The economics of temporal and locational flexibility of work

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Für Annie und Liene

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Daniel Possenriede
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List of abbreviations

AAP   *Arbeidsaanbodpanel* (Dutch Labour Supply Panel)

BUC   blow-up and cluster (estimator)

ECS   European Company Survey

ESWT   European Survey on Working Time and Work-Life Balance

EU15   The 15 member countries in the European Union prior to the accession
       of ten countries on 1 May 2004. The EU15 comprised the following
       countries: Austria, Belgium, Denmark, Finland, France, Germany, Greece,
       Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain, Sweden, United
       Kingdom.

EU27   The 27 member countries in the European Union as of 1 January 2007. In
       addition to the EU15, these comprised Bulgaria, Cyprus, Czech Republic,
       Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Romania, Slovakia,
       Slovenia. Croatia joined the EU on 1 July 2013, making it now the EU28.

FE   fixed-effects (estimator)

ICT   information and communication technology

IT   information technology

MLE   maximum likelihood estimator

NB   negative binomial regression

PO 2004 *Personeelsonderzoek Overheidspersoneel 2004* (Dutch Public Sector Em-
       ployee Survey 2004)

PTR   part-time employment rate

TLF   temporal and locational flexibility of work

WLB   work-life balance

1 An introduction to temporal and locational flexibility of work

1.1 The trend towards temporal and locational flexibility of work

All over Europe, new and more flexible patterns of working time and work organisation are emerging. Employees have become increasingly able to control temporal and locational aspects of their work in recent years. Many employees can choose and modify – within certain boundaries – when, where, and how long they work. This temporal and locational flexibility of work (TLF) is usually implemented via a variety of flexible work arrangements, such as flexi-time, telehomework, and part-time work, which facilitate employees with flexibility in the schedule, location, and duration of their work (Plantenga, 2003; Rau, 2003; Fagan, 2004; Hill et al., 2008).

The share of establishments in 21 EU-countries that offered some type of flexibility regarding the beginning and end of daily working time for example increased from 48% to 57% between 2004 and 2009 alone (Riedmann et al., 2010) and 43% of employees were able to vary the start- and end-times of work in the EU27 countries in 2012 (Anderson et al., 2012). The share of employees involved in telework for at least a quarter of their working time expanded from 5% to 8.3% between 2000 and 2005 (Paoli en Merllié, 2001; Parent-Thirion en Paoli, 2003; Parent-Thirion e.a., 2007). In the Netherlands the share of employees that work at home at least once a week even rose from 25% in 2005 to 32% in 2012 (Driessen and Kraan, 2011; Koppers et al., 2013).[1] 16.2% of employees finally reported to be working

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[1] In the Netherlands the share of employees that was able to determine the start- and end-times of their work rose only slightly from 36% in 2000 to 40% in 2008 (Vlasblom et al., 2013). According to another source, 45.5% of the employees were able to regularly or sometimes determine when they work in 2012 (Koppers et al., 2013). The share of employees that worked at home at least six hours per week increased from 9% in 2002 to 14% in 2010 (Vlasblom et al., 2013). Work at home means telework most of the time, since the share of employees that used a computer or laptop when working at home was 98% in 2010 (Vlasblom et al., 2013).

part-time in the EU27 in 2002 and this rate increased to 20% in 2012 (Eurostat, 2013). So there are a significant number of employees who are able and do make use of arrangements that provide TLF and this group has been growing steadily in recent years.

This trend towards increased TLF is caused by an interplay of several technical and societal developments, which change the organisation of work and private life. In general, work is part of highly complex processes in today's developed societies. Work tasks are carried out with and for other individuals and are therefore dependent on and embedded in a network of other production and consumption activities. Even though the number of network-ties certainly varies between different tasks, these ties always provide a temporal and locational context in which work is carried out and determine to what degree TLF is possible.

In many work relations the number and the strength of network-ties are declining, which increases the scope for TLF. One reason is that knowledge work and the service sector in general have become increasingly important in the last decades. Compared to work in the industry sector, work in the service sector and knowledge work in particular is characterised by a relatively low endowment of physical capital. In addition, the capital necessary in the service sector is quite mobile. This means that this type of work is less tied to the location of company premises and that there is a more potential for worker mobility.

Another important aspect is the proliferation of information and communication technology (ICT). Many of the aforementioned network-ties are due to the need to communicate and exchange information. ICT makes these ties more elastic. Especially knowledge work does not always require direct, simultaneous interactions of workers, and can be performed in teams scattered over long distances. The necessary asynchronous and remote communication is facilitated by ICT, which continuous to spread and improve further. Together, these changes in the structure of work reduce its temporal and locational embeddedness and raise the opportunity to adjust working times to changing circumstances.

In Western societies, we also witness a tendency towards individualisation of life trajectories and a growing heterogeneity of preferences, which lead to more variation in the organisation of private life and social timing (Anxo and Boulin, 2006). Employees prefer flexibility in working time and location in order to suit their preferred, more individualised life-styles and to be able to better combine paid work with other activities. These activities relate to family, education, care, transition into retirement or other anticipated and unanticipated events. Increased flexibility can help employees attain a balance between work and personal life under these circumstances in today's 24/7 global economy. This leads to a growing demand for individualized, employee-oriented working time arrangements.

For employers on the other hand, a flexible work culture is often seen as an important precondition for business success. Establishments want to improve services to their customers, increase labour productivity and decrease costs. Granting their employees more temporal and locational flexibility may be a way to accomplish this. Employers also increasingly provide these arrangements to their employees in order to attract and retain qualified personnel and to reduce expenses for office space and travel costs.

Taken together these developments contribute to the growing importance and proliferation of TLF. Consequently it has gained policy relevance and is a topical issue in many countries (see e.g. CEA, 2010; Taskforce DeeltijdPlus, 2010; Sociaal-Economische Raad, 2011; BMFSFJ, 2012). The consequences of TLF on different labour market domains, however, are still relatively little studied and this book is an attempt to increase our knowledge in this field.

The remaining part of this chapter will give a short introduction into the topic by presenting an overview of the main characteristics of TLF and pointing out some of the issues and difficulties involved regarding its analysis. It will define the sub-components of TLF, describe their development and point out some of their properties from an economic point of view. It will furthermore discuss problems with the empirical measurement of the phenomenon, pose the research questions addressed in this thesis, and give an overview over the book.

1.2 Defining temporal and locational flexibility of work

'Flexible' originates from Latin *flexibilis* and means capable of bending or twisting without breaking, elastic, or adaptable. It was originally alluding to the ability of a tree's branches to bend in the wind and to recover it's original position (Sennett, 1998). Flexibility thus refers to the adaptability to changing circumstances with the ability to regain the original state. Like branches differ in their ability to bend without breaking, flexibility is a matter of degree as well. Temporal and locational flexibility then refers to the ability of employees to make choices in the temporal and locational aspects of their work, in order to adapt to changing demands at work and at home. This means that employees can control to some extent when, where and how long they work, usually via a variety of flexible work arrangements (Plantenga, 2003; Rau, 2003; Fagan, 2004; Hill et al., 2008). Along these line, TLF can be subdivided into duration, schedule and location flexibility.

Duration flexibility allows workers to adjust how long they work. Part-time or reduced-hours employment for example makes it possible to work fewer hours than

full-time employees.[2] The mere availability of part-time jobs is not sufficient for duration *flexibility,* though. Workers should instead be able to adjust the number of hours within a reasonable time period and within the same job. Other arrangements that provide duration flexibility include job sharing, different forms of paid and unpaid leave (e.g. parental, care, educational) as well as phased-retirement.

Schedule flexibility allows employees to determine when they work. Flexi-time arrangements for example allow employees to schedule working hours flexibly on a daily or weekly basis, but may require them to work at certain 'core' hours during the day. As an extension, working hours may vary between days and weeks, but workers must reach a specified average working time over a set reference period. Flexi-time arrangements may also permit workers to build up credits or accumulate deficits in hours worked on working time accounts up to a specified maximum. Compressed working weeks and annualised working hours are further variants and extensions of schedule flexibility.

Location flexibility or flexplace arrangements enable employees to choose where they work. The job tasks may not be performed on the employer's premises but carried out remotely at the employee's domestic home or another location chosen by the employee. If the remote work is organised and/or performed using information technology it is usually referred to as telework.[3]

Duration, schedule and location flexibility can be combined but may also substitute each other to a certain extent (Chung, 2009). Employees may at the same time have the possibility to work at home for some of their weekly working hours, to flexibly vary their work schedule, and to work reduced hours as well. But the three flexibility dimensions may also interact. When working reduced hours for instance there is also more room for schedule flexibility because compared to full-time work the operating hours of the establishment are relatively longer. When working only a few hours per week, however, location flexibility may be limited because the relative cost of remote work increases, since communication and monitoring becomes more

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[2] The work hours are usually calculated on a weekly basis or as the average over a period of employment of up to one year. For statistical purposes though, part time is commonly defined as a specified number of hours, usually less than 30 or 35 hours per week.

[3] The concept of workplace flexibility as defined by Hill et al. (2008) is quite similar to TLF. There are a few reasons why we did not apply it in this analysis, though. First, workplace flexibility has also been used for employer-oriented flexibility (see below) in the past (but seems to be predominantly applied to employee-oriented arrangements more recently (e.g. CEA, 2010)). Second, workplace flexibility is a broader concept in that it may cover flexibility in benefits, contracts and careers next to TLF as well. TLF therefore better reflects the focus of this book on flexibility in working time *and* location than workplace flexibility. Nevertheless, the findings presented here mostly apply to the workplace flexibility context as well.

difficult for example. The preference for and usage of a particular arrangement may also be reduced if another arrangement is available. Employees may be willing to work more hours for example if they have more control over their schedules.

In the social science literature it is common to distinguish between employer- and employee-oriented flexibility, albeit with varying terminology (cf. Reilly, 2001; Fagan, 2004; Kerkhofs et al., 2008; Chung, 2009). Employer-oriented flexibility generally serves the employer in adjusting and organising work to business needs and market forces. Its main goal is to sustain and increase the competitiveness of the establishment and ensure organisational fitness. Implications for employees are generally given secondary attention. Employee-oriented flexibility on the other hand facilitates employees with options to adjust their work and working conditions to personal preferences and responsibilities and emphasizes individual agency. Both types of flexibility do not necessarily oppose each other, however, but can be complementary in the degree to which they benefit employers and employees. The dividing line is therefore whether the priority lies on the demands of the organisation or the needs of the employees (Hill et al., 2008). In that sense, TLF would be considered employee-oriented flexibility since it emphasizes employees' agency and control over working time and place in order to improve the fit between work and personal life. Establishments can also benefit from this type of flexibility, however, because turnover, travel, and office costs are likely to be lower and efficiency and productivity may increase.

Simple formal models of TLF are given in the appendix to this chapter.

1.3 Developments in temporal and locational flexibility

1.3.1 Work duration and duration flexibility

Compared to today's standards, working hours during the industrialisation were characterized by excessive lengths. Workers often had to work 16 hours per day and more than 70 hours per week. Beginning in the mid-19th century, working time was gradually reduced and regulated by collective labour agreements and national and international legislation. While workers in most present-day industrialized countries had to work more than 2900 hours a year in 1870, average annual hours had dropped to less than 2300 in most of these countries by the end of the 1920s. The hours distribution became more compressed and the workday more standardized. After World War II working hours in the industrialized countries

were largely shaped by the eight-hour workday and 40-hour work week (Bosch et al., 1994; Bosch, 1999; Costa, 2000; Messenger, 2010).

Part-time employment slowly started to emerge in the late 1950s and 1960s. The development of part-time employment was set off by labour market shortages and firms sought to increase labour supply by recruiting married women who, at the time, usually dropped out of employment once they had entered wedlock. Since the family and the household were considered to be their main responsibility and facilities to combine work and care did not exist yet, they could only be recruited by offering part-time jobs (Merens, 2008). Rising levels of education, higher wages and a declining birth rate – fewer children meant less time necessary for child-care over the life-course – also lead to increasing female labour participation in subsequent years (Euwals et al., 2011). Momentum started to grow in the 1970s and by 1985 the part-time employment rate (PTR) had already reached 12.9% in the EU15, 14.7% in the US, and around 20% in countries like the UK, Netherlands and Denmark (OECD, 2012). Rising levels of unemployment lead EU governments to support part-time employment with policies aimed at a redistribution of paid work during that time.

Since the 1990s, globalization and the expanding service sector increased the demand for part-time employees further. In order to adjust their workforce to the business cycle to meet expected and unexpected peeks in the demand for goods and services, employers needed both full- and part-time employees that could be employed with varying hours if necessary. Service hours were extended, so that operating hours exceeded normal working hours. Employers used part-time employment to fill these gaps. On the supply side, this was accompanied by further increasing female labour participation and reconciliation of work and family as the main reasons for part-time work (Bosch et al., 1994; Plantenga, 1996, 2002; Fagan, 2004). The increases in female participation and part-time work were accompanied by changes in beliefs about employment of women in general and mothers in particular. Policies were issued to foster equal opportunities and economic emancipation of women. This marked a general shift in the direction of dual-earner households and an adult-worker model in general (Merens, 2008). As a consequence, in 1999 the PTR reached 15.9% in what came to be the EU27 countries and climbed further to 20.0% in 2012 (Eurostat, 2013).[4] Still, most employees work the legislated

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[4] There are considerable differences in the actual distribution of working hours between countries, though. The EU27 PTR is slightly dampened by the New Member States, as 17.6% of the workforce in the EU15 was working part-time in 1999 already. In the Euro area the PTR was 21.6% in 2012. There are considerable cross-country variations in part-time employment however. In 2012, Bulgaria had the lowest rate with 2.4% and the Netherlands the highest with 49.8%; Austria, Belgium, Denmark, Germany, Ireland, Sweden, and the United Kingdom all had PTRs of over 20% as well.

maximum of 35–40 hours with significant groups of employees working part-time jobs of around 20 hours per week in some countries (Plantenga and Remery, 2010; Anxo et al., 2013).

This uneven distribution in working hours is hard to explain with basic neoclassical labour market theory. The standard neoclassical labour supply model is based on the wage rate and non-work income and takes preferences of workers as given and stable. The model assumes complete freedom of choice in the number of hours worked, even though it is widely acknowledged that 'the reality is always a far cry from a hypothetical complete flexibility in hours worked' (Cahuc and Zylberberg, 2004). Indeed one would expect the hours distribution to be more uniform or normal in shape according to the theory.

Some extensions to the model are necessary to understand the empirical facts. From a labour demand perspective, employers are faced with quasi-fixed costs for each employee hired plus a variable cost per hour worked. For a given number of hours demanded, coordination and supervision costs rise with each additional worker. Some of the fixed costs (hiring, training, supervision and administration, work equipment etc.) tend to increase with skill complexity and human capital investments. The total cost of hiring a worker for 8 hours is therefore not the same as that of hiring 8 workers for an hour. In addition, employers have an interest to fully utilize their capital and minimize downtime in order to maximize profit. Employers would therefore like to hire workers for as many hours as possible or at least set minimum hours and fixed work durations (Golden, 1996, 2006a; Díaz and Echevarria, 2009).

Employees may not be opposed to moderately long working hours as well. They also face quasi-fixed costs due to job search and working in general (e.g. commuting, child-care). These costs impose minimum 'reservation hours' (Cogan, 1981). Working fewer than 'standard' hours is often costly in terms of compensation losses (in addition to a *pro rata* wage reduction) and career impairment because working hours may be interpreted as signalling effort and commitment. Social norms and aversion against income loss and decreased social status may prevent a reduction of hours as well (Golden, 2006a). Communication and interaction between workers also leads to a synchronisation of work activities and duration (Weiss, 1996). From a household perspective, a division of labour with one spouse specializing in market work and the other in household production may also be efficient (Becker, 1985).[5]

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[5] The specialisation strategy hinges on stable relationships both at home and at work. The more unstable these relationships get (separation and divorce on the one hand, unemployment, precarious employment, etc. on the other), the higher the incentives for a more diversified approach.

Nevertheless it is quite likely that the excessive long hours in the 19th century did not reflect true workers' preferences (Altman, 1999). Even though employers and employees may both tend towards long hours in general, their preferences about the actual number of hours worked are likely to diverge.[6] The observed number of hours therefore represent the outcome of a bargaining process, with excessive hours reflecting the bargaining power of employers (Golden, 1996).

The upcoming labour movement in the 19th century helped to constrain this bargaining power. As employees found themselves in a difficult bargaining situation – if they were not willing to work long hours in the buyers' labour market of the 18th and 19th century they were likely to be replaced by competitors – labour unions were the solution to this coordination problem and effective in reducing working time length. This reduction was accompanied by legal working time regulations, which were *inter alia* issued due to the social and health costs of long work hours. This process lead to the spike in the working hours distribution around 40 working hours per week in most European countries today.

The part-time spikes and the increasing variation in work duration can be explained by particular part-time labour demand and supply. As noted above, labour shortages, demand in specific labour market domains (e.g. due to extension of service hours, as a buffer for product demand variation or in low-level service sector jobs) and retention of qualified personnel play an important role on the demand side. On the supply side, part-time work is primarily driven by employees with significant non-labour responsibilities and preferences (cf. increasing female labour participation) as well as rising wages and incomes that allow for more 'leisure time'. Institutional settings, like tax exemptions below a certain wage threshold, school and day-care schedules, as well as part-time supporting policies and regulations contribute further to this development (Bosch et al., 1994; Merens, 2008).

Another important aspect of work duration is its flexibility. While the above explains the distribution of work hours, it does not account for the adaptability of work duration within individual labour relations, i.e. duration flexibility. Many employees are faced with varying non-labour responsibilities over their life-course. These constrain the number of hours that can be devoted to paid work and increase the opportunity costs of employment. Preferences regarding the number of hours devoted to paid work therefore are likely to change over time and if they do, employees would like to adapt their work hours temporarily or permanently (Drago et al., 2009).

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[6] Since the amount of the fixed costs differs between employees and employers and variable costs are also likely to increase at different rates (there are differentials in decreasing returns to scale for example), the number of hours are not automatically in equilibrium.

Even though these new preferences may be put into practice by switching jobs, such changes always involve search and switching costs and depreciation of specific human capital. Workers are therefore likely to prefer adaptability in the number of hours worked within the same job, i.e. duration flexibility. This type of flexibility has been facilitated in some countries in recent years, for example by a legal right to adjust working hours in the Netherlands and Germany.

1.3.2 Work timing and schedule flexibility

Based on the standard model and assuming no specific preference structure on both labour demand and supply, one would expect that working times are spread evenly over the day and the week. Clearly this is not the case as most work is performed during the day and on weekdays, and not at nights and on weekends. The timing of work is certainly constrained by physical and biological factors, like the available daylight and the circadian rhythm. Within these limits, however, there is quite some scope for variation in work timing.[7]

An important factor in explaining a pattern of work timing is togetherness and complementarity in production and leisure. For the most part, the production and consumption of goods and services does not take place *in vacuo*. Employees with different skills work together in teams within and across firms. Numerous workers also interact directly with clients and business partners. Many products and services have to be produced 'just-in-time' and are 'time-critical', either because other workers in the production process depend on them, the products are expected by customers at a certain time (e.g. opening hours) or the production involves perishable goods. All these interactions have to be coordinated and the timing of different work activities has to be matched. This coordination in production can often be accomplished most easily when employees work together simultaneously and at the same location, both within and across firms and industries (Weiss, 1996).[8] As a result there are restrictions on the time and location frame in which work can take place depending on the production context.

Leisure activities – both productive[9] and recreational – also benefit from co-ordination and the amount of utility derived from leisure frequently depends on

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[7] According to Hamermesh et al. (2008), the importance of natural cues for timing such as the available daylight even seems to diminish compared to artificial cues like the timing of television programmes.

[8] Individuals from those states in the US and Australia that do not switch to daylight savings time, for example, seem to change their schedules when neighbouring states switch to daylight savings time in order to synchronize activities more closely (Hamermesh et al., 2008).

[9] Productive leisure are activities that are unpaid but create (social) value, such as housework, volunteer work, care tasks or further education.

the presence of companionable others. Certain activities, like dinner, are more appealing together with family or friends than undertaking them alone for instance. Spouses therefore seem to coordinate their working times to enjoy more synchronized leisure for instance (Sullivan, 1996; Hamermesh, 2002; Hallberg, 2003; Carriero et al., 2009). Hamermesh (2002) further argues that evening- and night-work is a disamenity, which workers try to avoid as their earnings power increases. This may be due to both biological (night-work is more exhausting) as well as social factors, like the coordination of leisure activities. Certain activities require 'somebody to play with' and an individual's opportunity set in time-use is therefore dependent on the time-use choices of others. This implies that there clearly are externalities in the time-use decisions of individuals (Jenkins and Osberg, 2004).

Since both productivity from work and utility from leisure are higher when other individuals are available, there is a strong case for the coordination and synchronisation in the timing of work and leisure. As a very rough approximation it would be best if most individuals would work and enjoy leisure at the same times. Coordination costs can therefore be reduced by social conventions – for example by setting the usual working and office hours from 9-to-5, Monday to Friday.

Just as with work duration there is also a case for flexibility in work scheduling, however. The timing and fit of both work and leisure activities can be improved when work schedules are adaptable to changing circumstances. Historically, working time flexibility[10] was first conceptualized as employer-oriented flexibility, i.e. flexibility that primarily served the interest of the employer. Working-time reductions in the post-WWII era for instance were mainly attained in exchange for more flexibility in working time and other working conditions. Workers usually received wage premiums for overtime and work at atypical times (evening, night, weekends), which increased unit costs when labour was demanded at these times. With expanding service and opening hours, employers strived to decrease these costs. To some extent, the wage premiums were effectively traded in for a reduction of regular working hours in collective labour agreements (Bosch et al., 1994).

Working time flexibility[10] also plays an important role as a means to enhance competitiveness in the model of the flexible firm by Atkinson and Meager (Atkinson, 1984; Atkinson and Meager, 1986).[11] In general, employers seek more flexibility in

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[10] In this context, working time flexibility refers to both duration *and* schedule flexibility, since these two aspects of temporal flexibility were not distinguished at the time.

[11] Within the Atkinson-Meager framework, working time flexibility is defined as internal numerical flexibility, i.e. the adjustment of working hours and schedules of workers already employed in the firm. Apart from this, Atkinson defined three other types of flexibility: External numerical flexibility

order to meet expected and unexpected seasonal and cyclical changes in product and thus labour demand. The demand for flexible labour increases further by the expansion of time-critical services that cannot be stored and have to be produced on the spot. Apart from external flexibility, this employer-oriented flexibility is mainly attained with overtime, shift work, working time accounts, short-time work and other flexible work arrangements.

Flexible work schedules have been gaining importance for employees as well, due to rising wages and more individualised life-styles as well as a higher female labour force participation, an increase of dual-earner households and the resulting need of many workers to combine market work with other responsibilities. Many employees have to coordinate and switch between competing private and work-related tasks and cannot directly control the timing of numerous activities related to work, productive and sometimes even recreational leisure (e.g. cultural or sports events). Consequently these activities have to be coordinated with others and are only possible within certain time-frames or at specific points in time (e.g. office, shop, child care, or school hours). Employees may therefore benefit from control over their work schedule as it might help them to implement their preferred life-style and to react to changing time demands at home. In essence, schedule flexibility may improve the fit between work and non-work activities, reduce the risk of overlapping activities and prevent and eliminate time conflicts (Bosch et al., 1994; Golden, 2006a).

1.3.3 Work location and location flexibility

Labour is usually carried out on the company premises (office, factory, shop, etc.) or at the object of labour (in the field, on the site, at the client, etc.). This is especially so in the agriculture and industry sectors, where the capital share is high. In that sense, work is tied to the – mostly immobile – capital, and the location of the capital most of the time determines the work location.

Due to the spread of knowledge work and ICT, work becomes less dependent on the location of the firm and its capital, however. Now it is possible to take part of the capital infrastructure (e.g a laptop) away from the company premises and perform a considerable amount of work remotely. ICT facilitates remote and asynchronous communication and thus decreases the costs of remote work. This

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refers to the adjustment of the labour intake from the external market; functional flexibility stands for the change of duties and responsibilities of the already employed workforce within the firm; wage flexibility finally means variation of remuneration.

partly compensates physical presence and employees can work at home or another, third location of their choosing.

For employees, location flexibility is in many respects an extension of schedule flexibility. Like schedule flexibility, location flexibility provides short-term flexibility and facilitates the coordination and combination of different activities on a daily basis. In addition, telehomework makes it possible to multitask or divide the day into smaller, alternating chunks of work and leisure. Work at home or away from the employer's premises may therefore become more productive and 'pleasing'. There may be fewer interruptions by colleagues or clients and a nicer, more inspiring surrounding. Employees can also reduce commuting time by avoiding traffic jams and spend this time on more productive activities. As an externality, traffic flows and the environment will also benefit from the resulting reductions in traffic congestion and a more even use of transportation routes. Extensive telehomework may however also lead to blurring boundaries between work and private life (Kossek et al., 2006). It further reduces direct interaction with colleagues and supervisors. This may lead to increased team conflict (Hinds and Bailey, 2003), negative effects on the career (Elsbach et al., 2010), as well as less satisfaction with and commitment towards the employer (ten Brummelhuis et al., 2010). Employers on the other hand can save office space if some of their employees work remotely, but may also have more difficulties managing and monitoring employees and their work (Felstead et al., 2003).

1.4 Availability and combinations of flexibility arrangements

Although the general trend is positive, the availability of flexibility arrangements differs across jobs, organisations and industries (e.g. Gray and Tudball, 2003; Drago et al., 2009; Golden, 2009; CEA, 2010). This variation is due to structural differences in production processes and institutional settings as well as cost and benefit differentials in the implementation and support of flexibility arrangements.

It has already been observed early on that the extent to which TLF can be incorporated into different jobs is limited by the structural demands of the job and the task profile (see e.g. Owen, 1977). Compare for instance the type of work in an operating room or on an assembly line on the one hand with independent knowledge work on the other. Many jobs require employees to be physically present at the workplace at a given time in order to operate machinery or interact with colleagues

and clients. The scope for TLF basically varies with the degree of interpersonal productivity and the extent to which simultaneous workflows and interactions are necessary within a production process. Weiss (1985) and Coles and Treble (1993, 1996) for example show that employers differ in their requirements on employees to be reliably present at the workplace at predetermined, fixed times due to differences in production processes. Reliability is more important in processes with high interpersonal productivity, such as assembly line production, team-work in manufacturing (Heywood and Jirjahn, 2004), or just-in-time technology (Coles et al., 2007; Lanfranchi and Treble, 2010).

Along these lines, the scope for TLF does not only vary between different jobs and tasks in general but the degree to which different modes of flexibility are possible within the same job differs as well. Job sharing and working reduced hours for instance may generally be possible in jobs that involve a lot of simultaneous contact with colleagues and clients, but an individual variation in the schedule or location of work may be more difficult to implement. On the other hand, TLF may still be compatible with team-work or any other production process that requires skill-based complementarity and cooperation between workers (facilitated e.g. by asynchronous or remote communication) as long as the production process does not require full synchronisation of schedule and location between workers and tasks.

TLF can also be structurally limited due to the institutional setting. Legal restrictions and collective agreements for example determine the maximum number of shifts, work and on-call hours and therefore limit employers' flexibility. In countries like the Netherlands and Germany, which provide a legal right to adjust the number of work hours to employees, this right can only be exercised once a year.[12]

In jobs where TLF is structurally possible its availability is determined by management's assessment of its costs and benefits. Granting employees TLF means giving up some control over the production process. When employees can influence to some extent when, where and how long to work, their presence cannot be reliably assumed to the same extent as with fixed schedules. Employers are then faced with higher supervision and monitoring costs and it may be more difficult to ensure and coordinate an optimal sequence of activities. This is especially relevant in continuous-production environments and other production processes where direct interactions are important. In smaller companies or highly specialized occupations, coverage issues can even arise (cf. Coles and Treble (1996) for the related case of

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[12] Employees in the Netherlands may request an increase and decrease in contractual working hours. German employees only have a legal right to request a decrease in working hours and not an increase.

absenteeism). Informal communication, interaction, and management processes also take place less easily and frequently when employees are not reliably present at the workplace.[13] When used extensively, TLF arrangements may also constrain peer effects, both positive ones, such as social learning (Sacerdote, 2001) and higher productivity (Falk and Ichino, 2006; Mas and Moretti, 2009), as well as negative ones, like absenteeism (De Paola, 2010).

Granting employees more autonomy over the work process and monitoring them on work-output rather than input or 'face-time' may limit the costs of TLF. Output-monitoring may however be difficult or not possible to implement in low-status jobs with little intrinsic motivation or when output cannot be measured easily. Finally there may be a trade-off between the flexibility of management and the organisation as a whole and employee-oriented TLF.

While these costs limit the availability of TLF, there are also potential benefits which give room for TLF. It can improve organisational performance if flexibility improves customer services and extends operating and service hours in order to increase production and capacity utilisation. To the extent that flexibility improves employees' ability to coordinate work and non-work activities it can boost job performance by reducing absences and tardiness and raising work effort. If used as an employee benefit and reward for performance, TLF may prevent an escalation of the internal firm pay scale. It may also increase organisational attachment and help recruit and retain human capital this way. Apart from these indirect costs savings, TLF and especially location flexibility may directly reduce office and travelling costs for some businesses.

All these factors influence the availability of TLF and the flexibility parameters above. In addition, TLF availability is not static but changes over time. An important factor in these dynamics is technological change, since the timing and setting of work, their adaptability and the importance of simultaneity is largely determined by technology. Before the invention of electrical light for example, work schedules were mostly limited to the light hours of the day. The invention of artificial lighting allowed for the extension of working hours into the evening and night. Work became less dependent upon seasonal variations in daylight and working days could start and end at the same time over the whole year. This made it possible to organise working time differently and allowed greater choice in the timing of work and leisure (cf. Hamermesh, 1998) but also made working times

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[13] The same reasons were expressed by the management of the internet company Yahoo when they banned remote work and required all employees to work at the company offices in early 2013 with the goal to increase collaboration, team-spirit, innovation, and creativity (Swisher, 2013; Tkaczyk, 2013).

more planned and socially embedded. Modern technology allows for even more scope in the organisation of work and working time and reduces the importance of simultaneity in timing and location. This applies especially to innovations in ICT. Communication is crucial to most, if not to all, production processes. Yet, it does not always have to be direct and immediate. The proliferation of ICT simplifies the exchange of information, particularly through asynchronous communication. This facilitates TLF, since individuals do not have to be present at the same time and place to communicate. The innovations in ICT are also one of the reasons why the importance and scope of TLF has been increasing in the last two decades. From this perspective it can be expected that the structural obstacles against TLF in certain jobs and task profiles and the costs of TLF in general will further decline in the future and that TLF can increasingly be made available.

1.5 Empirical measurement

Empirical research on the availability and the effects of TLF is hindered by the fact that the statistical measurement and data collection of temporal and locational aspects of work is far from perfect (CEA, 2010; Plantenga and Remery, 2010). At first sight this is surprising given the centrality of time and place in the work process. Usually work duration, measured as contractual or actual working hours, is readily available from standard labour force surveys. But only some surveys and datasets contain items on work schedules and location (e.g. shift-work, work at atypical times, homework), however, and even fewer contain some items on duration, schedule and location flexibility. A few special surveys measure TLF more extensively (e.g. Eurofound's European Survey on Working Time and Work-Life Balance (ESWT) and European Company Survey (ECS)), but here the number of suitable covariates and outcome variables are often limited .

When data on TLF is available in a dataset, it is often not measured systematically and in-depth, however, as many surveys do not contain items on all three subcomponents of TLF (duration, schedule, and location) or flexibility is not measured with sufficient depth. Most available datasets only cover basic flexi-time arrangements that allow employees to vary their start- and end-times around a required core of daily hours, for example, but not more flexible types of schedule flexibility like time-banking or leave-saving schemes that allow for compressed working weeks or even extended periods of leave. This makes it difficult to analyse different TLF arrangements comprehensively and simultaneously. These limitations already apply to simple cross-sectional data. Cross-country or longitudinal data (or any other kind of data that allows for causal analysis for that matter) is even more scarce.

Apart from that, both the access and the usage of TLF arrangements can be measured to quantify the extent of TLF in the workplace. Ideally both measures should be available, but most of the time only actual usage of TLF arrangements is assessed. When flexibility is defined as adaptability to changing circumstances, access to or availability of TLF arrangements is a more useful and appropriate measure, however. Having access to TLF arrangements increases employees' set of resources even though some employees may not make use of them on a regular basis. When only the usage is assessed, it is not clear whether employees do not make use of flexibility arrangements because they are not available or because they do not regularly require this type of flexibility. Recording only those employees that make use of the arrangements may furthermore unduly select those that already require more flexibility, which may lead to biased results. If only access is measured, however, it is not assessed which arrangements are actually used and effective in helping employees to adapt to changing time constraints.

Limitations in data availability and quality are no news to any empirical researcher of course. There are a few specific reasons, however, that may explain why this problem is more pervasive with TLF data. TLF arrangements are often negotiated individually and independently from statutory regulation or collective agreements. These informal arrangements do not always show up in official data. Furthermore, some arrangements are only relevant, applicable, or utilised by specific groups of employees due to structural characteristics of their work tasks, making it difficult to measure these in broad surveys. In addition, there are often discrepancies between employers and employees regarding their perceptions of the availability of TLF arrangements. Employees may be unaware of these policies or may not be aware that their managers would be willing to implement flexible practices. As a consequence they report less TLF availability than their employers (Budd and Mumford, 2006).

More fundamentally, TLF is a rather broad concept ranging from relatively small adaptations of start- and end-times of work around a core set of hours to a completely flexible, autonomous allocation of working time coupled with output-oriented monitoring and performance evaluation. In jobs with TLF of the latter type, which are similar to self-employment in these respects, work is organised and thus measured and evaluated quite differently than in jobs that are more traditionally organized. As a result, TLF concepts and arrangements are not standardised but rather interrelated and in flux. Whereas homework used to be a defining characteristic of some work tasks in the past for example (e.g. shelling prawns, tailoring garments, etc.), it has become more widely available in other jobs and is now seen as an option for employees to be able to better combine work with other activities

and for employers to reduce turnover, office space, and travel costs. In flexible jobs, concepts like overtime or work at atypical times also become less clear-cut because the boundaries between work and private life are blurred. On the one hand, this is desired in order to improve on the combination of work and private life. On the other hand it complicates measurement and it is also problematic if work impinges on private life (Everingham, 2002; Kossek et al., 2006).

So while the theoretical concept of TLF is relatively easily defined – adaptability of work duration, schedule and location to changing circumstances – it's multi-faceted, real-life representations make it hard to grasp empirically. Limitations in data availability on TLF are therefore not only caused by the novelty of the phenomenon, but also due to more structural problems in conceptualisation and measurement. In any case there is tremendous scope for improvement in the statistical and empirical treatment of this phenomenon.

1.6 Scope and outline of the book

A significant number of employees can and does make use of TLF arrangements and this group has been growing in recent years. TLF is therefore a topical issue in many countries, albeit under different labels, e.g. flexible work arrangements, workplace flexibility (see e.g. CEA, 2010), *Het Nieuwe Werken* (Sociaal-Economische Raad, 2011), or *Zeitsouveräntät* (BMFSFJ, 2012). This discourse is first and foremost concerned with the combination and reconciliation of work and private life, but touches on individualisation of life-styles and life trajectories as well. Against the backdrop of the expected labour force shortages in the future, an increase of (female) labour supply has become an important policy aim (Rürup and Gruescu, 2005; Taskforce DeeltijdPlus, 2010; Eichhorst et al., 2011).[14] The influx of new groups of workers with significant non-work responsibilities into the labour market has also made labour supply more diverse. In this context, schedule and location flexibility have been heralded as superior alternatives to part-time work, even though their effects, with respect to labour supply and otherwise, are less well studied and it is unclear whether they actually have the intended, positive effects.

If brought to its full potential, TLF has wide-ranging consequences for employees, employers, and society at large, because it reframes and changes fundamental concepts of work organisation and working time. But despite the growing importance and policy relevance of TLF, its consequences on different labour market domains have received relatively little attention in empirical research so far, particularly

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[14] Even though this aim may currently be considered a less pressing one, due to the great recession.

with respect to schedule and location flexibility and the combination thereof. This dissertation therefore attempts to shed some light on four relevant labour-related aspects and consequences of increased TLF for different stakeholders. Since we study schedule, location, and duration flexibility simultaneously, we are able to compare their effects. Along the way we touch on how this new phenomenon relates to existing theories in labour economics. Here we only give a short overview over the research topics, but refer for a more comprehensive introduction to the respective chapters.

Chapters 2 and 3 of this dissertation are devoted to consequences for employees. First we investigate in chapter 2 whether TLF indeed facilitates the combination of work and private life. In particular we examine whether it improves employees' working time fit and makes them more satisfied with their jobs. The main premise is that TLF provides employees with more control over their working life, thereby leading to a better match between paid work and other activities and decreasing the amount of stress experienced by employees. One of the main contributions of this analysis is that it examines and compares the effects of schedule, location and duration flexibility at the same time. Furthermore we investigate whether these flexibility arrangements indeed support employees with care responsibilities.

In chapter 3 we take a look at a more long-term issue, namely the impact of TLF on work relations and career. Previous research has shown that part-time work can have adverse effects on employees' career prospects, but it is not so well known, whether and to what extent this applies to schedule and location flexibility as well. Duration flexibility often implies a depreciation of human capital, because with reduced hours existing skills are less applied and less experience and knowledge is gained. Less human capital often means worse career prospects. Duration flexibility is also often more available in lower-status and assistance jobs, which means that one may have to move downward on the job scale to gain duration flexibility, or at least the opportunity to move further up is impaired. Since schedule and location flexibility do not imply a reduction in work time and are available in higher status jobs as well, these two reasons seem to apply less to this kind of flexibility. However, with schedule and location flexibility an employee's face-time or visibility at the workplace may be reduced, which might lead employers to question his or her reliability and dedication towards work. So schedule and location flexibility may still imply adverse effects on career opportunities.

Chapter 4 is then devoted to a potential benefit of TLF for employers, namely a reduction of sickness absenteeism. The introduction of TLF can be costly for employers, because varying and less presence of employees at the workplace makes their coordination, supervision, and monitoring more complicated. Employers will

therefore only introduce TLF arrangements, if they can expect some benefit from it. One of these potential benefits may be a reduction of absenteeism. With TLF employees can respond more flexibly to minor sickness or private 'emergencies' and experience less work-related stress. This may reduce absence rates, which would contribute to the business case for TLF.

The outcome that we finally examine in chapter 5 concerns employees and employers alike but also society as a whole. Against the backdrop of an ageing society and potential labour force shortages, TLF arrangements have become a common policy recommendation to increase labour supply. It is often assumed that when employees are able to work more flexibly and therefore are able to better combine work and private life, they might be willing to work more hours. This notion is supported by surveys in which a considerable share of respondents report that they would be willing to supply more hours to the labour market if more flexibility options were available. It is, however, empirically still unclear whether more schedule and location flexibility indeed induces employees to work more hours and thus increases labour supply. This might be a solution against future labour market shortages in countries like the Netherlands where labour force participation is high, but where part-time work is used extensively to combine work and private life and average weekly working hours are therefore low.

All previously mentioned empirical analyses are executed on the basis of Dutch data. The Netherlands are a good test case in this context because they are a highly developed service society with an excellent ICT infrastructure and an already quite flexible labour market. The high share of part-time work makes it possible to compare duration flexibility with schedule and location flexibility. One of the main contributions is therefore the comparison of the outcomes of these different types of flexibility.

Chapter 6 finally summarizes the results from the empirical analyses and concludes.

Appendix

1.A Simple models of temporal and locational flexibility

Flexibility is a matter of degree. Moreover, it is possible to distinguish between employer- and employee-oriented flexibility, depending on whether the priority of a work arrangement lies on the demands of the organisation or the needs of the employees. Following Golden (1996, 2006a), these features are illustrated by the following simple models:

$$\Delta H_t = \delta^s(H_t^* - H_{t-1}) + \delta^d(H_t^d - H_{t-1}), \qquad 0 \le \delta^s, \ \delta^d \le 1 \qquad (1.A.1)$$

The degree of duration flexibility available to the employee and the employer are denoted by δ^s and δ^d, respectively. H and H^* designate actual and preferred work hours of the employee, respectively, and H^d the number of work hours demanded by the employer. The subscripts t and $t-1$ represent the current and the previous time period. If $\delta^s = 1$ an employee can fully adjust work duration between two periods according to her preferences; if $\delta^d = 1$ work duration can be fully adjusted to business needs and employer preferences. If both duration parameters are zero, work duration is completely determined by the production process or institutional settings (see section 1.4).[15]

Schedule and location flexibility can be modelled very similarly. Workers are not indifferent to the scheduling of their work hours since they have to coordinate competing work-related and private responsibilities. So employees most likely have a preferred time interval (I^*) over which they would like their work to be scheduled, for example from 9-to-5. This preferred interval does not have to coincide with the actual scheduled interval (I) of course. In addition, the preferred schedule I^* may change frequently, sometimes even daily, due to anticipated and unanticipated changes in non-work responsibilities. The responsiveness of the schedule to these changes in preferences and therefore the degree of schedule flexibility is

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[15] Two separate flexibility parameters for employee and employer are necessary to account for the notion that employer- and employee-oriented flexibility are not mutually exclusive (i.e. the sum of δ^s and δ^d can be larger than one) (Fagan, 2004; Anxo et al., 2006; Chung, 2009; Kerkhofs et al., 2008; Messenger, 2010) and that the production process or institutional setting may limit flexibility (i.e. the sum of δ^s and δ^d may be smaller than one). The view found in earlier literature (e.g. Rubery and Grimshaw, 2003; Visser, 2003), that employer- and employee-oriented flexibility are opposing sides on a linear continuum, could simply be represented by just one δ parameter and it's inverse ($\delta - 1$) (cf. Golden, 1996, 2006a).

represented by the term τ in the equation:

$$\Delta I_t = \tau(I_t^* - I_{t-1}), \qquad 0 \leq \tau \leq 1 \qquad\qquad (1.A.2)$$

ΔI_t designates the (employee-induced) change in the current schedule, I_{t-1} represents the schedule of the previous period. If τ = 1 an employee has full schedule flexibility; if $\tau = 0$ the schedule is fully determined by the employer, the production process, or the institutional setting. Location flexibility can be represented by a similar model, with the symbols changed accordingly. For simplicity only employee-oriented flexibility is modelled here. Equation 1.A.1 can be easily adapted for employer-oriented schedule and location flexibility.

2 Temporal and locational flexibility of work, working-time fit, and job satisfaction

2.1 Introduction

In recent years there has been a shift in many industrialised countries from jobs with fixed schedules carried out on a full-time basis on the premises of the employer towards more flexible forms of work organisation, where employees can choose and modify – within certain boundaries – when, where, and how long they work. This trend towards temporal and locational flexibility of work (TLF) is the result of an individualizing work force, the need of employees to combine paid work with other (unpaid) activities and thus a growing demand for employee-centred working time arrangements. Employers on the other hand increasingly provide these arrangements to their employees not only to increase their own flexibility and competitiveness but also to attract and retain qualified personnel. This all happens against the backdrop of an ageing society, expectations of labour force shortages, and the proliferation of new information technology, which facilitates this increase in TLF (Plantenga, 2003).

If TLF arrangements indeed improve the fit between paid work and other activities, this should be reflected in employees' overall job satisfaction. This chapter assesses whether this is the case by analysing the effects of TLF arrangements on self-reported satisfaction with working-time fit and overall job satisfaction of Dutch employees. We consider three TLF arrangements at the same time, i.e. flexibility in the work schedule (flexi-time), location (telehomework) and duration (part-time). These arrangements often come in bundles and can be substituted and combined (Chung, 2009). Since analysing these arrangements in isolation may lead to biased results, it is important to examine them jointly. In addition this combined approach facilitates the comparison of relative effects of the arrangements. The analysis is based on a large, longitudinal household dataset that makes it possible to study the

relation between different TLF arrangements and satisfaction while controlling for various confounding factors.

Identifying job arrangements and characteristics that affect job satisfaction and working-time fit is relevant for various labour market domains. Job satisfaction has thus been on the agenda of economics and sociology since at least the 1970s (Hamermesh, 1977; Kalleberg, 1977; Freeman, 1978; Borjas, 1979). Despite its subjectivity it has increasingly been viewed as a comprehensive measure of employees' utility from the job (Clark, 1996; Clark and Oswald, 1996). Job satisfaction is a predictor for quits, lay-offs and job transitions (Freeman, 1978; Akerlof et al., 1988; Clark, 2001), as well as health and absenteeism (Faragher et al., 2005; Roelen et al., 2008; Fischer and Sousa-Poza, 2009). It is also positively associated with productivity (Argyle, 1989; Judge et al., 2001; Zelenski et al., 2008; Böckerman and Ilmakunnas, 2012) and organisational performance (Ostroff, 1992). Due to its reciprocal impact on overall well-being (Judge and Watanabe, 1993), job satisfaction is also increasingly perceived as an end in itself (Saltzstein et al., 2001).

The results show that TLF is generally associated with better working-time fit and higher job satisfaction scores, with access to flexi-time having the largest impact. Telehomework does not significantly increase working-time fit, though. For part-time work we even find a negative association with overall job satisfaction, which is in line with theory but in contrast to some previous empirical findings. Interestingly, there are no considerable gender differences in the effects of TLF in general and also no differences in the associations between flexibility, working-time fit, and job satisfaction between employees with and without family responsibilities. TLF apparently appeals not only to employees with family responsibilities but more generally to all employees.

2.2 Theoretical framework

In comparison to the 40 hour work-weeks and 8 hour work-days that constitute the de-facto standard in most industrialized countries today (Bosch, 1999; Parent-Thirion et al., 2007), TLF arrangements make it possible to modify the schedule (e.g. flexi-time), location (telehomework), and duration (part-time) of work. These variations in the organizational aspects of paid work provide (time) autonomy and flexibility to workers and can improve the fit between paid work and other activities (Fagan, 2004; Hill et al., 2008). TLF arrangements are usually not available and used in isolation but in various combinations. They may complement and substitute

each other and should therefore be examined jointly to prevent possible biases (Kalleberg et al., 2003; Chung, 2009).

Both the relationships between TLF and satisfaction with working-time fit and between TLF and overall job satisfaction are investigated. The impact of TLF on satisfaction with working-time fit indicates whether TLF arrangements are effective in reconciling work and private life and improving perceived work-life fit. The relation between TLF arrangements and overall job satisfaction shows whether these arrangements have a substantive influence among the whole bundle of factors affecting utility from work. In other words, does TLF play a significant role for overall job satisfaction?

In order to analyse the effect of TLF on an employee's utility from working, a simple bottom-up model (Diener, 1984)[1] is used, which, if only implicitly, has been implemented before in many other economic studies on the determinants of job satisfaction (Sousa-Poza and Sousa-Poza, 2000b). The bottom-up approach used here basically assumes that individual job satisfaction is the net sum of work-role inputs (such as education, working time and effort) and work-role outputs (such as wages, fringe benefits, status, (favourable) working conditions and intrinsic aspects) (Hulin et al., 1985; Judge and Watanabe, 1993; Sousa-Poza and Sousa-Poza, 2000b). Each work-role input (output) is associated with a negative (positive) utility and depending on whether the resulting net sum is positive or negative, overall job satisfaction (or facets thereof) will be positive or negative. Formally, an individual's utility from work can then be written as:

$$U_w = \sum (W_{output} - W_{input}) \tag{2.1}$$

TLF is expected to have a positive impact on utility from work in general. TLF provides employees with more control and autonomy over their (working) life, and therefore improves on the match between paid work and private life (Hill et al., 2001, 2008). TLF also allows employees to work during times more suited to their personal needs and biological clock and may decrease the amount of work- and commuting-related stress experienced by the employees, thereby optimizing their efforts (Scandura and Lankau, 1997; Baltes et al., 1999). In addition, TLF may

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[1] The corresponding top-down theories assume that an individual's "global features of personality are thought to influence the way a person reacts to events" (Diener, 1984). According to this view "subjective domain satisfactions derive from, rather than cause, overall subjective well-being" (Diener, 1984). Since our aim is to analyse determinants of job satisfaction, a top-down approach is not applicable.

signal to employees that their employer cares about their well-being and their responsibilities outside work (Grover and Crooker, 1995; Casper and Harris, 2008). In summary, TLF is expected to provide positive utility from work and should therefore be considered a work-role output.

Previous empirical research on schedule flexibility and flexi-time in particular finds a positive association with job satisfaction and satisfaction with the work schedule (Baltes et al., 1999; Cotti et al., 2013) as well as organisational commitment and satisfaction with the employer (Grover and Crooker, 1995; Scandura and Lankau, 1997; Kelliher and Anderson, 2010). For location flexibility the evidence is more ambiguous. Whereas Bailey and Kurland (2002) find little evidence in their meta-analysis that telehomework increases job satisfaction, Gajendran and Harrison (2007) do find positive impacts on job satisfaction, mostly because it improves perceived autonomy. They argue that "telecommuting indirectly influences job satisfaction, […] by raising perceptions of control over the location, timing, and means of completing one's work" (Gajendran and Harrison, 2007). These mixed findings hint at a complex, possibly hump-shaped relation between the extent of telehomework utilisation and job satisfaction (Golden and Veiga, 2005; Virick et al., 2010). Telehomework potentially leads to blurring boundaries between work and private life (Kossek et al., 2006), therefore exerting a negative effect on perceived fit between working time and private life and possibly job satisfaction in general (Saltzstein et al., 2001; Peters and van der Lippe, 2007; Peters et al., 2009). Telehomework also reduces direct interaction with colleagues and supervisors and may therefore lead to increased team conflict (Hinds and Bailey, 2003), as well as less organisational commitment and satisfaction with the employer (ten Brummelhuis et al., 2010). These drawbacks most likely increase with the extent of telehomework utilisation (Golden, 2006b).

Duration flexibility is expected to have a positive impact on working-time fit, because employees can adjust the number of hours to their needs and more time is available for private activities. With respect to overall job satisfaction, part-time work is generally associated with low occupational status and lower hourly wages (Manning and Petrongolo, 2008), as well as fewer opportunities for training and career advancement (Sandor, 2011). Since it mainly occurs in marginalised and menial jobs, it further leads to occupational downgrading (Connolly and Gregory, 2008). Part-time work is therefore often considered to be intrinsically unsatisfying and should be associated with lower levels of job satisfaction (Booth and van Ours, 2008, 2009, 2013). These effects may be less relevant in the Netherlands than elsewhere, though, since the majority of part-time work is done voluntarily and has

been promoted by public policy (Plantenga, 2002; Visser, 2002; Cousins and Tang, 2004; Portegijs and Keuzenkamp, 2008).[2] Previous empirical results regarding the relation between part-time work and job satisfaction are also ambiguous. Booth and van Ours for example find positive effects for the UK (2008), no or slightly positive effects for Australia (2009)[3], and negative effects for the Netherlands (2013).[4]

The impact of TLF on satisfaction with working-time fit is likely to be stronger than the impact on overall job satisfaction, since the latter is influenced by many more factors.[5] The effects on overall job satisfaction may in fact be composite: On the one hand TLF may increase satisfaction with the job and the employer through increased autonomy, work-life balance and self-determination. On the other hand TLF may decrease satisfaction through negative effects on the career and a feeling of being a 'lonesome worker' (less team spirit, organisational commitment, etc.).

The considerations above translate into the following hypotheses:

Hypothesis 1a: *TLF is positively associated with working-time fit and overall job satisfaction.*

Hypothesis 1b: *The size of the associations is strongest for schedule flexibility and weakest for duration flexibility, with location flexibility in between.*

Hypothesis 1c: *The associations are stronger for satisfaction with working-time fit than for overall job satisfaction.*

TLF is likely to affect working-time fit and overall job satisfaction differently for different groups. Previous research on job satisfaction for example found a gender

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[2] In the Netherlands, being the "only part-time economy in the world" (Freeman, 1998) part-time employment is not limited to marginal jobs, but rather a widespread feature of mainstream employment (Portegijs and Keuzenkamp, 2008). Part-time employment in the Netherlands nevertheless leads to foregone promotions and lower future wage growth, too (Román, 2006; Russo and Hassink, 2008).

[3] Booth and van Ours (2009) find no effects when using a simple part-time dummy (<35h) and positive effects with more disaggregated hours categories.

[4] For their job satisfaction analysis, Booth and van Ours (2013) also use the Dutch Labour Supply Panel (see below), but with a different time frame (1992-2006) and (almost) no time-variant control variables. Note also that they restrict their samples to married or cohabiting employees in all three studies. Finally, while all results from the three studies are based on fixed-effects ordered logit specifications, they use an estimator based on the one developed by Ferrer-i-Carbonell and Frijters (2004), which has been shown to produce biased parameter estimates in Monte-Carlo simulations (Baetschmann et al., 2011; Dickerson et al., 2012; Riedl and Geishecker, 2012).

[5] Sloane and Williams (2000) for example find that the nature of work itself accounts for most of the overall job satisfaction.

gap, i.e. women report on average higher levels of job satisfaction than men (Dalton and Marcis, 1987; Clark, 1997; Sousa-Poza and Sousa-Poza, 2000a). Since females are on average worse-off in the labour market in terms of pay, career opportunities and working conditions, this gender gap seems quite paradoxical. Some authors therefore hypothesized that the gender gap in job satisfaction may be caused by self-selection of women into certain jobs (Bender et al., 2005; Asadullah and Fernández, 2008). In order to combine paid work with family responsibilities, women predominantly prefer jobs that offer TLF and other work-life balance (WLB) policies and therefore choose jobs that offer these. The existing empirical evidence is not fully conclusive though. While not explicitly addressing the gender gap, Scandura and Lankau (1997) observe that flexible work hours lead to higher job satisfaction and organizational commitment for female employees and for employees with family responsibilities. Bender et al. (2005) show that scheduling flexibility and the perception of not having to choose between job and family/personal life is valued more by female employees and eliminates the gender gap in job satisfaction. Asadullah and Fernández (2008) on the other hand do not find significant gender differences in the effect of WLB policies on job satisfaction in general. In any case, these previous findings should prompt us to examine the differences in the effects of TLF for employees with and without family responsibilities.

Hypothesis 2: *TLF increases the probability of reporting higher levels of satisfaction with working-time fit and with overall job satisfaction more for employees with family-responsibilities than for those without.*

2.3 Methodology

2.3.1 Data

For the analysis the Dutch Labour Supply Panel (*Arbeidsaanbodpanel*, AAP), a biennial panel survey of a representative sample of Dutch households.[6] The panel survey is conducted to study developments in labour market behaviour and working conditions in the Netherlands and covers a broad range of work- and life-course-related items. The target population consists of the Dutch labour force aged 16 to 66 years. The AAP has existed since 1985, but questions about (tele-)homework

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[6] The panel was formerly known as the OSA Labour Supply Panel is now conducted on behalf of the Social Cultureel Planbureau. The data and its documentation are in Dutch and available via http://easy.dans.knaw.nl (urn:nbn:nl:ui:13-4js-jl3).

Table 2.1: Descriptive statistics

Variables	Gross sample		Net sample			
	Mean	S.E.	Mean	S.E.	Min	Max
Job satisfaction	3.24	(0.005)	3.24	(0.006)	1	4
Work hours fit	3.94	(0.008)	3.93	(0.009)	1	5
Flexi-time	0.37	(0.004)	0.39	(0.004)	0	1
Telehomework	0.17	(0.003)	0.17	(0.003)	0	1
Contracted hours						
Small part-time (1 - 11h)	0.07	(0.002)	0.04	(0.002)	0	1
Medium part-time (12 - 19h)	0.11	(0.002)	0.10	(0.003)	0	1
Large part-time (20 - 35h)	0.31	(0.004)	0.32	(0.004)	0	1
Full-time (36+h)	0.52	(0.004)	0.53	(0.005)	0	1
Marital status						
Married	0.64	(0.004)	0.68	(0.004)	0	1
Cohabiting	0.11	(0.002)	0.11	(0.003)	0	1
Single	0.24	(0.003)	0.20	(0.004)	0	1
Child(ren)	0.53	(0.004)	0.56	(0.004)	0	1
Education						
Primary school	0.03	(0.001)	0.02	(0.001)	0	1
Lower secondary	0.23	(0.003)	0.22	(0.004)	0	1
Higher secondary	0.39	(0.004)	0.38	(0.004)	0	1
Vocational college	0.25	(0.003)	0.27	(0.004)	0	1
Academic	0.10	(0.002)	0.11	(0.003)	0	1
Work experience	20.40	(0.087)	20.97	(0.099)	0	52
Wage per hour	11.85	(0.041)	11.94	(0.043)	1	100
Permanent contract	0.83	(0.003)	0.88	(0.003)	0	1
Supervisor	0.30	(0.003)	0.32	(0.004)	0	1
2nd job	0.07	(0.002)	0.07	(0.002)	0	1
Occupational level						
Elementary	0.06	(0.002)	0.04	(0.002)	0	1
Lower	0.25	(0.003)	0.22	(0.004)	0	1
Medium	0.35	(0.004)	0.37	(0.004)	0	1
Higher	0.26	(0.003)	0.28	(0.004)	0	1
Scientific	0.07	(0.002)	0.08	(0.002)	0	1
Empl. status change	0.35	(0.004)	0.33	(0.004)	0	1
No. of employees (/1000)	0.50	(0.017)	0.53	(0.019)	0	70
Sector						
Agriculture	0.01	(0.001)	0.01	(0.001)	0	1
Industry	0.11	(0.002)	0.12	(0.003)	0	1
Construction	0.04	(0.001)	0.04	(0.002)	0	1
Trade, gastronomy, repair	0.16	(0.003)	0.14	(0.003)	0	1
Transport	0.06	(0.002)	0.06	(0.002)	0	1
Business services	0.16	(0.003)	0.17	(0.003)	0	1
Care, Welfare	0.21	(0.003)	0.20	(0.004)	0	1

Table 2.1: Descriptive statistics *(cont.)*

Variables	Gross sample		Net sample		Min	Max
	Mean	S.E.	Mean	S.E.		
Other services	0.05	(0.002)	0.05	(0.002)	0	1
Government	0.09	(0.002)	0.10	(0.003)	0	1
Education	0.11	(0.002)	0.11	(0.003)	0	1
2002	0.18	(0.003)	0.14	(0.003)	0	1
2004	0.19	(0.003)	0.21	(0.004)	0	1
2006	0.22	(0.003)	0.22	(0.004)	0	1
2008	0.21	(0.003)	0.24	(0.004)	0	1
2010	0.20	(0.003)	0.19	(0.004)	0	1
Observations	17136		12292			

Note: The gross sample comprises the observations of all employees in the sample, the net sample the observations used for estimation after list-wise deletion due to missing values. S.E. is the standard error of the mean.

were first asked in 2002, so only the waves from 2002 onwards are suitable for an analysis of TLF. This means that we have five waves available for this analysis, for every other year since 2002 to the last publicly available wave from 2010. We restrict the sample to employees (i.e. we exclude self-employed, unemployed, full-time students, etc.), which results in an unbalanced panel of 17,136 observations from 7,771 individuals (gross sample). For further analysis we excluded those observations with missing values on any of the variables used in the analysis (net sample). Table 2.1 presents an overview and descriptive statistics of the variables used in the analysis.

Self-reported measures of job satisfaction are used as a proxy for the individual utility derived from working. These measures are widely used indicators of well-being and have been shown to be closely related to a range of other – potentially more objective – measures of happiness (Freeman, 1978; Frey and Stutzer, 2002; Kristensen and Westergaard-Nielsen, 2007). In the AAP, the job satisfaction variable is obtained from the following question and measured on a 4-point Likert-scale.

'How satisfied are you, everything included, with your job?'

The variable on working-time fit is measured on a 5-point Likert-scale and acquired from this question:

'To what extent do you agree with the following statements? [...] "I can let my working hours fit in well with my home situation."'

The main independent variables and indicators for TLF are flexi-time, telehomework, and part-time work. Flexi-time and telehomework are coded as dummy variables. The flexi-time variable was obtained from the following survey question:

> 'Can you say whether each of the following characteristics does or does not apply to the work you do? [...] "Determine start- and end-time myself"'

The telehomework variable was obtained from the following question:

> 'Do you work at home every now and then in your current job?'

We only count those respondents as telehomeworkers who state that they work at home once a week on average.[7] On average, 39% of the respondents in the sample can determine the start- and end-times of their work and 17% work at home at least once a week.

The part-time variable contains four categories (small, medium, large part-time and full-time) and was created on the basis of a question on contracted hours:

> 'How many hours do you work according to your contract? Overtimehours should not be considered.'[8]

A large set of control variables was used, which is outlined in table 2.1. The controls follow the social sciences literature on job satisfaction and measure observable personal and household as well as job and employer characteristics. Most control variables are measured as dummy or categorical variables.

2.3.2 Statistical model

The starting point of our analysis is the following model:

$$Y_{it}^* = \beta' X_{it} + \alpha_i + \varepsilon_{it} \qquad (2.2)$$

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[7] Telehomeworkers were asked how often they were working at home on average. From 2004 onwards the answer categories were less than once per month, less than twice per month, once per week or twice or more often per week. We only count the latter two categories as telehomeworkers. In 2002 the answer categories were once per month, twice per month, three times per month, more than three times per month. We include only the latter as telehomeworkers.

[8] The literal translation of the survey question is 'what is the size of your appointment?' We use a categorical instead of a continuous variable in order to account for potential non-linearities in the effects.

where Y_{it}^* is a measure of working-time fit or job satisfaction, respectively, of individual i at time t, X_{it} is a vector of observable characteristics, and β is a vector of parameters to be estimated.[9] α_i is the time-invariant, individual-specific part of the unobservables, which may be correlated with x_{it}, and ε_{it} is an idiosyncratic error term. Since unobservable personal and job-related traits are likely to be correlated with job satisfaction and working-time fit, we treat α_i as a fixed effect (Diener, 1984; Ferrer-i-Carbonell and Frijters, 2004).

Job satisfaction and working-time fit are measured as categorical variables, so the observed variable Y_{it} is related to the latent variable Y_{it}^* as follows:

$$Y_{it} = k \quad \text{if} \quad \tau_{ik} < Y_{it}^* \leq \tau_{ik+1}, \quad k = 1, \dots, K, \tag{2.3}$$

where individual-specific thresholds τ_i are increasing, i.e. ($\tau_{ik} \leq \tau_{ik+1} \; \forall k$), $\tau_{i1} = -\infty$, and $\tau_{iK+1} = \infty$.

We estimate equation (2.2) with two different specifications. First we utilize a linear fixed-effects (linear FE) specification, which implies that $Y_{it} = Y_{it}^*$. This essentially imposes a cardinal interpretation of the dependent variables. While this may be somewhat worrisome for economists, Ferrer-i-Carbonell and Frijters (2004) find that 'assuming ordinality or cardinality of happiness scores makes little difference', whereas 'allowing for fixed-effects does change results substantially'. Whether cardinality may be rightfully assumed probably depends on the aggregation level, i.e. the number of categories, of the outcome variable (Riedl and Geishecker, 2012). Our outcome variables only have 4 or 5 categories, respectively, whereas it had 11 categories in Ferrer-i-Carbonell and Frijters' (2004) article, so cardinality may still be a strong assumption in our case. The advantage of such as simple specification, however, is that the parameters can be easily interpreted as marginal effects.

In order to relax the cardinality assumption we also estimate a fixed-effects ordered logit model. In particular we apply the blow-up and cluster (BUC) estimator developed by Baetschmann et al. (2011).[10] The authors provide a comprehensive review of different fixed-effect ordered logit estimators and their Monte-Carlo simulations show that the BUC estimator is consistent, robust in finite samples, and easily implemented. Dickerson et al. (2012) and Riedl and Geishecker (2012) provide further assessments of these estimators and draw similar conclusions.[11]

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[9] We omit an index to denote the two different outcome variables and the independent variables and parameters associated with it for simplicity.

[10] An equivalent estimator was introduced in the biostatistics literature by Mukherjee et al. (2008).

[11] See Frijters and Beatton (2012) and Geishecker et al. (2012) for more applied work using the BUC estimator.

2.4 Results

Simple cross-tabulations of working-time fit and job satisfaction on the one hand and the three TLF arrangements under consideration on the other already show large differentials in the association of the different types of TLF with working-time fit and job satisfaction. Employees with flexi-time agree considerably more often with the statement that they can fit their working times well with their home-situation (see table 2.2). In the 'strongly agree' category there is an almost 12 percentage points difference between these two groups of employees. Part-time work is also associated with an increase in working-time fit according to these descriptives. The percentages of employees who state that they 'strongly disagree', 'disagree', or that they are 'neutral' with the statement increase with working time. The percentages of employees that 'strongly agree' with the statement sharply declines across the working time categories; the difference in percentages between small-part time employees and full-time employees in this category is 19 percentage points. Telehomework on the other hand does not seem to make a difference with respect to working-time fit, since satisfaction with working-time fit is virtually the same whether employees occasionally work at home or not.

Both flexi-time and telehomework are positively associated with overall job satisfaction (table 2.3). The share of respondents who state that they are very satisfied with their job is almost seven percentage points higher when they can determine the start- and end-times of their work themselves than when they cannot. The same goes for employees who work at home at least once a week. Telehomework does not seem to make a marked difference at the lower end of the job satisfaction distribution, though, whereas fewer employees with flexi-time seem to be (very) dissatisfied with their job than those without. There are hardly any differences in overall job satisfaction with respect to part-time work.

We now turn to the parameter estimates. Specifications were estimated for male and female employees jointly and separately. The specification on the total sample is based on the assumption that male and female employees evaluate job characteristics similarly. This assumption may be too strong, however, since earlier studies have shown that men and women often value job and workplace characteristics differently (Sloane and Williams, 2000; Bender et al., 2005). By estimating separate regressions this restriction is relaxed, allowing for different utility functions for males and females regarding their job characteristics.

Table 2.4 shows the linear FE and BUC estimates of TLF arrangements on working-time fit. Similar to the cross-tabulations, flexi-time is positively associated with working-time fit, i.e. being able to determine the start- and end-times of work in-

Table 2.2: Working time fit by TLF arrangements

	Working times fit well with 'home-situation'				
	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
Flexi-time					
No	4.24	8.31	19.05	41.61	26.80
	(0.27)	(0.35)	(0.51)	(0.65)	(0.63)
Yes	1.02	3.65	12.54	44.69	38.09
	(0.15)	(0.28)	(0.52)	(0.80)	(0.84)
Telehomework					
No	3.05	6.54	16.48	42.64	31.29
	(0.19)	(0.27)	(0.42)	(0.56)	(0.58)
Yes	2.67	6.25	16.69	43.63	30.76
	(0.39)	(0.56)	(0.88)	(1.17)	(1.15)
Contracted hours					
Small part-time (1–11h)	1.66	4.24	9.23	39.67	45.20
	(0.55)	(0.86)	(1.24)	(2.33)	(2.42)
Medium part-time (12–19h)	2.08	4.07	13.10	40.02	40.73
	(0.42)	(0.60)	(1.07)	(1.52)	(1.65)
Large part-time (20–35h)	2.81	5.36	14.72	42.89	34.22
	(0.29)	(0.39)	(0.65)	(0.91)	(0.94)
Full-time (36+h)	3.38	7.82	18.86	43.55	26.39
	(0.25)	(0.37)	(0.53)	(0.68)	(0.66)
Total	2.99	6.49	16.51	42.81	31.20
	(0.18)	(0.25)	(0.38)	(0.51)	(0.53)

Note: Percentage of employees reporting how working times fit with 'home-situation' by TLF arrangements. Linearized standard errors of percentages in parentheses.

creases the probability of being satisfied with one's working time. The coefficients on telehomework are not significantly different from zero at conventional levels of significance, suggesting that working from home at least once a week does not improve working-time fit. This is consistent with the simple cross-tabulations as well. Part-time work is positively associated with working-time fit, especially small- and medium-sized part-time jobs with up to 20h per week. Here the coefficients are comparable in size with those on flexi-time. Large part-time jobs increase working-time fit only slightly compared to full-time jobs and the coefficients are not significantly different from zero for male employees and borderline significant for female employees.

Next, table 2.5 presents the parameter estimates of TLF arrangements on overall

Table 2.3: Job satisfaction by TLF arrangements

	Very dissatisfied	Dissatisfied	Satisfied	Very satisfied
Flexi-time				
No	1.40	8.57	58.29	31.74
	(0.15)	(0.37)	(0.68)	(0.67)
Yes	0.90	6.91	53.56	38.63
	(0.14)	(0.41)	(0.86)	(0.87)
Telehomework				
No	1.25	8.14	57.41	33.20
	(0.12)	(0.31)	(0.59)	(0.59)
Yes	1.00	6.87	51.74	40.39
	(0.23)	(0.62)	(1.27)	(1.29)
Contracted hours				
Small part-time (1–11h)	1.29	8.86	59.41	30.44
	(0.55)	(1.29)	(2.35)	(2.26)
Medium part-time (12–19h)	0.96	7.91	58.15	32.99
	(0.28)	(0.86)	(1.62)	(1.61)
Large part-time (20–35h)	1.62	7.59	54.20	36.60
	(0.22)	(0.45)	(0.95)	(0.97)
Full-time (36+h)	0.99	8.05	57.23	33.73
	(0.13)	(0.39)	(0.73)	(0.73)
Total	1.20	7.92	56.44	34.43
	(0.11)	(0.28)	(0.56)	(0.56)

Note: Percentage of employees reporting their job satisfaction by TLF arrangements. Linearized standard errors of percentages in parentheses.

job satisfaction. Flexi-time again is positively and strongly significantly associated with job satisfaction. The coefficients of the linear FE specifications are about half the size of those on working-time fit. This suggests a smaller impact of flexi-time on job satisfaction than on working-time fit, which, as mentioned above, is expected. For the total sample the telehomework coefficient is significant at the 5% level, positive, but about half the size of the flexi-time coefficient. It is only borderline significant for the male sample and not statistically significant for the female sample. Finally, part-time work seems to be negatively associated with overall job satisfaction for female employees. The level of statistical significance is lower, however, for the BUC estimator (which does not assume cardinality of the job satisfaction variable). For male employees the part-time coefficients are not significantly different from zero at conventional levels.

Table 2.4: TLF arrangements on working-time fit

Variables	Total		Male		Female	
	Linear FE	BUC (OR)	Linear FE	BUC (OR)	Linear FE	BUC (OR)
Flexi-time	0.205***	1.8***	0.185***	1.64***	0.224***	1.97***
	(0.0315)	(0.16)	(0.0439)	(0.193)	(0.0452)	(0.273)
Telehomework	−0.0284	0.911	−0.0434	0.89	−0.0052	0.936
	(0.0365)	(0.0923)	(0.0491)	(0.121)	(0.0537)	(0.142)
Part-time work						
Ref: Full-time (36+h)						
Small part-time (1–11h)	0.308***	2.27***	0.206	1.59	0.295**	2.36**
	(0.114)	(0.712)	(0.324)	(1.24)	(0.131)	(0.874)
Medium part-time (12–19h)	0.283***	1.97***	0.578**	3.28**	0.268***	1.9**
	(0.0821)	(0.401)	(0.254)	(1.73)	(0.0997)	(0.48)
Large part-time (20–35h)	0.116**	1.33**	0.0441	1.09	0.158**	1.51**
	(0.0518)	(0.184)	(0.0713)	(0.225)	(0.0751)	(0.296)
Observations	12292	10614	6369	5739	5923	4875
Individuals	6032	2295	3105	1217	2927	1078

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$
Note: Parameter estimates of TLF arrangements on working-time fit. BUC coefficients are odds-ratios; the reference point is therefore one. Clustered standard errors in parentheses. See table 2.A.1 for the full specification.

Table 2.5: TLF arrangements on job satisfaction

Variables	Total		Male		Female	
	Linear FE	BUC (OR)	Linear FE	BUC (OR)	Linear FE	BUC (OR)
Flexi-time	0.0874***	1.505***	0.0844***	1.528***	0.0947***	1.581***
	(0.0228)	(0.148)	(0.0301)	(0.204)	(0.0348)	(0.233)
Telehomework	0.0611**	1.326**	0.0822**	1.469**	0.0426	1.172
	(0.0248)	(0.153)	(0.0347)	(0.245)	(0.0351)	(0.188)
Part-time work						
Ref: Full-time (36+h)						
Small part-time (1–11h)	−0.168**	0.586	−0.149	0.581	−0.200**	0.504
	(0.0840)	(0.222)	(0.234)	(0.706)	(0.0964)	(0.210)
Medium part-time (12–19h)	−0.132**	0.642*	0.0543	1.458	−0.194***	0.499**
	(0.0571)	(0.147)	(0.162)	(0.990)	(0.0719)	(0.142)
Large part-time (20–35h)	−0.0724**	0.779*	−0.0455	0.842	−0.117**	0.682*
	(0.0364)	(0.118)	(0.0494)	(0.205)	(0.0542)	(0.142)
Observations	12292	6184	6369	3174	5923	3010
Individuals	6032	1732	3105	881	2927	851

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$
Note: Parameter estimates of TLF arrangements on job satisfaction. BUC coefficients are odds-ratios; the reference point is therefore one. Clustered standard errors in parentheses. See table 2.A.2 for the full specification.

For schedule flexibility hypotheses 1a to 1c are therefore not rejected by our data. Flexi-time is positively associated with working-time fit and job satisfaction and the association is stronger than those of telehomework or part-time work with the two outcome variables. The association of flexi-time with working time fit is also stronger than the one with job satisfaction. For location flexibility, the hypotheses are rejected with respect to working time fit by our data, because we do not find any significant results for telehomework here. Since we 'control' for flexi-time in the regressions, one can assume that this variable picks up the schedule flexibility component that may be inherent in telehomework in most jobs. That is, employees may be able to determine their working time when working from home. Telehomework is positively associated with overall job satisfaction, however, at least for male employees, but the size of the association is smaller than that of flexi-time. Hypotheses 1a and 1b are therefore not rejected for location flexibility with respect to job satisfaction. Duration flexibility is positively associated with working-time fit, in about the same order as flexi-time for work durations of up to 20 hours per week.[12] With respect to overall job satisfaction, the hypotheses are rejected, however, since part-time work seems to have a negative effect here for female employees and no effect for male employees. Hypotheses 1a and 1c are therefore not rejected with respect to work duration. Finally, our results are qualitatively the same for both the linear FE and BUC estimators. Assuming cardinality or ordinality with respect to working-time fit and overall job satisfaction therefore does not seem to make much of a difference in this case.

In order to test whether there are gender differences in the effects of TLF on working-time fit and job satisfaction, the separate regression models that were estimated with the BUC estimator for male and female employees are combined into one model by seemingly unrelated estimation (Weesie, 1999; StataCorp, 2013).[13] Wald tests for differences in the coefficients are performed then. With respect to working-time fit the null hypothesis of equal coefficients on TLF arrangements is not rejected. This implies that there are no statistically significant gender differences in the association of TLF arrangements and working-time fit. Except for medium part-time work, there are also no statistical differences between the coefficients on male and female employees with respect to job satisfaction. The medium part-time coefficient on the female sample is negative, significantly different from zero at the

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[12] While the flexi-time coefficients are slightly smaller, these little differences are not statistically significant.

[13] Seemingly unrelated estimation combines the parameter estimates and associated variance-covariance matrices of two or more regression models, thereby making it possible to test cross-model hypotheses.

5% level and different from the coefficient on the male sample at the 10% level. Female employees working 12–19 hours per week are therefore significantly less satisfied than females working full-time and less satisfied than men working the same amount of hours. This result is somewhat sensitive to the exact specification, however. The parameter estimates for example loose statistical significance if one excludes all observations from 2002. In any case, part-time work does not seem to have a positive effect on job satisfaction. This is in line with previous results found for the Netherlands (Booth and van Ours, 2013).

In order to test hypothesis 2, namely that TLF has a higher impact with respect to working-time fit and job satisfaction for employees with family responsibilities than for those without, we also estimated both specifications for employees with and without children (see tables 2.A.3 and 2.A.4 in the appendix). Once more the estimation results were combined by seemingly unrelated estimation. Here again the null hypothesis of equal coefficients is rejected only once. According to the estimates, employees without children who work at home at least once a week are more likely to report a higher level of job satisfaction compared to their colleagues not working at home and compared to employees with children working at home (both only borderline significant at the 10% level). Apart from this exception, the associations between TLF and working-time fit and job satisfaction do not appear to depend on family responsibilities, like having children at home. This result is further supported by the absence of significant gender differences as mentioned above. Hypothesis 2 is therefore rejected by our data.

A few limitations of this analysis need to be mentioned. Even though we control for many individual and job-related characteristics, including fixed effects, the estimates do not allow for a true causal interpretation, since we cannot control for unobserved time-varying factors. A common shock may potentially affect the availability and use of TLF arrangements and job satisfaction at the same time for example. Reverse causality may also potentially bias our estimates (i.e. more satisfied employees can make more use of TLF arrangements), even though previous research has not found this to be a considerable issue (Jonge et al., 2001). A drawback of our data is that we do not measure true location and duration flexibility, i.e. whether employees are able to actively influence and change the work location and duration, but rather the actual use of telehomework and part-time arrangements.[14] Telehomework or part-time work may for example be (partly) determined by the employer, so our data measures the revealed outcome of a bargaining process

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[14] For schedule flexibility we measure whether employees can determine their start- and end-times, i.e. whether employees can make choices in their schedule.

Table 2.6: TLF arrangements on working-time fit by children at home

	No children		Child(ren) at home	
	Linear FE	BUC (OR)	Linear FE	BUC (OR)
Flexi-time	0.136**	1.441**	0.202***	1.790***
	(0.0563)	(0.223)	(0.0399)	(0.207)
Telehomework	−0.0943	0.730*	0.00211	0.990
	(0.0638)	(0.139)	(0.0470)	(0.128)
Part-time work				
Ref: Full-time (36+h)				
Small part-time (1–11h)	0.528***	3.534**	0.226	1.865
	(0.185)	(1.738)	(0.149)	(0.841)
Medium part-time (12–19h)	0.305	2.110**	0.291***	2.121***
	(0.187)	(0.793)	(0.106)	(0.603)
Large part-time (20–35h)	0.103	1.281	0.134*	1.418
	(0.0755)	(0.255)	(0.0795)	(0.320)
Observations	5402	3608	6890	6076
Individuals	3239	898	3279	1279

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$
Note: Parameter estimates of TLF arrangements on working-time fit. BUC coefficients are odds-ratios; the reference point is therefore one. Clustered standard errors in parentheses. See table 2.A.3 for the full specification.

Table 2.7: TLF arrangements on job satisfaction by children at home

	No children		Child(ren) at home	
	Linear FE	BUC (OR)	Linear FE	BUC (OR)
Flexi-time	0.0656*	1.379*	0.0778***	1.452***
	(0.0380)	(0.229)	(0.0301)	(0.186)
Telehomework	0.0304	1.139	0.0695**	1.380**
	(0.0421)	(0.234)	(0.0344)	(0.215)
Part-time work				
Ref: Full-time (36+h)				
Small part-time (1–11h)	−0.145	0.671	−0.187*	0.473
	(0.142)	(0.415)	(0.112)	(0.238)
Medium part-time (12–19h)	−0.148	0.636	−0.117	0.620
	(0.0924)	(0.239)	(0.0851)	(0.210)
Large part-time (20–35h)	−0.114**	0.678*	−0.0538	0.777
	(0.0536)	(0.150)	(0.0587)	(0.199)
Observations	5402	2110	6890	3549
Individuals	3239	672	3279	973

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$
Note: Parameter estimates of TLF arrangements on job satisfaction. BUC coefficients are odds-ratios; the reference point is therefore one. Clustered standard errors in parentheses. See table 2.A.4 for the full specification.

between employer and employee rather than an employee's actual choice set. From this perspective, our estimates should be interpreted as a lower bound to the true estimates.

2.5 Conclusion

Temporal and locational flexibility of work is an important element in current policy debates about working conditions and the combination of work and private life (see e.g. CEA, 2010; Sociaal-Economische Raad, 2011; BMFSFJ, 2012). Flexibility is not only viewed as a means to improve the competitiveness of enterprises, but can also provide employees with a greater scope to reconcile their professional, private, and family lives. Furthermore TLF is expected to increase female labour participation and reduce shortages of qualified personnel in the future.

This study analyses whether TLF arrangements, namely flexi-time, telehome-work, and part-time work, improve the fit between working time and private life and increase employee's overall job satisfaction. The main premise is that TLF provides employees with more control over their working life, leads to a better match between paid work and other activities, decreases the amount of stress experienced by employees and signals to employees that their employer cares about their well-being and their responsibilities outside work. A simple bottom-up model is used under the assumption that utility from work is the sum of work-role inputs and outputs. The items that are employed to measure utility from work are self-reported working-time fit and overall job satisfaction.

The main results of this analysis are the following: Schedule flexibility in the form of flexible, self-determined start- and end-times of work is positively associated with both working-time fit and job satisfaction. Telehomework or location flexibility is also related to higher job satisfaction, although to a smaller extent than flexi-time. It does not seem to affect working-time fit in a significant way, however. Part-time work, i.e. schedule flexibility, finally increases working-time fit much in the same way as flexi-time. Our estimates show no or a negative association with overall job satisfaction, however, especially for female employees. Furthermore we hardly find any gender differences in the effects of TLF on working-time fit and job satisfaction. TLF also does not seem to be particularly more relevant for employees with family responsibilities, a group of workers who presumably struggle more with the combination of work and private life than other groups of workers. The associations of TLF with working-time fit and job satisfaction for this group are in any case quite similar to those for employees without children at home.

The conclusions that can be drawn from this analysis is that schedule flexibility may be a superior alternative to duration flexibility with respect to the combination of work and private life. It is similarly associated with good working-time fit, seems to have a positive effect on job satisfaction and does not appear to be the career liability that part-time work is (see chapter 3). Location flexibility does not seem to support the combination of work and private life in a significant way – at least not with respect to working-time fit. It presumably improves workers' autonomy, though, and thus increases job satisfaction. Since previous research has shown that higher job satisfaction translates into fewer job quits, a lower rate of absenteeism and increased general well-being, this would be beneficial to both employers and employees. The result that part-time work is negatively associated with job satisfaction is remarkable, because even though it is in line with what theory would predict considering the occupational drawbacks of part-time work (Connolly and Gregory, 2008; Manning, 2003), it contrasts some of the previous empirical results on the supposedly contented part-time worker (Booth and van Ours, 2008, 2009).

Appendix

2.A Tables

Table 2.A.1: TLF arrangements on working-time fit

	Total		Male		Female	
	Linear FE	BUC (OR)	Linear FE	BUC (OR)	Linear FE	BUC (OR)
Flexi-time	0.205***	1.798***	0.185***	1.639***	0.224***	1.973***
	(0.0315)	(0.160)	(0.0439)	(0.193)	(0.0452)	(0.273)
Telehomework	−0.0284	0.911	−0.0434	0.890	−0.00519	0.936
	(0.0365)	(0.0923)	(0.0491)	(0.121)	(0.0537)	(0.142)
Part-time work						
Ref: Full-time (36h+)						
Small part-time (1–11h)	0.308***	2.275***	0.206	1.586	0.295**	2.358**
	(0.114)	(0.712)	(0.324)	(1.241)	(0.131)	(0.874)
Medium part-time (12–19h)	0.283***	1.973***	0.578**	3.278**	0.268***	1.899**
	(0.0821)	(0.401)	(0.254)	(1.729)	(0.0997)	(0.480)
Large part-time (20–35h)	0.116**	1.326**	0.0441	1.086	0.158**	1.511**
	(0.0518)	(0.184)	(0.0713)	(0.225)	(0.0751)	(0.296)
Martial status						
Ref: Married						
Cohabiting	0.146*	1.435*	0.114	1.394	0.164	1.443
	(0.0749)	(0.286)	(0.0983)	(0.397)	(0.108)	(0.401)
Single	0.337***	2.393***	0.539***	4.756***	0.227*	1.619
	(0.102)	(0.650)	(0.165)	(2.290)	(0.128)	(0.501)
Child(ren)	−0.112**	0.732**	−0.0975	0.791	−0.130**	0.657**
	(0.0452)	(0.0932)	(0.0625)	(0.135)	(0.0654)	(0.123)
Education						
Ref: Primary School						
Lower secondary	0.0382	1.054	−0.0163	0.931	0.178	1.597
	(0.106)	(0.299)	(0.138)	(0.318)	(0.152)	(0.855)
Higher secondary	0.0876	1.204	0.0197	1.022	0.232	1.842
	(0.111)	(0.358)	(0.148)	(0.373)	(0.158)	(0.981)
Vocational college	0.0467	1.110	−0.0515	0.850	0.238	1.952
	(0.123)	(0.366)	(0.165)	(0.354)	(0.175)	(1.117)
Academic	0.121	1.335	0.0927	1.259	0.187	1.762
	(0.149)	(0.536)	(0.189)	(0.629)	(0.236)	(1.202)
Work experience	−0.00188	0.997	0.00103	1.005	−0.00413	0.989
	(0.00409)	(0.0101)	(0.00593)	(0.0136)	(0.00560)	(0.0152)
Wage per hour	−0.00110	0.996	−0.00299	0.993	0.00335	1.007
	(0.00304)	(0.00985)	(0.00452)	(0.0131)	(0.00485)	(0.0169)
Permanent contract	−0.0371	0.886	−0.0587	0.890	−0.0133	0.894
	(0.0472)	(0.108)	(0.0756)	(0.159)	(0.0588)	(0.150)
Supervisor	0.000354	1.009	−0.00129	1.004	0.00601	1.020
	(0.0353)	(0.0944)	(0.0472)	(0.128)	(0.0533)	(0.141)
2nd job	−0.113*	0.734*	−0.0636	0.764	−0.144*	0.688*
	(0.0641)	(0.122)	(0.0983)	(0.201)	(0.0844)	(0.147)
Occupational level						
Ref: Medium						

Table 2.A.1: TLF arrangements on working-time fit *(cont.)*

	Total		Male		Female	
	Linear FE	BUC (OR)	Linear FE	BUC (OR)	Linear FE	BUC (OR)
Elementary	−0.100	0.781	−0.138	0.769	−0.0381	0.923
	(0.0800)	(0.164)	(0.122)	(0.205)	(0.0976)	(0.310)
Lower	−0.0721**	0.808**	−0.0556	0.873	−0.0855*	0.732**
	(0.0359)	(0.0818)	(0.0535)	(0.126)	(0.0480)	(0.102)
Higher	0.00952	1.034	−0.0158	0.962	0.0635	1.190
	(0.0343)	(0.103)	(0.0452)	(0.126)	(0.0537)	(0.189)
Scientific	0.0423	1.104	0.0198	1.048	0.0862	1.251
	(0.0505)	(0.158)	(0.0643)	(0.188)	(0.0831)	(0.304)
Empl. status change	0.0774***	1.223***	0.0699*	1.188*	0.0779**	1.254**
	(0.0260)	(0.0843)	(0.0365)	(0.113)	(0.0377)	(0.128)
No. of employees (/1000)	−0.00181	0.997	−0.0000225	1.000	−0.00992	0.981
	(0.00599)	(0.0119)	(0.00710)	(0.0149)	(0.0133)	(0.0286)
Sector						
Ref: Agriculture						
Industry	0.0726	1.146	0.131	1.308	−0.0943	0.693
	(0.162)	(0.482)	(0.195)	(0.616)	(0.275)	(0.573)
Construction	−0.133	0.666	−0.0266	0.877	−0.525	0.158*
	(0.170)	(0.298)	(0.198)	(0.429)	(0.322)	(0.152)
Trade, gastronomy, repair	0.0468	1.125	0.0778	1.198	−0.0993	0.696
	(0.168)	(0.492)	(0.204)	(0.599)	(0.292)	(0.586)
Transport	0.0319	1.055	0.191	1.605	−0.393	0.269
	(0.188)	(0.515)	(0.225)	(0.893)	(0.332)	(0.257)
Business services	0.0812	1.245	0.186	1.586	−0.176	0.564
	(0.167)	(0.546)	(0.201)	(0.787)	(0.294)	(0.481)
Care, Welfare	0.0615	1.199	0.283	1.948	−0.213	0.521
	(0.181)	(0.564)	(0.252)	(1.123)	(0.302)	(0.455)
Other services	0.0467	1.166	0.228	1.879	−0.314	0.384
	(0.183)	(0.575)	(0.219)	(1.062)	(0.323)	(0.357)
Government	0.154	1.590	0.145	1.476	0.0886	1.360
	(0.180)	(0.767)	(0.220)	(0.823)	(0.308)	(1.260)
Education	0.117	1.381	0.234	1.663	−0.144	0.658
	(0.187)	(0.674)	(0.234)	(0.966)	(0.319)	(0.599)
Constant	3.704***	–	3.630***	–	3.763***	–
	(0.227)		(0.301)		(0.361)	
Observations	12292	10614	6369	5739	5923	4875
Individuals	6032	2295	3105	1217	2927	1078

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

Note: Parameter estimates of TLF arrangements on working-time fit. BUC coefficients are odds-ratios; the reference point is therefore one. Year (wave) dummies included. Clustered standard errors in parentheses.

Table 2.A.2: TLF arrangements on job satisfaction

	Total		Male		Female	
	Linear FE	BUC (OR)	Linear FE	BUC (OR)	Linear FE	BUC (OR)
Flexi-time	0.0874***	1.505***	0.0844***	1.528***	0.0947***	1.581***
	(0.0228)	(0.148)	(0.0301)	(0.204)	(0.0348)	(0.233)
Telehomework	0.0611**	1.326**	0.0822**	1.469**	0.0426	1.172
	(0.0248)	(0.153)	(0.0347)	(0.245)	(0.0351)	(0.188)
Part-time work						
Ref: Full-time (36+h)						
Small part-time (1–11h)	−0.168**	0.586	−0.149	0.581	−0.200**	0.504
	(0.0840)	(0.222)	(0.234)	(0.706)	(0.0964)	(0.210)
Medium part-time (12–19h)	−0.132**	0.642*	0.0543	1.458	−0.194***	0.499**
	(0.0571)	(0.147)	(0.162)	(0.990)	(0.0719)	(0.142)
Large part-time (20–35h)	−0.0724**	0.779*	−0.0455	0.842	−0.117**	0.682*
	(0.0364)	(0.118)	(0.0494)	(0.205)	(0.0542)	(0.142)
Martial status						
Ref: Married						
Cohabiting	−0.0354	0.891	−0.0706	0.799	−0.00297	0.973
	(0.0464)	(0.183)	(0.0640)	(0.260)	(0.0648)	(0.261)
Single	0.0565	1.355	0.124	2.079	0.0156	1.002
	(0.0613)	(0.396)	(0.0886)	(0.996)	(0.0809)	(0.363)
Child(ren)	0.0166	1.111	−0.00915	1.006	0.0487	1.239
	(0.0281)	(0.154)	(0.0384)	(0.203)	(0.0421)	(0.257)
Education						
Ref: Primary School						
Lower secondary	−0.0721	0.674	−0.142	0.478	0.0701	1.527
	(0.0762)	(0.272)	(0.0926)	(0.251)	(0.127)	(0.939)
Higher secondary	−0.0886	0.610	−0.143	0.450	0.0307	1.247
	(0.0806)	(0.257)	(0.100)	(0.251)	(0.131)	(0.775)
Vocational college	−0.103	0.573	−0.166	0.398	0.0167	1.186
	(0.0888)	(0.267)	(0.113)	(0.248)	(0.142)	(0.822)
Academic	−0.126	0.513	−0.179	0.366	−0.0143	1.000
	(0.101)	(0.276)	(0.131)	(0.260)	(0.158)	(0.837)
Work experience	−0.00404	0.983	−0.00513	0.983	−0.00242	0.989
	(0.00288)	(0.0110)	(0.00408)	(0.0147)	(0.00397)	(0.0168)
Wage per hour	0.00744***	1.031**	0.00877***	1.037**	0.00397	1.017
	(0.00239)	(0.0125)	(0.00331)	(0.0170)	(0.00362)	(0.0204)
Permanent contract	−0.0615*	0.826	−0.0745	0.788	−0.0493	0.843
	(0.0344)	(0.108)	(0.0534)	(0.152)	(0.0445)	(0.155)
Supervisor	0.0596***	1.299**	0.0679**	1.421**	0.0516	1.179
	(0.0231)	(0.140)	(0.0297)	(0.206)	(0.0367)	(0.193)
2nd job	−0.0946**	0.668**	−0.0245	0.887	−0.134**	0.590**
	(0.0438)	(0.131)	(0.0630)	(0.269)	(0.0609)	(0.149)
Occupational level						
Ref: Medium						
Elementary	−0.000357	1.058	0.0285	1.188	−0.0270	0.914
	(0.0498)	(0.291)	(0.0636)	(0.391)	(0.0803)	(0.443)
Lower	0.000624	0.994	−0.0224	0.872	0.0178	1.075
	(0.0226)	(0.112)	(0.0334)	(0.150)	(0.0305)	(0.164)
Higher	0.0641***	1.315***	0.0801***	1.435***	0.0445	1.181
	(0.0231)	(0.138)	(0.0295)	(0.194)	(0.0374)	(0.199)
Scientific	0.0511	1.221	0.0538	1.253	0.0518	1.170
	(0.0362)	(0.202)	(0.0455)	(0.277)	(0.0611)	(0.297)

Table 2.A.2: TLF arrangements on job satisfaction *(cont.)*

	Total		Male		Female	
	Linear FE	BUC (OR)	Linear FE	BUC (OR)	Linear FE	BUC (OR)
Empl. status change	0.116***	1.688***	0.0880***	1.516***	0.139***	1.872***
	(0.0179)	(0.137)	(0.0255)	(0.177)	(0.0254)	(0.215)
No. of employees (/1000)	−0.00227	0.992	−0.00156	0.998	−0.00499	0.970
	(0.00310)	(0.0139)	(0.00348)	(0.0141)	(0.00614)	(0.0315)
Sector						
Ref: Agriculture						
Industry	0.0147	1.209	0.0930	1.627	−0.180	0.667
	(0.123)	(0.530)	(0.116)	(0.909)	(0.307)	(0.551)
Construction	−0.0683	0.803	−0.0343	0.855	−0.0570	1.059
	(0.129)	(0.411)	(0.122)	(0.521)	(0.338)	(1.082)
Trade, gastronomy, repair	−0.0310	0.993	0.00204	1.066	−0.128	0.939
	(0.127)	(0.455)	(0.117)	(0.622)	(0.318)	(0.766)
Transport	0.129	1.892	0.180	2.400	0.0153	1.427
	(0.136)	(0.955)	(0.129)	(1.534)	(0.339)	(1.312)
Business services	0.0355	1.269	0.157	1.989	−0.186	0.639
	(0.123)	(0.560)	(0.116)	(1.130)	(0.310)	(0.511)
Care, Welfare	0.127	1.844	0.0654	1.413	0.0593	1.896
	(0.133)	(0.887)	(0.145)	(0.941)	(0.317)	(1.577)
Other services	0.156	2.087	0.245*	2.952*	−0.0113	1.502
	(0.134)	(1.031)	(0.131)	(1.843)	(0.326)	(1.340)
Government	0.0550	1.355	0.0479	1.211	0.0147	1.485
	(0.132)	(0.659)	(0.126)	(0.758)	(0.324)	(1.278)
Education	0.271*	3.279**	0.222	2.950	0.244	3.650
	(0.140)	(1.700)	(0.139)	(1.992)	(0.330)	(3.212)
Constant	3.209***	–	3.216***	–	3.235***	–
	(0.172)		(0.202)		(0.354)	
Observations	12292	6184	6369	3174	5923	3010
Individuals	6032	1732	3105	881	2927	851

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$
Note: Parameter estimates of TLF arrangements on job satisfaction. BUC coefficients are odds-ratios; the reference point is therefore one. Year (wave) dummies included. Clustered standard errors in parentheses.

Table 2.A.3: TLF arrangements on working-time fit by children at home

	No children		Child(ren) at home	
	Linear FE	BUC (OR)	Linear FE	BUC (OR)
Flexi-time	0.136**	1.441**	0.202***	1.790***
	(0.0563)	(0.223)	(0.0399)	(0.207)
Telehomework	−0.0943	0.730*	0.00211	0.990
	(0.0638)	(0.139)	(0.0470)	(0.128)
Part-time work				
Ref: Full-time (36h+)				
Small part-time (1–11h)	0.528***	3.534**	0.226	1.865
	(0.185)	(1.738)	(0.149)	(0.841)
Medium part-time (12–19h)	0.305	2.110**	0.291***	2.121***
	(0.187)	(0.793)	(0.106)	(0.603)
Large part-time (20–35h)	0.103	1.281	0.134*	1.418
	(0.0755)	(0.255)	(0.0795)	(0.320)
Martial status				
Ref: Married				
Cohabiting	0.218**	1.777**	−0.0212	0.936
	(0.103)	(0.510)	(0.152)	(0.350)
Single	0.458***	3.320***	0.0118	1.035
	(0.126)	(1.179)	(0.214)	(0.609)
Education				
Ref: Primary School				
Lower secondary	0.0111	1.120	−0.00412	1.022
	(0.165)	(0.595)	(0.122)	(0.393)
Higher secondary	0.166	1.604	0.00839	1.082
	(0.171)	(0.886)	(0.134)	(0.430)
Vocational college	0.174	1.756	−0.0619	0.889
	(0.194)	(1.061)	(0.153)	(0.396)
Academic	0.153	1.571	0.163	1.607
	(0.224)	(1.083)	(0.194)	(0.890)
Work experience	−0.00989	0.975	0.000679	1.003
	(0.00679)	(0.0183)	(0.00563)	(0.0126)
Wage per hour	−0.00460	0.984	−0.000348	1.000
	(0.00468)	(0.0172)	(0.00427)	(0.0135)
Permanent contract	−0.0875	0.791	−0.0649	0.816
	(0.0711)	(0.141)	(0.0674)	(0.152)
Supervisor	−0.0368	0.904	0.00955	1.023
	(0.0576)	(0.149)	(0.0481)	(0.128)
2nd job	−0.145	0.625*	−0.0898	0.813
	(0.106)	(0.174)	(0.0840)	(0.179)
Occupational level				
Ref: Medium				
Elementary	−0.221*	0.583*	−0.0479	0.865
	(0.117)	(0.174)	(0.115)	(0.275)
Lower	−0.0727	0.809	−0.0844*	0.770*
	(0.0573)	(0.129)	(0.0499)	(0.110)
Higher	0.0705	1.217	−0.0475	0.881
	(0.0570)	(0.202)	(0.0435)	(0.113)
Scientific	0.0741	1.235	0.0213	1.070
	(0.0835)	(0.301)	(0.0657)	(0.200)
Empl. status change	0.0562	1.152	0.0655*	1.187*
	(0.0432)	(0.139)	(0.0343)	(0.108)

Table 2.A.3: TLF arrangements on working-time fit by children at home *(cont.)*

	No children		Child(ren) at home	
	Linear FE	BUC (OR)	Linear FE	BUC (OR)
No. of employees (/1000)	−0.00826	0.979	0.000410	1.001
	(0.00692)	(0.0200)	(0.00927)	(0.0177)
Sector				
Ref: Agriculture				
Industry	0.263	2.359	0.117	1.243
	(0.269)	(1.826)	(0.214)	(0.666)
Construction	0.0896	1.263	−0.135	0.735
	(0.282)	(1.058)	(0.231)	(0.407)
Trade, gastronomy, repair	0.337	2.843	0.0657	1.156
	(0.283)	(2.248)	(0.219)	(0.640)
Transport	0.382	3.757	0.0822	1.186
	(0.298)	(3.320)	(0.250)	(0.733)
Business services	0.381	3.347	0.101	1.306
	(0.273)	(2.618)	(0.223)	(0.738)
Care, Welfare	0.187	2.332	0.147	1.453
	(0.295)	(1.909)	(0.244)	(0.899)
Other services	0.500*	4.541*	−0.0889	0.699
	(0.299)	(3.848)	(0.247)	(0.470)
Government	0.390	3.417	0.131	1.427
	(0.285)	(2.832)	(0.242)	(0.902)
Education	0.355	3.386	0.248	2.017
	(0.312)	(2.875)	(0.246)	(1.296)
Constant	3.516***	–	3.703***	–
	(0.384)		(0.291)	
Observations	5402	3608	6890	6076
Individuals	3239	898	3279	1279

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$
Note: Parameter estimates of TLF arrangements on working-time fit. BUC coefficients are odds-ratios; the reference point is therefore one. Year (wave) dummies included. Clustered standard errors in parentheses.

Table 2.A.4: TLF arrangements on job satisfaction by children at home

	No children		Child(ren) at home	
	Linear FE	BUC (OR)	Linear FE	BUC (OR)
Flexi-time	0.0656*	1.379*	0.0778***	1.452***
	(0.0380)	(0.229)	(0.0301)	(0.186)
Telehomework	0.0304	1.139	0.0695**	1.380**
	(0.0421)	(0.234)	(0.0344)	(0.215)
Part-time work				
Ref: Full-time (36h+)				
Small part-time (1–11h)	−0.145	0.671	−0.187*	0.473
	(0.142)	(0.415)	(0.112)	(0.238)
Medium part-time (12–19h)	−0.148	0.636	−0.117	0.620
	(0.0924)	(0.239)	(0.0851)	(0.210)
Large part-time (20–35h)	−0.114**	0.678*	−0.0538	0.777
	(0.0536)	(0.150)	(0.0587)	(0.199)
Martial status				
Ref: Married				
Cohabiting	−0.0377	0.806	−0.0355	0.885
	(0.0655)	(0.258)	(0.0932)	(0.300)
Single	0.111	1.728	−0.112	0.574
	(0.0913)	(0.741)	(0.100)	(0.294)
Education				
Ref: Primary School				
Lower secondary	−0.0990	0.431	−0.0268	0.889
	(0.0942)	(0.328)	(0.117)	(0.438)
Higher secondary	−0.0900	0.446	−0.0966	0.625
	(0.107)	(0.343)	(0.122)	(0.326)
Vocational college	−0.165	0.291	−0.0673	0.726
	(0.125)	(0.244)	(0.132)	(0.424)
Academic	−0.262*	0.176*	−0.0167	1.024
	(0.143)	(0.163)	(0.149)	(0.786)
Work experience	−0.00345	0.991	−0.00281	0.989
	(0.00480)	(0.0206)	(0.00400)	(0.0147)
Wage per hour	0.00947**	1.040*	0.00447	1.022
	(0.00390)	(0.0211)	(0.00302)	(0.0156)
Permanent contract	−0.0813	0.758	−0.0580	0.823
	(0.0531)	(0.141)	(0.0480)	(0.157)
Supervisor	0.0982**	1.596**	0.0528*	1.235
	(0.0402)	(0.292)	(0.0305)	(0.177)
2nd job	−0.116	0.551*	−0.0637	0.737
	(0.0788)	(0.191)	(0.0554)	(0.180)
Occupational level				
Ref: Medium				
Elementary	0.00203	0.922	−0.0123	1.001
	(0.0870)	(0.404)	(0.0606)	(0.369)
Lower	0.0270	1.149	−0.0154	0.918
	(0.0385)	(0.241)	(0.0299)	(0.134)
Higher	0.0799**	1.334	0.0395	1.200
	(0.0398)	(0.256)	(0.0308)	(0.166)
Scientific	0.105*	1.537	0.0194	1.025
	(0.0630)	(0.466)	(0.0474)	(0.225)
Empl. status change	0.121***	1.619***	0.0990***	1.609***
	(0.0318)	(0.234)	(0.0231)	(0.167)

Table 2.A.4: TLF arrangements on job satisfaction by children at home *(cont.)*

	No children		Child(ren) at home	
	Linear FE	BUC (OR)	Linear FE	BUC (OR)
No. of employees (/1000)	0.00253	1.010	−0.00573*	0.979
	(0.00479)	(0.0249)	(0.00344)	(0.0193)
Sector				
Ref: Agriculture				
Industry	−0.00298	1.252	−0.0507	0.821
	(0.253)	(0.829)	(0.146)	(0.468)
Construction	−0.0218	1.240	−0.140	0.598
	(0.263)	(0.995)	(0.164)	(0.382)
Trade, gastronomy, repair	−0.102	0.879	−0.0458	0.842
	(0.267)	(0.590)	(0.149)	(0.509)
Transport	0.197	2.821	0.105	1.798
	(0.278)	(2.110)	(0.162)	(1.227)
Business services	0.0724	1.781	−0.0237	0.943
	(0.256)	(1.172)	(0.143)	(0.536)
Care, Welfare	0.0312	1.471	0.165	1.951
	(0.270)	(1.045)	(0.157)	(1.226)
Other services	0.249	4.117*	0.0454	1.211
	(0.268)	(3.083)	(0.161)	(0.777)
Government	0.106	2.109	−0.0155	0.958
	(0.265)	(1.505)	(0.159)	(0.630)
Education	0.346	6.245**	0.188	2.086
	(0.268)	(4.736)	(0.181)	(1.472)
Constant	3.180***	–	3.278***	–
	(0.324)		(0.218)	
Observations	5402	2110	6890	3549
Individuals	3239	672	3279	973

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$
Note: Parameter estimates of TLF arrangements on job satisfaction. BUC coefficients are odds-
ratios; the reference point is therefore one. Year (wave) dummies included. Clustered stand-
ard errors in parentheses.

3 Does schedule and location flexibility harm your career?

3.1 Introduction

Many employees nowadays make use of work arrangements with which they can influence and modify the duration, schedule and location of their work. These arrangements provide them with flexibility in the duration (part-time work for example), schedule (flexi-time), and location (telehomework) of their work. Together, this is what we refer to as temporal and locational flexibility of work (TLF).

TLF is, among other things, viewed as a means to combine paid work with other activities and as such highly topical in the policy debate in a number of countries (see e.g. CEA, 2010; BMFSFJ, 2012). Previous research on arrangements that support the combination of work and private life via a (temporary) reduction of working time, like part-time work or parental leave for instance, has shown adverse effects of these arrangements on careers, like fewer promotions, fewer training opportunities or reduced wage growth, however (e.g. Stafford and Sundström, 1996; Glass, 2004; Román, 2006; Connolly and Gregory, 2008; Russo and Hassink, 2008). These adverse effects have been mainly attributed to depreciation of human capital, occupational segregation and statistical discrimination based on real or expected productivity differentials. So while duration flexibility may be a good means to combine work with private life, one of its major drawbacks is that it harms an employee's career.

A notable difference between arrangements like part-time work and parental leave which provide flexibility via a reduction of work duration and arrangements such as flexi-time and telehomework which provide flexibility in the work schedule or location, is that with the latter employees do not reduce their total workload but only vary or reduce their physical presence at the workplace. Even though private responsibilities may sometimes interfere with work responsibilities (e.g. having to pick up the children from school at a certain time), these arrangements

make it possible to complete work tasks from home or at a different time of the day. So whereas employees utilising these arrangements may be less visible at the workplace compared to their colleagues that do not make use of them, their work output should be about the same. Occasionally working at home or shifting work towards times when the office is less crowded may even affect productivity positively due to a reduction of distractions and disruptions of work. Thus if work duration, completed workload, and output are the prime categories on which employers award promotions, utilisation of TLF arrangements like flexi-time and telehomework should not make a difference for career prospects. In that case, flexi-time and telehomework would be superior arrangements to combine paid work with other activities and responsibilities.

Employers may, however, interpret the utilisation of these arrangement by employees as an indicator for competing interests between work and private life and thus (relatively) low commitment towards the job. If this is indeed the case and employers base their perceptions of employees' commitment on their visibility at work and use it as a screening device, then schedule and location flexibility may exert a negative effect on career advancement after all. Anecdotal evidence about low utilisation of TLF arrangement due to career concerns and previous research that stresses the importance of supervisory and organisational support (e.g. Allen, 2001; Ryan and Kossek, 2008; Hoobler et al., 2009) both suggest that presence and visibility at the workplace matter for career advancement. It is therefore unclear to what extent the adverse effects that are documented for the utilisation of duration flexibility are to be expected for schedule and location flexibility as well.

In this chapter we therefore investigate the consequences of TLF, especially with respect to schedule and location, on career advancement in a longitudinal setup. In particular we estimate the effect of flexi-time and the weekly frequency of telehomework utilisation on the incidence of promotions and employer-paid training in the two years following the current survey. The analysis is carried out on the basis of a large Dutch household panel dataset for the years 2004–2010, which makes it possible to control for various potentially confounding factors.

Our results indicate that flexi-time and occasional telehomework does not significantly affect career advancement, at least not with respect to promotions and employer-paid training. Working at home more frequently, however, is associated with fewer promotions and less employer-paid training and thus adverse effects on career advancement.

3.2 Theoretical framework

Employees who (temporarily) reduce their working time often face adverse career effects compared to their colleagues who do not make use of arrangements such as part-time work or parental leave (Román, 2006). This can mainly be attributed to a depreciation of human capital as well as occupational segregation and sorting. Human capital depreciates because employees who work fewer hours gain less work experience relative to their full-time working colleagues. Furthermore their prior work-related knowledge and experience stagnates or even deteriorates because it is underutilised and, due to fixed costs, they may also receive less training (Hirsch, 2005; Manning and Swaffield, 2008; Russo and Hassink, 2008).

Occupational segregation is caused by employees having to switch employers, jobs, and/or task profiles to gain access to certain working conditions, e.g. to effectively be able to work part-time for example (Connolly and Gregory, 2008; Manning and Petrongolo, 2008). Or they may choose to stay in a certain job and function level in order to maintain job amenities and to not having to work overtime. This means that they effectively trade-off career advancement for stability and flexibility (Evertsson and Duvander, 2011). Employees making use of duration flexibility thus switch to or stay in jobs less favourable for career advancement.

Compared to duration flexibility, i.e. a (temporary) reduction of working time, schedule and location flexibility are not likely to lead to adverse career effects via these two channels. For one, with arrangements such as flexi-time and telehomework employees do not reduce their working time and therefore gain as much work experience as their colleagues who do not make use of these arrangements. A depreciation of human capital is therefore not to be expected. In addition, these arrangements are awarded more often to employees in higher ranks (Gray and Tudball, 2003; Golden, 2008, 2009), so (negative) occupational segregation does not seem likely here either. This suggests that regarding career prospects, schedule and location flexibility appear to be attractive alternatives for employees to combine work and private life compared to duration flexibility.

A third reason for adverse career effects, however, is statistical discrimination based on expected or real differentials in effort, reliability, and productivity (Phelps, 1972; Román, 2006; Sigle-Rushton and Waldfogel, 2007; Evertsson and Duvander, 2011). Since investments like hiring, training and promotion of employees are costly, employers generally prefer dependable employees who are continuously available and display an unfettered dedication towards their job. Clearly it is most profitable for employers to promote those employees that are the most productive

and ambitious and that put in the most effort at the workplace. Ambition, effort, and productivity are not fully observable at reasonable cost, however. Faced with such asymmetric information, employers often rely on signals and screening devices to evaluate (prospective) employees. The most extensively discussed example in the literature is the use of education as an indicator in the hiring decision. Apart from human capital, differences in education reveal differences in ability and ambition between prospective employees and can therefore be used to sort and rank them (Arrow, 1973; Spence, 1973; Stiglitz, 1975).

Employers assess their employees not only during the hiring process, but also evaluate them in order to select candidates for promotion and career development for example. Where work performance or output cannot be measured directly in the production process, employers have to rely on other indicators. One such indicator appears to be visibility and presence at the workplace. The use of long hours and overtime as an indicator that is based on visibility at work is documented in the economic literature (Landers et al., 1996; Simpson, 1998; Sousa-Poza and Ziegler, 2003; Anger, 2008). According to this literature employees are incited to compete over long hours because those employees that display the most overtime are rewarded with better career prospects. Visibility and presence at work thus is interpreted as an indicator of resilience, effort, and ambition. It also indicates whether or not employees have private responsibilities that may interfere with work, because those who do cannot effectively compete over long hours (Simpson, 1998).

As discussed in the human resource management and social sciences literature, the underlying psychological mechanism for the evaluation based on visibility may be the concept of face-time (Kossek and Dyne, 2008; Elsbach et al., 2010). According to Elsbach et al. (2010), observers make spontaneous trait inferences based on the amount of face-time – the amount of time one is seen at the work site – and more visible employees are perceived more positively than less visible ones. These trait inferences are not only based on direct interactions with colleagues and supervisors, but also on differences in *passive* face-time, i.e. being passively observed at the worksite without direct interactions affects perceptions about an employee.

Elsbach et al. (2010) further distinguish between expected face time – being seen at work during normal work hours – and extracurricular face-time – being seen at work outside of normal work hours (in addition to being seen during normal hours). According to their study, employees who display expected face-time are perceived as 'reliable' and 'dependable', whereas employees who show extracurricular face-time

are considered by their supervisors and peers to be 'dedicated' and 'committed'. This implies that employees are evaluated both on the basis of the amount and timing of their presence at work. It further suggests that extraordinary presence at the workplace is necessary to display effort and ambition. This corresponds well with the economic literature on long hours and overtime according to which presenteeism at the workplace is interpreted as an indicator of effort and ambition.[1]

Visibility and presence at the workplace is consequently an important factor for the assessment of employees, in particular for promotions and other career decisions. But how do different TLF arrangements influence the presence at the workplace? Working reduced hours, possibly due to competing demands at home, unambiguously reduces presence at work and therefore lowers employers' expectations regarding the productivity and motivation of an employee (Becker, 1985; Sigle-Rushton and Waldfogel, 2007; Evertsson and Duvander, 2011). For duration flexibility like part-time work or parental leave it has therefore been established that they affect career prospects negatively (Stafford and Sundström, 1996; Sheridan, 2004; Román, 2006; Russo and Hassink, 2008).

For flexibility in schedule or location, i.e. flexi-time or telehomework, the situation is more complex. If flexi-time is organised around an interval of core hours it can be assumed that that the core hours are the interval during which face-time is expected. Holding working hours constant, flexi-time will not have a large impact on visibility at work then. If the flexi-time scheme does not require core hours it is difficult to predict its impact because the effect depends on the design and the utilisation of the flexi-time scheme within the firm and the resulting expectations of colleagues and supervisors.[2] Since we have no data on the exact design of the flexi-time scheme we hypothesise that flexi-time does not change perceptions of visibility significantly and therefore does not affect career opportunities, such as promotions and employer-paid training.

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[1] Elsbach et al. (2010) emphasize that the trait inferences are made spontaneously and unintentional. This is a major difference compared to signalling and screening theories because the latter assume an intentional act from at least either the employee and the employer. The prediction of the passive face-time approach about the TLF arrangement – career nexus is the same, however, namely that less visibility at the workplace decreases promotion probability.

[2] If employees using flexi-time are able to shift their working time such that they show more extra-curricular face-time but less expected face-time, for example, and if the positive effect of increased extracurricular face-time exceeds the negative effect of reduced expected face-time, flexi-time usage may have a positive effect on career prospects. In general, if employees' flexi-time utilisation is perceived as being mostly caused by work demands it should have a positive impact; if it is perceived as being mostly caused by private or home demands, however, it is likely to have a negative impact on the perceptions of supervisors and colleagues.

Hypothesis 1: *Flexi-time does not affect career opportunities.*

For telehomework the impact on visibility and subsequently on career advancement depends on the extent and timing of usage. For employees, there may be two different motivations for the use of locational flexibility in the form of telehomework. One is to complete work at home and to stay on top of things in order to show extra initiative and commitment towards the job. This type of telehomework is presumably carried out occasionally, in an *ad hoc* fashion, and outside of regular office hours in the evening or at weekends. It therefore takes place during times that would be considered extracurricular face-time. This type of telehomework is a complement to time spent in the office and may thus be considered 'overtime at home'.[3] As such it indicates extra effort and ambition and improves career opportunities.

Hypothesis 2a: *Occasional telehomework improves career opportunities.*

The other motivation for telehomework is to be able to combine work and private life and to attend to private responsibilities. This type of telehomework is presumably carried out after an employee leaves work early or on designated work-at-home days, i.e. in a time interval during which presence at the office is usually expected. These employees are therefore likely to be perceived as less dependable and less committed to their work. In this scenario telehomework serves as a substitute for time spent at the office and, with respect to visibility at work, telehomework becomes more similar to part-time work. It is not possible then for employers to distinguish between extraordinary and expected effort, because traditional indicators such as overtime can not be observed and there is more uncertainty regarding the performance and effort of the teleworking employee. So if telehomework is utilised frequently and becomes structural, employers are likely to interpret this as competing demands between work and private life and as an indicator of (relatively) low commitment and ambition towards the job. Frequent telehomework therefore diminishes career opportunities.

Hypothesis 2b: *Frequent telehomework diminishes career opportunities.*

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[3] 'To finish work / overtime' is actually the main motivation for working at home given by the respondents in the data used for our analysis (cf. Vlasblom et al., 2013).

3.3 Methodology

3.3.1 Data and variable description

The data for the analysis is taken from the Dutch Labour Supply Panel (*Arbeids-aanbodpanel*, AAP), a biennial panel survey of a representative sample of Dutch households.[4] The panel survey is conducted to study developments in labour market behaviour and working conditions in the Netherlands and covers a broad range of work- and life-course-related items. The target population consists of the Dutch labour force aged 16 to 66 years. The AAP exists since 1985, but questions about telehomework frequency, which we intend to use here, were consistently asked in 2004 for the first time, so only the waves from 2004 onwards are suitable for our analysis.[5] This means that we have four waves available, for every other year since 2004 to the last publicly available wave from 2010.

As indicators for schedule and location flexibility, we use flexi-time and telehomework, respectively. The flexi-time variable was obtained from the following survey question:

> 'Can you say whether each of the following characteristics does or does not apply to the work you do? [...] Determine start- and end-time myself'

The binary flexi-time variable therefore indicates whether the respondent has variable, self-determined start- and ending times.

The telehomework frequency variable was obtained from the following question:

> 'Do you work at home every now and then in your current job?'

If the answer is yes, the respondent is then asked:

> 'How often do you work at home on average? Never; less than once a week; once a week; twice a week or more.'

From this we create the telehomework frequency variable with four categories. While the question refers to work at home and not explicitly to telework, only 2.71% of the respondents in our net sample who work at home do not use ICT. Hence we label this variable telehomework.

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[4] The panel was formerly known as the OSA Labour Supply Panel is now conducted on behalf of the Social Cultureel Planbureau. The data and its documentation are in Dutch and available via http://easy.dans.knaw.nl.

[5] Telehomework frequency is already available in 2002, but with a different, incompatible coding.

The part-time variable is based on a question on actual hours:

'How many hours do you <u>actually</u> work per week on average?'

From this we created a variable with four categories: small part-time (1–11h) , medium part-time (12–19h), large part-time (20–35h) and full-time employment (36+h). We use a categorical instead of a continuous variable in order to account for potential non-linearities in the effects.

As dependent variables we use promotions and employer-paid training in the two years following the current survey as indicators for career advancement. The information on promotion and training was taken from the following wave of the panel. Regarding promotions, respondents were asked whether their employment situation had changed in the previous two years, i.e. they were asked in $t + 1$ if there were any changes between t and $t + 1$. Up to seven employment changes within the preceding two years were recorded in total. If the employment situation changed, employees were asked whether they got promoted at the same employer. Our variable indicates a promotion if one of these changes was reported by the respondent as one. Since our reference point is time t and the promotion happened between t and $t + 1$, we call this future promotion.

The training variable is constructed very similarly. It indicates future employer-paid training if the respondent reported in the next wave that at least one of up to three work- or employment-related studies or courses he or she followed in the previous two years was paid by the employer.

A number of control variables are used in the regression analysis in order to rule out confounding factors due to differences in individual, household and job characteristics. These are respondents' age, marital status, children at home, level of education, work experience, permanent contract, sector, firm size and year dummies.

Our sample is restricted to employees only, i.e. we exclude self-employed, unemployed and full-time students for example. This is by design, because a respondent has to be employed in order to become promoted or receive employer-paid training. We also exclude employees who always work at home, because the employer does not offer a workplace for example. Furthermore we can only use information from individuals with observations from at least two consecutive years, because information about promotions and training needs to be taken from the following wave of the panel. This also implies that we effectively drop all observations from 2010 (except for the information on promotions and training between 2008 and 2010 from that wave). Finally we drop observations with missing values on any of the variables used in the analysis by listwise deletion. This results in an unbalanced

panel of 6,642 observations from 3,471 individuals. Table 3.1 gives an overview over the variables used and compares the gross and net samples. The gross sample contains the observations without listwise deletion and without two consecutive responses in addition to the net sample, which contains only those observations used in our analysis. The descriptives do not differ markedly between both samples. Individuals in the net sample are slightly more likely to work at home, to work full-time, to be married rather than single, to have children, to have more work experience and to have a permanent contract. All of the following statistics are restricted to the net sample.

3.3.2 Statistical model

We estimate a simple model in which the probability of a promotion in the future depends, among others, on whether employees have flexible working times, the frequency of telehomework, and the number of actual work hours:

$$P_{i,t+1} = \beta_1 ft_{i,t} + \beta_2 tw_{i,t} + \beta_3 pt_{i,t} + \gamma' Z_{i,t} + \alpha_i + \varepsilon_{i,t} \tag{3.1}$$

$P_{i,t}$ is a dummy variable equal to one if the employee i was promoted between the years t and $t+1$, and zero otherwise. $ft_{i,t}$ designates a flexi-time dummy, $tw_{i,t}$ and $pt_{i,t}$ vectors of indicators for telehomework frequency and the number of actual hours, respectively. $Z_{i,t}$ is a vector of control variables (including time dummies), α_i the individual-specific, and ε_{it} the idiosyncratic error term. β_k ($k = 1, 2, 3$) and γ are vectors of parameters to be estimated. With this model we essentially regress observable individual, job, and firm characteristics in t on the probability of promotion between t and $t+1$ (i.e. within the two years following the current survey). The model for future training is equivalent.

The models are estimated by a fixed-effects linear probability specification (LPM) and a fixed-effects logit specification. The advantage of the LPM over the logit specification is that it easily provides average marginal effects. LPMs may not be suitable, however, if too many observations are predicted outside the unit-interval, i.e. smaller than zero or larger than one. In our case this affects up to 14.5% of the observations in the different estimations. Therefore, we also estimate a fixed-effects/conditional logit specification as a sensitivity check. Both specifications are estimated for the total sample and separately for male and female employees.

A drawback of the fixed-effects/conditional logit specification and therefore a limitation of this analysis is that only those individuals with variation in the dependent variable are used for estimation. This means that individuals who

Table 3.1: Descriptive statistics

Variables	Gross sample		Net sample		Min	Max
	Mean	S.E.	Mean	S.E.		
Future promotion	0.07	(0.003)	0.07	(0.003)	0	1
Future employer-paid training	0.35	(0.006)	0.35	(0.006)	0	1
Flexi-time	0.38	(0.005)	0.40	(0.006)	0	1
Telehomework frequency						
Never	0.69	(0.004)	0.66	(0.006)	0	1
Less than once a week	0.14	(0.003)	0.16	(0.004)	0	1
Once a week	0.07	(0.002)	0.08	(0.003)	0	1
Twice a week or more	0.10	(0.003)	0.10	(0.004)	0	1
Actual work hours						
Small part-time (1–11h)	0.08	(0.003)	0.05	(0.003)	0	1
Medium part-time (12–19h)	0.11	(0.003)	0.10	(0.004)	0	1
Large part-time (20–35h)	0.30	(0.004)	0.31	(0.006)	0	1
Full-time (36+h)	0.51	(0.005)	0.54	(0.006)	0	1
Marital status						
Married	0.64	(0.005)	0.71	(0.006)	0	1
Cohabiting	0.11	(0.003)	0.11	(0.004)	0	1
Single	0.25	(0.004)	0.18	(0.005)	0	1
Child(ren)	0.52	(0.005)	0.57	(0.006)	0	1
Work experience	19.88	(0.110)	21.46	(0.132)	0	52
Permanent contract	0.82	(0.004)	0.87	(0.004)	0	1
No. of employees (/1000)	0.52	(0.024)	0.53	(0.025)	0	60
2004	0.31	(0.004)	0.29	(0.006)	0	1
2006	0.36	(0.005)	0.35	(0.006)	0	1
2008	0.34	(0.005)	0.35	(0.006)	0	1
Observations	10740		6642			
Individuals	6147		3471			

Note: The gross sample comprises the observations of all employees in the sample, the net sample the observations used for estimation after list-wise deletion due to missing values. S.E. is the standard error of the mean.

received promotion/training in all observed waves or none at all are eliminated from the estimation sample, so there might be some selection going on (see the relatively low number of individuals and observations used in the fixed-effects logit specifications reported below). This essentially applies to the fixed-effects LPM as well, since it only makes use of the within-variation. Random-effects specifications are not likely to provide consistent estimates, however, since one has to make the strong assumption that the individual-specific error is not correlated with explanatory variables. Hausman tests consequently rejected any random-effects specification in favour of fixed-effects. We also tested several variables for an instrumental variables specification, but unfortunately the dataset does not provide suitable instruments.

3.4 Results

On average, 7.35% of the employees in the net sample are promoted in the following two years, whereas 34.96% participate in employer-paid training. A simple cross-tabulation suggests that TLF indeed affects the probability of both incidents (table 3.2). Employees with access to flexi-time have a 1.63 percentage points higher probability of being promoted, though this difference is not statistically significant at the 5% significance level. Their chance of participating in employer-paid training is also 6.91 points higher. Employees who work at home less than once a week have a 4.19 percentage point higher chance of being promoted than employees who never work at home. There is no significant difference between those who never work at home and those who work at home once a week or more often, however. All telehomeworkers have a significantly higher chance of participating in employer-paid training compared to those employees who never work at home. Employees working full-time and those with large part-time jobs finally have a higher chance of being promoted and participating in training than those in small and medium part-time jobs. So based on these simple cross-tabulations one might be tempted to conclude that TLF arrangements do matter for career advancement and that (occasional) use of schedule and location flexibility may improve career opportunities.

These descriptive statistics do not take any confounding factors like individual and job characteristics into account of course. We therefore turn to the parameter estimates of the regression analysis. Table 3.3 shows the results for future promotions. First of all, the results from the LPM and logit specifications are qualitatively the same, so we will focus on the LPM results in the following.

Table 3.2: Future promotion and training by TLF arrangements

	Promotion		Training		N
	%	S.E.	%	S.E.	
Flexi-time					
No	6.69	(0.40)	32.17	(0.74)	3963
Yes	8.32	(0.53)	39.08	(0.94)	2679
Telehomework frequency					
Never	6.56	(0.37)	30.92	(0.70)	4389
Less than once a week	10.75	(0.95)	44.25	(1.53)	1060
Once a week	6.93	(1.13)	44.75	(2.21)	505
Twice a week or more	7.41	(1.00)	39.24	(1.86)	688
Actual hours					
Small part-time (1–11h)	4.78	(1.17)	11.04	(1.72)	335
Medium part-time (12–19h)	4.25	(0.79)	27.31	(1.74)	659
Large part-time (20–35h)	7.17	(0.57)	34.01	(1.04)	2079
Full-time (36+h)	8.27	(0.46)	39.17	(0.82)	3569
Total	7.35	(0.32)	34.96	(0.59)	6642

Note: Percentage of employees receiving future promotion or training by TLF arrangements. S.E. is the standard error of the mean.

For employees who work at home at least once a week the incidence of promotion is reduced by about 5 percentage points and working at home twice a week or more is associated with a reduction of the promotion probability of 6 percentage points. The logit estimates are only borderline significant at the 10% level but similar to the LPM results in general. This supports the hypothesis that regular telehomework decreases visibility at work and thus conveys an impression of unreliability, less dedication towards work, and competing responsibilities at home.[6]

Occasional telehomework, however, i.e. working at home less than once a week, does not significantly affect the promotion probability for the total sample. This suggests that the data does not support hypothesis 2a, namely that occasional telehomework is viewed as 'overtime at home' and therefore increases career opportunities.

Access to flexi-time also does not seem to affect the probability of promotion significantly for the total sample; the coefficient is not significantly different from zero

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[6] The results from the fixed-effects specifications are virtually the same if we omit all control variables and regress future promotion only on flexi-time and telehomework frequency.

(or one in case of the odds ratios reported for the logit model). The data therefore does not reject the hypothesis that flexi-time does not affect career advancement.

The coefficients on part-time work are not significantly different from zero, which seems to suggest that there is no effect. At first glance, this is surprising, given that previous research has shown that part-time work has adverse effects on career advancement. Since our estimation strategy relies on within-variation only, however, there may not be a sufficient number of observations in the smaller part-time categories with variation in promotion probability to be able to estimate a clear effect. It might also take more time for negative effects of part-time to appear, i.e. the time span covered in our data may be too narrow. From a more optimistic point of view, it might also be the case that since part-time work is so widespread in the Netherlands, particularly among female employees, it does not serve as a screening device anymore and therefore does not exert a negative effect here.[7] Human capital effects, however, should still be observable in the medium and long run.

We also estimate equation 3.1 separately by gender. Since the time-varying control variables are neither individually nor jointly significantly different from zero, we omit them from the model. We also omit the part-time work categories for male employees because there is too few simultaneous variation in part-time work and future promotion to reliably estimate an effect. Looking at the estimation results, it turns out that flexi-time appears to have a slightly negative effect on the promotion probability for female employees, but the coefficient is only borderline significant at the 10% level in both the LPM and logit specifications. The negative effect of regular (once a week) and frequent (twice a week or more) telehomework that we observed for the total sample seems to be significant for male employees only. Here, the two coefficients are also one percentage point larger than for the total sample. For female employees the coefficients on telehomework and part-time work are not significantly different from zero.

The results for training, shown in table 3.4, are qualitatively the same. Working at home twice a week or more decreases the probability of employer-paid training by 7.7 percentage points compared to those employees who never work at home according to the estimates for the total sample. Employees in small part-time jobs also receive significantly less employer-paid training than full-time employees, namely 16.8 percentage points. Flexi-time, however, does not affect the probability of employer-paid training significantly according to the estimates, nor does occasional telehomework.

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[7] Albrecht et al. (1999) for example argue for the Swedish case that parental leave can only act as a signal when men take it. Since virtually all entitled women take parental leave due to the strong financial incentives and custom, their leave taking does not signal anything towards the employer.

Table 3.3: Parameter estimates: Future promotion

Variables	Total LPM	Total Logit (OR)	Male LPM	Male Logit (OR)	Female LPM	Female Logit (OR)
Flexi-time	−0.0165	0.691	5.3e-4	1.01	−0.0371*	0.46*
	(0.0149)	(0.175)	(0.0205)	(0.365)	(0.0215)	(0.204)
Telehomework frequency						
Ref: Never						
Less than once a week	−2.2e-4	1.05	−4.4e-4	0.976	0.0017	1.11
	(0.0198)	(0.236)	(0.0266)	(0.338)	(0.0291)	(0.506)
Once a week	−0.0504**	0.551	−0.0612*	0.392**	−0.0324	0.922
	(0.0251)	(0.209)	(0.0323)	(0.185)	(0.0387)	(0.453)
Twice a week or more	−0.0596**	0.539*	−0.0699*	0.469	−0.0431	0.707
	(0.0265)	(0.181)	(0.0372)	(0.24)	(0.0372)	(0.505)
Actual work hours						
Ref: Full-time (36+h)						
Small part-time (1–11h)	0.0185	1.72	–	–	0.0723	5.67
	(0.0391)	(7.12)			(0.0489)	(26.3)
Medium part-time (12–19h)	0.0282	1.43	–	–	0.0721*	4.12
	(0.033)	(3.24)			(0.0422)	(8.62)
Large part-time (20–35h)	−0.0176	0.718	–	–	−0.001	1.03
	(0.0224)	(0.336)			(0.0342)	(0.469)
Martial status						
Ref: Married						
Cohabiting	−0.0208	0.823	–	–	–	–
	(0.0555)	(0.467)				
Single	−0.0783	0.385	–	–	–	–
	(0.0673)	(0.412)				
Child(ren)	0.0167	1.87	–	–	–	–
	(0.0231)	(0.774)				
Work experience	−4.7e-5	0.989	–	–	–	–
	(0.0017)	(0.0458)				
Permanent contract	0.0154	1.28	–	–	–	–
	(0.0214)	(0.447)				
No. of employees (/1000)	−9.8e-5	1.01	–	–	–	–
	(0.0031)	(0.159)				
Constant	0.0743	–	0.0777***	–	0.0578*	–
	(0.0491)		(0.0157)		(0.0309)	
Pred. outside unit int. (%)	14.5		0		20.01	
Observations	6642	749	3479	386	3163	363
Individuals	3701	290	1892	146	1809	144

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

Note: Parameter estimates of fixed-effects linear probability (LPM) and logit specifications of TLF arrangements on future promotion. Coefficients of logit models are odds ratios. Year (wave) dummies included. Clustered (LPM) / bootstrapped (logit) standard errors in parentheses.

Table 3.4: Parameter estimates: Future employer-paid training

Variables	Total		Male		Female	
	LPM	Logit (OR)	LPM	Logit (OR)	LPM	Logit (OR)
Flexi-time	−0.0084	0.948	−0.0268	0.825	0.0165	1.14
	(0.025)	(0.163)	(0.0334)	(0.188)	(0.037)	(0.255)
Telehomework frequency Ref: Never						
Less than once a week	7.7e-4	0.972	−0.0254	0.814	0.0304	1.14
	(0.0283)	(0.171)	(0.0358)	(0.194)	(0.047)	(0.292)
Once a week	−0.0158	0.868	−0.0874*	0.521*	0.0672	1.37
	(0.0354)	(0.201)	(0.0479)	(0.186)	(0.0521)	(0.368)
Twice a week or more	−0.0773**	0.602**	−0.0877*	0.562*	−0.07	0.548*
	(0.0378)	(0.152)	(0.0527)	(0.175)	(0.0542)	(0.171)
Actual work hours Ref: Full-time (36+h)						
Small part-time (1–11h)	−0.168**	0.353*	−0.338***	1.3e-13***	−0.0927	0.585
	(0.0722)	(0.202)	(0.122)	(9.8e-13)	(0.0938)	(0.325)
Medium part-time (12–19h)	−0.0452	0.732	−0.132	1.6e-7***	−0.0142	0.949
	(0.0522)	(0.329)	(0.113)	(8.0e-7)	(0.0668)	(0.395)
Large part-time (20–35h)	0.0022	1.02	−0.0137	0.896	0.0251	1.25
	(0.0352)	(0.279)	(0.0496)	(0.272)	(0.0534)	(0.448)
Martial status Ref: Married						
Cohabiting	−0.119*	0.513	−0.243***	0.251	0.0125	1.16
	(0.0667)	(0.21)	(0.0917)	(0.74)	(0.0936)	(0.861)
Single	−0.127	0.5	−0.132	0.468	−0.0759	0.718
	(0.0877)	(0.288)	(0.113)	(3.07)	(0.126)	(0.601)
Child(ren)	0.0401	1.3	0.0117	1.07	0.0764	1.76
	(0.0389)	(0.316)	(0.0568)	(0.376)	(0.0518)	(0.643)
Work experience	−0.0048*	0.953*	−9.9e-6	1	−0.0099**	0.908***
	(0.0027)	(0.0264)	(0.0035)	(0.0351)	(0.0041)	(0.0326)
Permanent contract	−0.0168	0.904	−0.0125	0.939	−0.0128	0.957
	(0.0303)	(0.178)	(0.05)	(0.239)	(0.0381)	(0.354)
No. of employees (/1000)	0.0018	1.01	0.0016	1.01	0.0056	1.03
	(0.0056)	(0.0551)	(0.006)	(0.0401)	(0.0131)	(0.138)
Constant	0.485***	–	0.461***	–	0.438***	–
	(0.0717)		(0.101)		(0.106)	
Pred. outside unit int. (%)	0.0452		7.85		2.56	
Observations	6642	1955	3479	1079	3163	876
Individuals	3701	747	1892	408	1809	339

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

Note: Parameter estimates of fixed-effects linear probability (LPM) and logit specifications of TLF arrangements on future employer-paid training. Coefficients of logit models are odds ratios. Year (wave) dummies included. Clustered (LPM) / bootstrapped (logit) standard errors in parentheses.

Again it is mainly male employees who seem to be affected by the negative impact of telehomework. For them the coefficients for regular and frequent telehomework indicate a significant drop in employer-paid training by about 8.7 percentage points. For females only the coefficient on working at home twice a week or more on the logit specification is significant at the 10% level and indicates a decrease in employer-paid training comparable in size to males. Regular or occasional telehomework does not seem to influence the probability of employer-paid training for females significantly.

The coefficients on part-time work are only significant for the male sample, but not for female employees. Note, however, that the share of males working small or medium part-time jobs is very small in our sample (2.1% and 1.5%, respectively).

We also estimated our model on an indicator of future new employment relation with a different employer, i.e. a future job switch. We do not find a significant effect here (not shown). This suggests that schedule and location flexibility is only visible and sanctioned internally within the firm and not outside the firm. These types of flexibility therefore do not serve as indicators for employers other than the current one.

3.5 Discussion and conclusion

Many employees make use of work arrangements which provide them with flexibility in the duration, schedule and location of their work. Previous research has established, however, that duration flexibility, such as part-time work, comes at a cost and has a negative impact on career advancement. For schedule and location flexibility this aspect is less clear, however. On the one hand, employees do not reduce their total working time when they vary their schedule or location of work, so human capital considerations should not play a role here. Occupational segregation or downgrading is also not likely to be a major issue, because schedule and location flexibility is often available in higher status jobs as well. Employees who make use of flexi-time or telehomework are less visible at the workplace, however, and may therefore be perceived as less committed to their work. Employers might therefore be more reluctant to award promotions or employer-paid training to them.

The results of our analysis, based on a large Dutch household panel dataset spanning the years 2004 to 2010, indicate that flexi-time (variable start- and end-times) generally does not significantly affect the probability of future promotions and employer-paid training. The only exception is that flexi-time seems to have a negative effect on the promotion probability of female employees. This result

is not further supported by our estimates on employer-paid training or for male employees, however.

Occasional telehomework also does not affect promotions and employer-paid training according to our estimates. Our hypothesis that occasional telehomework may be interpreted as 'overtime at home' is therefore not supported by the data. More frequent telehomework, however, decreases the probability of both promotions and employer-paid training, especially for male employees. Our interpretation of these findings is that visibility at work indeed plays an important role for the assessment of (male) employees and that less visibility impairs further career development.

The results merit some discussion to put them into perspective. First of all, we have not discussed another potential confounding factor in the in the relation between TLF arrangement utilisation and career prospects, namely that there may be differences in productivity due to TLF arrangement use. If TLF affects productivity (negatively) then these differences in productivity may explain differences in promotion and training opportunities. In our analysis we implicitly assumed that productivity is not affected by TLF utilisation. Many previous studies on productivity and performance effects of schedule and location flexibility indeed find small positive or no effects (Hill et al., 1998; Baltes et al., 1999; Eaton, 2003; Gajendran and Harrison, 2007).[8] Studies on the relationship between schedule and location flexibility and wages suggest a positive effect on productivity as well (e.g. Johnson and Provan, 1995; Gariety and Shaffer, 2001, 2007). Productivity effects of TLF may therefore have a (small) counterbalancing effect on the TLF–career relation. Our results would then constitute a lower bound for the relation between telehomework and promotions.[9]

Second, the fact that flexi-time does not seem to have an impact on promotions and employer-paid training should be used with caution, because our data on flexi-time is relatively poor. We only use a binary indicator for access to flexible start- and end-times, because we have no data on usage available. Since flexi-time implies

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[8] It seems likely though, that the productivity effects depend on the intensity of TLF utilisation and the nature of work tasks, see. e.g. Dutcher (2012).

[9] There may also be an inverse U-shaped effect of telehomework on productivity as well. Occasional telehomework may improve productivity due to fewer disturbances at home for example. Employees are not disturbed by colleagues or clients and can therefore better concentrate on their work at home. With frequent telehomework productivity may suffer, however, because communication is hampered, peers cannot help out, or provoke better performance, etc (cf. Mas and Moretti, 2009). This would provide an alternative theoretical explanation for an inverse U-shaped effect of flexibility on career advancement. Nevertheless, this hypothetical inverse U-shaped relation is not supported by our data.

that employees spend their whole working time at the workplace (just at possibly varying times) one would expect that it has less of an effect on promotions for example than telehomework. Since it is more commonly available than telehomework, it may not be possible to use it as a reliable screening device, either (cf. Albrecht et al., 1999). Nevertheless it would be desirable for future research to be able to confirm this hypothesis with better data and a different estimation strategy.

Third, employers may have different motivations to pay for the training of their employees. Even though its main motivation is likely to be employee retention and career development (cf. Acemoglu and Pischke, 1998), e.g. by rewarding highly productive employees, it may also be assigned to employees with low productivity to get them (back) up to standard. Training may also be directly related to telehomework, if employees receive training to work more efficiently at home for example. This would imply a positive effect of telehomework on employer-provided training. Our estimates would then constitute a lower bound for the relation between telehomework and career-related training. Despite these minor shortcomings, we nevertheless believe that the estimations on training in combination with those on promotions draw a consistent and comprehensive picture of the adverse effects of frequent telehomework on career advancement.

In summary, our results suggest that moderate schedule and location flexibility does not significantly harm career opportunities. Flexi-time and telehomework can therefore be considered useful arrangements to combine paid work with other activities and responsibilities. More frequent use of these arrangements by employees, however, is sanctioned by employers with fewer promotions and less training. It thus seems to be interpreted as insufficient commitment towards the job and competing interests between work and private life. Since the use of these arrangements is less visible outside the firm compared to part-time work for example, the negative career effects of flexi-time and telehomework do not seem to extend to new jobs, however. So as long as employees ensure a decent level of visibility at the workplace, these arrangements may still be preferable alternatives to part-time work in order to gain some temporal and locational flexibility.

4 Does temporal and locational flexibility of work reduce absenteeism?

4.1 Introduction

Compared to the tremendous amount of literature on the number of hours worked, the timing and setting of work has received relatively little attention among labour economists.[1] Most of the time it is implicitly assumed that employees work together simultaneously and at the same location in order to produce goods and services. This does not always have to be the case, of course. An interesting new development in this respect refers to temporal and locational flexibility (TLF). An increasing number of establishments experiment with a new organisation of work and working time in which employees can determine and modify when, where, and how long they work (Messenger, 2010). This provides them with more flexibility with respect to the duration, schedule, and location of work. The share of establishments in 21 EU countries which offered some type of flexibility regarding the beginning and end of daily working time for example rose from 48% to 57% between 2005 and 2009 alone (Riedmann et al., 2010). In the EU27 the share of employees involved in telework for at least a quarter of their working time expanded from 5% to 8.3% between 2000 and 2005 (Paoli and Merllié, 2001; Parent-Thirion and Paoli, 2003; Parent-Thirion et al., 2007). Facilitated by new management styles and modern information and communication technology (ICT), employees can exert more control over the timing and setting of work, which becomes much more individualised under TLF.

It may be presumed that increased TLF is beneficial for employees and in line with the preferences of modern knowledge workers. Employees demand more flexibility in order to suit their preferred life styles and to strike a balance between

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[1] Notable exceptions being some of the works of Daniel Hamermesh (e.g. Hamermesh, 1998, 1999, 2002; Hamermesh and Pfann, 2004).

work and personal life. TLF caters this demand by giving employees more control over duration, schedule and location of work (Lewis, 2003; Plantenga, 2003; Rau, 2003). As a result, TLF allows employees to work during times more suited to their personal needs and circadian rhythm. TLF also reduces time spent commuting or sometimes eliminates commuting altogether. Previous research accordingly indicates that TLF improves the fit between working time and private life and increases job satisfaction (see chapter 2).

Employers may also benefit from increased flexibility for employees, however (Reilly, 2001; Anxo et al., 2006; Chung, 2009). TLF can save costs because turnover and travel expenses are reduced and less office space may be needed. Furthermore, employees' attitudes and morale are improved, leading to more dedicated employees (Allen, 2001; Kelliher and Anderson, 2010).

Another potential benefit, which will be the focus of this chapter, is the reduction of absenteeism rates through increased TLF. TLF may reduce absenteeism because employees can respond more flexibly to minor sickness or private 'emergencies'. Furthermore it may improve worker's health through reduced stress and increased job satisfaction. As a result, TLF arrangements may be an effective device to reduce absenteeism.

Increasing TLF may also come at a cost, however, as less and variable face-time, i.e. presence and visibility at the workplace, complicates coordination, supervision, and monitoring of employees (Felstead et al., 2003). There is also less opportunity for direct interaction and (informal) communication between employees when they do not work simultaneously at the same place. This may reduce favourable peer effects, such as social learning (Sacerdote, 2001) and higher productivity (Falk and Ichino, 2006; Mas and Moretti, 2009).[2] We do not attempt a full cost-benefit analysis in this study, though. The costs of implementing TLF differ between sectors, firms and even types and groups of employees, which is why such an analysis is beyond the scope of this chapter. Other potential advantages of TLF, such as increases in productivity and organisational commitment, are also not considered here.

Instead we focus on reductions of absenteeism as one potential benefit of TLF for employers. Across Europe, average rates of absence are between 3% and 6% of working time with estimated costs amounting to 2.5% of GDP (Edwards and Greasley, 2010). In the Netherlands, with average absence rates of around 4.3% in recent years, yearly wage costs of sickness absenteeism were estimated to be 7.5 billion Euro in 2009 (Hartman et al., 2010). Further reduction of absenteeism may therefore lead to considerable cost savings for employers and society. In addition, absenteeism has been considered an inverse proxy of effort and productivity, espe-

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[2] Adverse peer effects , like absenteeism (De Paola, 2010), may decrease as well, however.

cially in the literature which deals with the link between (financial) incentives and absenteeism (see e.g. Hassink and Koning, 2009).

In order to analyse the effects of TLF on the frequency and duration of sickness absenteeism we use a cross-section survey of Dutch public sector employees. Unfortunately the empirical measurement of TLF is far from perfect yet (CEA, 2010; Plantenga and Remery, 2010). TLF in the strict sense refers to an individualized organisation of work and working time in which at least part of the work can be done outside the premises of the employer and outside regular working hours. In this study we presume that the organisational and agency aspects of TLF are best represented by access to arrangements such as flexi-time, telehomework and part-time work (Plantenga, 2003; Lewis, 2003; Hill et al., 2008). Flexi-time gives employees (some) control over their work schedule and part-time work enables employees to adjust the weekly duration of work. Both are presumed to capture the individualised working times of TLF. Telehomework allows employees (some degree of) individual choice in the location of work and covers the possibility to work at different places. While our cross-sectional data unfortunately does not allow for a causal analysis but can only establish associations between TLF and absenteeism, it is one of the few datasets which contain information on access to flexi-time and telehomework (and not only their utilisation) as well as data on short absences (and not only absences of at least a week for example).

This study is one of the first to analyse potential consequences of this relatively new phenomenon of TLF for employers. It is also one of the few analyses that consider different types of flexibility at the same time. Our results indicate that increased TLF is negatively associated with sickness absenteeism in general and that flexi-time in particular reduces both the frequency and duration of absences.

4.2 Theoretical framework

It has been argued in the economic literature on absenteeism that employers have different requirements on workers to be reliably present at the workplace at fixed, predetermined times and therefore have different shadow costs of absenteeism (Weiss, 1985; Coles and Treble, 1993, 1996). Reliability in work attendance is particularly important in industrial production processes, such as assembly lines, team-work in manufacturing (Heywood and Jirjahn, 2004), or just-in-time production (Coles et al., 2007; Lanfranchi and Treble, 2010). These processes rely on a relatively large endowment of immobile capital and productivity often depends on synchronized activities, because employees need to perform time-critical tasks, interact with clients face-to-face, or complement each other directly in the produc-

tion process (Kremer, 1993; Coles and Treble, 1996).[3] Employers' preference for low levels of absenteeism in these industries results in wage premiums for reliability in work attendance and increased monitoring. Employees in turn sort into jobs based on preferences for non-work activities and their abilities to be reliably present at the workplace at employer-determined times. The resulting differences in absenteeism between firms and industries reflect an equilibrium of this sorting process (Coles and Treble, 1996; Coles et al., 2007).

Quite similar reasons, i.e. different requirements for reliability in work attendance and presence at the workplace due to differences in production processes, determine employers' supply of TLF arrangements to a substantial degree. It is therefore not always possible for employers to implement TLF and give employees more control over time and place of work. In fact, the extent to which TLF can be incorporated varies between different jobs and task profiles, since the importance of simultaneity and presence at the workplace differs between production processes (see already Owen, 1977). Compare for example the type of work in an operating room or on an assembly line on the one hand with the type of work of knowledge or web workers on the other. This implies that TLF may not always be available to employees, especially in jobs that require their physical presence.

Yet, an increasing number of establishments and professions do not require constant physical presence at employer-determined times and locations and work can be exercised more flexibly, not least because information is increasingly transferable through ICT. Modern technology reduces the importance of synchrony in timing and location, allowing for new possibilities in the organisation of work and working time. TLF can therefore still be compatible with team-work or any other production process that requires skill-based complementarity and cooperation between workers as long as this process does not require full synchronisation of time and place between workers and tasks.

There are several reasons why increased TLF may have an impact on absenteeism in those production processes where its implementation is generally possible. First, there may be direct effects of increased control over working time and place on absenteeism. It has previously been argued that absenteeism is higher when there is a mismatch between preferred and actual working hours (Dunn and Youngblood, 1986) and that absenteeism serves as a coping mechanism against bad working conditions, such as low work-time control (Kristensen, 1991). It is therefore to be expected that the absence rate is lower if working conditions are more in line with employees' preferences.

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[3] Reliability and physical presence is also important in some service sector occupations, however, especially if they require face-to-face interaction with colleagues or clients (hospitals, hair dressers, etc.).

Second, TLF arrangements may generate behavioural effects due to an improved timing of and fit between work-related and non-work activities. Emergencies and other non-work responsibilities that appear more or less unplanned may interfere with employee's ability to show up at work. Under a fixed working time regime, absenteeism is the only device that permits an employee to undertake these activities and may therefore be used to obtain work schedule flexibility (Allen, 1981). An employee with TLF on the other hand experiences fewer time restrictions and can thus fit these activities more flexibly into his or her schedule. So instead of using sick leave as a shortcut to be able to react to unforeseen emergencies or attend important non-work activities during scheduled working time – i.e. instead of 'shirking' – employees may make use of TLF arrangements for this purpose (Kim and Campagna, 1981).[4] In that sense, TLF is a more 'controlled' form of absence from the workplace, because it ensures that work tasks are still maintained, and, compared to sickness leave, it provides more reliability for employers with respect to the nature and extent of the absence.

Increased control over working time and place may not only change the way in which employees reconcile emergencies and non-work activities with their work responsibilities, but also how they deal with minor sicknesses and sickness absenteeism. Employees who are sick and have the opportunity to flexibly reschedule their work or to work at home may not report sick or return to work more quickly than employees without these opportunities.[5]

Apart from these behavioural effects, TLF may finally have a positive effect on employees' health via various pathways. Work-time control is associated with positive health outcomes and has been shown to moderate adverse effects on health associated with work-related stress and employer-oriented flexibility, such as overtime and work at irregular hours (Ala-Mursula et al., 2005; Costa et al., 2006; Grzywacz et al., 2008; Olsen and Dahl, 2010). Temporal flexibility furthermore reduces the impact of long domestic and total working hours on absences and work-family interference (Ala-Mursula et al., 2004, 2006; Geurts et al., 2009). Commuters in particular experience a reduction of time available for domestic work, discretionary

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[4] Of course, these two means of obtaining work schedule flexibility come at different (potential) costs to employees and employers. Increased absences may for example result in lower wages, a lower likelihood of promotion or even dismissal for the employee. With TLF the risk of these drawbacks should be considerably smaller.

[5] There may be adverse long-run effects, though. If work pressure is high, more flexibility may lead to presenteeism, i.e. working on the job while being sick. Presenteeism has in general been shown to affect health negatively and is therefore detrimental to productivity and employees' well-being (Kivimäki et al., 2005; Hansen and Andersen, 2009).

leisure activities, sleep, and recovery, which again can lead to health complaints and therefore higher sickness absence rates (Costal et al., 1988). Since TLF can reduce commuting times substantially, it may reduce absenteeism via this route as well (Ala-Mursula et al., 2006; van Ommeren and Gutiérrez-i-Puigarnau, 2011). TLF finally increases job satisfaction (Scandura and Lankau (1997); chapter 2) which again has been shown to improve health (Faragher et al., 2005; Fischer and Sousa-Poza, 2009).

When we look at the different forms of TLF, there may be differences between arrangements such as flexi-time and telehomework on the one hand and part-time work on the other in their potential to reduce absenteeism. Most of the obstacles to work attendance, sickness-related or otherwise, come at short notice. Flexi-time and telehomework make it possible to adjust working schedule and location rather quickly and we consequently assume that these arrangements have a significant impact on absenteeism. Part-time work is different in this respect because adjustments of the length of work are not so quickly made. It seems unlikely then that part-time work will have the same short-term behavioural effects on absenteeism. Nevertheless, some long-term, indirect effects may exist, via health, stress, job satisfaction, etc., as mentioned above. In surveys, part-time workers report for example to be less exposed to work-related health and safety risks, such as hazards and poor ergonomic conditions, and to experience lower work intensity. They also report fewer work-related health symptoms, such as backache, muscular pain, stress and fatigue (Fagan and Burchell, 2002; Isusi and Corral, 2004; Burchell et al., 2007). Part-time employment may therefore have an effect in this domain.

Shorter work hours also improve the combination of paid work and private life, *ceteris paribus*, simply because more time is available for non-work activities. Part-time employment also gives more room for flexible scheduling, because the smaller the number of working hours of an employee, the smaller their fraction relative to a given amount of business hours and therefore the more room to schedule these hours into the roster. More part-time than full-time employees therefore report to have at least some control over their work schedule. Part-time employees accordingly report more often that their work lives are compatible with other commitments (Fagan and Burchell, 2002; Burchell et al., 2007). Furthermore, the opportunity costs of work increase under the assumption of decreasing marginal utility from work. More working hours would therefore lead to an increase in absenteeism (Allen, 1981).[6]

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[6] Increased hours may theoretically lead to a *decrease* in absences as well, because the cost of a potential job loss increases with working hours (Drago and Wooden, 1992). Empirically, Drago and Wooden (1992) find a positive (composite) effect, however.

TLF may be particularly relevant for workers with care responsibilities, because those may entail unexpected tasks that cannot be delayed, but have to be performed immediately or at specific times of the day (Hassink and Van den Berg, 2011). Especially young children are likely to cause unexpected emergencies that interfere with work responsibilities (Greenhaus and Beutell, 1985). Here again, more control over the timing and location of work may reduce the need to 'shirk'. Two previous studies accordingly point towards a negative relationship of flexi-time on work-family conflict and subsequent absenteeism. Ralston and Flanagan (1985) found that flexi-time reduces absenteeism of both men and women by helping to cope with inter-role conflict. VandenHeuvel (1997) shows that family-related absence is reduced if (female) workers can flexibly reschedule their work hours due to family reasons. So, TLF may reduce absenteeism especially for employees with family responsibilities, due to their greater need for flexibility.

In summary there are several ways how TLF influences absenteeism. It may change the way employees directly deal with emergencies and (minor) sickness, and it may improve health, for example by reducing stress and increasing job satisfaction. Part-time work is different from flexi-time and telehomework in that it usually cannot be adapted as quickly to changing circumstances as the latter two. Part-time work may nevertheless have positive longer-term effects on health and work-life fit and may therefore reduce absenteeism as well. Employees with family responsibilities, finally, benefit particularly from TLF. These considerations lead to the following hypotheses:

Hypothesis 1*: Increased temporal and locational flexibility through the use of TLF arrangements (flexi-time, telehomework, part-time work) is negatively associated with sickness absenteeism.*

Hypothesis 2: *The association is stronger for flexi-time and telehomework than for part-time work, because the former make it possible to adjust the timing and location of work at short notice.*

Hypothesis 3: *The association between temporal and locational flexibility and sickness absenteeism is stronger for employees with family responsibilities than for those without, due to a higher demand for flexibility by the former group of employees.*

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4.3 Methodology

4.3.1 Data

The Dutch Public Sector Employee Survey 2004 (*Personeelsonderzoek Overheids-personeel*, PO 2004) by the Dutch Ministry of the Interior and Kingdom Relations (MinBZK, 2005) is used for the analysis.[7] This survey is conducted biennially to study the satisfaction, motivation, characteristics and labour market behaviour of public sector employees in the Netherlands. TLF was already a noteworthy phenomenon in 2004 and the institutional framework has not changed significantly since. The PO 2004 edition is unique in that it includes data on the preference for and the availability of TLF arrangements and other working conditions. It contains data on more than 20,000 employees from all public sectors, like state government, municipalities, police, defence, schools, universities, and academic hospitals and provides detailed information on work organisation, fringe benefits, and other work-related factors, as well as socio-economic and household characteristics of the surveyed employees.

All respondents were employed with the same employer for the whole year 2003 (MinBZK, 2005, p. 63).[8] Data from individuals working in the defence sector as well as from all individuals with missing information on one of the variables used were excluded from the analysis, resulting in a net sample size of 18,296 employees.[9] Table 4.1 presents an overview and descriptive statistics of the variables used in the analysis.

The dataset contains three variables relating to absenteeism; a binary variable for whether or not the respondent reported sick, the total number of times the respondent was absent (frequency) and the total number of days the respondent was absent (duration) in the previous year. The latter two are used as the dependent variables. In 2003 57.0% of the employees reported sick at least once. On average, employees called in sick 1.14 times and 7.41 days.

The main independent variables are the opportunity to work at home every now and then (telehomework) and to have flexible working times (flexi-time), which are

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[7] The PO datasets are available for scientific research upon request at the Dutch Ministry of the Interior and Kingdom Relations.

[8] This includes employees who changed jobs or had multiple contracts with the same employer, who stopped working for not more than three months and resumed afterwards, or whose number of working hours changed. It does not include employees who entered and left the public sector or changed employers within the public sector (e.g. from one police corps to another) in 2003 (MinBZK, 2005, p. 69). For a description of the sample design see MinBZK (2005, p. 64 et sqq.).

[9] The gross sample size, i.e. including observations with missing values, is 23,073.

Table 4.1: Descriptive statistics

Variables	Gross sample		Net sample		Min	Max
	Mean	S.E.	Mean	S.E.		
Number of times reported sick	1.168	(0.010)	1.141	(0.011)	0	25
Number of days reported sick	7.518	(0.147)	7.414	(0.160)	0	260
Flexi-time access	0.549	(0.003)	0.568	(0.004)	0	1
Telehomework access	0.503	(0.003)	0.515	(0.004)	0	1
Part-time job						
Small (1–11h)	0.026	(0.001)	0.022	(0.001)	0	1
Medium (12–19h)	0.081	(0.002)	0.075	(0.002)	0	1
Large (20–35h)	0.322	(0.003)	0.313	(0.003)	0	1
Full-time (36+h)	0.571	(0.003)	0.589	(0.004)	0	1
Workdays per week						
1 workday	0.012	(0.001)	0.011	(0.001)	0	1
2 workdays	0.051	(0.001)	0.048	(0.002)	0	1
3 workdays	0.145	(0.002)	0.140	(0.003)	0	1
4 workdays	0.283	(0.003)	0.283	(0.003)	0	1
5 workdays	0.503	(0.003)	0.512	(0.004)	0	1
6 workdays	0.006	(0.001)	0.006	(0.001)	0	1
Female	0.493	(0.003)	0.472	(0.004)	0	1
Child(ren) 0–5 years at home	0.144	(0.002)	0.152	(0.003)	0	1
Child(ren) 6+ years at home	0.432	(0.003)	0.438	(0.004)	0	1
Marital status						
Single	0.162	(0.002)	0.163	(0.003)	0	1
Cohabiting or married	0.818	(0.003)	0.829	(0.003)	0	1
Living at parent's home	0.013	(0.001)	0.004	(0.000)	0	1
Other	0.007	(0.001)	0.004	(0.000)	0	1
Does partner have a job?						
No	0.319	(0.003)	0.313	(0.003)	0	1
Yes, ≤ 20h	0.158	(0.002)	0.163	(0.003)	0	1
Yes, > 20h	0.523	(0.003)	0.524	(0.004)	0	1
Age						
15–24 years	0.035	(0.001)	0.031	(0.001)	0	1
25–34 years	0.177	(0.003)	0.184	(0.003)	0	1
35–44 years	0.259	(0.003)	0.268	(0.003)	0	1
45–54 years	0.366	(0.003)	0.366	(0.004)	0	1
55+ years	0.164	(0.002)	0.151	(0.003)	0	1
Highest educational degree						
Primary	0.007	(0.001)	0.004	(0.000)	0	1
Lower vocational	0.041	(0.001)	0.035	(0.001)	0	1
Lower secondary	0.075	(0.002)	0.073	(0.002)	0	1
Higher secondary	0.059	(0.002)	0.061	(0.002)	0	1
Vocational	0.147	(0.002)	0.150	(0.003)	0	1
Professional	0.452	(0.003)	0.447	(0.004)	0	1

Table 4.1: Descriptive statistics *(cont.)*

Variables	Gross sample		Net sample		Min	Max
	Mean	S.E.	Mean	S.E.		
Academic (bachelor)	0.035	(0.001)	0.035	(0.001)	0	1
Academic (master+)	0.184	(0.003)	0.194	(0.003)	0	1
Work experience (years)	22.267	(0.071)	22.158	(0.078)	0	55
Wage						
≤ 1.250 EUR	0.092	(0.002)	0.083	(0.002)	0	1
1.251–1.500 EUR	0.077	(0.002)	0.072	(0.002)	0	1
1.501–1.750 EUR	0.073	(0.002)	0.070	(0.002)	0	1
1.751–2.000 EUR	0.087	(0.002)	0.083	(0.002)	0	1
2.001–2.500 EUR	0.182	(0.003)	0.178	(0.003)	0	1
2.501–3.000 EUR	0.135	(0.002)	0.137	(0.003)	0	1
3.001–3.500 EUR	0.141	(0.002)	0.145	(0.003)	0	1
3.501–4.000 EUR	0.093	(0.002)	0.098	(0.002)	0	1
4.001–4.500 EUR	0.056	(0.002)	0.061	(0.002)	0	1
4.501–5.000 EUR	0.032	(0.001)	0.035	(0.001)	0	1
> 5.000 EUR	0.032	(0.001)	0.036	(0.001)	0	1
Regularly doing overtime	0.466	(0.003)	0.472	(0.004)	0	1
Satisfaction with hours						
Satisfied	0.817	(0.003)	0.816	(0.003)	0	1
Prefers more hours	0.059	(0.002)	0.056	(0.002)	0	1
Prefers fewer hours	0.124	(0.002)	0.128	(0.002)	0	1
Multiple jobs	0.063	(0.002)	0.059	(0.002)	0	1
Contract						
Permanent	0.938	(0.002)	0.945	(0.002)	0	1
Temporary	0.049	(0.001)	0.045	(0.002)	0	1
Other	0.012	(0.001)	0.010	(0.001)	0	1
Executive position	0.260	(0.003)	0.274	(0.003)	0	1
Sector						
State government	0.162	(0.002)	0.176	(0.003)	0	1
Municipalities	0.073	(0.002)	0.077	(0.002)	0	1
Primary education	0.190	(0.003)	0.172	(0.003)	0	1
Secondary education	0.180	(0.003)	0.171	(0.003)	0	1
Vocational training	0.141	(0.002)	0.138	(0.003)	0	1
Judiciary	0.012	(0.001)	0.012	(0.001)	0	1
Police	0.077	(0.002)	0.080	(0.002)	0	1
Research institutes	0.014	(0.001)	0.015	(0.001)	0	1
Higher professional education	0.029	(0.001)	0.030	(0.001)	0	1
University	0.039	(0.001)	0.041	(0.001)	0	1
District water board	0.017	(0.001)	0.019	(0.001)	0	1
Provinces	0.024	(0.001)	0.027	(0.001)	0	1
Academic hospitals	0.043	(0.001)	0.042	(0.001)	0	1
Firm size						
1–10 employees	0.009	(0.001)	0.008	(0.001)	0	1

Table 4.1: Descriptive statistics *(cont.)*

Variables	Gross sample		Net sample		Min	Max
	Mean	S.E.	Mean	S.E.		
11–20 employees	0.025	(0.001)	0.023	(0.001)	0	1
21–50 employees	0.064	(0.002)	0.059	(0.002)	0	1
51–100 employees	0.078	(0.002)	0.073	(0.002)	0	1
101–500 employees	0.313	(0.003)	0.310	(0.003)	0	1
501–1.000 employees	0.128	(0.002)	0.131	(0.002)	0	1
1.001–5.000 employees	0.244	(0.003)	0.252	(0.003)	0	1
> 5.000 employees	0.139	(0.002)	0.145	(0.003)	0	1
Observations	23073		18296			

Note: The gross sample comprises the observations of all employees in the sample, the net sample the observations used for estimation after list-wise deletion due to missing values. S.E. is the standard error of the mean.

both dummy variables (0 = no/don't know; 1 = yes)[10], as well as three part-time work categories.

A large number of control variables that measure observable personal and household as well as job and employer characteristics are used (see table 4.1). Many of these are likely to be correlated with TLF arrangements and to simultaneously affect the frequency and length of absences. Most control variables are measured as dummy or categorical variables.

4.3.2 Statistical model

Both dependent variables are count outcomes which exhibit significant overdispersion. The data was therefore fitted with a negative binomial regression model (NB).[11] In the NB the counts follow a Poisson regression model to which a variable v_i is added, such that e^{v_i} follows a gamma distribution with mean 1 and variance α. α denotes the overdispersion parameter; the larger α, the greater the overdispersion:

$$y_i \sim \text{Poisson}(\mu_i)$$

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[10] The 'no' (arrangement not available) and the 'don't know' categories are treated the same. For our analysis it is very unlikely that unknown policies affect absences. If an employee is not aware of whether or not she has access to an arrangement, she probably will not have made use of it.

[11] See Cameron and Trivedi (1998), Long (1997), Long and Freese (2005) or Winkelmann (2008) for a statistical treatment of count data models.

where

$$\mu_i = \exp(X_i'\beta + v_i) \cdot exposure$$

and

$$e^{v_i} \sim \text{Gamma}(1/\alpha, \alpha)$$

The above implies that

$$\mu_i \sim \text{Gamma}(1/\alpha, \alpha\mu_i)$$

and thus

$$\text{Var}(y_i) = \mu_i(1 + \alpha\mu_i)$$

The dispersion for the ith observation is therefore equal to $1 + \alpha(\exp(\beta'X_i) \cdot exposure_i)$. Specifically we thus employ a negative binomial mean-dispersion model (NB2 in the terminology of Cameron and Trivedi (1998, pp. 70-77)).

The overdispersion parameter α, reported in the tables below, is significantly different from zero in all models. As a robustness check, the models were also estimated by Poisson quasi-MLE (Gourieroux et al., 1984; Cameron and Trivedi, 2010). This alternative specification did not affect the results significantly. Fitting the data with a zero-inflated model was rejected in favour of the NB2, due to the risk of misspecification and overfitting the data (Long, 1997; Staub and Winkelmann, 2013).[12]

Two models for each of the two dependent variables were estimated. The first model includes all independent and control variables, but no interactions. In the second model we interact flexi-time and telehomework, respectively, with dummy variables indicating the presence of one or more children of two different age categories. This will show us whether these work arrangements have an additional effect for employees with (small) children and reduce absenteeism by helping them to combine paid work with private life. Both models were estimated for the total

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[12] In order to use zero-inflated models one basically has to assume that there is a two-stage process at work: The first process determines whether or not it is structurally possible for an employee to be absent, the second determines the extent of the absences, given that absences are possible. It is hard to imagine why the structural probability of an employee to be absent should be zero, however, so the use of zero-inflated models is not justified here.

sample as well as separately for female and male employees in order to determine whether there are structural differences in the effect of TLF arrangements on the absence behaviour of men and women (VandenHeuvel and Wooden, 1995).

The regular number of workdays per week was used as an exposure variable, to account for the fact that the absolute risk of absence is reduced for those who work fewer days. In addition, the workdays variable was included as a control to disentangle the effects of variation in working hours from variation in working days (see Barmby et al. (2001) for a similar strategy).

The usual limitations of cross-sectional data like this also apply to this empirical analysis. The analysis does not imply any statistical causality and despite the large number of control variables there may be potential biases due to unobservable heterogeneity at the individual, job, or firm level. Employees with unobserved private responsibilities or preferences for flexibility may for example self-select into jobs with TLF and exhibit higher absenteeism rates as well. TLF is also not possible in jobs where the task profile requires reliability in work attendance and presence at the workplace and we do not have any information in the data on whether TLF would be generally possible. The literature based on Coles and Treble (1996), however, implies that employers will pay wage premiums and monitor employees more extensively in jobs where reliable attendance is crucial. To the extent that TLF is also not possible in these jobs, we may assume that absenteeism is lower to begin with here. Both aspects, i.e. self-selection and structural differences in TLF availability, would imply a downward bias on our estimates.

Furthermore we have to rely on self-reported data, which means that measurement errors are possible. Employees may not fully recall the frequency and duration of absences in the previous year for example (Dionne and Dostie, 2007).

4.4 Results

Table 4.2 shows the incidence rate ratios, table 4.3 the average marginal effects for the model without interactions. Access to flexi-time and access to telehomework have a significant effect on the number of times absent according to the model. Both reduce the absence frequency by about 5% or 0.06 absences per year holding all other variables in the model constant (column absence frequency: total sample). Access to flexi-time furthermore reduces the length of absences significantly by 15.5% or 1.27 days per year (absence duration: total sample). The coefficients on part-time work are not significantly different from the base category (>35h per week) for the total sample on both the absence frequency and duration with one

Table 4.2: Incidence rate ratios of TLF on absence frequency and duration

	Absence Frequency			Absence Duration		
	Total	Male	Female	Total	Male	Female
Flexi-time access	0.951**	0.937*	0.959	0.845***	0.804***	0.876**
	(0.0220)	(0.0331)	(0.0282)	(0.0421)	(0.0544)	(0.0576)
Telehomework access	0.941***	0.924**	0.956*	0.952	0.956	0.944
	(0.0199)	(0.0296)	(0.0262)	(0.0434)	(0.0612)	(0.0563)
Small part-time (1–11h)	0.925	0.967	0.914	0.826	1.080	0.739
	(0.0767)	(0.137)	(0.0963)	(0.151)	(0.296)	(0.165)
Medium part-time (12–19h)	0.910*	0.896	0.920	0.899	0.659*	1.004
	(0.0468)	(0.0921)	(0.0573)	(0.104)	(0.152)	(0.129)
Large part-time (20–35h)	1.037	1.122**	1.016	1.000	1.023	1.003
	(0.0334)	(0.0552)	(0.0424)	(0.0657)	(0.0991)	(0.0822)
Female	1.193***	–	–	1.360***	–	–
	(0.0288)			(0.0789)		
Children 0–5 years at home	1.085***	1.178***	1.028	1.011	1.021	1.067
	(0.0288)	(0.0454)	(0.0382)	(0.0599)	(0.0901)	(0.0828)
Children 6+ years at home	0.944**	0.983	0.909***	0.947	0.924	0.988
	(0.0211)	(0.0317)	(0.0277)	(0.0467)	(0.0630)	(0.0665)
α	0.459	0.551	0.367	3.639	4.183	3.074
	(0.0225)	(0.0367)	(0.0255)	(0.0591)	(0.0951)	(0.0681)
Observations	18296	9652	8644	18296	9652	8644

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

Note: Parameter estimates of TLF arrangements on absence frequency and duration from negative binomial regression. The coefficients are incidence rate ratios; the reference point is therefore 1. The reference group is employees with full-time jobs (36+ hours) and no access to flexi-time nor telehomework. α denotes the overdispersion parameter. Number of workdays used as an exposure variable. Robust standard errors in parentheses. See table 4.A.1 in the appendix to this chapter for the full-specification.

exception. Employees with medium part-time jobs (12–19h per week) are about 9% or 0.10 times less absent than employees working full-time, but the coefficient is only significant at the 10% level. Note, however, that the regular weekly number of workdays was used as an exposure variable, and included as a control (cf. Barmby et al. (2001)). The latter exhibit large coefficients net of exposure, so employees working fewer than five days are *relatively* more often and longer absent than those working five days, holding the number of hours constant (i.e. compressed working week). Employees working only two days a week for example are on average 2.5 times more often and twice as long absent than employees who usually work five days. In *absolute* terms, employees working two to four days a week are as often and as long absent as employees working five days.

Table 4.3: Average marginal effects of TLF on absence frequency and duration

	Absence Frequency			Absence Duration		
	Total	Male	Female	Total	Male	Female
Flexi-time access	−0.0578**	−0.0646*	−0.0544	−1.270***	−1.519***	−1.102**
	(0.0266)	(0.0356)	(0.0386)	(0.384)	(0.489)	(0.554)
Telehomework access	−0.0687***	−0.0787**	−0.0590*	−0.368	−0.307	−0.474
	(0.0240)	(0.0319)	(0.0357)	(0.338)	(0.435)	(0.489)
Small part-time (1–11h)	−0.0849	−0.0323	−0.113	−1.310	0.549	−2.167
	(0.0877)	(0.134)	(0.128)	(1.149)	(2.025)	(1.419)
Medium part-time (12–19h)	−0.103*	−0.101	−0.105	−0.758	−2.334**	0.0316
	(0.0544)	(0.0907)	(0.0776)	(0.800)	(1.063)	(1.070)
Large part-time (20–35h)	0.0420	0.119**	0.0213	0.000506	0.158	0.0268
	(0.0374)	(0.0527)	(0.0550)	(0.496)	(0.676)	(0.681)
Observations	18296	9652	8644	18296	9652	8644

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

Note: Average marginal effects after negative binomial regression. Robust standard errors in parentheses. See table 4.A.1 for reference groups and control variables.

As a next step, the model is estimated separately by gender to determine whether there are significant differences in the effect of TLF on the absence behaviour of men and women. The estimation results from the separate regressions are combined by seemingly unrelated estimation Weesie (1999) and StataCorp (2013).[13] Subsequent Wald tests for differences in the coefficients do not reject the hypothesis of equal coefficients on flexi-time, telehomework and part-time work for male and female employees, both with respect to frequency and duration of absences (see table 4.2).[14] So there are virtually no gender differences in the associations between TLF arrangements and absenteeism.

To analyse whether TLF arrangements have an additional effect for employees with family responsibilities, the flexi-time and telehomework variables are both interacted with dummy variables indicating the presence of one or more children of two different age categories (see table 4.4). The main effects are similar in size and direction to the specification without interactions above. The interaction effects are not significantly different from zero with respect to absence frequency.

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[13] Seemingly unrelated estimation combines the parameter estimates and associated variance-covariance matrices of two or more regression models in order to test cross-model hypotheses.

[14] Even though two part-time coefficients on the male sample are significantly different from one (the reported coefficients are incidence rate ratios and therefore the reference point is one), these coefficients do not differ from those of female employees at conventional levels of significance.

Table 4.4: Incidence rate ratios of TLF on absence frequency and duration: Interactions with children

	Absence Frequency			Absence Duration		
	Total	Male	Female	Total	Male	Female
Flexi-time access	0.929**	0.921*	0.943	0.798***	0.734***	0.876**
	(0.0286)	(0.0388)	(0.0341)	(0.0511)	(0.0534)	(0.0551)
Telehomework access	0.946*	0.938	0.952	1.018	1.037	0.992
	(0.0280)	(0.0383)	(0.0334)	(0.0626)	(0.0715)	(0.0609)
Children 0–5 years at home	1.083*	1.154**	1.051	1.071	0.968	1.288***
	(0.0462)	(0.0777)	(0.0569)	(0.102)	(0.117)	(0.120)
Children 6+ years at home	0.920**	0.984	0.871***	0.936	0.919	0.966
	(0.0319)	(0.0472)	(0.0378)	(0.0701)	(0.0762)	(0.0692)
Flexi-time*Children 0–5	0.986	0.973	0.982	0.953	0.930	0.866
	(0.0470)	(0.0757)	(0.0615)	(0.0990)	(0.132)	(0.0948)
Flexi-time*Children 6+	1.065	1.049	1.059	1.158*	1.236**	1.060
	(0.0428)	(0.0578)	(0.0539)	(0.103)	(0.116)	(0.0905)
Telehomework*Children 0–5	1.023	1.082	0.973	0.952	1.218	0.786**
	(0.0470)	(0.0817)	(0.0608)	(0.0946)	(0.167)	(0.0857)
Telehomework*Children 6+	0.980	0.944	1.024	0.872	0.797**	0.980
	(0.0390)	(0.0512)	(0.0520)	(0.0782)	(0.0726)	(0.0824)
Small part-time (1–11h)	0.923	0.962	0.912	0.822	1.073	0.727**
	(0.0764)	(0.134)	(0.0847)	(0.148)	(0.290)	(0.114)
Medium part-time (12–19h)	0.909*	0.895	0.918	0.894	0.656**	1.000
	(0.0468)	(0.0933)	(0.0529)	(0.103)	(0.113)	(0.0952)
Large part-time (20–35h)	1.037	1.121***	1.015	0.998	1.011	1.003
	(0.0333)	(0.0469)	(0.0377)	(0.0653)	(0.0705)	(0.0621)
Female	1.193***	–	–	1.366***	–	–
	(0.0288)			(0.0787)		
α	0.458	0.550	0.367	3.637	4.176	3.070
	(0.0225)	(0.0254)	(0.0183)	(0.0590)	(0.0739)	(0.0533)
Observations	18296	9652	8644	18296	9652	8644

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

Note: Parameter estimates of TLF arrangements on absence frequency and duration from negative binomial regression. The coefficients are incidence rate ratios; the reference point is therefore 1. The reference group is male employees with full-time jobs (36+ hours), no access to flexi-time nor telehomework and without children. α denotes the overdispersion parameter. Number of workdays used as an exposure variable. Robust standard errors in parentheses. See table 4.A.2 in the appendix to this chapter for the full specification.

With respect to absence duration, the main flexi-time incident rate ratio of male employees is 0.734 and the interaction between flexi-time and small children up to 5 years of age is not significant. The incidence rate ratio of the interaction between flexi-time and children of six years and older for male employees is positive and significant. So male employees without children with access to flexi-time report significantly shorter absences on average by about 26% or some 2.2 days per year (and this effect persists for male employees with small children), but male employees with older children seem to benefit from flexi-time less. Finally the incidence rate ratios of the interaction of telehomework and children with respect to absence duration is significantly smaller for male (telehomework*children 6+) and female (telehomework*children 0 – 5) employees. This provides some support for the hypothesis that the association between TLF and absenteeism is stronger for employees with family responsibilities. Apart from this, however, TLF does not seem to have any *additional* effects for employees with children at home.

4.5 Discussion and conclusion

An increasing number of establishments experiment with a new organisation of work and working time in which employees can determine and modify when, where, and how long they work. Due to differences in production processes which vary in their requirement for reliability in work attendance and presence at the workplace, this temporal and locational flexibility of work is not available in all occupation and task profiles. Nevertheless, this interesting new development represents the increasing individualisation of the labour market and affects a growing share of jobs and establishments.

In this chapter we focus on one of the potential consequences of TLF that are also of interest for employers, namely how TLF affects on the frequency and length of sickness absenteeism. Our analysis shows that increased temporal and locational flexibility is negatively associated with sickness absenteeism in general. Especially flexi-time, i.e. quickly adjustable schedule flexibility, reduces both the frequency and – in particular – the duration of absences. Telehomework or location flexibility seems to mainly affect absence frequency but not absence duration. So by and large, absence from work via schedule and location flexibility seems to partly substitute sickness absenteeism. This is beneficial and not a zero-sum game for employers, because it ensures that work tasks are still maintained and it provides more reliability for employers with respect to the nature and extent of the absence. Regarding schedule and location flexibility, hypothesis 1, stating that TLF is negatively associated with absenteeism, is therefore not rejected by the data.

Long-term duration flexibility in the form of part-time work finally does not appear to have a significant impact on absenteeism in general, at least not with respect to the number of working hours and holding the number of workdays constant. So even though part-time employees report more often that their work is compatible with other commitments (Burchell et al., 2007; Fagan and Burchell, 2002), this is not reflected in fewer and shorter absences. Controlling for the number of hours, fewer workdays are associated with relatively more frequent and longer spells of absenteeism. So with respect to duration flexibility, hypotheses 1 is rejected by the data. Accordingly, hypothesis 2, stating that the negative association between TLF and absenteeism is stronger for flexi-time and telehomework than for part-time work, is not rejected by the data.

TLF is likely to be particularly relevant for employees with family responsibilities. This should be reflected in lower absenteeism for this group in particular, because TLF offers an alternative to 'emergency-induced' absences, and because it may reduce work-life related stress in general. This reasoning is only very weakly supported by the data, however. There are virtually no gender differences with respect to the effects of flexi-time and telehomework and the interactions of these two variables with the presence of children are mostly not significant. Hypothesis 3 is thus for the most part rejected by the data.

This finding may seem puzzling at first glance. Employees with access to tele-homework and especially flexi-time report significantly more often than their colleagues without access to these arrangements that their working times match well with their private life (see chapter 2). This improved fit between work and private life may not translate into fewer and shorter absences, however, because alternative arrangements like short-term care leave are available to react to emergencies (Olsen and Dahl, 2010). It is also possible that voluntary or family-related absences were under-reported in our data, since the dependent variables explicitly measure the frequency and length of *sickness* absence. Employees may thus be reluctant to report family-related absences in this category (Drago and Wooden, 1992; VandenHeuvel, 1997).[15] Employees with children that do not have access to TLF arrangements may therefore still have more absence days altogether (i.e. sickness and family-related) than those with access.

Even though the data does not allow for firm conclusions on whether TLF mainly affects absenteeism because it lifts time-restrictions and changes employees' behaviour or because it improves employees' health, we still attempt an educated guess. The behavioural effects of increased TLF on absenteeism should mainly concern

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[15] On the reliability of self-reported data on sick leave in general, see van Poppel et al. (2002), Ferrie et al. (2005) and Voss et al. (2008).

and become apparent in short-term absences, since emergencies and minor indispositions by their very nature come at short notice and often last only a short time. Health-related effects of TLF on the other hand should be reflected in reductions in medium- and long-term absences. If the effect of TLF is larger with respect to the frequency of absences than with respect to their duration, it can be interpreted as a short-term behavioural effect. If the effect is larger with respect to the length than to the frequency, however, it is likely to be a health-related effect. The analysis indicates that telehomework is associated with fewer but not with significantly shorter absences. This suggests that telehomework only reduces short-term absences and thus has an effect on employees' behaviour, but not so much on their health. Flexi-time reduces the frequency of absences similarly, but also has a considerable and highly significant effect on absence duration. Flexi-time therefore not only appears to affect the behaviour of employees but seems to have a positive influence on health as well.

The results of this study do not cover a full cost-benefit analysis of TLF for employers, but focus only on one potential consequence of TLF. The costs of implementing TLF as well as the costs of absenteeism differ between sectors, firms and even types and groups of employees (Coles and Treble, 1996; Heywood and Jirjahn, 2004; Coles et al., 2007), which makes such an analysis extremely difficult. Other potential advantages of TLF, such as increases in productivity and organisational commitment, would have to be considered as well. Another limitation of this study is that we cannot control for individual-, job-, or firm-related heterogeneity and that we do not have data on private sector employees. We are therefore only able to establish associations between TLF and sickness absenteeism. Future analyses can improve on both of these issues, once better data becomes available.

The markedly negative association between TLF and absenteeism nevertheless shows a clear benefit of TLF and should increase employers' interest in it further. Apparently TLF is not only valuable for employees and in line with the preferences of modern knowledge workers, but can be quite beneficial for employers as well.

Appendix

4.A Tables

Table 4.A.1: Incidence rate ratios of TLF on absence frequency and duration

	Absence Frequency			Absence Duration		
	Total	Male	Female	Total	Male	Female
Flexi-time access	0.951**	0.937*	0.959	0.845***	0.804***	0.876**
	(0.0220)	(0.0331)	(0.0282)	(0.0421)	(0.0544)	(0.0576)
Telehomework access	0.941***	0.924**	0.956*	0.952	0.956	0.944
	(0.0199)	(0.0296)	(0.0262)	(0.0434)	(0.0612)	(0.0563)
Part-time employment						
Ref: Full-time						
Small (1–11h)	0.925	0.967	0.914	0.826	1.080	0.739
	(0.0767)	(0.137)	(0.0963)	(0.151)	(0.296)	(0.165)
Medium (12–19h)	0.910*	0.896	0.920	0.899	0.659*	1.004
	(0.0468)	(0.0921)	(0.0573)	(0.104)	(0.152)	(0.129)
Large (20–35h)	1.037	1.122**	1.016	1.000	1.023	1.003
	(0.0334)	(0.0552)	(0.0424)	(0.0657)	(0.0991)	(0.0822)
Workdays per week						
Ref: 5 workdays						
1 workday	2.108***	1.379	2.707***	2.009**	1.032	2.580**
	(0.355)	(0.442)	(0.551)	(0.679)	(0.495)	(1.008)
2 workdays	2.408***	2.706***	2.416***	2.119***	2.431***	2.078***
	(0.142)	(0.341)	(0.161)	(0.266)	(0.558)	(0.303)
3 workdays	1.608***	1.850***	1.626***	1.473***	1.966***	1.407***
	(0.0641)	(0.165)	(0.0746)	(0.117)	(0.271)	(0.133)
4 workdays	1.339***	1.296***	1.359***	1.398***	1.386***	1.394***
	(0.0363)	(0.0481)	(0.0524)	(0.0813)	(0.108)	(0.104)
6 workdays	0.663***	0.623***	0.723	0.526**	0.356***	1.018
	(0.104)	(0.113)	(0.210)	(0.136)	(0.0760)	(0.465)
Female	1.193***	–	–	1.360***	–	–
	(0.0288)			(0.0789)		
Children 0 – 5 years at home	1.085***	1.178***	1.028	1.011	1.021	1.067
	(0.0288)	(0.0454)	(0.0382)	(0.0599)	(0.0901)	(0.0828)
Children 6+ years at home	0.944**	0.983	0.909***	0.947	0.924	0.988
	(0.0211)	(0.0317)	(0.0277)	(0.0467)	(0.0630)	(0.0665)
Marital status						
Ref: Single						
Cohabiting or married	0.790***	0.812***	0.792***	0.746***	0.826*	0.662***
	(0.0280)	(0.0438)	(0.0389)	(0.0579)	(0.0909)	(0.0745)
Living at parent's home	0.914	1.258	0.740*	0.667*	0.833	0.528**
	(0.110)	(0.210)	(0.124)	(0.139)	(0.176)	(0.161)
Other	0.953	0.932	0.962	0.567***	0.561**	0.560**
	(0.124)	(0.209)	(0.150)	(0.111)	(0.159)	(0.159)
Does partner have a job?						
Ref: No						
Yes, ≤ 20h	1.081**	1.077*	1.102	1.078	1.088	1.305

Table 4.A.1: Incidence rate ratios of TLF on absence frequency and duration *(cont.)*

	Absence Frequency			Absence Duration		
	Total	Male	Female	Total	Male	Female
	(0.0385)	(0.0436)	(0.0881)	(0.0833)	(0.0870)	(0.250)
Yes, > 20h	1.056*	1.122***	1.002	0.977	1.062	0.997
	(0.0330)	(0.0448)	(0.0467)	(0.0663)	(0.0851)	(0.108)
Age						
Ref: 15–24 years						
25–34 years	0.975	1.259**	0.914	1.021	1.634***	0.884
	(0.0538)	(0.120)	(0.0597)	(0.103)	(0.238)	(0.103)
35–44 years	0.902*	1.373***	0.789***	0.889	1.514**	0.752**
	(0.0562)	(0.146)	(0.0602)	(0.104)	(0.266)	(0.103)
45–54 years	0.857**	1.406***	0.719***	0.932	1.546**	0.816
	(0.0606)	(0.174)	(0.0613)	(0.130)	(0.335)	(0.132)
55+ years	0.805**	1.445**	0.608***	0.729*	1.330	0.521***
	(0.0697)	(0.217)	(0.0642)	(0.120)	(0.346)	(0.1000)
Highest educational degree						
Ref: Primary						
Lower vocational	1.178	1.080	1.337	1.457*	1.354	1.573
	(0.184)	(0.214)	(0.333)	(0.330)	(0.376)	(0.598)
Lower secondary	1.222	1.043	1.538*	1.207	1.356	1.054
	(0.184)	(0.205)	(0.362)	(0.259)	(0.363)	(0.372)
Higher secondary	1.170	1.100	1.357	1.079	1.350	0.897
	(0.176)	(0.214)	(0.320)	(0.234)	(0.374)	(0.316)
Vocational	1.126	0.985	1.379	1.212	1.227	1.229
	(0.166)	(0.186)	(0.321)	(0.254)	(0.322)	(0.428)
Professional	1.105	0.995	1.302	1.102	1.128	1.087
	(0.163)	(0.190)	(0.302)	(0.232)	(0.299)	(0.377)
Academic (bachelor)	1.118	1.067	1.165	0.872	0.880	0.964
	(0.177)	(0.217)	(0.293)	(0.213)	(0.261)	(0.410)
Academic (master+)	1.125	0.993	1.324	0.991	1.036	0.894
	(0.169)	(0.193)	(0.311)	(0.218)	(0.289)	(0.316)
Work experience (years)	0.994***	0.989***	0.996	1.020***	1.018***	1.021***
	(0.00182)	(0.00305)	(0.00236)	(0.00413)	(0.00621)	(0.00516)
Wage						
Ref: ≤ 1.250 EUR						
1.251–1.500 EUR	1.010	1.077	1.004	0.775**	0.668	0.758***
	(0.0491)	(0.148)	(0.0535)	(0.0832)	(0.226)	(0.0775)
1.501–1.750 EUR	1.051	1.231	0.993	0.796**	0.514**	0.853
	(0.0553)	(0.173)	(0.0556)	(0.0858)	(0.158)	(0.0975)
1.751–2.000 EUR	1.025	1.047	1.029	0.819*	0.559*	0.832
	(0.0516)	(0.135)	(0.0591)	(0.0943)	(0.175)	(0.101)
2.001–2.500 EUR	1.004	1.063	0.989	0.869	0.537**	0.938
	(0.0491)	(0.133)	(0.0552)	(0.0920)	(0.162)	(0.106)
2.501–3.000 EUR	0.962	1.029	0.925	0.764**	0.438***	0.915
	(0.0511)	(0.129)	(0.0603)	(0.0886)	(0.133)	(0.124)
3.001–3.500 EUR	0.971	1.000	0.990	0.687***	0.422***	0.791
	(0.0550)	(0.128)	(0.0728)	(0.0833)	(0.128)	(0.124)
3.501–4.000 EUR	0.975	1.038	0.918	0.739**	0.462**	0.842
	(0.0609)	(0.136)	(0.0779)	(0.0995)	(0.144)	(0.164)
4.001–4.500 EUR	0.936	0.978	0.925	0.731**	0.470**	0.594***
	(0.0664)	(0.134)	(0.0965)	(0.116)	(0.154)	(0.114)
4.501–5.000 EUR	0.842**	0.880	0.888	1.041	0.625	1.278

Table 4.A.1: Incidence rate ratios of TLF on absence frequency and duration *(cont.)*

	Absence Frequency			Absence Duration		
	Total	Male	Female	Total	Male	Female
	(0.0701)	(0.128)	(0.113)	(0.202)	(0.219)	(0.354)
> 5.000 EUR	0.782***	0.818	0.816	0.656**	0.350***	1.304
	(0.0653)	(0.120)	(0.111)	(0.123)	(0.119)	(0.444)
Regularly doing overtime	0.857***	0.843***	0.877***	0.816***	0.776***	0.832***
	(0.0172)	(0.0252)	(0.0236)	(0.0371)	(0.0495)	(0.0495)
Satisfaction with hours Ref: Satisfied						
Prefers more hours	0.974	0.929	1.006	0.850*	0.960	0.747***
	(0.0418)	(0.0628)	(0.0544)	(0.0793)	(0.143)	(0.0733)
Prefers fewer hours	1.457***	1.430***	1.466***	1.789***	1.736***	1.920***
	(0.0370)	(0.0512)	(0.0523)	(0.102)	(0.138)	(0.148)
2+ jobs	0.981	0.964	0.953	1.032	1.049	1.008
	(0.0389)	(0.0581)	(0.0508)	(0.0996)	(0.134)	(0.134)
Contract Ref: Permanent						
Temporary	0.966	0.984	0.954	0.763***	0.728***	0.754***
	(0.0445)	(0.0662)	(0.0587)	(0.0651)	(0.0896)	(0.0794)
Other	1.013	0.942	1.036	1.242	1.276	1.100
	(0.0808)	(0.115)	(0.107)	(0.202)	(0.309)	(0.148)
Executive position	0.852***	0.822***	0.901***	0.822***	0.845**	0.785***
	(0.0209)	(0.0270)	(0.0331)	(0.0430)	(0.0567)	(0.0592)
Sector Ref: State government						
Municipalities	0.968	0.895*	1.051	0.994	1.028	0.922
	(0.0394)	(0.0529)	(0.0554)	(0.0907)	(0.134)	(0.0972)
Primary education	0.713***	0.675***	0.769***	0.707***	0.717**	0.678***
	(0.0303)	(0.0493)	(0.0426)	(0.0675)	(0.113)	(0.0770)
Secondary education	1.044	0.927	1.157***	0.684***	0.603***	0.752***
	(0.0387)	(0.0490)	(0.0599)	(0.0561)	(0.0670)	(0.0816)
Vocational training	0.883***	0.757***	1.017	0.870	0.756**	0.940
	(0.0329)	(0.0417)	(0.0511)	(0.0749)	(0.0892)	(0.103)
Judiciary	0.492***	0.531***	0.465***	0.512***	0.483**	0.638
	(0.0475)	(0.0725)	(0.0654)	(0.113)	(0.145)	(0.230)
Police	1.004	1.015	0.966	1.129	1.073	1.144
	(0.0437)	(0.0561)	(0.0631)	(0.0924)	(0.111)	(0.154)
Research institutes	0.940	0.847	1.157	0.752*	0.744	0.883
	(0.0748)	(0.0965)	(0.126)	(0.128)	(0.192)	(0.181)
Higher professional education	0.868**	0.716***	1.034	0.862	0.748	0.952
	(0.0522)	(0.0588)	(0.0885)	(0.118)	(0.137)	(0.165)
University	0.830***	0.799***	0.879*	0.803*	0.845	0.758**
	(0.0445)	(0.0639)	(0.0623)	(0.106)	(0.164)	(0.104)
District water board	0.773***	0.773**	0.912	0.675**	0.717*	0.565**
	(0.0614)	(0.0790)	(0.117)	(0.115)	(0.143)	(0.151)
Provinces	0.898*	0.959	0.892	0.832	0.754	0.926
	(0.0512)	(0.0787)	(0.0698)	(0.102)	(0.131)	(0.156)
Academic hospitals	0.979	0.955	1.018	0.794**	0.926	0.706***
	(0.0467)	(0.0827)	(0.0609)	(0.0865)	(0.171)	(0.0885)
Firm size Ref: 1–10 employees						
11–20 employees	0.878	0.927	0.873	0.994	0.573	1.226

Table 4.A.1: Incidence rate ratios of TLF on absence frequency and duration *(cont.)*

	Absence Frequency			Absence Duration		
	Total	Male	Female	Total	Male	Female
	(0.123)	(0.234)	(0.147)	(0.311)	(0.302)	(0.376)
21–50 employees	1.063	1.053	1.065	0.943	0.682	1.110
	(0.137)	(0.240)	(0.166)	(0.258)	(0.337)	(0.273)
51–100 employees	1.023	1.109	0.980	1.274	0.906	1.475
	(0.130)	(0.245)	(0.151)	(0.356)	(0.451)	(0.373)
101–500 employees	0.964	1.055	0.924	1.167	0.987	1.169
	(0.119)	(0.228)	(0.138)	(0.315)	(0.475)	(0.280)
501–1.000 employees	0.984	1.061	0.952	1.062	0.946	1.066
	(0.123)	(0.233)	(0.144)	(0.291)	(0.459)	(0.265)
1.001–5.000 employees	1.020	1.093	0.993	1.219	1.056	1.214
	(0.127)	(0.238)	(0.149)	(0.331)	(0.509)	(0.296)
5.000+ employees	1.013	1.009	1.062	1.180	0.883	1.440
	(0.127)	(0.221)	(0.162)	(0.324)	(0.429)	(0.362)
α	0.459	0.551	0.367	3.639	4.183	3.074
	(0.0225)	(0.0367)	(0.0255)	(0.0591)	(0.0951)	(0.0681)
Observations	18296	9652	8644	18296	9652	8644

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

Note: Parameter estimates of TLF arrangements on absence frequency and duration from negative binomial regression. The coefficients are incidence rate ratios from negative binomial regression; the reference point is therefore 1. α denotes the overdispersion parameter. Number of workdays used as an exposure variable. Robust standard errors in parentheses.

Table 4.A.2: Incidence rate ratios of TLF on absence frequency and duration: Interactions with children

	Absence Frequency			Absence Duration		
	Total	Male	Female	Total	Male	Female
Flexi-time access	0.929**	0.921*	0.943	0.798***	0.734***	0.876**
	(0.0286)	(0.0388)	(0.0341)	(0.0511)	(0.0534)	(0.0551)
Telehomework access	0.946*	0.938	0.952	1.018	1.037	0.992
	(0.0280)	(0.0383)	(0.0334)	(0.0626)	(0.0715)	(0.0609)
Children 0 – 5 years at home	1.083*	1.154**	1.051	1.071	0.968	1.288***
	(0.0462)	(0.0777)	(0.0569)	(0.102)	(0.117)	(0.120)
Children 6+ years at home	0.920**	0.984	0.871***	0.936	0.919	0.966
	(0.0319)	(0.0472)	(0.0378)	(0.0701)	(0.0762)	(0.0692)
Flexi-time*Children 0–5	0.986	0.973	0.982	0.953	0.930	0.866
	(0.0470)	(0.0757)	(0.0615)	(0.0990)	(0.132)	(0.0948)
Flexi-time*Children 6+	1.065	1.049	1.059	1.158*	1.236**	1.060
	(0.0428)	(0.0578)	(0.0539)	(0.103)	(0.116)	(0.0905)
Telehomework*Children 0–5	1.023	1.082	0.973	0.952	1.218	0.786**
	(0.0470)	(0.0817)	(0.0608)	(0.0946)	(0.167)	(0.0857)
Telehomework*Children 6+	0.980	0.944	1.024	0.872	0.797**	0.980
	(0.0390)	(0.0512)	(0.0520)	(0.0782)	(0.0726)	(0.0824)
Part-time job						
Ref: Full-time						
Small (1–11h)	0.923	0.962	0.912	0.822	1.073	0.727**
	(0.0764)	(0.134)	(0.0847)	(0.148)	(0.290)	(0.114)
Medium (12–19h)	0.909*	0.895	0.918	0.894	0.656**	1.000
	(0.0468)	(0.0933)	(0.0529)	(0.103)	(0.113)	(0.0952)
Large (20–35h)	1.037	1.121***	1.015	0.998	1.011	1.003
	(0.0333)	(0.0469)	(0.0377)	(0.0653)	(0.0705)	(0.0621)
Workdays per week						
Ref: 5 workdays						
1 workday	2.112***	1.382	2.708***	2.012**	1.062	2.532***
	(0.356)	(0.341)	(0.417)	(0.675)	(0.343)	(0.551)
2 workdays	2.410***	2.704***	2.422***	2.117***	2.397***	2.075***
	(0.142)	(0.281)	(0.152)	(0.263)	(0.419)	(0.211)
3 workdays	1.608***	1.849***	1.631***	1.474***	1.957***	1.415***
	(0.0640)	(0.126)	(0.0698)	(0.117)	(0.230)	(0.101)
4 workdays	1.339***	1.296***	1.360***	1.401***	1.381***	1.394***
	(0.0362)	(0.0430)	(0.0468)	(0.0809)	(0.0752)	(0.0830)
6 workdays	0.663***	0.622***	0.723	0.531**	0.354***	1.018
	(0.104)	(0.106)	(0.155)	(0.140)	(0.0892)	(0.372)
Female	1.193***	–	–	1.366***	–	–
	(0.0288)			(0.0787)		
Marital status						
Ref: Single						
Cohabiting or married	0.790***	0.812***	0.791***	0.747***	0.824**	0.667***
	(0.0280)	(0.0388)	(0.0388)	(0.0579)	(0.0662)	(0.0550)
Living at parent's home	0.914	1.259	0.737*	0.674*	0.839	0.531*
	(0.111)	(0.221)	(0.133)	(0.139)	(0.280)	(0.178)
Other	0.954	0.931	0.962	0.569***	0.550	0.563*
	(0.124)	(0.212)	(0.153)	(0.113)	(0.217)	(0.167)
Does partner have a job?						
Ref: No						

Table 4.A.2: Incidence rate ratios of TLF on absence frequency and duration:
Interactions with children *(cont.)*

	Absence Frequency			Absence Duration		
	Total	Male	Female	Total	Male	Female
Yes, ≤ 20h	1.081**	1.077**	1.104	1.076	1.082	1.316**
	(0.0385)	(0.0398)	(0.0882)	(0.0830)	(0.0655)	(0.176)
Yes, > 20h	1.057*	1.123***	1.003	0.978	1.062	0.993
	(0.0330)	(0.0399)	(0.0470)	(0.0660)	(0.0619)	(0.0770)
Age						
Ref: 15–24 years						
25–34 years	0.974	1.257**	0.914	1.016	1.623***	0.872
	(0.0537)	(0.133)	(0.0548)	(0.103)	(0.287)	(0.0988)
35–44 years	0.901*	1.369***	0.791***	0.884	1.482**	0.752**
	(0.0561)	(0.157)	(0.0547)	(0.103)	(0.280)	(0.0960)
45–54 years	0.858**	1.404***	0.723***	0.933	1.517**	0.817
	(0.0607)	(0.179)	(0.0569)	(0.130)	(0.314)	(0.116)
55+ years	0.805**	1.442**	0.610***	0.724**	1.288	0.524***
	(0.0696)	(0.208)	(0.0564)	(0.119)	(0.302)	(0.0848)
Highest educational degree						
Ref: Primary						
Lower vocational	1.178	1.078	1.333	1.434	1.312	1.545
	(0.184)	(0.206)	(0.310)	(0.325)	(0.424)	(0.553)
Lower secondary	1.220	1.042	1.532*	1.181	1.304	1.030
	(0.184)	(0.196)	(0.339)	(0.255)	(0.415)	(0.347)
Higher secondary	1.169	1.103	1.352	1.059	1.319	0.882
	(0.176)	(0.210)	(0.300)	(0.231)	(0.426)	(0.298)
Vocational	1.127	0.987	1.377	1.195	1.200	1.202
	(0.166)	(0.184)	(0.303)	(0.252)	(0.377)	(0.403)
Professional	1.106	0.996	1.299	1.086	1.100	1.064
	(0.164)	(0.185)	(0.285)	(0.230)	(0.345)	(0.355)
Academic (bachelor)	1.120	1.069	1.163	0.863	0.864	0.949
	(0.178)	(0.210)	(0.273)	(0.213)	(0.286)	(0.340)
Academic (master+)	1.126	0.992	1.323	0.976	1.002	0.882
	(0.170)	(0.188)	(0.294)	(0.215)	(0.322)	(0.299)
Work experience (years)	0.994***	0.989***	0.996*	1.020***	1.018***	1.020***
	(0.00182)	(0.00284)	(0.00221)	(0.00410)	(0.00463)	(0.00387)
Wage						
Ref: ≤ 1.250 EUR						
1.251–1.500 EUR	1.010	1.075	1.002	0.775**	0.688	0.753***
	(0.0491)	(0.150)	(0.0477)	(0.0825)	(0.176)	(0.0620)
1.501–1.750 EUR	1.051	1.230	0.992	0.795**	0.531***	0.848*
	(0.0553)	(0.163)	(0.0509)	(0.0847)	(0.130)	(0.0763)
1.751–2.000 EUR	1.026	1.045	1.030	0.826*	0.573**	0.837*
	(0.0517)	(0.136)	(0.0540)	(0.0944)	(0.136)	(0.0762)
2.001–2.500 EUR	1.005	1.061	0.988	0.870	0.550***	0.937
	(0.0490)	(0.133)	(0.0492)	(0.0910)	(0.125)	(0.0807)
2.501–3.000 EUR	0.962	1.024	0.926	0.767**	0.448***	0.920
	(0.0511)	(0.129)	(0.0537)	(0.0882)	(0.102)	(0.0918)
3.001–3.500 EUR	0.971	0.998	0.990	0.694***	0.436***	0.792**
	(0.0549)	(0.127)	(0.0643)	(0.0833)	(0.101)	(0.0884)
3.501–4.000 EUR	0.975	1.037	0.920	0.745**	0.471***	0.846
	(0.0610)	(0.135)	(0.0730)	(0.0999)	(0.110)	(0.111)

Table 4.A.2: Incidence rate ratios of TLF on absence frequency and duration:
Interactions with children *(cont.)*

	Absence Frequency			Absence Duration		
	Total	Male	Female	Total	Male	Female
4.001–4.500 EUR	0.936	0.976	0.926	0.735*	0.485***	0.592***
	(0.0664)	(0.131)	(0.0929)	(0.116)	(0.117)	(0.0991)
4.501–5.000 EUR	0.842**	0.878	0.888	1.042	0.642*	1.290
	(0.0701)	(0.125)	(0.114)	(0.201)	(0.161)	(0.267)
> 5.000 EUR	0.781***	0.818	0.815	0.660**	0.364***	1.273
	(0.0653)	(0.119)	(0.118)	(0.123)	(0.0934)	(0.293)
Regularly doing overtime	0.857***	0.844***	0.876***	0.815***	0.779***	0.826***
	(0.0172)	(0.0238)	(0.0224)	(0.0369)	(0.0370)	(0.0357)
Satisfaction with hours						
Ref: Satisfied						
Prefers more hours	0.974	0.930	1.005	0.847*	0.972	0.743***
	(0.0418)	(0.0605)	(0.0496)	(0.0784)	(0.104)	(0.0616)
Prefers fewer hours	1.458***	1.432***	1.468***	1.791***	1.745***	1.909***
	(0.0370)	(0.0508)	(0.0498)	(0.103)	(0.111)	(0.120)
2+ jobs	0.982	0.964	0.953	1.030	1.046	1.012
	(0.0389)	(0.0554)	(0.0510)	(0.0988)	(0.101)	(0.0895)
Contract						
Ref: Permanent						
Temporary	0.968	0.982	0.957	0.768***	0.727***	0.764***
	(0.0446)	(0.0678)	(0.0524)	(0.0654)	(0.0862)	(0.0726)
Other	1.013	0.942	1.039	1.237	1.271	1.100
	(0.0808)	(0.132)	(0.110)	(0.199)	(0.304)	(0.207)
Executive position	0.851***	0.822***	0.900***	0.821***	0.845***	0.788***
	(0.0209)	(0.0253)	(0.0304)	(0.0431)	(0.0432)	(0.0436)
Sector						
Ref: State government						
Municipalities	0.967	0.894**	1.051	0.993	1.024	0.936
	(0.0393)	(0.0485)	(0.0561)	(0.0905)	(0.0956)	(0.0878)
Primary education	0.712***	0.675***	0.770***	0.704***	0.705***	0.681***
	(0.0302)	(0.0455)	(0.0381)	(0.0670)	(0.0773)	(0.0583)
Secondary education	1.043	0.926	1.157***	0.683***	0.601***	0.758***
	(0.0386)	(0.0470)	(0.0559)	(0.0558)	(0.0529)	(0.0657)
Vocational training	0.882***	0.758***	1.016	0.868	0.750***	0.943
	(0.0329)	(0.0395)	(0.0475)	(0.0746)	(0.0667)	(0.0779)
Judiciary	0.491***	0.531***	0.466***	0.510***	0.478***	0.636**
	(0.0474)	(0.0782)	(0.0714)	(0.113)	(0.102)	(0.138)
Police	1.004	1.016	0.966	1.127	1.067	1.156
	(0.0437)	(0.0523)	(0.0588)	(0.0916)	(0.0971)	(0.125)
Research institutes	0.943	0.848	1.161	0.758	0.743	0.888
	(0.0750)	(0.0958)	(0.121)	(0.130)	(0.137)	(0.130)
Higher professional education	0.870**	0.718***	1.033	0.861	0.765*	0.947
	(0.0523)	(0.0630)	(0.0791)	(0.117)	(0.114)	(0.126)
University	0.831***	0.798***	0.879*	0.805	0.848	0.761**
	(0.0446)	(0.0600)	(0.0620)	(0.106)	(0.107)	(0.0913)
District water board	0.772***	0.770***	0.913	0.674**	0.694**	0.574**
	(0.0612)	(0.0745)	(0.113)	(0.114)	(0.111)	(0.126)
Provinces	0.899*	0.958	0.893	0.834	0.748**	0.931
	(0.0513)	(0.0822)	(0.0754)	(0.102)	(0.109)	(0.139)

Table 4.A.2: Incidence rate ratios of TLF on absence frequency and duration: Interactions with children *(cont.)*

	Absence Frequency			Absence Duration		
	Total	Male	Female	Total	Male	Female
Academic hospitals	0.979	0.957	1.015	0.798**	0.946	0.700***
	(0.0469)	(0.0797)	(0.0585)	(0.0868)	(0.137)	(0.0721)
Firm size						
Ref: 1–10 employees						
11–20 employees	0.878	0.930	0.873	1.015	0.606	1.221
	(0.123)	(0.212)	(0.122)	(0.310)	(0.211)	(0.276)
21–50 employees	1.061	1.057	1.064	0.956	0.730	1.102
	(0.137)	(0.213)	(0.135)	(0.251)	(0.227)	(0.230)
51–100 employees	1.021	1.114	0.980	1.284	0.957	1.454*
	(0.130)	(0.219)	(0.125)	(0.345)	(0.288)	(0.306)
101–500 employees	0.963	1.059	0.924	1.178	1.043	1.151
	(0.119)	(0.203)	(0.114)	(0.306)	(0.304)	(0.234)
501–1.000 employees	0.982	1.066	0.951	1.073	0.997	1.049
	(0.123)	(0.207)	(0.120)	(0.283)	(0.295)	(0.218)
1.001–5.000 employees	1.018	1.095	0.993	1.230	1.102	1.192
	(0.127)	(0.211)	(0.124)	(0.321)	(0.323)	(0.246)
5.000+ employees	1.012	1.013	1.064	1.188	0.914	1.433*
	(0.127)	(0.197)	(0.135)	(0.314)	(0.271)	(0.302)
α	0.458	0.550	0.367	3.637	4.176	3.070
	(0.0225)	(0.0254)	(0.0183)	(0.0590)	(0.0739)	(0.0533)
Observations	18296	9652	8644	18296	9652	8644

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

Note: Parameter estimates of TLF arrangements on absence frequency and duration from negative binomial regression. The coefficients are incidence rate ratios from negative binomial regression; the reference point is therefore 1. α denotes the overdispersion parameter. Number of workdays used as an exposure variable. Robust standard errors in parentheses.

5 Does temporal and locational flexibility of work increase the number of working hours?

5.1 Introduction

An increasing number of employees can make choices in the temporal and locational aspects of their work, namely the schedule, duration, and location of work (Plantenga and Remery, 2010; Messenger, 2010). As a consequence, the number of employees that can make use of arrangements such as flexi-time, telehomework, or part-time work has been rising in recent years. This temporal and locational flexibility of work (TLF) has been fostered by an increasing importance of knowledge work and service industries in general, new forms of work organisation, but in particular by the proliferation of information and communication technology (ICT), which has facilitated asynchronous and remote exchange of information.

In many debates, TLF is primarily viewed as a means to combine work and private life and as such highly topical in the policy debate in a number of countries (see e.g. CEA, 2010; BMFSFJ, 2012). As such, TLF arrangements have also become a common policy recommendation to increase labour supply in order to increase economic growth and to prevent labour force shortages in the future (Rürup and Gruescu, 2005; Taskforce DeeltijdPlus, 2010; Sociaal-Economische Raad, 2011). In an environment of relatively high labour force participation rates and a lot of part-time work, especially for female employees, the main focus is on increasing the number of working hours with more TLF. It has not, to the best of our knowledge, been tested empirically yet, whether this supposed link between TLF and increasing working hours actually holds.

The aim of this chapter is therefore to analyse whether and to what extent TLF arrangements indeed influence labour supply. In particular we analyse the impact of TLF arrangements that provide schedule and location flexibility on the number of actual, contracted, and preferred working hours. The analysis is carried out

on the basis of a Dutch household panel dataset. The Netherlands are a good test case in this context because they are a highly developed service society with an excellent ICT infrastructure, which means that the scope for TLF is relatively high. Increasing working hours of part-time employees has been a policy concern for some years now (Taskforce DeeltijdPlus, 2010; Sociaal-Economische Raad, 2011) and the Dutch labour market is quite flexible already. Employees in the Netherlands have a legal right to both decrease and increase their contracted working hours for example.[1] Obstacles to adjust working hours are therefore comparatively low and contracted hours should adapt relatively quickly to new conditions, also within existing employment relations.

The results indicate that the effects of TLF on working hours are quite limited. Telehomework is associated with moderate increases in actual hours, but not in contracted or preferred hours, which implies that telehomework primarily leads to more overtime. Flexi-time generally seems to have an ambiguous effect on working hours and is negatively associated with contracted and preferred working hours for females. So despite positive effects on job satisfaction and working time fit, TLF does not seem to lead to an increase in labour supply.

5.2 Theoretical framework

Female labour force participation rates have increased tremendously in the Netherlands in the last two decades. Being on par with the European Union (EU) average at around 55% at the beginning of the 1990's, they have been around 73% in recent years and thus eight to ten percentage points above the EU average. Average weekly working hours of females, however, have remained relatively low at around 25 hours per week during that time (see figure 5.1). This is because part-time work is used extensively to combine work and private life in the Netherlands, private life here meaning any other responsibility, activity or event that is not paid work. In the face of an ageing society, the expected labour force shortages, and low economic growth in general, the resulting low number of weekly and annual working hours is more and more seen as problematic, however. Various policies to increase female

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[1] Every employee who has worked for a company with ten or more employees for at least one year can request a working hours adjustment. This right can be exercised once a year. The employer may only dismiss a request for working hours adjustment if it is a severe impediment to business interest. The Working Hours Adjustment Act (*Wet Aanpassing Arbeidsduur*) has been effective since mid 2000. Equal treatment of part-time and full-time employees with respect to employment conditions is furthermore stipulated in the Equal Treatment Working Hours Act (*Wet verbod op onderscheid naar arbeidsduur*), effective since 1996.
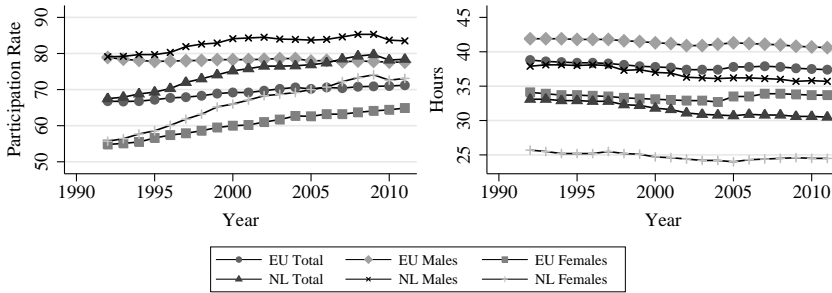
Note: EU designates EU12 until 1994, EU15 −2004, EU25 −2006 and EU27 −2011
Source: European Union Labour Force Survey (EU–LFS)

Figure 5.1: Participation rates and average working hours in the EU and the
　　　　　Netherlands, 1992–2011

labour supply at the intensive margin have therefore been suggested, among which calls for more temporal and locational flexibility. The idea is that arrangements such as flexi-time and telehomework can to some extent substitute part-time work as a means to reconcile work and private life. As a result, more TLF and thus more control over working hours improves work-life fit and will induce employees to supply more hours to the labour market.

The notion that more TLF leads to an increase in labour supply has been supported by surveys in which a considerable share of respondents report that they would be willing to supply more hours to the labour market if more flexibility options were available. In a 2009 survey for example 35–41% of non-participants and 25–39% of part-time workers responded that more flexibility would be an important condition to either participate in or supply more hours to the labour market, respectively (Cloïn et al., 2010). The conditions mentioned include better reconciliation of working times and private life, finding a job with the preferred number of hours, working part of the week from home, being able to take a day off if a family member gets sick, and finding a job closer to home. If these responses are indeed sincere, more temporal and locational flexibility and a better fit between work and private life should raise labour supply.

In theory two potential channels can lead from increased flexibility in work schedule and location to more working hours. The first one concerns a decrease in commuting time, the second a reduction of schedule constraints and a better match between work and private schedules.

Figure 5.2: Commuting and labour supply

Although commuting can be seen as a prerequisite for paid work, commuting time *per se* is unproductive and inefficient. Commuting time can be reduced with flexible working times, because it is possible to avoid rush hour traffic by commuting at less busy times. Commuting can even be eliminated altogether when one is able to work at home. This time gain can then be spent at work.[2]

While the theoretical predictions are to some extent dependent on the assumptions made, a simple model predicts exactly this.[3] In a graphical representation (figure 5.2), C designates the consumption of goods, L the consumption of leisure, L_0 maximum time available. The line L_0A designates non-labour income, IC is the indifference curve, corresponding to the level of utility obtained by the individual, and BC is the budget line with slope w, the wage rate. If time has to be spent on commuting, the optimal solution is situated at the tangency point E_1 of the indiffer-

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[2] Flexible working times may also induce employees to travel to work earlier and leave from work later to avoid traffic congestion, increasing work duration as a result (Arnott et al., 1993; Gutiérrez-i-Puigarnau and van Ommeren, 2010).

[3] Predictions differ depending on whether one distinguishes between monetary and time costs of commuting, whether workdays, daily and total hours are allowed to vary, and whether one considers a static or dynamic approach (See e.g. Manning, 2003; Gutiérrez-i-Puigarnau and van Ommeren, 2010; Black et al., 2014).

ence curve with the budget constraint BC_1. Here, the individual would supply $L_1 L_c$ hours on labour, spend $L_c L_0 = \Delta c$ on commuting and enjoy $0L_1$ hours of leisure.[4]

If commuting is eliminated, the budget constraint shifts to the right and utility increases. The optimal solution is now at E_2 and leisure time increases by $L_1 L_2$. At the same time, labour supply increases by $\Delta c - L_1 L_2$ and is now $L_2 L_0$. Part of the time gain due to a reduction in commuting time will thus be spent on additional labour supply. This result holds unambiguously if we assume leisure and consumption to be normal goods (Black et al., 2014).[5]

The size of the effect of TLF due to commuting time savings alone is likely to be limited however. While there is little direct evidence on the effects of commuting costs on labour supply, indirect evidence (e.g. that commuters seem to attach relatively low value to travel time) suggests that the effect of the length of the commute on labour supply is rather weak (Gibbons and Machin, 2006). More recently, Gutiérrez-i-Puigarnau and van Ommeren (2010) even found a small positive effect of commuting on the number of daily and weekly working hours, due to the interplay of working hours per day and working days per week.

A second channel via which more temporal and locational flexibility can lead to an increase in labour supply is a reduction of schedule constraints and a better match between schedules of work and private life. Tasks and events of both paid work and private life are not distributed randomly over the day and week. Most of the time they take place within defined schedules, because in both spheres workers depend on and interact with other individuals. Work is usually carried out in teams within and across firms and many workers deal directly with clients and business partners. Goods and services have to be produced and handled at specific times because they are expected by other workers in the production chain, clients expect them at specific times (e.g. during opening and business hours) or because the goods involved are perishable or otherwise time-critical. In addition, working hours and schedules are generally limited due to legal restrictions and social norms. As a result, workers are often constrained in the choice of their working schedule.

In the same vein, the timing of leisure tasks and activities often depend on others. The schedules of working parents for example depend on their children's daycare

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[4] The amount of commuting time is exaggerated in the figure for better visibility.

[5] We assume here that individuals are able to choose their preferred levels of consumption and leisure without any other constraints of course. In addition, a decrease in commuting costs and thus a shift in the budget constraint to the right reduces the size of the kink in the budget line. This reduction of the fixed costs of work not only increases labour supply at the intensive margin, but also induces non-working individuals to participate and thus raises labour force participation as well (e.g. Oi, 1976; Cogan, 1981; Black et al., 2014). Since Dutch labour participation rates are relatively high already, though, we focus on the effects on hours worked in this study.

and school schedules. Informal care often has to be performed at specific times of the day (Hassink and Van den Berg, 2011). Stores, businesses as well as public and health services have limited business and opening hours. Further education classes and recreational activities (sports, clubs, etc.) take place at designated times. Since daycare, school, office and service hours usually cannot be altered by individual workers, they constitute a binding schedule constraint for them.

Both work and leisure activities thus impose a schedule constraint on workers, meaning that these activities can only be performed at specific times or within a specified time frame. Activities therefore have to be coordinated and their schedules matched. This matching can be achieved more easily the more flexible and controllable schedules are. When work schedules are fixed, however, they may clash with leisure activity schedules and vice versa. In this case the schedules and their limited flexibility constrain the number of hours available to the labour market. So not only the number of hours that are devoted to leisure activities limit the number of working hours (as established by standard labour supply theory), but also the schedule of both work and leisure activities do. More flexibility in work schedule and location should then improve the fit between work and leisure activities, prevent and eliminate time conflicts and improve allocative efficiency (Bosch et al., 1994; Golden, 2006a).

One may question whether schedule constraints are really binding, however. On the one hand and according to standard labour supply theory, workers can choose their schedules and working hours freely and without costs for example. Even though workers may not always be able to adjust their working hours within a job (due to restrictions in schedule and location, contractual constraints, or requirements of the production process for instance), it is assumed that they can always and instantaneously switch to jobs that fit their preferences. This is only true in a labour market with perfect information, though. When there are information asymmetry, search costs, and thin labour markets involved, free job choice and therefore work schedules are at least to some extent constrained. On the other hand, there has been a trend towards more flexible store opening hours in many countries in recent years, making leisure schedule constraints arguably less binding. Daycare and school hours as well as service hours of public and health services still remain quite fixed, though, and workers often perceive them as being incompatible with their work schedules (for the Netherlands see e.g. Cloïn et al. (2010) and Sociaal-Economische Raad (2011)). Dutch schools are usually out on Wednesday and Friday afternoons for example, so parents who do not want to or are not able to arrange adequate daycare have to stay at home. So at least at the margin, workers' choice in the scheduling of activities is constrained.

The trade-off between working hours and schedules is easily illustrated with an extension of the standard labour supply model (Golden, 1996, 2006a). According to the standard model, an individual's well-being is determined by his or her consumption and hours of leisure. This is represented by a utility function (U) with the standard consumption (C) and leisure (L) arguments. But since utility from work is also dependent on work schedule, location, and their flexibility, we add a schedule parameter (S) to the utility function:

$$U = U[C, L, S] \tag{5.1}$$

S represents both the schedule and location of work as well as their adaptability. Based on the considerations above, we assume that work schedules and locations that fit in well with leisure activities provide more utility than those that do not. In addition, flexible schedules and locations provide more utility than inflexible ones, because they are more adaptable to changing circumstances for instance. Note that this is not much different from the usual assumptions about consumption and leisure in standard labour economics. Just like we assume that consumption and leisure are normal goods, i.e. that more consumption and more leisure 'is better' in the sense that it provides more utility, we assume here that more flexibility in work schedule and location (i.e. more control over timing and location of work) and thus a better schedule and working time fit 'is better' as well.

It follows that utility is strictly increasing and marginal utility decreasing in all arguments:

$$\frac{\partial U}{\partial C}, \frac{\partial U}{\partial L}, \frac{\partial U}{\partial S} > 0; \quad \frac{\partial^2 U}{\partial C^2}, \frac{\partial^2 U}{\partial L^2}, \frac{\partial^2 U}{\partial S^2} \leq 0 \tag{5.2}$$

Under these general assumptions, workers should be willing to trade leisure time or income for more flexibility and vice versa (Golden, 2006a).[6]

We need to keep in mind, though, that consumption potentially is another channel via which a trade-off with TLF might take place. Instead of increasing labour supply, workers may be willing to trade part of their wage or future wage increases for increased flexibility and better work schedules (Altonji and Paxson, 1988; Baughman et al., 2003; Heywood et al., 2007). This will be addressed in the empirical analysis by controlling for wage.

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[6] Note that this model also captures workers who do not have binding private schedule constraints in the above sense, but just a preference for work at certain intervals, e.g. due to certain life-style choices. Nevertheless the degree to which private schedule constraints are binding certainly differs between workers and depends *inter alia* on whether they have care responsibilities or not.

Based on these considerations we arrive at the following hypothesis:

Hypothesis: More temporal and locational flexibility of work leads to an increase in hours worked.

In the empirical analysis we will use flexi-time and telehomework as indicators for TLF (see below). While we do not have exact theoretical predictions as to sizes of the effects, we expect telehomework to have a stronger impact on working hours than flexi-time. Telehomework potentially leads to larger time gains because commuting time can be omitted altogether, whereas flexi-time only reduces commuting time. Furthermore, telehomework potentially reduces schedule constraints more effectively than flexi-time because it allows employees to schedule working time outside of office hours, e.g. in the evening or at weekends.

5.3 Data and variable description

The data for the analysis is taken from the Dutch Labour Supply Panel (*Arbeidsaanbodpanel*, AAP), a biennial panel survey of a representative sample of Dutch households.[7] The panel survey is conducted to study developments in labour market behaviour and working conditions in the Netherlands and covers a broad range of work- and life-course-related items. The target population consists of the Dutch labour force aged 16 to 66 years. The AAP has existed since 1985, but questions about (tele)homework were first asked in 2002, so only the waves from 2002 onwards are suitable for an analysis of TLF. This means that we have five waves available for this analysis, for every other year since 2002 to the last publicly available wave from 2010. We restrict the sample to employees (i.e. we exclude self-employed, unemployed, full-time students, etc.), which results in an unbalanced panel of 17,136 observations from 7,771 individuals.

We use flexi-time and telehomework as indicators for TLF. The flexi-time variable was obtained from the following survey question:

> 'Can you say whether each of the following characteristics does or does not apply to the work you do? [...] Determine start- and end-time myself'

The telehomework variable was obtained from the following question:

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[7] The panel was formerly known as the OSA Labour Supply Panel is now conducted on behalf of the Social Cultureel Planbureau. The data and its documentation are in Dutch and available via http://easy.dans.knaw.nl.

Table 5.1: Flexi-time and telehomework by year and gender

	Male		Female		Total		N
	%	S.E.	%	S.E.	%	S.E.	
Flexi-time							
2002	36.41	(1.57)	26.72	(1.41)	31.51	(1.07)	1952
2004	45.54	(1.28)	34.37	(1.37)	40.57	(0.95)	2748
2006	43.46	(1.25)	33.52	(1.26)	38.75	(0.91)	3035
2008	47.92	(1.27)	34.73	(1.24)	41.56	(0.90)	3073
2010	43.97	(1.40)	33.23	(1.34)	38.64	(0.99)	2518
Total	44.05	(0.86)	32.85	(0.84)	38.69	(0.61)	13326
Telehomework							
2002	15.98	(1.19)	13.16	(1.09)	14.55	(0.82)	1952
2004	17.37	(0.97)	14.98	(1.02)	16.30	(0.73)	2748
2006	18.79	(0.98)	16.62	(0.98)	17.76	(0.71)	3035
2008	20.19	(1.01)	18.54	(1.01)	19.39	(0.74)	3073
2010	19.78	(1.12)	17.85	(1.08)	18.82	(0.80)	2518
Total	18.59	(0.66)	16.46	(0.66)	17.57	(0.48)	13326

Note: Share of employees with flexi-time or telehomework by year and gender. S.E. is the standard error of the mean.

'Do you work at home every now and then in your current job?'[8]

We only count those respondents as telehomeworkers who state that they work at home once a week on average.[9] On average, 39% of the respondents in the sample can determine the start- and end-times of their work and 18% work at home at least once a week. The shares of flexi-timers and telehomeworkers are generally larger for male than for female employees (see table 5.1). Over the five waves, 1017 respondents change their flexi-time and 713 change their telehomework status (i.e. they were e.g. working at home in at least one wave and not working at home in another). The availability and use of flexi-time and telehomework varies greatly across sectors (see table 5.2), which suggests that job-related factors play an important role here.

[8] While the question refers to work at home and not explicitly to telework, only 2.2% of the respondents who work at home do not use ICT. Hence we label this variable telehomework.

[9] Telehomeworkers were asked how often they were working at home on average. From 2004 onwards the answer categories were less than once per month, less than twice per month, once per week or twice or more often per week. We only count the latter two categories as telehomeworkers. In 2002 the answer categories were once per month, twice per month, three times per month, more than three times per month. We include only the latter as telehomeworkers.

Table 5.2: Flexi-time and telehomework by sector

Sector	Flexi-time		Telehomework		N
	%	S.E.	%	S.E.	
Agriculture	32.61	(4.01)	6.52	(2.11)	138
Industry	37.98	(1.24)	10.69	(0.79)	1543
Construction	29.93	(1.91)	10.03	(1.25)	578
Trade, gastronomy, repair	24.65	(0.99)	8.31	(0.64)	1878
Transport	31.26	(1.61)	6.47	(0.85)	835
Business services	54.84	(1.05)	18.25	(0.82)	2241
Care, Welfare	30.68	(0.89)	13.95	(0.67)	2689
Other services	43.16	(1.99)	18.52	(1.56)	621
Government	66.87	(1.30)	15.57	(1.00)	1304
Education	28.95	(1.17)	53.17	(1.29)	1499
Total	38.69	(0.42)	17.57	(0.33)	13326

Note: Share of employees with flexi-time and telehomework by sector. S.E. is the standard error of the mean.

We use actual, contracted, and preferred hours as outcome variables. Prior research has found a positive relationship between telehomework and hours worked (Peters and van der Lippe, 2007; Eldridge and Wulff Pabilonia, 2008; Noonan and Glass, 2012). This has however been mainly attributed to an increase in work demands and overtime, as well as an expansion of the standard working week via an increase in actual hours (Peters and van der Lippe, 2007; Noonan and Glass, 2012). If only actual and (unpaid) overtime hours increase but contracted and preferred hours do not, workers may not benefit from the increase in working hours through higher income (assuming that the hourly wage would stay the same after an increase in contracted hours). Furthermore the work-life fit of employees may not increase but rather decrease if preferred hours stay the same. We therefore not only analyse the impact of TLF on actual working hours, but consider contracted and preferred hours as well.

The contracted and actual hours variables were obtained from the following survey questions:

'How many hours do you work according to your contract? Overtime-hours should not be considered.' And

'How many hours per week do you actually work on average?'

Actual working hours are only available from 2004 onwards, whereas contracted and preferred hours are also available for previous waves. The preferred hours

Table 5.3: Average working hours by gender

Working hours	Male		Female		Total		N
	Mean	S.E.	Mean	S.E.	Mean	S.E.	
Actual hours	39.60	(0.12)	26.84	(0.14)	33.55	(0.11)	11355
Contracted hours	36.54	(0.08)	25.05	(0.12)	31.04	(0.09)	13326
Preferred hours	35.69	(0.09)	25.02	(0.12)	30.58	(0.09)	13326

Note: Employees' average working hours by gender. S.E. is the standard error of the mean.

variable was derived from the following question:

> 'Are you satisfied with the current number of contract hours or would you like to work more or fewer hours? Take into account that your hourly wage does not change and that others in your household will not work more or fewer hours.' The answer categories are: 'Yes, satisfied with hours; No, I would like to work X MORE hours per week; No, I would like to work X FEWER hours per week.'

Contracted hours were used as the basis for the preferred hours variable, to which X hours were added or subtracted depending on whether respondents indicated that they wanted to work more or less hours. On average, employees in the sample actually work 33.55h (39.60h and 26.84h for male and female employees, respectively, see table 5.3). Contracted hours are a little lower at 31.04h (36.54h for males and 25.05h for females). Preferred hours are again slightly lower, but have been slowly increasing for female employees in the period under consideration (from 23.55h in 2002 to 25.29h in 2010; not shown).

In order to rule out confounding factors due to differences in individual, household and job characteristics, we add a number of control variables to our models. These are respondents' age, marital status, children at home, level of education, work experience, changes in employment (e.g. promotions and demotions within the same job as well as job switches), two or more jobs, contract type, level of occupation, number of supervised employees, sector, firm size and a time trend. Observations with missing values on any of these variables are dropped from the analysis by listwise deletion, resulting in a net sample of 13,326 observations from 6,398 individuals. Table 5.4 shows the descriptive statistics for both this net sample and the gross sample ($N = 17,136$) without listwise deletions.

Table 5.4: Descriptive statistics

	Gross sample		Net sample			
Variables	Mean	S.E.	Mean	S.E.	Min	Max
Actual hours	31.45	(0.110)	33.55	(0.108)	0	90
Contracted hours	30.52	(0.083)	31.04	(0.087)	0	91
Preferred hours	30.04	(0.083)	30.58	(0.087)	0	91
Flexi-time	0.37	(0.004)	0.39	(0.004)	0	1
Telehomework	0.17	(0.003)	0.18	(0.003)	0	1
Age	41.05	(0.091)	42.36	(0.095)	16	66
Marital status						
Married	0.64	(0.004)	0.68	(0.004)	0	1
Cohabiting	0.11	(0.002)	0.11	(0.003)	0	1
Single	0.24	(0.003)	0.20	(0.003)	0	1
Child(ren)	0.53	(0.004)	0.56	(0.004)	0	1
Primary school	0.03	(0.001)	0.02	(0.001)	0	1
Education						
Lower secondary	0.23	(0.003)	0.22	(0.004)	0	1
Higher secondary	0.39	(0.004)	0.38	(0.004)	0	1
Vocational college	0.25	(0.003)	0.26	(0.004)	0	1
Academic	0.10	(0.002)	0.11	(0.003)	0	1
Work experience	20.40	(0.087)	20.87	(0.095)	0	52
Permanent contract	0.83	(0.003)	0.87	(0.003)	0	1
Empl. status change	0.35	(0.004)	0.33	(0.004)	0	1
2nd job	0.07	(0.002)	0.07	(0.002)	0	1
Supervised employees						
None	0.70	(0.003)	0.69	(0.004)	0	1
1–9 employees	0.21	(0.003)	0.22	(0.004)	0	1
10–49 employees	0.08	(0.002)	0.08	(0.002)	0	1
50 or more employees	0.02	(0.001)	0.02	(0.001)	0	1
Occupational level						
Elementary	0.06	(0.002)	0.04	(0.002)	0	1
Lower	0.25	(0.003)	0.23	(0.004)	0	1
Medium	0.35	(0.004)	0.37	(0.004)	0	1
Higher	0.26	(0.003)	0.28	(0.004)	0	1
Scientific	0.07	(0.002)	0.08	(0.002)	0	1
Sector						
Agriculture	0.01	(0.001)	0.01	(0.001)	0	1
Industry	0.11	(0.002)	0.12	(0.003)	0	1
Construction	0.04	(0.001)	0.04	(0.002)	0	1
Trade, gastronomy, repair	0.16	(0.003)	0.14	(0.003)	0	1
Transport	0.06	(0.002)	0.06	(0.002)	0	1
Business services	0.16	(0.003)	0.17	(0.003)	0	1
Care, Welfare	0.21	(0.003)	0.20	(0.003)	0	1
Other services	0.05	(0.002)	0.05	(0.002)	0	1

Table 5.4: Descriptive statistics *(cont.)*

Variables	Gross sample		Net sample		Min	Max
	Mean	S.E.	Mean	S.E.		
Government	0.09	(0.002)	0.10	(0.003)	0	1
Education	0.11	(0.002)	0.11	(0.003)	0	1
No. of employees (/1000)	0.50	(0.017)	0.52	(0.018)	0	70
2002	0.18	(0.003)	0.15	(0.003)	0	1
2004	0.19	(0.003)	0.21	(0.004)	0	1
2006	0.22	(0.003)	0.23	(0.004)	0	1
2008	0.21	(0.003)	0.23	(0.004)	0	1
2010	0.20	(0.003)	0.19	(0.003)	0	1
Observations	17136		13326			

Note: The gross sample comprises the observations of all employees in the sample, the net sample those observations used for estimation after list-wise deletion due to missing values. S.E. is the standard error of the mean.

5.4 Empirical analysis

Our analysis starts out with a simple cross-tabulation of the TLF and working hours variables (table 5.5). A comparison of working hours of employees with and without TLF seems to support the hypothesis that TLF is associated with increased labour supply. Contracted and preferred hours are on average two to three hours longer for flex-timers and telehomeworkers than for their colleagues without those types of TLF. Actual hours are even five hours longer for employees with TLF.

Not surprisingly, this finding is supported by simple correlations between the TLF and working hours variables (table 5.6). All correlation coefficients are positive and significantly different from zero, except for the male sample, where the correlations between telehomework and contracted and preferred hours, respectively, are not significant. The correlation coefficients on actual hours are always larger than those on contracted and preferred hours and the coefficients on flexi-time are larger than those on telehomework (with one exception, namely actual hours of female employees). Again, this does not reject our hypothesis, so that based on simple descriptives the notion that TLF is associated with a longer work duration appears to be supported by the data.

These simple correlations do not take any confounding factors like individual and job characteristics into account of course. These are likely to play an important role, however. Availability and usage of TLF arrangements as well as working hours differ across jobs, organisations, and industries for example (see also table 5.2). The differences in TLF availability are on the one hand related to structural differences

Table 5.5: Average working hours by flexi-time and telehomework

Working hours	Flexi-time				Telehomework			
	Yes		No		Yes		No	
	Mean	S.E.	Mean	S.E.	Mean	S.E.	Mean	S.E.
Actual hours	36.27	(0.17)	31.75	(0.14)	37.03	(0.17)	31.80	(0.13)
Contracted hours	32.86	(0.13)	29.89	(0.11)	32.90	(0.13)	30.14	(0.11)
Preferred hours	32.13	(0.13)	29.60	(0.11)	32.07	(0.13)	29.86	(0.11)

Note: Employees' average working hours by flexi-time and telehomework. S.E. is the standard error of the mean.

in production processes and institutional settings. Telehomework for instance is hard to implement in assembly line jobs, while it is a common feature of consultancy and similar jobs nowadays. On the other hand, the degree of availability depends on employers' cost and benefit differentials in the implementation and support of flexibility arrangements. Supervision and monitoring costs differ between jobs and tasks but are likely to be larger if employees are not predictably available at the workplace for example. Firm characteristics may also play a role. In small establishments for example, each member of a team is often seen as critical to business operations, which is why managers may be more reluctant to allow their employees to work at home. Availability and usage of TLF as well as work length are therefore to a certain extent determined by and dependent on job characteristics, some of which may not be directly observable. It is therefore necessary to control for job-related heterogeneity in the analysis.

Individual employee characteristics are also likely to influence both TLF arrangement availability and use as well as working hours. Preferences for working hours and TLF depend both on changes in individual and household characteristics (marital status, children, etc.), as well as on the more general intrinsic preferences for work and leisure. These preferences also influence job choice. Since the availability of TLF arrangements differs between jobs and organisations, employees with stronger preferences for TLF may sort into firms and jobs that are more likely to provide TLF arrangements. In addition, employees with preferences for fewer work hours, e.g. due to private responsibilities, may sort into jobs with more TLF as well, because they give them more room to combine work and private life.

So as a next step in the analysis, we want to control for individual and job-related heterogeneity without putting too much structure on the data. We therefore regress the working hours variables as well as the two indicators for TLF, flexi-time and

Table 5.6: Pairwise correlations of variables

	Actual hours	Contracted hours	Preferred hours	Flexi-time
Total (N = 13326)				
Flexi-time	0.19***	0.14***	0.12***	1
Telehomework	0.16***	0.059***	0.046***	0.18***
Male (N = 6946)				
Flexi-time	0.18***	0.083***	0.061***	1
Telehomework	0.17***	0.012	−0.0033	0.21***
Female (N = 6380)				
Flexi-time	0.13***	0.11***	0.086***	1
Telehomework	0.17***	0.087***	0.072***	0.14***

*** $p < 0.01$

telehomework, on the same set of control variables (see section 5.3) and calculate correlations between the residuals from these regressions. This will essentially give us correlation coefficients between TLF and working hours after controlling for a number of confounding factors. The regression models are given by the following equation:

$$F_{it} = \gamma' Z_{it} + \alpha_i + \varepsilon_{it} \tag{5.3}$$

F_{it} designates a vector of outcome variables (flexi-time and telehomework as well as actual, contracted and preferred hours, respectively)[10], and Z_{it} a vector of control variables. α_i is the individual-specific and ε_{it} the idiosyncratic error term. i denominates the individual and t the wave (Δt is two years in this biennial panel). γ is a vector of parameters to be estimated.

We estimate equation 5.3 with a fixed-effects specification to control for individual-specific effects. This rules out that individual preferences influence the use of TLF and the number of working hours at the same time for example. It also controls for time-invariant job-related heterogeneity.[11] Furthermore we estimate the model

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[10] A superscript to indicate the different outcome variables is omitted.

[11] We estimated the model with a random-effects specification as well. The crucial assumption of a random-effects specification however is that the individual-specific error term α_i is not correlated with the right-hand side variables Z_{it}, otherwise the estimated coefficients will be biased. Since the availability and usage of TLF and the number of working hours quite likely depend on various job and individual characteristics this assumptions seems rather strong. The random-effects specification was thus firmly rejected by a Hausman specification test in favour of the fixed-effects specification for all models and (sub-)samples considered.

Table 5.7: Pairwise correlations of residuals after fixed-effects estimation

	Actual hours	Contracted hours	Preferred hours	Flexi-time
Total (N = 13326)				
Flexi-time	0.015	−0.015*	−0.0041	1
Telehomework	0.047***	0.017**	0.017**	0.036***
Male (N = 6946)				
Flexi-time	0.027**	0.0066	0.025**	1
Telehomework	0.035***	0.0013	0.016	0.037***
Female (N = 6380)				
Flexi-time	−0.0025	−0.039***	−0.043***	1
Telehomework	0.051***	0.020	0.011	0.033***

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$
Note: See tables 5.A.1 and 5.A.2 in the appendix for regressors used and parameter estimates.

for the total sample and separately for male and female employees, because male and female employees usually have different non-work responsibilities and react differently to labour market incentives (e.g. Blau and Kahn, 2007).[12] After estimating these models, we further estimate the residuals from the regressions (i.e. the term ε_{it} in equation 5.3) and calculate the correlations between these.

Table 5.7 shows the pairwise correlations between the residuals. In general the correlations are small and often not significantly different from zero. There is essentially no significant correlation between flexi-time and actual or preferred hours for the total sample, and a small negative correlation between flexi-time and contracted hours. The correlation between flexi-time and actual or preferred hours remain positive for male employees. For the female sample, however, the correlations between flexi-time and contracted or preferred hours even turn out to be negative. The correlations between telehomework and actual hours are positive and significantly different from zero for all samples. For contracted and preferred hours, the correlations with telehomework are only significantly different from zero for the total sample. The results imply that much of the raw correlation

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[12] Note that since the flexi-time and telehomework indicators are binary, we effectively estimate linear probability models for these TLF variables. We do not control for the other TLF arrangement in these models (i.e. flexi-time is not controlled for in the telehomework regression and vice versa). The linear probability models for flexi-time behave well, as no observations are predicted outside the uni-interval. For telehomework, 5.0%, 15.7%, and 11.5% of the observations are predicted outside the unit-interval for the total, male, and female sample respectively.

between working hours and TLF arrangements is due to individual and job-related heterogeneity, because the correlations are much smaller – down to a third at least – than those between the raw variables or even turn out negative. After controlling for this heterogeneity, there remains no unambiguous correlation between flexi-time and work hours and a small positive correlation between telehomework and actual work hours.

These results suggest already that the association between TLF and the number of working hours is rather small in general after controlling for individual and job-related factors. Ideally though, we would also like to quantify the relative effects of both TLF arrangements on working hours. We therefore estimate a simple model in which working hours depend on whether employees have flexible working times or can work at home. This model, which many readers may be more familiar with, allows us to estimate the relative effects of both TLF arrangements at the same time. It also allows us to easily estimate the effects for different sub-samples. The model looks as follows:

$$H_{it} = \beta_1 ft_{it} + \beta_2 tw_{it} + \kappa' Z_{it} + \omega_i + \eta_{it} \tag{5.4}$$

H_{it} designates three different measures of working hours (actual, contracted and preferred hours, respectively), ft flexi-time, tw telehomework, and Z a vector of control variables. ω_i is the individual-specific and η_{it} the idiosyncratic error term. β and κ are (vectors of) parameters to be estimated. Again we estimate the model with a fixed-effects specification for the total, male and female sub-samples.[13] The data would support the hypothesis if the beta coefficients are positive and significantly different from zero.

Strictly speaking, fixed-effects specifications based on equation 5.4 still do not statistically imply causality and a few empirical issues may bias the estimates. One of these potential biases are self-selection and other sources of endogeneity, like common shocks that may at the same time influence the availability and usage of TLF on the one hand and the number of working hours on the other. Many employees may for example be simultaneously choosing working hours and working conditions as parts of a whole employment package at the start of a contract.[14] Employers may also award TLF to employees with the largest productivity, status, or authority

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[13] The random-effects specification was again firmly rejected by a Hausman specification test for all samples.

[14] Note however that more than half of the employees for which TLF status changes have no change in their employment status. This indicates that a considerable share of employees in our sample do not make these choices simultaneously.

(cf. Golden, 2009; Winder, 2009; Noonan and Glass, 2012). Since we control for changes in employment as well as for time-fixed-effects both of these confounding factors are only relevant, however, if they are time-varying and independent of promotions and job switches for example.

Underlying this specification is furthermore that the idiosyncratic error term ε_{it} is strictly exogenous. This means that time-varying unobserved variables from any time period may not be correlated with any of the explanatory variables from all time periods. This assumption would be violated for example if there were reverse causality or a feedback mechanism going on This might be the case for TLF, because instead of being a policy for improved working conditions and work-life fit, employees might get more TLF, when (actual) working hours and workloads increase in order to get the job done (Noonan and Glass, 2012). This means that causality would run from increased hours to TLF and not the other way around. Prior research has indeed shown that employees at the high end of the hours spectrum have considerably more access to flexi-time for example than those with a standard 40h working week. Part-time employees, however, enjoy greater availability than full-time employees as well, so access to TLF seems to actually be U-shaped in working hours (Golden, 2008, 2009). So there might be a feedback mechanism that may work in both directions which means that the overall impact on our estimates is unclear.[15]

Table 5.8 presents the parameter estimates of flexi-time and telehomework on working hours per week. According to our estimations, the flexi-time coefficient with respect to actual hours is not significantly different from zero for all samples. With respect to contracted and preferred hours, the flexi-time coefficient is also not significantly different from zero for the male sub-sample and the total sample, but it turns out negative for the female sub-sample. This implies for example that female employees who can determine the start- and end-time of work prefer to work 42 min./week (i.e. 0.707 h/week * 60 min./h) less than those without this flexibility. This reduction is somewhat surprising and may be caused by the above-mentioned simultaneous choices of working hours and TLF arrangements or some other omitted factor, e.g. informal care for elderly.

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[15] We checked whether these potential biases can be eliminated from the analysis by means of an instrumental variable analysis and tried to find suitable instrumental variables for TLF and working hours. We tested various autonomy measures for telehomework and flexi-time such as 'I can determine how I do my job', 'I can determine my work speed', or 'I can determine in which order I do my work'. For working hours we used marital status and a self-reported measure on how well knowledge and skills match with the actual work. All of these variables turned out to be weak instruments in the fixed-effects specification, however, and would therefore lead to biased estimates. Hence, we were not successful in finding suitable instruments.

Table 5.8: TLF arrangements on working hours

	Actual hours			Contracted hours			Preferred hours		
	Total	Male	Female	Total	Male	Female	Total	Male	Female
Flexi-time	0.198	0.381	-0.0821	-0.193	0.0701	-0.547**	-0.0763	0.386	-0.707**
	(0.231)	(0.294)	(0.357)	(0.168)	(0.201)	(0.270)	(0.206)	(0.282)	(0.292)
Telehomework	0.829***	0.580*	0.934***	0.262	0.0132	0.346	0.334	0.274	0.237
	(0.247)	(0.334)	(0.357)	(0.168)	(0.201)	(0.275)	(0.229)	(0.320)	(0.321)
Observations	11355	5974	5381	13326	6946	6380	13326	6946	6380
Individuals	5641	2954	2687	6398	3301	3097	6398	3301	3097

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

Note: Parameter estimates of TLF arrangements on working hours. Clustered standard errors in parentheses. See table 5.A.3 in the appendix for the full-specification.

The coefficients on telehomework are only positive and significantly different from zero with respect to actual hours. The estimates indicate an increase of around 50 minutes in actual working hours per week for the total sample. This translates into an increase of 2.5% in actual hours (50 min. relative to 33.51 mean actual hours in the sample). For female employees the coefficient suggests an increase of 56 min./week. For the male sub-sample the coefficient is only significant at the 10% level and indicates an increase of some 35 min./week. These findings fit in with previous research, which found a positive association between telehomework and overtime (Peters and van der Lippe, 2007; Peters et al., 2009; Noonan and Glass, 2012).

In general the estimates from equation 5.4 are in line with the results obtained from equation 5.3. Our results are therefore not sensitive to either specification and both estimation strategies show that the association between TLF arrangements and hours worked is generally small.

Until now we did not include wage per hour in the specifications above, even though wage is a potentially important factor in the relationship between TLF and working hours, because employees may trade wage instead of leisure for more flexibility (see equations 5.1 and 5.2). The classic interpretation is that more flexibility and control for employees implies compensating wage differentials, assuming that it provides utility to employees but costs to employers (Altonji and Paxson, 1988; Baughman et al., 2003; Heywood et al., 2007). TLF may, however, also provide (net) benefits to employers, e.g. through higher productivity, effort, and (employer-oriented) flexibility, or lower turnover, costs for office space, and absenteeism (see chapter 4). Most previous empirical analyses regarding the TLF-wage relationship indeed seem to suggest that the net effect of TLF on wages is either absent or positive (e.g. Johnson and Provan, 1995; Gariety and Shaffer, 2001; Anderson et al., 2003; Bonke et al., 2004; Gariety and Shaffer, 2007; Lowen and Sicilian, 2009). Due to the so-called division bias (Borjas, 1980), however, we cannot just add wage as an independent variable to equation 5.4.[16] We therefore instrument wage with lagged wage from the previous wave and add this to equation 5.4. This leads to a significant drop in sample size but gives comparable results with respect to the baseline specifications nevertheless.[17]

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[16] Hourly wages are calculated by dividing net wages per month by hours per month. This causes measurement error in hours to enter both sides of equation 5.4 and results in a spurious negative correlation between wages and hours.

[17] The coefficients are even more similar when we compare the specification with wage included with the baseline specification with wage excluded both estimated on the same sample. In their study on labour supply and commuting, Gutiérrez-i-Puigarnau and van Ommeren (2010) also find that the inclusion of an instrumented wage variable does not affect their results.

As a sensitivity analysis we also estimated equation 5.4 separately for employees with children (for which we can assume that they have more private responsibilities and therefore would expect a larger effect), as well as professionals (i.e. employees with a 'higher' or 'scientific' level of occupation which have better access to TLF).[18] We also estimate the model for contracted and preferred hours on the actual hours sample, i.e. the 2004–2010 waves, to rule out that the differences in effects with respect to actual, contracted, and preferred is merely caused by differences in data availability. Finally we experimented with the inclusion of lags of flexi-time and telehomework in order to take possible adjustment lags into account. The results did not change significantly for all these sub-samples and different specifications, however.

5.5 Discussion and conclusion

In this chapter we analyse the effect of temporal and locational flexibility of work (TLF) on the number of working hours using Dutch household panel data spanning the period from 2002 to 2010. We test the claim that more TLF leads to an increase in labour supply due to a better fit between work and private life. Especially within the Dutch context, an increase of TLF has been a common policy recommendation to increase the labour supply in order to increase economic growth and to prevent labour force shortages in the future.

According to our estimates, the general effects of TLF on working hours are moderate at best. Telehomework has a positive association with actual hours and our results imply an increase of around 49 minutes per week. Contracted and preferred working hours are not affected significantly by telehomework. Telehomework therefore does not seem to be associated with a structural increase in contracted working hours nor with an increase in preferred hours.

With respect to flexi-time the results are even more ambiguous. Most coefficients are not significantly different from zero at the 5% level. For females our estimates suggest that flexi-time is negatively associated with the number of working hours.

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[18] It might seem desirable to estimate this model on the sub-sample of part-time working (female) employees as well. Part-time employment may be an alternative strategy to combine work and private life and one thus might expect the largest effects of schedule and location flexibility here. Empirically, this is incorrect, however, because one would select the sample on the dependent variable and thus get biased estimates. Furthermore we are interested in the net effect of TLF, not just the effect on part-timers. Given the distribution of working hours across gender in the Netherlands, i.e. male employees mostly working full-time and female employees mostly working part-time, one could interpret gender as a (fuzzy) proxy for part-time/full-time employment, however.

The results therefore show that flexi-time does not seem to be associated with an increase in hours worked, but possibly even with a decrease for female employees, and that telehomework seems to be primarily associated with an increase in actual working hours.

At least part of the positive effect of telehomework on actual hours seems to be driven by an increase in unpaid overtime hours. Preliminary estimates indicate that unpaid overtime hours increase by one hour per week for male employees and half an hour per week for female employees who work at home at least once a week.[19] This suggests that TLF may also be used for work intensification and an increase in overtime hours, a result that has been discussed before (Peters and van der Lippe, 2007; Noonan and Glass, 2012). An alternative interpretation is that employees may reciprocate TLF availability by exerting extra effort (Akerlof, 1982; Kelliher and Anderson, 2010). Previous findings that TLF increases job satisfaction (see for example chapter 2 of this book) and job performance (Hill et al., 1998; Baltes et al., 1999; Eaton, 2003; Gajendran and Harrison, 2007) support this interpretation. Both explanations, i.e. telehomework as a means for employers to intensify work on the one hand and more work effort from employees in exchange for more flexibility on the other, may nevertheless apply, particularly for different ends of the job spectrum.

The negative effect of flexi-time on working hours is somewhat surprising. It is not clear theoretically, why this should be a genuine effect of flexi-time on working hours. An explanation might be that females may gain access to flexi-time and reduce their working hours at the same time due to a common shock, e.g. care responsibilities other than towards their own children, for which we do not control in the analysis.

A possible explanation for the moderate effects of TLF on working hours in general is that the changes are just too small to matter. Commuting for example seems to have small, ambiguous effects on labour supply in general (Gibbons and Machin, 2006; Gutiérrez-i-Puigarnau and van Ommeren, 2010) and a reduction of commuting time therefore may not have a clear effect on labour supply. In addition, telehomework is partly used to just transfer some work home, so working time at the office is substituted for working time at home (Peters and van der Lippe, 2007; Noonan and Glass, 2012). Another explanation is that employees may not be willing to increase labour supply but may just as well enjoy their improved work-life fit

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[19] We estimated a model like equation 5.4 on paid and unpaid overtime hours. These results are only indicative, however, due to the large number of employees with zero overtime hours. Estimates are therefore not shown.

from increased TLF. Labour market imperfections may allow them to do so, since TLF seems to be primarily distributed among higher-status jobs with possibly less supply side competition (Felstead et al., 2002; Golden, 2008, 2009; Smulders et al., 2011). Norms and societal preferences may reinforce this trend further, in the sense that work norms have eroded due to proliferation of part-time work in the Netherlands (Wielers and Raven, 2013) and that it is therefore not 'attractive' to increase working hours (see e.g. Bosch et al., 2010; Booth and van Ours, 2013).

The merits of this study are that we consider two TLF arrangements, namely flexi-time and telehomework, at the same time and that we utilized data spanning eight years from different sectors. The results further indicate the importance of controlling for unobserved heterogeneity in jobs and individuals in this type of analyses. A limitation of our study is that we cannot completely rule out endogeneity and reverse causality and therefore do not identify a true causal effect, statistically. Since the correlation between TLF and working hours after controlling for several individual and job-related factors turns to be small, this does not seem to be a major issue, however. Future research could extend this analysis with other TLF arrangements, like self-scheduling or working time accounts.

Overall the hypothesis that more temporal and locational flexibility of work leads to an increase in hours worked appears to be mostly rejected. The findings suggest that TLF does not have strong effects on labour supply at the intensive margin with the exception of telehomework and actual hours. This implies that the arguments regarding increases in labour supply in the debate about policy support for TLF are not empirically supported. This does not take away that there may be other good reasons to support improvements in TLF and working conditions.

Appendix

5.A Tables

Table 5.A.1: Control variables on working hours

	Actual hours			Contracted hours			Preferred hours		
	Total	Male	Female	Total	Male	Female	Total	Male	Female
Age	0.0515	-0.109	0.258***	0.0339	-0.0552	0.149***	0.129***	0.0788	0.192***
	(0.0467)	(0.0693)	(0.0603)	(0.0366)	(0.0533)	(0.0481)	(0.0457)	(0.0681)	(0.0598)
Martial status									
Ref: Married									
Cohabiting	0.985*	-0.455	2.270***	0.759*	-0.329	1.782***	0.392	-0.768	1.411*
	(0.532)	(0.626)	(0.811)	(0.395)	(0.389)	(0.623)	(0.539)	(0.711)	(0.775)
Single	1.932**	-1.083	3.761***	1.885***	0.255	3.027***	2.384***	0.898	3.468***
	(0.754)	(0.942)	(0.984)	(0.603)	(0.677)	(0.815)	(0.698)	(0.785)	(0.977)
Child(ren)	-1.457***	-0.0626	-2.892***	-1.140***	0.356	-2.682***	-0.874***	0.111	-1.877***
	(0.314)	(0.363)	(0.501)	(0.254)	(0.255)	(0.418)	(0.313)	(0.402)	(0.458)
Lower secondary	1.817*	2.017*	0.410	1.028	0.922	0.862	1.466	1.513	0.973
	(0.929)	(1.102)	(1.707)	(0.796)	(0.968)	(1.343)	(0.953)	(1.277)	(1.227)
Education									
Ref: Primary School									
Higher secondary	2.535**	2.237*	1.888	1.691**	1.370	1.863	2.570***	2.289*	2.561**
	(0.992)	(1.178)	(1.808)	(0.829)	(0.999)	(1.406)	(0.979)	(1.302)	(1.305)
Vocational college	4.876***	4.111***	4.692**	3.335***	2.510**	3.980**	3.782***	2.894**	4.365***
	(1.128)	(1.369)	(1.975)	(0.933)	(1.131)	(1.562)	(1.073)	(1.420)	(1.475)
Academic	5.256***	4.452***	4.878**	4.064***	2.693**	5.358***	4.789***	3.148**	6.351***
	(1.332)	(1.507)	(2.448)	(1.096)	(1.268)	(1.912)	(1.217)	(1.535)	(1.840)
Work experience	-0.0164	-0.0211	-0.0314	-0.00725	-0.00985	-0.0149	-0.0216	-0.0226	-0.0318
	(0.0326)	(0.0532)	(0.0342)	(0.0247)	(0.0395)	(0.0276)	(0.0310)	(0.0472)	(0.0392)
Permanent contract	0.696*	0.345	1.063*	0.427	0.462	0.371	-0.0880	-0.287	0.0137
	(0.397)	(0.536)	(0.558)	(0.326)	(0.434)	(0.461)	(0.341)	(0.500)	(0.457)

Table 5.A.1: Control variables on working hours *(cont.)*

	Actual hours			Contracted hours			Preferred hours		
	Total	Male	Female	Total	Male	Female	Total	Male	Female
Empl. status change	0.292	−0.229	0.809***	0.0633	−0.275	0.398**	0.0538	−0.222	0.285
	(0.179)	(0.248)	(0.248)	(0.132)	(0.173)	(0.193)	(0.166)	(0.238)	(0.225)
2nd job	−0.755	−0.884	−0.796	−1.219**	−1.761***	−0.886	−0.923*	−1.480**	−0.628
	(0.545)	(0.812)	(0.721)	(0.482)	(0.653)	(0.680)	(0.511)	(0.701)	(0.721)
Supervised employees									
Ref: None									
1-9 employees	1.060***	0.860***	1.204***	0.422**	0.240	0.540*	0.236	0.0119	0.442
	(0.243)	(0.284)	(0.404)	(0.173)	(0.198)	(0.295)	(0.209)	(0.279)	(0.309)
10-49 employees	1.688***	1.645***	1.537*	0.563**	0.374	0.643	0.535	0.387	0.544
	(0.439)	(0.491)	(0.844)	(0.285)	(0.309)	(0.570)	(0.343)	(0.404)	(0.642)
50 or more employees	3.357***	3.698***	1.364	1.359	1.551**	0.0937	1.485	1.918**	−0.646
	(0.954)	(1.013)	(2.164)	(0.883)	(0.710)	(2.786)	(0.969)	(0.835)	(3.011)
Occupational level									
Ref: Medium									
Elementary	−1.858***	−2.340***	−1.457	−1.224**	−1.556**	−0.792	−1.392***	−1.767***	−1.066
	(0.670)	(0.896)	(1.045)	(0.513)	(0.638)	(0.852)	(0.537)	(0.613)	(0.958)
Lower	−0.428*	−0.209	−0.511	−0.260	−0.213	−0.201	0.0231	0.249	−0.109
	(0.231)	(0.307)	(0.330)	(0.190)	(0.238)	(0.278)	(0.234)	(0.353)	(0.303)
Higher	0.521**	0.438	0.412	0.354**	0.255	0.393	0.261	0.246	0.177
	(0.220)	(0.279)	(0.354)	(0.170)	(0.213)	(0.276)	(0.216)	(0.290)	(0.320)
Scientific	0.376	0.762*	−0.443	0.239	0.495*	−0.269	0.153	0.304	−0.148
	(0.356)	(0.433)	(0.617)	(0.231)	(0.291)	(0.382)	(0.320)	(0.401)	(0.536)
Sector									
Ref: Agriculture									
Industry	0.299	−0.746	2.393	0.695	−0.0474	2.273	0.369	−0.551	2.499*
	(0.819)	(0.658)	(1.899)	(0.813)	(0.521)	(2.220)	(0.770)	(0.824)	(1.402)
Construction	0.752	−0.391	3.450	1.760*	0.884	3.967	0.925	0.116	2.870
	(0.906)	(0.772)	(2.149)	(0.899)	(0.649)	(2.797)	(0.844)	(0.881)	(2.220)
Trade, gastronomy, repair	−0.347	−1.328*	2.346	0.250	−0.497	2.305	0.409	−0.384	2.404*
	(0.875)	(0.721)	(2.007)	(0.868)	(0.558)	(2.334)	(0.811)	(0.882)	(1.435)
Transport	0.957	−1.059	6.332**	1.431	−0.434	6.371**	0.620	−0.747	3.923**
	(1.077)	(1.017)	(2.499)	(1.080)	(0.924)	(2.738)	(1.026)	(1.125)	(1.994)
Business services	0.992	−0.788	4.797**	1.358	0.329	3.761	1.021	0.287	2.882**

Table 5.A.1: Control variables on working hours *(cont.)*

	Actual hours			Contracted hours			Preferred hours		
	Total	Male	Female	Total	Male	Female	Total	Male	Female
	(0.841)	(0.698)	(2.042)	(0.839)	(0.585)	(2.306)	(0.805)	(0.876)	(1.466)
Care, Welfare	1.346	−1.082	5.183**	1.389	−0.0381	3.960*	1.199	−0.389	3.717**
	(1.031)	(1.098)	(2.152)	(0.973)	(0.932)	(2.386)	(0.984)	(1.392)	(1.573)
Other services	0.482	−1.254	4.196*	0.563	−0.606	2.977	0.628	−0.421	2.763*
	(0.981)	(0.969)	(2.157)	(0.922)	(0.751)	(2.399)	(0.962)	(1.153)	(1.619)
Government	1.223	−0.550	4.722**	0.839	−0.606	3.549	1.239	−0.237	3.865**
	(0.969)	(0.917)	(2.153)	(0.922)	(0.766)	(2.376)	(0.906)	(1.037)	(1.584)
Education	3.253***	−0.278	8.331***	2.585**	0.436	5.937**	2.340**	−0.385	6.002***
	(1.234)	(1.303)	(2.416)	(1.121)	(0.984)	(2.601)	(1.162)	(1.283)	(1.957)
No. of employees (/1000)	0.0405	0.0604*	0.0209	0.0249	0.0387	0.0218	0.0110	0.0315	−0.0222
	(0.0289)	(0.0338)	(0.0515)	(0.0216)	(0.0260)	(0.0392)	(0.0325)	(0.0293)	(0.100)
Constant	26.59***	42.21***	8.147**	26.12***	36.95***	12.83***	21.47***	30.36***	11.00***
	(2.046)	(2.573)	(3.397)	(1.743)	(2.030)	(3.196)	(2.073)	(2.921)	(2.885)
Observations	11355	5974	5381	13326	6946	6380	13326	6946	6380
Individuals	5641	2954	2687	6398	3301	3097	6398	3301	3097

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

Note: Parameter estimates of control variables only on working hours. Year (wave) dummies included. Clustered standard errors in parentheses.

Table 5.A.2: Control variables on TLF arrangements

	Flexi-time			Telehomework		
	Total	Male	Female	Total	Male	Female
Age	0.00389	0.000814	0.00704**	0.00561***	0.00394	0.00814***
	(0.00241)	(0.00329)	(0.00349)	(0.00192)	(0.00264)	(0.00282)
Martial status						
Ref: Married						
Cohabiting	-0.0283	-0.0428	-0.0158	-0.0126	-0.0676*	0.0371
	(0.0309)	(0.0475)	(0.0401)	(0.0245)	(0.0365)	(0.0325)
Single	-0.0192	-0.0500	0.00692	-0.0255	-0.0887	0.0224
	(0.0381)	(0.0698)	(0.0433)	(0.0309)	(0.0563)	(0.0350)
Child(ren)	0.0381**	0.0586**	0.0198	0.0326**	0.0600***	0.00364
	(0.0190)	(0.0281)	(0.0248)	(0.0164)	(0.0222)	(0.0237)
Lower secondary	-0.0120	0.0494	-0.151*	-0.0268	-0.000359	-0.0864**
	(0.0389)	(0.0375)	(0.0798)	(0.0233)	(0.0275)	(0.0403)
Education						
Ref: Primary School						
Higher secondary	-0.0249	0.0459	-0.170*	-0.0145	0.00691	-0.0664*
	(0.0426)	(0.0408)	(0.0868)	(0.0259)	(0.0338)	(0.0401)
Vocational college	-0.0177	0.0487	-0.151	-0.0107	0.0629	-0.126**
	(0.0493)	(0.0525)	(0.0939)	(0.0347)	(0.0463)	(0.0513)
Academic	-0.00644	0.00691	-0.0653	0.0555	0.112*	-0.0305
	(0.0592)	(0.0675)	(0.106)	(0.0498)	(0.0669)	(0.0760)
Work experience	0.000175	0.00305	-0.00287	0.000474	0.000532	0.0000345
	(0.00156)	(0.00191)	(0.00238)	(0.00112)	(0.00147)	(0.00173)
Permanent contract	0.00377	-0.0297	0.0247	0.00970	0.000770	0.0177
	(0.0193)	(0.0294)	(0.0254)	(0.0146)	(0.0227)	(0.0190)
Empl. status change	0.0155	0.0146	0.0135	0.0102	0.00500	0.0167
	(0.0103)	(0.0148)	(0.0144)	(0.00893)	(0.0131)	(0.0120)
2nd job	-0.00435	-0.00620	-0.00580	-0.00168	-0.0466	0.0262
	(0.0229)	(0.0377)	(0.0284)	(0.0210)	(0.0355)	(0.0248)
Supervised employees						
Ref: None						
1-9 employees	0.0264*	0.0141	0.0444*	0.0312**	0.0227	0.0378*
	(0.0145)	(0.0188)	(0.0227)	(0.0134)	(0.0179)	(0.0204)
10-49 employees	0.0655***	0.0619*	0.0631	0.0498**	0.0376	0.0588

Table 5.A.2: Control variables on TLF arrangements *(cont.)*

	Flexi-time			Telehomework		
	Total	Male	Female	Total	Male	Female
	(0.0254)	(0.0320)	(0.0404)	(0.0229)	(0.0274)	(0.0405)
50 or more employees	0.0179	0.0265	-0.0359	0.0567	0.0621	0.0107
	(0.0542)	(0.0626)	(0.108)	(0.0531)	(0.0597)	(0.115)
Occupational level						
Ref: Medium						
Elementary	-0.0509*	-0.0964***	-0.000304	0.000811	0.0141	-0.0191
	(0.0278)	(0.0341)	(0.0457)	(0.0147)	(0.0212)	(0.0198)
Lower	-0.0273*	-0.0245	-0.0270	-0.0138	-0.00306	-0.0249*
	(0.0140)	(0.0207)	(0.0195)	(0.00975)	(0.0136)	(0.0140)
Higher	0.00545	0.00890	-0.00472	-0.0143	-0.0197	-0.00852
	(0.0149)	(0.0196)	(0.0230)	(0.0133)	(0.0174)	(0.0204)
Scientific	0.0215	0.0431	-0.0193	-0.0458**	-0.0517*	-0.0399
	(0.0214)	(0.0264)	(0.0365)	(0.0227)	(0.0285)	(0.0374)
Sector						
Ref: Agriculture						
Industry	-0.112	-0.0913	-0.148	0.0173	-0.00795	0.0718
	(0.0818)	(0.0934)	(0.165)	(0.0470)	(0.0583)	(0.0816)
Construction	-0.0981	-0.0739	-0.116	0.0341	0.0172	0.0715
	(0.0866)	(0.0960)	(0.218)	(0.0521)	(0.0607)	(0.146)
Trade, gastronomy, repair	-0.158*	-0.126	-0.219	0.0438	0.0318	0.0654
	(0.0824)	(0.0953)	(0.158)	(0.0480)	(0.0606)	(0.0824)
Transport	-0.121	-0.0700	-0.230	0.0225	-0.00460	0.0976
	(0.0898)	(0.105)	(0.166)	(0.0505)	(0.0622)	(0.0902)
Business services	-0.0864	-0.0612	-0.136	0.0252	-0.00418	0.0758
	(0.0819)	(0.0944)	(0.159)	(0.0483)	(0.0583)	(0.0895)
Care, Welfare	-0.0639	-0.00826	-0.134	0.0708	0.128*	0.0741
	(0.0870)	(0.109)	(0.163)	(0.0549)	(0.0772)	(0.0904)
Other services	-0.100	-0.00899	-0.251	0.0575	0.0521	0.0819
	(0.0888)	(0.104)	(0.167)	(0.0536)	(0.0675)	(0.0938)
Government	-0.0305	-0.0120	-0.0711	0.0401	0.0416	0.0587
	(0.0881)	(0.103)	(0.168)	(0.0520)	(0.0627)	(0.0940)
Education	-0.133	-0.172	-0.139	0.0376	-0.0523	0.129
	(0.0933)	(0.113)	(0.171)	(0.0613)	(0.0725)	(0.105)

Table 5.A.2: Control variables on TLF arrangements *(cont.)*

	Flexi-time			Telehomework		
	Total	Male	Female	Total	Male	Female
No. of employees (/1000)	-0.0000914	0.000348	-0.000801	0.00429	0.00401	0.00711
	(0.00134)	(0.00126)	(0.00401)	(0.00270)	(0.00297)	(0.00523)
Constant	0.295**	0.345**	0.349*	-0.125	-0.0491	-0.204
	(0.127)	(0.165)	(0.212)	(0.0880)	(0.122)	(0.135)
Observations	13326	6946	6380	13326	6946	6380
Individuals	6398	3301	3097	6398	3301	3097

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

Note: Parameter estimates of control variables on flexi-time and telehomework. Year (wave) dummies included. Clustered standard errors in parentheses.

Table 5.A.3: TLF arrangements on working hours

	Actual hours			Contracted hours			Preferred hours		
	Total	Male	Female	Total	Male	Female	Total	Male	Female
Flexi-time	0.198	0.381	-0.0821	-0.193	0.0701	-0.547**	-0.0763	0.386	-0.707**
	(0.231)	(0.294)	(0.357)	(0.168)	(0.201)	(0.270)	(0.206)	(0.282)	(0.292)
Telehomework	0.829***	0.580*	0.934***	0.262	0.0132	0.346	0.334	0.274	0.237
	(0.247)	(0.334)	(0.357)	(0.168)	(0.201)	(0.275)	(0.229)	(0.320)	(0.321)
Age	0.0419	-0.113	0.244***	0.0332	-0.0553	0.150***	0.127***	0.0774	0.195***
	(0.0467)	(0.0692)	(0.0607)	(0.0366)	(0.0532)	(0.0481)	(0.0456)	(0.0679)	(0.0597)
Martial status									
Ref: Married									
Cohabiting	1.000*	-0.398	2.231***	0.757*	-0.325	1.761***	0.394	-0.733	1.391*
	(0.530)	(0.624)	(0.812)	(0.396)	(0.391)	(0.625)	(0.538)	(0.706)	(0.776)
Single	1.942***	-1.042	3.743***	1.888***	0.259	3.023***	2.391***	0.942	3.467***
	(0.753)	(0.937)	(0.985)	(0.603)	(0.674)	(0.819)	(0.697)	(0.780)	(0.981)
Child(ren)	-1.486***	-0.115	-2.895***	-1.141***	0.352	-2.672***	-0.882***	0.0718	-1.864***
	(0.313)	(0.363)	(0.501)	(0.254)	(0.255)	(0.419)	(0.312)	(0.398)	(0.456)
Lower secondary	1.859**	2.000*	0.509	1.033	0.919	0.809	1.474	1.494	0.887
	(0.930)	(1.103)	(1.709)	(0.795)	(0.968)	(1.336)	(0.952)	(1.278)	(1.211)
Education									
Ref: Primary School									
Higher secondary	2.577***	2.233*	1.955	1.690**	1.366	1.793	2.573***	2.270*	2.457*
	(0.993)	(1.177)	(1.808)	(0.828)	(0.999)	(1.398)	(0.978)	(1.302)	(1.287)
Vocational college	4.918***	4.068***	4.816***	3.334***	2.505**	3.941**	3.784***	2.858**	4.288***
	(1.128)	(1.367)	(1.973)	(0.932)	(1.131)	(1.552)	(1.072)	(1.420)	(1.457)
Academic	5.223***	4.382***	4.915***	4.049***	2.691***	5.333***	4.770***	3.115**	6.312***
	(1.331)	(1.503)	(2.445)	(1.096)	(1.269)	(1.904)	(1.216)	(1.535)	(1.820)
Work experience	-0.0161	-0.0226	-0.0303	-0.00734	-0.0101	-0.0165	-0.0217	-0.0239	-0.0339
	(0.0325)	(0.0531)	(0.0342)	(0.0248)	(0.0396)	(0.0276)	(0.0310)	(0.0471)	(0.0392)
Permanent contract	0.689*	0.346	1.058*	0.425	0.464	0.378	-0.0909	-0.275	0.0270
	(0.398)	(0.537)	(0.557)	(0.325)	(0.434)	(0.459)	(0.340)	(0.500)	(0.455)
Empl. status change	0.285	-0.236	0.799***	0.0636	-0.276	0.400**	0.0515	-0.229	0.290
	(0.179)	(0.248)	(0.248)	(0.132)	(0.173)	(0.192)	(0.166)	(0.238)	(0.225)
2nd job	-0.748	-0.868	-0.806	-1.219**	-1.760***	-0.898	-0.923*	-1.465**	-0.638
	(0.546)	(0.812)	(0.722)	(0.482)	(0.652)	(0.680)	(0.511)	(0.703)	(0.720)

Table 5.A.3: TLF arrangements on working hours *(cont.)*

	Actual hours			Contracted hours			Preferred hours		
	Total	Male	Female	Total	Male	Female	Total	Male	Female
Supervised employees									
Ref: None									
1-9 employees	1.025***	0.835***	1.182***	0.418**	0.238	0.552*	0.227	0.000236	0.465
	(0.244)	(0.285)	(0.406)	(0.173)	(0.198)	(0.295)	(0.209)	(0.279)	(0.308)
10-49 employees	1.651***	1.610***	1.510*	0.563**	0.369	0.658	0.523	0.353	0.575
	(0.438)	(0.489)	(0.844)	(0.286)	(0.310)	(0.573)	(0.344)	(0.405)	(0.644)
50 or more employees	3.291***	3.630***	1.315	1.348	1.549**	0.0703	1.468	1.891**	-0.674
	(0.955)	(1.014)	(2.176)	(0.884)	(0.711)	(2.788)	(0.968)	(0.833)	(3.009)
Occupational level									
Ref: Medium									
Elementary	-1.850***	-2.320***	-1.427	-1.234**	-1.549**	-0.786	-1.396***	-1.734***	-1.061
	(0.669)	(0.895)	(1.046)	(0.512)	(0.636)	(0.850)	(0.538)	(0.616)	(0.951)
Lower	-0.408*	-0.200	-0.476	-0.262	-0.211	-0.207	0.0257	0.260	-0.122
	(0.231)	(0.308)	(0.331)	(0.190)	(0.239)	(0.278)	(0.235)	(0.354)	(0.303)
Higher	0.532**	0.442	0.425	0.358**	0.254	0.394	0.266	0.248	0.176
	(0.220)	(0.279)	(0.352)	(0.169)	(0.213)	(0.275)	(0.215)	(0.288)	(0.319)
Scientific	0.422	0.779*	-0.386	0.256	0.493*	-0.266	0.170	0.302	-0.152
	(0.354)	(0.433)	(0.609)	(0.232)	(0.290)	(0.379)	(0.322)	(0.401)	(0.533)
Sector									
Ref: Agriculture									
Industry	0.306	-0.707	2.297	0.669	-0.0409	2.167	0.354	-0.514	2.377*
	(0.839)	(0.684)	(1.948)	(0.814)	(0.521)	(2.222)	(0.769)	(0.820)	(1.356)
Construction	0.746	-0.380	3.395	1.733*	0.889	3.878	0.906	0.140	2.771
	(0.923)	(0.791)	(2.199)	(0.898)	(0.648)	(2.800)	(0.843)	(0.879)	(2.198)
Trade, gastronomy, repair	-0.350	-1.295*	2.263	0.208	-0.488	2.162	0.383	-0.344	2.234
	(0.894)	(0.743)	(2.056)	(0.868)	(0.558)	(2.335)	(0.811)	(0.880)	(1.391)
Transport	0.959	-1.045	6.232**	1.402	-0.429	6.211**	0.603	-0.719	3.737**
	(1.092)	(1.033)	(2.543)	(1.080)	(0.924)	(2.736)	(1.025)	(1.121)	(1.951)
Business services	0.984	-0.775	4.718***	1.335	0.334	3.660	1.006	0.312	2.768*
	(0.861)	(0.719)	(2.095)	(0.840)	(0.585)	(2.310)	(0.805)	(0.874)	(1.428)
Care, Welfare	1.313	-1.136	5.106**	1.359	-0.0392	3.861	1.170	-0.421	3.605**
	(1.046)	(1.114)	(2.198)	(0.973)	(0.934)	(2.388)	(0.983)	(1.384)	(1.533)
Other services	0.445	-1.294	4.097*	0.529	-0.606	2.811	0.601	-0.431	2.566

Table 5.A.3: TLF arrangements on working hours *(cont.)*

	Actual hours			Contracted hours			Preferred hours		
	Total	Male	Female	Total	Male	Female	Total	Male	Female
	(0.997)	(0.986)	(2.203)	(0.923)	(0.751)	(2.403)	(0.961)	(1.149)	(1.582)
Government	1.197	−0.565	4.677**	0.822	−0.606	3.490	1.224	−0.243	3.800**
	(0.984)	(0.930)	(2.201)	(0.923)	(0.766)	(2.379)	(0.906)	(1.034)	(1.546)
Education	3.255***	−0.205	8.233***	2.550**	0.449	5.817**	2.317**	−0.304	5.873***
	(1.245)	(1.320)	(2.452)	(1.120)	(0.983)	(2.598)	(1.157)	(1.283)	(1.909)
No. of employees (/1000)	0.0360	0.0572*	0.0142	0.0238	0.0387	0.0189	0.00952	0.0302	−0.0244
	(0.0281)	(0.0330)	(0.0496)	(0.0216)	(0.0261)	(0.0392)	(0.0326)	(0.0292)	(0.101)
Constant	26.78***	42.19***	8.581**	26.21***	36.93***	13.09***	21.53***	30.24***	11.29***
	(2.051)	(2.590)	(3.402)	(1.741)	(2.037)	(3.179)	(2.068)	(2.921)	(2.845)
Observations	11355	5974	5381	13326	6946	6380	13326	6946	6380
Individuals	5641	2954	2687	6398	3301	3097	6398	3301	3097

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

Note: Parameter estimates of TLF arrangements on working hours. Year (wave) dummies included. Clustered standard errors in parentheses.

6 Conclusion

This dissertation is focussed on the phenomenon of temporal and locational flexibility of work. Facilitated by technological innovation and new organisational practices, employees can exert greater control over and make more choices in the duration, schedule and location of their work. Apart from more 'traditional' forms like working reduced hours, TLF concerns arrangements such as variable start- and end-times of work (flexi-time) and working from home (telehomework). This type of flexibility is currently expanding strongly and has wide-ranging consequences on labour supply and demand, both in the short and in the long run. Despite these developments, it has not received much attention in labour economics so far. This study is therefore an attempt to shed some light on this phenomenon.

6.1 Empirical results

The introductory chapter gives an overview over and a conceptualisation of the topic and already points at some difficulties in the empirical treatment of the phenomenon. The empirical analyses are focussed on the effects of TLF arrangements for different stakeholders in the labour market. Chapters 2 and 3 are devoted to consequences for employees, namely the impact on working-time fit and job satisfaction, and potential adverse effects on careers, respectively. In chapter 4 we investigate a potential benefit for employers, a reduction of absenteeism. Chapter 5 finally offers an analysis of the impact of schedule and location flexibility on the number of working hours. Here, we will sum up the results by TLF arrangement and start out with the effects of flexi-time (see table 6.1).

Schedule flexibility in the form of flexible, self-determined start- and end-times of work is positively associated with both working-time fit and job satisfaction. Apparently, it provides employees with more control over their working life and leads to a better match between paid work and other activities. We do not find any gender differences nor differences between employees with or without children at home in the impact of flexi-time on working time fit or job satisfaction. It therefore seems that flexi-time does increase working-time fit and job satisfaction of all employees alike and not particularly for those with family responsibilities.

Table 6.1: Summary of findings

	Schedule flexibility (flexi-time)	Location flexibility (telehomework)	Duration flexibility (part-time work)
Working-time fit	++	○	++
Job satisfaction	++	++	−[a]
Career	○	−	○[b]
Absenteeism	−−	−	○[c]
Working hours	○	○[d]	n.a.

Note: +, −, and ○ indicate a positive, negative, or no significant association between the flexibility and the outcome variable, respectively. ++ and −− indicate a strong and highly significant association. n.a. means not applicable.

[a] Not significant for male employees.
[b] Previous research has found negative effects.
[c] Employees with fewer work days show more absenteeism.
[d] Telehomework is associated with an increase in actual hours.

One may wonder, whether such a flexibility option does have adverse effects on the career advancement of employees. Employees presence at the workplace and therefore their visibility for colleagues and supervisors is more variable when they make use of flexible working times. With one exception though, flexi-time does not seem to have a significantly negative effect on promotions and employer-paid training according to our estimates.[1] We would interpret our results and the seemingly general absence of adverse effects on career advancement as preliminary, however, because our dataset only provided us with information about access to flexi-time but not with information about actual usage of this arrangement.

Flexi-time also has a positive impact on absenteeism. Schedule flexibility, which implies quickly adjustable working hours, reduces both the frequency and – in particular – the duration of absences according to our estimates. Our educated guess is that flexi-time has a beneficial effect on both employee's behaviour – they do not as quickly call in sick for example – and on their health as well, in particular because they experience less stress.

Schedule flexibility finally does not seem to lead to an increase in hours worked. It may even be associated with a decrease in labour supply of female employees. A possible explanation for the lack of an association between schedule flexibility and working hours may be that the impact of flexi-time on the whole time schedule

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[1] The one exception is that our estimates indicated a slightly negative effect on promotion probabilities for female employees.

of employees is just too small to induce a sustained change in the number of work hours.

Next we examine the outcomes for location flexibility. Telehomework is associated with higher job satisfaction as well, but to a smaller extent than flexi-time and mostly for males and not for females. Previous research points out that higher job satisfaction is related to fewer job quits, a lower rate of absenteeism and increased general well-being. Flexi-time and telehomework are therefore likely to exert beneficial effects in these domains for both (male) employees and employers.

Telehomework is also associated with moderate increases in actual hours, but not in contracted or preferred hours. It therefore seems to primarily lead to more overtime. This may be caused by employers granting telehomework in order to intensify work or because employees exert more work effort in exchange for more flexibility. Working at home once per week or more thus does not seem to significantly support the combination of work and private life – at least not when this is measured as working-time fit. A possible explanation for this is that apart from the increase in overtime hours, employees may experience it as stressful when boundaries between work and private life become more blurry when they work at home.

Frequent telehomework may also have a negative effect on one's career. According to our results, the probability of a promotion or employer-paid training is significantly reduced especially for male employees who regularly work at home more than once a week. These employees presumably display less face-time at the workplace than is expected and are therefore likely to be perceived as less dependable and less committed to their work. Our interpretation of these findings is that visibility at work indeed plays an important role for the assessment of employees and that less visibility impairs further career advancement. Occasional telehomework, however, does not seem to affect one's career as it does not significantly affect the probability of promotions and employer-paid training according to our results.

Regarding sickness absence, telehomework seems to negatively affect its frequency but not its duration. Location flexibility therefore has a positive effect on employee's behaviour, because it apparently changes how they deal with unexpected events or minor health problems for example, but does not seem to affect their health overall. In general, sickness absence can to some extent be substituted by schedule and location flexibility.

Finally we turn to the results for duration flexibility. Not very surprisingly, part-time work is positively associated with working-time fit, especially for work durations of up to 20 hours per week. It appears to have a negative effect on job satisfaction for female employees and no effect for male employees, however. This

is in line with theory and previous results found for the Netherlands, but contrasts some of the previous empirical results from other countries.

A reduced number of weekly work hours does not appear to have a significant impact on absenteeism in general. Controlling for the number of hours, however, fewer workdays are associated with relatively more frequent and longer spells of absenteeism.

With our data, we were not able to reliably reproduce the adverse effects of part-time work on career advancement documented in the literature. Apart from the optimistic view that part-time work may not be used as a screening device in the Netherlands anymore because it is so common, our estimation strategy may not be able to pick up these effects due to low within-variation with respect to part-time work and promotions or employer-paid training.

Concerning working-time fit, job satisfaction, and absenteeism we also tested for interaction effects between the different TLF arrangements, but these were mostly absent. Apparently the combination of arrangements does not add anything extra with respect to these outcomes, i.e. sum is not more than their parts. The same is generally the case for gender differences and differences between employees with or without children. Gender differences in the effects of TLF arrangements are either small or absent according to our results. TLF also does not seem to be particularly more relevant for employees with family responsibilities, a group of workers who presumably struggle more with the combination of work and private life than other groups of workers. TLF should therefore not be viewed as a dedicated family policy, but rather as a flexibility option targeted at all employees regardless of gender and family background.

Our studies are among the first to analyse TLF comprehensively and in combination, so that we are able to disentangle and compare their labour market consequences. So which type of flexibility is generally preferable based on our outcomes? Schedule flexibility like flexi-time improves working-time fit and job satisfaction, does not seem to have significant adverse career effects, and, regarding absenteeism, is also beneficial for employers (and is also likely to have a relatively small impact on work organisation and the production process in general). From this perspective, it indeed seems as a preferable form of flexibility since the positive outcomes with respect to the consequences examined outweigh the potential negative ones by far. One should add however, that flexible start- and end-times of work also provide relatively little flexibility compared to working reduced hours or working at home.

Judged by the moderately positive effects on job satisfaction, location flexibility and telehomework in particular provides employees with more autonomy. It does

not improve the working-time fit of employees and is associated with an increase in actual hours without raising contracted or preferred hours, however. It furthermore reduces absenteeism rates only moderately and has adverse effects on career advancement. For employers the increase in actual hours and the reduction in absenteeism may be sufficient to consider its implementation (abstracting from any other potential consequences and assuming that the production process allows it). Employees should be careful to utilise this type of flexibility too frequently, however, since the balance between pros and cons is likely to become negative then. Both schedule and location flexibility do not appear to be able to increase the number of hours worked, with the exception of telehomework raising actual hours. This suggests that both types of flexibility are currently not effective policy options to increase labour supply at the intensive margin.

Whereas duration flexibility or part-time work increases working-time fit as expected, its impact on job satisfaction and absenteeism is rather limited. We do not find negative effects on career advancement in our setup, but would be reluctant to interpret this absence of adverse effects as one of part-time's benefits. In summary, part-time work is a widely used flexibility option but one with ambiguous consequences. Employees should consider whether increasing working hours with more schedule flexibility would not be a better alternative.

The results with respect to working-time fit, job satisfaction, career, and working hours are based on analyses of a recent Dutch longitudinal dataset, which allowed us to control for individual and job-related,[2] unobserved and time-invariant factors (also known as fixed-effects). This represents a significant advantage over much of the existing studies on labour market consequences of TLF, because access and usage of TLF and the respective outcomes are quite likely to be related to unobserved factors like personal preferences.[3]

In general these conclusions are based on the outcomes discussed in this thesis and do not take into account other potential positive and negative consequences of TLF arrangements. Although the empirical results are based on data on the Netherlands, the results are interesting in a broader context, particularly as many countries today are discussing how to adjust and organise work and working time in such a way that they facilitate the combination of work and private life.

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[2] To the extent that we controlled for job-switches.

[3] A suitable longitudinal dataset was unfortunately not available for our analysis on absenteeism. The cross-sectional data we used provided us with enough information to capture many relevant individual, job- and firm-related aspects, however. We also discussed two important aspects which would imply a downward bias on our estimates, making our case of a negative effect of TLF on absenteeism rather stronger than weaker.

6.2 Recent developments and wider implications

Two interesting developments with respect to TLF took place recently. On the one hand the US-American IT companies Yahoo and Hewlett-Packard banned or reduced access to schedule and location flexibility arrangements for their employees, demanding or at least firmly encouraging them to work on the company premises and not at home. This drew a lot of media attention, especially in the case of Yahoo, leading commentators to speculate about a decline in telehomework. Internal memos on the subject from the two companies, which are both currently suffering economic difficulties and attempting a turnaround, stressed the need for more employee collaboration and engagement and raised the expectation of increased cohesion and innovation by this change in company policy (Swisher, 2013; Tkaczyk, 2013; Hesseldahl, 2013).

This development is particularly interesting and even paradoxical at first sight, exactly because these two are IT companies, whose type of work would seem particularly well suited for flexible and remote work. But they are also both currently struggling with economic difficulties and as organisations apparently lack cohesion and innovativeness, which, according to their management, comes to a significant extent from their (remote) employees being too scattered and disconnected from each other. In the light of the results presented here, particularly with respect to the importance of face-time, these management decisions therefore do not seem far-fetched. From this perspective, the purpose of a modern office is precisely to bring employees together and have them cooperate with each other.

At the same time, many Dutch employers both in the private and public sector increasingly offer TLF with the objective to reduce costs, particularly for office space. This often involves a restructuring of the offices with the abolition of individual offices and the introduction of flex-spaces, where employees do not have their own dedicated workplace anymore but work in shared areas. Employees are also encouraged to increasingly work at home by this policy. The popularity of this new type of flexibility among Dutch employers may be due to the fact that it is more common in the Dutch part-time economy that many employees are not present every working day of the week, so management practices are set to deal with 'absent' employees.

Common to both developments is the fact that TLF is a trending management and human resources topic, which employers are actively pursuing, either by creating formal arrangements for the first time or through a (re)formalisation of existing, long-standing arrangements. Here they have to strike a balance between the right amount of flexibility and other aims of the organisation, for example collegiality and workplace cohesion as well as organisational attachment and commitment.

Both developments furthermore underscore the context-dependence of the impact and suitability of TLF. Whether or not employers grant access to TLF arrangements does not only depend on technical aspects like the production process but also on current company and management objectives, as well as the cultural and policy framework. In addition, the timing and setting of work becomes much more individualised and does not adhere to a 9–5 standard anymore. This individualisation is not only influenced by differences in employees' background and preferences but also to a large extent by differences in work relations and employer demands.

Another relevant aspect is the importance of autonomy in the use of TLF arrangements, for example for employees with family responsibilities. In order to coordinate private schedules and activities, reliable working times and regularity may be more valuable to them than too much variability in work schedule and location. They may therefore prefer to not use TLF arrangements but opt for fixed, regular schedules in order to keep strict boundaries between work and private life. Employee choice is therefore essential for the assessment of the labour market consequences of TLF as discussed here, since the results of our analyses may potentially be very different if employees do not use TLF arrangements voluntarily (cf. Lee and DeVoe, 2012).

Regarding future research in labour economics this leads us again to the problem of measurement. As already mentioned in the introduction, TLF as a phenomenon has grown tremendously but is difficult to grasp empirically. With current data we do not really know whether TLF utilisation happens voluntary or involuntary. As a starting point, the distinction between access to and utilisation of TLF arrangements could shed light on this issue. The data is also limited to some TLF arrangements like flexi-time, whereas data on self-scheduling for example is relatively scarce. This may be particularly relevant for sectors where individualised flexi-time is less common due to the production process, e.g. the welfare and care sector. A first suggestion for future research would therefore be to improve data and to investigate these lesser known arrangements.

Another interesting area of research, based on the discussion above, would be the impact of TLF on communication and collaboration among colleagues, peer effects, and thus on innovation and productivity within firms. In the debate about a reduction of telehomework, chance encounters between employees are often mentioned as essential for innovation and firm performance. So to what extent and under which circumstances does TLF restrain communication and collaboration? How important are formal and informal conversations really for productivity? Does a cutback on flexibility improve these aspects again? First evidence that working at home may be beneficial for creative tasks but counterproductive for dull

ones (Dutcher, 2012), indicates already that the relationship between flexibility, innovation, and productivity may be more complex than the media debate suggests.

On a higher level this touches on the social element of work and the impact of cooperation, collaboration, and peer effects on productivity. There is already some research on peer effects in learning (Sacerdote, 2001) and as an incentive (Falk and Ichino, 2006; Mas and Moretti, 2009), but we know too little about how these affect cooperation and collaboration between employees and to what extent TLF may have an impact on this relationship. Apparently employees do not always have to be together at the same time and place in many production processes in order to be productive, otherwise employers would not introduce TLF arrangements at such a large scale. On the other hand, there seems to be a sufficient level of social interaction necessary for work processes to be effective and efficient.

Future research should therefore also focus on the role of autonomy, monitoring, and incentives. TLF implies more autonomy and control over the duration, schedule, and location of work. How much flexibility and autonomy do employees need in order to feel comfortable at their work place? Is there a general optimal balance between flexibility and regularity in schedule, location, and duration of work, which promotes both employee well-being and productivity? TLF also implies less visibility and presence at work, which creates problems for monitoring and managerial control. This raises the question of how employees can best be managed under these circumstances, e.g. by focussing more on output-driven than on input-driven incentives. What is the right amount of monitoring, how can it be executed sufficiently? To what extent is monitoring still necessary, assuming that TLF provides more utility for employees? How can employers provide the right incentives for employees to perform in the companies interest?

Additional central topics of labour economics are wages and remuneration. On the one hand 'fringe benefits' like flexi-time and telehomework may imply compensating wage differentials. On the other they may also provide benefits to employers, either through increased employee effort and productivity, or cost reductions for absenteeism or office space. Most previous empirical analyses regarding the TLF-wage relationship come to the conclusion that the net effect of TLF on wages is either absent or positive (cf. chapter 5). Another explanation for these results may also be imperfect, segmented labour markets (Poggi, 2007; Winder, 2009), as TLF seems to be primarily distributed among higher-status jobs. The exact relation between TLF and wages therefore still remains a bit vague and deserves some further research, not least with respect to wage growth and other long-term effects (cf. chapter 3, Glass (2004)).

Furthermore, what does TLF imply for work relations? If the schedule, location, and duration of work and therefore the boundaries between paid work and private life become more flexible, familiar concepts such as overtime are also more difficult to define. That does not mean that the underlying idea, i.e. work in excess of what was originally defined and expected, does vanish as well, however. The work obligations of an employee, which are traditionally defined as an input of e.g. 40 hours per week, become less specific, too. Work objectives and responsibilities therefore may have to be negotiated and defined more explicitly.

Apart from the consequences of TLF, progress can also be made in the analysis of its preconditions. Which factors are necessary for TLF and can explain its current proliferation? Apparently a specific type of technological progress, namely the development of information and communication technology, is essential for its dissemination. TLF can also be obtained more easily in production processes where (physical) capital is relatively less important (apart from IT infrastructure of course) or where it is separable, divisible, and mobile. Given that it provides more autonomy to and demands more self-management from employees, it is also better suited for rather lean management structures and flat hierarchies.

At a more theoretical level, TLF finally raises some implications for labour economics itself as well. TLF probably does not affect the general understanding of a production function combining labour and capital. It also does not change the relation between labour and capital fundamentally. It does challenge some implicit classical assumptions rooted in the industrial foundations of (labour) economics, however, e.g. the general understanding of the industrial production process as an assembly line, which requires employees to be together at the same time and place. TLF also sets the spotlight on two otherwise rather understudied aspects of labour economics, namely the timing and location of work. The utility of workers is likely to depend not only on the amount of consumption and leisure, but also on the schedule and location of work, for instance. TLF therefore adds context to the production function, similar to spatial or geographical economics. Hence, the when and where of the production process becomes more important.

In summary, temporal and locational flexibility of work has the potential to challenge the definition and meaning of employment relations, work organisation, and work in general, by giving employees more autonomy and making them stakeholders in the firm's production and work processes.

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Nederlandse samenvatting

In heel Europa zijn nieuwe en flexibelere vormen om werk en werktijden te organiseren in opkomst. Een interessante ontwikkeling in dit verband is het tijds- en plaatsonafhankelijk werken (TPW), ook wel flexibel werken of Het Nieuwe Werken genoemd. Een toenemend aantal werknemers kan hierdoor keuzes maken omtrent de temporele en locatiespecifieke aspecten van hun werk. Het gaat dan om de duur, de tijden en de plaats van het werk (Plantenga en Remery, 2010; Messenger, 2010). Als gevolg hiervan is in de afgelopen jaren het aantal werknemers dat gebruik kan maken van regelingen zoals flexibele arbeidstijden, thuiswerken, of deeltijd werk aanzienlijk gestegen. In 2012 waren 43% van de medewerkers in de EU27 landen in staat om de start - en eindtijd van het werk te variëren (Anderson e.a., 2012). Het aandeel werknemers dat minstens een kwart van de arbeidstijd telewerkt is tussen 2000 en 2005 gestegen van 5% naar 8.3% (Paoli en Merllié, 2001; Parent-Thirion en Paoli, 2003; Parent-Thirion e.a., 2007) terwijl het aandeel van werknemers met een deeltijdaanstelling is gestegen van 16,2% in 2002 tot 20% in 2012 (Eurostat, 2013). In Nederland waren in 2012 45,5% van de werknemers in staat om regelmatig of soms te bepalen wanneer ze werken en 49,8% werkten in deeltijd (Koppers e.a., 2013; Eurostat, 2013). Het aandeel werknemers dat minstens één keer per week thuis werkt is zelfs toegenomen van 25% in 2005 naar 32% in 2012 (Driessen en Kraan, 2011; Koppers e.a., 2013). Er is dus een groot aantal werknemers, dat tijds- en plaatsonafhankelijk werkt of kan werken en deze groep is in de afgelopen jaren gestaag gegroeid.

Deze trend naar meer TPW wordt veroorzaakt door een samenspel van diverse technologische en maatschappelijke ontwikkelingen, die de organisatie van werk en privéleven veranderen. Een reden is dat de dienstensector en kenniswerk in het bijzonder steeds belangrijker zijn geworden in de afgelopen decennia. In vergelijking met de industriële sector is voor dit soort werk relatief weinig fysiek kapitaal nodig. Bovendien is dit kapitaal vaak deelbaar en veel mobieler. Dit betekent dat werk minder aan de plaats van het bedrijf is gebonden, zodat werknemers meer keuzemogelijkheden hebben in de locatie van hun werk .

Een tweede belangrijk aspect is de toename van informatie- en communicatietechnologie (ICT). Veel van de bovengenoemde relaties bestaan vanwege de

behoefte om te communiceren en informatie uit te wisselen. ICT maakt deze banden „elastischer" omdat het communicatie vergemakkelijkt. Vooral bij kenniswerk is niet altijd direct, gelijktijdig contact tussen werknemers vereist. Het werk kan ook in teams worden uitgevoerd, waarbij de leden op verschillende locaties werken. De noodzakelijke asynchrone en externe communicatie wordt gefaciliteerd door ICT. Samen verminderen deze veranderingen in de structuur van het werk de tijd- en locatiespecifieke inbedding en vergroten ze de mogelijkheden om de arbeidstijd en -plaats aan veranderende omstandigheden aan te passen.

In westerse samenlevingen is er ook een tendens naar een toenemende individualisering van levenslopen en een groeiende heterogeniteit van preferenties gaande, die leiden tot meer variatie in de organisatie van het privéleven en – meer in het algemeen – in het ritme van de samenleving (Anxo en Boulin, 2006). Werknemers vragen om meer flexibiliteit in arbeidstijden en -plaats om hun werk beter met andere activiteiten te kunnen combineren en zo beter tegemoet te komen aan de gewenste, meer geïndividualiseerde levensstijl. Deze andere activiteiten hebben betrekking op familie, onderwijs, zorg, overgang naar pensioen of andere verwachte en onverwachte gebeurtenissen. Onder deze omstandigheden kan meer flexibiliteit werknemers helpen in de huidige 24/7 economie een betere balans tussen werk en privéleven te bereiken. Het gevolg is een groeiende vraag naar geïndividualiseerde, personeelsgerichte arbeidstijden. Werkgevers voldoen steeds vaker aan deze vraag en introduceren TPW om gekwalificeerd personeel aan te trekken en te behouden en om kosten voor bijvoorbeeld kantoorruimte en reizen te verminderen.

Samen dragen deze ontwikkelingen bij aan het groeiende belang en de toename van TPW. Het is dan ook een beleidsrelevant en actueel thema in veel landen, zij het onder verschillende labels zoals *flexible work arrangements, workplace flexibility* (zie bijv. CEA, 2010), Het Nieuwe Werken (Taskforce DeeltijdPlus, 2010; Sociaal-Economische Raad, 2011), of *Zeitsouveräntät* (BMFSFJ, 2012). De gevolgen van TPW op verschillende arbeidsmarktdomeinen zijn echter nog relatief weinig onderzocht en dit boek is een poging om onze kennis op dit gebied te vergroten.

Tijds- en plaatsonafhankelijk werken gedefinieerd

„Flexibel" is afkomstig van het Latijnse *flexibilis*, wat buigen of verdraaien zonder te breken, elastisch of aanpasbaar betekent. Het woord verwees oorspronkelijk naar het vermogen van takken van een boom om in de wind te buigen en naar de originele positie te terug te keren (Sennett, 1998). Flexibiliteit verwijst dus naar het aanpassen aan veranderende omstandigheden en het vermogen om weer de

oorspronkelijke toestand te bereiken. Zoals takken verschillen in hun vermogen om te buigen, kan ook flexibiliteit op verschillende manieren worden vormgegeven. Flexibel werken verwijst vervolgens naar het vermogen van werknemers om keuzes te maken in de temporele en locatiespecifieke aspecten van hun werk, om zich aan te passen aan veranderende omstandigheden op het werk en thuis. Dit betekent dat werknemers tot op zekere hoogte kunnen bepalen waar, wanneer en hoe lang ze werken, meestal via een aantal flexibele werkregelingen (Plantenga, 2003; Rau, 2003; Fagan, 2004; Hill e.a., 2008). TPW kan dus worden onderverdeeld in flexibiliteit in arbeidsduur, -tijd en -plaats.

Flexibiliteit in arbeidsduur geeft werknemers de mogelijkheid om te beïnvloeden hoe lang ze werken. Deeltijdwerk maakt het bijvoorbeeld mogelijk om minder uren te werken.[1] Alleen de beschikbaarheid van deeltijdbanen is echter niet voldoende voor *flexibiliteit* in arbeidsduur. Voor echte flexibiliteit moeten werknemers ook in staat zijn om het aantal werkuren aan te passen – binnen een redelijke termijn en binnen hetzelfde werk. Andere relevante regelingen in dit verband zijn duobanen, verschillende vormen van betaald en onbetaald verlof (bijvoorbeeld ouderschapsverlof of verlof voor zorg of onderwijs) alsmede gefaseerde uittreding.

Flexibiliteit in arbeidstijd biedt werknemers de mogelijkheid om te bepalen wanneer ze werken. Werknemers met flexibele arbeidstijden kunnen hun rooster flexibel indelen. Het kan echter nodig zijn om tijdens bepaalde „kernuren" gedurende de dag verplicht aanwezig te zijn. Werknemers kunnen soms ook tijdtegoeden op arbeidstijdrekeningen tot een bepaald maximum sparen of tekorten laten oplopen. Gecomprimeerde werkweken en arbeidstijden op jaarbasis zijn andere varianten van flexibele arbeidstijden.

Met flexibiliteit in arbeidsplaats of plaatsonafhankelijk werken wordt bedoeld dat werknemers kunnen kiezen waar ze werken. De werktaken worden niet op de locatie van de werkgever uitgevoerd, maar op afstand thuis bij de werknemer of op een andere door de werknemer gekozen locatie. Als het werk op afstand wordt georganiseerd of uitgevoerd met behulp van informatietechnologie is er sprake van telewerk.

Arrangementen voor flexibiliteit in arbeidsduur, -tijd en -plaats kunnen als alternatief voor elkaar fungeren, maar kunnen ook worden gecombineerd (Chung, 2009). Werknemers kunnen op hetzelfde moment de mogelijkheid hebben om én thuis te werken én hun arbeidstijden flexibel te variëren én minder uren werken. Maar de drie dimensies van flexibiliteit kunnen elkaar ook beïnvloeden. Als men

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[1] De werkuren worden meestal berekend op weekbasis of als gemiddelde over een werkperiode van maximaal een jaar. Voor statistische doeleinden wordt deeltijd doorgaans gedefinieerd als een bepaald aantal, meestal minder dan 30 of 35, uren per week.

in deeltijd werkt, is er bijvoorbeeld ook meer ruimte voor flexibele arbeidstijden, omdat in vergelijking met voltijds werken de kantooruren relatief langer zijn. De eigen arbeidsuren kunnen dus over een groter aantal kantooruren worden verdeeld. Als men slechts een paar uur per week werkt, kan de flexibiliteit in arbeidsplaats beperkt zijn omdat de relatieve kosten van het plaatsonafhankelijk werken toenemen, aangezien communicatie en monitoring moeilijker wordt. De voorkeur voor en het gebruik van een bepaald flex-arrangement kan ook veranderen als andere arrangementen beschikbaar komen. Werknemers zouden bijvoorbeeld bereid kunnen zijn om meer uren te werken als ze meer controle over hun arbeidstijden hebben.

In de sociaalwetenschappelijke literatuur is het gebruikelijk om een onderscheid te maken tussen werkgevers- en werknemersgerichte flexibiliteit (cf. Reilly, 2001; Fagan, 2004; Kerkhofs e.a., 2008; Chung, 2009). Met werkgeversgerichte flexibiliteit kan de werkgever het werk en de arbeidsvoorwaarden aan zakelijke behoeften aanpassen. Het voornaamste doel is het handhaven en vergroten van het concurrentievermogen van het bedrijf, en implicaties voor het personeel blijven in eerste instantie buiten beschouwing. Personeels- of werknemersgerichte flexibiliteit faciliteert medewerkers om hun werk en werkomstandigheden aan te passen aan persoonlijke voorkeuren en taken en benadrukt individuele keuzevrijheid. Beide vormen van flexibiliteit botsen niet noodzakelijkerwijs met elkaar, maar kunnen complementair zijn in die zin dat zowel werkgevers als ook werknemers profiteren van meer flexibiliteit. De scheidslijn is dus, of de prioriteit op de wensen van de organisatie of de behoeften van de werknemers ligt (Hill e.a., 2008). In die zin kan TPW als werknemersgerichte flexibiliteit worden beschouwd, omdat op deze manier vooral de keuzevrijheid en controle van werknemers over tijd en plaats wordt benadrukt. Werkgevers kunnen echter ook van deze vorm van flexibiliteit profiteren, omdat TPW een positief effect kan hebben op het personeelsverloop, de kosten voor reizen en huisvesting kan verlagen en de efficiëntie en productiviteit van de organisatie kan verhogen.

Arbeidsmarkteffecten van TPW

Ondanks het groeiende belang en de beleidsrelevantie van TPW, hebben de gevolgen op verschillende arbeidsmarktdomeinen tot nu toe relatief weinig aandacht gekregen in empirisch onderzoek. Dit geldt vooral voor de effecten van flexibiliteit in tijd en plaats. Dit proefschrift is daarom een poging om licht te werpen op vier relevante arbeidsgerelateerde aspecten en gevolgen van TPW. Ten eerste kijken we naar werknemers en analyseren we de effecten van TPW op de baantevredenheid

en de afstemming tussen arbeidstijden en de thuissituatie enerzijds en op de loopbaanontwikkeling anderzijds. Ten tweede onderzoeken we of TPW leidt tot een daling in het ziekteverzuim, een effect waar met name werkgevers baat bij hebben. Ten slotte analyseren we of meer flexibiliteit in tijd en plaats tot een toename van het aantal gewerkte uren leidt. TPW wordt in beleidsadviezen immers vaak als een instrument voor een groter arbeidsaanbod genoemd. Hiervan zou de economie en de samenleving als geheel kunnen profiteren, gegeven de toekomstige ontgroening en vergrijzing van de samenleving en het verwachte tekort aan arbeidskrachten. Aangezien we tegelijkertijd de flexibiliteit in duur, tijd en plaats onderzoeken, zijn we in staat om hun relatieve effecten te vergelijken.

Drie van de vier empirische onderzoeken zijn gebaseerd op het SCP Arbeidsaanbodpanel (AAP), een tweejaarlijks panelonderzoek van een representatieve steekproef van Nederlandse huishoudens.[2] Het panelonderzoek wordt in opdracht van het Sociaal en Cultureel Planbureau uitgevoerd om de ontwikkelingen in de arbeidsmarkt en de arbeidsvoorwaarden in Nederland te bestuderen en bevat een breed scala van individuele, werk- en huishoud-gegevens. De doelgroep bestaat uit de Nederlandse beroepsbevolking van 16 tot 66 jaar. Hoewel het AAP al sinds 1985 bestaat, zijn alleen de golven vanaf 2002 geschikt voor een analyse van TPW, omdat in dat jaar pas vragen over telewerk zijn opgenomen. Het brede karakter van het databestand maakt het mogelijk om de uitkomsten van verschillende TPW regelingen te analyseren en daarbij voor diverse factoren te controleren.

Baantevredenheid en afstemming tussen arbeidstijden en de thuissituatie

Het eerste empirische hoofdstuk betreft het effect van TPW op de afstemming tussen arbeidstijden en de thuissituatie en de tevredenheid met de baan in het algemeen. Als TPW inderdaad tot een betere afstemming tussen betaald werk en andere activiteiten leidt, dan zou dit ook invloed kunnen hebben op de algemene baantevredenheid van werknemers. In dit hoofdstuk wordt nagegaan of dit inderdaad het geval is, door het effect van TPW op zelf-gerapporteerde tevredenheid met de aansluiting van arbeidstijden op de thuissituatie en de algemene tevredenheid met de baan te analyseren.

Uit het onderzoek op basis van het AAP blijkt dat flexibiliteit in arbeidstijd in de vorm van zelf bepaalde begin- en eindtijden een positieve relatie heeft met zowel

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[2] De data en de bijbehorende documentatie zijn verkrijgbaar via http://easy.dans.knaw.nl (urn:nbn:nl:ui:13-4JS-jl3).

de afstemming tussen arbeidstijden en de thuissituatie alsook de baantevredenheid. Telewerk of flexibiliteit in arbeidsplaats is ook gerelateerd aan een hogere baantevredenheid, zij het in mindere mate dan flexibele arbeidstijden. Flexibiliteit in arbeidsplaats heeft echter geen invloed op de afstemming tussen arbeidstijden en de thuissituatie. Deeltijd, als proxy voor flexibiliteit in arbeidsduur, komt ten slotte de aansluiting van arbeidstijden op de thuissituatie op dezelfde manier ten goede als flexibele arbeidstijden. Opvallend genoeg laten onze schattingen geen of een negatieve associatie met de algemene baantevredenheid zien, vooral voor vrouwelijke werknemers. Verder vinden we nauwelijks verschillen tussen mannen en vrouwen in de effecten van TPW op de afstemming tussen arbeidstijden en de thuissituatie en op de baantevredenheid. TPW lijkt ook niet relevanter te zijn voor werknemers met een gezin; een groep werknemers die vermoedelijk meer worstelt met de combinatie van werk en privé dan andere groepen werknemers. De relatie tussen TPW en arbeidstijden en de thuissituatie enerzijds en baantevredenheid anderzijds is voor deze groep in ieder geval vergelijkbaar met die voor werknemers zonder thuiswonende kinderen.

Een conclusie van deze analyse is dat flexibiliteit in arbeidstijd een beter alternatief voor de combinatie van werk en privé kan zijn dan flexibiliteit in arbeidsduur. Flexibiliteit in arbeidsduur is geassocieerd met een betere afstemming tussen arbeidstijden en de thuissituatie en lijkt een positief effect op baantevredenheid te hebben. Flexibiliteit in arbeidsplaats lijkt niet op een significante manier de combinatie van werk en privé te verbeteren. Het is wel geassocieerd met een hogere baantevredenheid, vermoedelijk omdat het de autonomie van de werknemers vergroot. Omdat eerder onderzoek heeft aangetoond dat een hogere baantevredenheid zich vertaalt in minder verloop, een lager ziekteverzuim en in het algemeen een groter welzijn, zou dit gunstig zijn voor zowel werkgevers als werknemers. Het resultaat dat de relatie tussen deeltijdwerk en baantevredenheid negatief is, is opmerkelijk. Hoewel het in lijn is met theoretische voorspellingen, gezien de nadelen van deeltijdarbeid voor carrière, loon, etc. (Connolly en Gregory, 2008; Manning, 2003), contrasteert de bevinding met een aantal eerdere empirische resultaten met betrekking tot de zogenaamde tevreden deeltijdwerker (bijv. Booth en van Ours, 2008, 2009).

Carrière

TPW wordt onder meer gezien als een middel om betaald werk met andere activiteiten te combineren. Eerder onderzoek laat zien dat regelingen die de combinatie van werk en privé via een (tijdelijke) vermindering van de arbeidstijd faciliteren, zoals

deeltijdwerk of ouderschapsverlof, negatieve effecten op de loopbaanontwikkeling hebben. Het gaat dan om minder promoties, minder opleidingsmogelijkheden of lagere stijging van het loonniveau (bijv. Stafford en Sundström, 1996; Glass, 2004; Román, 2006; Connolly en Gregory, 2008; Russo en Hassink, 2008). Deze nadelige effecten zijn voornamelijk toe te schrijven aan de afschrijving van human capital, segregatie op de arbeidsmarkt en statistische discriminatie op basis van reële of verwachte productiviteitsverschillen. Dus terwijl flexibiliteit in arbeidsduur een goed instrument kan zijn om werk met privé te combineren, is één van de belangrijkste nadelen dat het schade toe kan brengen aan de carrière van de werknemer.

Een opmerkelijk verschil tussen regelingen zoals deeltijdwerk en ouderschapsverlof, die flexibiliteit bieden via een vermindering van de arbeidsduur, en regelingen zoals flexibele arbeidstijden en telewerk, die flexibiliteit in tijd en plaats bieden, is dat werknemers niet hun totale arbeidsduur verminderen maar alleen hun fysieke aanwezigheid op de werkplek qua tijdstip veranderen of verminderen. Deze regelingen maken het daarom mogelijk om werktaken vanuit huis of op een ander tijdstip van de dag af te ronden. Dus hoewel werknemers die gebruik maken van deze regeling minder zichtbaar zijn op de werkplek in vergelijking met hun collega's die hiervan geen gebruik maken, zou de totale output van de werknemer min of meer gelijk moeten blijven.

Werkgevers zouden echter het gebruik maken van deze regeling door de werknemers kunnen interpreteren als een signaal voor problemen tussen werk en privé en voor een (relatief) lage betrokkenheid bij het werk. Als dit het geval is en werkgevers hun perceptie van betrokkenheid van een werknemer inderdaad baseren op diens zichtbaarheid op het werk, dan zou flexibiliteit in arbeidstijd en -plaats alsnog een negatief effect op de loopbaanontwikkeling kunnen hebben. Het is daarom niet helemaal duidelijk in hoeverre de negatieve effecten die zijn vastgesteld voor flexibiliteit in arbeidsduur ook te verwachten zijn voor flexibiliteit in arbeidstijd en -plaats.

In dit hoofdstuk analyseren we daarom de gevolgen van TPW, vooral met betrekking tot flexibiliteit in arbeidstijd en -plaats, op de loopbaanontwikkeling in een longitudinale opzet. Hiervoor schatten we het effect van flexibele arbeidstijden en de wekelijkse frequentie van telewerk op de kans op promotie en door de werkgever betaalde opleidingen binnen de twee jaar na de enquête. De analyse werd ook op basis van het AAP uitgevoerd, deze keer alleen voor de jaren 2004–2010.

Uit de resultaten van onze analyse blijkt dat flexibele begin- en eindtijden over het algemeen de kans op toekomstige promoties en door de werkgever betaalde opleidingen niet significant beïnvloeden. De enige uitzondering is dat flexibele arbeidstijden wellicht een negatief effect op de kans op promoties van vrouwelijke

werknemers kunnen hebben. Dit resultaat wordt echter niet verder onderbouwd door onze schattingen voor mannelijke werknemers of door onze schattingen met betrekking tot opleidingen.

Incidenteel telewerk is ook niet van invloed op de kans op promoties en op door werkgever betaalde opleidingen. Dat is echter wel het geval indien er sprake is van regelmatig telewerk, vooral voor mannelijke werknemers. Onze interpretatie van dit resultaat is dat zichtbaarheid op het werk inderdaad een belangrijke factor is bij de beoordeling van (mannelijke) werknemers en dat geringe zichtbaarheid de verdere loopbaanontwikkeling belemmert.

Onze schattingen laten ook geen effect van deeltijd op de kans op promoties en op door werkgever betaalde opleidingen zien. Dit is nogal verrassend, omdat eerder onderzoek een negatief effect op de loopbaanontwikkeling heeft aangetoond. Het is echter mogelijk dat er te weinig variatie in onze data zit met betrekking tot de promotie- en opleidingskansen van werknemers met een kleine deeltijdbaan. Wellicht is voor een duidelijk effect ook het tijdsbestek van onze gegevens te kort. Het resultaat dat deeltijd geen effect op carrière lijkt te hebben wordt daarom mogelijkerwijs door onze gegevens en onderzoeksopzet veroorzaakt.

Het resultaat dat flexibele arbeidstijden geen invloed lijken te hebben op promoties en door werkgever betaalde opleidingen moet voorzichtig worden geïnterpreteerd, omdat onze gegevens over flexibele arbeidstijden relatief beperkt zijn. Wij gebruiken alleen een binaire indicator voor de beschikbaarheid van flexibele begin- en eindtijden, omdat er geen gegevens beschikbaar zijn over het gebruik van deze regeling. We weten dus niet of de ondervraagden daadwerkelijk gebruik hebben gemaakt van deze regeling, en als gevolg daarvan zal er ongetwijfeld wat ruis in de resultaten zitten. Desalniettemin zijn er goede redenen om aan te nemen dat de schattingen over het algemeen wel betrouwbaar zijn. Aangezien flexibele arbeidstijden impliceren dat werknemers voor de totale duur van het contract op de werkplek aanwezig zijn (alleen op wisselende tijden), zou kunnen worden verwacht dat flexibele arbeidstijden een kleiner effect hebben op promoties dan bijvoorbeeld telewerk. Ook kunnen flexibele arbeidstijden moeilijker als selectiefilter worden gebruikt, omdat vrij veel werknemers gebruik kunnen maken van dit arrangement (cf. Albrecht e.a., 1999). Toch zou het wenselijk zijn om deze hypothese in toekomstig onderzoek met betere gegevens en schattingen te testen.

Samengevat wijzen onze resultaten erop dat matig gebruik van TPW niet schadelijk is voor de loopbaanontwikkeling. Frequenter telewerk wordt door werkgevers echter gesanctioneerd met minder promotiekansen en met minder betaalde opleidingen. Regelmatig TPW lijkt daarom te worden geïnterpreteerd als signaal van onvoldoende betrokkenheid bij het werk en van conflicten tussen werk en privé.

Ziekteverzuim

Over het algemeen kan worden verondersteld dat de mogelijkheid om tijd- en plaatsonafhankelijk te werken gunstig is voor werknemers en in lijn met de preferenties van de moderne kenniswerkers. Werkgevers kunnen echter ook van meer personeelsgerichte flexibiliteit profiteren (Reilly, 2001; Anxo e.a., 2006; Chung, 2009). Door TPW kan bijvoorbeeld op de kosten voor kantoorruimte, personeelsverloop en woon-werkverkeer worden bespaard. Daarnaast wordt de motivatie van medewerkers verbeterd, wat kan leiden tot meer betrokkenheid bij de organisatie (Allen, 2001; Kelliher en Anderson, 2010).

Een ander potentieel voordeel van TPW is een vermindering van ziekteverzuim. Door TPW zou ziekteverzuim verminderd kunnen worden, omdat werknemers flexibeler op kleine ziektes en andere „noodgevallen" in het privéleven kunnen reageren. Daarnaast zou het de gezondheid van werknemers kunnen verbeteren, omdat het tot minder stress en tot meer tevredenheid met de baan zou kunnen leiden.

Om de invloed van TPW op de frequentie en de duur van het ziekteverzuim te analyseren, gebruiken we een enquête van Nederlandse werknemers in de publieke sector, te weten het Personeelsonderzoek Overheidspersoneel 2004 (PO 2004) van het Nederlandse Ministerie van Binnenlandse Zaken en Koninkrijksrelaties (MinBZK, 2005). Deze enquête wordt tweejaarlijks uitgevoerd om de kenmerken, motivatie, en het arbeidsmarktgedrag van werknemers in de publieke sector in Nederland te analyseren. Het PO 2004 is uniek omdat het gegevens over de voorkeur voor en de beschikbaarheid van TPW regelingen en andere arbeidsvoorwaarden omvat. Het databestand bestaat uit gegevens van meer dan 20.000 medewerkers uit alle publieke sectoren en bevat naast sociaal-economische en huishoudkenmerken van de werknemers gedetailleerde informatie over de arbeidsorganisatie, secundaire arbeidsvoorwaarden en andere werkgerelateerde factoren.

Op basis van deze gegevens volgt uit onze analyse dat flexibiliteit met betrekking tot tijd en plaats van het werk over het algemeen negatief is geassocieerd met ziekteverzuim. Met name flexibele arbeidstijden verminderen de frequentie maar vooral ook de duur van het verzuim. Telewerk of flexibiliteit in arbeidsplaats lijkt voornamelijk de frequentie, maar niet de duur van het verzuim te beïnvloeden.

Deeltijdwerk blijkt echter geen significant effect op ziekteverzuim te hebben, althans niet met betrekking tot het aantal werkuren en onder constant houding van het aantal werkdagen. Als we het aantal uren constant houden, zijn minder werkdagen echter geassocieerd met frequentere en langere periodes van ziekteverzuim.

Uit de resultaten blijkt geen verschil tussen mannen en vrouwen met betrekking tot flexibele arbeidstijden en telewerk. De interacties tussen deze twee variabelen en de aanwezigheid van kinderen in het huishouden zijn in de meeste gevallen ook niet significant.

Hoewel een volledige kosten-baten analyse van TPW voor werkgevers buiten het bestek van deze studie valt, wijst de duidelijke negatieve associatie tussen TPW en ziekteverzuim toch op een duidelijk voordeel van TPW. Dit zou de interesse van werkgevers in dergelijke arrangementen verder kunnen vergroten. Blijkbaar is TPW niet alleen waardevol voor werknemers en in lijn met de wensen van moderne kenniswerkers, maar kan het ook gunstig voor werkgevers zijn.

Arbeidsaanbod

TPW wordt vaak als beleid geadviseerd om het arbeidsaanbod te vergroten, met als doel de economische groei op peil te houden en een tekort aan arbeidskrachten in de toekomst te vermijden (Taskforce DeeltijdPlus, 2010; Sociaal-Economische Raad, 2011). In de huidige situatie met een relatief hoge arbeidsparticipatie en veel deeltijdwerk, vooral door vrouwelijke werknemers, ligt de nadruk op het vergroten van het aantal gewerkte uren. Dit zou met meer flexibiliteit door TPW bereikt kunnen worden. Immers wanneer arbeid en privé beter is te combineren, zouden werknemers bereid kunnen zijn meer uren te werken. Voor zover bekend is deze relatie echter nog niet grondig empirisch getest.

Het doel van dit hoofdstuk is dan ook om te onderzoeken of en in welke mate TPW regelingen inderdaad een invloed hebben op het arbeidsaanbod. In het bijzonder analyseren we de impact van flex-arrangementen met betrekking tot arbeidstijden en -plaats op het aantal feitelijke, gecontracteerde en gewenste werkuren. Deze analyse is weer op basis van SCP Arbeidsaanbodpanel (2002–2010) uitgevoerd.

Volgens onze schattingen zijn de gevolgen van TPW op het aantal arbeidsuren hooguit matig te noemen. Telewerk heeft een positieve associatie met de feitelijk gewerkte uren en onze resultaten impliceren een gemiddelde stijging van ongeveer 49 minuten per week. Dit lijkt echter vooral te worden veroorzaakt door een toename van onbetaalde overuren. Gecontracteerde en gewenste arbeidstijd worden namelijk niet significant beïnvloed door telewerk. Dit suggereert dat telewerk door werkgevers ook wordt gebruikt voor werkintensivering en een toename van overuren (Peters en van der Lippe, 2007; Noonan en Glass, 2012). Een alternatieve interpretatie is dat werknemers op de mogelijkheid om thuis te werken op hun beurt met extra inspanning reageren (Akerlof, 1982; Kelliher en Anderson, 2010). Eerdere bevindingen, dat TPW leidt tot meer tevredenheid en betere prestaties

op het werk, ondersteunen deze interpretatie (Hill e.a., 1998; Baltes e.a., 1999; Eaton, 2003; Gajendran en Harrison, 2007). Beide verklaringen zouden echter tegelijkertijd aan verschillende kanten van de arbeidsmarkt van toepassing kunnen zijn.

De resultaten voor flexibele arbeidstijden zijn nog bescheidener. De meeste coëfficiënten verschillen niet significant van nul op het 5 procent niveau. Er lijkt dus geen effect te zijn, in ieder geval niet op de korte termijn. Voor vrouwen blijken flexibele arbeidstijden volgens onze schattingen zelfs een negatief effect op het aantal contractuele en gewenste werkuren te hebben. Dit is enigszins verrassend. Een mogelijke verklaring zou kunnen zijn dat vrouwen vanwege een *common shock* tegelijkertijd toegang tot flexibele arbeidstijden (kunnen) krijgen en minder gaan werken. Dit zou bijvoorbeeld door zorgtaken voor iemand anders dan hun eigen kinderen worden veroorzaakt. Hiervoor kunnen we immers in de analyse niet controleren.

Een verklaring voor het bescheiden effect van TPW op werkuren is dat de impact gewoon *too small to matter* is. Woon-werkverkeer blijkt bijvoorbeeld alleen kleine, onduidelijke effecten op het arbeidsaanbod te hebben (Gibbons en Machin, 2006; Gutiérrez-i-Puigarnau en van Ommeren, 2010) en een vermindering van de reistijd vanwege een toename van thuiswerken zal derhalve ook geen duidelijk effect op het arbeidsaanbod hebben. Daarnaast wordt thuiswerken deels gebruikt om werktaken mee naar huis te nemen, dus arbeidstijd op kantoor wordt vervangen door dezelfde arbeidstijd thuis (Peters en van der Lippe, 2007; Noonan en Glass, 2012). Een andere verklaring is dat werknemers niet bereid zijn om het arbeidsaanbod te vergroten, maar liever genieten van hun betere work-life fit. Door een imperfecte arbeidsmarkt zouden ze hiertoe in staat kunnen zijn, bijvoorbeeld omdat TPW voornamelijk mogelijk is in banen met een hogere status en met relatief weinig concurrentie op de aanbodzijde (Felstead e.a., 2002; Golden, 2008, 2009; Smulders e.a., 2011). Normen en maatschappelijke preferenties zouden deze trend verder kunnen versterken. Eerder onderzoek heeft namelijk aangetoond dat werknormen in Nederland als gevolg van de toename in deeltijdwerk blijkbaar zijn achteruitgegaan (Wielers en Raven, 2013) en dat het niet aantrekkelijk wordt gevonden om meer uren te gaan werken (Bosch e.a., 2010; Booth en van Ours, 2013).

Samengevat blijkt de hypothese, dat meer flexibel werk leidt tot een toename van gewerkte uren, grotendeels te moeten worden afgewezen. Dit betekent dat de argumenten met betrekking tot een verhoging van het arbeidsaanbod door TPW empirisch niet worden ondersteund. Dit neemt echter niet weg dat er andere redenen voor meer TPW zijn.

Conclusies

Tijds- en plaatsonafhankelijk werken, ofwel flexibel werken, heeft een vlucht genomen in Nederland en Europa. In Nederland beschikt bijna de helft van de werknemers over flexibele arbeidstijden of werkt in deeltijd, en één derde werkt minstens een keer per week thuis. Desondanks bestaat er relatief weinig empirisch onderzoek naar de economische gevolgen van met name flexibele arbeidstijden en tele-/thuiswerk. In dit onderzoek gaan we daarom na, wat de gevolgen van flexibel werken zijn voor de afstemming tussen werk en privé, de tevredenheid met de baan, de loopbaanontwikkeling, het ziekteverzuim en het arbeidsaanbod van werknemers.

Flexibele arbeidstijden blijken volgens onze resultaten de tevredenheid van werknemers met hun baan en de afstemming tussen arbeidstijden en de thuissituatie te verbeteren. Werknemers, die hun begin- en eindtijden kunnen bepalen of die thuis kunnen werken, melden zich ook minder vaak en minder lang ziek. Flexibele arbeidstijden lijken geen negatieve effecten op de carrière te hebben. Ze leiden echter niet tot een verhoging van de arbeidsduur, maar mogelijk zelfs tot een daling van de arbeidsduur voor vrouwelijke werknemers.

Telewerk heeft blijkbaar geen invloed op de afstemming tussen arbeidstijden en thuissituatie, maar wel een positieve relatie met baantevredenheid. Werknemers, die regelmatig thuis werken en daarom minder zichtbaar zijn voor hun collega's en leidinggevenden, maken echter minder promoties en krijgen minder opleidingen door hun werkgevers betaald dan werknemers, die niet thuis werken. Telewerk blijkt de feitelijke arbeidsuren enigszins te verhogen, maar het heeft geen significant effect op het aantal contractuele en gewenste arbeidsuren. De Verwachtingen dat flexibel werken zal leiden tot een substantiële toename in arbeidsdeelname van deeltijders, worden door onze resultaten daarom niet onderbouwd.

Deeltijdwerk leidt tenslotte tot een betere afstemming tussen arbeidstijden en de thuissituatie. In tegenstelling tot eerdere studies vinden we geen positief effect op baantevredenheid. Dit resultaat komt echter wel met theoretische overwegingen overeen. Deeltijdwerk lijkt ook geen effect op verzuim te hebben.

Werknemers én werkgevers kunnen dus van tijds- en plaatsonafhankelijk werken profiteren. Werknemers profiteren van een betere afstemming tussen werk en privé en meer baantevredenheid. Flexibele arbeidstijden zijn daarom een goed alternatief voor deeltijdwerk, mede omdat deze arrangementen geen negatieve consequenties voor de loopbaanontwikkeling hebben. Werkgevers die flexibele arbeidstijden en telewerk introduceren profiteren van minder ziekteverzuim. Flexibel werken leidt niet tot een toename in (contract)uren. Het is dus geen geschikt instrument om de arbeidsdeelname van deeltijdwerkers te verhogen.

Curriculum vitae

Daniel Possenriede was born in Aurich (Germany) in 1977 and completed his secondary education at the Herbartgymnasium in Oldenburg in 1997. After a vocational training to become an audiovisual media clerk and working as a marketing assistant at an IT company, he studied socio-economics in Hamburg and Växjö (Sweden) and received a Bachelor in Sociology from Universität Hamburg in 2006. Daniel continued his studies at the Utrecht University School of Economics (USE) and received a Master of Science degree in Economics and Social Sciences *cum laude* in 2007. Since 2008 he worked as a researcher and PhD candidate at the Chair of Economics of the Welfare State at USE within the multidisciplinary research project 'Life course, social security and the labour market' ('*Levensloop, sociale zekerheid en arbeidsmarkt*'), sponsored by *Instituut Gak*. Daniel participated in the IZA European Summer School in Labor Economics in 2012 and presented his research at various conferences and institutions, such as the EALE Annual Conference, the ILERA European Conference, the *Sociaal-Economische Raad*, and the *Institut für Arbeitsmarkt- und Berufsforschung*. This work culminated in this dissertation.

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