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## Work Pressure and Day-Care Teacher Turnover



The publication *Work Pressure and Day-Care Teacher Turnover* is available at [www.akf.dk](http://www.akf.dk)

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© Cover: Phonowerk, Lars Degnbol

Publisher: AKF

ISBN: 978-87-7509-944-3

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June 2010(05)

**AKF, Danish Institute of Governmental Research**

Carries out and reports social science research of interest to the public sector and in particular to regions and local governments.

Elvira Andersson and Mette Gørtz

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AKF, Danish Institute of Governmental Research

2010

## Preface

This paper is part of a series of three independent papers which look into the role of work pressure for day-care teachers' labour-market situation. In this paper, we focus on day-care teachers' mobility pattern. Another paper looks at sickness absence and entry into disability pension. And the third paper focuses on voluntary early retirement. In all analyses, work pressures are measured by the child-to-teacher ratio. We have benefited greatly from discussions with Thomas Lund and from comments and suggestions from Fane Naja Groes and Nicolai Kristensen. Finally, we are grateful for valuable inputs from an expert monitoring group from ministries, organisations and research institutions with particular knowledge of work environment and labour-market situation of day-care teachers.

Funding from the Danish Working Environment Research Fund (*Arbejdsmiljøforskningsfonden*) is kindly acknowledged.

Mette Gørtz

June 2010

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## Summary

This paper investigates how job mobility is related to work pressure. The day-care sector in Denmark is used as an ideal case since we have objective and comparable information on work pressure measured by the child-to-teacher ratio, i.e. the number of enrolled children per teacher. We look at job switches within the day-care sector and exit from day care to employment into other sectors. The paper uses a unique employer-employee matched longitudinal data set based on Danish administrative registers with information at individual, workplace and municipal levels. In general, we find that job switches are positively correlated with the child-to-teacher ratio. We find the strongest correlation for nursery care, whereas the effects for preschool teachers are smaller and less significant. Thus, there is a higher job turnover in municipalities with a high work pressure. We suspect that teachers select into municipalities based on working conditions offered. Thus, the child-to-teacher ratio may be endogenous. The paper examines two instruments that are used jointly: municipalities guaranteed access to preschool (GAPS) and the share of Conservatives and Liberals in the municipality. IV-estimates generally show similar relationships between the child-to-teacher ratio, but the parameter estimates are higher, standard errors are higher, and statistical significance is difficult to establish due to weak instruments. Hence, we cannot establish a causal relationship based on the instruments at hand, but we do find significant correlation between the child-to-teacher ratio and job shifts.

# 1 Introduction

Job mobility is inevitable and also advantageous to society, serving as a means to foster knowledge spill-over across institutions and firms. However, job mobility is also costly to society since both firm-specific (institution-specific) and general human capital are made redundant when an employee leaves a firm to work in another firm or in another industry. A particular focus in the paper is the role of work pressure as a possible determinant of mobility. A number of studies have found significant effects of self-reported measures of working characteristics or sector-specific work pressure indices on mobility (see e.g. Bartel 1982; Delfgaauw 2007; Akerlof, Rose & Yellen 1988; Feng 2009). However, self-reported measures are subjective by nature, and sector-specific work pressure is often difficult to compare across sectors.

The day-care sector is ideal as an example of an industry where we can study the relationship between work pressure and mobility. The main measure of work pressure used in the paper is the child-to-teacher ratio, i.e. the number of enrolled children per teacher, which is based on annual reports on number of children and employees in the day-care sector from the municipalities to Statistics Denmark. Thus, in contrast to previous studies on working conditions, measure of work pressure used in this paper is objective. The child-to-teacher ratio varies over time, across municipalities and possibly also across day-care centres within municipalities.

The paper distinguishes between workplace switches and occupational switches, using information collected at individual, workplace and municipal levels. Each year, approximately 5% of trained day-care teachers (*pædagoger*) exit the day-care sector, and about 11% switch workplaces within the day-care sector.<sup>1</sup>

For the empirical analysis, the paper uses an employer-employee matched longitudinal data set, based on Danish administrative registers for the period 2002-2006. The data contain information on employment, family background, sickness absence and use of health care for day-care teachers who were employed in Danish day-care centres during the period 2002-2006. Earlier studies have established that teacher attrition and mobility occur at the beginning of a teacher's career. Thus, there is some inter-temporal persistence in outcomes motivated by inertia and habit persistence in the teacher decision-making process, cf. Feng (2009). We follow a large and fairly homogenous population of day-care teachers with similar educational backgrounds, which reduces variation in mobility due to differences in long-term choices, such as the choice of education or occupation.

Previous studies, cf. Feng (2009), suggest that schools in areas primarily serving disadvantaged students face particular difficulty in staffing their classrooms<sup>2</sup>. Since our data have information on child

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<sup>1</sup> Around half the day-care teachers in the Danish day-care sector have completed a 3½-year-long pedagogical education, whereas the other half are day-care assistants. The latter have either attended a shorter day-care assistant education or work as day-care assistants without previous training. This study focuses on the group of trained day-care teachers having completed the 3½-year-long pedagogical education.

<sup>2</sup> There is increasing evidence that early childhood stimulation is extremely important for child development and later social outcomes. Based on this evidence, the literature by e.g. Heckman and co-authors, cf. Heckman, Krueger & Friedman (2002) emphasises the importance of early intervention. Moreover, recent research in the economics of education suggests that teacher quality is a crucial factor for student achievement, cf. Rivkin, Hanushek & Kain (2005). Given the importance of early childhood development, the quality of preschool teachers should be equally important for child development.



background for the children in the day-care institutions, we can examine this problem in a Danish context.

We estimate our empirical model of job switches using the multinomial logit model. We find that work pressure, measured by the child-to-teacher ratio, has a significant and positive correlation with the turnover probability for day-care teachers employed in nurseries, while pecuniary returns also play a large role in explaining job switches among preschool teachers. We suspect that selection into jobs and into municipalities may be affected by the child-to-teacher ratio. We try to take account of selectivity by using instrumental variables methods, exploiting exogenous variation in municipalities' guaranteed access to preschool (GAPS) and share of Conservative-Liberals in the city council.

The paper is organised as follows. Section 2 describes previous evidence on the relationship between work pressure and job-switch decisions. Section 3 describes our data and gives a broad picture of the Danish day-care sector and mobility patterns of day-care teachers. Section 4 presents our empirical model. Section 5 presents the results. Section 6 concludes.

## 2 Previous Evidence

Individual quit or job-switch decisions are the results of utility-maximising choices over several job opportunities. Workers base their decisions on individual preferences and job characteristics, choosing the option that yields the highest present value of expected utility. However, as argued by e.g. Johnson (1978) and Jovanovic (1979), workers cannot predict perfectly the match between their tastes and abilities and the characteristics of a particular job or occupation. The characteristics of the match may first become apparent after some experience in the job. This induces job-shopping behaviour, i.e. workers try out jobs in search of a better match. Workers may thus select out of jobs where their productivity is revealed to be relatively low or where the job characteristics are revealed to be non-satisfactory and stay in jobs where their productivity is revealed to be relatively high or where there is a good match between job characteristics and their particular preferences.

Empirical analyses of job mobility typically focus on wages as a determinant of job-switch behaviour, and several studies find a negative relationship between wages and the probability to quit (see e.g. Freeman 1980). However, non-pecuniary job characteristics may also be an important determinant of mobility behaviour. The disutility caused by adverse working conditions may be mitigated by compensatory wage differentials. However, if the wage does not compensate fully for adverse working conditions, workers can increase their utility by switching jobs. As Böckerman & Ilmakunnas (2007) remark, this is likely to be the case in labour markets that are subject to a great degree of unionisation, such as the Danish one. Although collective agreements that regulate the labour market may contain some pecuniary compensation for adverse working conditions, the apparent heterogeneity of workplaces makes it difficult for these agreements to take into account all the relevant aspects of working conditions. Moreover, collective agreements tend to lead to wage compression, which may prevent the creation of compensating wage differentials. Instead, adverse working conditions may substantially increase the level of job dissatisfaction.

Several studies have investigated potential links between working conditions and quit behaviour, using occupation-specific characteristics as explanatory variables. Using an occupation-specific index of fringe benefits and adverse working conditions, Bartel (1982) finds that non-pecuniary working conditions affect quit behaviour, especially for older workers. Similarly, Akerlof, Rose & Yellen (1988) find significant effects of non-pecuniary job characteristics on quit behaviour using National Longitudinal Survey (NLS) data. Their results also indicate that job switches lead to an increased level of job satisfaction among workers. Self-reported job satisfaction has in turn been shown to be a good predictor of actual quit behaviour, see e.g. Kristensen & Westergård-Nielsen (2006). Combining these insights, Böckerman & Ilmakunnas (2007) investigate the relationship between job disamenities, job satisfaction, quit intentions and actual switches using a rich Finnish survey data set combined with register variables. The authors conclude that adverse working conditions and actual job switches are much less connected than adverse working conditions and switch *intentions* or on-the-job *search*. A possible interpretation of this result is that unobserved individual factors which reduce job satisfaction may also reduce the chances of getting a new job.

The mechanisms underlying a job switch within the particular line of work (intra-sector mobility) may differ from those underlying a switch of careers (inter-sector mobility). Neal (1999) develops a two-

stage model, where workers first search for a suitable career and subsequently search for a suitable employer. Whereas the utility derived from occupational choice is related to the match between the worker and the type of work that he or she performs, the utility associated with working for a particular employer is related to e.g. the suitability of the work environment or the colleagues at the particular workplace. Using the National Longitudinal Survey of Youth (NLSY) data, Neal finds that experienced workers are less likely to switch careers when switching jobs than workers with less experience. Additionally, the likelihood of switching careers falls sharply after a worker has switched jobs within a particular line of work. Neal concludes that in the absence of perfect information about career and job characteristics, workers first use their experience in a particular job to gain information about the type of work performed and thus about possible careers. When a suitable career match is found, any subsequent mobility is likely to occur within the particular line of work.

According to this model, inter- and intra-sector mobility is likely to occur at different stages in teachers' careers and to be driven by partly different motives. Whereas we expect workplace-specific characteristics to be relatively more related to intra-sector mobility, variables related to the profession as such can be expected to influence inter-sector mobility to a larger extent. In a study based on a survey among employees who either left or accepted a job within the Dutch public sector in 2001, Delfgaauw (2007) finds results compatible with these expectations. Delfgaauw finds that workers who report pay, work pressure, working conditions, job duties or management as important when deciding to quit their earlier job are more likely to leave their current industry altogether. On the other hand, employees who report dissatisfaction with working hours, working atmosphere or commuting time as the main reasons to quit are more likely to stay within their current industry when switching jobs.

In a study based on longitudinal Florida data, Feng (2009) analyses labour-market choices of school teachers in Florida, using objective measures of working conditions at classroom, school and district levels. Feng distinguishes between four different outcomes: staying at the present school, moving to a different school within the district, moving to a new school in a new school district or leaving teaching. She identifies "pull" and "push" factors, which are found to affect teacher mobility. Push factors encompass pay and working conditions in one's own workplace, while pull factors encompass the corresponding characteristics in competing school districts or professions. The push factors included in Feng's analysis consist of wages and student characteristics. Pull factors consist of relative salaries of teachers in other districts, relative salaries of individuals in other professions and relative working conditions in both the teacher's own district and other districts. Using a discrete-time multinomial-logit-hazard model, Feng finds significant effects of working conditions at all levels of job switch and quit behaviour. Variables such as class size, math test scores and ethnic and social characteristics of the student group seem to play a larger role in explaining all types of teacher mobility when measured at the classroom level than when measured at school or district levels.

### 3 Data

For the empirical analysis, we use a large micro panel based on administrative registers from Statistics Denmark. The data cover all individuals who were employed in Danish preschools and day nurseries for some period during 2002-2006, and contain information on labour-market status, i.e. information on sector of employment and specific workplace, unemployment periods, retirement, parental leave or other periods outside the labour force etc. for each individual on an annual basis. Using this information, we track employees' transitions within, into and out of the day-care sector. Moreover, the data contain information on long-term (i.e. more than two weeks) sick-leave periods and health-care use, i.e. visits to general practitioners, specialists, hospitalisation, medical (somatic) diagnoses etc., which allows us to investigate potential links between health and mobility.

To identify day-care sector employees and distinguish between workers in different day-care types we use the six-digit industrial code DB93, which is based on the European NACE classification. The employees within the day-care sector differ in educational background and job description. Day-care teachers have completed a 3½-year pedagogical education, while teaching assistants have usually followed a 2-year course with a combination of school and practice teaching. However, individuals with no further education may also be employed as teaching assistants. This group typically consists of young people who gain labour-market experience before attaining further education or older workers who receive labour-market training after a period of unemployment. Additionally, day-care centres typically employ staff occupied with e.g. cleaning, maintenance and kitchen duties. The occupational code DISCO, which corresponds to the international ISCO classification, allows us to distinguish between work categories.

Our population consists of trained day-care teachers, who have completed a 3½-year pedagogical education. The analysis excludes teaching assistants despite their similarities to trained teachers in terms of job description and hence in the likelihood of being affected by the job pressure measured by the child-to-teacher ratio. Due to the possibility of early retirement at the age of 60 and above, the sample is restricted to individuals below 60 years of age.

A unique feature of the data is the possibility to identify the children who are enrolled in the specific day-care centres. Due to data limitations, it was not possible for Statistics Denmark to connect all day-care institutions to one workplace. Approximately 53% of the day-care teachers are connected with their particular child group. Based on this subset of the data, we investigate whether the family background of the enrolled children has any impact on teacher turnover. This could be the case if for instance social problems among the children enrolled in specific day-care centres enhance the work pressure of the employees.

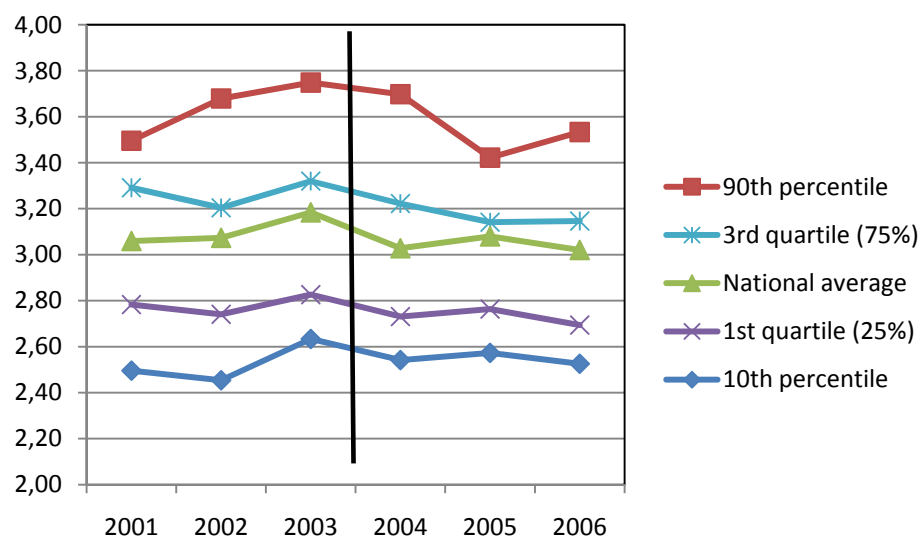
Danish day-care centres are directed at preschool children aged ½-6. There are three different types of day-care centres; day nurseries (for children aged ½-3), preschools (for children aged 3-6), and age-integrated day-care centres, which are combined day nurseries and preschools for children aged ½-6. The allocation of children across these types of day-care centres differs substantially across municipalities. In some municipalities, age-integrated day-care centres (age ½-6) are the dominating type of day-care centre, whereas in others, the majority of children aged 3-6 attend traditional preschool. For ½-3-year-old children, some municipalities offer nursery openings, whereas other municipalities rely on municipal organised child minding. This paper focuses specifically on day-care teachers employed in nurs-

eries (i.e. day-care centres for children aged  $\frac{1}{2}$ -3) and preschools (i.e. day-care centres for children aged 3-6). Age-integrated day-care centres are excluded from the analysis since they serve both infants below 3 years of age and preschool children aged 3-6. Therefore, variation over municipalities and over time in the child-to-teacher ratio of this type of day-care centres may be a result of variation in the age distribution of the enrolled children across municipalities or over time. Variations over time within a municipality are likely to be very dependent on the number of children in the relevant age groups 0-3 and 3-6, which varies from year to year. Child minding is excluded because no figures for child-to-teacher ratio are available for this type of child care.

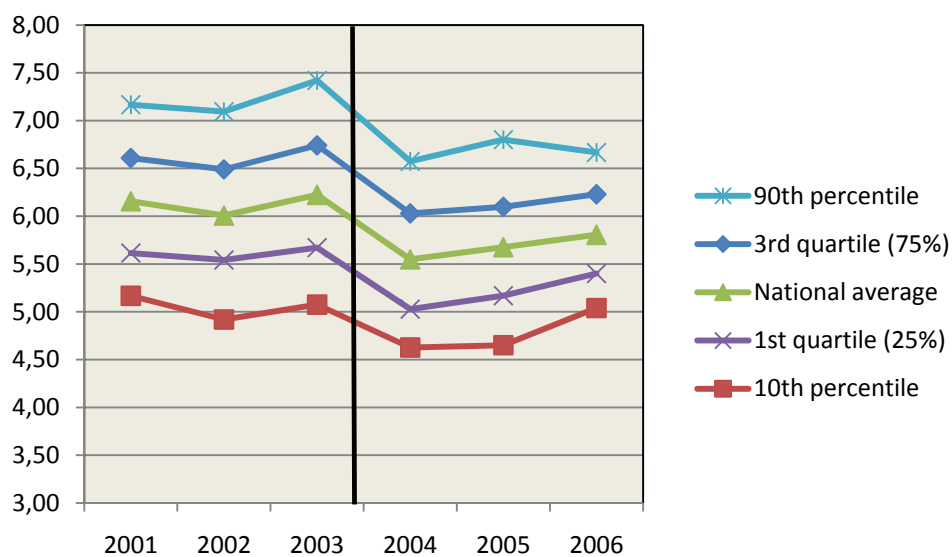
The child-to-teacher ratio is an ideal indicator both of the quality of the child-care offerings and of the working conditions in the day-care sector. The level of child-to-teacher ratio is measured as the number of children per full-time day-care employee who is occupied with child care (teachers and assisting teachers with pedagogical functions). Thus, staff occupied with kitchen duties, cleaning, maintenance, repair etc. are not part of the child-to-teacher ratio. Our information on the child-to-teacher ratio is based on municipal reports to Statistics Denmark on the number of children and employees in day-care centres. These reports have undergone some changes during the period of observation. Thus, there was a change in definitions in municipal reports of staff resources between 2000 and 2001. Moreover, the reports to the day-care register in Statistics Denmark changed around 2003-2004. Thus, until 2003, the number of children enrolled in day care was reported in the spring, whereas during the period 2004-2006, this reporting took place in the autumn. Since there is some seasonality in the number of children enrolled in day care due to 6-year-olds moving from preschool to elementary school around August each year, there is some measurement error when comparing the number of children prior to and after 2003. We can therefore only compare child-to-teacher ratios within the periods 1995-2000, 2001-2003 and 2004-2006. Our empirical study focuses on the time periods after 2001.

On average, the child-to-teacher ratio in nurseries was around three children per teacher or assistant teacher over the period 2001-2006, see figure 3.1. In preschool (i.e. day-care centres for children aged 3-6), the child-to-teacher ratio was around six children per pedagogical employee over the period 2001-2006, see figure 3.2. There seems to be a tendency that municipalities have a fairly constant child-to-teacher ratio over time, but there is quite some variation across municipalities.

**Figure 3.1 Child-to-teacher ratio in nurseries, 2001-2006**



**Figure 3.2 Child-to-teacher ratio in preschool, 2001-2006**



Note: Figures 3.1 & 3.2: For 2001-2003, the number of both employees and number of children enrolled in day-care institutions were reported in March, while for 2004-2006, the reporting was carried out in September. Thus, the child-to-teacher ratio cannot necessarily be compared across these two periods.

Among teachers, the propensity to switch job within the day-care sector (intra-sector mobility) or to leave the day-care sector altogether (inter-sector mobility) varies substantially between age groups with mobility rates declining with age. Table 3.1 displays the mobility pattern of day-care teachers. The table focuses on the group of teachers who were employed in two consecutive years. The vast majority (84%)

of those who are employed as day-care teachers in a given year remain at the same workplace the following year, whereas around 16% change jobs. This figure is comparable with the national average, cf. Dansk Industri (2009). About 10-11% of the day-care teachers working in Danish nurseries or preschools switched workplaces within the day-care sector within a given year during 2002-2006. Approximately 4% of the day-care teachers employed in nurseries and 5% of the preschool teachers left the day-care sector altogether. Of those who left the day-care sector, about 80% stayed within public-sector employment, and the majority found jobs similar to their earlier profession, such as work within elder care or at institutions for individuals with social problems or mental illness. Approximately 20% of those who leave the day-care sector return within two years.

**Table 3.1 Labour-market status for individuals who were employed as day-care teachers in the previous year, averages 2002-2006**

Labour-market status	Nurseries	Preschools
	Per cent	
Same job	84.2	84.0
Job switch within day-care sector, same municipality	7.1	6.1
Job switch within day-care sector, other municipality	4.6	4.7
Occupational switch	4.1	5.2

Source: Own calculations based on register data from Statistics Denmark.

Note: The table displays average values over the whole period 2002-2006 for day-care teachers employed in nurseries and preschools. Job switches within the day-care sector include job switches to other nurseries or preschools, age-integrated institutions, after school care and child minding.

## 4 Empirical Model

Using the rich information in the data, we track employees' transitions into and out of the day-care sector, and analyse mobility across day-care centres within the sector. Since most of the information in the data is only available in annual intervals, the analysis considers the probability of leaving the day-care sector within a given year. Thus, we investigate the mobility behaviour of individuals who were employed as day-care teachers in either nurseries or preschools in a given year, using information on labour-market status the following year.

As Farber (1999) notes, there may be heterogeneity in mobility rates due to worker preferences. Several studies have found that mobility varies with age, suggesting variation in mobility patterns among age groups. It is widely observed that young workers tend to be more mobile than older workers (see e.g. Euwals 2001). This matter has been studied by Osterman (1980), who investigates the changes in mobility rates over age groups as a transition process, where young workers become less mobile as they mature and settle into families and into the housing market. The differences in mobility patterns may, as Bartel (1982) remarks, be due to workers from different age groups differing in their preferences for non-pecuniary work characteristics as opposed to monetary returns. This could in turn be a result of for example changes in health or family status.

Gielen & van Ours (2006) also show that young workers exhibit more employment dynamics than older workers. Additionally, the employment dynamics of young workers mainly vary with employment fluctuations at the national and sector levels, whereas for older workers, employment dynamics mainly vary with firm-specific employment changes. Adjustments in the workforce occur mainly as an effect of fluctuations in worker entry for young and prime-age workers, while they occur mainly as a result of fluctuations in separation rates for old workers.

Similarly, general health status may affect mobility behaviour. Workers in poor health may be relatively more affected by adverse physical working conditions and stress than healthier workers. Therefore, we may expect day-care teachers in poor health to be relatively more prone to switch jobs due to adverse non-pecuniary job characteristics than healthy teachers. Moreover, teachers with long illness periods suffer the risk of being laid off. On the other hand, teachers with poor health may be more risk-averse since job switches may also create more job uncertainty.

Family duties are also likely to affect workers' labour-market decisions, especially in professions dominated by female workers, such as the child-care sector. Nielsen, Simonsen & Verner (2004) show that mothers are overrepresented among Danish public-sector workers, whereas non-mothers are relatively more likely to work in the private sector. The authors conclude that this outcome may be the result of a self-selection process, where women who have or are planning to have children choose to work in the public sector due to its family-friendly working conditions, such as flexible working hours and generous parental leave schemes.

Using National Longitudinal Survey of Youth (NLSY) data, Keith & McWilliams (1997) show that women are much more likely to switch jobs due to family responsibilities than men. This type of job switch is associated with a significantly lower wage growth than job switches conducted for other reasons. Similarly, Phipps, Burton & Lethbridge (2001) show that Canadian women who switch jobs following a parental-leave spell experience a significant income penalty while there is no significant penalty for



women who return to the same job. Simonsen & Skipper (2006, 2008) find negative and significant, but small effects, for Danish women employed in the public sector suggesting a wage penalty for women prior to child birth. These results suggest that women move into lower-paying jobs that offer a more family-friendly work environment in connection with their first childbirth. Kunze & Ejrnæs (2004) find a similar effect for skilled West German women during a 3-year period prior to their first childbirth, suggesting that the change of professions may occur before motherhood. To account for the possibility of family formation affecting day-care teachers' career choices, the analysis includes number of children lagged.

While adverse working conditions at the current workplace may affect quit behaviour by pushing the employee out of the day-care sector, the surrounding labour market may also attract workers by offering better wages and more favourable non-pecuniary work characteristics. Thus, following Feng's (2009) terminology, the quit decision can be seen as a result of both "push factors" consisting of adverse conditions at the current workplace and "pull factors" consisting of opportunities at competing workplaces or in competing sectors. The analysis uses several variables related to working conditions at the workplace and municipal levels.

Whereas the child-to-teacher ratio is a relatively direct measure of the work pressure at the municipal level, the size of the workplace may impact the flexibility of its practices. For example, larger day-care centres may be able to uphold a higher degree of specialisation, e.g. implement senior policies, which give elderly workers less stressful or physically demanding tasks. Using Swiss survey data, Winter-Ebmer & Zweimüller (1999) find a negative effect of firm size on search behaviour and job mobility, suggesting that job satisfaction is higher among employees in larger firms. On the other hand, it is possible that a larger workplace also implies a lesser sense of responsibility and a more impersonal atmosphere, instead reducing job satisfaction and inducing quit behaviour.

Job satisfaction and mobility behaviour may also be affected by the characteristics and behaviour of colleagues and enrolled children. For example, high absence or turnover rates at the workplace may enhance the work pressure of remaining teachers. Moreover, it is possible that a more challenging child group, e.g. a large share of children belonging to socially disadvantaged groups, increases the stress of teaching and thereby induces teacher attrition. Earlier studies have shown that a high percentage of low-income and minority students are associated with higher exit rates among American school teachers (see e.g. Feng 2009; Hanushek, Kain & Rivkin 2004).

The Danish day-care sector has a low level of wage dispersion. Instead, the main source of earnings inequality among day-care teachers is differences in working hours. The large share of part-time positions within the day-care sector also reduces average earnings relative to competing sectors. Mobility decisions may be related to an adjustment of working hours, which in turn may be motivated by pecuniary returns, i.e. a teacher may want to increase her/his earnings by increasing the number of hours worked. To account for this type of behaviour, we use yearly net earnings rather than wages as a measure of pecuniary work characteristics.

The "pull factors", consisting of labour-market opportunities in competing sectors or at competing workplaces may affect individual job-switch decisions through both pecuniary and non-pecuniary channels. We control for the local unemployment rate, which is one indicator for non-pecuniary working characteristics for competing sectors. Moreover, as the average age of the enrolled children, and thus the work load associated with each child, differ across day-care types, these cannot be compared with re-

spect to child-to-teacher ratios. Therefore, opportunity earnings are used as the sole measure of alternative workplace characteristics. Feng (2009) suggests a between-sector opportunity wage measure calculated as a simple weighted wage average in the sectors into which teachers move when they leave teaching. Alternative wages in other districts are calculated based on information about the number of teaching positions and physical proximity, and districts are weighted based on relative frequencies of moves. Following this line of reasoning, we construct separate opportunity earnings measures for intra- and inter-sector job switches by simply calculating the average net earnings for day-care teachers of the same gender and age group who left the sector or switched workplaces within the sector, respectively, during the previous year. This measure takes actual mobility patterns of day-care teachers into account.

The choice between staying at the current workplace and switching jobs is modelled as a utility-maximising choice. The day-care teacher will choose among different jobs and occupational sectors based on her/his characteristics and preferences. Thus, at every point in time, the individual faces the utility-maximising problem

$$\max U( W_{ijkt}, Z_{ijkt}, A_{imt} )$$

where the characteristics of the current workplace are a combination of  $W_{ijkt}$ , which represents the wage for individual  $i$  in workplace  $j$  and municipality  $k$  at time  $t$ , and  $Z_{ijkt}$ , which is a vector of non-pecuniary characteristics of the current job.  $A_{imt}$  denotes the outside options faced by the teacher, thus containing pecuniary and non-pecuniary characteristics of competing jobs.

A job switch occurs when net utility from leaving the current job is greater than the costs associated with mobility. A job switch may lead to a number of (in our case: three) different new employment situations. The individual may change jobs to another day-care institution in the same municipality; or the individual may change jobs to a day-care institution in another municipality; or the individual may choose to change occupation and leave the day-care sector. We expect that the child-to-teacher ratio may impact differently on the choice between these three alternative situations. Hence, we analyse the potential effects of work pressure on job switches using a multinomial logit model. We assume that the probability for individual  $i$ , who is employed at workplace  $j$  in municipality  $k$  at time  $t$  to switch jobs depends on an underlying net utility of a job switch, which is a linear function of a set of explanatory variables.

$$y_{ijkt}^* = \beta_0 + \beta_1 X_{it} + \beta_2 W_{ijkt} + \beta_3 S_{ikt} + \beta_4 \Pi_{ikt} + \beta_5 A_{imt} + \beta_6 P_{kt} + \beta_7 \phi_t + \varepsilon_{ijkt}$$

$X_{it}$  is a vector of individual characteristics representing teacher  $i$  in period  $t$ . These characteristics include age, family background, employment history, and indicators of previous health status.  $W_{ijkt}$  represents individual earnings in the current job. The  $\beta$ -estimates may vary across different alternative states.

The non-pecuniary workplace characteristics included are the average child-to-teacher ratio at the municipal level  $\Pi_{ikt}$  and a vector of workplace-specific characteristics,  $S_{ikt}$ , including workplace size, the shares of trained teachers and male employees, and the parental background of the children attended in the institution. Consequently,  $\beta_4$  is our main parameter of interest. Since we do not have access to information on the non-pecuniary characteristics of competing jobs, the vector of alternative work characteristics,  $A_{imt}$  is restricted to including opportunity earnings.

Turnover rates vary over the business cycle, as workers may be more inclined to quit their current job if it is relatively easy to find a new one. Apart from including municipal level unemployment rates for the day-care teacher's municipality of residence denoted by  $P_{kt}$  to account for aggregate labour-market conditions, we control for aggregate time-variant shocks and time trends by using time dummies,  $\phi_t$ .  $\varepsilon_{ijkt}$  is white noise.

## Identification

We suspect that there are (at least) two potential sources of endogeneity. First, teachers select into municipalities based on information about working conditions (the child-to-teacher ratio). Hence, municipalities with favourable working conditions may be relatively more successful in attracting high-qualified teachers who may also be more stable and less prone for frequent job switches. Thus, teachers with a high job change frequency may select into municipalities with a high child-to-teacher ratio. Hence, if we find a positive correlation between the child-to-teacher ratio and mobility, we cannot be sure if we can interpret this as a causal relationship.

Secondly, another potential source of endogeneity which may be relevant for this study is that municipalities which experience a high quit rate among day-care teachers may respond by reducing the child-to-teacher ratio in order to hold on to employees or to accommodate new and inexperienced employees in the sector. We checked this by performing estimations at the municipal level of the relationship between previous turnover rates and current child-to-teacher ratio. These municipal level regressions show a negative and significant relationship between previous turnover rates and current child-to-teacher ratio indicating that municipalities do respond to exit rates by improving the child-to-teacher ratio. In the presence of such a feedback mechanism, any estimate of a positive and significant relationship between lagged child-to-teacher ratio and job changes at the individual level can be argued to represent a lower bound of the true causal effect between the child-to-teacher ratio and quit behaviour; see Manski & Pepper (2000) for a discussion.

Instrumental variables estimation offers a way of dealing with problems of selectivity and endogeneity. We instrument the child-to-teacher ratio with two instruments: a dummy for whether municipalities live up to their obligation to offer day-care arrangements by the age of twelve months, i.e. guaranteed access to preschool (*pasningsgaranti*, henceforth abbreviated to GAPS), and the share of Conservative-Liberals in the municipality. These two instruments are both significantly related to the child-to-teacher ratio. Details on the applicability of these instruments are discussed in the appendix. Both instruments are lagged one year compared to the child-to-teacher ratio.

Guaranteed access to childcare (GAPS) was part of government policy from the mid-1990s, but the policy has been transmitted to municipalities in a varying pace. By 2000, around 75% of the municipalities offered GAPS, and by 2006 almost 100% of the municipalities report guaranteed access to childcare.<sup>3</sup> Our initial suspicion was that GAPS was offered more often and earlier on in municipalities with a high service level in day care and hence with a low child-to-teacher ratio. If this was the case, GAPS might suffer from the same sort of endogeneity problems as the child-to-teacher ratio. However, there have been some exogenous changes in the incentive structure set by the government in order to speed up

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<sup>3</sup> Since 2006, guaranteed access to preschool (*pasningsgaranti*) has been mandatory for the municipalities. Information on GAPS by municipality and by year has been obtained from Niels Glavind, Bureau 2000.

the implementation in GAPS in the municipalities during our period of analysis. In 1999, the Danish Parliament passed a law saying that the municipalities could raise the parent user fee in day care from maximum 30% of the operating expenses to 32% in 2001 and 33% in 2002 under the condition that municipalities offered GAPS.<sup>4</sup> This led around half of the municipalities to raise the parent user fee to 32% in 2001, while the other half either stayed on 30% or raised the fee to 31% of the operating expenses. Furthermore, in 2002, 190 (out of 275) municipalities raised the parent user fee to 33% of the total operating expenses in day care, cf. Bureau 2000 (2001; 2002; 2007). We expect that the decision of the municipalities to live up to GAPS affects the child-to-teacher ratio. At the same time, we are rather confident that the decision of the municipalities to implement GAPS is determined by the government incentives regarding parental fees rather than the municipality's success in attracting new day-care personnel. Thus, as we show in the appendix that we have access to plausible exogenous variation in the child-to-teacher ratio. The GAPS instrument has previously been used in Datta Gupta & Simonsen (2010).

Our second instrument is the share of Conservative-Liberal parties in the municipality council.<sup>5</sup> We hypothesise that there is a positive correlation between the share of Conservative-Liberals and the child-to-teacher ratio. Moreover, we argue that this is a valid instrument as the political colour of the city council affects mobility and other labour-market outcomes of the day-care teachers only through the child-to-teacher ratio (or other factors which are highly correlated with the child-to-teacher ratio as e.g. monetary resources to the day-care area). The share of municipalities with a Conservative-Liberal majority was 52% around 2000, whereas around 2 out of 3 municipalities in 2006 had a Conservative-Liberal majority. The political constitution of the municipality council may depend on the social background of the families living in the municipality. We control for social background of the children in some of the regressions presented in section 5.

Thus, we hypothesise that both instruments are strongly correlated with the child-to-teacher ratio and are assumed not to affect mobility directly, but only indirectly through the child-to-teacher ratio.

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<sup>4</sup> Guaranteed access to childcare (GAPS) is fulfilled if the municipality can offer some form of childcare to families when their child reaches the age of six months. Under this guarantee, the parents cannot decide themselves whether their child should be placed in an institution rather than child minding, and the parents cannot require a specific institution in a specific (local) area.

<sup>5</sup> The Conservative-Liberal coalition constitutes of three parties, the Conservative Party, the Liberal Party (*Venstre*) and Danish People's Party (*Dansk Folkeparti*).

## 5 Results

In the empirical analysis, we estimate the empirical model described in section 4 using different specifications and choices of explanatory variables. We focus on the period after 2002 due to the shifts in the measurement of the child-to-teacher ratio in 2000/2001 and 2003/2004. Child-to-teacher ratios enter as lagged variables in the model of job switches. Thus, we analyse job switches for the period 2002-2006 regressed on child-to-teacher ratios from 2001-2005. We use a dummy for the period after 2005 to account for the change in the measurement of the child-to-teacher ratio around 2004. The child-to-teacher ratio is interacted with the dummy for the period post 2005 to account for different effects of the child-to-teacher ratio measure before and after 2005. The model is estimated simultaneously for nursery and preschool teachers, and we control for a possible difference in levels and reactions to the child-to-teacher ratio by using a dummy for preschool which is interacted with the child-to-teacher ratio. The child-to-teacher ratio is measured as number of children per full-time pedagogical employee. Thus, there is one variable for the “baseline” child-to-teacher ratio (corresponding to changes in the child-to-teacher ratio for nursery care up to 2004), and three interaction variables, i.e. child-to-teacher ratio interacted with the period after 2005, child-to-teacher ratio interacted with preschool dummy, and child-to-teacher ratio interacted jointly with both preschool and the post 2005 dummy. Tables with full estimation results are found in the appendix. Table A.2 gives summary statistics for the estimation sample. Table A.3 gives estimation results for model (1), which is the baseline model with controls for individual effects. Table A.4 has estimation results for model (2), which is the baseline model with controls for individual and institution/firm characteristics. Table A.5 presents estimation results for model (3) which is the baseline model with controls for parental background of the children. Table A.6 presents estimation results for model (4) and (5). Model (4) controls for past long-term sickness absence, and model (5) interacts past sickness absence with the child-to-teacher ratio.

Model (1) in table A.3, column 1, shows that the correlation between the child-to-teacher ratio and job shifts within the day-care sector and within the municipality is insignificant. However, the child-to-teacher ratio is positively and significantly related to job shifts within the day-care sector, but outside the municipality, when we focus on the period after 2005. This effect is smaller for preschool teachers, which is natural, since a change by 1 child in the child-to-teacher ratio has a stronger relative impact on work pressure in nursery care than in preschool. Job shifts from day-care to other sectors in the economy are positively and significantly related to the child-to-teacher ratio, especially for nursery care. We find similar results when we add other explanatory variables in models (2)-(5) in tables A.4-A.6, column 1. Male teachers have a higher exit probability, older teachers have a lower probability of changing job, and experience is negatively related to job-change probabilities. Moreover, we find that the net wage in the current job has a negative and significant effect on the probability of changing jobs, as expected. Moreover, consistent with this, the opportunity wage (which is a pull factor) generally has a positive and significant impact on the probability of changing jobs. Previous estimations (not reported here) also showed that younger teachers tend to respond more to opportunity wages than older, which confirms Bartel’s (1982) findings. Job mobility is also related to characteristics of colleagues at the workplace. The size of the institution and the share of trained teachers both reduce job-switch probability within the sector.

Model (3) estimation results show that the probability of job changes within the day-care sector is correlated with the parental background of the children in the institutions, especially the share of immigrant children is positively related to the probability of changing jobs from one institution to another. However, quitting the day-care sector altogether does not seem to be related to the children's parental characteristics. Previous research suggests that for instance immigrant children face specific problems with regard to especially language skills when entering school, cf. Rangvid (2009). Day care might play a role in stimulating these children's language skills, but this effort becomes more difficult if the very institutions with many children with immigrant background face a high teacher turnover. Municipalities might consider how to promote recruitment and retention in institutions with many disadvantaged children, since this investment might pay off in the school system in terms of saved costs for extra language classes. It seems fair to argue that a high teacher turnover rate in institutions with many children with immigrant or generally disadvantaged backgrounds is problematic, since this group of children may be more dependent on having a stable environment with a steady staff of teachers who are aware of the children's specific problems and needs and whom the children have confidence in.

Models (4)-(5) include previous long-term sickness periods. We find that the probability of changing jobs is increasing with past periods of long-term absence. Interacting the child-to-teacher variables with the dummy for past sickness period indicates that teachers who had one or several past sickness absence periods within the last year are more sensitive to the child-to-teacher ratio in terms of job switch probabilities than the average teacher. An interesting result is that the probability of changing jobs is positively associated with having experienced period(s) of long-term illness (more than 15 days) in the previous year.

The local unemployment rate has a negative and – in some specifications – significant impact on the likelihood of changing jobs. Thus, an increase in the unemployment rate in the teacher's municipality of residence is negatively and significantly related to the probability of leaving the day-care sector for teachers in both types of day-care centres, suggesting that individuals tend to hold on to their jobs when finding a new one becomes more difficult. This is consistent with our prior hypothesis of quit behaviour being dependent on general labour-market conditions.

Teachers with a low tendency of changing jobs may select into or may be more likely to obtain a job in municipalities with favourable work conditions, as argued in section 4. We try to take account of selectivity by using the instrumental variable estimation (IV). In general, IV results show a higher correlation between job mobility and the child-to-teacher ratio, but the standard errors are also higher. The IV results generally confirm the positive relationship between the child-to-teacher ratio and the probability of job switches, but the IV are generally insignificant when it comes to the impact of the child-to-teacher ratio. Due to these high parameter estimates and low significance, we focus in the following on the simple cross-section results when interpreting the size of the estimated effects. The parameter estimate cannot necessarily be interpreted as a causal effect.

In order to assess the importance of the parameter estimates for the probability of job switch, we need to calculate the marginal effects of the explanatory variables based on the estimation results in the appendix. Table 5.1 shows marginal effects for models 1-4 (ordinary cross-section estimates of the multinomial logit model) of a change in the child-to-teacher ratio. The interpretation of the marginal effects is the following, if we for instance focus on the results from model 1. A difference in the child-to-teacher ratio of 1 is associated with a higher probability of staying in the same institution for nursery teachers,

especially after 2005 (the marginal effect for nursery teachers of an increase in the child-to-teacher ratio after 2005 is  $-0.0178 + (-0.0228) = -0.0406 = -4.06$  percentage points). The positive difference in the child-to-teacher ratio of 1 is associated with a higher probability of job switches inside the day-care sector, but outside the municipality, especially after 2005, and the probability of a sector switch is  $0.0173 = 1.73$  percentage points higher for nursery care teachers before 2005.

**Table 5.1 Marginal effects, child-to-teacher ratio**

	Model 1	Model 2	Model 3	Model 4
<b>(1) Stay</b>				
Child-to-teacher ratio	-0.0178	0.0000	-0.0240	-0.0180
C-t-t * post 2005	-0.0228 *	-0.0203 (*)	-0.0118	-0.0234 *
C-t-t * preschool	0.0222	0.0076	0.0312	0.0224
C-t-t * post 2005 * preschool	0.0136 *	0.0125 *	0.0078	0.0139 *
<b>(2) Job switch within municipality</b>				
Child-to-teacher ratio	0.0078	-0.0085	0.0067	0.0078
C-t-t * post 2005	0.0091	0.0079	0.0037	0.0092
C-t-t * preschool	-0.0126	0.0011	-0.0127	-0.0126
C-t-t * post 2005 * preschool	-0.0064	-0.0062	-0.0034	-0.0064
<b>(3) Job switch outside municipality</b>				
Child-to-teacher ratio	-0.0073	-0.0074	-0.0011	-0.0072
C-t-t * post 2005	0.0119 *	0.0103 *	0.0086	0.0122 *
C-t-t * preschool	0.0077	0.0076	0.0021	0.0076
C-t-t * post 2005 * preschool	-0.0066 *	-0.0055 *	-0.0047	-0.0067 *
<b>(4) Sector switch</b>				
Child-to-teacher ratio	0.0173 *	0.0159 *	0.0184 **	0.0174 **
C-t-t * post 2005	0.0018	0.0020	-0.0005	0.0020
C-t-t * preschool	-0.0173 *	-0.0164 *	-0.0206 **	-0.0173 **
C-t-t * post 2005 * preschool	-0.0007	-0.0009	0.0002	-0.0007

## 6 Conclusion

Our results indicate that day-care teachers working with children from different age groups differ systematically in their response to work pressure, measured by the child-to-teacher ratio. Analysed by a multinomial logit model, we find that the job-change probability for teachers working in nursery care seems to be higher at workplaces with a higher child-to-teacher ratio. On the other hand, we find a significantly lower relationship between the child-to-teacher ratio and job shifts for preschool teachers. The differences in responses to the child-to-teacher ratio are natural since the enrolment of one additional child increases work pressure by a larger amount in nurseries than in preschools.

The correlations found in the multinomial logit estimations cannot necessarily be interpreted as representing a causal relationship, due to the potential endogeneity of the child-to-teacher ratio. This endogeneity occurs since teachers with a low propensity to change jobs (“stable” teachers) may be more successful in getting jobs in municipalities with favourable working conditions including a relatively low child-to-teacher ratio.

We try to take the possible selectivity effects into account by instrumenting the child-to-teacher ratio with two instruments: guaranteed access to preschool (GAPS) and the share of Conservative-Liberals in the municipality. The IV-results show a higher relationship between the child-to-teacher ratio and job switches, but the standard errors are also higher, and the IV-estimates of the key variables of interest are generally not significant. Thus, based on these results we cannot conclude that a causal relationship exists between the child-to-teacher ratio and job switches based on the IV-results. On the other hand, the IV-results do not contradict the simple multinomial logit results. We base our conclusions on the simple multinomial logit results, bearing in mind that these reflect correlations rather than a true causal relationship.

Generally, we find that individuals with prior long-term sickness periods are more likely to change jobs. Moreover, in most cases we find that teachers with past long-term sickness periods are more sensitive to (changes in) the child-to-teacher ratio with respect to their job-change behaviour.

Based on the multinomial logit estimations, we find that the job change probability is lower for older teachers and teachers with extensive experience, as found by most previous studies. Day-care teachers’ job-change patterns are significantly responsive to pecuniary job characteristics. We differentiated between push and pull factors and found that the net wage at the current workplace is negatively related to job change probability, implying that a low present wage “pushes” teachers out of their present employment. Correspondingly, we find that the opportunity wage is positively related to the propensity to seek alternative employment.

Finally, we analysed if teacher turnover is responsive to the composition of the child group. We find that teachers working in institutions with a high proportion of children with an immigrant background are more likely to change jobs within the day-care sector (intra-sector mobility), especially within the same municipality. The association between a high share of immigrant children in the institution and a high teacher turnover suggests that institutions with many disadvantaged children face larger problems in providing a stable teaching environment than institutions with more privileged children.



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## Appendix

We now take a look at the first-stage regressions in the IV estimation. Our instruments should fulfil two criteria: Relevance and exogeneity.

First, instruments should be relevant in explaining the variation in the child-to-teacher ratio. We find that our two instruments, i.e. the municipality guaranteed child-care provision (lagged) and the political colour of the city council, are strongly correlated with the child-to-teacher ratio. A rule of thumb has it that the F-statistics for the test of the joint significance of the instruments in the first-stage regression should be above 10. This criterion is fulfilled for nursery care 2002-2004, while the instruments seem to be less strong for other time periods and for preschool, cf. table A.1a and A.1b for first-stage regression results. Guaranteed access to child care is generally negatively related to the child-to-teacher ratio. Thus, municipal politicians' guarantee of child-care access was presumably followed up by more resources. The period 2005-2006 for preschool is an exception to this observation. Moreover, the share of Conservative-Liberals in the city council seems to be associated with a higher child-to-teacher ratio (fewer resources to child care).

**Table A.1a First-stage regressions**

	Nursery care			
	2002-2004		2005-2006	
	b	t	b	t
GAPS	-0.219	4.19	-0.049	0.37
Share of Conservative-Liberals	0.619	3.26	1.775	2.65
F-value*	14.8		3.99	

\*) F-value for test of joint significance of the two instruments.

Note: First-stage regression also includes exogenous explanatory variables included in the main model.

**Table A.1b First-stage regressions**

	Preschool			
	2002-2004		2005-2006	
	b	t	b	t
GAPS	-0.251	3.12	0.339	1.38
Share of Conservative-Liberals	0.027	0.10	0.945	2.79
F-value*	5.59		4.43	

\*) F-value for test of joint significance of the two instruments.

Note: First-stage regression also includes exogenous explanatory variables included in the main model.

Secondly, the instruments should be exogenous to the unobserved variation in our mobility measure. This is tested by the Sargan test, which is a test of the overidentifying restrictions. The hypothesis being tested with the Sargan test is that the instrumental variables are uncorrelated to some set of residuals given that at least one instrument is exogenous. In that case, they are acceptable, healthy instruments. We find that the null hypothesis is accepted statistically in all the IV estimations, so the instruments pass the overidentifying restrictions test and are hence valid by this criterion.

## Tables – Estimation Results

**Table A.2 Summary statistics**

	Obs	Mean	Std.	Min	Max
Child-to-teacher ratio	68430	5.106	1.433	1.440	10.390
Male	68430	0.049		0.000	1.000
ln age	68430	3.711	0.228	3.045	4.078
ln age squared	68430	13.826	1.675	9.269	16.626
Single	68430	0.154		0.000	1.000
# of young children	68380	0.989	1.019	0.000	6.000
ln experience	68430	2.614	0.664	0.000	3.756
ln total net wage	68430	11.491	0.413	8.187	12.735
ln opportunity wage	68380	11.235	0.223	10.275	11.743
Unemployment rate	68430	5.794	1.571	2.200	13.500
Size of institution	68430	8.108	2.240	3.000	18.350
Share of trained teachers	68430	0.599		0.077	1.000
Share of male teachers	68430	0.112		0.000	1.000
Share of parents with no education	41715	0.205		0.000	1.000
Share of immigrant parents	41716	0.103		0.000	1.000
Past sickness absence	68430	0.072		0.000	1.000

**Table A.3 Job switches, multinomial logit regression**

	Model 1		Model 1, IV	
	b	t	b	t
<b>Switch within municipality</b>				
Child-to-teacher ratio	0.161	(0.56)	-1.000	(1.58)
C-t-t * post 2005	0.187	(0.85)	0.198	(0.17)
C-t-t * preschool	-0.246	(0.89)	0.061	(0.10)
C-t-t * post 2005 * preschool	-0.127	(1.29)	-0.231	(0.40)
Preschool	0.850	(1.09)	2.706	(1.40)
Male	0.369***	(5.45)	0.268***	(3.48)
Ln age	4.810	(1.06)	4.461	(0.91)
Ln age squared	-0.705	(1.13)	-0.665	(1.00)
Dummy single	0.140***	(3.82)	0.090*	(2.05)
# children	-0.034	(1.46)	-0.009	(0.37)
Lag ln experience	-0.308***	(7.70)	-0.288***	(6.23)
Lag ln net hourly wage	-1.005***	(15.05)	-1.038***	(15.61)
Lag ln net opportunity wage	0.040	(0.31)	0.035	(0.25)
Unemployment rate	0.094	(1.77)	0.074	(1.43)
Constant	0.363	(0.05)	4.797	(0.57)
<b>Within sector, across municipalities</b>				
Child-to-teacher ratio	-0.108	(0.34)	2.357	(1.52)
C-t-t * post 2005	0.310*	(2.52)	-1.518	(1.53)
C-t-t * preschool	0.108	(0.35)	-2.218	(1.83)
C-t-t * post 2005 * preschool	-0.174**	(2.85)	0.754	(1.37)
Preschool	-0.212	(0.24)	5.806	(1.61)
Male	0.619***	(7.90)	0.612***	(7.54)
Ln age	9.347*	(2.41)	9.332*	(2.37)
Ln age squared	-1.542**	(2.98)	-1.546**	(2.93)
Dummy single	0.036	(0.45)	0.041	(0.66)
# children	-0.157***	(5.55)	-0.158***	(5.77)
Lag ln experience	-0.194***	(3.43)	-0.193***	(3.38)
Lag ln net salary	-1.288***	(16.66)	-1.297***	(14.13)
Lag ln net opportunity wage	0.000	(0.00)	0.018	(0.16)
Unemployment rate	-0.166***	(4.18)	-0.168***	(4.56)
Constant	0.074	(0.01)	-6.766	(0.79)
<b>Sector switch</b>				
Child-to-teacher ratio	0.423*	(2.24)	0.971	(0.83)
C-t-t * post 2005	0.101	(0.87)	-0.346	(0.75)
C-t-t * preschool	-0.432*	(2.41)	-1.107	(1.17)
C-t-t * post 2005 * preschool	-0.051	(0.80)	0.159	(0.65)
Preschool	1.492**	(2.73)	3.764	(1.48)
Male	0.739***	(10.53)	0.720***	(9.93)
Ln age	-38.068***	(8.06)	-38.257***	(8.11)
Ln age squared	4.895***	(7.71)	4.918***	(7.77)
Dummy single	0.353***	(6.64)	0.346***	(6.93)
# children	0.032	(1.25)	0.038	(1.29)
Lag ln experience	-0.234***	(3.65)	-0.230***	(3.54)
Lag ln net hourly wage	-1.449***	(19.60)	-1.457***	(17.11)
Lag ln net opportunity wage	0.982***	(6.78)	0.986***	(6.70)
Unemployment rate	0.027	(1.38)	0.021	(0.94)
Constant	75.029***	(9.00)	73.962***	(7.21)
Time dummies	Yes		Yes	
Log likelihood	-37288		-37221	
N	68380		68380	

Note: Standard errors are clustered by municipality in both models and bootstrapped in the IV model.

\*\*\*) p=0.001, \*\*) p=0.01, \*) p=0.05.

**Table A.4 Job switches with control for institution characteristics**

	Model 2		Model 2, IV	
	b	t	b	t
<b>Switch within municipality</b>				
Child-to-teacher ratio	-0.128	(0.47)	-1.842*	(2.22)
C-t-t * post 2005	0.163	(0.73)	0.667	(1.45)
C-t-t * preschool	-0.002	(0.01)	1.015	(1.51)
C-t-t * post 2005 * preschool	-0.121	(1.25)	-0.449	(1.94)
Preschool	-0.070	(0.08)	-1.125	(0.64)
Male	0.344***	(5.20)	0.313***	(4.43)
Ln age	4.875	(1.10)	4.913	(1.01)
Ln age squared	-0.717	(1.18)	-0.731	(1.11)
Dummy single	0.125**	(3.23)	0.080	(1.61)
# children	-0.031	(1.31)	-0.014	(0.54)
Lag ln experience	-0.298***	(7.40)	-0.281***	(5.97)
Lag ln net hourly wage	-1.003***	(15.37)	-1.022***	(14.62)
Lag ln net opportunity wage	0.042	(0.32)	0.046	(0.32)
Unemployment rate	0.080	(1.84)	0.062	(1.43)
Size of institution	-0.090**	(2.87)	-0.198**	(2.90)
Share trained teachers	0.630	(0.87)	0.873	(1.03)
Share male teachers	0.246	(0.50)	-1.226	(1.20)
Constant	1.702	(0.25)	7.958	(0.87)
<b>Within sector, across municipality</b>				
Child-to-teacher ratio	-0.147	(0.48)	0.050	(0.05)
C-t-t * post 2005	0.272*	(2.21)	0.147	(0.33)
C-t-t * preschool	0.136	(0.47)	-0.028	(0.06)
C-t-t * post 2005 * preschool	-0.147*	(2.48)	-0.077	(0.28)
Preschool	-0.378	(0.45)	-0.020	(0.02)
Male	0.599***	(7.68)	0.601***	(8.10)
Ln age	8.463*	(2.24)	8.464*	(2.10)
Ln age squared	-1.425**	(2.83)	-1.425**	(2.66)
Dummy single	0.017	(0.22)	0.019	(0.31)
# children	-0.148***	(5.24)	-0.148***	(5.17)
Lag ln experience	-0.193***	(3.46)	-0.194***	(3.33)
Lag ln net hourly wage	-1.306***	(16.68)	-1.306***	(14.41)
Lag ln net opportunity wage	0.012	(0.11)	0.011	(0.09)
Unemployment rate	-0.150***	(3.73)	-0.150***	(3.81)
Size of institution	-0.046*	(2.25)	-0.042	(0.46)
Share trained teachers	-1.531***	(5.00)	-1.545***	(5.05)
Share male teachers	0.557	(0.94)	0.613	(0.44)
Constant	3.139	(0.49)	2.568	(0.31)
<b>Sector switch</b>				
Child-to-teacher ratio	0.353	(1.68)	0.085	(0.11)
C-t-t * post 2005	0.100	(0.87)	0.187	(0.68)
C-t-t * preschool	-0.379*	(2.00)	-0.285	(0.65)
C-t-t * post 2005 * preschool	-0.052	(0.82)	-0.112	(0.76)
Preschool	1.331*	(2.40)	1.518	(1.72)
Male	0.752***	(10.64)	0.743***	(10.94)
Ln age	-37.922***	(8.21)	-37.953***	(8.25)
Ln age squared	4.874***	(7.86)	4.876***	(7.94)
Dummy single	0.352***	(6.69)	0.341***	(6.97)
# children	0.032	(1.23)	0.037	(1.35)
Lag ln experience	-0.233***	(3.60)	-0.229***	(3.30)
Lag ln net hourly wage	-1.452***	(20.03)	-1.457***	(17.62)
Lag ln net opportunity wage	0.983***	(6.82)	0.984***	(6.28)
Unemployment rate	0.028	(1.44)	0.022	(0.91)
Size of institution	-0.018	(0.93)	-0.043	(0.60)
Share trained teachers	-0.082	(0.30)	-0.026	(0.06)
Share male teachers	-0.467	(1.31)	-0.839	(0.85)
Constant	75.286***	(9.14)	76.486***	(7.40)
Time dummies	Yes		Yes	
Log likelihood	-37205		-37178	
N	68380		68380	

Note: Standard errors are clustered by municipality in both models and bootstrapped in the IV model.

\*\*\*) p=0.001, \*\*) p=0.01, \*) p=0.05.

**Table A.5 Job switches with control for parental background of children**

	Model 3		Model 3, IV	
	b	t	b	t
<b>Switch within municipality</b>				
Child-to-teacher ratio	0.175	(0.57)	-0.812	(0.94)
C-t-t * post 2005	0.093	(0.37)	-0.780	(0.88)
C-t-t * preschool	-0.309	(1.00)	0.437	(0.50)
C-t-t * post 2005 * preschool	-0.081	(0.65)	0.292	(0.68)
Preschool	1.103	(1.22)	-0.215	(0.08)
Male	0.330***	(3.37)	0.290**	(2.61)
Ln age	12.248*	(2.28)	12.454*	(2.25)
Ln age squared	-1.687*	(2.30)	-1.719*	(2.29)
Dummy single	0.219***	(4.17)	0.206***	(3.34)
# children	-0.016	(0.48)	-0.011	(0.32)
Lag ln experience	-0.332***	(5.39)	-0.326***	(4.82)
Lag ln net hourly wage	-0.871***	(7.15)	-0.875***	(6.64)
Lag ln net opportunity wage	0.084	(0.52)	0.087	(0.48)
Unemployment rate	0.009	(0.25)	-0.008	(0.20)
Share parents short educ	-0.322	(1.11)	-0.062	(0.16)
Share immigrant parents	0.813***	(3.49)	0.417	(0.91)
Constant	-15.414	(1.85)	-12.939	(1.42)
<b>Within sector, across municipality</b>				
Child-to-teacher ratio	0.010	(0.03)	3.434	(1.45)
C-t-t * post 2005	0.276	(1.37)	-1.724*	(2.04)
C-t-t * preschool	0.007	(0.02)	-3.463	(1.88)
C-t-t * post 2005 * preschool	-0.153	(1.46)	0.849	(1.76)
Preschool	-0.116	(0.11)	9.635*	(2.51)
Male	0.592***	(4.50)	0.565***	(4.48)
Ln age	8.568	(1.18)	8.810	(1.22)
Ln age squared	-1.439	(1.48)	-1.481	(1.53)
Dummy single	0.011	(0.14)	0.012	(0.15)
# children	-0.110**	(3.07)	-0.109**	(3.22)
Lag ln experience	-0.297***	(3.43)	-0.304***	(3.55)
Lag ln net hourly wage	-0.902***	(12.39)	-0.923***	(11.35)
Lag ln net opportunity wage	0.190	(1.12)	0.216	(1.23)
Unemployment rate	-0.175**	(3.29)	-0.180***	(3.48)
Share parents short educ	-1.087*	(2.32)	-1.021	(1.55)
Share immigrant parents	0.622	(1.90)	0.504	(0.65)
Constant	-4.987	(0.39)	-14.770	(0.96)
<b>Sector switch</b>				
Child-to-teacher ratio	0.717**	(2.82)	0.628	(0.50)
C-t-t * post 2005	0.004	(0.02)	-0.835	(1.30)
C-t-t * preschool	-0.812**	(3.18)	-0.754	(0.74)
C-t-t * post 2005 * preschool	-0.006	(0.06)	0.382	(1.21)
Preschool	2.667***	(3.56)	2.596	(1.07)
Male	0.657***	(5.37)	0.641***	(4.99)
Ln age	-5.481	(0.74)	-5.619	(0.67)
Ln age squared	0.557	(0.57)	0.572	(0.52)
Dummy single	0.252**	(3.23)	0.249**	(2.93)
# children	0.024	(0.59)	0.026	(0.59)
Lag ln experience	-0.445***	(4.80)	-0.443***	(4.58)
Lag ln net hourly wage	-0.957***	(11.96)	-0.961***	(10.62)
Lag ln net opportunity wage	0.520*	(2.29)	0.531*	(2.17)
Unemployment rate	-0.021	(0.73)	-0.029	(0.74)
Share parents short educ	0.046	(0.13)	0.124	(0.23)
Share immigrant parents	-0.150	(0.62)	-0.281	(0.54)
Constant	13.495	(1.08)	13.988	(1.01)
Time dummies	Yes		Yes	
Log likelihood	-18368		-18347	
N	41715		41715	

Note: Standard errors are clustered by municipality in both models and bootstrapped in the IV model.

\*\*\*) p=0.001, \*\*) p=0.01, \*) p=0.05.





**Table A.6 Job switch with control for past long-term sickness**

	Model 4		Model 4, IV		Model 5	
	b	T	b	t	b	t
<b>Switch within municipality</b>						
Child-to-teacher ratio	0.163	(0.57)	-0.998	(1.58)	0.170	(0.59)
C-t-t * post 2005	0.191	(0.87)	0.207	(0.19)	0.187	(0.87)
C-t-t * preschool	-0.247	(0.89)	0.067	(0.11)	-0.250	(0.90)
C-t-t * post 2005 * preschool	-0.128	(1.32)	-0.234	(0.43)	-0.123	(1.35)
C-t-t * long-sick					-0.046	(0.26)
C-t-t * post 2005 * long-sick					0.028	(0.28)
C-t-t * preschool * long-sick					-0.002	(0.02)
C-t-t * pre * p 2005 * long-sick					-0.041	(0.39)
Preschool	0.850	(1.09)	2.667	(1.37)	0.860	(1.11)
Male	0.378***	(5.51)	0.277***	(3.55)	0.377***	(5.48)
Ln age	4.369	(0.97)	4.061	(0.89)	4.392	(0.98)
Ln age squared	-0.649	(1.06)	-0.614	(0.98)	-0.653	(1.06)
Dummy single	0.140***	(3.82)	0.090*	(2.03)	0.140***	(3.81)
# children	-0.031	(1.33)	-0.007	(0.27)	-0.031	(1.35)
Lag ln experience	-0.306***	(7.63)	-0.286***	(6.54)	-0.307***	(7.60)
Lag ln net hourly wage	-1.006***	(15.02)	-1.039***	(15.54)	-1.007***	(14.90)
Lag ln net opportunity wage	0.036	(0.28)	0.031	(0.23)	0.037	(0.29)
Unemployment rate	0.094	(1.77)	0.075	(1.42)	0.094	(1.77)
Lag long-term sick	0.333***	(4.44)	0.300***	(3.66)	0.580	(1.08)
Constant	1.249	(0.18)	5.596	(0.71)	1.175	(0.17)
<b>Within sector, across municipality</b>						
Child-to-teacher ratio	-0.104	(0.32)	2.380	(1.48)	-0.119	(0.37)
C-t-t * post 2005	0.318**	(2.60)	-1.524	(1.58)	0.304*	(2.42)
C-t-t * preschool	0.105	(0.34)	-2.233	(1.73)	0.108	(0.35)
C-t-t * post 2005 * preschool	-0.177**	(2.92)	0.758	(1.42)	-0.164**	(2.59)
C-t-t * long-sick					0.120	(0.48)
C-t-t * post 2005 * long-sick					0.181*	(2.20)
C-t-t * preschool * long-sick					-0.001	(0.01)
C-t-t * pre * p 2005 * long-sick					-0.172	(1.83)
Preschool	-0.205	(0.23)	5.823	(1.53)	-0.201	(0.23)
Male	0.634***	(8.00)	0.627***	(7.67)	0.633***	(7.96)
Ln age	8.568*	(2.20)	8.565*	(2.14)	8.663*	(2.21)
Ln age squared	-1.444**	(2.77)	-1.449**	(2.72)	-1.457**	(2.78)
Dummy single	0.037	(0.46)	0.042	(0.67)	0.035	(0.43)
# children	-0.150***	(5.38)	-0.151***	(5.35)	-0.150***	(5.41)
Lag ln experience	-0.192***	(3.42)	-0.192**	(3.16)	-0.193***	(3.43)
Lag ln net hourly wage	-1.290***	(16.57)	-1.299***	(15.60)	-1.289***	(16.55)
Lag ln net opportunity wage	-0.013	(0.11)	0.005	(0.04)	-0.015	(0.13)
Unemployment rate	-0.166***	(4.17)	-0.168***	(4.45)	-0.166***	(4.17)
Lag long-term sick	0.586***	(7.33)	0.577***	(7.32)	-0.101	(0.17)
Constant	1.704	(0.26)	-5.221	(0.63)	1.602	(0.24)
<b>Sector switch</b>						
Child-to-teacher ratio	0.426*	(2.27)	0.988	(0.82)	0.415*	(2.26)
C-t-t * post 2005	0.108	(0.93)	-0.331	(0.73)	0.115	(0.97)
C-t-t * preschool	-0.435*	(2.44)	-1.112	(1.11)	-0.423*	(2.43)
C-t-t * post 2005 * preschool	-0.054	(0.85)	0.154	(0.65)	-0.060	(0.92)
C-t-t * long-sick					0.145	(0.77)
C-t-t * post 2005 * long-sick					-0.109	(1.06)
C-t-t * preschool * long-sick					-0.158	(1.39)
C-t-t * pre * p 2005 * long-sick					0.100	(0.91)

	Model 4		Model 4, IV		Model 5	
	b	T	b	t	b	t
Preschool	1.496**	(2.74)	3.738	(1.38)	1.500**	(2.77)
Male	0.753***	(10.63)	0.735***	(10.41)	0.753***	(10.64)
Ln age	-38.754***	(8.11)	-38.932***	(8.10)	-38.803***	(8.07)
Ln age squared	4.980***	(7.76)	5.002***	(7.77)	4.987***	(7.71)
Dummy single	0.353***	(6.65)	0.347***	(6.88)	0.353***	(6.72)
# children	0.039	(1.48)	0.044	(1.51)	0.039	(1.49)
Lag ln experience	-0.233***	(3.62)	-0.229***	(3.36)	-0.233***	(3.63)
Lag ln net hourly wage	-1.450***	(19.46)	-1.458***	(18.65)	-1.452***	(19.52)
Lag ln net opportunity wage	0.969***	(6.70)	0.974***	(6.50)	0.973***	(6.74)
Unemployment rate	0.027	(1.38)	0.021	(0.95)	0.027	(1.37)
Lag long-term sick	0.580***	(7.72)	0.572***	(6.85)	0.599	(1.22)
Constant	76.483***	(9.10)	75.347***	(7.39)	76.555***	(9.04)
Time dummies	Yes		Yes		Yes	
Log likelihood	-37216		-37151		-37208	
N	68380		68380		68380	

Note: Standard errors are clustered by municipality in both models and bootstrapped in the IV model.


\*\*\*)  $p=0.001$ , \*\*)  $p=0.01$ , \*)  $p=0.05$ .

## Dansk sammenfatning

Elvira Andersson og Mette Gørtz

### Arbejdspres og jobskift hos daginstitutionspersonale

Dette arbejdsrapport undersøger mobiliteten i daginstitutionssektoren. Vi ser på mobiliteten inden for sektoren (dvs. skift af arbejdsplads inden for kommunen og ud af kommunen) og mobiliteten ud af sektoren (dvs. sektor- eller brancheskift). Der anvendes individdata kombineret med oplysninger på arbejdspladsniveau og på kommuneniveau. Analyserne fokuserer på, hvad arbejdspres betyder for sandsynligheden for at skifte job inden for sektoren og sandsynligheden for at forlade sektoren. Arbejdspres måles ved hjælp af den kommunale normering, dvs. antal børn pr. voksen i kommunens daginstitutioner. Dette mål for arbejdspres er mere objektivt end de mål for arbejdspres, som har været anvendt i tidligere undersøgelser af sammenhængen mellem arbejdspres og jobmobilitet. Analyserne bygger på et enestående pannedatasæt baseret på Danmarks Statistiks registerdata med information om de ansatte og deres arbejdspladser. Generelt finder vi, at sandsynligheden for jobskift hænger positivt sammen med normeringen målt ved antal børn pr. voksen i vuggestuerne. Flere børn pr. voksen er således forbundet med en højere sandsynlighed for at skifte til en anden daginstitution uden for kommunen eller til at skifte sektor. Denne sammenhæng er mindre for de ansatte i børnehaverne.



## Work Pressure and Day-Care Teacher Turnover

This paper investigates mobility both within the day-care sector (i.e. workplace switches) and out of the sector (i.e. occupational switches), using information collected at individual, workplace and municipal levels. A particular focus is the role of work pressure as a possible determinant of job switches within the day-care sector and exit from day care to employment in other sectors. The main measure of work pressure used in this paper is the child-to-teacher ratio, i.e. the number of enrolled children per teacher. This measure of work pressure is considered more objective than other measures of work pressure used in prior analyses. The paper uses a unique employer-employee matched longitudinal data set based on Danish administrative registers. In general, we find that job switches are positively correlated with the child-to-teacher ratio in nursery care. The effects for preschool teachers are smaller and less significant.