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Regional labour market dynamics and the gender employment gap

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Inge Noback

REGIONAL LABOUR MARKET DYNAMICS AND THE GENDER EMPLOYMENT GAP

Regional labour market dynamics and the gender employment gap

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Preface

The advantage of studying differences between women and men on the Dutch labour market is that you're not likely to get bored; there are so many angles of approach and if it becomes too overwhelming there's always the data to return to. It turned out that for me the option of 'going back to the data' has been a life saver.

This project has not been easy for me, as some of you know, so I am very grateful to be writing these final words. Many people have contributed to this project one way or another and I'd like to take the opportunity of thanking some of you in person.

First of all Jouke, you have been an exceptional supervisor. Your ability to always ask the right question (usually the one thing I don't have an answer to straight away), your enthusiasm as a researcher and your pragmatic approach to dealing with all kinds of issues have been of great value to me. I would not have been able to complete this dissertation without your patience and guidance. And Lourens, I have been really lucky to have you as a daily supervisor. Your enthusiasm and encouragement have had a great impact on me and I look back on our trip to Cambridge with many fond memories. Philip, I am so happy you decided to come to Groningen and I enjoy our morning coffees very much.

Furthermore I'd like to thank Aleid and Karen for your influence on my academic career and of course for your friendship. And Aleid, I really enjoy our trips/endeavors in search of self-development and relaxation and I hope there will be many more adventures in the future. I truly feel that I have been very fortunate with my place of work and I would like to mention some colleagues in particular: Heike, Petra, and Louise for your friendship and putting up with me as a roommate/neighbour; Viktor, Maria, An, and Sierdjan for their tech-support and kindness.

On a more personal note I would like to thank my family and my parents in particular: Anne and Aldert, who have shown incredible support and great interest in my work over the years. Not a conference went by without you wishing me luck with the presentation and I feel truly fortunate to have you as my parents. Thanks to Jurjen, for your keen eye for detail and Miriam for the many interesting discussions. I

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Inge Noback
Oudeschip, August 2011

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1

Introduction

1.1 Motivation for this study

'The bloody arrogance of male executives' and 'The myth of the Dutch princess'[1] are just two examples of recent headlines in Dutch newspapers indicating a lively debate on the position of women in the labour market. To attain equality and to solve the problems resulting from aging, the author of the first article argues that men and women should spend equal amounts of time doing paid and unpaid work. In the second article the author claims women should be considered serious participants in the labour market and should not be depicted as dependent, ignorant and workshy creatures. In general, the public debate largely focuses on the need for and desirability of policy measures to increase female labour participation.

Female labour market participation has changed substantially over the last few decades in the Netherlands. There has been a sharp increase in participation and women also remain in the labour market after having children. Mothers, who traditionally formed a group with low labour force participation, have taken up work in large numbers since part-time jobs have become much more widely available. This tremendous increase in part-time jobs has resulted in a combination of high levels of employment with low average work hours. Working part-time is not without disadvantages however: these jobs generally offer lower wages, less training and fewer opportunities for career advancement (Van den Brakel et al., 2010; Saint-Martin and Venn, 2010).

Despite the increase in female participation, important differences between the position of men and women on the labour market remain. Women work fewer hours, earn less, are more frequently unemployed and their share in jobs at a supervisory level is lower (Merens et al., 2011). This unfavourable position of women in the labour market is referred to in the literature as *the gender employment gap*. While most studies on gender differences in the labour market do not consider that the labour market functions on a regional scale, most regional labour market studies in turn do not pay much attention to gender differences. According to Elhorst (1996), the national labour market does not exist. Psychological and geographical frictions limit daily commuting time, resulting in employees and employers being confronted with a

[1] 'The bloody arrogance of male executives' appeared in NRC Handelsblad 6-10-2009 as *'De godvergeten arrogantie van mannen aan de top'* by Elsbeth Etty. 'The myth of the Dutch princess' appeared in de Volkskrant 6-11-2010 as *'De mythe van de Nederlandse prinses'* by Marjon Bolwijn.

small set of overlapping regional labour markets. The limited spatial range of labour market behaviour is clearly illustrated by the fact that people are only willing to accept a limited daily commute (Van Ham, 2002; Turner and Niemeier, 1997). The main aim of this thesis is therefore *to gain insight into the gender-specific regional differences in labour market participation*.

There are several arguments to increase female labour participation or close the gender employment gap. An often cited argument is that having a paid job with sufficient wage is considered a prerequisite for an independent existence (Merens et al., 2011). In addition, the equality argument is often referred to. For example, the European Commission has developed a new strategy for gender equality where the main purpose is to improve the utilization of female capacities (EU, 2010). However, in the context of aging, the economic argument to increase female participation is becoming equally relevant. The Netherlands, like many European countries, faces a decline in the working-age population as a result of aging, which poses a serious threat to current welfare levels. Given the high prevalence of part-time work among women, increasing female participation –especially in terms of working hours– could make a significant contribution to mitigate the adverse effects of aging.

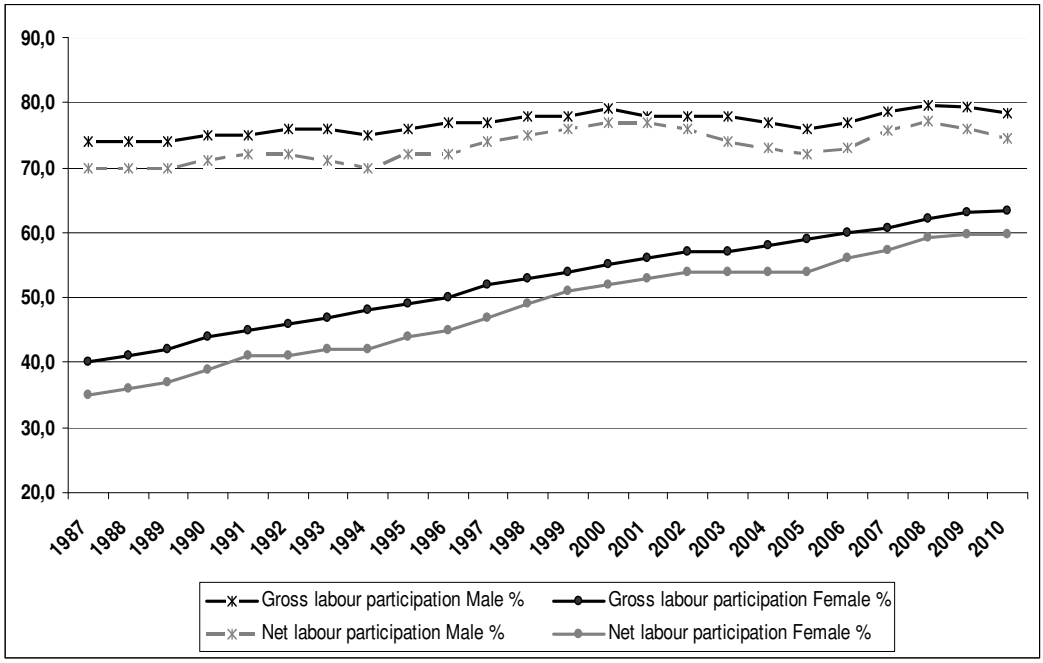
This thesis contributes to existing literature by exploring several aspects of the gender employment gap. At the heart of each chapter are differences between men and women in a labour market context. Specific attention is paid to differences in employment rates, working hours and career advancement. The remainder of this chapter comprises both a description of the research framework, including a brief overview of the recent developments in the Dutch labour market, and the research aims and outline of this thesis.

1.2 Research framework

The Dutch labour market differs from other countries due to a unique combination of high levels of labour market participation combined with low average working hours. Since the mid-1980s female employment rates, or net participation, increased from 30 percent in 1985 to almost 60 percent in 2009. As shown in Figure 1, during the same period male employment rates only increased gradually and appear more cyclical in nature. As a result of the increase in female employment, *the gender employment gap*,

i.e. the difference between male and female employment, decreased drastically from 35 percentage points to about 15 percentage points in 2009.

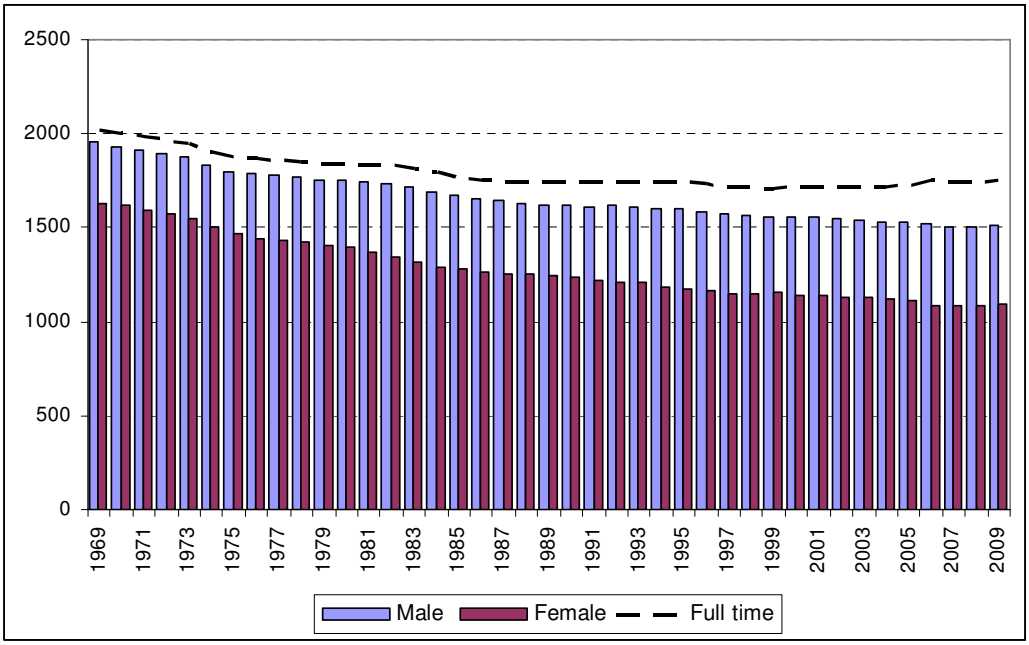
Figure 1 Male and female labour market participation for the Netherlands



Source: Statistics Netherlands 2011

Figure 2 depicts the development of the gender-specific average annual working hours per job compared to full-time hours. During the same period that the gender employment gap has been closing, *the gender hours gap* has increased. Although both male and female working hours per job have dropped, the drop is larger for females than for males. The developments depicted in Figures 1 and 2 have resulted in the unique combination of high employment rates and low average working hours compared to other countries.

Figure 2 Male and female average annual working hours for the Netherlands



Source: Statistics Netherlands 2010

The increase in female participation in the labour market can be attributed to a combination of factors. Women have become better educated, there has been a drop in fertility and it is more accepted that women combine work with raising children (e.g. De Graaf and Vermeulen, 1997; OECD, 2002). On the demand-side, there has been a shift from agriculture and manufacturing towards a service economy, in which women are overrepresented. Moreover, in addition to these factors, a broader variety of employment and working-time arrangements has become available through a bi-directional process: female participation is encouraged by greater flexibility, while more women in the labour market create a greater demand for these types of arrangements.

This thesis considers the differences between men and women in the Dutch labour market. The three main topics are gender-specific differences in employment rates, working hours and career advancement. The theoretical framework adopted in this study is constructed using concepts from labour supply studies, time-space geography and the managerial literature.

Determinants of employment and hours worked

The next section presents a brief overview of the main determinants of labour market participation. Regional labour market participation can be interpreted as the proportion of people willing to work at the current wage, after correcting for a broad range of micro-oriented variables such as education and household situation (Elhorst, 1996). The individual decision to participate in the labour market can be aggregated to obtain an explanatory model of regional participation (Elhorst and Zeilstra, 2007). Pencavel (1986) described this method for homogeneous groups, after which Elhorst and Zeilstra (2007) further developed the methodology to correct for the occurrence of heterogeneity within groups. The advantage of explanatory models of regional participation is that they acknowledge that the regional opportunity structure influences individual labour decisions. The micro-oriented variables or socioeconomic characteristics and the regional opportunity structure are briefly described in the following sections.

Socioeconomic characteristics

Given the wage offered, people decide to work for a certain number of hours by weighing leisure and work against each other (e.g. Groot and Pott-Buter, 1993; Cörvers and Goldsteyn, 2003; Henkens et al., 2002). Individuals are assumed to maximize utility, subject to time and budget constraints (Bosworth et al., 1996). In other words, people try to achieve maximum utility but are limited both by time and money. Other than time spent in paid work and leisure, time also refers to unpaid activities such as domestic work and caretaking. A change in the wage-rate can be broken down into income and substitution effects. When the income effect is greater than the substitution effect the individual can achieve the same level of utility while working fewer hours than before. A larger substitution effect indicates that leisure has become more expensive, which means the individual will choose to work more hours.

Human capital theory suggests that investing in human capital through education, work experience or on-the-job training generates a higher rate of return. This means that those who are better educated or have more professional experience will have higher wages. Better educated workers have better access to high productivity jobs and higher wages, however there are also higher opportunity costs of choosing not to work (OECD, 2002; Callens et al., 2000). Furthermore, the better

educated have an advantage in searching for new jobs, they are more career-oriented and are better able to arrange supporting services such as domestic help and childcare (Elhorst and Zeilstra, 2007; Van der Laan and Van der Bout, 1990; Siegers and Zanedel, 1981). In the local labour market a larger share of better educated people will lead to higher employment rates (Shapiro, 2006). Higher human capital leads to longer working hours for individuals. Only when wages far exceed average wage levels will the labour supply curve bend backwards.

Decisions about labour participation and working hours are made by individuals and at the household level. According to new home economics, partners divide all paid and unpaid tasks to maximize household utility (Becker, 1981). This however does not imply that men and women consequently spend an equal amount of time on paid and unpaid work. In the Netherlands the division in paid and unpaid tasks is not only determined by differences in human capital between the partners in a household. Dutch women have a strong preference for taking care of their children and balance work with caregiving by working fewer hours (Vlasblom and Schipper, 2004; Turner and Niemeier, 1997). Therefore, despite comparable levels of education and work experience, when a couple has children the mother will reduce her working hours or even stop working altogether. Providing care is not necessarily limited to children but can also refer to taking care of other dependent relatives (Moen and Yan, 2000). In a society that faces rapid aging, the increase in, for example, dependent parents can have a negative impact on women's labour participation, as they continue to take on the greatest share of household tasks and caregiving (Turner and Niemeier, 1997).

Labour supply decisions are furthermore affected by age and the individual's stage in the life course. Age-specific employment patterns tend to follow an inverted U-curve: young people participate less because they are still in education, while towards the end of a career people participate less to anticipate retirement. Female labour participation is also influenced by the presence of children. The presence of young children especially affects female employment since Dutch women prefer to take care of their children. If women decide to withdraw from the labour force permanently after the birth of a first or subsequent child, their age-specific employment pattern will follow a uni-modal curve. If the withdrawal is during child rearing years only, the age-specific employment pattern will show a bi-modal or M-shaped curve.

Regional opportunity structure

The rise in dual-income households contributed to a rise in spatial mismatches between place of residence and the place of work (Van Ham et al., 2001). Taking two job locations into consideration makes it more difficult to find the optimal location to live with minimal commuting. A place of residence also reflects lifestyle preferences: some people prefer highly urban areas with easy access to amenities like shops and theatres, whereas others prefer the space and tranquillity that certain rural areas provide (De Meester et al., 2007).

Where people live determines their local opportunity structure: nearby jobs, shops, childcare facilities, schools and other amenities such as theatres and restaurants. Highly urban areas have more jobs available which means that there are more opportunities for finding good job matches (Van der Laan and Van der Bout, 1990). De Meester et al. (2007) found that women work more hours in highly urban areas, either because they pursue a modern lifestyle or because they benefit from the supporting opportunity structure of large cities. Men on the other hand work fewer hours in cities because in highly urban areas there is a higher prevalence of more symmetrical household arrangements (Kasten, 2003). With respect to childcare, access to childcare facilities is important for the employment opportunities of women, since women continue to do most of the housework, including taking care of children (Van Ham and Mulder, 2005).

Daily life occurs at a variety of locations and you have to travel to get from one location to the next. Depending on the mode of transportation and the time available in a day, people can only travel a maximum distance a day. Hägerstrand (1970) calls this a person's 'potential daily prism'. A larger potential daily prism offers better opportunities to get a higher paid job. In general, women have a smaller potential daily prism: they commute shorter distances and for shorter durations than men (Turner and Niemeier, 1997; Camstra, 1996; Hanson and Pratt, 1990). On average, women travel 28.8 km a day and men 41.8, including the commute to work and all other trips (Statistics Netherlands, 2007). Since women continue to do a larger share of the unpaid work, there is less time available to travel (Hanson and Pratt, 1990). Moreover, since most women work part-time and earn less, it is also more expensive to engage in long commutes (Camstra, 1996).

Employment opportunities in the local labour market are furthermore determined by the demand for labour in a region, the sectoral composition of

employment and access to employment opportunities in a region. The vacancy-unemployment ratio gives an indication of the demand for labour in a region, and the likelihood of finding a job is higher when there are more vacancies available per unemployed person. However, the kinds of jobs that are available also influence the chances of finding a positive job match. Due to occupational segregation, job opportunities differ for men and women. Bowen and Finegan (1969) developed the 'industry-mix' to measure structural differences between regions in the relative abundance of jobs commonly held by females. In regions with a larger share of female-dominated sectors such as healthcare and education there are more employment opportunities for women. Finally, poor access to local employment opportunities becomes apparent through high regional unemployment rates (Van Ham and Büchel, 2006). Although the effect of unemployment is a priori unknown, a positive effect on employment is interpreted as an additional worker effect and a negative effect as a discouraged worker effect (e.g. Euwals, 2007; Elhorst, 1996). When long-term unemployment of the main earner (usually male) leads to low household income, the partner (usually female) accepts a job to increase the household income (Lundberg, 1985). On the other hand, high levels of unemployment imply poor opportunities and increased competition for jobs, which could discourage people to look for a job. Women were found to be particularly sensitive to the discouraged worker effect (Van Ham, 2002).

Determinants of career advancement

Household composition and human capital described in the previous sections also affect career advancement. Family responsibilities form a barrier to the advancement of women because of persistent stereotypes such as 'mothers are not career oriented' and because mothers generally work fewer hours, which implies there is less time to invest in training and development opportunities (Metz, 2005; Tharenou et al., 1994). For men, on the other hand, having children positively affects career advancement because they make career choices beneficial to their role as the main breadwinner (Tharenou et al., 1994). For women, being single and childless contributes to achieving occupational success (Dykstra and Fokkema, 2000). Investing in human capital, either sector-specific knowledge or enterprise-specific knowledge through on-the-job training, also positively contributes to career advancement. Men were found to be more likely to participate in training (Dieckhoff and Steiber, 2010).

The remainder of this section provides a description of the relationship between gender stereotypes and corporate culture, spatial flexibility and career advancement based on the managerial literature.

Gender stereotypes and corporate culture

There is ample evidence that women face more obstacles that hinder career advancement than men do (e.g. Eddleston et al., 2004; Tharenou, 2005). These barriers include gender discrimination, a male-dominated organizational structure and a lack of informal networks to help women advance (Tharenou, 2005). Gender stereotypes and social identity are important for career advancement because they are integral to the thoughts, behaviours and attitudes of employees (Kottke and Agars, 2005). Women are perceived as quitters, less career oriented and less competitive than their male colleagues and men are thought to have superior leadership qualities. Being female or male forms an important part of an employee's identity, which can cause in-group bias and group conflict (Kottke and Agars, 2005).

Although organizations encompass both masculine and feminine characteristics, they generally tend to be more masculine in nature (e.g. Van Vianen and Fischer, 2002; Priola and Brannan, 2009; Guillaume and Pochic, 2009). Management cultures in particular are characterized by the establishment and maintenance of status and authority, hierarchy, linear career paths and competition, which are all considered masculine traits. This type of male-dominated culture forms a barrier for women's careers through a process of exclusion and selection (Van Vianen and Fischer, 2002). Exclusion refers to prejudiced attitudes and gender stereotypes and selection refers to male employees favouring male colleagues and the self-selection of female employees into certain jobs or companies.

Spatial flexibility

Access to top-level positions in some cases requires long-distance commuting or even relocation to be near a firm's headquarters, where most of the higher positions are concentrated. Several studies discuss the relationship between career advancement and spatial flexibility, which is the willingness to relocate or engage in long-distance commuting to further a career (Van Ham, 2002; Guillaume and Pochic, 2009; Eddelston, 2004). Female managerial careers were found to lag behind those of their

male colleagues because they relocate less frequently, particular when they have children (Bielby and Bielby, 1992; Brett, 1997; Guilaume and Pochic, 2009).

In addition to a lower willingness to relocate, women also have shorter commute duration and distance (Turner and Niemeier, 1997; Camstra, 1996; Hanson and Pratt, 1990). The time geographical perspective used to explain the shorter commute distance of women is described in the previous section on the regional opportunity structure. To summarize, a lower willingness to relocate or commute over larger distances has a negative effect on the career advancement of female employees.

1.3 Research aims and outline of the thesis

The aim of this study is to gain insight into various aspects of the gender employment gap in the Netherlands. In particular, attention is paid to gender-specific differences in regional employment rates, working hours and career advancement. The main motivation for this thesis is to explore the options for increasing female employment, in particular with respect to working hours, to tackle the adverse effects of aging the Netherlands is facing.

The first part of this thesis consists of two studies that focus on regional labour markets and differences in male and female employment rates. Chapter 2 presents an analysis of gender-specific employment rates and the gender employment gap in Dutch municipalities in 2002. A Spatial Moving Average (SMA) specification is used to handle the occurrence of spatial dependence for female employment and the gender employment gap. Since no significant spatial structure could be identified for male employment, an OLS regression is used. Not all municipalities are included in this analysis because important variables such as education and childcare were not available for all areas. The methodology is therefore applied to a data set comprised of a sample of nearly 300 municipalities, which account for 80 percent of the Dutch population. All models are estimated using GeoDa. The research aim of Chapter 2 is *to increase insight into the regional variation of gender-specific employment in the Netherlands and more specifically regional variation of the gender employment gap*.

As an extension of Chapter 2, Chapter 3 adopts a Structural Equation Model (SEM) to analyse female employment rates. The dataset created for the research presented in Chapter 2 contains several highly correlated variables which in a

regression model are likely to lead to multicollinearity and finally to incorrectly dropping variables from the model. The advantage of a SEM structure is that it is designed to handle both observed variables and latent variables, i.e. theoretical concepts such as socioeconomic status, in a single model framework to solve typical problems of multicollinearity. The structural model and measurement model of the latent variables are estimated simultaneously by means of maximum likelihood using LISREL. The research aim of Chapter 3 is *to gain further insight into the determinants of regional variation in female labour participation by incorporating observed variables and theoretical derived variables*.

Differences in work hours between men and women are addressed in Chapter 4. For this purpose a unique micro-level database was compiled from the Social Statistics Jobs database (SSB-Jobs) and the Municipal Base Registry (MBR) available through Statistics Netherlands. The analysis is focused on changes in working hours without change in employment, therefore employees are selected that have occupied the same job over a period of several years. This resulted in a dataset containing roughly 2.6 million male and 2.5 million female employees. The data includes personal and household characteristics, residential context and job characteristics. Due to the level of detail of the data, information on partners with jobs could be incorporated in the analysis, including same-sex couples. First, the determinants of working hours are analysed using an OLS regression. Next, a bivariate probit with sample selection is used to estimate what factors influence the occurrence of a change in working hours and subsequently the nature of the change, namely an increase or decrease in working hours. All models are estimated in STATA and are corrected for the occurrence of heterogeneity, which is a common problem for large micro-level datasets. Given the low and declining average working hours in relation to the decline of the working population due to aging, the research aim of Chapter 4 is *to explore the options for increasing working hours by analysing the dynamics in hours of male and female employees in the Netherlands*.

Chapter 5 presents the findings of the analysis of gender-specific differences in career advancement. Career advancement refers to differences in tangible outcomes, i.e. income, job level and career mobility. The analysis was based on a data set of around 10,000 mid-level and top-level managers. These data were obtained from the personnel records of a major Dutch financial services company for 2001 and 2008. Specific attention is paid to employees who work full-time over four days (4*9),

because they combine aspects of the Dutch culture of working part-time and the corporate culture of working full-time to further a career. Gender differences in income, function-level and career mobility are estimated separately. First, models are estimated by means of an OLS regression including a gender-dummy, to explore structural differences between men and women. Next, the models are also estimated separately for men and women, to detect possible differences in magnitude and significance. The main aim of Chapter 5 is *to gain insight into the determinants of female and male career advancement in financial services*.

Finally, Chapter 6 presents an overview of the main findings drawn from the analyses in Chapters 2 to 5. Furthermore, this chapter also presents a discussion of the policy implications, the limitations of this thesis and suggestions for further research.

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2

Gender-specific spatial interactions

on Dutch regional labour markets and the gender employment gap[2]

Abstract This paper analyses gender-specific employment rates and the gender employment gap in Dutch municipalities for 2002. The novelty of this analysis is that it takes into account the extent to which gender-specific education, income and unemployment influence the male and female employment rates and gender gap. Men and women do often not compete for the same jobs but rather we find that high male unemployment has an indirect positive significant effect on female employment rates and a negative significant effect on male employment. The gender employment gap narrows with female education and in urban areas and widens with the care-prone age composition of the municipal population.

[2] This chapter is reprinted from: Noback, I., Broersma, L. and Van Dijk, J., Gender-specific spatial interactions on Dutch regional labour markets and the gender employment gap, forthcoming in *Regional Studies*.

2.1 Introduction

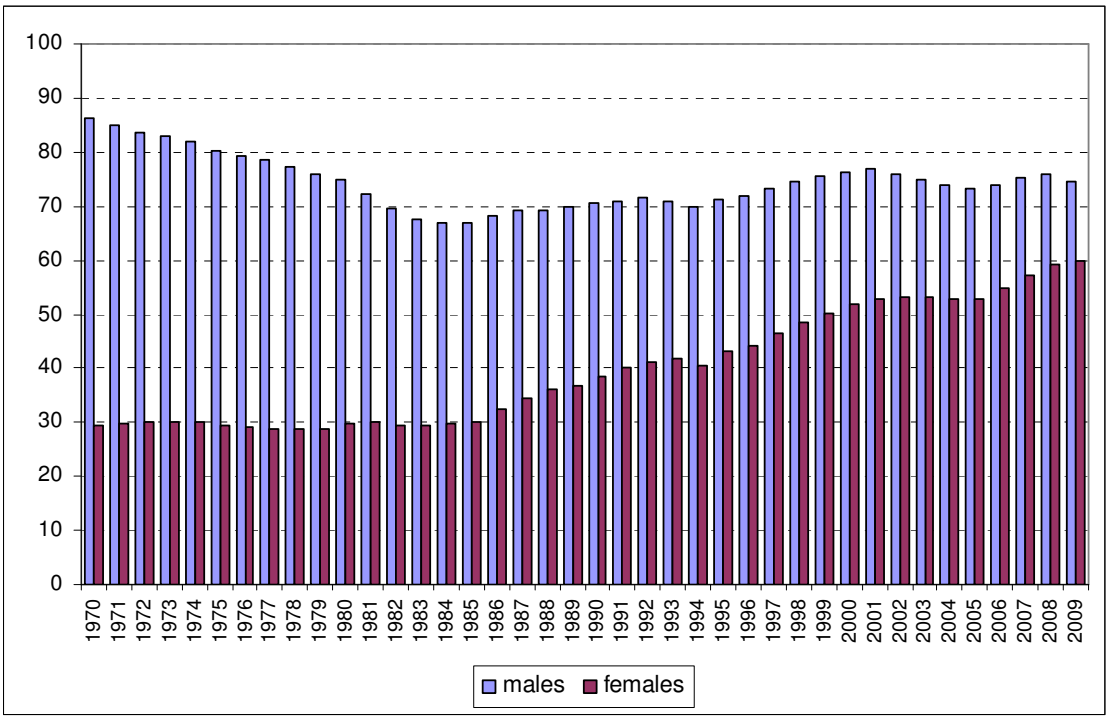
The Dutch population, like those in many Western European countries, is rapidly aging. Increasing resource transfers to the elderly from a smaller working population base will form a serious challenge for the Dutch government (Carey, 2002). To maintain current welfare levels, participation needs to increase. The aim of this study is therefore to gain more insight into the factors that determine participation, particularly employment, or net participation.

Figure 1 shows the development of the gender employment gap over the past four decades in the Netherlands. Throughout the 1970s until halfway into the 1980s, the female employment rate was more or less constant around 30 percent, while the male employment rate fell from almost 90 percent in 1970 to slightly below 70 percent in 1984. During this period the gender employment gap declined from roughly 60 to 40 percentage points. This was however entirely caused by a falling male employment rate. The female employment rate really started to take off from the second half of the 1980s onwards from 30 percent in 1985 to almost 60 percent in 2009. Compared to this, the male employment rate increased only gradually and is more cyclical in nature than female employment. During this period the gender employment gap closed further to roughly 15 percentage points in 2009, this time due to the rise in female employment.

The increase in female participation during the past decades can be attributed to a combination of factors. On the supply side, women have become better educated, fertility has decreased, and it is more accepted nowadays that women combine paid work with raising children (e.g. De Graaf and Vermeulen, 1997; OECD, 2002). Changes on the demand side of the labour market also contributed to the increase in female participation. Between 1960 and 2009 the female employed labour force more than tripled from slightly less than 1 million to almost 3.3 million female workers. The shift from a manufacturing to a service economy in that period and the tremendous increase in part-time jobs contributed to the possibility of combining paid work with raising children, without leaving the labour market. Henkens et al. (2002) argue that the increase in female participation is almost completely due to the growth in the number of women working part-time. According to Statistics Netherlands, in 2002 20 percent of the employed women worked in minor part-time

jobs of less than 20 hours a week, while 47 percent of the employed women held part-time jobs between 20 and 35 hours a week.

Figure 1 Gender employment gap -male and female employment rate- in the Netherlands 1970-2009



Source: Statistics Netherlands 2010

Despite the increase in female employment, *the gender employment gap* still persists. Until now, the gender employment gap has mainly been studied at the national level, which does not take into account that labour markets function on a regional scale rather than on a national scale. The limited spatial range of spatial labour market behaviour is clearly illustrated by the fact that people are only willing to accept a limited daily commuting time (see for example Van Ham, 2002; Turner and Niemeier, 1997). The literature also shows evidence of a gender commuting gap: women commute over shorter distances and times than men (Crane, 2007). According to Elhorst (1996) the national labour market does not exist. Rather, employers and employees or job seekers are limited to a small set of overlapping regional labour markets due to psychological and geographical frictions (Elhorst, 1996, p.210). Furthermore it is well known that there are substantial regional differences in labour market performance. Therefore, our aim is to obtain more insight into the regional variation of gender-specific employment in the Netherlands and more specifically

regional variation of the gender employment gap by adopting a spatial econometrics approach that allows us to take also into account interrelated labour markets of neighbouring regions.

Special attention will be paid to the interactions between male and female participation and unemployment. It might be that men and women compete for the same jobs, but it might also be that the labour market status (especially with regard to unemployment) of men exerts an additional worker or discouragement effect on women or vice versa. We will explicitly test for this by including female unemployment rates and the distribution of jobs with regard to female-dominated sectors into the model that explains the employment rates of males and vice versa. Insights into these cross-effects is especially relevant for active labour market policy aiming to stimulate the re-entrance of unemployed workers into employment and to stimulate a further increase in the employment rate, especially for women and men at older ages which is an explicit goal of the Dutch labour policy.

The paper is organized as follows. In Section 2 an overview of variables determining employment is presented on the basis of a literature review. Section 3 provides a description of the data and the adopted methodology. The empirical results of the regression analysis are discussed in Section 4 and Section 5 presents a summary and conclusion.

2.2 Determinants of employment

This Section presents a short overview of studies on labour force participation, especially those on regional labour markets and female participation. Because we are interested in the gender employment gap we use gender-specific employment, or net participation rates instead of gross participation rates, in which the unemployed are also included. The gender-specific employment rate (*ERg,r*) is defined as, $ER_{g,r} = 100 \cdot E_{g,r} / P_{g,r}$,

where *Eg,r* is the proportion of men or women (*g*={m,f}), aged 15-64, with a job of at least 12 hours in region *r*, and *Pg,r* is the male or female (*g*={m,f}) potential labour force (i.e. population between 15-64) in region *r*. Region *r* refers to place of residence because employment data are measured according to place of residence.

According to Elhorst (1996) the regional participation rate can be interpreted as the proportion of people who are willing to work at the current wage, controlling for

a broad range of micro-oriented variables such as taxes and non-wage income, cost of living and socio-economic characteristics such as age, education and household situation. An explanatory model of regional participation can be obtained by aggregating the microeconomic framework of the labour force decision across individuals (Elhorst and Zeilstra, 2007). This method has been described for homogeneous groups by Pencavel (1986) and was further developed by Elhorst and Zeilstra (2007) to apply to heterogeneous groups. A common way of resolving problems with heterogeneity is to estimate models separately for men and women and to correct for composition effects of groups. An advantage of working with regional data is that these types of models take into account that individual labour decisions are influenced by regional indicators, which determine the spatial opportunity structure. Similarly Van der Laan and Van der Bout (1990) argue that regional variation in female participation rates is influenced by the heterogeneity of potential participants in the labour market and by the regional (labour market) context.

Based on the results of the meta-analysis by Elhorst (1996) we adopt an eclectic approach and develop an empirical model including all commonly used explanatory variables. The model includes both socio-economic indicators, for example, measures of population composition based on the microeconomic model and variables that describe the regional opportunity structure such as regional unemployment rates. The variables included in the empirical model are described in the following Sections in more detail, including the theoretically expected outcomes.

Socio-economic characteristics

Studies explaining labour force participation through a micro-economic approach usually start with the human capital theory (Van Ham and Büchel, 2006). Assuming that people strive for utility maximization, labour force participation can be explained in terms of time and income constraints. Based on the theory of consumer behaviour, leisure and work are weighed against each other, resulting in the decision to participate in the labour market for a certain amount of hours, given the wage that is offered (see among others Groot and Pott-Buter, 1993; Cörvers and Golsteyn, 2003; Henkens et al., 2002). An increase in wages tends to have a positive effect on labour supply (Van der Veen and Evers, 1984). People who are already employed will stay in the workforce and people who are not active on the labour

market are stimulated to participate, which can be described as 'encouraged worker effect'. Only for wages that far exceed average wage levels the labour supply curve will be backwards-bending. In view of the fact that the units of analysis are regions, only average wage levels will be considered, which implies that a backward-bending supply curve is not very likely. Higher *wage levels* are therefore expected to lead to higher employment rates.

Elaborating further on the human capital theory, higher education results in better access to high productivity jobs and higher wages and consequently in higher opportunity costs of choosing not to work (see among others OECD, 2002; Callens et al., 2000). Those who are higher educated are also likely to search more efficiently and successfully, and given the higher opportunity costs of not working they are likely to be more career oriented (see among others Siegers and Zandanel, 1981). Furthermore, organizing individual arrangements for required supporting services such as domestic help and childcare, is easier for high income earners (Elhorst and Zeilsta, 2007; Van der Laan and Van der Bout, 1990; Siegers and Zandanel, 1981). In accordance with human capital theory and these empirical findings, we expect that regions with a larger share of higher *educated* show higher male and female employment rates.

Another aspect of labour supply that is often included in studies of labour force participation is the age composition of the population. The age-specific employment pattern tends to follow an inverted U curve (Elder and Johnson, 1999; Fitzenberger et al., 2004). Young people participate less because they are still engaged in their studies and older people participate less because they retire early, are more likely to become ill or disabled, or are unable to find a new job after having been laid off.

For women, their labour market participation is also influenced by the presence of children. According to Vlasblom and Schipper (2004) Dutch women have a strong preference to take care of their own children and the birth of a first child can induce women to withdraw from the labour force. If women decide to withdraw from the labour force permanently, the age-specific employment pattern will take a uni-modal shape. If withdrawal from the labour force is only temporary, during the child rearing years, the age-specific employment pattern will show a bi-modal or M-shaped curve with a clear dip in participation between the age of 30 and 35 (Plantenga, 1997; Fitzenberger et al., 2004). Depending on the population composition

of a region, we expect *age* to have a negative effect on employment when larger shares of the population are still engaged in education or are close to retirement. And we expect higher female employment rates when there is a larger proportion of women in the age group just beyond the typical reproduction period.

According to Moen and Yan (2000) caregiving is not limited to taking care of children but also refers to taking care of other dependent relatives. In a rapidly aging society where women provide the majority of care, the potential increase of, for instance, dependent parents can have a negative effect on the employment rate of women. Although men are undertaking more household chores and caregiving than in the past, women continue to do a greater share (Turner and Niemeier, 1997). These tasks influence female job opportunities because they take up time which consequently is no longer available for jobs that require long commuting hours (Pratt and Hanson, 1991). To take into account the effect of both taking care of children and dependent elderly persons, we include a *demographic pressure* variable in our model. Since women continue to do a greater share of caregiving, we expect higher demographic pressure to exert a negative effect especially on female employment.

Regional opportunity structure

Several authors have argued that individual labour market decisions are influenced by regional characteristics (see for example Elhorst and Zeilstra, 2007; Van der Laan and Van der Bout, 1990). In this Section we will discuss the effect of the opportunity structure of the regional labour market on employment. Van Ham and Büchel (2006) found that poor regional labour market characteristics influence the probability of being employed as well as the willingness to work. The characteristics under discussion are unemployment, vacancies, sector composition, urbanization, accessibility to employment and the availability of childcare facilities.

High regional unemployment rates are an indication of poor access to local employment opportunities (Van Ham and Büchel, 2006). Broersma and Van Dijk (2002) clearly show that in the Netherlands (like most European countries) labour adjustments due to changes in labour demand mainly take place via changes in the employment rates and not via migration of workers as is often the case in the U.S. In general a positive effect of unemployment is interpreted as an additional worker effect and a negative effect is interpreted as a discouraged worker effect (see among others Euwals et al., 2007; Elhorst, 1996; Van der Veen and Evers, 1984). An additional

worker effect occurs when the household income drops to a level that is too low as a result of long-term unemployment of the main wage earner (who is usually male). In this situation, the partner (usually female) accepts a job offer to maintain the household income at an acceptable level (Lundberg, 1985). A discouraged worker effect is defined as the decision to refrain from job search as a result of poor opportunities on the labour market (Van Ham, 2002). High unemployment rates increase the competition for jobs and hence the search costs for suitable jobs. In this context job seekers might get discouraged and decide to stop their search effort. Especially women were found to be sensitive to the discouraged worker effect (Van Ham, 2002). In view of our aim to gain more insight into the cross-effects of unemployment we include both *male and female unemployment* in the empirical model. We expect that high rates of male unemployment in a region exert a positive effect on the female employment levels as a result of the additional worker effect. Furthermore, we expect high rates of female unemployment to have a negative effect on female employment, i.e. they constitute a discouragement effect. Similarly, high rates of male unemployment will negatively influence male employment in a region.

Where the unemployment rate reflects the supply side of the labour market, the vacancy rate gives an indication of the demand for labour in a region. When there are more vacancies per unemployed the likelihood of finding a job is higher. We expect that a higher vacancy rate leads to higher regional employment shares for both men and women. Employment opportunities are also influenced by the sector composition of employment. Due to occupational segregation, these opportunities differ for men and women. Bowen and Finegan (1969, p.479) first introduced the sector composition of employment "designed to measure structural differences between metropolitan areas in the relative abundance of those jobs commonly held by females". Regions with a relative abundance of jobs commonly held by women, i.e. female-dominated *sectors*, such as healthcare and education where more part-time jobs are available and working hours are flexible, are expected to show higher female employment rates.

Another indicator of access to employment opportunities is urbanization. Highly urbanized areas tend to have favourable labour conditions simply because there are more jobs available, which means better opportunities of achieving a positive job match (Van der Laan and Van der Bout, 1990; De Meester et al., 2007). Moreover, large firm headquarters and government offices, which customarily

employ a large number of women, are predominantly located in highly urbanized areas (Siegers and Zandanel, 1981). De Meester et al. (2007) also mention the positive effect of supporting services in urban areas. Urbanization can also be viewed as a substitute for the degree of emancipation (Van der Veen and Evers, 1984; Van der Laan and Van der Bout, 1990). De Meester et al. (2007) found some evidence of the emergence of a 'combination model' in highly urban areas in the Netherlands, whereas the dominant model is the 'one-and-a-half model'. In the 'combination model' highly-educated women and equally or less educated partners divide both paid and unpaid tasks more equally. Similarly, Siegers and Zandanel (1981) argue that societal opposition against female employment is probably lower in urban areas. Regardless of gender, we expect regions with higher levels of *urbanization* to show higher employment rates, particularly for females.

A higher travel-to-work commute duration in a region is an indication of the relative scarcity of suitable nearby jobs. A shorter commuting time then implies that more suitable jobs are available at a short distance. Women commute a shorter distance and time than men (Turner and Niemeier, 1997; Camstra, 1996; Pratt and Hanson, 1991). In 2003 Dutch men commute on average just over 20 kilometres and for women this is about 12 kilometres (Molnár, 2004). According to Camstra (1996), women usually work fewer hours and earn less, which makes commuting relatively time-consuming and expensive. Furthermore, since women do a large share of the unpaid work, their time available for paid employment and travelling to and from work is far less than for men (Hanson and Pratt, 1990). However, Camstra (1996) and Crane (2007) also found evidence that the gender gap in commuting is converging. We expect a negative relation between a higher average *commuting* duration and employment and we expect this influence to be stronger for women because women are more sensitive to longer commuting times.

As described in the introduction, during the 1970s and 1980s a large group of married women entered and remained in the labour force throughout their working lives, combining work with raising children. Still, women tend to do most of the housework including taking care of children. Therefore, access to childcare facilities is expected to be relevant for the employment opportunities of women (Van Ham and Mulder, 2005). We expect that regions with more *childcare facilities* available show higher female employment.

2.3 Data and methodology

Data

The aim of this study is to obtain more insight into the regional variation in gender-specific employment rates and the gender employment gap. A person is considered employed when he or she works for at least 12 hours a week. Going by this criterion, it implies that part-time jobs covering 12-35 hours a week are included, while people who are looking for a job or temporarily recovering from an injury or illness are excluded.[3] The gender employment gap is defined as the difference between the male and the female employment rate. In order to obtain a better understanding, we also estimated a model for the ratio of the number of employed women vis-a-vis employed men, which is used to operationalize the gender employment gap.

We have analysed employment rates for the year 2002 at the spatial level of Local Area Units[4] or municipalities. We focus our analysis on 2002 because data on the provision of childcare in municipalities are available only for that year. Ideally we would have liked to base the analysis on all 496 municipalities in 2002 and over a range of subsequent years. However the required data are not consistently available for all municipalities and over a period of several years, in part due to the large number of explanatory variables included in the empirical model. Especially data for education and childcare are not available for small, predominantly rural municipalities. For 2002, the male employment rate is available for 392 municipalities and data on the explanatory variables for 295 municipalities. The female employment rate for 2002 is available for 377 municipalities, and the explanatory variables for 298 municipalities.[5] The empirical model of the male employment rate is therefore estimated for 295 municipalities and for the female employment rate for 298 municipalities, which accounts for 80 percent of the Dutch population. There is a

[3] In this respect, we follow the Dutch definition of the labour force comprising employed persons with a job of at least 12 hours a week and persons searching actively for a job. The common international definition does not include restriction on the number of hours, but considers all jobs regardless of weekly hours. The main reason for the hours restriction is the fact that persons who work at least 12 hours a week in general regard employment as their main activity, whereas persons with smaller jobs usually have other main activities. Hence, this definition is closer to the concept of labour market participation.

[4] The basic components of the NUTS regions consist of Local Administrative Units or LAU. LAU 1 is former NUTS level 4 and LAU 2, used to indicate municipalities, is former NUTS level 5.

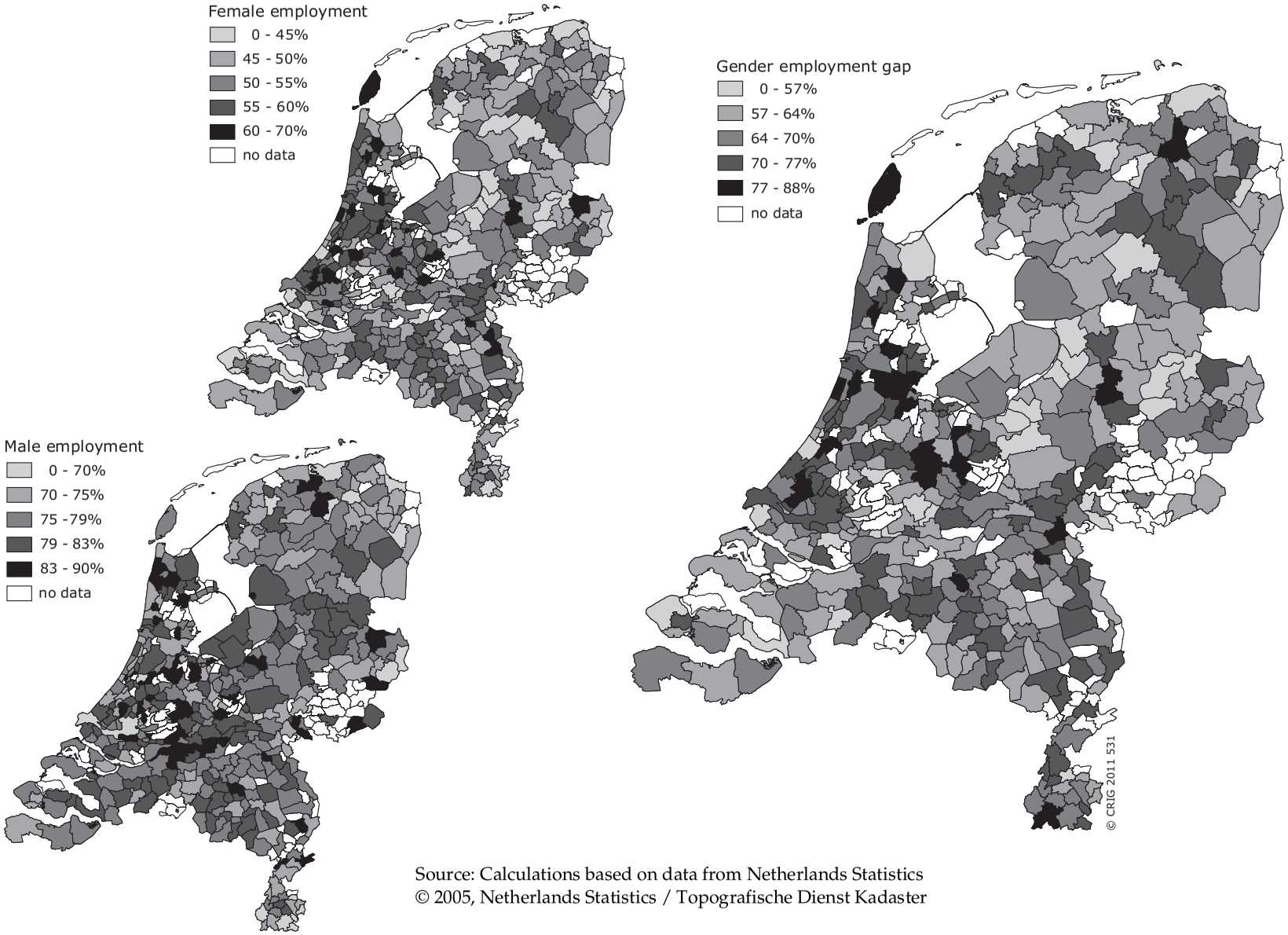
[5] These different numbers are related to the fact that the Labour Force Survey, which lies at the heart of this analysis, is a relatively small survey where information in densely-populated areas will compromise the confidentiality and reliability of these results. We have chosen the maximum number of observation to be able to specify male and female employment rate models.

slight bias in the models towards larger municipalities. Most of the excluded municipalities are near the eastern and southern borders. This means that possible disturbance posed by border regions with respect to the spatial dependence structure of the remaining municipalities will be relatively small. We have also estimated the models without childcare and education, thus allowing the inclusion of all municipalities for which the employment rates are available. There were no significant changes in the results other than a smaller adjusted R^2. Moreover the spatial dependence structure did not change significantly.

Figure 2 shows the regional variation of female and male employment rates and the gender employment gap at the municipality level. It is obvious that there is considerable spatial variation in participation rates as well as different patterns for males and females respectively. For men the employment rate ranges from 63 percent in the municipality of Groningen up to 90 percent in Boskoop, with the average lying at 78 percent. For women the average is much lower at 52 percent and there is substantial regional variation; ranging from 34 percent in Laren up to 70 percent in Ouder-Amstel. Municipalities with relatively high rates of employment are more or less located in the centre of the Netherlands, for both men and women. However, high and low rates between male and female employment often do not occur in the same municipalities; the correlation coefficient is only 0.24.[6] The difference in employment shares between men and women, i.e. the gender employment gap, appears to be the smallest in municipalities around the larger cities. Heemstede has the smallest difference in participation: for every 100 men, there are 88 women who work. In Laren the figure is only 45 women. On average for the Netherlands as a whole for every 100 men that work, 67 of their female counterparts do the same.

[6] The bivariate correlation matrix is available upon request.

Figure 2 Employment rates for Dutch municipalities 2002



Source: Calculations based on data from Netherlands Statistics
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The considerable variation in employment rates, which becomes visible at a lower regional scale, strongly supports the relevance of smaller units of analysis, in this case municipalities. However, employment in a particular municipality could also be affected by neighbouring municipalities because of spillover and the possibility of commuting. Therefore we will consider spatial dependence among municipalities.

The occurrence of spatial dependence can be tested by calculating Moran's *I* (Anselin et al., 2006). The value of Moran's *I* depends on a spatial weights matrix in which the supposed spatial dependence is specified. Since we assume that particularly the labour market situation of the adjacent municipalities exerts considerable influence we use a *queen's contiguity matrix* for the analysis. A first-order queen contiguity is represented by a row-standardized weight matrix W, where $w_{ij} = 1$ if municipalities share a common border or vertex and 0 elsewhere. We have considered alternatives to first-order queen contiguity, including second-order contiguity and inverse distance. The results obtained with first-order contiguity proved to provide the best fit, which can be explained by the fact that short distance commuting is most common in the Netherlands.[7]

A *spatial lag* of the labour market can be calculated using this weights matrix, which means a weighted average of the employment rates of neighbouring municipalities. This weighted average or *spatial lag* is used to calculate Moran's *I* which is defined as $I = \left[\sum_i \sum_j w_{ij} z_i \cdot z_j / s_o\right] / \left[\sum_i z_i^2 / N\right]$ with: $z_i = x_i - m_x$ deviations from mean, N is the number of observations and: $s_o = \sum_i \sum_j w_{ij}$ the number of neighbour pairs (Anselin et al., 2006).

Operationalization of the explanatory variables

The majority of the data are obtained from Statistics Netherlands and are supplemented by data on sectors derived from the LISA business register[8], unemployment and vacancy data provided by the Centre for Work and Income (CWI), and data on the provision of childcare services from Deloitte[9].

[7] According to Statistics Netherlands in 2002 men on average commuted 20 kilometres to work and women 12 kilometres.
[8] For more information about the LISA data, see www.lisa.nl.
[9] Childcare data collected by Deloitte on behalf of the Ministry of Social Affairs.

For the *wage level* we use gender-specific average disposable income, namely income after tax deductions, for men and women aged 15 and older who received an income during the entire year. The advantage of using disposable income above the gross wage is that the latter does not reflect the purchasing power correctly because taxes and social security contributions differ per household, income and industry.

Education is measured as the gender-specific proportion of those who are lower educated in the total population. Lower education refers to completed primary education and a lower level of secondary education. Ideally we would have preferred to include data for the proportion of higher educated in a municipality but due to the smaller number, data for the higher educated are only available for a considerably limited number of municipalities because of confidentiality regulations of Statistics Netherlands.

Age for men is measured as the proportion of men close to retirement, aged between 50 and 60. And age for women is measured as the proportion of women beyond the typical reproduction period, aged between 40 and 50. To take into account the effect of providing care for children and others, such as the elderly we also include the dependency ratio which is measured as:

$$\frac{No.\ of\ \ persons < 20 + No.\ of\ \ persons > 65}{No.\ of\ \ persons\ 20\text{-}65\ years\ of\ \ age} \times 100 \quad .$$

We have also distinguished between the so-called 'green' (of those below 20 years) and 'grey' (those above 65) pressure. However, a test on the equality of the estimated coefficients of both effects could not be accepted at any reasonable significance level. That is why we continue with the overall demographic pressure.

To measure regional labour market conditions, the *regional unemployment rate*, Bowen and Finegan's (1980) *industry mix* and the *vacancy-unemployment (VU) ratio* are included in the empirical model. Since male unemployment and female labour market behaviour may theoretically affect each other crosswise through additional and discouraged worker effects, gender-specific unemployment rates are included in the model. The percentage of unemployed men or women is measured as the share of unemployed in the gender-specific labour force. The employment data are measured by place of residence.

The industry mix indicator formulated by Bowen and Finegan (1980) measures the extent to which the regional sector structure i.e. industrial composition is favourable for women in terms of the availability of jobs. The indicator predicts the

expected share of female jobs in a region based on the regional industry mix combined with the national ratio of males and females in each sector.[10] Following Elhorst (2008) we measure the predicted ratio of female employment to total employment as:

$$Mix^{r,f} = 100 \cdot \sum_{s=1}^{6} \frac{E_s^{r,m+f}}{E_{total}^{r,m+f}} \cdot \frac{E_s^{n,f}}{E_s^{n,m+f}},$$

where E refers to employment, s to sector, f to females, m to males, r to region and n to country.

The VU ratio has the drawback that not all vacancies are reported and a lot of vacancies are filled without any public announcement. Nevertheless, this drawback can be partly circumvented by adding the rate of *urbanization*, measured as the average address density of a region. As discussed earlier, urbanization can be seen as an indicator of job opportunities within a municipality. Other regional variables included in the empirical model are *childcare facilities* and *commuting*. The provision of childcare is measured by the availability of day-care facilities for children aged 0-12, i.e. the number of day-care slots and after-school-care facilities times 1.711 over the number of children aged 0-12 in a municipality. Commuting duration is measured as the average commute-to-work duration, i.e. the average time people commute to and from work.

Table 1 provides an overview of the descriptive statistics of the variables included in the analysis. An overview of the definitions of the variables and the data sources can be found in Appendix A.

[10] In this study jobs are concentrated in 6 sectors, which are all included in the industry mix: agriculture, manufacturing, finance business and other services, distributive services and hotels, healthcare and public administration and education.

[11] One slot consists of 10 units (five days per week times two segments; morning and afternoon) and is on average occupied by 1.7 children. Based on oral information provided by Deloitte.

Table 1 Descriptive statistics

	Mean	*Standard deviation*	*Min-Max*
Dependent variables			
Employed women (%)	52.1	5.78	37.6 - 68.0
Employed men (%)	77.6	4.48	63.0 - 90.0
Gender employment gap (employed women / 100 men)	67.3	7.49	46.7 - 87.9
Explanatory variables			
Urbanisation (address density)	1091.9	753.84	179 - 6088
Vacancies per unemployment ratio	2.37	1.29	0.3 - 10.1
Industry mix	35.85	4.53	25.4 - 50.9
Unemployed men (%)	5.69	2.89	1.5 - 16.8
Unemployed women (%)	7.66	3.64	2.3 - 22.3
Disposable income men	22.77	2.21	18.5 - 38.3
Disposable income women	13.69	1.18	11.7 - 18.2
Lower educated men	24.5	5.6	11.6 - 44.9
Lower educated women	27.1	5.9	12.1 - 50.4
Proportion women aged 40-50	15.43	1.17	12.4 - 20.6
Proportion men aged 50-60	14.55	1.32	9.9 - 17.6
Demographic pressure	63.88	5.79	45.5 - 84.8
Childcare facilities	0.24	0.13	0.01 - 0.84
Commute-to-work duration (day)	11.64	2.38	7.3 - 21.1

Model specification and spatial dependence

Moran's I is first calculated and it suggests spatial dependence only for the female, not for the male, employment rate. In the specification analysis of our empirical model we take this possible spatial dependence into account by testing what kind of spatial structure will best fit the data.[12] We test whether our specification either can be represented by a spatial autoregressive (SAR) lag structure, i.e.

$$\varphi(W)\, y = \alpha + \beta X + \varepsilon \qquad (1)$$

or by a spatial moving average (SMA) structure on the error process, i.e.

$$y = \alpha + \beta X + \lambda(W)\varepsilon \qquad (2)$$

[12] The specification analysis is conducted with the statistical package GeoDa (Anselin, 2003).

In these specifications, y is the dependent variable (gender-specific employment rate), X refers to the vector of explanatory variables, comprising the socio-economic and regional opportunity variables defined earlier and ε represents the error process. In addition, $\varphi(W)=1-\sum_{j}\varphi_j W^j$ and $\lambda(W)=1-\sum_{j}\lambda_j W^j$, in which W reflects the spatial lag, which is determined by the spatial weight matrix W defined earlier.

We note that the spatial lag structure of (1) and (2) are related since the SAR structure in (1) can be rewritten as an SMA model with an infinite lag. Conversely, the SMA specification in (2) can be rewritten in an infinitely lagged SAR specification. The same holds for the combination of both in a spatial autoregressive moving average (SARMA) model, which is why this latter specification will not be further explored. We test whether model specification (1) or (2) best fits the data concerning the female employment rate and the male employment rate, respectively. Next, we will consider the implications for the gender gap model.

2.4 Results

Given our numbers of observation, we set the number of spatial lags in (1) and (2) equal to 1, i.e. j=1. In testing for the spatial structure in the models of the male and female employment rate in table 2, the presence of a spatial error structure with a single lag cannot be rejected for the female employment rate. For the male employment rate on the other hand no significant spatial structure could be identified. The gender employment gap, defined as the ratio between the male and female employment rates, follows the same spatial structure as for the female employment rate, which is confirmed by the usual LM tests.

Hence, specification (2) is chosen to conduct our analysis for female employment while for male employment no specific spatial structure will be imposed on the model. The estimation results of table 2 for female employment and the gender employment gap indeed show a positive significant effect of λ. The definition of the gender employment gap implies that an obvious adaptation would be to specify the gender gap model also in terms of the ratio of the gender-specific variables, i.e. income, education and unemployment. Testing whether this improves the model revealed that only the ratios of female to male education and unemployment rates

improved the gender gap model as explanatory variables.[13] Female and male income are included separately.

The adjusted R^2 from the OLS regressions shows the lowest explained variance for men (0.38), a substantially higher share for women (0.49) and the best fit for the ratio (0.53). Therefore we can conclude that this model is adequate for explaining a large part of the variation in employment by gender as well as the gender employment gap.[14] Let us proceed with a discussion of the results according to the different characteristics we have distinguished for the explanatory variables.

Socio-economic characteristics

We find that only female *disposable income* has a significant positive effect on the female employment rate and the gender employment gap. Male disposable income has no significant effect. Hence, municipalities with higher levels of female disposable income show a narrower gender employment gap. These results could indicate that for women the substitution effect is larger than the income effect whereas for men income and substitution effects compensate each other.

Municipalities with a relatively larger share of lower *educated* women have lower female employment. This is in accordance with the classical human capital theories where higher education has a positive influence on labour market participation. Higher educated women are more career-oriented and have better access to the labour market than lower educated women. For the gender employment gap we find that municipalities with a high ratio of low educated females to low educated males have a wider gender employment gap than vice versa. This is also in line with human capital theory.

[13] Comparing the Schwarz selection criterion of a model with no ratio (SC=-818) with a model with all three variables taken as ratios (SC=-808) is not an improvement, while a model with only ratios of female to male education and unemployment (SC=-824) is.

[14] According to Anselin and Bera (1998), the R^2 is not suitable to measure the fit of the model because unlike the log likelihood it does not take the spatial autocorrelation of the residuals into account. Since the results of the OLS estimations do not differ substantially from the results of the spatial error estimations we can argue that the model provides a good explanation of the variation in participation.

Table 2 Estimation results for models of female and male employment rates and the gender employment gap in Dutch municipalities in 2002

	Female employment rate		**Male employment rate**			**Gender employment gap** (=ratio female vs. male employment rate)	
Tests on spatial dependence						Tests on spatial dependence	
LM test on Spatial AR (SAR)	0.001		2.155			LM test on Spatial AR (SAR)	3.295*
LM test on Spatial MA (SMA)	4.655***		0.165			LM test on Spatial MA (SMA)	4.412**
Model specification	coefficient	z-value	coefficient	t-value		**Model specification**	coefficient z-value
Constant	46.57	6.513	101.4	19.46		Constant	0.678 7.873
Female income	0.694	1.840				Female income	0.020 3.166
Male income			0.042	0.280		Male income	0.006 0.197
Female aged 40-50	0.986	3.965				Female aged 40-50	0.008 2.404
Male aged 50-60			-0.551	-2.875		Male aged 50-60	-0.001 -0.382
Demographic pressure	-0.206	-3.905	-0.080	-1.657		Demographic pressure	-0.003 -3.853
VU ratio	0.153	0.744	-0.111	-0.652		VU ratio	0.001 0.325
Industry mix	0.032	0.454	-0.156	-2.712		Industry mix	0.001 0.727
Urbanisation	0.002	3.879	-0.001	-1.015		Urbanisation	1.4E-05 2.024
Childcare facilities	-0.116	-0.059	-2.331	-1.259		Childcare facilities	-0.010 -0.383
Commute duration	0.076	0.590	0.099	0.889		Commute duration	0.001 0.418
Female lower educated	-0.241	-4.928				Ratio of female vs. male lower educated	-0.087 -5.163
Male lower educated			-0.083	-2.219			
Female unemployed rate	-1.431	-7.166	0.488	2.948		Ratio of female vs. male unemployment	-0.115 -9.409
Male unemployed rate	1.216	4.493	-1.352	-6.106			
λ	0.603	12.73				λ	0.581 11.92
Log likelihood	-837.7		-785.1			Log likelihood	448.8
Observations	298		295			Observations	283

*** p<0.01, ** p<0.05, * p<0.10

As expected, we found a positive significant relation between the proportion of women *aged* 40-50 and female employment and a negative significant relation between the proportion of men aged 50-60 and male employment. The effect of a higher proportion of women aged 40-50 on the ratio of female to male employment is also positively significant. This means municipalities with a larger share of women in the age group 40-50, an age group just beyond the typical reproduction period, have higher levels of female employment, also resulting in a smaller gender employment gap. As discussed in Section 2, the age-specific employment pattern of Dutch women resembles an M-shaped curve. Our results support the second rise in the employment curve that takes place after the dip during child-raising ages. This follows from the fact that taking care of children becomes less time-consuming as they grow older, which enables women to return to the labour market. For men we find that in municipalities with a larger share of men in the age group 50-60 the male net participation is lower. Men close to their retirement age more often retire early, which negatively affects the male employment rate.

Related to age and family formation we found a significant negative relation between *demographic pressure* and female employment. Municipalities with a larger share of children and elderly, i.e. higher demographic pressure, show lower female employment rates. Demographic pressure exerts no significant effect on male employment and a negative significant effect on the gender employment gap. A high share of children or elderly people widens the gender employment gap. In line with previous studies, these results show that female employment levels continue to be affected by the burden of taking care of children and additionally by taking care of elderly.

Regional opportunity structure

The relation between net participation and *unemployment* appears to be highly complex. Encouragement, discouragement and competition play a role and men and women are influenced differently. Results indicate that municipalities with higher shares of male unemployment show lower male employment rates. The female unemployment rate also has a negative significant effect on the female employment rate. This negative significant relation can be interpreted as the theoretical notion of the discouraged worker effect, i.e. refraining from a job search due to perceived poor opportunities on the labour market.

We also find that cross-effects are important: high male unemployment has a significant positive effect on the female employment rate and the same holds for the effect between female unemployment and male employment rates. This can be interpreted as the theoretical notion of the additional worker effect: if more men are out of a job then their partners, most likely women, will start working and vice versa. Our results show that these effects can also be identified at the aggregated level of municipalities. Concerning the gender employment gap, we find a negative effect of the ratio of female to male unemployment. Hence, a higher female to male unemployment ratio discourages women to work, thereby widening the gap and vice versa.

A positive significant relation was found between *urbanization* and female employment and the gender employment gap. Hence, the gender employment gap is smaller in urban areas. There is no significant relation between male employment and urbanization.

A favourable *industry mix* for females appears to have no significant effect on either female employment or the gender gap. It appears to have a slightly negative effect only on the male employment rate. So instead of females benefitting from a favourable structure, it appears that males are disadvantaged by such a structure.

There were no significant effects of the *VU ratio*, *childcare* and *commuting* in either of the models. A possible explanation for the lack of an effect of childcare on female employment rates might be the limited scale of childcare provision in the Netherlands. Te Riele (2006) shows that less than 20 percent of the households with children younger than 12 years resort to formal childcare. An alternative explanation might be the location of childcare facilities. Before the Childcare Act of 2005, childcare facilities were subsidized by municipalities with a preference for non-profit organizations, commonly found in smaller municipalities (Noailly et al., 2007). Since the level of use is usually lower in these smaller municipalities, added stimulus to use childcare facilities apparently has not yet resulted in a significant increase in participation rates. A final explanation is the fact that particularly lower educated women benefit from an increase in these facilities. Higher educated women with young children will keep working or search for work in any case. These high-income female workers can afford to pay for childcare, thereby mitigating the possible participation-enhancing effect of childcare facilities for all female workers. Since

municipal data on female employment by level of education are not available, we are unable to test this assumption.

The possible lack of a commuting effect may be related to the fact that data on gender-specific commuting duration are not available.

Spatial dependence

Last but not least we attempt to provide an explanation for the spatial error term λ. This parameter indicates that there is an unobserved effect of neighbouring municipalities on the municipal gender employment gap. One way to identify this effect is to add a spatial lag to the explanatory variables of the model and test whether any of the variables in neighbouring municipalities exert influence on a particular municipality's own gender employment gap. We experimented with several specifications, but in no case did we find a significant effect of surrounding municipalities. Another way to identify this effect is to make use of the fact that a SMA model with one lagged error term can be rewritten as a SAR model with in theory infinite spatial lags. Estimating a SAR(1) specification instead of our SMA(1)-specification of table 1 also gave no further insight in the presence of spatial spillover effects.

2.5 Summary and conclusion

Since the early 1980s, the Netherlands has experienced a sharp increase in female labour market participation. This rise led to an additional boost to narrowing the gender employment gap. However, this gap has not closed yet; the levels of net as well as gross participation continue to be lower for women. This is not just a Dutch phenomenon, and it also occurs in many other European countries, such as the United Kingdom, Denmark and Germany. In the international literature little attention has been given to the gender aspect of regional variation in participation rates at the level of municipalities. Given the rapidly aging population, the aim of this research was to provide more insight into the determining factors of regional differences in employment between men, women and specifically the gender employment gap by performing an analysis of gender-specific employment rates at the municipality level for 2002.

From a visual inspection of maps depicting the employment rates at the municipal level it is clear that there is considerable spatial variation and that this pattern differs for men and women. Variation in the gender employment gap provided yet another pattern; regions with low male employment do not necessarily have low female employment. To explain the gender-specific regional variation in employment rates a combination of explanatory variables consisting of socio-economic characteristics and the regional opportunity structure were included in a spatial econometric model of the municipal gender employment gap. The results indicated that the model is capable of explaining a significant part of the variation in net labour market participation. The results also indicated that complex processes of crosswise effects between men and women occur.

Some of the results were as expected; we found a smaller gender employment gap in urban areas and in line with human capital theory, municipalities with a high ratio of low educated females to low educated males exhibit a wider gender employment gap. Other results were however quite unexpected. We found a positive but insignificant effect of the industry mix, the VU ratio and commute duration on the gender employment gap. Furthermore, the provision of childcare facilities made no significant contribution to closing the gender employment gap. The use of formal childcare is low and the provision of childcare is not demand-driven but subsidized by municipalities with a preference for non-profit organizations located in smaller municipalities. Since the implementation of the Childcare Act of 2005 there have been some major changes with regard to the provision of childcare. Therefore further research is needed with new data, preferably for several consecutive years, to explore the relation and causality between the provision of childcare and female employment rates. Finally, we found strong cross-effects of gender-specific unemployment on female and male employment rates. Men and women do not compete for the same jobs but rather higher levels of male unemployment have a positive significant effect on female employment, suggesting encouragement, and higher levels of female unemployment have a negative significant effect suggesting discouragement. A higher female to male unemployment ratio has a negative significant effect on the gender employment gap implying a widening of the gap. This results from a combination of the negative effect of larger shares of female unemployment on female employment and the positive effect on male employment.

Furthermore we have to consider the direction of causality, households might choose to live in a region with low employment levels because one of the partners does not want to work. Given the cross-sectional design of this study, we cannot address this issue in more detail in the present analysis. In order to fully understand these processes more research is needed using panel data for several consecutive years. A multi-level analysis that combines regional data with individual data can provide more insight into the interaction between micro behaviour and macro variables at the regional level. It will however be quite difficult to gather municipal data for a range of years that contains the necessary amount of detail.

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3

Determinants of regional female labour market participation in the Netherlands

A spatial structural equation modelling approach[15]

Abstract The paper analyses the determinants of female labour participation. Structural equation modelling is used to handle theoretical concepts and to solve the typical problem of multicollinearity. The proposed methodology is applied to a dataset for the year 2002 made up of a sample of 278 municipalities in the Netherlands. The structural model and measurement model of the latent variables are estimated simultaneously by means of maximum likelihood. Model estimation and tests are performed using LISREL. Female participation is found to be positively influenced by the added-worker effect and negatively by the discouraged worker effect. The results show a negative impact of demographic pressure and a positive impact of socio-economic status and female-dominated sector structure.

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3.1 Introduction

Since the 1970s the share of employed women in the Dutch labour market has increased rapidly. In the 1960s only 25 percent of the women were employed, whereas in 2005 59 percent of the women had a paid job. This increase was largely the result of married women entering the labour market between the 1970s and 1980s (De Graaf and Vermeulen, 1997). During the process of modernisation since 1970s Dutch women are increasingly higher educated, more career oriented, increasingly independent, and they try to synchronise work and family formation (OECD, 2002). Changes on the demand side of the Dutch labour market also contributed to the increase in female participation. The increase in employment no longer occurs in agriculture and manufacturing but has shifted towards services, where women can find jobs more easily. Furthermore, that a much broader variety of employment and working-time arrangements have become available led to a strong increase of part-time jobs. In the Netherlands, the majority of employed women work in part-time jobs to combine paid work with taking care of children. Despite the rapid increase in female participation nationally, there are significant regional differences. In 2002 the average female participation was 52 percent, ranging from 34 percent in the municipality Laren to 70 percent in Ouder-Amstel (Statistics Netherlands, 2002).

This paper analyses the determinants of female labour participation in Dutch municipalities in 2002. The main reason for our study to focus on female labour participation at the municipality level is that according to Elhorst (1996b) there is no "national" labour market, due to the heterogeneous nature of labour supply and demand. Instead, there are submarkets which can be classified by types of firms and industry, job types, types of workers and especially the locations of economic actors. Employees and employers usually have access to particular submarkets only (Elhorst, 1996b). The limited spatial range of labour market behaviour is clearly illustrated by the fact that people in general are only willing to accept a limited daily commuting time (see for example Van Ham, 2002; Turner and Niemeier, 1997). Since there are no data available for local labour market areas, we analyse municipality data. Studying participation rates at the municipal level allows for a detailed description of the spatial variation in labour force participation. However, analysis at the municipal level makes it necessary to take into account the presence of commuter flows, which

indicates the presence of a larger labour market and implies spatial dependence between municipalities.

In order to get insight into the determinants of regional variation of female labour participation at the municipality level, we adopt a spatial structural equation model (SEM) including both observed and theoretical constructs (often referred to as latent variables). A SEM allows simultaneous handling of observed and latent variables within one model framework. Observed variables, such as the presence of day care and after school care facilities, possess direct empirical meanings derived from experience and can be directly measured. Latent variables or theoretical constructs, on the other hand, refer to those phenomena that are supposed to exist but cannot be observed directly. A well-known example is socio-economic status. It refers to an individual's standing in the society, which cannot be observed or measured directly. However, it can be measured via observable indicators like educational attainment, occupational status, income, etc.

The use of a SEM has several advantages. First, it leads to a closer correspondence between theory and empirics because it gives latent variables empirical meanings by means of operational definitions (Oud and Folmer, 2008). Second, it may reduce multicollinearity because the strongly correlated observed variables that are indicators of an underlying latent variable are substituted by latent variables in the structural model whereas they are dependent variables in the measurement model. Third, it allows accounting for measurement errors in the explanatory variables and thus reduces bias towards zero (Jöreskog and Sörbom, 1996; Folmer and Oud, 2008).

The paper is organized as follows. In Section 2 the conceptual model is presented on the basis of a literature review. Section 3 gives a brief introduction to structural equation modelling. The empirical results of the analysis are discussed in Section 4. Section 5 concludes and discusses some policy implications.

3.2 Conceptual model

Most studies that focus on explaining regional variation of labour force participation depart from a theoretical framework based on the neoclassical model of individual labour supply (see among others Evers and Veen, 1983; Elhorst, 1996a). The individual participation decisions, derived from a static model of choice between

consumption and leisure, are aggregated to obtain an explanatory model of regional participation rates (Elhorst, 1996b; Elhorst and Zeilstra, 2007). According to Elhorst (1996b) the regional participation rate can be interpreted as the proportion of people who are willing to work at the current wage, controlling for a broad range of micro variables such as price of consumption, taxes and non-wage income, and socio-economic characteristics like age, education and household situation. However, Elhorst (1996b) also argues that studies on regional labour market participation generally do not limit themselves to the microeconomic model, but also focus on possible relationships between labour participation and local variables related to work and residence. Van der Laan and Van der Bout (1990), for example, argue that regional variation in female participation rates is influenced by the heterogeneity of potential participants in the labour market and by the regional (labour market) context. Similar to Van der Laan and Van der Bout (1990) we adopt an eclectic approach and develop a model based on an extensive literature review, including Elhorst (1996b) who presents an overview of 17 empirical studies in which participation rates have been estimated using regional data.

Micro-level characteristics

The wage level is assumed to have a positive effect on female labour market participation. This follows from the neoclassical model of individual labour supply which analyses the choice between actual hours of work and leisure on the basis of the theory of consumer behaviour, where leisure and work are weighed against each other (see among others Groot and Pott-Buter, 1993; Cörvers and Golsteyn, 2003; Henkens et al., 2002). Veen and Evers (1984) argue that at the aggregate level an increase in wages tends to have a positive labour supply effect. Employed will stay in the workforce and those who are not active are stimulated to participate -only for wages well above average the labour supply curve will be backward-bending-.

Educational attainment is postulated to have a positive effect on job opportunities according to 'Human Capital' theory (Becker, 1962). In general, higher education results in better access to interesting jobs and higher wages and consequently in higher opportunity costs of choosing not to work (see among others OECD, 2002; Callens et al., 2000). Some authors discuss the effect of education on labour participation in more detail. Elhorst and Zeilstra (2007) argue that higher educated have favourable labour market characteristics and are less prone to layoffs

as they possess skills that are more often in demand. Moreover, they are likely to search more efficiently and successfully, to look for self-fulfilment and to be more career-oriented (see among others Siegers and Zandanel, 1981). Furthermore, higher income makes it easier to organize individual arrangements for paid help and childcare (Elhorst and Zeilstra, 2007; Van der Laan and Van der Bout, 1990; Siegers and Zandanel, 1981).

According to Vlasblom and Schippers (2004) participation rates first rise with age and start to decline after a certain age. Young individuals participate less because they are still in education and older people participate less because they retire, become disabled or do not succeed in finding new jobs after they have been laid off. Hence, the age-specific employment pattern tends to follow an inverted-U curve (Elder and Johnson, 1999; Fitzenberger et al., 2004).

For women there is a strong relation between labour market participation and the presence of children (see among others Siegers and Zandanel, 1981; Molho and Elias, 1984; Vlasblom and Schippers, 2004). Research by Vlasblom and Schippers (2004) showed that participation rates go down considerably after the birth of the first child. Moreover, longer periods with young children lead to lower participation rates due to the strong preference of Dutch women to take care of their own children (Vlasblom and Schippers, 2004). This becomes apparent in several different ways. Typically Dutch is the one-and-a-half earner model in which men are the main breadwinners and women are the primary caregivers and combine paid work with household responsibilities by working part-time (De Meester et al., 2007). Furthermore, data for the Netherlands shows that 60 per cent of the households with children aged 12 or younger, with at least one of the parents working 12 hours a week or more, do not use childcare (Te Riele, 2006). If women decide to withdraw from the labour force permanently, the age-specific employment pattern will take the shape of a left-hand peak curve. If withdrawal from the labour force is only temporary, during child raising ages, the age-specific employment pattern will show an M-shaped curve with a clear dip in participation around the age of 30–35 (Plantenga, 1997; Fitzenberger et al., 2004). The employment curve for Dutch women resembles an M-shaped curve with two peaks; one for the age group 25-30 and a lower one for the age group 45–50 (Statistics Netherlands, 2002).

The provision of care is not necessarily limited to taking care of children but can also refer to taking care of other dependent relatives (Moen and Yan, 2000). In a

rapidly ageing society dependent elders require an increasing amount of care. Since women are the main care providers, not only with regard to taking care of children but also providing volunteer aid for elders, ageing poses a threat to female labour participation.

Finally, the relation between labour participation and homeownership is also discussed by several authors (Van der Laan and Van der Bout, 1990; Siegers, 1976; Bowen and Finegan, 1969). Buying a house requires that a high enough income is maintained to qualify for a mortgage. Therefore, a positive relationship is expected between homeownership and participation.

Regional labour market characteristics

According to Elhorst and Zeilstra (2007) one of the advantages of using regional data over micro-data is that individual labour market decisions are often influenced by regional characteristics such as the local labour market. Similar to most European countries, in the Netherlands labour adjustments due to changes in labour demand mainly take place via changes in the participation rates and not via migration of workers, as is often the case in the US (Broersma and Van Dijk, 2002). The regional unemployment rate and the sectoral composition of employment are used most frequently to describe the local labour market situation. In the overview provided by Elhorst (1996b) all except one of 17 studies include the regional unemployment rate in their analyses. The sign of unemployment is a priori unknown, but in general a positive effect of unemployment is interpreted as an additional-worker effect and a negative effect as a discouraged worker effect (see among others Euwals et al., 2007; Elhorst, 1996b; Veen and Evers, 1984). The additional-worker effect occurs when the household income drops to a critically low level due to long-term unemployment of the main breadwinner (who is usually male). In this situation, the partner (usually female) is forced to find a job to keep the household income at an acceptable level (Lundberg, 1985). The discouraged worker effect is defined as the decision to refrain from job search as a result of poor chances on the labour market (Van Ham, 2002). High unemployment rates in a tight labour market increases the competition for jobs. In this context job seekers might get discouraged and decide to stop their search effort. Especially women have been found to be sensitive to the discouraged worker effect (Van Ham, 2002).

The second indicator frequently used to describe the local labour market situation is the sectoral composition of employment (e.g. Elhorst, 1996a). Bowen and Finegan (1969) first introduced the sectoral composition of employment "designed to measure structural differences between metropolitan areas in the relative abundance of those jobs commonly held by females" (p479). Regions with a relative abundance of so-called female-dominated sectors like education and government or healthcare are expected to show higher female participation.

Other regional characteristics

Elhorst (1996b) observes that other variables than the ones discussed above are used to explain regional participation rates as well. Based on this literature review we include commuting behaviour and childcare facilities. A majority of the literature indicates that employed women tend to have shorter commute-to-work distances and times than employed men (see among others Camstra, 1996; Hanson and Pratt, 1988; Turner and Niemeier, 1997). Camstra (1996) provides two main arguments that explain women's preference for shorter commuting distance. First, women usually work fewer hours per day and generally have lower wages, making commuting relatively more expensive and time consuming. Moreover, they are overrepresented in lower-status service jobs, which are easier to find nearby, since they are more widespread. Second, women are more inclined to do a larger share of unpaid work, which makes it more difficult to allocate their time. In the Netherlands both women and men spend about an equal amount of time travelling, partly because women make more short trips either on foot or by bike and men travel further, usually by car (Molnár, 2005).

Despite significant changes in gender roles, several studies have indicated that women are still primarily responsible for household task including taking care of children or other dependent relatives (SCP, 1999; Moen and Yan, 2000). This also applies to double-income households. This implies good geographical access to high-quality childcare facilities might be especially relevant for the employment opportunities of mothers (Van Ham and Mulder, 2005).

3.3 Methodology

The dataset we analyse contains several highly correlated variables that basically refer to underlying theoretical concepts (also denoted latent variables). For example, the variable "female-dominated sector" could be perceived as a latent variable with observed indicators the share of jobs in healthcare and the share of jobs in education and government. Inclusion of the highly correlated observed variables in a regression model is likely to lead to multicollinearity, and, hence, to the increase of the estimated variances of the estimators of the coefficients of the collinear observed explanatory variables and to incorrectly dropping variables from the model (Oud and Folmer, 2008). A solution to the problem is to replace the observed variables by latent variables and to apply a SEM.

A SEM is a system of equations model. The structure includes two parts: (i) the structural model presenting the causal relationships between exogenous and endogenous latent variables as well as the relationships among latent endogenous variables mutually and (ii) the measurement model showing the relationships between the latent variables and their indicators (Folmer and Oud, 2008).

A SEM in general form consists of three basic equations:

$$y = \Lambda_y \eta + \varepsilon \qquad \text{with} \quad \text{cov}(\varepsilon) = \Theta_\varepsilon, \qquad (1)$$

$$\mathrm{x} = \Lambda_x \xi + \delta \qquad \text{with} \quad \text{cov}(\delta) = \Theta_\delta, \qquad (2)$$

$$\eta = \mathrm{B}\eta + \Gamma\xi + \zeta \qquad \text{with} \quad \text{cov}(\xi) = \Phi, \ \text{cov}(\zeta) = \Psi. \qquad (3)$$

In the measurement models (1) and (2), the vectors y and x are observed endogenous and exogenous variables, respectively; the vectors η and ξ contain latent endogenous and exogenous variables, respectively; the matrices Λ_y and Λ_x specify the loadings of the observed variables (indicators) on the vectors of latent variables, and Θ_ε and Θ_δ are the measurement error covariance matrices. Directly observed variables can be conveniently handled in the structural model by specifying an

identity relationship between a given observed variable and the corresponding latent variable in the measurement model.[16]

In the structural model (3) B specifies the structural relationships among the latent endogenous variables mutually and Γ contains the impacts of the exogenous latent variables on the endogenous latent variables. Φ is the covariance matrix of the latent exogenous variables and Ψ the covariance matrices of the errors in the structural model. The measurement errors in ε and δ are assumed to be uncorrelated with the latent variables in η and ξ as well as with the structural errors in ζ.

In a SEM modelling framework parameter estimation is done by minimizing the distance between the theoretical covariance matrix (based on hypotheses relating to the model structure as specified in the parameter matrices $\Lambda_x, \Lambda_y, \Theta_\varepsilon, \Theta_\delta$, B, Γ, Φ and Ψ) and the observed covariance matrix. Several estimators for SEM have been developed including instrumental variables (IV), two-stage least squares (TSLS), unweighted least squares (ULS), generalized least squares (GLS), fully weighted (WLS) and diagonally weighted least squares (DWLS), and maximum likelihood (ML). ML method is the most commonly used method in estimating SEM models and the default in the statistical packages LISREL and Mx. In the following, we apply ML estimation. It maximizes the log-likelihood function:

$$l(\theta \mid Y) = -\frac{N}{2}\ln|\Sigma| - \frac{N}{2}tr\left(S\Sigma^{-1}\right) - \frac{pN}{2}\ln 2\pi \qquad (4)$$

where Σ is the theoretical variance covariance matrix in terms of the free and constrained elements in the eight parameter matrices:

$$\Sigma = \begin{bmatrix} \Lambda_y(I-B)(\Gamma\Phi\Gamma' + \Psi)(I-B)'\Lambda_y + \Theta_\varepsilon & \Lambda_y(I-B)\Gamma\Phi\Lambda_x' \\ \Lambda_x\Phi\Gamma'(I-B)'\Lambda_y' & \Lambda_x\Phi\Lambda_x' + \Theta_\delta \end{bmatrix} \qquad (5)$$

S is the observed variance covariance matrix for given data Y.

[16] An alternative procedure to handle multicollinearity is the application of a two-step procedure, i.e. the application of e.g. principle component analysis to the collinear variables as a first step and inclusion of the principle components in the regression model in a subsequent step. An important advantage of SEM compared to the two-step procedures is that it allows estimation of both the measurement and structural (regression) model simultaneously.

The ML-estimator $\hat{\theta} = \arg\max l(\theta \mid Y)$ chooses that value of θ which maximizes $l(\theta \mid Y)$. Minimizing the fit function:

$$F_{ML} = \ln|\Sigma| + tr(S\Sigma^{-1}) - \ln|S| - p \qquad (6)$$

gives the same results as maximizing the above likelihood function (Oud and Folmer, 2008).

The LISREL software package also provides information on identification and contains a variety of test and model evaluation statistics and provides modification indices which can be used as suggestions in further specification of the model (see Jöreskog and Sörbom, 1996 for details).

3.4 Empirical results

In this paper the female participation rate is defined as the proportion of women of the potential female labour force in a municipality who have a job for at least 12 h a week. Hence, part-time jobs are included. Women who are looking for a job or temporarily recovering from an injury or illness are excluded, though. Observe that although unemployed women are part of the active labour force, they are generally underreported because not all women who look for a job report to an employment agency.

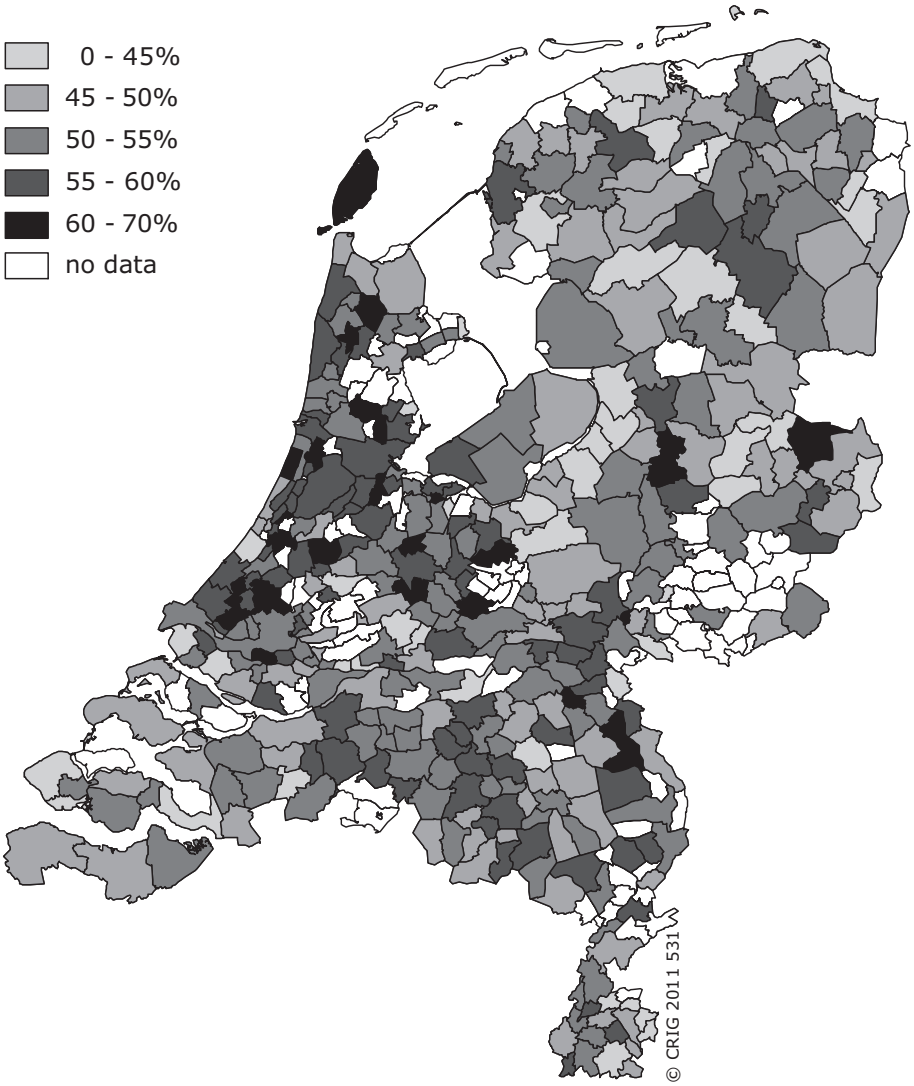
We analyse participation rates by municipality for the year 2002. Ideally, we would have estimated the model based on data for all 496 municipalities. However, the required data are not available for all municipalities, in part because of the large number of explanatory variables included in the conceptual model. Especially, data for education and childcare are missing for smaller, predominantly rural municipalities.

For 2002, data on female participation are available for 377 municipalities, and data on the explanatory variables are available for 278 municipalities. The empirical model is therefore estimated for 278 municipalities, which accounts for 80 percent of the Dutch population. Therefore, the impact of the missing data on model results is only minor. It should be observed that we have also estimated the model for a larger set of municipalities (377) without the explanatory variables education and childcare

that are missing for a substantial proportion of municipalities. There results differed only slightly from the results presented here.

The regional variation of female participation is shown in Figure 1. It is obvious that there is considerable spatial variation in participation rates. Higher degrees of participation appear over-represented in the centre of the Netherlands and in cities including the three cities in the North of the Netherlands. The cluster of high female participation in the province of Drenthe in the North of the Netherlands can be explained by the high prevalence of health care facilities.

Figure 1 Female participation in Dutch municipalities, 2002



Source: Data from Statistics Netherlands

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The considerable variation in participation, which becomes visible at a lower regional scale, strongly supports the use of smaller geographical units of analysis, in this case municipalities. However, the scale of labour markets usually exceeds the scale of municipalities because commuting flows frequently cross municipality borders on a large scale. Therefore, we have to take the labour market situation of neighbouring municipalities into account.

For wage level we use average disposable income, i.e. income after tax deductions, of women aged over 15 who received an income during an entire year. The advantage of using disposable income above the gross wage rate is that the latter does not reflect purchasing power correctly because taxes and social security payment differ per household, income and industrial sector.

We treat wage as an exogenous variable because the majority of the wages in the Netherlands are bargained under a collective labour agreement (CAO). This is a national agreement, sector-specific and does not differ between men and women (see Lommerud et al., 2000; Correa López and Naylor, 2004). The fact that wages are set at the national level rather than at the regional level does not mean that average wages are largely equal across regions. Wages can vary across municipalities due to differences in regional economic structure and the cost of living, which is higher for the central and highly urban areas.

Ideally, we would include the proportion of higher educated directly but due to privacy regulations data for higher educated are incomplete. We therefore calculated a proxy for the educational level of women in a municipality as follows:

$$1-\left(\frac{\text{No. of } w\text{omen with at least a completed primary education and the first stages of secondary education}}{\text{Female population in labour market}}\right)$$

Age and family formation are measured as the proportions of women after child- bearing years, aged between 35 and 45. To take into account the effect of providing care for children and elders we also include the dependency ratio defined as:

$$\frac{\text{No. of persons} < 20 + \text{No. of persons} > 65}{\text{No. of persons 20 - 65 years of age}} \times 100$$

Homeownership is measured as the proportion of owned houses.

To measure local labour market conditions, the regional unemployment rate and the share of employment in healthcare, education and government are included in the empirical model. Since male unemployment and female labour market behaviour affect each other crosswise, gender-specific unemployment rates are included in the model. The percentage of unemployed men or women is measured as the number of unemployed to the labour force. The employment data are measured by place of residence.

Other local variables included in the empirical model are commuting and childcare facilities. Commuting is measured as the average commute-to-work duration, i.e. the average time people need to commute to work. The provision of childcare is measured by (i) the availability of day care facilities for children aged 0–3, i.e. the number of day care slots times 1.7 over the number of children aged 0–3 in a municipality[17] and (ii) after school care facilities for children aged 4–12, i.e. the number of after school slots times 1.7 over the number of children aged 4–12.

Table 1 provides an overview of the descriptive statistics of the indicators included in the empirical model. A complete overview of the variables and the data sources can be found in appendix A.

[17] One slot consists of 10 units (five days per week times two segments; morning and afternoon) and is on average occupied by 1.7 children. Based on oral information provided by Deloitte consultancy.

Table 1 Descriptive statistics

	Mean	*Std. Deviation*	*Min-Max*
Dependent variables			
Female participation rate (%)	52.11	5.86	37.60 - 68.00
Explanatory variables			
Average disposable income (1000 Euro)	13.69	1.18	11.90 - 18.20
Education level (%)	86.28	2.89	74.55 - 93.55
Women 35-45 years old (%)	15.81	1.12	13.47 - 19.69
Demographic pressure	63.67	5.75	45.50 - 84.80
House ownership (%)	60.11	10.06	14.00 - 81.00
Unemployed women (%)	7.67	3.69	2.28 - 22.31
Unemployed men (%)	5.73	2.93	1.51 - 16.78
Jobs in healthcare (%)	12.56	6.52	1.67 - 37.85
Jobs in education and government (%)	10.11	4.97	2.48 - 40.32
Commute-to-work duration (minutes per person per day)	11.57	2.24	7.26 - 21.08
Day care facilities (available slots per 100 children aged 0-3)	18.57	10.69	0.86 - 69.41
After school care facilities (available slots per 100 children aged 4-12)	5.31	3.26	0.14 - 21.00

Model specification

The SEM model we apply has only one dependent variable: female labour market participation rate. The set of explanatory variables includes both observables (e.g percentage of women aged 35-45, male and female unemployment rates) and latent variables (female-dominated sectors and socio-economic status). The indicators of female-dominated sectors are percentages of jobs (1) in healthcare, (2) in education and government, since both offer more work opportunities for females. Disposable income, percentage of higher educated females and percentage of house ownership are chosen as indicators for the second latent variable socio-economic status. Each observable represents a different aspect of socio-economic status. The observed variables are treated as single-indicator latent variables with factor loadings in Λ fixed at 1, and the corresponding measurement errors in δ fixed at 0 (i.e., we assume no measurement error).

Since the units of observation (municipalities) are small, female labour market participation in one municipality could also be affected by some exogenous variables in neighbouring municipalities because of spillovers among municipalities and the possibility of commuting. Therefore spatial dependence among municipalities needs to be considered. We assume first-order queen contiguity, which is represented by a

weight matrix W where w_{ij} = 1 if municipalities share a common border or vertex and 0 elsewhere. A normalized weight matrix is used such that for each observation, the weights of the neighbouring values sums to 1. First-order queen contiguity is considered adequate due to the fact that short distance commuting is most common in the Netherlands. We also considered several alternatives to the first-order contiguity, including second-order queen contiguity and inverse distance.[18] However, the results obtained by these alternative specifications only slightly differed from the first-order queen contiguity results.

Regarding the identification of spatial dependence we proceed as follows. First we estimate the model by means of OLS applying the statistical package GeoDa (Anselin et al., 2006) which includes several Lagrange Multiplier statistics to test spatial dependence. The spatial dependence can either be the result of spatial autocorrelation of the dependent variable (spatial lag) or spatial autocorrelation in the residuals (spatial error). As Table 2 shows, the Lagrange Multiplier test indicates a spatial error model rather than a spatial lag model. Particularly, none of the Lagrange Multiplier statistics for a spatial lag model are significant. Moreover, there are no substantive arguments for a spatial lag model (i.e. a spatially correlated dependent variable), since the participation rate in one region cannot directly affect the participation in other regions. However, there are substantive arguments for a spatial error model due to spatial spillover of supply and demand of labour among regions. For instance, female labour supply in a given region may be influenced by female and male labour supply and demand in neighbouring regions.

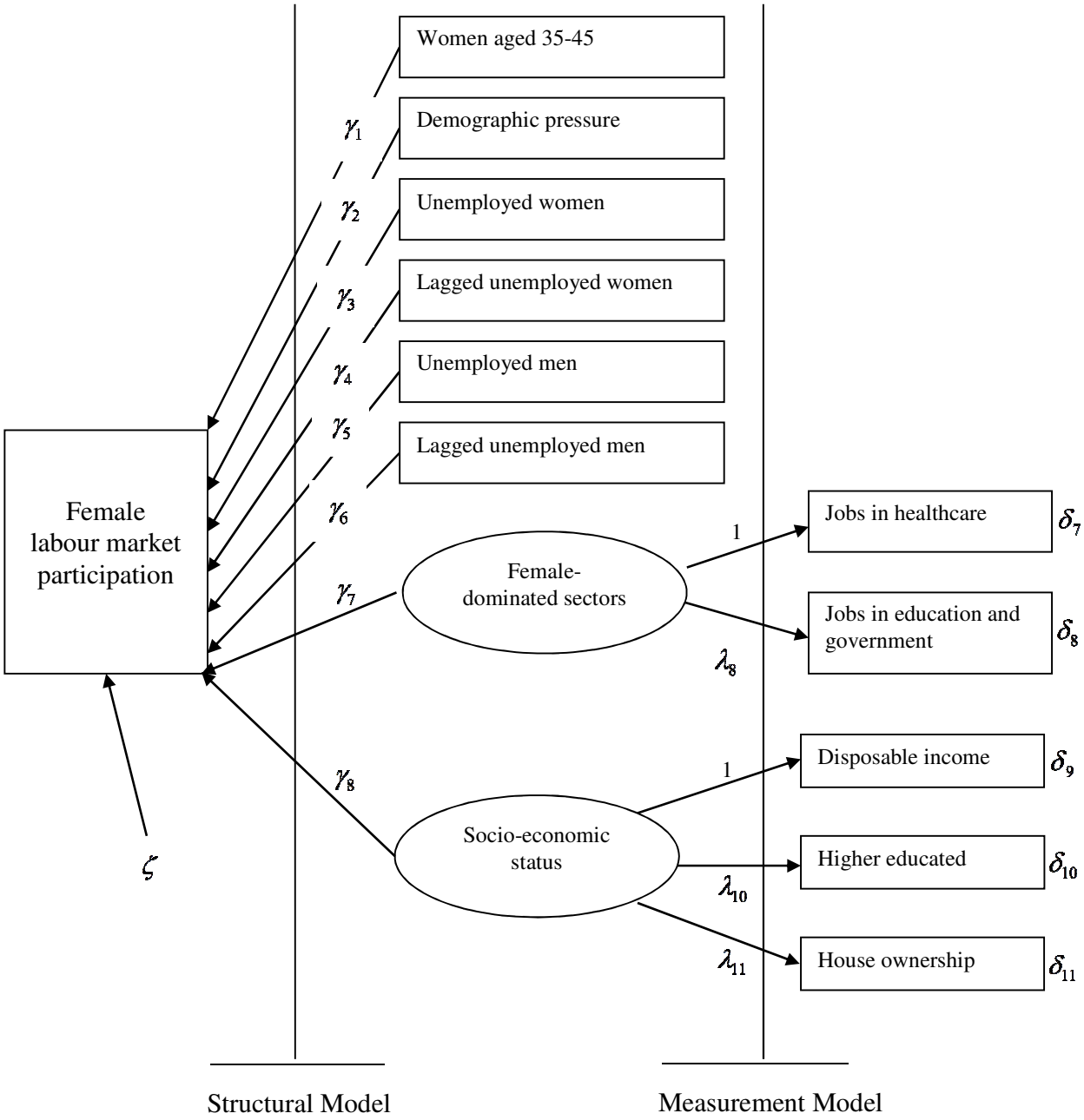
Table 2 Diagnostics for spatial dependence in GeoDa

Test	***Value***	***Prob.***
Moran's I (error)	2.696936	0.006998
Lagrange Multiplier (lag)	0.925748	0.335970
Robust LM (lag)	5.71E-05	0.993971
Lagrange Multiplier (error)	4.766236	0.029023
Robust LM (error)	3.840546	0.050027
Lagrange Multiplier (SARMA)	4.766294	0.092260

[18] As observed above, commuting in the Netherlands is mainly over short distances which renders second- and higher order contiguity and inverse-distance implausible.

Figure 2 presents the path diagram of the final SEM participation model estimated. Some variables that were discussed in the theoretical framework were left out of the final model. Explanations for the deletion follow below.

Figure 2 Path diagram of the SEM female participation model



Estimation results

The χ^2 value for the combined measurement and structural model (overall fit) is 74.28 with degrees of freedom $df = 19$ ($p = 0.00$). However, the likelihood ratio test is sensitive to sample size and deviations from normality and therefore not quite appropriate. A popular alternative SEM model fit measure, which is based on the χ^2 but less sensitive to the above mentioned deviations, is the RMSEA (Root Mean Square Error of Approximation). The RMSEA value for our model is 0.097 with a 90 percent C.I. = (0.073; 0.122) which indicates a reasonable overall fit (Browne and Cudeck, 1993). Moreover, other model judgement statistics such as the modification indices which give hints that some coefficients have been incorrectly fixed or constrained (Jöreskog and Sörbom, 1996) support the overall model fit. Particularly, there are no indications that coefficients have incorrectly been fixed at zero. (The matrix of modification indices is available upon request from the corresponding author.)

We now turn to the measurement model of the exogenous variables presented in Table 3. Table 3 displays the R^2 values, coefficients, standard errors and z-statistics of the measurement model. The R^2 values are squared multiple correlations indicating the percentage of the variance of a latent variable explained by the indicator. The R^2 values are all very high (0.86–0.99) indicating that the reliability of the indicators is very high.

Table 3 LISREL estimates of the measurement model

Variable	*Coefficient*	*Std. Error*	*z-Value*	*R-squared*
Female-dominated sectors				
Jobs in healthcare (%)	1			0.86
Jobs in education and government (%)	0.80***	0.028	28.79	0.86
Socio-economic status				
Disposable income	1			0.99
Higher educated (%)	0.63***	0.003	218.78	0.99
House ownership (%)	0.44***	0.006	79.01	0.97

Note: *** = p<0.01

The coefficients are factor loadings indicating the weight each indicator carries in defining the corresponding latent variable. For each latent variable, the coefficient of first indicator is fixed at 1 to fix the measurement scale of each latent variable so as to render the model identified (Jöreskog and Sörbom, 1996). The factor loadings for the

second and third indicators of both latent variables are significant at 1 percent level with values less than 1, indicating that the second or third indicator does not contribute as much as the first indicator in defining the latent variables. Moreover, the third indicator -house ownership (0.44)- is less important than the second indicator -higher educated (0.63)- in defining socio-economic status.

The structural model presented in Table 4 is the outcome of a stepwise procedure. We started off with a model including all the variables in the theoretical model. Next variables which were highly insignificant were excluded one by one. The final model does not include commuting behaviour because it was insignificant. Childcare was excluded from the model due to measurement issues. Similar to Van der Laan and Van der Bout (1990) we found a negative significant effect of childcare, which seems counter-intuitive. In their study childcare was excluded from the analysis because the indicator they used to measure the availability of childcare was a combination of various types of childcare and the result was therefore difficult to interpret. Other studies have also raised concerns about the proper way to measure the effect of childcare on female participation. Van Ham and Büchel (2004) found that the density of regional childcare is less important than its perceived quality. At this moment we do not have indicators to adequately measure the quality of childcare provided or the accessibility to childcare on female participation.

Table 4 shows the estimated coefficients, standard errors, z-statistics and R^2 value of the structural model. The R^2 value of 0.72 indicates that about 72 percent of the variation in female participation is explained by all the explanatory variables in the structural model together.

Table 4 LISREL estimates of the structural model

Variable	Coefficient	Std. Error	z-Value
Socio-economic status	3.58***	0.92	3.89
Women 35-45 years old (%)	1.98***	0.42	4.66
Demographic pressure	-2.84***	0.55	-5.18
Female unemployment (%)	-1.14***	0.22	-5.37
Lagged female unemployment (%)	0.80***	0.30	2.63
Male unemployment (%)	0.85**	0.34	2.51
Lagged male unemployment (%)	-1.14***	0.40	-2.84
Female-dominated sectors	0.53**	0.24	2.24
Constant	-12.22	11.46	-1.07
R-squared			0.72

Note: *** = p<0.01, ** = p<0.05

The results indicate a positive significant relation between socio-economic status and female participation, as hypothesized in Section 2. As expected, there also is a positive significant relation between the proportion of women aged 35-45 and female labour market participation. In other words, municipalities with a larger share of women in the age group 35-45, an age-group also referred to as 'after childbearing years', have higher levels of female participation. This follows from the fact that taking care of children becomes less intensive as they grow older and women return to the labour market.

Furthermore, the results show a significant negative relation between demographic pressure and female participation. Municipalities with a larger share of children and elders, i.e. higher demographic pressure, have lower female participation rates. This study confirms earlier studies where it was found that Dutch women prefer to take care of their own children (Vlasblom and Schippers, 2004).

The results indicate a negative significant relationship between female unemployment rate and female participation in the home municipality. The negative relation is in line with the theoretical notion of the discouraged-worker effect, i.e. the tendency to refrain from searching for a job due to perceived poor chances on the labour market. For lagged female unemployment (i.e. the average share of unemployed women for neighbouring municipalities), we found a positive relation. This is an unexpected result for which no clear explanation is available. A possible explanation could be that the lagged unemployment rate is viewed as an indication of deteriorating employment opportunities in general which induces those females who are interested in getting employed to increase job searching which in its turn leads to a higher employment rate. Needless to say, this heroic assumption needs further investigation, particularly at the micro level.

The relationship between male unemployment and female participation is positive and significant, indicating an additional-worker effect. This means that municipalities with high shares of unemployed men have relatively higher female participation rates. The rationale is that if men are unable to find a job, wives are induced to take up jobs to keep the household income at an acceptable level. Since women usually do not compete with men for the same jobs female participation tends to increase with higher shares of unemployed men. For the lagged male unemployment we found a negative relation, which can be interpreted as a discouraged-worker effect. Relatively higher average levels of male unemployment in

neighbouring regions can be perceived as a general indication of poor chances on the labour market. Since women are more sensitive to the negative labour market situations and could more easily get discouraged, they tend to refrain from job search for increasing levels of male unemployment in neighbouring regions.

As expected, we found a positive significant relationship between female-dominated sector structure and female participation. As discussed in Section 2, women tend to search for jobs nearby to limit commuting duration; therefore, a favourable local labour market situation tends to increase female participation.

3.5 Conclusions and policy implications

The aim of this paper was to gain insight into the determinants of female labour market participation at the municipal level in the Netherlands. For that purpose we applied a structural equation modelling approach which allows handling of both observed and latent variables in one model framework. Application of SEM allows a close correspondence between theory and empirics and reduces the problems of multicollinearity and attenuation due to measurement errors in the explanatory variables.

There are two latent explanatory variables in the model: female-dominated sectors and socio-economic status. The measurement model shows that the percentage of jobs in healthcare is a more important indicator of female-dominated sectors than percentage of jobs in education and government; that the proportion of higher educated females and house ownership are both less important indicators of socio-economic status than disposable income.

On the basis of the structural equation model, we identified the following positive determinants of female labour market participation: percentage of women aged 35-45, male unemployment rate, lagged female unemployment rate, female-dominated sectors and socio-economic status. Female unemployment rate, lagged male unemployment rate and demographic pressure were found to have negative impacts. Generally, the empirical findings are in line with the hypothesized theoretical model except for the unexpected relationship between lagged female unemployment rate and female participation.

The empirical findings in this paper have some interesting policy implications. The Dutch government is currently engaged in the development of new policies to increase female labour participation. The findings of this paper show that an important policy handle to achieve this goal is to make it financially more attractive for women to participate. Existing tax return regulations need to be reconsidered for this purpose. Another interesting finding is the negative relationship between childcare and female participation which is contrary to theory and intuition. The strong preference of Dutch women to take care of their children themselves might in part explain this unexpected relation. Another possibility is poor matching between facilities and expectations due to, e.g. mismatch between opening hours of childcare facilities and female working hours. This implies that not only the expansion of childcare opportunities ought to be considered but also opening hours of childcare facilities and working-time regimes.

The unexpected positive relation we found between the lagged female unemployment rate and female participation suggests that further micro-level research on the perception of female unemployment in other regions than the home is needed.

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4

Gender-specific dynamics in working hours

Exploring the potential for increasing working hours in an ageing society[19]

Abstract The Dutch labour market is characterized by a combination of high employment rates and exceptionally low and even declining average work hours. This decline in work hours poses a serious threat to current welfare levels, with the decline in working-age population caused by ageing. The aim of this paper is therefore to assess the possibilities for increasing working hours per employee. We analyse the observed changes in working hours of a group of employees who remain in the same job, to avoid bias in the results as a result of job change. First the determinants of work hours are analysed using an OLS regression, and then the dynamics in work hours are analysed with a bivariate probit model with sample selection.

We find that women change their work hours more frequently than men, especially if they work in a minor part-time job. An increase in hours of work is more likely to occur after a decrease in the hourly wage for both male and female employees. Women also increase their hours when the youngest child reaches the secondary school-going age or when they become single. With the exception of the birth of the first child, men increase their work hours after the birth of subsequent children. Moreover we find that gay male employees work fewer hours than heterosexual men, and are more likely to decrease their hours, whereas lesbian employees work more hours than heterosexual female employees and are more inclined to increase their hours.

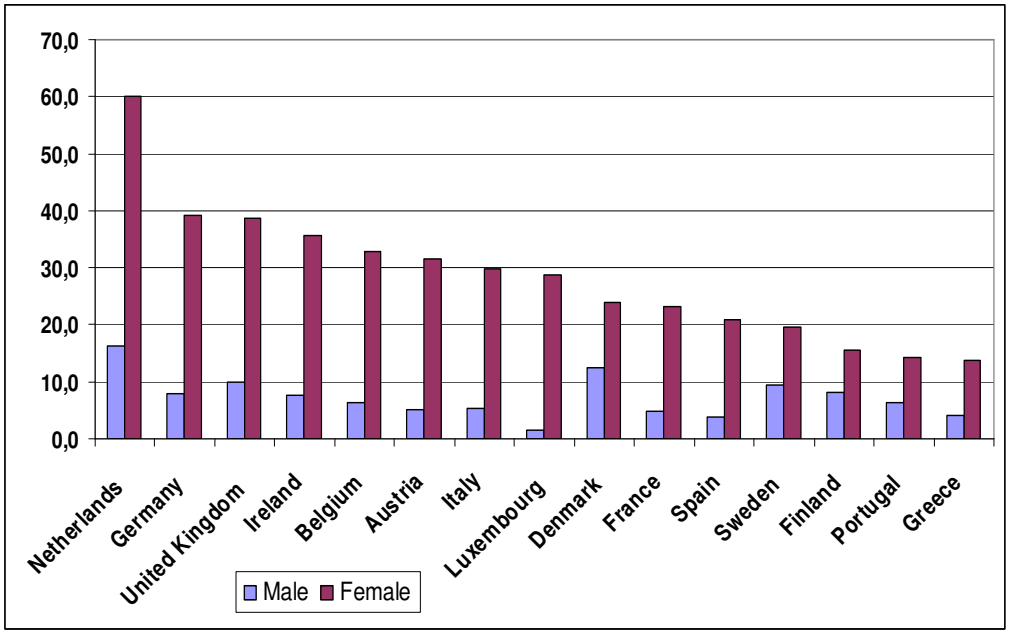
[19] This chapter is reprinted from: Noback, I., Broersma, L. and Van Dijk, J., Gender-specific dynamics in working hours: exploring the potential for increasing working hours in an aging society, and has been submitted to an international journal.

4.1 Introduction

The Dutch labour market differs from other countries due to the unique combination of high employment rates and low average number of hours worked. Dutch employment rates are among the highest in the world, with 76.1 total employment in 2008. At the same time the average number of hours worked per year per person is one of the lowest, 1,389 in 2008, while the OECD total was 1,764 average hours actually worked (OECD, 2010). Like many other countries, the Netherlands faces a decline in the working-age population as a result of ageing. The implications of ageing pose a serious threat to current welfare levels, but given the unique situation of the Dutch labour market, increasing the number of working hours seems to be an obvious solution. However, low working hours might be hard to change, due to established preferences of the worker to work a low number of hours. The aim of this paper is therefore to explore the possibilities for increasing the number of hours worked by people who are currently active in the labour market.

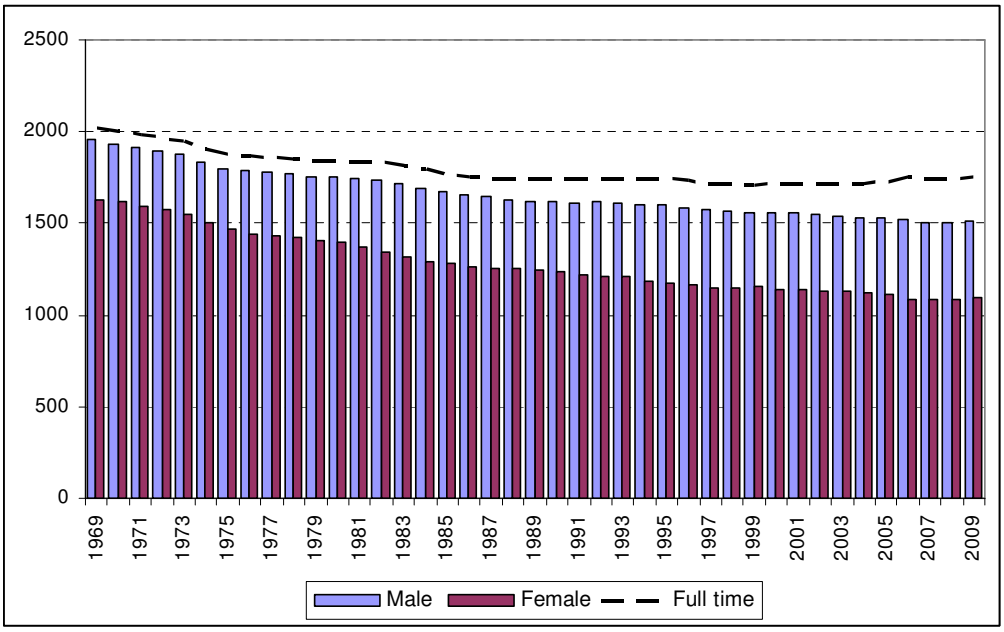
Figures 1 and 2 show that the Netherlands has the highest proportion of part-time employment and that the number of working hours continues to decrease. What is interesting to note is that although women are by far the largest group of part-time workers, the proportion of male part-time employment is also significant and much higher than in other countries. Figure 2 depicts the development of the average annual number of hours worked per job by sex in the Netherlands, compared to full-time hours of work over the past four decades. It shows that in the Netherlands hours of work per job for both males and females have fallen, but that this fall is greater for females than for males.

Figure 1 Male and female part-time (<30h) employment in the EU 15 countries 2008



Based on OECD labour Force Statistics, 2008

Figure 2 Male and female average annual working hours for the Netherlands



Based on Statistics Netherlands, 2009

Figures 1 and 2 provide convincing evidence of the low and declining working hours of female as well as male workers in the Netherlands compared to other EU 15 countries. This implies that there is ample room for addressing the adverse effects of

ageing, if the negative trend of falling hours of work in Figure 2 could be slowed down or reversed. This paper will explore the possibilities for increasing working hours by analysing the observed changes in hours worked by male and female employees in the Netherlands. There might be various reasons for changes in working hours, for example the birth of a child or a change in income. However, a change in working hours might also be associated with dynamics of employment, (i.e. job finders, job switchers, job losers). In this study, we focus on changes in working hours that occur without a change in job, which in our view is the most relevant change in relation to the issue of ageing. For this purpose a unique database will be created, comprising workers who occupied the same job in the period 2003-2005.

The analysis consists of two parts. First, we assess which factors determine the actual number of hours worked for jobs carried out by both females and males. This provides an indication of the factors that might be relevant for an increase in working hours. Next, we analyse the observed changes in working hours of a given job, in order to shed light on the factors that determine the changes in working hours. The analysis of observed changes in work hour is important in order to identify factors that might slow down or even reverse the negative trend in female and male working hours as depicted in Figure 2. In addition, both analyses help to assess the possibilities for creating an increase in wealth through a change in (the trend of) working hours, in order to curb the adverse effects of ageing.

This paper is organized as follows. Section 2 presents a literature review of studies that focus on the issue of (female) working hours, and this will provide a context within which our study is embedded. A description of the data and the methodology used is provided in Section 3. The empirical results will be presented in Section 4, and finally Section 5 provides a conclusion and discussion.

4.2 Literature review

Part-time jobs provide opportunities to mobilize groups with traditionally low labour participation, such as mothers, youth and older workers, to take up work (Saint-Martin and Venn, 2010). At the same time, part-time work is also a form of labour under-utilization, which given the expected decrease of the working-age population poses a threat to the current level of welfare. Welfare becomes strained because more elderly people create a greater demand for resource transfers from a declining

working population (Carey, 2002). Basically, differences in welfare between the EU 15 countries, that is differences in the value added per capita as shown in the last column of Table 1, can be broken down into a number of determinants. Per capita GDP of a country equals labour productivity in terms of GDP per hour, multiplied by the hours worked per employed person, labour participation, and age structure, respectively. Table 1 shows the effect of each of these determinants on welfare in the countries of the EU 15 for the period 1996-2009. Table 1 also shows the potential that the various countries have to enhance their level of wealth, or per capita GDP. The individual country's labour productivity and wealth are expressed as a percentage of the EU 15 average. The effects of working hours and labour utilization indicate their ability to fill the gap between productivity and wealth.

Table 1 Labour productivity, per capita income levels and the effects of working hours and labour utilization, EU 15 countries, 1996-2009

	Value added per hour worked	Effects of: Working hours	Labour utilization: Net labour participation	Labour utilization: Age structure	Value added per capita
	(labour productivity as % of EU 15)	(hours worked per employed person - minus EU 15)	(net labour participation - minus EU 15)	(ratio pop 15-64 and total pop - minus EU 15)	(wealth as % of EU 15)
Belgium	120.0	-5.1	-6.8	-1.6	106.5
Denmark	122.0	-4.0	17.0	-0.8	134.3
Germany	114.8	-11.8	3.3	0.7	107.1
Ireland	116.0	4.0	0.1	0.9	121.0
Greece	36.4	26.9	-9.6	0.3	54.1
Spain	71.0	4.1	-10.2	2.7	67.6
France	116.6	-4.1	-2.3	-2.3	107.8
Italy	91.8	12.2	-14.7	0.4	89.8
Luxembourg	189.2	-3.8	-2.5	1.1	183.9
Netherlands	**117.1**	**-17.1**	**13.0**	**2.0**	**114.9**
Austria	102.2	1.0	7.6	1.3	112.2
Portugal	18.2	12.2	5.1	1.1	36.6
Finland	99.7	5.4	5.0	2.7	112.7
Sweden	111.1	0.0	12.2	-3.0	120.3
UK	95.3	3.8	10.2	-1.5	107.7

Source: Eurostat and EUKLEMS database

With regard to the Netherlands, Table 1 shows that between 1996 and 2009 labour productivity was 117 percent of that in the EU 15, whereas the level of wealth was about 115 percent of the EU 15. This difference is related to the fact that Dutch employed persons work far fewer hours compared to the EU 15 (-17 percent). In fact

the Netherlands has the largest negative contribution of working hours of all EU 15 countries. This is caused by the fact that the Netherlands has a particularly low average number or hours that women work. At the same time labour participation in the Netherlands is much higher than the EU 15 average (+13 percent), and also the proportion of people in the working age bracket 15-64 is slightly above the EU 15 level. This implies that compared to the rest of Europe there is ample room for the Netherlands to enhance wealth if the number of working hours is increased, because the participation rate is already at a level substantially above the EU average.

Most of the research into work hours has focused on explanations for cross-sectional differences between individuals, or in some instances changes in work hours over time (Coleman and Pencavel, 1993). Few studies, however, have explored the dynamics or observed changes in work hours of individual employees, which is the primary goal of this study. Therefore, we will analyse the observed changes in hours of work of individuals as well as in a household context. Since decisions regarding work are often made at the household level, it is important to take the attributes of the partner into account.

The labour supply of Dutch women is generally determined by age, education and stage in the life course, for example whether there are any young children in the household (Van Doorne-Huiskes, 2005). Age and education are also important determinants of the labour supply of men, as well as sector structure and regional unemployment levels (Noback et al., 2010). The determinants used in this study can be roughly summarized into three categories: socio-economic characteristics, spatial context and job characteristics. We start with an explanation of socio-economic characteristics.

Socio-economic characteristics

The decision to work a certain number of hours can be expressed using a basic utility function based on the consumption of leisure and goods (Bosworth et al., 1996). Individuals are assumed to maximize their utility subject to time and budget constraints. Time in this respect refers not only to time spent in paid work and leisure, but also comprises unpaid activities such as domestic work. A change in wage rate can be broken down into income and substitution effects. If the income effect is larger than the substitution effect, this means that a person can achieve the same level of utility while working fewer hours than before. If the substitution effect is larger,

leisure has become more expensive relative to goods, and the individual substitutes goods for leisure by working more.

According to human capital theory, high-skilled workers generate a higher rate of return on human capital than low-skilled workers. Investing in human capital refers to education, but also to human capital acquired during the working career, such as on-the- job training or job experience (Becker, 1962). In addition, high-skilled people also have better access to high productivity jobs, are able to search more effectively and successfully for jobs, and are more likely to be career-oriented (Callens et al., 2000; Siegers and Zandanel, 1981).

With respect to changes in work hours over time, Coleman and Pencavel (1993) found that hours worked have increased among high-skilled workers, but have fallen among low-skilled workers. In addition, Rosenthal and Strange (2008) found a positive relation between agglomeration and hours worked for high-skilled workers, and a negative relation for low-skilled workers. They argue that these low-skilled employees work fewer hours in cities because there are more small jobs available and the workload is spread over a larger number of individuals. At the same time those who work hard are drawn to cities and when there is more competition working longer hours can be a way of signalling ability. Agglomeration actually encourages professionals to work harder, resulting in an urban rat race (Rosenthal and Strange, 2008).

Decisions with regard to working hours are made by individuals and at the household level. According to new home economics, utility or profit maximization takes place at the household level (Becker, 1981). Based on differences in human capital, partners divide all paid and unpaid tasks in order to maximize earning capacity. Empirical studies of the Netherlands have shown that rather than differences in human capital, cultural preferences determine the division of paid and unpaid work at the household level. Dutch women have a strong preference to take care of their own children (Vlasblom and Schippers, 2004; Turner and Niemeier, 1997), and balancing work and caring responsibilities is possible with part-time jobs that provide flexible work hours. This implies that females who are part of a family with young children work fewer hours, whereas men work more, regardless of their human capital.

By matching individuals at the household level we are able to identify gay and lesbian couples. Given the relation between gender stereotypes and labour supply, exploring the labour supply of same-sex workers might provide some interesting insights. Literature on sexual orientation states that the average labour supply of gay men is generally smaller, because gay couples consist of both primary and secondary earners, whereas heterosexual men are mostly primary earners. Lesbian couples also consist of primary and secondary earners, whereas female partners of heterosexual couples are mostly secondary earners (Ahmed et al., 2011). Men in gay households have a higher expected income as a result of the gender pay gap. According to Berg and Lien (2002), gay men will therefore opt for more leisure, less work and subsequently earn less individually than heterosexual men. Lesbian couples, on the other hand, will have lower expected household income and may therefore opt for more hours of work, resulting in higher individual earning than heterosexual females.

There are two dominant theoretical explanations for deviating labour participation of gays and lesbians in the labour market, namely *discrimination* and household *specialization* (Ahmed et al., 2011). Discrimination refers to attitudes and stereotypes towards those who are gay, for example, lesbians being stereotyped as 'masculine' or gay men being confronted with hostility. This type of discrimination is dependent on whether homosexuality is overtly expressed. At the household level, specialization as proposed by Becker (1981) entails that heterosexual males specialize in paid work and females specialize in unpaid care and housework. Homosexual couples are unable to specialize, because there is no comparative advantage from biological differentiation (Ahmed et al., 2011). Both theoretical explanations predict that gay men experience disadvantages compared with heterosexual men, and lesbians experience advantages compared with heterosexual women.

As mentioned in the introduction, working hours are mainly determined by education, age and stage in the life course. Young people work fewer hours because they are still in the process of receiving an education, people in mid-career work more hours, and towards the end of their career decrease their working hours. This age-specific employment pattern follows an inverted U-curve. For women this is different because of their reproductive career, which might result in a (temporary) decline in working hours or withdrawal from participation in the age cohort 25-45. In the case

of a temporary withdrawal, the female employment curve is a bi-modal or M-shaped curve, and in the case of permanent withdrawal the curve takes a uni-modal shape.

Based on the foregoing, we expect high-skilled employees to work more hours than low-skilled ones, regardless of gender. We expect women with young children to work fewer hours and to reduce their hours after having a baby, although they may catch up later when the children start schooling. We expect both male and female employees to reduce their hours toward the end of their career. Finally, we expect gay men to work fewer hours than heterosexual males and lesbian employees to work more hours than heterosexual female employees.

Spatial context

In six out of ten couples in the Netherlands, with or without children, both partners work at least 12 hours a week (Statistics Netherlands, 2011). The majority among these couples fit the one-and-a-half earners model, i.e. one partner works full-time and the other works part-time. As a result of these dual-career households, there has been an increase of spatial mismatches that occur between place of residence and the workplace (Van Ham et al., 2001). Where people live can also be the result of certain lifestyle preferences (De Meester et al., 2007), as some prefer highly urban environments with easy access to theatres and restaurants, while others prefer more rural areas that offer space and tranquillity.

The local opportunity structure of the residential environment offers possibilities and constraints in terms of availability of jobs, supporting services such as grocery shops or childcare services, and other consumption amenities such as restaurants and theatres. All activities take place at a certain location and people have to travel from one location to the other, which takes time. Depending on the mode of transportation and the speed at which somebody travels from one place to another, a person can only travel a maximum distance in a day. Hägerstrand (1970) characterizes this phenomenon as a person's *potential daily prism*. A car provides a much larger *daily prism*, for example, than walking or riding a bicycle does. De Meester et al. (2007) found that women work more hours in highly urbanized areas, because they either pursue a modern lifestyle or benefit from the supporting opportunity structure of large cities. On the other hand, men work fewer hours, due to a more symmetrical household arrangement, which occurs primarily in highly urban areas (Karsten, 2003).

The increase in spatial mismatch between place of residence and work causes people to commute greater distances to and from work. Commuting and work hours are closely related, because a wider *potential daily prism* implies better opportunities to obtain a higher paid job. In general, women commute shorter distances than men (Turner and Niemeier, 1997; Camstra, 1996; Hanson and Pratt, 1990). On average, women travel 28.8 km a day and men 41.8, including the commute to work and all other trips (Statistics Netherlands, 2007). Since women do a large share of the unpaid work, there is less time available for commuting to and from work (Hanson and Pratt, 1990). These trips are also relatively more expensive, since women work fewer hours and earn less than men do (Camstra, 1996).

We expect a positive relation between commute distance and hours worked for men, because a longer commute is only worthwhile for a job which generates higher returns on human capital. For women we expect a negative relation, because they face more severe time-space constraints due to a larger share of unpaid work. However, Noback and Van Dijk (2010) also found a positive significant relation between commute duration and income for women, suggesting that longer commutes do occur as long as they are worthwhile. We expect women to commute over a greater distance only if they work longer hours. An increase in commuting distance will have a negative effect on hours worked, because travel-to-work takes more time, leaving less time for work and other activities. We expect female employees who live in cities, particularly in the Randstad region which is centrally located in the Netherlands, to work more hours. Men who are part of a family with children will work fewer hours in highly urban areas, due to a higher prevalence of symmetrical household arrangements. Men with families who relocate to urban areas will reduce their hours, whereas women with families will increase them. Similarly men with families that relocate to rural areas will increase their hours and mothers will reduce them.

Job characteristics

Sector structure is also part of the local opportunity structure. Sectors differ in the prevalence of part-time jobs and flexible work schedules. Bowen and Finegan (1969) as well as Pratt and Hanson (1991) refer to 'jobs commonly held by women' and 'female-dominated sectors'. Jobs are considered to be female-dominated if over 70 percent of the workers are female. Examples of female-dominated sectors are

healthcare and education, where more part-time jobs are available and flexible work hours are possible.

In addition to the possibility of working part-time, work hours may vary as a result of working in shifts or irregular work hours. This creates a possibility to exercise more flexibility at the household level in carrying out unpaid activities, for example, childcare. We therefore expect a positive effect of working irregular jobs on work hours as well as dynamics in working hours. Finally, we also take into account the size of the establishment in relation to working hours. According to Saint-Martin and Venn (2010), part-time workers are more likely to work in smaller firms. Small establishments introduce part-time jobs out of business needs. Larger firms, however, offer more flexibility because of a larger internal labour market. Employees who work in larger firms therefore have more opportunities to switch their work hours.

We expect women who work in female-dominated industries to work fewer hours and to switch their work hours more frequently, but to what extent this also applies to men is unclear. Furthermore we expect employees who work irregular jobs, and are therefore more flexible, to work more hours and employees who change their work from regular to irregular hours to increase the number of hours they work. Finally, we expect employees working in larger firms to change their hours more frequently, and employees who work in smaller firms to work part-time more often.

4.3 Data and methodology

Data

To gain insight into the determinants of working hours and particularly the observed changes of working hours for Dutch men and women, a unique combination of micro-level data for the Netherlands was created. Observed changes in work hours refer to the occurrence of a change in work hours and, in the case of a change, the subsequent direction of change: an increase in hours or a decrease.

The data were compiled starting with a selection of employees with a fixed occupation who were followed from 2003 to 2005. At the heart of the analysis is the so-called Social Statistical Jobs Database (SSB-Jobs), which in essence is a matched employer-employee census. On the employee side, personal characteristics, such as age and household situation, available from the Municipality Base Registry (MBR), can be linked to the jobs. We will now continue with a short description of the data.

The Social Statistical Jobs Database (SSB-Jobs) is a combination of registers and surveys containing information on the jobs of all Dutch employees at the location of the branch they work in, dates they started or ended their jobs, and the business unit's main economic activity (NACE). We have information on all employees in the Netherlands in the period 2003-2005. Some indicators in this database, such as wages and hours worked, are not available for all employees, but only for a sample. This sample is based on the Survey of Employment and Wages (SEW)[20], which is included in the SSB-Jobs. On the employer side this database comprises all business units with employees between 2003 and 2005. Hence, the SSB-Jobs is basically the core of a matched employer-employee census.

In principle, the SSB-Jobs is set up as a longitudinal database containing all employment periods of all employees in the Netherlands. This implies that there are about 10 million jobs of employees recorded for a period of a year, i.e. including jobs starting and ending within that same year. At any fixed point in time in the period under consideration, there are about 7 million employee jobs in the Netherlands. Hence there are roughly 3 million that appear and disappear within one year. This data based on the number of jobs at a fixed point in time is called the cross-section database. For our analysis, the fixed point in time is set at December 31 of each year.

For the purpose of this paper we will only use the employee-side of the SSB-Jobs, which means that its matched character to employers is not fully utilized. From the employers' side we include only the industry class, firm size and firm location. Figure 3 provides a graphical description of the databases used in our analysis. The SSB-Jobs database comprises several registers, such as the tax income register and the social insurance register, the latter including all employees who are liable to pay to social insurance premiums. It also includes survey information from the SEW. For the purpose of our analysis we restricted our search to the SEW sample, because we needed information about hours worked as well as wage rates. Hence we are unable to fully benefit from the census character of the SSB-Jobs.

[20] The SEW is a survey among 80,000 firms, with a total of almost 4 million employees.

Figure 3 Schematic representation of MBR and SSB-Jobs databases

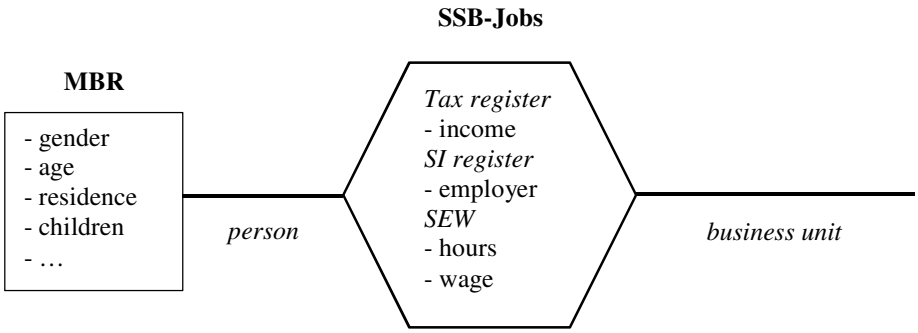


Figure 3 shows that the SSB-Jobs represents both the employer for whom the employee works and the employee himself or herself. From the employer side, production or balance sheet information can be linked to the SSB-Jobs. From the employee side, worker characteristics can be linked to the SSB-Jobs. Our focus lies on the analysis of the employee characteristics. These personal-characteristics are available from the Municipality Base Register (MBR). In theory, the MBR comprises information on gender, age, place of residence, marital status, number of children, and ethnicity of all 16 million inhabitants of all Dutch municipalities. However, we only have access to information for a selection of people who have a job, meaning those recorded in the SSB-Jobs data.

Because we have information on both the firm location and the residential location at the municipal level, we can approximate the home-work distance. Using the xy coordinates of both locations in respective municipalities we calculated the Euclidian distance between the centre points of each municipality. Although this is not an exact measure, Haandrikman and Harmsen (2008) argue that there are no serious barriers in geographical distance arising from the physical landscape and the dense infrastructure. As a consequence, people who live in the same municipality where they work will have a zero kilometre commute distance, but because Dutch municipalities are relatively very small this is not a real problem.

Despite the numerous possibilities of working with such rich micro-data, there is one serious limitation. The data do not contain information about the level of educational attainment of the employees. However, because we use hourly wage as an explanatory variable the problem of not having information about education is limited, given the high correlation between wage and education.

Finally, the MBR data also allow us to link people at the household level, which means that we can locate partners and children provided they have a job (SSB-Jobs). For our analysis, we focus on partners who are also included in the SEW survey, because we want to include hours of work and wages. For all men who were registered as having a partner we were able to locate 43 percent of the partners, and for all women with partners we were able to locate 46 percent. Because the data are gender-specific we can also identify same-sex couples. The inability to locate a partner is the result of either the partner being self-employed, unemployed or not participating in the labour force. All three states imply that the partner is not included in the SSB-Jobs, and subsequently not in our MBR- selection.

Methodology

The aim of this study is twofold. First, we want to explore the determinants of hours worked, to obtain an idea about the factors which might also be involved in determining the observed changes in hours worked, which is the second aim. Our methodology, therefore, also consists of two parts. First, we estimate a model[21] to explain hours of work from worker attributes (gender, age, wage, being gay), household attributes (marital status, partner and child characteristics), residential (urbanization, commuting distance) and job characteristics (industry, type of contract, firm size). This equation reads as follows:

$$h_i = \alpha_{0,i} + \sum_j \alpha_j D_{j,i} + \sum_j \beta_j x_{j,i} + \sum_j \gamma_j x_{j,i} \cdot x_{j,i} \qquad (1)$$

where h refers to hours of work and D_j are dummy variables representing socio-economic characteristics, spatial context and occupational characteristics. The variables x_j reflect characteristics measured as a continuous time variable. The final term expresses the possibility of cross-product and squared x_j variables.

In the second part of the empirical analysis we focus on the observed changes in working hours, with particular attention to possibilities for increasing the number of hours. We confine our attention to the working hours of workers within the same job, the same occupation and employed by the same employer. As before, change in

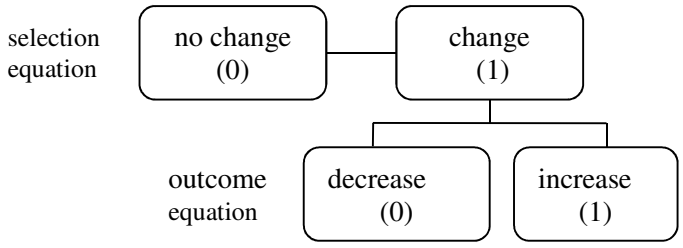
[21] We use the statistical package STATA, which incorporates several options for robustness checks, including a correction for heterogeneity as a result of the large sample size.

working hours within the same occupation is related to changes in personal, household, residential and firm-level characteristics. We also test the hypothesis that certain level variables, such as age, wage and being gay, also have an effect on the change in working hours.

$$\Delta h_i = \theta_{0,i} + \sum_k \theta_k D_{k,i} + \sum_k \mu_k x_{k,i} + \sum_k \eta_k \Delta x_{k,i} \qquad (2)$$

Equation (2) will be specified as a bivariate probit with sample selection. This methodology is clearly described by Van de Ven and Van Praag (1981). The model, depicted in Figure 4, consists of a selection equation and an outcome equation. The selection equation determines whether people change their work hours. For those people who do change their work hours, we want to know whether they increase or decrease their hours. In order to identify the model, we include nine sector dummies in the selection equation that are not included in the outcome equation (as exclusion restrictions). As argued in Section 2, there is a relation between industry type and flexibility in working time arrangements. Female-dominated sectors, such as health care and education, offer more variation in work hours because of part-time jobs and include companies that have a large enough internal labour market to facilitate changes in work hours. It is, however, not determined *a priori* whether this change relates to an increase in hours or a reduction.

Figure 4 Two stages in the analysis of dynamics in working hours



For the empirical analysis we will adopt a bivariate probit model with sample selection, because we assume that there is an underlying relationship that determines the utility of increasing the number of hours worked:

$$I_i^* = \chi + \delta X_i + v_i, \tag{3}$$

where I_i^* is a latent variable (i.e., it is not observed). Instead, we only see whether the individual increases or decreases their number of hours worked:

$$\begin{aligned} &I_i = 1 \quad \text{if } I_i^* > 0, \\ &I_i = 0 \quad \text{otherwise} \end{aligned} \tag{4}$$

The dependent variable of our outcome equation is therefore a dichotomous variable, which is I_i=1 for people who increase their working hours and I_i=0 for people who reduce their hours.

This dependent variable is, however, only observed for people who decide to change their working hours. We therefore model a selection equation:

$$C_i^* = \alpha + \beta X_i + u_i, \tag{5}$$

with C_i^* a latent variable capturing the utility to individuals of changing the working hours. We do not observe C_i^* directly, but observe a dichotomous variable that is C_i=1 for people who change their working hours and C_i=0 for people who do not change their hours:

$$\begin{aligned} &C_i = 1 \quad \text{if } C_i^* > 0, \\ &C_i = 0 \quad \text{otherwise} \end{aligned} \tag{6}$$

Since the error terms u_i(5) and v_i(3) might be correlated, estimation of the model in equation (4) is likely to result in biased estimates. We therefore adopt a bivariate

probit with sample selection specification by using the routine "heckprob" in STATA (Baum, 2006).

4.4 Empirical results

Based on a combination of the SSB-Jobs with the SEW selection for hours and wages, we have information for approximately 2.5 million male and female employees[22] for the period 2003-2005. Table 2 shows the average hours worked per week for the lowest and highest quartile of hourly wages of employees, further specified for the presence of young children. As expected, the average number of hours worked is lower for women than for men, and both averages are below the national average of hours worked for 2005; 39.5 for men and 28.1 for women (Statistics Netherlands, 2005). The majority of women work in part-time jobs, whereas most men work full-time.

Women with a child younger than 12 work the least number of hours, whereas their male counterparts with young children on average work the most hours a week. There appears to be no difference between the lowest and highest quartile for men. Women in the highest quartile work more hours than women in the lowest quartile. Furthermore, women without children work more hours than women with children.

[22] The descriptive results are based on all employees in the database; the models are based on samples of approximately 50% due to data limitations in STATA.

Table 2 Average hours worked for the lowest and highest quartile of hourly wages of employees

	Women		*Men*	
All	27 hours a week		37 hours a week	
	Lowest quartile	***Highest quartile***	***Lowest quartile***	***Highest quartile***
Hours 12-20 (minor part-time)	24%	14 %	1 %	2 %
Hours 20-36 (part-time)	62 %	70 %	34 %	42 %
Hours >36 (full-time)	14 %	16 %	65 %	56 %
	Average hours	Average hours	Average hours	Average hours
All	27	29	37	37
No children	30	32	37	37
Youngest child <4	23	25	37	37
Youngest child 4-12	24	25	37	37
Youngest child >12	28	31	37	37

Let us begin with an overview of the results for the model explaining hours worked as presented in Table 3. The models are gender-specific and consist of two parts. The first part includes all employees, and the second part is a selection of employees for whom we were able to find information on the partners in SSB-Jobs and SEW (this is true for 43 percent of the women and 46 percent of the men with partners). Only partners recorded in SSB-Jobs are included, which means that we can take into account the job characteristics of the partner.

The R-squared or explained variance for the models for female work hours is much higher than that of the models for male work hours. As shown in Table 2, there is also a much greater variation in female working hours than there is for male working hours. Also the models where the job characteristics of the partner are included do not add to the explained variance, or in the case of male working hours they only add a little.

Table 3 Gender-specific results for hours worked

	All employees				Employees with matched partners			
	Women		**Men**		**Women**		**Men**	
	Coef.	t-value	Coef.	t-value	Coef.	t-value	Coef.	t-value
Constant	29.11	173.01	38.80	433.83	34.73	99.73	41.84	244.54
Year 2004 (reference 2003)	0.111	7.88	-0.011	-1.58	0.041	1.74	0.004	0.31
Year 2005 (reference 2003)	0.017	1.18	-0.057	-7.89	0.048	2.02	-0.042	-3.38
Age	-0.027	-4.16	0.048	11.07	-0.064	-5.00	0.001	0.13
Age squared	-0.002	-23.19	-0.001	-19.26	-0.002	-11.06	-0.001	-6.04
Ln wage	2.352	85.39	0.076	5.92	2.799	56.93	0.438	18.55
Ln wage partner					-1.326	-39.84	-0.74	-43.26
Hours worked by partner					-0.077	-30.25	-0.026	-35.52
One child (reference no children)	-1.780	-68.42	0.434	36.21	-1.599	-39.16	0.332	16.30
Two children (reference no children)	-2.864	-101.3	0.519	40.69	-2.570	-57.84	0.362	16.44
Three or more children (reference no children)	-2.485	-71.84	0.678	44.37	-2.158	-40.67	0.490	18.59
Youngest child <4 (reference no child / adult child)	-5.995	-212.7	-0.860	-64.23	-6.216	-136.1	-1.138	-49.15
Youngest child 4-12 (reference no child / adult child)	-4.289	-153.7	-0.553	-43.17	-4.497	-101.8	-0.739	-33.61
Youngest child 12-18 (reference no child / adult child)	-1.004	-34.41	-0.169	-13.20	-0.996	-21.94	-0.186	-8.75
Single	2.875	168.80	-0.332	-30.50				
Single Parent	4.318	171.89	-0.607	-20.34				
Gay	3.083	64.11	-1.004	-24.36	2.496	39.08	-0.811	-13.72
Commute distance (km)	0.013	35.70	0.002	14.48	0.017	25.88	0.002	8.79
Commute distance (km) Partner					0.001	3.64	-0.003	-10.95
Lives in Randstad region	1.627	107.81	-0.223	-27.97	1.642	62.10	-0.091	-6.68
Lives in urban municipality	0.613	43.52	-0.177	-24.35	0.482	20.61	-0.171	-13.95
Company size	3.80e-06	5.42	1.11e-05	43.19	6.31e-06	5.30	9.32e-06	22.13
Innovation and Knowledge Intensive sector	1.493	48.26	0.367	29.68	1.654	30.60	0.358	17.00
Partner works in Innovation and KI sector					-0.183	-0.50	-0.169	-6.49
Irregular shifts (reference regular work hours)	0.036	2.31	-0.384	-42.13	-0.132	-5.04	-0.374	-23.73
Irregular shifts of partner					0.019	0.63	0.172	12.79
N	1.229.564		1.302.607		421.198		456.092	
R-Squared	0.349		0.187		0.312		0.195	

Analysis includes 49 industry dummies for all employees, 98 when including the partners

Socio-economic characteristics

We find that regardless of gender, wage has a positive significant effect on hours of work. Given that wage is highly correlated to education, this implies that these results correspond to the findings of Coleman and Pencavel (1993), namely that high-

skilled employees work more hours than low-skilled employees. The hourly wage of a partner has a negative relation to the hours male and female employees work. This suggests the occurrence of household specialization, although not necessarily gender-specific, since the effect is also significant, albeit smaller for men. Similarly there is a negative significant relation between the hours worked by the partner and the working hours of both male and female employees.

As expected, the presence and age of children are important determinants of female working hours. However, being a parent also has a significant influence on male working hours. Mothers work fewer hours than women without children, regardless of the age and number of children. The impact of younger children, however, is larger than older children, suggesting a decrease in the caretaking burden as children grow older. Similarly, the transition into parenthood has a larger impact on working hours of female employees than the transition from the first child to subsequent children. For fathers we find that men work more hours when they have more children, but fewer when the children are young. With regard to household composition, we find that single men and single fathers work fewer hours, suggesting that men who are part of a family with children work more hours because of the need to earn more income for the family. Single women and single mothers, on the other hand, work more hours because they are primary earners, whereas women with partners are usually secondary earners.

In accordance with the literature on sexual orientation and labour supply, we find that gay males work significantly fewer hours and lesbian employees work significantly more hours than their heterosexual counterparts. The effect is also significant for gay couples who comprise both primary and secondary earners. Secondary earners among gay male couples result in a significant negative effect on hours worked, and primary earners among lesbian couples result in significantly more work hours.

Finally, the effect of age on the number of working hours a week is as expected: male employees work more hours mid-career and reduce their working hours towards the end of their career. For men with a recorded partner, the effect of age is only significant towards the end of their career. Female employees have the highest number of work hours when they are young, and decrease their hours before men do, due to the onset of their reproductive career.

Residential context

The relation between commuting distance and hours worked is positive and significant for both men and women. The coefficient for females is higher, which implies that they require more compensation in terms of working hours if they commute more. For the effect of partners who commute, we find a negative significant effect of the partners' commuting distance for males and for females a positive significant effect. This is not what one would expect, given that men usually have a wider potential daily prism (Hägerstrand, 1970), and women have less time available for commuting (Hanson and Pratt, 1990). However, we do not find empirical evidence for these gender-specific commute differences at the household level. Similar to the results of Noback and Van Dijk (2010), we find a positive significant effect of commuting distance for both female and male working hours.

In accordance with previous research by De Meester et al. (2007), we find that men who live in highly urban environments work fewer hours and women work more hours. The effect is greater for the Randstad region, which is the most centralized area in the Netherlands. These relations are the same for men and women who are part of a couple, which confirms the occurrence of more symmetrical household arrangements (Karsten, 2003) in urban areas.

Job characteristics

As expected, male and female employees work more hours in larger firms. Also employees who work in high-skilled knowledge-intensive and innovative jobs work significantly more hours. For men, having a partner who works in a knowledge-intensive and innovative job has a negative significant effect on their own work hours. This effect is not significant for women.

As expected, women who work irregular hours work slightly more hours than those who work regular hours. However, this effect is completely reversed for women with a working partner. For men and males with a working partner we find that they work significantly fewer hours in an irregular job. Having a partner who works irregular hours has no significant effect on the hours worked for female employees, but it does have a positive significant effect on the work hours of male employees.

We now turn to the second part of our analysis, regarding observed changes in hours worked between the years 2003, 2004 and 2005. As depicted in Figure 4, the model consists of two parts, a selection model and an outcome model. The selection model focuses on factors that contribute to the occurrence of a change in the hours of work. The outcome model concerns the direction of the change, i.e. an expansion of hours or a reduction. Changes of less than 1 hour are not taken into account.

From Table 4 it becomes clear that women change their hours on a much larger scale than men do. There appears to be a slight tendency towards decreasing the number of hours worked rather than increasing them, especially in the case of first-time parenthood. The dynamics in the health care sector are shown, because that is the sector in which employees most frequently change their working hours.

Table 4 Descriptives for changes in hours worked

	No change	*Fewer hours*	*More hours*	*N*
Men	93 %	4 %	3 %	1.736.444
Women	72 %	15 %	13 %	1.639.547
First-time fathers	90 %	6 %	3 %	45.134
First-time mothers	53 %	36 %	11 %	49.358
Men in health care	89 %	6 %	6 %	156.756
Women in health care	63 %	19 %	17 %	692.594

Table 5 shows the results of the bivariate probit estimation with sample selection, i.e. the outcomes of the "heckprob" routine in STATA. As with Table 3, the models are divided into all female and male employees and employees with partners who have a job and therefore are recorded in the SSB-Jobs and SEW database.

The dependent variable in the analysis is the occurrence of a change in work hours; therefore most explanatory variables also refer to changes. Nevertheless, we also want to know which employees are more likely to change the number of hours they work, those in minor part-time jobs of 12-20 hours, those in part-time jobs of 20-36 hours, or those in full-time jobs of more than 36 hours a week.

In general we find that employees who work in minor part-time jobs change their hours significantly more than employees who work in part-time jobs. For female employees we find that women who work full-time are less inclined to change their hours than females working in part-time jobs, whereas full-time working men are

more inclined to change their hours. When they do change their hours, employees in minor part-time jobs are more likely to increase their hours, and logically full-time working employees are more likely to decrease their hours.

Table 5 Gender-specific results for changes in hours worked

	All employees				Employees with matched partners			
	Women		**Men**		**Women**		**Men**	
Change[Δ] (1) / no change[Δ] (0)	Coef.	z-value	Coef.	z-value	Coef.	z-value	Coef.	z-value
Constant	-0.614	-18.08	-1.192	-30.40	-0.674	-9.91	-1.642	-20.58
Δ Year 2004-2005	0.034	14.54	0.103	32.50	0.035	8.48	0.096	17.42
Minor part-time 12-20 (reference part-time 20-36)	0.116	39.30	0.646	56.32	0.046	9.24	0.616	29.27
Full-time (reference part-time 20-36)	-0.278	-68.34	0.127	35.64	-0.292	-35.17	0.157	25.18
Age	0.051	43.07	0.015	8.84	0.045	17.90	0.017	5.02
Age squared	-0.001	-42.98	-.0002	-9.90	-0.001	-17.88	-.0002	-5.40
Ln wage	-0.737	-142.9	-.514	-86.28	-0.769	-79.99	-0.643	-57.53
Δ wage increase € 1-5	1.301	435.36	0.757	184.45	1.343	250.29	0.772	108.82
Δ wage increase > € 5	2.219	323.30	1.534	188.72	2.240	180.57	1.561	107.65
Δ wage decrease € 1-5	1.073	358.71	0.671	158.93	1.087	208.32	0.662	90.73
Δ wage decrease > € 5	1.593	223.20	1.411	134.81	1.649	132.23	1.428	75.42
Ln wage partner					0.099	13.32	0.275	26.04
Δ Ln wage partner					0.046	4.28	0.002	0.18
Δ hours worked by partner					-0.003	-2.47	0.002	2.16
Δ birth of first child	0.373	58.82	0.174	19.36	0.338	28.73	0.223	14.61
Δ birth of first child lagged (1 year before)	0.099	16.09	0.101	10.98	0.305	2.77	0.099	7.11
Δ birth of subsequent child	0.083	12.21	0.059	6.45	0.048	4.22	0.096	6.58
Δ birth of sub. child lagged (1 year before)	0.043	7.92	0.063	8.89	0.007	0.75	0.091	8.15
Δ age youngest 3-4	0.068	9.00	0.040	3.97	0.013	1.04	0.061	3.79
Δ age youngest 12-13	0.119	15.68	-.026	-2.46	0.111	9.16	-.011	-0.65
Gay	-0.183	-15.11	0.128	8.37	-0.254	-14.30	0.089	3.33
Δ partner to single	-0.089	-11.06	0.032	2.82				
Δ single to partner	-0.060	-7.71	-.013	-1.22				
Δ commute distance	0.001	2.24	.0003	1.28	0.001	1.36	-2.82e-05	-0.04
Δ commute distance partner					-.0003	-1.49	0.002	0.18
Δ move from urban to rural municipality	-0.015	-1.10	0.034	1.89	-0.052	-1.93	0.032	0.96
Δ move from rural to urban municipality	-0.051	-2.65	.0004	0.02	-0.052	-1.30	-.104	-1.94
Δ company size	0.001	8.96	0.002	13.84	0.001	6.59	0.001	7.50
Innovation and KI sector	-0.167	-31.95	-.345	-63.87	-0.155	-16.42	-.303	-31.80
Innovation and KI sector partner					-0.009	-1.54	0.009	0.82
Δ regular to irregular shifts	0.173	24.65	0.105	8.07	0.143	11.13	0.068	3.02
Δ irregular to regular shifts	0.139	22.06	0.372	34.03	0.124	10.76	0.304	15.77
Partner Δ regular to irregular shifts					0.009	0.52	-.021	-1.20
Partner Δ irregular to regular shifts					0.012	0.68	0.019	1.28

[Δ] Selection variables for change are 9 sector dummies

Table 5 continued

	All employees				Employees with matched partners			
	Women		**Men**		**Women**		**Men**	
Increase (1) / decrease (0)	Coef.	z-value	Coef.	z-value	Coef.	z-value	Coef.	z-value
Constant	-0.624	-11.91	0.101	0.93	-1.725	-15.74	-0.684	-3.03
Δ Year 2004-2005	-0.014	-2.99	0.075	8.47	0.056	6.96	0.105	6.82
Minor part-time 12-20 (reference part-time 20-36)	0.342	60.51	0.497	17.64	0.318	32.71	0.539	10.38
Full-time (reference part-time 20-36)	-0.602	-64.30	-0.611	-57.17	-0.599	-30.59	-0.621	-29.88
Age	0.078	33.76	0.006	1.37	0.104	21.16	0.027	2.95
Age squared	-0.001	-34.94	-0.0002	-5.22	-0.001	-21.77	-0.0004	-4.80
Ln wage	-0.728	-67.78	-0.119	-6.51	-0.778	-40.84	-0.124	-3.19
Δ wage increase € 1-5	-0.649	-30.71	-0.821	-35.54	-0.627	-17.68	-0.833	-17.52
Δ wage increase > € 5	-0.666	-23.93	-1.013	-24.28	-0.631	-13.76	-0.967	-11.55
Δ wage decrease € 1-5	1.854	312.59	1.448	111.69	1.901	175.26	1.521	68.96
Δ wage decrease > € 5	2.439	175.46	1.666	52.81	2.498	105.67	1.791	30.23
Ln wage partner					0.198	13.69	0.093	2.89
Δ Ln wage partner					-0.176	-8.49	-0.098	-3.13
Δ hours worked partner					-0.003	-1.33	0.006	2.94
Δ birth first child	-0.943	-52.38	-0.255	-10.39	-0.953	-29.01	-0.397	-9.14
Δ birth of first child lagged (1 year before)	-0.202	-16.25	0.055	2.25	-0.219	-9.93	0.019	0.52
Δ birth of subsequent child	-0.289	-21.85	0.035	1.41	-0.297	-13.41	-0.003	-0.09
Δ birth of sub. child lagged (1 year before)	-0.034	-3.22	0.052	2.71	-0.014	-0.80	-0.017	-0.57
Δ age youngest 3-4	0.022	1.49	0.052	1.90	0.016	0.65	0.078	1.80
Δ age youngest 12-13	0.254	18.20	0.173	5.90	0.249	11.41	0.171	3.73
Gay	0.052	2.04	-0.061	-1.57	-0.081	-2.16	-0.166	-2.36
Δ partner to single	0.286	17.51	0.006	0.19				
Δ single to partner	-0.074	-4.67	-0.039	-1.41				
Δ commute distance	-0.004	-8.75	-0.003	-4.56	-0.004	-3.09	-0.003	-1.52
Δ commute distance partner					-0.001	-1.79	0.0003	0.41
Δ move from urban to rural municipality	0.064	2.37	0.105	2.21	0.191	3.55	0.177	1.95
Δ move from rural to urban municipality	0.156	4.09	-0.006	-0.09	0.211	2.70	-0.096	-0.63
Δ company size	0.002	15.00	0.0003	1.00	0.002	7.45	0.002	3.90
Innovation and KI sector	-0.003	-0.28	0.015	0.73	-0.032	-1.57	0.014	0.38
Innovation and KI sector partner					-0.032	-2.86	-0.054	-1.73
Δ regular to irregular shifts	.021	1.63	-0.122	-3.49	0.014	0.62	-0.182	-3.04
Δ irregular to regular shifts	-0.172	-14.17	-0.135	-4.89	-0.144	-6.75	-0.179	-3.53
Partner Δ regular to irregular shifts					-0.027	-0.76	-0.071	-1.49
Partner Δ irregular to regular shifts					-0.012	-0.36	-0.056	-1.32
N	1.623.753		1.735.812		495.160		546.705	
Uncensored N	461.953		119.917		155.000		40.751	
Rho	.612		.278		.658		.304	
(Prob / chi2)	(0.00)		(0.00)		(0.00)		(0.00)	

Socio-economic characteristics

We find that regardless of gender, employees with higher hourly wages, i.e. higher educated employees, are less likely to change their work hours. Having a partner

with a higher wage however, increases the likelihood of changing work hours. For all employees who have changed their work hours, those with higher wages are more likely to decrease their hours. Employees who have a partner with a higher income, however, are more likely to increase their work hours.

Any change in hourly wage, increases the likelihood of changing work hours. Male and female employees who started earning more and changed their work hours are more inclined to reduce their work hours, suggesting that the income effect is larger than the substitution effect. A decrease in hourly wage, on the other hand, increases the likelihood of expanding work hours, for those employees who change their hours. Wage changes of partners only increase the likelihood of change for female employees. When a partner has experienced an increase in earning, both female and male employees are more inclined to decrease their work hours, which implies that the dominance of the income effect is also found at the household level.

Following an increase in work hours of the partner, female employees are less likely to change their work hours, whereas the reverse is true for male employees. Subsequently male employees are more likely to start working more hours after an increase in their partner's hours, while there is no significant effect on the change in work hours of female employees.

As expected, age has a positive significant effect on the likelihood of changing work hours as well as the likelihood of increasing work hours. After the completion of an individual's educational career, during which it is not uncommon to hold minor part-time jobs, hours of work increase. Towards the end of the working career, hours of work decrease in anticipation of retirement, as becomes clear from the negative significant coefficient for age squared in all models.

The birth of a child and important transitions in the age of the youngest child largely have the expected effect on the likelihood and direction of a change in work hours of both parents. In particular the transition to parenthood increases the likelihood of changing work hours and subsequently the likelihood of decreasing work hours. For male employees this is only true for the birth of the first child; subsequent children do increase the likelihood of change, but either result in an increase in hours or have no significant effect. Although transitions in the age of the youngest child can have a positive effect on the likelihood of changing work hours, only when the youngest child reaches secondary school-going age, we find that male and female employees are more likely to increase their hours.

For women any change in the relationship status decreases the likelihood of changing work hours. Nevertheless for the female employees who have experienced a change in work hours, those who have become single again are more likely to increase their hours, whereas gaining a partner has the reverse effect and results in a decline in work hours. Men who have become single are more inclined to change their work hours, although there is no significant effect for the direction of change. With respect to household composition we also find that lesbian employees are less likely to change their hours compared to heterosexual female employees, whereas gay employees are more inclined to change their hours compared to their heterosexual counterparts. Lesbian women in general who have changed their work hours are more inclined to increase them compared to heterosexual female employees, and for all other gay employees we find a greater likelihood of decreasing work hours than their heterosexual counterparts. This implies that for lesbian women with a working partner we find the reverse effect to lesbian women with a self-employed or not working partner.

Residential context

Women who relocate from rural to urban municipalities are less likely to change their hours. Furthermore, an increase in the duration of commuting only has a positive significant effect on the opportunity to change work hours for females in general. There is no significant relation between relocating, a change in commute duration, and the likelihood of men changing their work hours.

An increase in commute duration is compensated by a reduction in work hours for the employees who have changed their hours, with the exception of men with a working partner. A change in the commute duration of the partner has no significant effect of any kind. Relocating from an urban to a rural municipality and vice versa has a positive significant effect on the likelihood of increasing work hours for female employees. For male employees the same relation is found, but only for those who have relocated from urban to rural municipalities.

Occupational effects

In general we find that employees who work in an expanding firm are more inclined to change their work hours, usually by increasing them. Working in a high-skilled innovative and knowledge-intensive sector has a negative significant effect on the likelihood of changing work hours. For the employees in that sector who do change

their hours, there is no significant relation for the direction of change. A change in the type of shifts in the workplace increases the likelihood of changing work hours. A change from irregular shifts to regular work hours has a negative significant effect, which implies that employees are more inclined to decrease their hours. Since working in irregular shifts provides a certain amount of flexibility, this loss of flexibility is apparently compensated by a decrease in work hours. We do not find the reverse effect for an increase in flexibility resulting from a shift to irregular hours.

Except for women with a partner who works in a highly skilled knowledge-intensive industry, we do not find any significant effect of the job characteristics of partners.

4.5 Concluding remarks

High levels of employment occur simultaneously with exceptionally low average work hours in the Netherlands, and this poses some interesting questions with regard to labour utilization. Current trends show that the low average of work hours is not only the result of the majority of women working part-time; a growing number of Dutch men also work part-time. With the decline of the working-age population as a result of ageing, the increase in part-time work can be viewed as an additional threat to current welfare levels. However, low working hours are also a potential solution for solving labour market shortages due to ageing. The aim of this paper is therefore to explore the possibilities for increasing the number of work hours of those who are currently active in the labour market.

A unique micro-level dataset was compiled, consisting of employees with a fixed occupation followed from 2003 to 2005. A combination of the Social Statistical Jobs Database (SSB-Jobs) and the Municipality Base Registry (MBR) provides data on personal characteristics, household composition, residential context and job characteristics. Partners of the employees are included in the analysis if they have a job and are registered in the SSB-Jobs. The richness of the data also allowed us to identify same-sex couples. The analysis started with an OLS regression to gain insight into the determinants of work hours. Next the dynamics in work hours were analysed by adopting a bivariate probit model with sample selection, using the "heckprob" routine in STATA.

The majority of Dutch women work in part-time jobs three or four days a week, whereas most men work full-time. As expected, we find that people work more hours when they earn more, when they work in highly skilled innovative jobs, or when they work in large firms. Women appear to benefit from the opportunity structure of highly urbanized municipalities and work more hours, whereas men who live in highly urban areas work fewer hours. This might be the result of a higher prevalence of symmetrical household arrangements in highly urban areas. Employees work fewer hours if they have children, especially when these are young. Results show several forms of gender stereotyping and household specialization; being single, being a single parent or being homosexual has a reverse effect for men as opposed to women.

Results further show that in particular people in part-time jobs of 12-20 hours are most likely to change their work hours. Men in full-time jobs are also more likely to change their work hours, whereas women in full-time jobs are less likely to change their hours. For women, a change in wage, children or job type increases the likelihood of changing their work hours. For men this is largely similar, although gay employees and those who have become single are also more likely to change their hours. Women are inclined to increase their work hours if they work in part-time jobs of 12-20 hours, when they experience a decline in wage, when the youngest child goes to secondary school and after a relocation. Finding or losing a partner affects the work hours of women, but not men, which suggests that women are more economically dependent if they are in a relationship. Men only reduce their work hours with the birth of a first child, after which further changes lead to further specialization within the household, resulting in more work hours for fathers and fewer for mothers. A change to regular shifts, implying a reduction in flexibility of work hours, leads to a reduction in work hours. Men are also more inclined to reduce their hours after a change to irregular hours, which has no significant effect for female employees.

Having a partner with higher wages increases the likelihood of changing hours, which usually translates into an increase in work hours. An increase in the wage of a partner has a negative significant effect on the direction of change, also for male employees. We do not find a significant relation for the job characteristics of partners.

The limitation of this study is that we have only considered changes at a certain point in time by constructing a cross-section dataset. The motivation for this design was that we wanted to eliminate the effect of job transitions (finding-switching-losing a job). Nevertheless, a next step is to adopt a life course perspective and include all changes employees experience during their work career. A challenge in this type of study design is to disentangle the effects caused by job transitions from other changes that take place during the life course, such as starting a family, (early) part-time retirement, and so on.

From a policy point of view, it is clear that female participation is relatively high in the Netherlands also because of the high prevalence of part-time jobs, which enable women to combine work with having children without leaving the labour force. When children become older the burden of caring decreases and we find that women increase their work hours. Providing high-quality, nearby child care amenities to alleviate this burden of care at an earlier stage might motivate mothers with younger children to increase their hours. Including homosexual employees and transitions in relationship status in our analysis reveals several interesting processes of household specialization related to existing gender stereotypes. Furthermore we also find evidence that this specialization is affected by the residential context, and there is a higher prevalence of more symmetrical household arrangements in highly urbanized areas. Given that changing gender stereotypes is a difficult and slow process, continuing to invest in human capital is more realistic from a policy perspective.

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5

Climbing the ladder

Gender-specific career advancement in financial services and the influence of flexible work-time arrangements[23]

Abstract The aim of this study is to gain insight into the gender-specific dynamics of career advancement. The analysis is based on a quantitative data set of circa 10,000 middle and top-level managers in a Dutch financial services company. Results indicate that women earn less, work in lower job levels, but show slightly higher career mobility than men. Working in a flexible full-time (4*9) arrangement turns out to be favourable for women who are 'rewarded' for working full-time, whereas men are 'penalized' for not working five days a week. Introducing this form of flexibility into a predominantly masculine organizational culture offers new opportunities for career advancement, albeit solely for women.

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5.1 Introduction

Both men and women may encounter difficulties in the course of their occupational career, which are linked to organizational aspects, the existence of glass ceilings, the presence of informal networks, and norms and values related to management positions such as time and mobility constraints. In the context of pursuing a work-life balance, difficulties can arise from both a corporate/organizational standpoint and an individual and family perspective. Women in particular face the double burden syndrome of combining caretaking activities and other unpaid work with a paid job. These household responsibilities negatively affect labour market opportunities in terms of available jobs and career prospects.

This research can be positioned within the growing number of studies adopting a quantitative study design to obtain more insight into gender-specific career advancement and other related aspects, such as discrimination, informal networks and organizational culture (e.g. Eddleston et al., 2004; Guillaume and Pochic, 2009). The aim of this paper is to gain insight into the gender-specific dynamics of career advancement. Career advancement is measured in terms of tangible outcomes, namely salary, job level, and career mobility. We explore the extent to which gender, household situation, corporate culture, human capital and spatial flexibility have significant effects on the career opportunities of male and female employees, based on the analysis of approximately 10,000 middle and top-level managers. These data were obtained from the personnel records of a major Dutch financial services company that contained information about career advancement over the period 2001-2008 including background characteristics of the employees. We pay special attention to the relation between career opportunities and new working-time arrangements, in particular the flexible full-time arrangement, which entails working four-day nine-hours-a-day (4*9) workweeks. This flexible full-time (4*9) arrangement has come into existence due to a need for more flexibility in an organizational context that strongly favours working full-time. Because in the Netherlands it is usual to take care of one's own children, working mothers in particular prefer to work part-time, rather than opting for formal day care. This phenomenon is referred to as the Dutch caretaking culture (Vlasblom and Schipper, 2005).

The company we analysed is especially interesting because of its front-runner position in the promotion of gender diversity evidenced by its engagement in public debate and a publicly announced commitment to increasing the number of female top-level managers. In the Netherlands, however, the majority of women work part-time and few women work in top-level management positions (Merens and Hermans, 2008). Therefore, we also interpreted the outcomes of the analyses in the context of more general tendencies in the Dutch labour market such as the increase in female participation and the changing sectoral and occupational structure of the labour market.

The paper is organized as follows. In the next Section we begin with a brief description of some recent developments in the Dutch labour market. Next we present a theoretical framework to explain of career advancement and the expected value for the explanatory variables divided into three groups: gender and household; corporate culture and human capital; and spatial flexibility. In the third Section the data and methodology are described. Section four discusses the empirical results based on some descriptive statistics and is followed by a discussion of the estimation results obtained from an econometric model. The paper ends with a summary of the results and provides general conclusions in relation to policy.

5.2 Career advancement: theory and background

In the past decades significant changes have taken place in the Dutch labour market. This is especially true for the position of women in the labour market. The educational level of women has risen and subsequently they have more opportunities in the labour market. Furthermore, women remain in the labour market after the birth of their first child, thereby significantly reducing the occurrence of career breaks. Partly as a result of these changes, female labour market participation rates have increased substantially. In the period 1996-2008 the number of jobs for women increased by 44 percent, whereas the number of jobs for men increased by only 14 percent (LISA News, 2009, p.7). Whereas in the 1980s the Dutch labour market was portrayed as the 'Dutch disease' due to the extremely high levels of unemployment, this turned around completely a decade later into 'the Dutch miracle'. Dutch unemployment rates have remained the lowest in Europe for almost a decade (EiE,

2008, p.37). Together with Denmark and Sweden, the Netherlands is one of the few countries that exceeded the Lisbon 2010 target of 70 percent for overall employment rate. The Dutch female participation rate is almost 70 percent and substantially above the Lisbon target of 60 percent for females.

Other significant changes are the way in which the service sector has become dominant and the flexibility on the labour market which has increased in many respects. One aspect of this flexibility is the tremendous increase in part-time jobs that are mainly taken up by the rapidly increasing number of women -especially married women- entering the labour market. Almost half of employees work part-time (less than 30 hours per week). Three-quarters of the women and one-quarter of the men work part-time, and for both groups this is about three times the European average (EiE, 2008, p.39). It is also interesting to note that only 5 percent of Dutch workers indicate that they work part-time on an involuntary basis, whereas at the European level this is more than 20 percent and for some countries it is even half the workforce that involuntarily work part-time.

Despite these changes, the position of Dutch women in the labour market deviates from the position of women in neighbouring countries. In the Netherlands women work fewer hours, regardless of educational attainment or the presence of children. We may conclude that in terms of access to jobs the Netherlands has one of the highest scores in Europe. But a very large proportion work part-time and indicate that they are happy with this arrangement. Because both men and women work part-time, the Netherlands is an ideal setting for studying the gender-specific effects of part-time work on career opportunities.

The theoretical framework captures the relation between gender, household situation and career advancement. Career advancement in this research project refers to being successful in one's career in terms of tangible outcomes, namely salary, job level and career mobility (for motivation Eddleston et al., 2004). In Section 4 we will present the results of three separate models using OLS estimations. The dependent variables of the first two models are full-time annual salary and function level in 2008. In the third model the dependent variable is career mobility which is measured as the difference in job level between 2001 and 2008. In the remainder of this Section we will describe the theoretical framework for the explanation of career advancement and the

expected relation to the explanatory variables divided into three groups: gender and household; corporate culture and human capital; and spatial flexibility.

Gender, household and career advancement

A wide range of empirical evidence suggests that women face more obstacles that hinder career advancement than men do (see, for example, Eddleston et al., 2004; Tharenou, 2005). Based on a review, Tharenou (2005) found that the barriers most often referred to are gender discrimination, male hierarchies and the lack of informal networks that help women to advance. These barriers are part of an existing male-dominated organizational structure that is challenged by the increasing number of higher-educated working women competing for career advancement. The relation between career advancement and organizational culture is discussed in the next Section.

Kottke and Agars (2005) argue that the impact of social cognitions, especially gender stereotypes and social identity, is most important to women's advancement, because they are integral to so much of the thought, behaviour and attitudes of employees. Gender discrimination is directly related to persistent stereotypes such as 'women are quitters' (Stroh et al., 1996) and 'men are more competitive and career oriented' (Van Vianen and Fischer, 2002). According to Swim et al. (1989), women are negatively affected by gender stereotypes in the evaluation of performance. This can manifest itself in lower salaries for women. Another explanation is the moderating effect of having children on career advancement, as described by Metz (2005). Because of reduced working hours women invest less in training and development opportunities and they also face the negative stereotyping of being less committed to having a career. Women are perceived to be less endowed with managerial abilities as compared to men, despite changes in perceptions over recent decades (Powell et al., 2002). Also sexism and the assumption regarding men's superior leadership capabilities are serious obstacles to women's advancement (Kottke and Agars, 2005). Kottke and Agars (2005) also discuss the impact of social identity on women's advancement. Being a member of a social group, or in this case being male or female, forms an important part of an employee's identity. This individual identity, based on a social group, can cause in-group bias and group conflict.

In the literature on gender and career advancement, family status or the work-family balance is frequently described as a barrier for women (e.g. Dykstra and

Fokkema, 2000; Kirchmeyer, 1998; Eddleston et al., 2004). Whereas men's careers often benefit from having children, because it pushes them to make career choices beneficial to their role as the main breadwinner, having children makes women less likely to pursue a career, due to the extra demands of caretaking (Tharenou et al., 1994).

In her study on the career advancement of mothers, Metz (2005) found that family responsibilities and work discontinuity are more likely to be reported as barriers by mothers, and personal traits and lack of promotion or work opportunities by non-mothers. Having children has a moderating effect on career advancement in the form of insufficient training and development opportunities and working hours. Previous studies have showed that having children can reduce the number of hours women work and the training they obtain (Metz, 2005; Tharenou et al., 1994). In addition Metz (2005) also mentions that many women perceive family responsibilities as a barrier to their advancement because of existing stereotypes among colleagues and superiors. Dykstra and Fokkema (2000) showed that the absence of household obligations, either by being single women and/or remaining childless, promotes women's occupational success. This relation between the absence of family ties and achieving occupational success is also referred to as the demographic price for success. Although one might expect singles to be more career-oriented, employees with family responsibilities are considered more stable and reliable, resulting in more career advancement compared to their single colleagues. This expectation is confirmed by Nickell (1979) and Herzog and Schlottman (1984). However, this may differ by gender. Career-oriented women tend to be single and postpone or refrain from having children (Metz, 2005). In their research on the glass ceiling and cultural preferences, Van Vianen and Fischer (2002) found that women perceived the work-home conflict as the most important barrier that prevented them from accepting a senior management position, regardless of their ambition.

Based on the foregoing considerations we will include the variable gender in the empirical analysis to test whether there are significant differences between male and female employees in terms of income, job level and career mobility. We control for differences in household formation by including two dummy variables: being single and having a dependent child younger than 13 years of age. Single women are expected to have better career opportunities than single men, and the career

opportunities of women are expected to be negatively influenced by the presence of young children.

Corporate culture, human capital and career advancement

As discussed in the previous Section, many of the barriers referred to in studies on the glass ceiling and career advancement of women relate to a male-dominated organizational culture. Although organizational cultures are based on a combination of masculine and feminine characteristics, they tend to be more masculine (e.g. Van Vianen and Fischer, 2002; Priola and Brannan, 2009; Guillaume and Pochic, 2009). Management cultures in particular are dominated by masculine norms and values such as the establishment of status and authority, hierarchical relations, the notion of a linear career path and competition. These organizational cultures form a barrier to women's careers through a process of exclusion and selection (van Vianen and Fischer, 2002). Exclusion refers to issues described in the previous Section on gender, such as gender stereotypes and prejudiced attitudes. Selection refers to selection by others, for example, male top-level managers favouring male colleagues, and self-selection. An example of self-selection is work preferences that deviate from the existing organizational structure that can result in women switching employers or rejecting opportunities for promotion. Priola and Brannan (2009) argue that leaving an organization or rejecting opportunities for promotion are forms of resistance against a masculine organizational culture. Female managers who were able to adopt and display masculine characteristics more often succeeded in being promoted to senior levels (Kerfoot and Knights, 1998; Guillaume and Pochic, 2009).

Over the course of a lifetime people invest in their human capital in different ways, starting with a general level of human capital gained through education. The accumulation of human capital acquired during a working career is comprised of sector-specific knowledge (Simpson, 1992) and enterprise-specific human capital gained through on-the-job training. Employees invest in knowledge and skills over the years, aiming to maximize the utility of this accumulated human capital (Becker, 1962). Research by Dieckhoff and Steiber (2010) showed that male employees are more likely to participate in on-the-job training than their female colleagues. Although human capital theory and gender role theory could not predict female participation in training, the researchers found that fatherhood positively influenced male participation. This can be explained by greater job attachment or job security

following from taking on the role of breadwinner. Sector- and enterprise-specific knowledge, however, can be lost as a result of job mobility. According to Van Ham (2002), employers place more value on the human capital acquired through a continuous career, and this accords with the masculine notion of a linear career. Given that women who have children during their career experience career breaks, this negatively affects the career opportunities of women with children.

Based on the preceding we include two human capital variables in our model in order to distinguish between firm-specific human capital acquired while working at the present firm, and human capital built up from job experience with other employers. Firm-specific human capital accumulation or internal work experience can be obtained directly from the data as the number of years of working with the firm (tenure). External work experience can be derived indirectly from the data set by assuming that each person started working at the same age of 20 and subtracting tenure. This implies that external job experience can be expressed as: Age - 20 - Tenure. We expect that all employees started working at about the same age, and this is a reasonable assumption because the variation in years of education is rather small as all employees have a degree from a university or college of higher education. Because some variation in the starting age is possible, in the empirical model we include external experience with a set of three dummies reflecting four intervals of external experience, ranging from less than five years, 5-15, 15-25 and more than 25 years of external experience. The minimal variation in formal education is also the reason why we do not include this variable as an explanatory variable in the empirical model. The a priori expectations for experience are not clear. On the one hand, firm-specific human capital obtained from internal experience might be more useful to the firm, but may also be less scarce and relatively easy to obtain. External experience, which might be harder to obtain, might be more useful for the firm and if this experience cannot be obtained via internal experience, it has to be sourced from outside the firm by hiring workers. This may lead to higher salaries and steeper career paths for those with more external experience.

To take into account the relation between corporate culture and career advancement we include different measures of work-time arrangements and approximations for career commitment in the model. While previous research by, for example, Donnelly (2010) has focussed on the creation of new and diverse work-time

patterns in a knowledge economy, we wish to gain insight into the consequences of these arrangements on career advancement. The relation between work-time arrangements and corporate culture is based on the barriers women face when working in male-dominated organizational structures, which are characterized by competition and linear career paths (see, for instance, Guillaume and Pochic, 2009). The combination of work and family responsibilities often results in deviating work-time arrangements for women. Combining work with family responsibilities can be achieved by working part-time or opting for other flexible work arrangements. To measure the effect of working part-time, we include working 32 hours or less a week as a dummy variable. Another possibility is working full-time (36 hours) in the form of a four-day nine-hours-a-day workweek. The main advantage of this arrangement is that it saves one day's commuting time of and allows workers to spend a full day on non-job-related activities. To measure the effect of working in a flexible full-time arrangement, we include a dummy variable for all employees who work 4 days in a 36-hour workweek (4*9). In their research on flexible contract workers, Green et al. (2010) found that flexible jobs are of lower quality, subjectively as well as objectively, for example in terms of pay. We expect that part-time workers will be paid less than full-time workers and that they experience less career advancement. Those working 4*9 are expected to perform better than part-time workers, but below the level of full-time five-day workers, because the last-mentioned are available for five days a week. Atkinson and Hall (2009) conclude in their study on the role of gender in flexible work arrangements is that many employees do not benefit from time reduction mechanisms due to financial or career barriers. Depending on the organizational culture, these effects may differ between men and women. If it is more common for women to work part-time, the 'penalty' might be lower for women than for men. For the same reason, women who work 4*9 may earn a higher level of regard in terms of commitment, as they are seen to be doing their very best to work full-time instead of part-time, whereas for men where the norm is to work full-time for five days, working 4*9 can be valued negatively.

Finally we include a dummy variable to measure above-average appraisal scores and above-average sick days as proxies for career commitment. Appraisal scores range between 5 (poor work evaluation) and 1 (excellent work evaluation), so all employees with a score of 1 or 2 are considered to be above-average. The average number of sick days is 12, and because of the non-linearity of sick days we include a

dummy with the value 1 for all employees who were sick for more than 12 days in the past year. We expect for both men and women that those with higher appraisal scores will do better in terms of wages and career advancement, and those with more than average sick days will do worse. However, the magnitude of the effects may differ by gender, depending on corporate culture, although we do not have an a priori expectation about how this will be related to gender.

Spatial flexibility and career advancement

According to Van Ham (2002, Chapter 3), spatial flexibility in the form of long-distance commuting and long-distance migration is also a factor that exerts an influence on career advancement. Guillaume and Pochic (2009) found in the case of a major French utility company with its headquarters in Paris that managers are not supposed to build their career in one site, because they need to keep some distance from the local social context, showing their loyalty to the organization first. Accepting a geographical move in their career is often presented as the norm to access top executive positions and it is risky to refuse an assignment to another location. In the end working in Paris is most profitable, because the number of highly paid jobs is larger there than in other areas. Eddleston et al. (2004) developed a model to explain managerial career success using willingness to relocate as a predictor. Frequency of relocation is considered to be one of the reasons why women's managerial career advancement lags behind that of men: women, especially those with children, relocate less frequently (Bielby and Bielby, 1992; Brett, 1997; Guillaume and Pochic, 2009).

Women also have a shorter commute distance and time than men (see among others Turner and Niemeier, 1997; Camstra, 1996; Hanson and Pratt, 1988). This can be explained using the time geographical perspective, in which time is an important constraint on our spatial behaviour. Since women do a large share of the unpaid work, they have less time available for work and also for travelling to work (Hanson and Pratt, 1990). This also explains the fact that women have a greater preference for working nine hours four days a week, instead of working five days.

Spatial flexibility is included in our analysis by incorporating the kilometres travelled between home and work. We expect that those who travel longer distances will be more flexible and have more prosperous careers. Furthermore, a dummy variable is included to indicate whether the employee works in Amsterdam where

the main office is located and senior management positions are overrepresented, or elsewhere in the country. Finally, a dummy variable is included to measure whether the employee has relocated to Amsterdam in the previous seven years. Given the better career opportunities in Amsterdam, we expect that those who work in Amsterdam or have moved to Amsterdam will do better. Both in terms of (long-distance) commuting and migration, women with children are less spatially flexible than men, and this may negatively affect their opportunities for career advancement. However, Van Ham (2002, Chapter 5) found that gender differences in workplace mobility only differ for women with children, while higher-educated single women turned out to be more spatially mobile as compared with men.

5.3 Data and Methods

The data used in this paper were provided by the human resources department of a large Dutch financial services company with around 30,000 employees working in the Netherlands. This is a multinational with over 100,000 employees worldwide and activities in the areas of banking, investment, life insurance, and retirement services. However, this research includes only employees working in the Netherlands. The data were derived from the personnel records and contain information on personal characteristics, such as age, marital status, number of children and age of the youngest child, and career characteristics including when employment at the firm began, work-time arrangements, appraisal scores and job location for both May 2008 and May 2001.

We focus on employees who work in middle management and higher levels, because of their high potential for promotion to senior management levels. Middle management starts at job level 9 and employees working at level 9 or higher possess a degree from a college of higher education or university. Because we are interested in career mobility among senior management staff, we selected employees who have worked for the company for at least seven years, which is a reasonable period for promotion to take place. The total number of people working for this company in May 2008 at level 9 or higher was 14,634 employees, comprising about half of the employees. Within that group 75 percent were male. The number of employees with at least seven years' tenure was 9,575, and this was 65 percent of the employees with

job level 9 and above. Among employees with seven or more years' tenure the proportion of males was also 75 percent.

To get a first feeling for the data we will start the empirical analysis with a discussion of some descriptive statistics. As a next step, career advancement is explained by means of an econometric model using personal and career characteristics as previously described. We set up three models covering different aspects of career advancement. In the first two models we give an explanation using full-time year salary and job level in May 2008. The salary of part-time workers is made comparable to full-time workers by adjusting the number of hours worked to full-time equivalence.

Formally the model is expressed as follows:

$$Wage = \alpha_0 + \alpha_1 \cdot gender + \alpha_2 \cdot child < 13 + \alpha_3 \cdot single + \alpha_4 \cdot < 32hours + \alpha_5 \cdot 4 * 9hours + \alpha_6 \cdot appraisal + \alpha_7 \cdot > 12sickdays + \alpha_8 \cdot tenure + \alpha_9 \cdot ext.experience 5 - 15 + \alpha_{10} \cdot ext.experience15 - 25 + \alpha_{11} \cdot ext.experience > 25 + \alpha_{12} \cdot commute30 - 50 + \alpha_{13} \cdot commute > 50km + \alpha_{14} \cdot jobnotAmsterdam + \varepsilon$$

In the third model, the dependent variable is career mobility measured as the difference in job level between 2008 and 2001. Because we measure the difference between two periods we use a growth model, structured as follows:

$$\Delta Careermobility = \alpha_0 + \alpha_1 \cdot joblevel'01 + \alpha_2 \cdot gender + \alpha_3 \cdot \Delta children + \alpha_4 \cdot < 32hours('01-'08) + \alpha_5 \cdot \Delta fte + \alpha_6 \cdot tenure + \alpha_7 \cdot ext.experience5 - 15 + \alpha_8 \cdot ext.experience15 - 25 + \alpha_9 \cdot ext.experience > 25 + \alpha_{10} \cdot \Delta commute(km) + \alpha_{11} \cdot \Delta Relocate - to - Amsterdam + \varepsilon$$

Job level in 2001 is used as a starting point as well as tenure and external job experience. We did not have data on all personal and career characteristics for 2001. Change in number of children is included in the model, as well as change in hours worked, measured in FTEs. Furthermore a dummy variable is included to measure whether someone worked part-time in both 2001 and 2008, assuming that this has not changed in the period in between 2001 and 2008. Finally, change in commuting

distance is included as well as a dummy variable to measure whether an employee has relocated to Amsterdam.

To unravel the gender differences in more detail we estimate each of the three models for the total sample with a gender dummy as one of the explanatory variables. This tells us whether there is a significant structural difference between males and females. In order to obtain insight into differences of the magnitude and significance of the effects we also estimate the models for males and females separately. Heteroskedasticity, which is a common problem for larger micro-data sets, was corrected for by using White heteroskedasticity-consistent standard errors and covariance.

5.4 Results

To interpret the results of modelling career advancement in terms of tangible outcomes, namely salary, job level and career mobility, we start with the discussion of some descriptives. Table 1 gives an overview of the gender-specific differences.

Table 1 Gender-specific differences

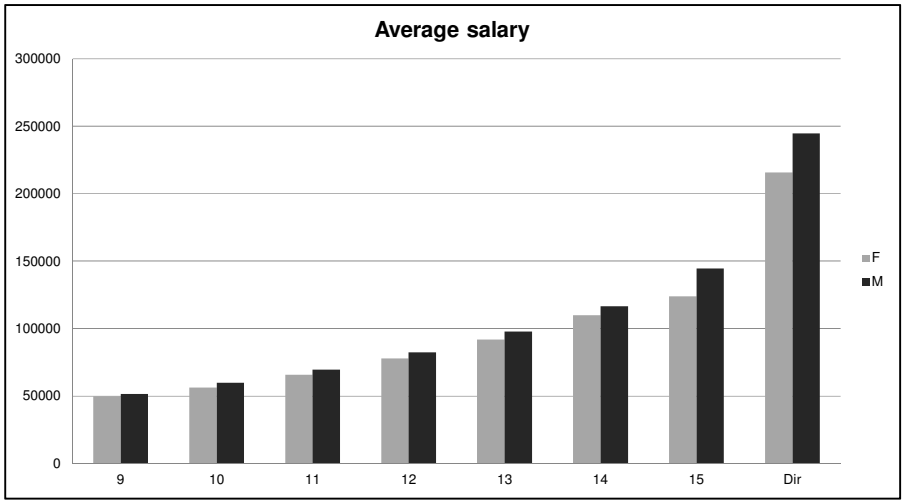
	Female Average	Male average
Salary	62,573	70,676
Job level	10.5	10.8
Career mobility	1.2	0.9
Percentage children < 13	48	39
Percentage singles	24	17
Percentage working < 32 hours	35	3
Percentage working 4*9	31	33
Percentage above-average appraisal score	28	27
Percentage > 12 sick days year	22	18
Tenure	14.6	18.5
Percentage external experience 0-5	39	40
Percentage external experience 5-10	37	29
Percentage external experience 10-15	14	17
Percentage external experience 15-25	9	13
Percentage external experience >25	1	1
Percentage commuting distance km 0-30	69	60
Percentage commuting distance km 30-50	21	24
Percentage commuting distance km >50	10	17
Percentage working in Amsterdam	55	49
Percentage relocating to Amsterdam	25	23

What is interesting to note is that although women earn less and work in lower job levels, their average career mobility is higher than the average male career mobility.

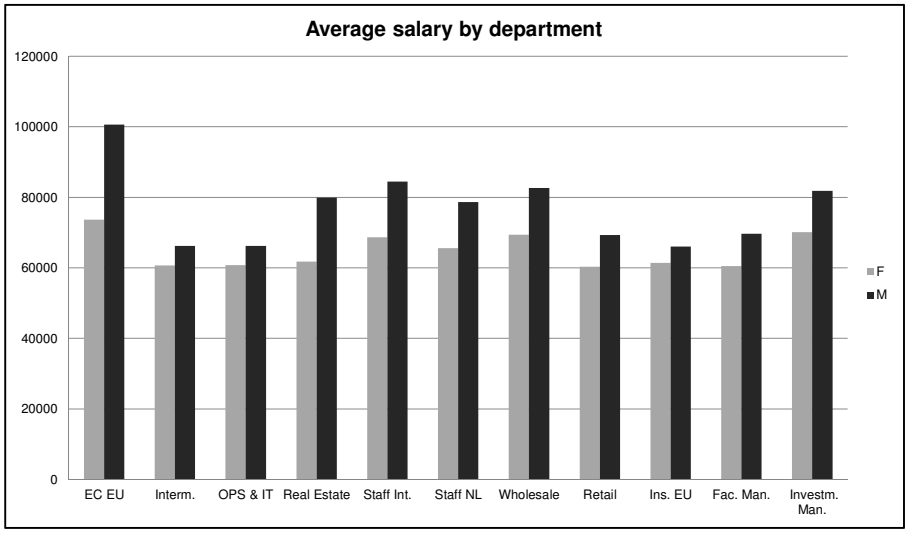
Furthermore, women are more often single, and close to 50 percent of the women have dependent children. The majority of the women deviate from the standard full-time workweek of five days, either because they work part-time or full-time for four days of nine hours, the 4*9 model. However, one-third of the men also opt for the 4*9 workweek. With regard to tenure and external job experience, it becomes clear that female employees are younger and subsequently have less job experience.

Next, we go into more detail to explore gender-specific differences in salary, job level and career mobility. Figures 1 shows the gender-specific differences in average full-time annual salary for the different job levels, for the different departments within the firm and for the specific retail department by job level.

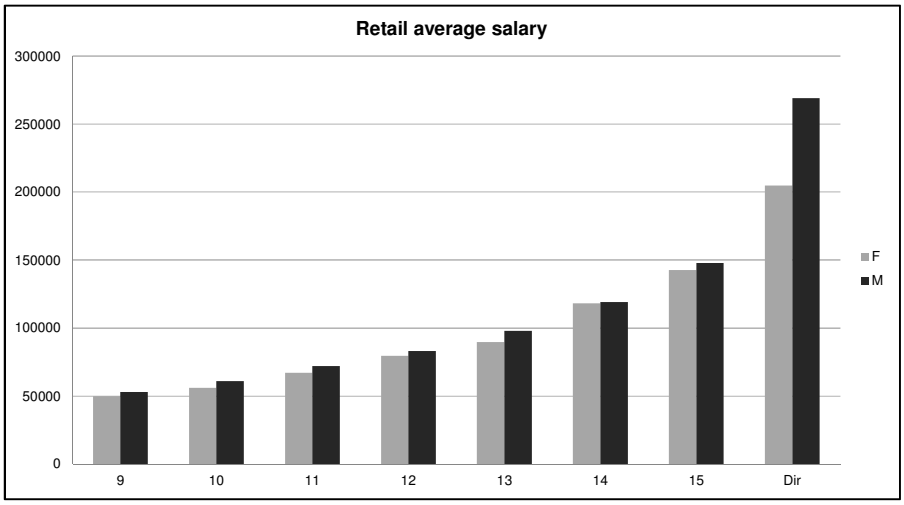
Figure 1 Average Full-time based salary of employees per job level and department



Source: human resources database, May 2008 n=9575



Source: human resources database, May 2008 n=9575



Source: human resources database, May 2008 n=2717

From Figure 1 it is clear that women earn less than men and that these differences increase with job levels. Figure 1 also shows that within the different departments women earn less than their male colleagues, although in some departments, for example EC EU, these differences are much larger than in others. Finally, Figure 1 shows that the pattern of average salary by job level depicted in the first graph is similar for the retail department depicted in the final graph, although the magnitudes differ.

To obtain insight into the gender-specific dynamics of job levels, we calculated a feminization rate (% women) of young, mid-career and senior managers (Guillaume and Pochic, 2009). The total number of employees in job level 15 combined with the board of directors is 145. As for the young managers, there are no male employees in these job levels, and two women work at level 15 and one on the board, both these adding up to 100percent, as Table 2 shows.

Table 2 Feminization rate employees with 7 years tenure

	Young managers (<35 years) (%)	Mid-career (35-44 Years) (%)	Senior managers (>45 years) (%)	Total (%)	N employees
9	39,9	38,1	20,5	30	2134
10	34,8	35,1	14,7	25,4	2719
11	39,4	36,4	14,9	26,7	2219
12	37,3	26,9	9,9	19	1344
13	40,0	25,7	10	18,4	756
14	0	18	7,9	12,8	258
15	100	6,5	3,7	6,1	115
Board	100	23,1	0	123,3	30
Total (%)	38	33,2	14,5	24,7	
N employees	965	3990	1659		9575

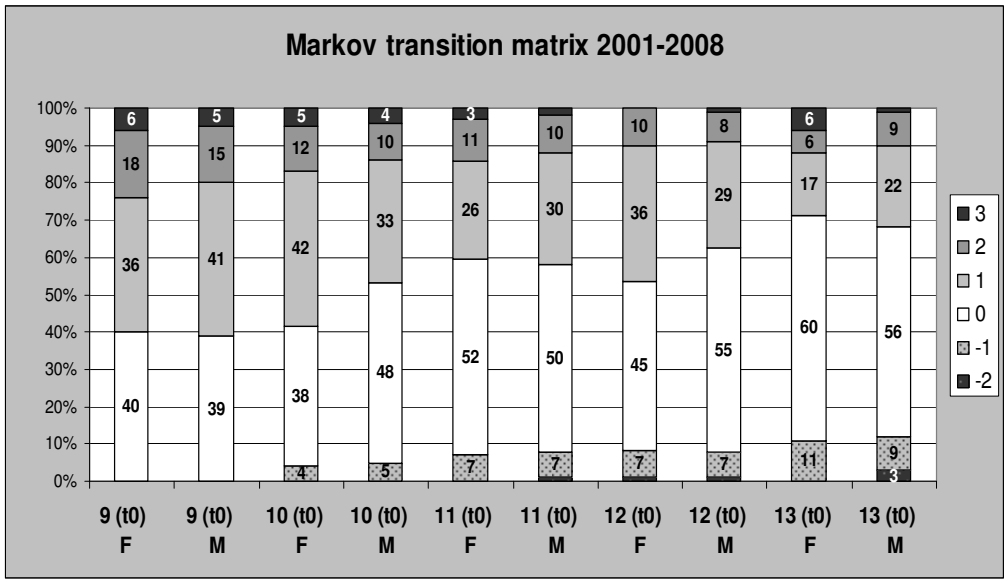
Source: human resources database, May 2008

Like Guillaume and Pochic (2009), we also find that the feminization of management roles has increased considerably and that almost 40 percent of the young managers are women. Among senior managers, women make up only 15 percent and the glass ceiling becomes apparent. In particular senior female managers hardly enter the highest echelons of the company.

Finally, we explore career mobility in Figure 4, which shows an overview of the gender-specific mobility of the employees between 2001 and 2008. We focus on the middle management levels 9 up to 13, because that is where the senior managers in 2008 originated from.

What is interesting is that for both job levels 10 and 12, more women than men move into higher-level positions. Furthermore, the proportion of women moving up two or more levels is higher than the proportion of men, except for job level 13.

Figure 4 Gender-specific proportional career mobility between 2001 and 2008



We now turn to a discussion of the estimation results for the econometric models which explain differences in earnings, job level and career mobility. Table 3 gives the estimates for the total sample for each of the three models. The gender-specific models for salary, job level and career mobility can be found in Appendix B. Furthermore, we also estimated the three models for a selection of employees who work 4*9 and form one-third of our sample. These employees have adopted a new work-time regime in which they benefit from a more flexible schedule while still

working full-time. These results can be found in Appendix C. The overall performance of the models explaining the salary and job level in May 2000 in terms of the adjusted R^2 yields values between 0.16 and 0.19, which is in line with other studies for these types of model. The salary model has also been estimated in a logarithmic transformation and the adjusted R^2 values are about 0.05 higher, but the t-values show only minor differences. We do not discuss the model with the logarithmic transformation, because the interpretation of the simple model is more straightforward: the coefficients multiplied by 1000 reflect the difference in earnings in euros.

Gender, household and career advancement

In line with the theoretical expectations and as has already become clear from the descriptive results, the econometric model in Table 3 confirms that women earn significantly less than their male colleagues, even after controlling for marital status and having a young child. There is no significant difference between men and women in the model which explains the job level at which they work. Although we know from the descriptives that more women work in middle management jobs than senior management, the possible negative effect of gender disappears in the multivariate model, most likely due to the effect of fewer years of tenure and job experience and work-time arrangements. In keeping with the conclusion derived from the univariate transition matrix in Figure 4, we found that being female has a significant positive effect on career mobility, even after taking into account tenure and job experience.

Table 3 Multivariate OLS regression of income, job level in 2008 and career mobility

	Salary B*	Salary t-value	Job level B*	Job level t-value	Mobility B*	Mobility t-value
Constant	53,190		10.609		4.921	
Job level 2001					-0.312	-52.01
Being Female = 1	-1,412	-2.59	0.016	0.45	0.050	2.15
Having Child < 13 = 1	2,997	6.18	0.215	6.69		
Δ Child					0.020	1.58
Being Single = 1	-4,859	-8.65	-0.329	-8.84		
Working ≤ 32 hours = 1	-10,960	-14.42	-1.000	-19.88		
Δ Part-time = 1					-0.442	-11.42
Working 4 * 9 = 1	-8,917	-19.48	-0.611	-20.17		
Δ FTE					2.067	13.65
Above-average appraisal = 1	5,318	11.35	0.353	11.40		
Being Sick ≥ 12 days = 1	-5,200	-9.94	-0.388	-11.20		
Tenure	784	26.35	0.013	6.69	-0.043	-31.85
Job exp. 5 – 15 years = 1	11,551	23.02	0.523	15.75	-0.236	-10.20
Job exp. 15 – 25 years = 1	19,274	24.86	0.635	12.37	-0.678	-18.91
Job exp. 25 + years = 1	21,612	10.67	0.667	4.98	-0.902	-10.00
Commute 30 – 50 km = 1	1,086	2.15	0.089	2.67		
Commute > 50 km = 1	2,217	3.72	0.203	5.16		
Δ Commute distance					0.003	7.95
Not in Amsterdam = 1	-6,122	-14.41	-0.496	-17.63		
Δ Relocate to Amsterdam = 1					0.161	5.80
Adjusted R Square	0.193		0.162		0.410	

* Unstandardized

We found a negative relation between being single and income and job levels. The negative effect of being single is about twice as high for males compared with females, indicating that single men in particular are considered to be less stable and reliable. Related to the effect of being single, we found that employees with young children also earn more and work in higher job levels. The positive effect for women is substantially higher than for men. Where the men are concerned, one can make the same argument as Tharenou et al. (1994) that they make career choices beneficial to their role as provider. For women it is more likely that they postpone the birth of their first child to invest in their career opportunities first. Overall there is no significant relation between an increased number of children in the period 2001-2008 and career mobility. However, for men it appears that having more children has a positive effect on promotion, whereas for women we find a negative although insignificant effect. Apparently having more children hampers the opportunities for promotion for women more than for men.

Corporate culture, human capital and career advancement

We found a strong negative significant relation between working part-time and career advancement in every aspect. Similarly, there is a negative relation between the four days of nine hours full-time arrangement and income and job level. The negative effects of working part-time are slightly higher for men than for women. In contrast to this, the negative effect of the 4*9 arrangement is twice as high for men than for women. Apparently deviations from the masculine organizational structure where the norm is to work full-time and be committed to your career are not rewarded, but women are 'rewarded' for working full-time in a society with such a strong emphasis on caretaking responsibilities and men are 'punished' for not being available on the work floor one day a week. When we estimated the models again for the selection of employees with a 4*9 full-time working arrangement, we found a positive effect of being female for both income and job level.

An increase in hours worked during the period 2001-2008 resulted in higher career mobility, for women a little more than for men. In accordance with the theoretical expectations, being sick more than average had a significant negative effect on income and job level, probably because of a perceived lower commitment and longer absence from work. Here too the negative effect for males is much higher than that for females. As expected, receiving above-average appraisal scores has a positive effect on income and job levels. This can be explained in part by the perceived capabilities and commitment, but also because high appraisal scores are rewarded with higher salaries. However, with regard to the effect of appraisal scores the positive effect is stronger for males than for females.

In accordance with the theoretical expectations, tenure and external job experience exert a positive significant effect on income and job level. It is also clear that additional years of internal experience have a smaller effect than more years of external experience[24]. However, this general pattern applies mainly to male workers. If we compare the results when the model is estimated separately for males and females, it becomes apparent that for internal experience there are no significant differences for men and women. However, only for men are the rewards for external experience substantially higher than for internal experience. For women, 5-15 years of

[24] For this comparison we need to take into account the fact that tenure is measured on a continuous scale in years and external experience is subdivided into four categories. However, if we multiply the coefficient for tenure by 10 years the corresponding amount of €7,837 is smaller than the amount of €11,551 for the category 5-15 (average about 10) years' external experience. The same conclusion can be drawn for the category 15-25 years of experience if we make the same calculation and it also applies to the outcomes for the function level.

external work experience are more or less equally rewarded compared with internal experience, but with more years of external experience the rewards diminish. More than 25 years of external experience even lead to lower additional income than 15-25 years of experience, implying that the marginal effect of a year of additional external experience becomes negative when such experience exceeds 25 years. This result may also have been caused by the fact that older women with many years of experience had fewer opportunities for promotion when they were young and were put in dead-end jobs. For males additional years of external experience continue to have a positive effect, although the marginal effect decreases slightly.

The model estimates for the job level show more or less the same gender pattern. This leads to the conclusion that for males job moves from other companies are one of the most effective means to advance a career, whereas for women internal career paths are the best way to build a career. A possible explanation for this profound gender difference might be that males coming from other companies have better bargaining positions (or bargaining skills) than internal employees eligible for promotion. It might also be that for females it is more difficult to switch companies, because they are constrained by the work-life balance (see, for example, Guillaume and Pochic, 2009). Apart from working part-time and taking care of children, women might also have limited mobility because they are much more often part of a dual-career couple. Switching jobs often requires extra effort to get acquainted with the new firm. This will be an even greater burden if the move to another firm also requires geographical relocation.

In contrast to the positive effect of experience on income and job level, more years of experience show a negative relation with career mobility, with hardly any differences by gender. The magnitude of internal experience is somewhat larger as compared with external experience. The negative relation can be explained by the dialectics of progress. The lower the job level in 2001, the more available are the opportunities for career mobility. There are far more job opportunities in middle management levels than at the senior management level. In all models, broader external experience has more favourable effects than longer internal experience, especially for males. This is probably because people coming from other companies have better bargaining positions than employees eligible for promotion within the company itself.

Spatial flexibility and career advancement

We expected that those who commute longer distances will achieve a higher position because enhanced mobility is an indicator of greater flexibility and commitment. In addition, employees in higher functions with better salaries can afford to live further away from work in the suburbs in pleasant residential neighbourhoods. This expectation is confirmed in the empirical models where we did indeed find a positive significant relation between commuting distance greater than 30 kilometres and career advancement. Although the average commuting distance was slightly lower for the female employees, the estimates by gender showed that the pay-off for women was substantially higher than for men when they commute more than 50 kilometres. The general time-geography literature also confirms that women have find it more burdensome to commute longer distances to work because of the combination of work and family responsibilities. Our results suggest that women indeed are rewarded when they are prepared to commute longer distances. The model outcomes for the increase in job level show that for both men and women an increase in commuting distance has a positive effect on career mobility.

Because the board of directors and the majority of senior staff positions are located in Amsterdam, we expect that career opportunities will be better if company employees work in Amsterdam, and this expectation is confirmed by the empirical outcomes. Employees who do not work in Amsterdam do not earn as much, and work in lower job levels than their colleagues in Amsterdam, and this is also the case for the models by gender. Also the career mobility of employees who have relocated to Amsterdam is significantly higher, but in the gender-specific models this only holds for men while the coefficient for females becomes insignificant. A possible explanation might be that a substantial proportion of the women move to Amsterdam for reasons other than their own career.

5.5 Discussion

The aim of this study is to gain insight into the gender-specific dynamics of career advancement. We studied gender-specific differences in career advancement in a Dutch financial services company with 30,000 employees on their payroll. This company carries out an explicit strategy of investing in gender diversity as a way of increasing corporate performance. Career advancement was measured in terms of

tangible outcomes, namely salary, current job level, and career mobility between 2001 and 2008.

Studying the dynamics of gender-specific career advancement in the Netherlands is of particular interest, because the Netherlands has clearly exceeded the Lisbon 2010 targets for overall employment rates and female employment rates, but at the same time the majority of Dutch women work part-time and the percentage of female top-level managers is low. In spite of that, financial services companies are investing in increasing the number of female managers in top-level positions to improve company performance. We explored the gender-specific career paths in a financial services company based on an analysis of almost 10,000 middle and top-level managers over the period 2001-2008. We analysed differences in salaries, job levels and career mobility by estimating models for both the total sample and by gender, including an analysis of employees who have adopted new work-time regimes by working 36 hours four days a week.

The empirical results largely confirm the theoretical expectations and findings obtained in other empirical studies. But the richness of our data set also leads to some interesting new findings. Traditional findings are that women earn less than men and attain lower job levels. We found evidence of a traditional corporate culture where 'proof' of career commitment is shown by working full-time. Additional years of experience both inside and outside the firm, higher appraisal scores and the presence of children lead to higher income and job levels, while these variables are negatively affected for singles, part-time workers or for those who work full-time over four days (4*9) or are more often sick. Working in Amsterdam where the headquarters is located leads to better career opportunities and the same is true for those who commute greater distances.

However, when the models are estimated separately for males and females the magnitude of the coefficients shows interesting differences by gender. Factors that can be associated with the traditional masculine career pattern show a higher pay-off for males than for females, as becomes apparent from the coefficients we found for years of job experience, especially external job experience, and above-average appraisal scores. On the other hand, our results show that the presence of factors that typically constitute a burden to females in developing a career are less harmful to women's career opportunities than men's. If men work part-time or nine hours four

days a week they earn substantially lower salaries than do their full-time male colleagues, compared to salary differences between females under comparable circumstances. The penalty of being single, being employed outside Amsterdam or being sick for more than the average number of sick days is also higher for men than for women. For women the presence of young children and commuting long distances lead to more compensation in salary and job level than for men. With regard to the model that directly explains the occurrence of career moves, the most striking gender difference is found for relocation to Amsterdam. For males this significantly improves their career, whereas for females the effect is insignificant, which may suggest that females relocate to Amsterdam for other reasons than their own career.

The results have some interesting policy implications. The preference of Dutch women to work part-time and the corporate culture of working full-time in top-level positions appear irreconcilable. However, the emergence of a flexible full-time (4*9) workweek has been shown to partly bridge this gap, although the effects appear to benefit only women. The introduction of flexible work-time regimes, in combination with redefining existing concepts of corporate culture with respect to linear career paths and job commitment, need to be considered in order to make top-level positions accessible for women.

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6

Conclusions and discussion

6.1 Introduction

Female labour market participation has changed substantially over the last few decades in the Netherlands. There has been a sharp increase in participation and women also remain in the labour market after having children. Mothers, who traditionally formed a group with low labour force participation, have now taken up work in large numbers in part-time jobs. This tremendous increase in part-time employment has resulted in a combination of high levels of employment with low average working hours is something in which the Netherlands is unique in the world.

The increase in female participation in the labour market can be attributed to a combination of factors. Women have become better educated, there has been a drop in fertility and there is greater acceptance that women combine work with raising children. On the demand-side, there has been a shift from agriculture and manufacturing towards a service economy in which women are overrepresented. A broader variety of employment and work-time arrangements have also become available.

Despite the increase in female participation, important differences between the position of men and women in the labour market remain. Women work fewer hours, earn less, are more frequently unemployed and their share of jobs at a supervisory level is lower. This unfavourable position of women in the labour market is referred to in the literature as *the gender employment gap*. This thesis contributes to existing literature by exploring several aspects of the gender employment gap. Attention is paid to gender-specific differences in employment rates, working hours and career advancement. In addition, the regional character of the labour market is also taken into account, as well as possible spillover effects between local labour markets. The main aim of this thesis is therefore *to gain insight into the gender-specific regional differences in labour market participation in the Netherlands*. To accomplish this aim the following research goals were formulated:

1. *To increase insight into the regional variation of gender-specific employment in the Netherlands and more specifically regional variation of the gender employment gap*
2. *To gain further insight into the determinants of regional variation in female labour participation by incorporating observed and theoretically derived latent variables*

3. *To explore the options for increasing working hours by analysing the dynamics in working hours of female and male employees in the Netherlands*
4. *To gain insight into the determinants of female and male career advancement in financial services*

Each of these research goals has been addressed in the preceding four chapters. The results obtained are integrated in this final chapter. First, a summary of the main results is presented, followed by a discussion of the data and methodology. The chapter concludes with directions for future research and policy implications.

6.2 Summary of the results

The paper in Chapter 2 entitled *Gender-specific spatial interactions on Dutch regional labour markets and the gender employment gap* analysed the gender-specific employment rates in Dutch municipalities for 2002. Despite the increase in female participation since the mid-1980s, the gender employment gap still persists. An increase in female participation can contribute to maintaining current welfare levels in a rapidly aging society. The aim of this paper was therefore *to gain more insight into the determinants of gender-specific participation*.

To explain the gender-specific regional variation in employment rates, a combination of explanatory variables consisting of socioeconomic characteristics and the regional opportunity structure was included in a spatial econometric model of the municipal gender employment gap and female employment rates. Since no significant spatial structure could be identified for male employment, an OLS regression was used. The model structure provided the best fit in terms of the adjusted R square for the gender employment gap of 0.53 and the lowest explained variance for male employment rates of 0.38. The adjusted R square for female employment is 0.49.

The socioeconomic determinants of the gender employment gap displayed the theoretically expected relationships. The gap narrows with higher female disposable income and, in line with human capital theory, widens with a higher ratio of the share of low educated females to low educated males. Male disposable income has no significant effect on male employment or on the gender employment gap. Municipalities with a larger proportion of men close to retirement, the 50-60 age

group, have lower male employment rates, but this displayed no significant relationship with the gender employment gap. Municipalities with a larger proportion of women in the 40-50 age group, just beyond the typical reproduction period, show higher female employment and also a smaller gender employment gap. A larger proportion of children and elderly dependents on the other hand has a significant negative effect on female employment and also widens the gender gap, indicating that caregiving tasks lower female participation. The dependency ratio has no significant effect on male employment rates.

For regional opportunity determinants, some results were as expected, others however were not. The regional opportunity structure of urban areas indeed proved to be favourable for female labour participation. Furthermore, the gender employment gap is smaller in urban municipalities. There is however a negative but insignificant relationship with male employment. Poor access to local employment opportunities, measured as female and male unemployment, has a negative effect on female and male employment as well as the gender employment gap. However, men and women often do not compete for the same jobs. Therefore high male unemployment has a significant indirect positive encouragement effect on female employment rates and vice versa. There was no significant effect of a favourable sector structure for women measured as the industry mix, but instead, there was a negative significant effect on male employment.

The absence of a significant relationship between the vacancy-unemployment ratio, commute duration and the availability of childcare facilities and male and female employment was unexpected. Particularly remarkable was the absence of a significant relationship between the provision of childcare and female employment. The explanation for the absence of a significant relationship between male and female employment and commute duration could be the absence of gender-specific data. There are several possible explanations for the insignificant impact of the provision of childcare facilities.

This lack of impact could result from the low uptake of formal childcare in the Netherlands in the study period. According to Te Riele (2006), 60 percent of households with children aged 12 or younger, with at least one of the parents working 12 hours a week or more, do not use childcare. There could also be a spatial mismatch between the need for childcare and the location of childcare facilities. Before the Childcare Act of 2005, childcare facilities were subsidized by

municipalities with a preference for non-profit organizations commonly found in smaller municipalities (Noailly et al., 2007). Since the level of use is commonly lower in these smaller municipalities, the added stimulus to use childcare facilities has apparently not yet resulted in a significant increase in participation rates. Section 6.3 provides a further discussion of the measurement issues in the provision of childcare.

Chapter 3, entitled *Determinants of regional female labour market participation in the Netherlands* presented the results of an additional analysis of the regional variation in female employment rates for Dutch municipalities in 2002 by means of a spatial structural equation model (SEM). The advantage of a SEM model framework is that it allows for a close correspondence between theory and empirics and it reduces multicollinearity, since strongly correlated observed variables, i.e. indicators of an underlying latent variable, are substituted by latent variables. SEM also offers an alternative methodology to incorporate the spatial dependence structure. The latent variables created in the structural model are included in the measurement model as dependent variables alongside the other observed variables. The structural model and measurement model of the latent variables were estimated simultaneously by means of maximum likelihood.

The model contains two latent variables: female-dominated sectors and socioeconomic status. Female-dominated sectors consist of the percentage of jobs in healthcare and the percentage of jobs in education and government in a municipality, which according to the measurement model are the most important indicators of female-dominated sectors. Socioeconomic status consists of the proportion of better educated women, the percentage homeownership and female disposable income, which is the most important indicator of socioeconomic status according to the measurement model.

The R square value of the structural model is 0.72 and indicates that about 72 percent of the variation in female participation is explained by the model, which is substantially higher than the R square of 0.49 of female participation modelled in Chapter 2. Adding the socioeconomic status and female-dominated sectors latent variables contributed significantly to the higher explained variance. The industry mix used in Chapter 2 did not show a significant effect on female employment or the gender employment gap, whereas female-dominated sectors clearly have a significant positive effect on female employment rates.

Most determinants displayed the theoretically expected relationship with female labour market participation and corresponded to the findings presented in Chapter 2. Municipalities with a larger proportion of women just beyond the typical reproductive period show higher female employment rates and municipalities with a larger proportion of children or elderly people, i.e. higher demographic pressure, show lower female employment rates. A larger proportion of unemployed males has a positive significant effect, which can be interpreted as the result of an additional-worker effect. A larger proportion of unemployed females in a municipality has a negative significant effect, which can be interpreted as the discouraged worker effect.

In addition to female and male unemployment proportions, the lagged gender-specific unemployment proportions are also included in the model to capture the spatial spillover effects that result from the use of smaller units of analysis, namely municipalities. The negative significant effect of lagged male unemployment can be perceived as a general indication of poor chances on the labour market that lead to discouragement. The positive significant effect of lagged female unemployment is difficult to interpret because the traditional explanation for the added worker effect does not apply. Women could view higher unemployment levels in neighbouring municipalities as a sign of a deteriorating labour market which in some way stimulates them to search for work with increased effort. Another explanation could be that higher unemployment proportions are found in urban areas, and mainly affect the lower skilled females. If the higher skilled females compete for jobs with these lower skilled unemployed, this could result in larger numbers of unemployed females in neighbouring regions.

Chapter 4, entitled *Gender-specific dynamics in hours worked: exploring the potential for increasing working hours in an aging society* analysed the changes in the working hours of female and male employees. With the decline of the working-age population as a result of aging, the increase in part-time work by female and male employees in the Netherlands poses a threat to current welfare levels. The aim of this paper was therefore to explore the possibilities for increasing the working hours of people currently active in the labour market. The determinants of working hours were analysed in two steps with an OLS regression followed by an analysis of the observed changes in working hours by means of a bivariate probit model with sample selection.

The results showed that men worked 37 hours on average, whereas women worked 27 hours a week. In line with human capital theory, employees with higher wages work more hours, as do employees who work in highly skilled innovative jobs. Employees who work in large firms also work more hours. Mothers work fewer hours than female employees without children, regardless of the age of the children, whereas fathers only work fewer hours when the children are young. Single women, single mothers and lesbian employees work more hours than females belonging to a heterosexual couple. However, single men, single fathers and gay male employees work fewer hours than heterosexual men in a relationship. Women who live in highly urban areas, particularly in the Randstad region, benefit from the local opportunity structure and work more hours, whereas men who live in highly urban areas work fewer hours, because of the higher prevalence of symmetrical household arrangements.

The second part of the analysis, where the changes in working hours observed were analysed using a bivariate probit model, showed that women change their working hours on a much larger scale than men and that most of the changes in working hours occur in the healthcare sector, where women are overrepresented. Women in minor part-time jobs are more likely to change their hours, whereas women in full-time jobs are less likely to do so. Both men in minor part-time jobs and in full-time jobs are more likely to change their hours than men in part-time jobs.

Employees who have experienced a change in hourly wage, a change in the regularity of their working hours, or who work in an expanding company are more likely to change their hours. With respect to changes in the household situation, having a baby increases the likelihood of changing working hours. For men, becoming single implies a greater likelihood of changing working hours. Gay men are also more likely to change their hours whereas lesbian employees are less likely to change their hours. Employees with higher wages or who work in highly skilled innovative jobs are less likely to change their hours.

For the sample of employees who actually changed their working hours, the results showed that women who worked in minor part-time jobs are more likely to increase their hours, as are women who have experienced a decrease in their hourly wage or who work in a growing company. When the youngest child reaches secondary school age, women are also more likely to increase their hours, as are women who have become single. Having a baby increases the likelihood of

decreasing the working hours of female employees, particularly with the birth of the first child. For men, the birth of the first child is also negatively significant, however, the birth of subsequent children has a lagged significant positive effect. Men who have experienced a decrease in wages are also more likely to increase their working hours. Employees who change their job type from irregular to regular hours are more likely to decrease their hours, and interestingly, for male employees the same applies to a change to irregular hours. For female employees the effect from changing to irregular hours is positive but insignificant.

The job characteristics of partners, other than wage and working hours, do not have a significant effect on the likelihood of change or the direction of a change in working hours. When a partner experiences a decrease in wages, both male and female employees are more likely to increase their working hours. When a partner increases his or her working hours, this has a negative but insignificant effect for female employees and a positive significant effect for male employees. The wage of a partner generally has a positive significant effect on the likelihood of increasing working hours for both female and male employees.

The paper in Chapter 5, entitled *Climbing the ladder: gender-specific career advancement in financial services and the influence of flexible working time arrangements*, addressed differences in the career opportunities of 10,000 mid and top-level managers in a Dutch financial services company. The data were obtained from the personnel records of the company and included the career characteristics of individual employees as well as their background characteristics. Career advancement was measured in terms of tangible outcomes, i.e. job level, income and career mobility between 2001 and 2008. Attention was paid to the influence of working time arrangements, in particular working full-time over four days (4*9). Models were estimated by means of an OLS regression for the entire sample, including a gender dummy, for men and women separately, and for the group of employees who work 4*9.

Theory suggests that female managers have more obstacles to their careers than their male colleagues due to gender discrimination, the presence of predominantly masculine organizational cultures and, for female managers with children, the double burden of combining work with family responsibilities. Empirical results to a certain extent confirmed these theoretical expectations, but

simultaneously also provided some new insights. In general, female employees earn less than their male colleagues and work at lower job levels, but they do show higher career mobility. The higher career mobility of female employees could be the result of a catching-up effect for women starting at lower levels than their actual capabilities. After correcting for internal experience and external experience, the difference in job levels between female and male managers ceases to be significant. The feminization rate of management rates shows that of the young managers, almost 40 percent are female, whereas for senior managers this percentage lags at 15 percent. This suggests that younger generations of female managers are outperforming the older generations; however, whether or not they will hit a glass ceiling in the course of their careers remains to be seen.

Working part-time or less than five days a week has a negative significant effect on all aspects of career advancement. Showing career commitment in a masculine corporate culture implies working full-time, five days a week, and employees who deviate from this norm earn less, work at lower job levels and show lower career mobility. This effect is, however, larger for male employees. Tenure has a positive significant effect on income and job levels, but only for male employees are the rewards for additional years of external experience substantially higher than for internal experience. However, where employees are willing to commute over longer distances or are willing to relocate to Amsterdam, the location of the corporate headquarters, they show higher career mobility, work at higher job levels and earn more.

Estimating the models separately for male and female employees revealed some remarkable differences. Factors traditionally associated with masculine corporate culture, such as tenure and above average appraisal scores, show higher pay-offs for males than for females. The presence of factors that are typically associated with the barriers for female career development, on the other hand, do more harm to male employees than female employees. Working part-time or full-time in four days results in substantially lower salaries for male employees. The coefficients for being sick more often than average are also substantially higher for men than they are for women. Finally, the model estimated for the group of 4*9 employees shows a positive significant effect of being female for income and job level. Apparently, female managers who work 4*9 and thereby, at least to a certain extent, comply with the masculine culture of working full-time are rewarded, whereas male

managers who work 4*9 are actually penalized for showing less career commitment by working only four days a week. Indeed, introducing this form of flexibility into a predominantly masculine organizational culture offers new opportunities for career advancement, albeit solely for women. In that sense, even male employees are discriminated against for deviating from the dominant concept of career commitment, namely working full-time five days a week.

6.3 Reflection on the data and methodology

In Chapters 2 and 3 the research aim was to gain more insight into the determinants of regional gender-specific labour market participation. For this purpose an extensive dataset was collected at a municipal level, including information on population composition and the regional opportunity structure. Despite the richness of the data, not all the theoretically significant indicators could be included. Data on the proportion of higher education graduates in a municipality are only available for a limited number of municipalities due to the confidentiality regulations of Statistics Netherlands. Although Statistics Netherlands is in the process of generating new data for this segment, these were not available at the time of writing.

Data for the availability of childcare facilities used in this study was collected for the Ministry of Social Affairs by Deloitte and was only available for the 2002. Theoretically, the presence of childcare facilities is an important indicator of female labour participation. In this study however the relationship between childcare and female labour participation was either insignificant or even negative. Other studies have encountered similar problems with childcare data. Van der Laan and Van der Bout (1990) also found a significant negative relationship between childcare and female participation and excluded childcare from their analysis because the data encompassed several forms of childcare, meaning that their results were therefore difficult to interpret. Van Ham and Büchel (2004) argue that the density of regional childcare is less important than its perceived quality, which is difficult to measure with certainty at a regional scale and of which there is currently no data available. Given the cross-sectional design of the study it is impossible to draw conclusions about the causal relationship between childcare and female participation. Nevertheless, the results with regard to childcare are remarkable, and therefore some

suggestions are offered to explore this relationship between childcare and female participation in greater detail in the following section on future research.

The analyses presented in Chapters 2 and 3 are based on municipalities. The advantage of using smaller units of observation is that they show a much larger variation in employment rates. However, the possibility of spatial dependence has to be taken into account since employment in one municipality could be affected by neighbouring municipalities by spatial spillovers and the possibility of commuting. The spatial dependence was specified in Geoda (Anselin, 2003) using a first order Queen's contiguity matrix W, where $w_{ij} = 1$ if municipalities share a common border or vertex, and equals 0 elsewhere. Lagrange Multipliers indicated the presence of spatial dependence for female employment and the gender employment gap, and suggested that a spatial moving average (SMA) structure on the error process proved the best fit. No significant spatial dependence structure was found for male employment.

The spatial error term λ actually indicated a significant unobserved effect of neighbouring municipalities on female employment and the gender employment gap. Attempts to identify this effect by adding a spatial lag to the explanatory variables or to rewrite the model as a SAR model gave no further insight into the presence of spatial spillover effects. Estimating the model with SEM improved the model fit but resulted in the theoretically unexpected positive significant effect of lagged female unemployment.

In Chapter 4 the dynamics in working hours were analysed for employees who had occupied their jobs for 3 consecutive years. A combination of the Social Statistical Jobs Data base (SSB-Jobs) with the Municipal Base Registry (MBR) resulted in a rich dataset that includes job characteristics and personal characteristics. The data unfortunately did not contain information on educational attainment. Data on educational attainment are very difficult to come by in the Netherlands at a smaller scale – for example at individual or municipality levels. The data does however contain information about hourly wage and as the results from the measurement model in Chapter 3 indicated, income is a more important indicator of socioeconomic status than education.

The data also includes information for partners in employment, including same-sex partners. Including same-sex couples in the analysis offered some interesting insights because traditional stereotypes of 'being male' and 'being female' do not apply to same-sex couples. Results indeed showed some interesting differences between gay couples and heterosexual couples: male gay employees and male gay employees that are part of a couple work fewer hours than heterosexual male employees, whereas lesbian employees work more hours. Lesbian employees are less likely to change their hours and gay male employees are more likely to change their hours. Although same-sex couples do have children, these numbers were too small to include into the analysis.

The analysis of the dynamics in working hours was based on a selection of employees who had occupied their jobs for 3 consecutive years. The reason for this selection was to avoid bias in the interpretation of dynamics in work hours resulting from job transitions (finding a job, switching or losing a job). The dynamics in working hours can be operationalized in several ways, but in essence employees either do not experience any change in working hours or their hours increase or decrease. In this study only changes larger than 1 hour were taken into account. Initially, the methodology for this study involved a multinomial logistic regression in which 3 categories (more hours, fewer hours and the reference category no change) were compared to each other. A multinomial logistic regression does not take account of the selection effect of experiencing a change in working hours and the results thereof are therefore difficult to interpret. A bivariate probit model with sample selection on the other hand does account for this selection effect and since the dependent variable is dichotomous, the interpretation is much more straightforward. This study is nevertheless rather exploratory in nature and given the rich data available there are many alternative strategies to gain further insight into the dynamics of working hours. In the section on future directions some suggestions for future research are presented.

Chapter 5 is an analysis of the gender-specific differences in career advancement. The research design involved a case study approach and the data were obtained from the personnel records of a major financial services company. The advantage of this approach is that it offered an opportunity to explore the differences in career opportunities between male and female managers by including personal

characteristics and firm characteristics – including indicators that at least to a certain extent capture the concept of corporate culture. This company was especially interesting because of its front-runner position in the promotion of gender diversity in a highly competitive masculine financial sector, with the majority of women in the Netherlands working part-time and few women working in top-level management positions.

The findings with respect to employees working full-time over four days (4*9) showed particularly interesting differences between men and women. On the one hand, female managers who work 4*9 are rewarded for showing career commitment by working full-time hours, but on the other hand, male managers working 4*9 are penalized because they are not available five days a week. It would be interesting to explore to what extent these findings also apply to companies in other sectors.

Also of note is the difference between the young female managers and the mid-career and senior female managers. The proportion of young and mid-career female managers is much larger over practically all job levels than the proportion of senior female managers. It would be interesting to explore whether or not the younger generation of female managers are still hindered in their career prospects by the existence of a glass ceiling.

6.4 Future directions and policy implications

The aim of the research presented in the preceding four chapters was to gain insight into the gender-specific regional differences in labour participation. The results that summarized in Section 6.2 provided new insights into the differences between men and women in the Dutch labour market. Based on these research findings this section presents several policy implications to increase labour participation. With the decline of the working-age population due to aging, increasing participation is necessary to maintain current welfare levels. Alternative solutions include increasing the age of retirement – which is currently under discussion by the Dutch government – attracting immigrant workers, or accepting a drop in welfare. Since other countries are also facing the effects of aging, the competition for labour will only increase. The low and even declining average numbers of hours worked, however, also provide an opportunity to moderate the adverse effect of aging. Before the policy implications of this study are discussed, this section will consider suggestions for future research.

In general, studies find that female labour participation is influenced by the presence and age of children, which would theoretically lead to the expectation of a positive significant relationship between the provision of childcare and female participation. The results of the relationship between the provision of childcare facilities and female labour participation at the municipal level, however, did not show the expected link. In Chapter 2 the relationship between childcare and female employment was negative but insignificant and in Chapter 3 the relationship was negatively significant. Van Ham and Büchel (2004) argued that the perceived quality of childcare facilities is more important than the density of their distribution. New data is needed to test this assumption. The effect of the recent shift towards a more demand-driven supply of childcare on female employment also needs to be explored using new data. The research presented in Chapters 2 and 3 is furthermore cross-sectional and therefore no conclusions can be drawn with regard to the causality of the relationship. Panel data is needed to determine whether an increase in the provision of childcare facilities actually results in an increase in female participation. Nevertheless, given the preference of Dutch women to care for their children (Vlasblom and Schipper, 2004), the quality aspect of childcare should also be considered a relevant factor for consideration.

As the results of Chapters 4 and 5 showed, becoming a parent has a significant effect on employment and depending on whether it is a first child or subsequent child, this effect is different for men and for women. Chapter 5 further showed that an increase in the number of children has a positive significant effect on the career mobility of male employees and a negative but insignificant effect on female employees. An important next step would be to explore to what extent changes that occur during the life-course have a lasting effect on the employment opportunities of men and women. Adopting a life-course perspective is possible because the SSB-Jobs and the MBR register all changes during a career and life course. It will however be a complex task to disentangle and interpret the different effects that result from changes that occur within a job and between jobs.

Finally, as mentioned previously, the dataset that was used to analyse differences in the career advancement of male and female managers only encompassed information from one firm in a particular sector. It would be interesting to explore to what extent these findings can be generalized. Given that the data

contained confidential information such as income and appraisal scores, it could be difficult to collect comparable data from other firms.

An increase in labour-market participation is a possible solution to counteract the adverse effects of aging. At the regional level, the results presented in Chapter 2 indicated that municipalities with a larger proportion of women in the age group just beyond the typical reproduction period, with a higher degree of urbanization and with a larger proportion of unemployed men show higher female participation. Chapter 3 added that municipalities with a larger proportion of women with higher socioeconomic status and municipalities with more female-dominated sectors likewise showed higher female participation. A larger proportion of dependent children and elderly people conversely has a negative significant effect on female participation and a larger proportion of female unemployment. No positive significant effect for the provision of childcare facilities on female employment rates was found.

The favourable opportunity structures available in the more urban municipalities was found to have a positive effect on female participation, which implies that creating more supporting services to decrease the burden of combining paid work with other unpaid care and household tasks will probably have a positive effect on female participation. The positive effect of female-dominated sectors – i.e. jobs in healthcare, education and government – showed that occupational segregation continues to be an important determinant in women's employment opportunities. Women today are increasingly better educated, but more action to interest young women in a broader range of occupations could significantly increase their employment opportunities. Furthermore, the negative significant effect of the dependency ratio and the positive significant effect of the proportion of women in the immediately post-reproductive age group strongly suggest that providing good quality and affordable care facilities for children and the elderly will decrease the care burden that continues to influence female participation.

At the individual level, results indicate that family responsibilities decrease the working hours of women, whereas for men the effect can be both positive and negative. Furthermore, the regional opportunity structure of highly urban areas is positively significant for the working hours of female employees and negatively

significant for male employees. Only women working in minor part-time jobs are more likely to increase their hours, which implies that a barrier exists for women working part-time to increase their working hours. Women whose youngest children have reached secondary school age are also more likely to increase their hours. This finding supports the idea that decreasing the care-giving burden by offering good quality and affordable supporting services will most likely increase the working hours of female employees.

Including gay employees in the analysis presented in Chapter 4 and exploring employees who opted to work 4*9 in Chapter 5 provided some interesting new insights into gender stereotypes and the influence of corporate culture. Although the findings of Chapter 5 cannot be generalized, they strongly suggest that male and female employees are treated substantially differently. Females who work nine hours in four days are considered career committed, whereas the same behaviour for male employees is perceived as deviating from the norm of working full-time five days a week and therefore as being less career committed.

The persisting gender stereotypes and the strong preference of Dutch women to care for their children appear deeply embedded in Dutch culture. It is an important task for the government to create a policy framework in which both men and women are stimulated to invest in knowledge and to utilize their capacities to the fullest. As mentioned in the introduction, the European Commission has already developed a strategy for gender equality, the main purpose of which is to improve the utilization of female capacities (EU, 2010). It is now up to the Dutch government to develop the policies and regulations required to translate this gender equality strategy into an everyday reality.

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Appendix A Data measurement and origin

Variables	Measured	Origin
Employment rates	Men or women with a job for at least 12 hours out of potential gender-specific labour force (three year averages)	Statistics Netherlands (CBS)/Labour force survey (EBB)
Disposable income	Includes people over 15 with a year-round salary after tax deductions (gender-specific)	CBS
Education	Number of lower educated as a percentage of the potential labour force of that municipality (gender-specific)	CBS
Age composition	The proportion of women aged 40-50 (after childbearing years) out of the total female population. The proportion of men aged 50-60 (close to retirement) out of the total male population	CBS
Demographic pressure	The share of *dependent* children and elders over the share of *active* population (20-65)	CBS
% unemployed	Unemployed jobseekers as a percentage of the labour force (gender-specific)	CWI: Unemployed Jobseekers / CBS: labour force
Vacancies per unemployment	The number of vacancies in 2002 per unemployed	Centre for Work and Income (CWI)
Industry Mix	$\text{Mix}^{r,f} = 100 * \sum_{s=1}^{6} \frac{E_s^{r,m+f}}{E_{total}^{r,m+f}} \cdot \frac{E_s^{n,f}}{E_s^{n,m+f}}$ where E = employment, s = sector, f = females, m = males, r = region and n = country. In this study jobs are captured in 6 sectors, which are all included in the industry mix; agriculture, manufacturing, finance business and other services, distributive services and hotels, healthcare and public administration and education	LISA business registry based on adaptations from data of the Dutch board of trade
Urbanisation	Average address density	CBS
Child care facilities	Number of day care slots and after school care slots *1.7 (average number of children per slot of 10 day segments) over the number of 0-12 year old children in that municipality	Deloitte[25]
Duration commute-to-work	Commute duration per person per day	CBS

[25] This data was collected for the Dutch ministry of social affairs and employment

Appendix B Gender-specific OLS estimations for income, job level in 2008 and career mobility

	Salary				Job level				Mobility			
	Men		Women		Men		Women		Men		Women	
	B2	t-value	B2	t-value	B2	t-value	B2	t-value	B2	t-value	B2	t-value
Constant	53,494		49,435		10.629		10.513		4.606		5.930	
Being Single=1	-5,424	-7.64	-2,559	-3.18	-0.359	-7.88	-0.213	-3.44				
Having Child <13=1	2,238	3.77	5,213	6.82	0.186	4.90	0.312	5.30				
Δ Child									0.045	3.05	-0.020	-0.80
Job level 2001									-0.278	-40.42	-0.416	-34.35
Tenure	801	22.54	751	14.18	.015	6.45	0.008	2.02	-0.044	-29.06	-0.043	-13.47
Job experience 5-15 years = 1	12,532	20.06	8,869	11.98	0.551	13.74	0.439	7.69	-0.273	-10.06	-0.147	-3.39
Job experience 15-25 years = 1	20,887	22.23	13,709	10.83	0.695	11.52	0.409	4.20	-0.736	-17.98	-0.536	-7.27
Job experience 25+ years = 1	24,001	10.10	11,771	3.17	0.804	5.27	0.028	0.10	-0.978	-9.81	-0.778	-3.72
Above-average appraisal = 1	5,911	10.27	3,423	4.77	0.396	10.73	0.215	3.90				
Working ≤ 32 hours = 1	-11,606	-8.24	-9,290	-11.09	-0.893	-9.88	-0.952	-14.76				
Δ Part-time = 1									-0.264	-3.51	-0.501	-11.14
Working 4*9 = 1	-10,134	-18.67	-4,095	-5.11	-0.690	-19.80	-0.313	-5.07				
Δ FTE									1.700	5.23	2.102	12.09
Being Sick ≥ 12 days = 1	-6,127	-9.44	-2,932	-3.78	-0.431	-10.34	-0.293	-4.90				
Commute 30-50 km = 1	979	1.59	1,029	1.30	0.086	2.19	0.081	1.32				
Commute >50 km = 1	1,857	2.65	3,185	2.97	0.195	4.33	0.205	2.48				
ΔCommute distance									0.003	6.32	0.002	3.04
Not in Amsterdam=1	-6,927	-13.24	-3,940	-6.09	-0.563	-16.75	-0.305	-6.11				
Δ Relocate to Amsterdam=1									0.221	6.65	0.016	0.33
Adjusted R Square	0.183		0.159		0.161		0.148		0.381		0.482	

Appendix C

OLS estimations for income, job level in 2008 and career mobility for selection of employees with flexible full-time contracts (4*9)

	Salary 4*9	*n 3138*	Job 4*9	*n 3138*		Career mobility 4*9	*n 3138*
	B	t-value	B	t-value		B	t-value
Constant	45,638	39.37	9.985	105.79	Constant	5.097	53.37
Being female = 1	1585	2.69	0.247	5.14	Being female = 1	0.221	6.7
Being single = 1	-2494	-3.74	-0.202	-3.72	Job '01	-0.383	-38.18
child < 13	2491	4.39	0.221	4.78	tenure	-0.031	-15.07
tenure	708	19.36	0.013	4.20	External exp. 5-15	-0.193	-5.55
External exp. 5-15	8741	14.38	0.380	7.67	External exp. 15-25	-0.424	-8.25
External exp. 15-25	14,695	16.42	0.499	6.84	External exp. 25+	-0.734	-6.03
External exp. 25+	17,110	7.79	0.474	2.65	More children	0.061	3.40
Above-average appraisal = 1	2440	4.20	0.152	3.21	Change in fte	1.238	3.18
Being sick >12	-3612	-6.32	-0.316	-6.78	Change commuting km	0.001	2.60
Commute 30-50 km	1291	2.27	0.075	1.6	Relocated to Amsterdam	0.203	4.98
Commute >50 km	1965	2.84	0.148	2.64			
Not in Amterdam =1	-2858	-5.70	-0.309	-7.57			
Adjusted R Square	0.159		0.078		Adjusted R Square	0.480	

Summary in Dutch

Regionale arbeidsmarkt dynamiek en werkgelegenheidsverschillen naar geslacht

Sinds halverwege de jaren tachtig zijn Nederlandse vrouwen in grote aantallen de arbeidsmarkt op gekomen en blijven steeds meer vrouwen werken na het krijgen van kinderen. Nederland kent dan ook een relatief hoge arbeidsparticipatie maar daar staat tegenover dat de meeste vrouwen, en ook steeds meer mannen, part-time werken. Toch zijn er belangrijke verschillen tussen mannen en vrouwen op de arbeidsmarkt; vrouwen verdienen vaak minder dan mannen, werken minder uren en zijn ondervertegenwoordigd in banen met een leidinggevende functie. Ook binnen Nederland zijn er verschillen, bijvoorbeeld tussen stad en platteland of tussen de Randstad en de rest van Nederland. Het doel van dit proefschrift is om meer inzicht te krijgen in de regio specifieke werkgelegenheidsverschillen tussen mannen en vrouwen en hoe deze samenhangen met loopbaanpatronen.

In hoofdstuk twee getiteld *Gender-specific spatial interactions on Dutch regional labour markets and the gender employment gap* worden de resultaten gepresenteerd van een multivariate analyse van geslachtsspecifieke werkgelegenheidsgraden per gemeenten in 2002, waarbij rekening gehouden wordt met ruimtelijke interactie effecten van aangrenzende gemeenten. Omdat gemeenten met een lage werkgelegenheidsgraad voor mannen niet noodzakelijk ook een lage werkgelegenheidsgraad voor vrouwen kennen wordt het verschil in de werkgelegenheidsgraad van deze twee ook apart geanalyseerd. Allereerst blijkt dat de gemeentelijke verschillen in de werkgelegenheidsgraad voor vrouwen veel meer uiteenlopen dan voor mannen. De resultaten laten ook zien dat mannen en vrouwen over het algemeen niet concurreren voor dezelfde banen maar dat wanneer er meer werkzoekende mannen zijn vrouwen aangemoedigd worden om te gaan werken. Vrouwen profiteren van de voordelen van een stedelijke omgeving wat blijkt uit een hogere welkgelegenheidsgraad, maar voor mannen is er geen significant verschil tussen stad en platteland. Verschillen tussen de werkgelegenheidsgraad van mannen en vrouwen zijn dan ook kleiner in stedelijke gemeenten. In gemeenten met een groter aandeel jongeren en ouderen,

ofwel een grotere demografische druk, is het verschil tussen mannen en vrouwen groter. Of vrouwen wel of niet werken wordt kennelijk beïnvloed door de zorg voor kinderen, maar ook door de zorg voor ouderen. Opmerkelijk is dat een gunstige sector stuctuur voor vrouwen, gemeten als de 'industry mix', geen effect heeft op de vrouwelijke werkgelegenheidsgraad of op het verschil tussen mannen en vrouwen, maar wel een negatief effect op de mannelijke werkgelegenheidsgraad. Ook opmerkelijk is dat er geen significant verband gevonden is tussen de aanwezigheid van kinderopvang faciliteiten en de werkgelegenheidsgraad van vrouwen.

In hoofdstuk drie getiteld *Determinants of regional female labour market participation in the Netherlands a structural equation modelling approach* wordt er verder ingegaan op het verklaren van de regionale variatie in de werkgelegenheidsgraad van vrouwen op gemeenteniveau voor het jaar 2002. Door het gebruik van een ruimtelijke structural equation model (SEM) kunnen zowel direct geobserveerde variabelen als theoretische constructen ofwel latente variabelen worden meegenomen in de analyse met als voordeel dat er een nauwere relatie tussen theorie en empirie onstaat en dat eventuele problemen met multicollineariteit sterk worden verminderd. Over het algemeen blijken de resultaten voor de SEM-analyse maar kleine verschillen te vertonen met die uit hoofdstuk twee. Net als in hoofdstuk twee wordt er een positief significant verband gevonden tussen gemeenten met een groter aandeel werkzoekende mannen en de vrouwelijke werkgelegenheidsgraad ofwel vrouwen worden aangemoedigd te gaan werken wanneer mannen dit niet lukt. Ook een grotere demografische druk heeft een negatieve uitwerking op de vrouwelijke werkgelegenheidsgraad. Het verschil met hoofdstuk twee is het gebruik van de latente variabelen 'sociaaleconomische status' en 'banen waar vrouwen zijn oververtegenwoordigd' die beide het verwachte positieve effect op de vrouwelijke werkgelegenheidsgraad hebben. Gemeenten met een groter aandeel vrouwen met een hogere sociaaleconomische status hebben een hogere vrouwelijke werkgelegenheidsgraad en gemeenten met meer banen waar vrouwen zijn oververtegenwoordigd hebben ook meer werkende vrouwen. De resultaten laten verder zien dat een SEM structuur beter in staat is de regionale variatie in werkgelegenheid van vrouwen te verklaren wat blijkt uit de hogere R-kwadraat.

Als gevolg van de vergrijzing neemt de beroepsbevolking af en komt onze welvaart onder druk te staan. Hoofdstuk vier getiteld *Gender-specific dynamics in working hours exploring the potential for increasing working hours in an aging society* gaat in op de vraag wat in potentie de mogelijkheden zijn om door middel van een toename in gewerkte uren de negatieve gevolgen van de vergrijzing op de welvaart te verminderen. Doordat er in Nederland op grote schaal part-time gewerkt wordt is er een aanzienlijk arbeidspotentieel van mensen die al actief zijn op de arbeidsmarkt, maar meer uren zouden kunnen gaan werken. Om dit goed te kunnen analyseren is er uit het Sociaal Statistisch Banen Bestand van het Centraal Bureau voor de Statistiek een selectie gemaakt van werknemers die tussen 2003 en 2005 dezelfde baan hebben gehouden, maar van wie wel het aantal werkuren kan zijn veranderd. De analyse bestaat uit twee stappen; allereerst wordt er bepaald of er een wijziging in de werkuren heeft plaatsgevonden en zo ja of dat ging om een afname of toename. Uit de resultaten blijkt dat de werkuren van vrouwen over het algemeen vaker veranderen dan de werkuren van mannen, helemaal wanneer ze in de eerste instantie een baan hadden van minder dan drie dagen per week. Vooral werknemers die minder zijn gaan verdienen gaan meer uren werken. Wanneer het jongste kind de middelbare school leeftijd bereikt vergroot dat de kans dat de moeder meer uren gaat werken. Het krijgen van een kind is in veel gevallen voor de moeder een reden om minder te gaan werken, maar voor vaders geldt dit alleen in geval van de geboorte van het eerste kind. Als er meer kinderen komen vergroot een volgend kind juist de kans op meer uren werk voor een vader. Homoseksuele mannen werken doorgaans minder uren vergeleken met heteroseksuele mannelijke werknemers, terwijl homoseksuele vrouwen juist meer uren werken ten opzichte van heteroseksuele vrouwelijke werknemers.

In hoofdstuk vijf getiteld *Climbing the ladder gender-specific career advancement in financial services and the influence of flexible work-time arrangements* worden de resultaten gepresenteerd van een multivariate analyse van man vrouw verschillen in functieschaal, salaris en promotie van een grote financiele instelling. De dataset bestaat uit de personeelsgegevens van ongeveer 10.000 medewerkers, die werken in functieschaal 9 of hoger. Er is in het bijzonder aandacht voor de werkvorm 4*9, dat wil zeggen een voltijds aanstelling van 36 uur uitgevoerd in vier dagen van negen uur per week. Vrouwen verdienen over het algemeen minder dan hun mannelijke

collega's en zijn relatief oververtegenwoordigd in lagere functieschalen. Daar in tegen maken vrouwen meer promotie. Een mogelijke verklaring hiervoor is dat vrouwen bij aanvang van hun baan wellicht lager ingeschaald worden dan mannen en dat verschil vervolgens inhalen. Meer werkervaring en het krijgen van een bovengemiddelde beoordeling hebben meer effect op de carriere van mannelijke dan van vrouwelijke medewerkers, maar mannen die niet voltijds werken of voltijds aanwezig zijn ondervinden daar meer hinder van dan vrouwelijke werknemers. Een derde van de medewerkers die werken in functieschaal 9 of hoger, werkt 4*9, maar is dus maar vier dagen per week aanwezig. Vrouwen die 4*9 werken worden hiervoor beloond omdat ze een voltijds aanstelling hebben, terwijl mannen die 4*9 werken worden afgestraft omdat ze maar vier in plaats van vijf dagen aanwezig zijn.

Dit proefschrift laat zien dat er belangrijke verschillen zijn tussen vrouwen en mannen op de Nederlandse arbeidsmarkt. Met behulp van gemeentelijke gegevens zijn regionale verschillen in de werkgelegenheidsgraden van vrouwen en mannen in kaart gebracht en verklaard. Met behulp van individuele gegevens werd inzicht verkregen in de veranderingen in gewerkte uren. Het onderzoek binnen de financiele instelling gaf inzicht in de verschillen in carriere ontwikkeling tussen vrouwen en mannen en in het bijzonder de invloed van 4*9, ofwel flexibel voltijds werken. Vrouwen zijn weliswaar massaal de arbeidsmarkt op gekomen en gebleven maar hun arbeidsmarktpositie en arbeidsmarktgedrag verschilt duidelijk van dat van mannen. Meer onderzoek is nodig om vragen te beantwoorden als 'onder welke condities draagt kinderopvang bij aan de vergroting van de arbeidsparticipatie van vrouwen?', 'wat is het effect van een toename van mogelijk zorgbehoevende ouderen op de arbeidsparticipatie van vrouwen?' en 'welke factoren zijn van invloed op veranderingen in gewerkte uren gedurende een complete loopbaan?'. Daar zijn vrouwen, maar vooral ook bedrijven en de samenleving als geheel bij gebaat nu er door de vergrijzing krapte op de arbeidsmarkt dreigt.