Pension income incentive	
Regular retirement	accruals: 5%; replacement rate: 90% at 67	accruals 7.5%; replacement rate: 90% at 67	accruals 10%; replacement rate: 90% at 67	accruals 5%; replacement rate: 95% at 67	accruals 5%; replacement rate: 85% at 67
Retirement age	64.7	65.4	65.6	64.3	65.3
Full-time-equivalent Age of retirement	64.7	65.4	65.6	64.3	65.3
Scenario		6	7	8	9
		Price of leisure incentive		Pension income incentive	
Gradual retirement		accruals 7.5%; replacement rate: 90% at 68	accruals 10%; replacement rate: 90% at 68	accruals 5%; replacement rate: 95% at 68	accruals 5%; replacement rate: 85% at 68
Retirement age		66.3	66.6	65.5	66.2
Full-time-equivalent Age of retirement		64.9	65.2	64.2	64.9

5.3.2 Stress, job dissatisfaction and gradual retirement

The above findings are likely to hide underlying heterogeneity across groups of workers in the effect of gradual retirement on retirement age and worker's labour supply. De Grip et al. (2013) show that the treatment effects of changes in retirement schemes on expected retirement age differs by education and tasks performed on the job. Here we focus on the role of stress and job satisfaction which have been shown to relate to retirement (Krause et al. 1997; Wahrendorf et al. 2013). Stressed workers and those who are less satisfied with their job might postpone retirement when they would have the opportunity to retire gradually as gradual retirement could reduce their stress at work. Table 5.4 shows to what extent there is heterogeneity in the relationship between gradual retirement and retirement age (Columns 1 and 2) and labour supply (Columns 3 and 4) with respect to work-related stress, and job satisfaction. The table shows that workers who are highly stressed and those who have low job satisfaction are more likely to stay relatively longer in the labour market when they are given the gradual retirement option. This suggests that introducing flexibility in working hours could induce these workers to increase their labour supply, probably because working fewer hours reduces the burden of work (see Chapter 2).

To study the heterogeneity in the effect of price of leisure on the relationship between gradual retirement and labour supply, Table 5.A4 in Appendix shows the estimation results for the triple interactions between gradual retirement, financial incentives, and work-related stress (Columns 1 and 3), and job satisfaction (Columns 2 and 4). The table shows that there are no significant differences in the impact of changes in the price of leisure or pension income on the pattern that stressed (dissatisfied) workers are more likely to respond to gradual retirement by staying longer in the labour market.

5.4 Preferences for gradual retirement

Van Soest et al. (2006) have shown that workers on average do not prefer gradual retirement. However, the determinants of workers' preference for gradual retirement have not been addressed in the literature. Financial incentives could affect workers' preference for gradual retirement. Although high incentives to postpone retirement and low pension income are generally less favourable options, they could be more preferred under gradual retirement than under regular retirement scenarios especially because gradual retirement could enable workers to trade-off more leisure time for lower replacement rates. Worker characteristics such as work-related stress and job satisfaction could also affect workers' preference of gradual retirement scenarios.

Table 5.A5 in the Appendix shows the average ranking of each retirement scenario. The table shows that retirement scenario 4 (95% replacement rate, regular retirement) is the most preferred one, while scenario 9 (85% replacement rate, gradual retirement) is the least preferred one. Table 5.6 reports the results of analyses on how attributes of the retirement scenarios relate to the rank- preference of the scenarios. Column 1 shows the ranking of retirement preferences without controlling for financial incentives, while Column 2 controls for financial incentives. The table shows that workers on average do not prefer gradual

retirement. On average, gradual retirement scenarios are ranked 0.6 position lower than regular retirement scenarios. Retirement scenarios with higher accruals are less preferred (about 0.8 lower rank), but this holds less so for gradual retirement scenarios. Retirement scenarios with high pension income are awarded a higher rank (about 1.2 higher rank). But again, this is less so the case for gradual retirement scenarios. These findings therefore suggest that respondents are willing to trade-off more leisure time for a lower pension income.

Table 5.4

Gradual retirement and full-time-equivalent age of retirement, heterogeneity analysis

	(1)	(2)	(3)	(4)
VARIABLES	Retirement age		Full-time-equivalent age of retirement	
Gradual retirement	0.985***	1.166***	-0.370***	-0.182***
	(0.018)	(0.026)	(0.018)	(0.025)
Stressed	-0.374***		-0.375***	
	(0.054)		(0.054)	
Gradual retirement*Stressed	0.123***		0.115***	
	(0.033)		(0.030)	
Satisfied in job		0.588***		0.589***
		(0.059)		(0.059)
Gradual retirement* Satisfied in job		-0.179***		-0.187***
		(0.032)		(0.032)
Controls	Yes	Yes	Yes	Yes
Constant	65.910***	65.275***	65.894***	65.258***
	(0.253)	(0.255)	(0.251)	(0.252)
Observations	19,515	19,390	19,515	19,390
R-squared	0.172	0.181	0.085	0.094

Controls include age, gender, accruals, pension income, as well as dummies for randomization pattern of scenarios. Robust standard errors corrected for clustering on the individual level in parentheses ***p<0.01, **p<0.05, *p<0.1. The differences in the number of observations across the four models is due to missing values for the heterogeneity variables.

Table 5.6 shows to what extent ranking of preferences is different between stressed (job dissatisfied) and non-stressed (job satisfied) workers. It shows that stress on the job does not affect workers' rating of gradual retirement scenarios (Column 1). Neither is there any difference between those who are more or less satisfied with their job (Column 2).[8]

8 Triple interaction between gradual retirement, financial incentives, and stress (job satisfaction) is statistically insignificant.

Table 5.5

OLS estimations for ranking of retirement scenarios preferences, the role of financial incentives

	(1)	(2)
VARIABLES	Ranking of preferences	
Gradual retirement	-0.808***	-0.573***
	(0.028)	(0.041)
Accruals		-0.758***
		(0.020)
Gradual retirement*Accruals		0.226***
		(0.028)
Income		1.193***
		(0.015)
Gradual retirement*Income		-0.221***
		(0.023)
Controls	Yes	Yes
Constant		
	3.325***	2.900***
	(0.011)	(0.029)
Observations	16,528	16,528
R-squared	0.076	0.400

Re-estimating the model using ordered probit gives similar results. Controls include age, gender, and dummies for randomization pattern of scenarios. Robust standard errors corrected for clustering on the individual level in parentheses ***p<0.01, **p<0.05, *p<0.1.

Table 5.6

OLS estimations for ranking of retirement scenarios preferences, the moderating role of individual characteristics

	(1)	(2)
VARIABLES	Ranking of preferences	
Gradual retirement	-0.629***	-0.713***
	(0.039)	(0.049)
Stressed	0.001	
	(0.022)	
Gradual retirement*Stressed	-0.005	
	(0.054)	
Satisfied in job		-0.008
		(0.007)
Gradual retirement*Satisfied in job		0.018
		(0.017)
Constant	2.951***	2.989***
	(0.031)	(0.033)
Controls	Yes	Yes
Observations	15,944	15,854
R-squared	0.393	0.395

Re-estimating the model using ordered probit gives similar results. Controls include age, gender, and dummies for randomization pattern of scenarios. Robust standard errors corrected for clustering on the individual level in parentheses ***p<0.01, **p<0.05, *p<0.1.

5.5 Concluding remarks

In this chapter, we use data from a stated preferences experiment to study to what extent gradual retirement could affect worker's age of retirement as well as worker's total life-time labour supply. Existing evidence in the literature finds that gradual retirement does not lead to a net increase of total labour supply of older workers (e.g., Gielen 2009; Machado and Portela 2012). However, these studies focus on actual retirement decisions. Therefore, they do not identify all retirement options which are available to older workers, because the options that are not chosen cannot be observed, or because it is not even clear which options could have been chosen by workers (Kantarci and Van Soest 2008 2013). Stated preferences can solve this problem by capturing a broader array of preference-driven behaviours, and therefore, could be used to estimate the causal relation between gradual retirement and worker's age of retirement and labour supply. Concerns may arise about the external validity of retirement options in stated preference studies, especially if the retirement options are not existent in reality, or because they can be very easily affected by labour market restrictions and unanticipated policy interventions or life events (Kantarci and Van Soest 2013). However, the literature shows that stated preference estimates and the estimates based on actual behaviour data are usually quite close (Louviere et al. 2000).

We found that the introduction of gradual retirement induces workers to retire one year later on average. However, total labour supply appears to decrease when workers have the gradual retirement option because the positive effect of delayed retirement on labour supply is cancelled out by the hours reduction before full retirement. Financial incentives, either in terms of changing the price of leisure or in terms of changing the pension income (regardless of their reported expected age of retirement) affect the chosen age of retirement and labour supply. A one percentage point increase in the price of leisure increases retirement age by about two months, while a one percentage point increase in pension income reduces retirement age by about one month. These effects are lower in a gradual retirement than in a regular retirement scenario. We also found that the impact of gradual retirement on retirement age and labour supply is heterogeneous among different groups. Stressed workers, and those who are dissatisfied with their jobs are more likely to retire late and less likely to decrease labour supply if they would have the opportunity of gradual retirement.

Appendix

Table 5.A1

Background characteristics

Characteristic	Attribute	Percentage
Age	< =45	7.22
	46-50	7.54
	51-55	14.15
	56-60	36.30
	>60	34.79
Gender	Male	61.14
	Female	38.86
Marital status	Lives with a partner	83.61
	Lives alone	16.39
Education	Low	3.62
	Intermediate	24.85
	High	71.53
Income level	<€40,000	17.28
	€40,000 – 59,999	48.69
	€60000-79,999	27.63
	€80,000+	6.39

Table 5.A2

Background characteristics by retirement scenario

Characteristic	Attribute	Percentage									P value of F test
		Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5	Scenario 6	Scenario 7	Scenario 8	Scenario 9	
Age	< =45	8.08	7.42	8.66	8.25	7.63	7.96	8.11	8.83	8.14	0.80
	46-50	8.4	8.35	7.93	8.61	8.86	8.23	8.2	8.43	8.68	0.99
	51-55	15.72	16.84	15.58	15	15.85	16.47	16.03	14.84	15.59	0.72
	56-60	40.77	40.53	40.77	41.23	40.7	40.24	40.96	40.94	40.41	0.99
	>60	27.03	26.87	27.06	26.91	26.95	27.1	26.7	26.95	27.18	1.00
Gender	Male	63.66	63.57	63.87	63.25	63.36	64.06	63.42	63.63	63.95	0.99
	Female	36.34	36.43	36.13	36.75	36.64	35.94	36.58	36.37	36.05	0.99
Marital status	Lives with a partner	83.61	84.17	84.02	83.24	83.19	83.97	84.21	83.07	83.01	0.95
	Lives alone	16.39	15.83	15.98	16.76	16.81	16.03	15.79	16.93	16.99	0.95
Education	Low	4	3.64	3.73	3	3.5	3.76	3.61	3.6	3.63	1.00
	Intermediate	25	23.45	23.84	26.42	25.88	23	24.02	26.22	26	0.14
	High	71.53	72.91	72.43	70.11	70.62	72.96	72.37	70.18	70.69	0.27
Income level	<€40,000	15.18	15	14.85	16	15.35	15	15	15.38	15.23	0.99
	€40,000 – 59,999	47	46.97	46.42	47	48	47	46.18	47.49	47.91	0.95
	€60000-79,999	31	31	31.07	31	31	31	31.03	30.63	30.77	0.99
	€80,000+	6.78	7.23	7.66	6.48	6.03	7.22	7.73	6.5	6.09	0.77

Table 5.A3

Items of the Effort-Reward Imbalance scale

- ERI1 I have constant time pressure due to a heavy work load
- ERI2 I have many interruptions and disturbances while performing my job
- ERI3 Over the past few years, my job has become more and more demanding
- ERI4 I receive the respect I deserve from my superior or a respective relevant person
- ERI5 My job promotion prospects are poor
- ERI6 I have experienced or I expect to experience an undesirable change in my work situation
- ERI7 My job security is poor
- ERI8 Considering all my efforts and achievements, I receive the respect and prestige I deserve at work
- ERI9 Considering all my efforts and achievements, my job promotion prospects are adequate
- ERI10 Considering all my efforts and achievements, my salary/income is adequate
- OC1 I get easily overwhelmed by time pressures at work
- OC2 As soon as I get up in the morning I start thinking about work problems
- OC3 When I get home, I can easily relax and 'switch off' work
- OC4 People close to me say I sacrifice too much for my job
- OC5 Work rarely lets me go, it is still on my mind when I go to bed
- OC6 If I postpone something that I was supposed to do today I'll have trouble sleeping at night

Table 5.A4

Heterogeneity in the effect of accruals on the relationship between gradual retirement and labour supply

	(1)	(2)	(3)	(4)
VARIABLES	Retirement age		FT-equivalent age of retirement	
Gradual retirement	0.926***	1.127***	-0.411***	-0.203***
	(0.031)	(0.046)	(0.030)	(0.046)
Stressed	-0.355***		-0.355***	
	(0.073)		(0.073)	
Gradual retirement*stressed	0.136**		0.136***	
	(0.054)		(0.053)	
Accruals	0.421***	0.528***	0.423***	0.530***
	(0.020)	(0.032)	(0.020)	(0.032)
Gradual retirement*accruals	-0.050***	-0.173***	-0.083***	-0.212***
	(0.019)	(0.029)	(0.019)	(0.028)
Stressed*accruals	0.045		0.045	
	(0.037)		(0.037)	
Gradual retirement*stressed*accruals	-0.008		-0.009	
	(0.034)		(0.033)	
Pension income	-0.466***	-0.523***	-0.468***	-0.526***
	(0.020)	(0.030)	(0.020)	(0.030)
Gradual retirement*pension income	0.096***	0.141***	0.101***	0.149***
	(0.017)	(0.025)	(0.017)	(0.025)
Stressed*pension income	-0.052		-0.052	
	(0.035)		(0.035)	
Gradual retirement*stressed*pension income	0.029		0.034	
	(0.026)		(0.026)	
Job satisfaction		0.601***		0.601***
		(0.080)		(0.080)
Gradual retirement*job satisfaction		-0.193***		-0.203***
		(0.059)		(0.057)
Job satisfaction*accruals		-0.118***		-0.118***
		(0.041)		(0.041)
Gradual retirement*job satisfaction*accruals		0.002		0.001
		(0.037)		(0.036)
Job satisfaction*pension income		0.046		0.046
		(0.039)		(0.039)
Gradual retirement*job satisfaction*pension income		-0.043		-0.044
		(0.030)		(0.029)
Controls	Yes	Yes	Yes	Yes
Constant	65.493***	64.898***	65.493***	64.897***
	(0.078)	(0.092)	(0.078)	(0.092)
Observations	19,515	19,390	19,515	19,390
R-squared	0.171	0.180	0.084	0.093

Controls include age, gender, and dummies for randomization pattern of scenarios. Robust standard errors corrected for clustering on the individual level in parentheses ***p<0.01, **p<0.05, *p<0.1.

Table 5.A5
Ranking of preferences for different retirement scenarios

Retirement Scenario	Average ranking
Scenario 1	3.74
Scenario 2	3.11
Scenario 3	2.46
Scenario 4	4.57
Scenario 5	2.30
Scenario 6	2.69
Scenario 7	1.98
Scenario 8	3.64
Scenario 9	1.81

The higher the average ranking, the more preferred is the retirement scenario.

Figure 5.A1
Examples of the retirement scenarios

We would like to know more about your retirement preferences. In the following five questions, we therefore confront you with different retirement scenarios. Thereby, you always have to assume that you work full-time.

Some of these scenarios only enable you to retire full-time, while other scenarios enable you to first retire part-time for two or three years before you retire full-time (you always retire three days and still work for two days in these scenarios). It always holds that the earlier you retire, the lower your pension will be.

In each question, we present a table in which for each possible retirement age is shown how much pension you will receive from that age.

The income is net (free disposable after taxes and benefits) and is expressed as a percentage of your current net wage. Your state old age pension (AOW) and the income from part-time work (in case of part-time retirement) are already included in the calculation. In the scenarios in which you first retire part-time, you would receive this income during the period in which you are part-time retired and during the period thereafter.

Scenario 1:

If you could choose among these possibilities, at what age you prefer to stop working?

Age of retirement	Replacement rate (as % of net income)
62	65
63	70
64	75
65	80
66	85
67	90
68	95
69	100
70	105

- Completely stop working at the age of 62 years at an income of 65%
- Completely stop working at the age of 63 years at an income of 70%
- Completely stop working at the age of 64 years at an income of 75%
- Completely stop working at the age of 65 years at an income of 80%
- Completely stop working at the age of 66 years at an income of 85%
- Completely stop working at the age of 67 years at an income of 90%
- Completely stop working at the age of 68 years at an income of 95%
- Completely stop working at the age of 69 years at an income of 100%
- Completely stop working at the age of 70 years at an income of 105%

Scenario 2:

Age of retirement	Replacement rate (as % of net income)
62	52.5
63	60
64	67.5
65	75
66	82.5
67	90
68	97.5
69	105
70	112.5

- Completely stop working at the age of 62 years at an income of 52.5%
- Completely stop working at the age of 63 years at an income of 60%
- Completely stop working at the age of 64 years at an income of 67.5%
- Completely stop working at the age of 65 years at an income of 75%
- Completely stop working at the age of 66 years at an income of 82.5%
- Completely stop working at the age of 67 years at an income of 90%
- Completely stop working at the age of 68 years at an income of 97.5%
- Completely stop working at the age of 69 years at an income of 105%
- Completely stop working at the age of 70 years at an income of 112.5%

Scenario 6:

Age of gradual retirement to full retirement	Replacement rate (as % of net income)
62–64	60
62–65	63,75
63–65	67,5
63–66	71,25
64–66	75
64–67	78,75
65–67	82,5
65–68	86,25
66–68	90
66–69	93,75
67–69	97,5
67–70	101,25

- Gradual retirement from 62 to 64 years and full retirement from 64 years at retirement income of 60%
- Gradual retirement from 62 to 65 and full retirement from 65 years at retirement income of 63.75%
- Gradual retirement from 63 to 65 and full retirement from 65 years at retirement income of 67.5%
- Gradual retirement from 63 to 66 years and full retirement from 65 years at retirement income of 71.25%
- Gradual retirement from 64 to 66 years and full retirement from 66 years to retirement income of 75%
- Gradual retirement from 64 to 67 years and full retirement from 67 years at retirement income of 78.75%
- Gradual retirement from 65 to 67 years and full-time retirement from 67 years at retirement income of 82.5%
- Gradual retirement from 65 to 68 years and full-time retirement from 68 years at retirement income of 86.25%
- Gradual retirement from 66 to 68 years and full-time retirement from 68 years at retirement income of 90%
- Gradual retirement from 66 to 69 years and full-time retirement from 69 years at retirement income of 93.75%
- Gradual retirement from 67 to 69 years and full-time retirement from 69 years at retirement income of 97.5%
- Gradual retirement from 67 to 70 years and full-time retirement from 70 years at retirement income of 101.25%

Scenario 8:

Age of gradual retirement to full retirement	Replacement rate (as % of net income)
62–64	75
62–65	77.5
63–65	80
63–66	82.5
64–66	85
64–67	87.5
65–67	90
65–68	92.5
66–68	95
66–69	97.5
67–69	100
67–70	102.5

- Gradual retirement from 62 to 64 years and full retirement from 64 years at retirement income of 60%
- Gradual retirement from 62 to 65 and full retirement from 65 years at retirement income of 63.75%
- Gradual retirement from 63 to 65 and full retirement from 65 years at retirement income of 67.5%
- Gradual retirement from 63 to 66 years and full retirement from 65 years at retirement income of 71.25%
- Gradual retirement from 64 to 66 years and full retirement from 66 years to retirement income of 75%
- Gradual retirement from 64 to 67 years and full retirement from 67 years at retirement income of 78.75%
- Gradual retirement from 65 to 67 years and full-time retirement from 67 years at retirement income of 82.5%
- Gradual retirement from 65 to 68 years and full-time retirement from 68 years at retirement income of 86.25%
- Gradual retirement from 66 to 68 years and full-time retirement from 68 years at retirement income of 90%
- Gradual retirement from 66 to 69 years and full-time retirement from 69 years at retirement income of 93.75%
- Gradual retirement from 67 to 69 years and full-time retirement from 69 years at retirement income of 97.5%
- Gradual retirement from 67 to 70 years and full-time retirement from 70 years at retirement income of 101.25%

06
SUMMARY OF MAIN FINDINGS

This thesis studied various determinants of working hours for different groups of workers as well as the relationship between working hours and various labour and health outcomes. Chapter 2 investigates short- and medium-term labour supply adjustments to work-related stress and their potential to reduce work-related stress. For this purpose, we use data from the German Socio-Economic Panel (SOEP) that contains a validated measure of work-related stress in the waves 2006 and 2011: the Effort-Reward Imbalance (ERI) model by Siegrist (1996). While the chapter does not tackle the endogeneity problem associated with individuals' unobserved heterogeneity in the willingness and the possibility to switch jobs and/or reduce working hours, the chapter makes use of the panel structure to study future consequences of work-related stress. We show that work-related stress has negative health implications and is associated with absenteeism from work. Workers respond to work-related stress by switching jobs and/or reducing working hours. These adjustments are gender-specific. While men are more likely to respond to stress by switching jobs, women usually respond to stress by reducing their working hours. We further showed that these adjustments seem to be associated with reduced work-related stress and improved health.

Chapter 3 investigates the integration patterns of Muslim and non-Muslim immigrants before and shortly after a violent wave of Islamist terrorist attacks hit Western Europe. The wave began with the Madrid bombings in March 2004 and extended to the London bombings in July 2005. The assassination of Theo van Gogh in Amsterdam by an Islamic fanatic of Moroccan origin took place in the middle of this wave, triggering nationwide outrage and increasing discrimination against Muslims in the Netherlands (Gautier et al. 2009). We use data from the Netherlands that oversample the four largest ethnic minorities in the country (Turks, Moroccans, Surinamese, and Dutch Antilleans).

We show that Muslim immigrants' perceived integration declined much more after the terrorist attacks than did that of non-Muslim immigrants. This pattern holds after including a large set of control variables and accounting for selection bias, and is not driven by any existing negative trend in the integration of Muslim immigrants prior to the attacks. Our findings suggest that perceived integration could potentially reveal more than objective measures of integration. We find that unemployment and working hours of Muslims are not negatively affected by the attacks. However, the geographic segregation of Muslim immigrants increased after the attacks. Our analyses on the heterogeneous effects of the terrorist attacks show that while the highly educated are affected most negatively with respect to their perceived integration, the low-educated became more geographically segregated. The decline in perceived integration of the highly-skilled Muslim migrants can be explained in light of their higher expectations on integration in the host country compared to the low skilled. Meanwhile, the increase in geographic segregation of low-skilled Muslims after the attacks could be a buffer that mitigated the effect of terrorism on their perceived integration as they could have obtained social support from being in a community of the same ethnic background. We further find that perceived integration is negatively associated with migrants' intention to return to their native country. This emphasizes the economic relevance of perceived integration of migrants.

Chapter 4 documents recent changes in the part-time pay penalty (PTPP) for female workers in the UK over the period 1997 to 2006 and investigates to what extent the decrease of the PTPP could be driven by relative changes in computer use and job tasks by full-

time and part-time workers. We find a decrease in the PTPP over the period 1997-2006 for female workers in the low- and medium-skilled occupations in the UK. This decrease has been accompanied by a convergence in computer use, self-planning, and influencing tasks between part-time and full-time workers. The convergence in computer use explains a substantial part of the decrease in the PTPP. Furthermore, the change in the PTPP is affected by changes in wage returns to job tasks performed more intensively by full-timers. While the decreasing returns to reading and writing have decreased the PTPP, the increasing returns to influencing have increased the PTPP despite the convergence in the influencing task input between part-time and full-time workers. Relative changes in the input and prices of computer use and job tasks together explain more than 50 percent of the wage convergence between part-time and full-time workers in low- and medium-skilled occupations.

Chapter 5 uses data from a stated preferences experiment to study to what extent gradual retirement could affect worker's age of retirement as well as worker's total life-time labour supply. Existing evidence in the literature finds that gradual retirement does not lead to a net increase of total labour supply of older workers (e.g., Gielen 2009; Machado and Portela 2012). However, these studies focus on actual retirement decisions. Therefore, they do not identify all retirement options which are available to older workers, because the options that are not chosen cannot be observed, or because it is not even clear which options could have been chosen by workers (Kantarci and Van Soest 2008, 2013). Stated preferences can solve this problem by capturing a broader array of preference-driven behaviours, and therefore, could be used to estimate the causal link between gradual retirement and worker's age of retirement and labour supply. Concerns may arise about the external validity of retirement options in stated preference studies, especially if the retirement options are not existent in reality, or because they can be very easily affected by labour market restrictions and any unanticipated policy interventions or life events (Kantarci and Van Soest 2013). However, the literature shows that stated preference estimates and the estimates based on actual behaviour data are usually quite close (Louviere et al. 2000).

We found that the introduction of gradual retirement induces workers to retire one year later on average. However, total labour supply appears to decrease when workers have the gradual retirement option because the positive effect of delayed retirement on labour supply is cancelled out by the hours reduction before full retirement. Financial incentives, either in terms of changing the price of leisure or in terms of changing the pension income (regardless of their reported expected age of retirement) affect the chosen age of retirement and labour supply. A one percentage point increase in the price of leisure increases retirement age by about two months, while a one percentage point increase in pension income reduces retirement age by about one month. These effects are lower in a gradual retirement than in a regular retirement scenario. We also found that the impact of gradual retirement on retirement age and labour supply is heterogeneous among different groups. Stressed workers, and those who are dissatisfied with their jobs are more likely to retire late and less likely to decrease labour supply if they would have the opportunity of gradual retirement.

07
VALORISATION ADDENDUM: POLICY RECOMMENDATIONS

In this chapter we discuss the policy implications of the four empirical chapters of this thesis.

7.1 Policy implications of Chapter 2

Work-related stress has negative spillover effects on employers as it is associated with absenteeism from work, and therefore, loss of productivity. In addition, work-related stress has adverse societal consequences as it negatively affects the health of workers. This chapter shows that workers respond to work-related stress by reducing working hours and/or changing jobs, and these labour market adjustments seem to be effective behavioural responses in reducing work-related stress and improving workers' health.

These findings suggest that constraints that workers may encounter in the labour market in terms of difficulty to decrease their working hours or change jobs may limit workers' ability to respond to work-related stress, and therefore could negatively affect their health outcomes. Firms could therefore benefit from giving stressed workers more freedom to reduce their working hours or to switch to other less stressful jobs within the firm. By doing this, firms could avoid loss of productivity coming from absenteeism from work.

7.2 Policy implications of Chapter 3

This chapter shows that after a wave of Islamic-fundamentalist terrorist attacks that hit Europe, Muslim immigrants' perceived integration in the Netherlands declined much more than that of non-Muslim immigrants, especially among the highly educated. Although working hours and unemployment of Muslims were not negatively affected by the attacks, geographic segregation of Muslim immigrants increased after the attacks especially among the low-educated. The chapter also shows that perceived integration is negatively associated with immigrants' intention to permanently re-migrate to their country of origin. These findings suggest that discrimination associated with terrorism could have a negative impact on the prospective stay of the most productive Muslim immigrants in the host country, which could have negative economic implications for the knowledge economy of Western societies.

Policy makers should be aware that the integration of the highly educated Muslim immigrants is affected the most by terrorism, and should pay more attention to this group in order to prevent the decline in their integration in the host country. Media coverage on the successful examples of Muslim immigrants could make highly-skilled Muslims feel more appreciated, and less inclined to leave the host country. Employers should be encouraged to discuss the perceived integration and preferences of re-emigration with immigrants who consider to re-migrate, and to assess to what extent this preference is associated with negative feelings towards their integration in the host country.

7.3 Policy implications of Chapter 4

This chapter shows that the part-time pay penalty for female workers within low- and medium-skilled occupations in the UK decreased significantly over the period 1997-2006. The convergence in computer use between part-time and full-time workers within these occupations explains a large share of the decrease in the part-time pay penalty. However, changes in returns to some job tasks could also explain a significant part of the decline the part-time pay penalty. These findings suggest that a task-based approach offers a highly relevant framework to analyse changes in the labour market position of part-time workers. The chapter suggests that the continuous diffusion of IT across part-time workers could be a major reason for the decline in the part-time pay penalty. Therefore, investments in IT infrastructure might further reduce the part-time pay penalty.

7.4 Policy implications of Chapter 5

This chapter shows that allowing for gradual retirement induces workers to retire one year later on average. However, total labour supply seems to decrease when workers have the gradual retirement option because the positive effect of delayed retirement on labour supply is cancelled out by the hours reduction before full retirement.

This suggests that the usefulness of gradual retirement option depends on the policy objectives. If the policy aims to postpone the age of full-time retirement, offering the gradual retirement option to workers could be a proper strategy. However, if the objective is to increase the life-time labour supply of older workers, gradual retirement will not be successful. It should be also taken into account that financial incentives can be used to increase the labour supply of workers. However, combining them with gradual retirement makes them weaker in extending labour supply.

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BIOGRAPHY

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