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The association between care leave for sick children and wage among Swedish parents

Katarina Boye

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Care more, earn less?
**The association between care leave for sick children and wage
among Swedish parents^a**

by

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Abstract

A number of studies have shown that women's and men's wages relate to parenthood in general and to parental leave in particular, but we know little about the possible wage impact of leave to care for sick children, which is a part of the Swedish parental leave system. On the one hand, care leave may influence human capital and real or perceived work capacity similarly to parental leave and send the employer the same signals about work commitment and responsibilities outside of work. On the other hand, important differences, including timing, frequency and predictability, between care leave and parental leave influence paid work. This study uses Swedish register data to analyse the association between care leave and wages among mothers and fathers who had their first child in 1994. The results show that care leave is associated with a lower wage, particularly among men, up to 13 years after the birth of the first child. One reason for the gender difference in the association between care leave and wage may be that men's care leave has a stronger signalling effect compared with women's care leave.

Keywords: Care leave, parental leave, wages, gender equality, family, labour market
JEL-codes: J13; J16

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1 Introduction

Children, particularly small children, tend to occasionally fall ill and require care outside of their formal childcare. Swedish parents have ample opportunities to stay home from work and care for a sick child without suffering large income losses. The Swedish parental leave system allows each parent up to 120 days of leave annually to care for sick children, which is reimbursed at almost 80 per cent of current earnings. Parents usually use a handful of days annually (own calculations from Statistics Sweden 2012 p. 43). This generous system, which facilitates parental reconciliation of work and family duties, is not utilised to the same extent by mothers and fathers. Since the introduction of care leave in 1974, the share of the total leave taken by women has fluctuated between 60 and 68 per cent (Statistics Sweden 2014).

Previous studies have shown that the take-up of parental leave, the main component of the parental leave insurance, which is primarily used to stay home with small children full time, is negatively related to wage (Albrecht et al. 1999; Albrecht et al. 2015; Evertsson 2014; Jansson et al. 2003; Stafford and Sundström 1996) and career advancement (Aisenbrey et al. 2009; Evertsson and Duvander 2010). Care leave is seldom included in these studies of the association between parental leave and labour market outcomes (for exceptions, see Evertsson 2014; Stafford and Sundström 1996). Nevertheless, care leave may have similar consequences in the labour market as parental leave. It may influence human capital accumulation or deterioration, work capacity, and it may provide a signal of work commitment to the employer. There may also be differences in how parental leave and care leave relate to labour market outcomes. The majority of parental leave is used for long, continuous periods, whereas care leave is used for short periods that are generally dispersed irregularly over a number of years. On the one hand, high levels of care leave may be needed for it to influence human capital and work capacity. The unpredictability of care leave may, on the other hand, pose additional problems for the employer and employee.

The present study uses Swedish register data to conduct an analysis of the association between care leave and wages among mothers and fathers who had their first child in 1994. Using fixed effects and OLS regression, the association is studied in the short-run, five years after the birth of the first child, and in the long-run, 13 years after the first child's birth. The results show a negative association between care leave and wage

after five and 13 years, and the association is significantly stronger for men than for women.

2 The Swedish parental leave system

The Swedish parental leave system consists of three parts: the parental leave part which is mainly used to care for small children full time, temporary parental leave which includes care leave for sick children and a leave for fathers with new-born children, and maternity allowance. These three parts are described below.

The parents in the present study had their first child in 1994, when the parental leave system included 450 days of parental leave per child. Each parent was entitled to half of the total parental leave, but parents could transfer some or all of their days to the other parent. The parental leave could be used until the child turned eight years old.¹ A total of 390 days was reimbursed at 77.6 per cent of current earnings, and 90 days were reimbursed at a flat rate. The part of a parent's income that exceeded a ceiling established by the insurance was not reimbursed. This ceiling was linked to the consumer price index. In 1995, 30 parental leave days were reserved for each parent (a 'daddy month' and a 'mommy month'), and parents could no longer transfer all of their days to the other parent. The time was forfeited if parents did not use their 30 days. A second reserved month was introduced in 2002, and the leave was extended to 480 days per child. These reforms applied to parents enrolled in this study if they had more children after 1994.

The temporary parental leave system is comprised of two parts, one of which is care leave for sick children. Care leave allows each parent 120 days annually per child to stay home and care for the sick child or to take the child to a health care provider, check-up or other appointment. Part of this leave can be taken to care for the child when the ordinary caretaker is ill. Care leave may be used by someone other than the child's parents. The leave can be used until the child turns 12 years old. The other part of the temporary parental leave system is paternity leave, or more specifically temporary leave in connection to a child's birth or adoption. This part of the parental leave scheme provides ten days that may be used by the other parent, usually the father, to stay home

¹ New rules apply to children born after December 31, 2013. All but 96 days have to be used before the child turns four years old and the rest can be used until the child turns 12 years old. This does not apply to the sample in this study.

from work following the birth of a child. Temporary parental leave is reimbursed at 77.6 per cent, and the parental leave reimbursement is capped at a certain income level that is tied to the consumer price index.

A third part of the parental leave system allows pregnant women to take leave for a period before birth. This leave is reimbursed at 77.6 per cent with the same income ceiling, but leave use and length are contingent upon the woman's health status and job type.

3 Labour market consequences of the gendered division of care

Parenthood has often been found to hamper women's labour market outcomes (e.g., Budig and England 2001; Datta Gupta and Smith 2002; Lundberg and Rose 2000; Waldfogel 1997, 1998). In a recent Swedish study, Angelov et al. (2013) showed that the wage and income gaps between women and their male partners increased after the birth of the couple's first child. The association between parenthood and gender differences in labour market outcomes may be related to the uneven division of maternal and paternal family responsibilities, such as the skewed division of parental leave. Previous research has shown that labour market outcomes correlate with the length of parental leave. Women's career advancement is hampered by lengthy parental leave (Aisenbrey et al. 2009; Evertsson and Duvander 2010), and a longer parental leave is associated with lower wages among women and men (Albrecht et al. 1999; Albrecht et al. 2015; Evertsson 2014; Jansson et al. 2003; Stafford and Sundström 1996). Johansson (2010) estimated a loss in annual income of 4.5 per cent per month of parental leave for women and a loss of 7.5 per cent for men. Although the association is stronger for men, the real loss in income would be greater for most women because women tend to take considerably more leave than men. Women used 75 per cent of all parental leave days taken in 2013 (Statistics Sweden 2014). Although studies tend to find a stronger association between parental leave and wages among men than among women, Evertsson (2014) did not find such a gender difference using recent data and taking selection into account (i.e. the possibility that parents with certain characteristics, associated with lower wages, self-select into long parental leaves).

In addition to analysing parental leave, Evertsson (2014) analysed temporary parental leave, i.e. the sum of care leave and paternity leave, and found a negative association

with women's and men's wages. Only one previous study has singled out care leave as such from other forms of child-related time out from the labour market. In their study of 1980s data from a large Swedish company, Stafford and Sundström (1996) showed that care leave was negatively associated particularly with men's wages, and the association was stronger compared to other forms of child-related time out taken by men. The present study partly builds on Stafford and Sundström's study but analyses more recent, nationally representative data. Unlike Stafford and Sundström, this study furthermore restricts the sample to first-time parents, reducing the wage influence of previous, unmeasured care leave.

There are a number of possible explanations for why mothers have lower wages than fathers. Sigle-Rushton and Waldfogel (2007) describe four main explanations commonly put forth in the literature related to the gender wage gap between parents: human capital depreciation, real or perceived differences in work capacity and effort between mothers and others, trade-offs between flexibility and wages and selection. These suggestions may be valid explanations of the gender wage gap as well as any parental wage gap that exists according to differing family responsibilities. Care leave may particularly contribute to the first two explanations, whereas the other two explanations suggest processes connected with selection and reversed causality.

There are several reasons for which care leave might have a different impact on wages than parental leave. For example, the timing, frequency and predictability of care leave differ from those of parental leave. Below, I discuss the four explanations of the association between parenthood, gender and wage related to care leave.

3.1 Human capital

According to the first explanation, which is derived from human capital theory, knowledge gained from education as well as from work may deteriorate during periods of absence from the labour market due to a lack of practice. The employee may also miss on-the-job training offered during the leave, and the implementation of new work practices or technology may render earlier knowledge obsolete (Mincer and Polachek 1974). Longer periods of parental leave (as well as part-time employment) may produce these results and hamper wages. Care leave generally does not imply the long, continuous absence associated with parental leave. The wages of parents who use care leave is hence less likely to be negatively influenced by missed on-the-job training or

the implementation of unfamiliar new work practices or technologies. The recurrent absence from work during a number of years may instead lead to a gradual deterioration or a slower growth of human capital, which may be primarily noticeable among parents who use numerous leave days.

3.2 Work capacity, effort and signalling

The second explanation for the wage gap between mothers and fathers relates to work capacity and effort in two ways. First, parents with great childcare responsibilities may put less effort into their paid work or be less capable. This hypothesis is in line with Becker (1985), who suggested that people, mostly women, who have numerous family and household responsibilities spend much of their energy at home and have less energy for paid work. Although Swedish women's work commitment has been shown to temporarily decrease during the transition to parenthood (Evertsson 2013), studies on US data have shown that mothers exhibit at least as much work effort and work and career commitment as others when work characteristics are held constant (e.g., Bielby & Bielby 1988; Cassirer & Reskin 2000; Kmec 2011; Marsden et al. 1993). Any association between parenthood and work effort is relevant to the association between care leave and wages only inasmuch as care leave drains parents of energy at work, and care leave may not have this effect on energy unless frequent care leave constantly interrupts work.

Second, employers' perceptions of employees' real or expected actions may influence their wages. Employers may engage in statistical discrimination and believe that mothers put less effort into their work because mothers usually shoulder the major responsibility for their children and household. Employers may believe that this is true about an individual mother regardless of whether she actually spends less energy at work and, as a result, pay her a lower wage. Care leave may be one aspect of parenthood that employers expect from mothers. It hence correlates with the characteristics that employers use to discriminate.

The signalling theory suggests a direct association between care leave and employer perceptions of an employee. Absence from the labour market may send signals about the employee's work commitment. Parents who choose to take a long parental leave break after having a child, work part-time or take a large amount of care leave may signal low work and career commitment as well as a high risk of future absence.

Employers may therefore invest less in employees with a high rate of absence (Albrecht et al. 1999; Stafford and Sundström 1996). The low predictability of care leave compared to parental leave and part-time work may be particularly problematic for the employer to address. Employers may be less willing to assign work tasks and responsibilities that demand a high level of availability to employees who use much care leave, and these factors tend to be positively related to wages. In this sense, mothers and fathers with a high rate of care leave absence do not fit the 'ideal worker' perception, which Acker (1990) suggested as an underlying factor in employer decisions regarding employees. These employees may furthermore be less willing to take on certain work tasks because they anticipate difficulties related to their high rate of absence.

It has been suggested that the parental leave signalling effect is stronger for men than for women (e.g., Albrecht et al. 1999; Stafford and Sundström 1996). These studies found a stronger association between parental leave and wage for men. Most mothers in Sweden take a considerable amount of leave, and this lengthy leave is rare among men; thus, employers may expect women, not men, to be absent for a long period. This expectation likely affects all women's or mothers' wages through statistical discrimination, whereas only the wages of men who actually take a long leave are affected through signalling. The gender difference in the use of care leave is smaller than the difference in parental leave, and the variation in women's care leave is greater than the variation in women's parental leave. The gender difference in the importance of signalling may therefore be relatively small for care leave.

3.3 Choices and selection

Parents who use a great number of care leave days may be less committed to their job and therefore earn a lower wage, and this lack of commitment may be a stable characteristic irrespective of leave taking. Hence, there may be selection of less work-committed women and men into care leave and lower wages. Related to this, women who are or plan to be mothers may choose 'mother-friendly jobs' that offer flexibility or convenient working hours but lower pay, slower wage growth or reduced career opportunities, to adjust their paid work to their family responsibilities. The idea that mothers choose these types of jobs has been questioned. Swedish women do not appear to abstain from supervisory positions because of family responsibilities to any greater extent than men do (Wright et al. 1995). Studies have also showed that female-

dominated jobs were less flexible than jobs with a more equal share of women and men (Kjellsson et al. 2014), that women did not have more flexible work schedules than men, and that flexible schedules did not lessen work-family conflicts (Grönlund 2004). If women or certain parents do trade wage for flexibility, this choice may not be a direct consequence of care leave but may be a consequence of selection; parents who want or feel obliged to prioritise family responsibility over paid work by choosing certain types of jobs may be inclined to use more care leave.

3.4 Socio-economic position and reversed causality

Parents with low-paying jobs or fewer working hours may be more willing to forgo paid work because these parents will lose less money and/or working time by staying at home. Parents with well-paying, high-status jobs may be less inclined to stay at home and to use formal leave. These parents lose more money from taking formal care leave, particularly if their income is above the income ceiling in the insurance scheme. It may also, on one hand, be more difficult for them to stay at home because of supervisory duties and high demands on availability in the types of jobs they have (e.g., Bygren and Gähler 2012; Gustafson 2006; Magnusson 2010). On the other hand, these jobs may be more flexible than other types of jobs, which facilitates for parents to stay at home to care for a sick child without using formal leave. Hence a fourth explanation is reversed causality caused by differences in the possibility and need to use formal care leave and the consequences of staying at home in lower-paid and higher-paid jobs.

4 Data

I analyse the short- and long-term consequences of care leave on wage using data from a collection of Swedish registers administered by Statistics Sweden. The registers used are *the Longitudinal integration database for health insurance and labour market studies* (LISA) and *the Structure of earnings survey* (LSS). The former covers the entire population under age 76. The latter covers the entire part of this population that works in the public sector or in large, private firms. Employees in private firms with fewer than 500 employees are randomly sampled each year. The sampling is designed to generate a representative sample of employees in smaller firms, but the sampling both underrepresents employees in smaller, private firms and makes these employees more difficult to follow over time. The data cover about 5 per cent of all private companies

and 50 per cent of all those employed in the private sector. Thus, the results might not be fully representative for all employees. The conditions of employees working in the public sector and larger private firms may have a greater influence on the results compared with the conditions of employees working in smaller private firms.

I follow a panel of parents whose first child was born in 1994. The data are available until 2007; thus, parents are followed for 13 years after the birth of their first child. Care leave for the first child and additional children born after 1994 is included in the analyses. It is not possible to discriminate between care leave taken for different children, but this discrimination is not necessary for these analyses. The long study period ensures that the study covers most of the care leave taken by the families because most care leave is taken for small children. All studied parents had paid employment and a wage during the year before the birth of their child (1993) as well as paid employment or unemployment during the years following childbirth when wage was measured (1999 and 2007, see below).

The unit of analysis in the dataset is person years. Some person years will drop out of the analysis due to selection criteria, such as the years when the person is not employed or receiving unemployment benefits. Years when children are born are excluded because these years are likely to be different from other years. The following analyses show that women's wages in the year of birth of the first child differ substantially from their wages in other years, indicating special circumstances during this period. Parents who have received care allowance at any time during the studied period are excluded. Care allowance, which reimburses anyone who requires an extended stay at home to care for a family member or relative, is an alternative to care leave for parents of children with serious illnesses or disabilities. Finally, individuals with missing information on any of the analysed variables are excluded. The sample consists of 23,157 parents who provided 60,187 person years. Because men are more likely to work in smaller private firms than women, the sampling of employees in private firms with 500 or fewer employees in the registry LSS means that the share of men is low, 40.6 per cent. I analyse wage in 1999 and in 2007 in two separate analyses, and a person must have information from the studied year to be included in the analysis. Some individuals in the sample only have information from 1999, and others only have information from 2007. Thus, the number of women and men studied in the two analyses differs slightly.

The 1999 analysis includes 10,455 women and 7,569 men (42.0 per cent men), and the 2007 analysis includes 11,494 women and 7,512 men (39.5 per cent men).

The selection criteria imply that only parents who stay in the labour market are analysed. Labour market participation may be influenced by parenthood in general and care leave in particular. The fact that only parents in the labour market are analysed is a minor problem because only these parents have a wage that can be influenced by care leave. The selection is only problematic with respect to drawing conclusions about the specific relationship between care leave and parents' career opportunities or the general economic situation. No such conclusions are drawn in this study. A related question considers working hours and the influence of care leave. For example, parents of children who are often ill may respond by reducing their working hours. This action is a feasible option due to the institutional right to reduced working hours available to parents of children less than eight years old in Sweden. In Sweden and elsewhere, a reduction in working hours is much more common among mothers than fathers (e.g., Misra et al. 2011). The data do not include working hours, but the changes in annual income between 1992 and 1996, i.e., the four years around the birth of the first child, in the studied sample suggest that women reduce their working hours quite substantially. Men's annual income increased by 20 per cent during this period, whereas women's annual income decreased by 11 per cent. Hence, women in the sample have a high likelihood to reduce working hours in response to children's needs. A wage penalty for part-time work may be the real cause behind any association between care leave and wage, but because no such penalty has been found in Sweden (Bardasi & Gornick 2008), it is unlikely to be an explanation for the results in the present study.

5 Method

The association between care leave and wage is studied with the OLS and individual fixed-effects regression methods. Small changes in care leave between two years are unlikely to influence wages, especially changes in wages over the course of only two or three years. Instead, short-term effects are studied five years after the birth of the first child, and long-term effects are considered 13 years after the transition to parenthood. The unit of analysis in the OLS is individuals who are studied at two time points, in 1999 and 2007. In the OLS analysis of short-term effects, the natural logarithm of wage

(log wage) in 1999 is regressed on accumulated number of care leave days between 1993, the year before the birth of the first child, and 1998, the year before log wage is measured. Parental leave is controlled for and accumulated in the same way as care leave. The other control variables are measured annually. The number of accumulated days of care leave and parental leave and the number of children is 0 for everyone in 1993 because the sample consists of first-time parents. The study of long-term effects analyses log wage in 2007 and care leave taken until 2006. The equation for the cross-sectional OLS is

$$\ln(w_t) = a + \beta_1 \sum_{1993}^{t-1} c.l. + \beta_2 \sum_{1993}^{t-1} p.l. + \beta_3 u.e._t + \beta_4 s.l._t + \beta_5 age\ c._t + \beta_6 no.c._t + \beta_7 ed._t + \beta_8 p.s._t + \varepsilon$$

where $t=1999$ in the study of short-term effects and 2007 in the study of long-term effects, w =wage, $c.l.$ =care leave, $p.l.$ =parental leave, $u.e.$ =unemployment, $s.l.$ =sick leave, $age\ c.$ =age of youngest child, $no. c.$ =number of children, $ed.$ =education, $p.s.$ =public sector and ε =error term, and the notation for individual i is omitted.

The main drawback with OLS is that a number of unmeasured personal characteristics may influence both wage and the number of children or the propensity to take up care leave. In other words, the OLS regression does not control for selection. For example, it is likely that stable differences in work commitment between individuals influence wage and may influence the use of care leave. The assumption that selection to take more care leave is based on characteristics that are stable over time can be modelled with individual fixed effects (FE), which control for unmeasured time-constant heterogeneity. The same models are run with OLS and FE but the unit of analysis in the FE is person years. Each individual is represented by two person years, 1993 and 1999 or 2007. The FE-analysis controls for unmeasured, stable characteristics by exploiting the within-individual variation over time, as opposed to differences between individuals. Hence, the change in log wage between 1993 and 1999/2007 is regressed on the change in accumulated care leave between 1993 and 1998/2006 and changes in the control variables.² The model controls for year (1993 and 1999/2007) to account for the general wage change between years. The equation for the FE is

$$\ln(w_{it}) = a_i + \beta_1 t + \beta_2 acc.c.l._{it} + \beta_3 acc.p.l._{it} + \beta_4 u.e._{it} + \beta_5 s.l._{it} + \beta_6 age\ c._{it} + \beta_7 no.c._{it} + \beta_8 ed._{it} + \beta_9 p.s._{it} + \varepsilon_{it}$$

² This is done with Stata's xtreg command.

where $t=1999$ in the study of short-term effects and 2007 in the study of long-term effects, w =wage, $acc.c.l.$ =accumulated care leave, i.e. care leave accumulated over years 1993-1998/2006 (so that in 1993 $acc.c.l.=0$ and in 1998 and 2006, respectively, it is the total number of days used 1993-1998 and 1993-2006, respectively), $acc.p.l.$ =accumulated parental leave, $u.e.$ =unemployment, $s.l.$ =sick leave, $age\ c.$ =age of youngest child, $no.\ c.$ =number of children, $ed.$ =education, $p.s.$ =public sector and ε =error term.³ The error term that does not change between 1993 and 1999/2007 is cancelled out, which eliminates time-constant heterogeneity. Notably, FE does not eliminate the influence of selection on the basis of time-varying, unmeasured characteristics. Work commitment, for example, may vary over time, not least as a consequence of parenthood. Work commitment changes that occur as a consequence of becoming a parent do not present a problem because only parents are studied, but changes that occur during parenthood may influence wage and are not controlled for in the FE analysis. It is nevertheless important to use this method to take into account selection on the basis of unmeasured, stable characteristics that may otherwise be important causes of associations found between care leave and wage. A drawback with FE compared to OLS is that each estimation is based only on information from people who actually experience a change in the variables for which the estimation is made. All individuals in the sample analysed here will have experienced a change in care leave days and in number and ages of children, but for other variables such as education and sick leave, only a part of the sample will have experienced a change. This group may be a qualitatively different sample compared with the sample for which no change occurs, which warrants the use of both methods.

Separate analyses are displayed for women and men. Any gender differences are tested by the inclusion of an interaction between gender and care leave in a pooled sample of women and men, and the results are reported but not shown in tables. The standard errors are clustered at the family level in the OLS because a large percentage of the women and men comprising the sample are couples that are analysed as individuals. These couples lived together at the birth of their first child; a majority, but not all, couples stayed together during the entire studied period. In the FE analysis, the standard errors are clustered at the individual level to correct for autocorrelation.

³ Note that in the second period in the FE-model (1999 or 2007), accumulated care leave is measured up until the year before 1999 or 2007. All other variables are measured in the relevant year (1999 or 2007).

Alternatively, it would also be correct to use standard errors clustered at the family level, as in the OLS analysis, but clustering at the individual or family level makes no empirical difference.

The sampling of employees of private firms with fewer than 500 employees warrants a robustness check. This additional analysis tests whether results of analyses separately by public and private sector differ from the results of the main analyses.

Having a sick child may hamper wage growth if the child is frequently sick or suffers from a serious disease. Having a sick child may influence work commitment, and sick children may suffer from additional problems that influence their parents' work capacity. In addition, there may be a correlation between illness in children and parents; parents and children may have common characteristics, and children may infect their parents. I use two approaches to account for these factors in the following analyses. First, the analyses exclude parents who received care allowance, as noted above. Second, the analyses control for the amount of sick leave absence. These measures may not sufficiently take into account any direct effects of children's illness on their parents' wages. An extensive use of care leave may reflect the effect of children's illness rather than time out.⁴ Furthermore, the variable for sick leave measures only longer periods of illness and not shorter periods of recurring flu or other illnesses that may frequently strike parents and children. Therefore, any association between care leave and wage may be partly caused by children's illness or parental illness.

6 Variables

The models include characteristics of children in the household, including the number of children and the age of the youngest child, and standard control variables in wage regressions that may change over time, namely, education and sector. Labour market experience is not included but absence from the labour market is partly captured by accumulated care leave and parental leave.

The dependent variable is the natural logarithm of *full-time equivalent monthly wage* in 1993, 1999 and 2007. The wage of parents who work part-time has been recalculated to correspond to a full-time wage, which is akin to measuring hourly wage. Any

⁴ Excluding the parents with the highest uptake of care leave, namely, the top five per cent, does not change the results.

association between working hours and the use of care leave should not greatly influence the association between this measure of wage and care leave. The measure does, however, only take into account contracted hours; thus, any variation in actual working time not reflected in contracted hours is not taken into account. Wage is adjusted to the 2011 monetary value.

The central independent variable is the *accumulated number of care leave days*. Parents can be on care leave for a partial day, and the measure used captures net days such that two half days are counted as one full day. Care leave taken during years when children are born is excluded from the measure because the data do not distinguish between care leave for sick children and paternity leave (ten days of leave usually taken by fathers directly following a child's birth). The paternity leave seriously inflates fathers' number of leave days during years when siblings are born. Care leave taken during these years is excluded for both fathers and mothers. The measure underestimates the accumulated care leave, but this underestimation is likely to be smaller than the overestimation of fathers' care leave that would have been introduced. The underestimation is equal for mothers and fathers, whereas the overestimation would have occurred for fathers only. Accumulated care leave is calculated for the period 1993-1998 for the analysis of wage in 1999 and 1993-2006 for the analysis of wage in 2007. No one in the sample took any care leave before his or her first child was born in 1994, and years when children are born are excluded from the calculation. Therefore, the accumulated number of leave days prior to 1995 is 0 for all parents in the sample. To enable an analysis of the functional form of the association between care leave and wage, a quadratic term is included in the OLS and FE regressions.

Education is measured in four levels: primary education including up to nine years of compulsory schooling, upper-secondary education, short post-upper-secondary education of up to two years and long post-upper-secondary education of at least three years.

Public sector indicates whether or not the individual worked in the public sector.

Characteristics of the children in the household are captured by variables measuring the *age of the youngest child* and the *number of children*.

Parental leave is a measure of the total number of accumulated parental leave days with economic compensation during 1993-1998 for the analysis of wage in 1999 and 1993-2006 for the analysis of wage in 2007. Parents may take parental leave from work

without claiming compensation from the Swedish Social Insurance Agency and it has been shown that the actual time away from work is usually longer than the number of days of compensated leave (e.g., Duvander and Viklund 2014). The measure used here is hence likely to underestimate the length of parental leave, particularly among women.

Unemployment is a measure of the number of days with unemployment benefits during a year.

Sick leave measures periods of absence from work longer than two weeks. The first two weeks of absence are paid by the employer, and the sick leave insurance pays for the third and subsequent weeks. The variable is a measure of the number of sick leave days covered by the insurance during a year.

The FE adds a control for year (1993, 1999 or 2007).

7 Results

7.1 Descriptive statistics and basic associations

Descriptive statistics are displayed in Table 1. Men earned higher wages than women in 1993, 1999 and 2007, but the gender difference was less pronounced in 1993, when women and men were childless, and it was particularly pronounced in 2007, after the parents had had children for 13 years. By 1999, women had used considerably more care leave than men, and this gender difference had increased by 2007. A similar pattern is observed for parental leave, although the gender difference does not increase over time. Women used more days of unemployment and sick leave than men in 1999 and 2007. The average woman and man in 1999 had slightly more than 1.5 children, and the youngest was three years old. In 2007, the number of children had only increased slightly, whereas the age of the youngest child had increased to ten. Hence, the parents tended to have had their children rather early in the period. Women tended to be more highly educated than men, and half of the women had acquired a post-upper secondary education of at least three years by 2007. It was relatively common for this sample to work in the public sector, most likely due to the random sampling of employees in smaller private firms and the longitudinal approach requiring that included individuals are sampled on several occasions. In 2007, 37 per cent of the men and 73 per cent of the women in the sample worked in the public sector. The corresponding numbers in the

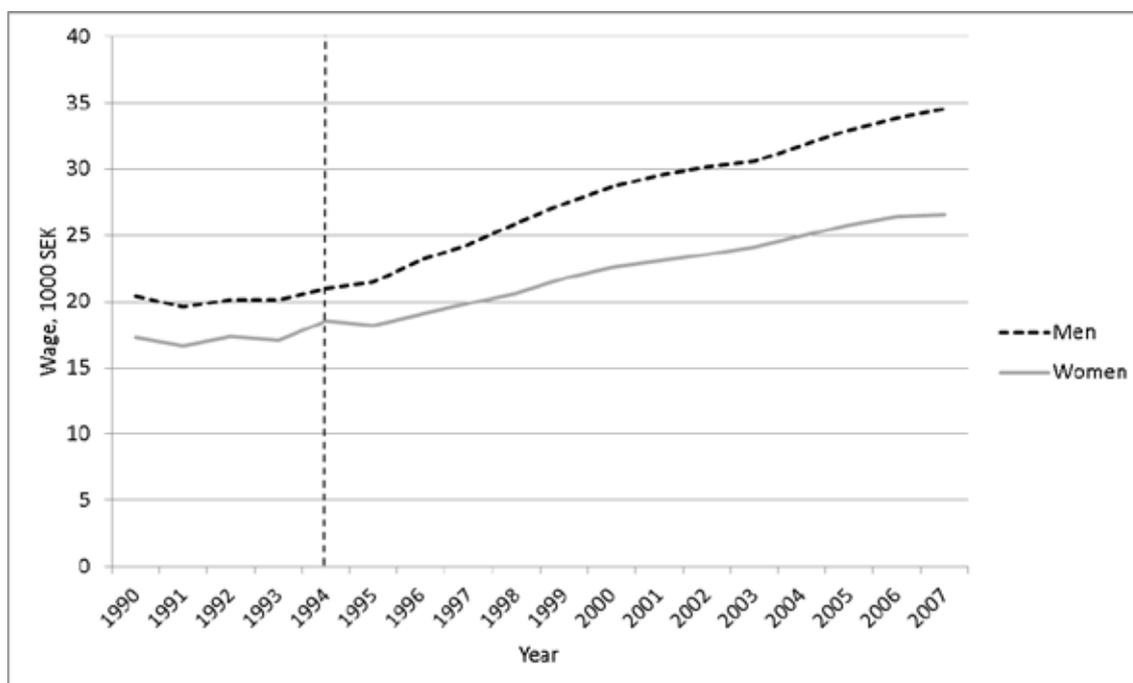
population are about 20 per cent among men and 50 per cent among women (Statistics Sweden 2014).

Table 1. Descriptive statistics. Wages in 1000 SEK are adjusted to the 2011 monetary value. Accumulated care leave and accumulated parental leave measures the leave used 1993-1998 and 1993-2006

	1999		2007		2007		2007	
	Men (n=7569)		Women (n=10455)		Men (n=7512)		Women (n=11494)	
	Mean/%	s.d.	Mean/%	s.d.	Mean/%	s.d.	Mean/%	s.d.
Wage (median)	24.47		20.45		30.66		24.59	
Wage in 1993 (median)	18.88		16.53		18.82		16.43	
Accumulated care leave	9.85	13.40	17.41	18.72	30.49	32.77	57.34	46.56
Accumulated parental leave	75.96	92.78	597.94	187.12	126.52	127.89	759.94	255.55
Unemployment	1.92	16.27	3.75	20.49	1.05	12.13	1.69	15.34
Sick leave	2.67	18.32	4.80	23.90	3.16	20.07	6.70	29.47
Age of youngest child	3.21	1.43	3.20	1.38	10.00	2.67	10.01	2.56
No. of children	1.66	0.77	1.74	0.54	1.76	0.98	1.96	0.76
Educational level:								
Primary	7.70%		4.11%		6.24%		2.21%	
Upper secondary	45.32%		49.15%		42.76%		44.21%	
Short post-upper sec.	11.59%		3.95%		11.58%		4.11%	
Long post-upper sec.	35.39%		42.78%		39.42%		49.48%	
Works in public sector	38.01%		70.12%		36.87%		72.66%	

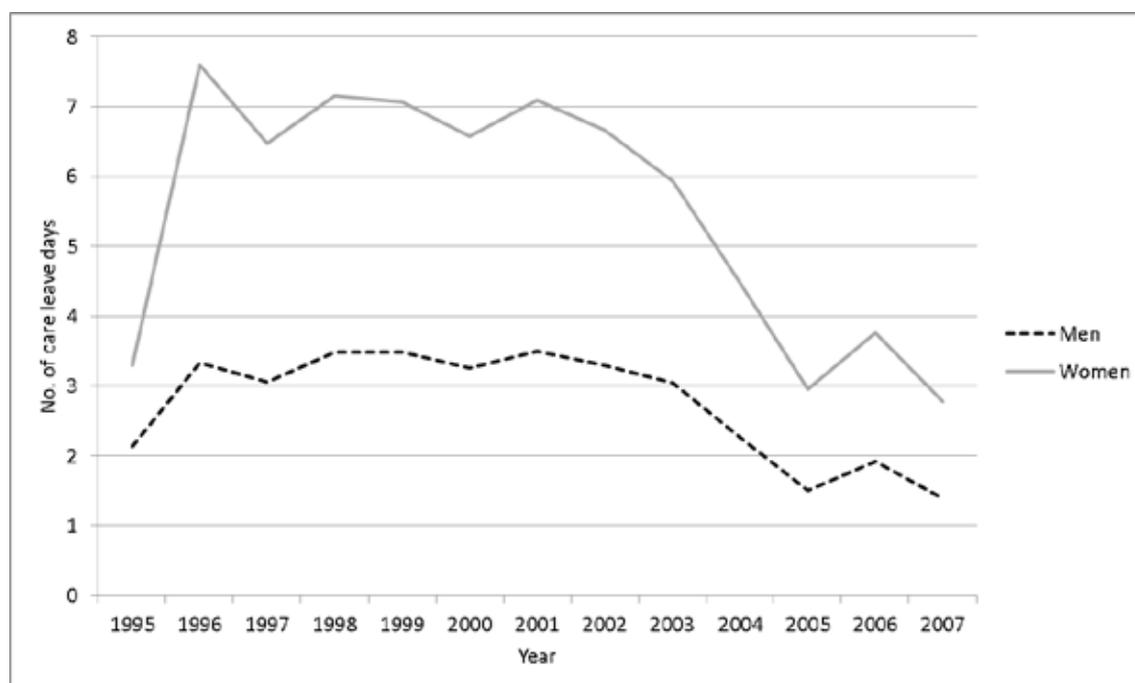
Figure 1 shows men's and women's average growth in wage from four years before to 13 years after their first child was born. The wage is adjusted to the 2011 monetary value to capture increases in real wages. Women's and men's wage growth was the same before the birth of the child (c.f. Angelov et al. 2013, who studied wage growth up to ten years before parenthood). The wage growth of both women and men was very small or non-existent during this period, which may reflect the economic crisis in the beginning of the 1990s. Men's wages began to increase around the birth of their first child, particularly one year after the birth of the child. A similar, but more modest, pattern can be observed among women. As a result, men's wages grew faster than women's, and a considerable gender wage gap developed by 2007.

Figure 1. 1990-2007 wages for women and men before and after the birth of their first child. Child born in 1994. Wages adjusted to the 2011 monetary value



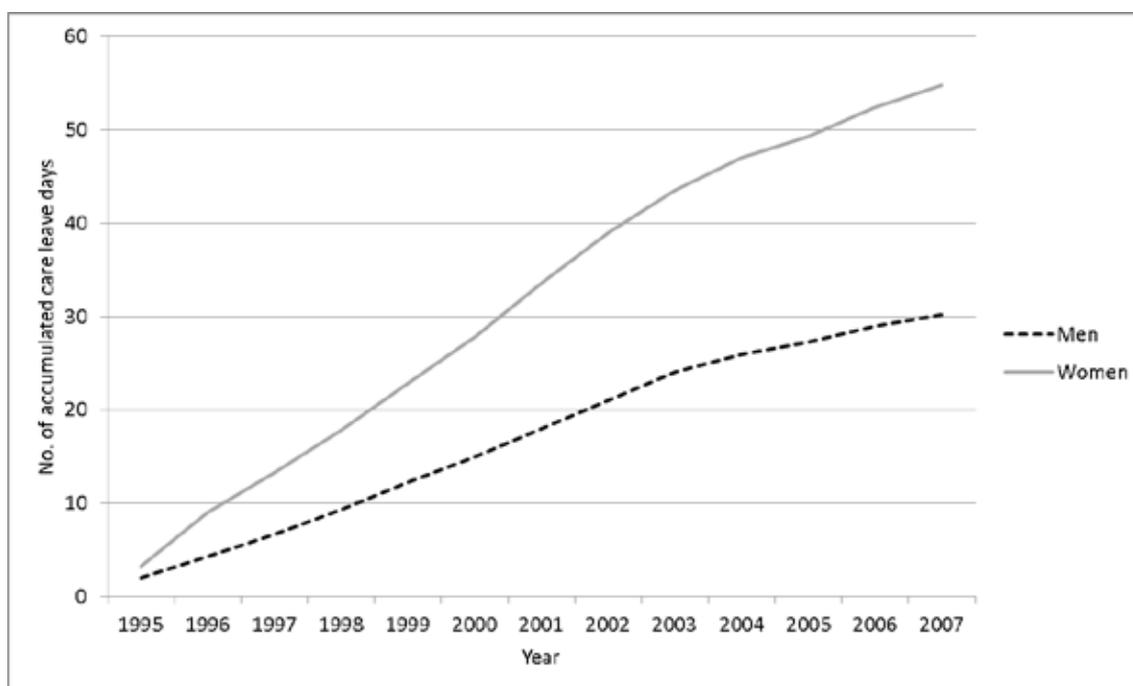
There is a ‘bump’ in women’s average wage level at childbirth. Women’s wages grew substantially between 1993, the year before their first child was born, and 1994, and dropped between 1994 and 1995 (Angelov et al. 2013 found the same pattern around childbirth). One explanation may be that full-time equivalent monthly wage is calculated, by the data provider, from actual income and contracted working hours. Changes in actual working hours, which influence income but are not reflected in contracted hours, will be present in the data as changes in wage. Women’s actual working hours may tend to deviate from their contracted hours in the year of their first child’s birth. The regression analyses in the present study are based on data from the year before and the year after the birth of the child; thus, the temporary increase in wage in the year of the child’s birth does not influence the results.

Figure 2. Women's and men's number of care leave days/year for the 13 years following the birth of their first child in 1994. Care leave taken during sibling birth years is not included



During the 13-year period after the birth of the first child, women's and men's use of care leave varied considerably (Figure 2). When the first child turned one year old in 1995, women averaged three days of care leave, only one day more than men. In subsequent years, both women's and men's annual care leave increased, but women experienced a greater increase than men. After the first child turned two years old, in 1996, men's care leave absence stayed at approximately three days/year until the child was nine years old, when men's care leave absence dropped. Women's care leave remained constant at approximately seven days/year until their oldest child was eight years old and then started to drop. By 2005, care leave had decreased to three days/year for women and two days/year for men, and care leave use remained constant for the remaining two years. The resulting accumulation of care leave is displayed in Figure 3. Women accumulated more leave days from the start, and their accumulated number of days increased much more rapidly. By the time the first child was 13 years old, in 2007, men had averaged a total of 30 care leave days, whereas women had used 57 days, almost twice as much.

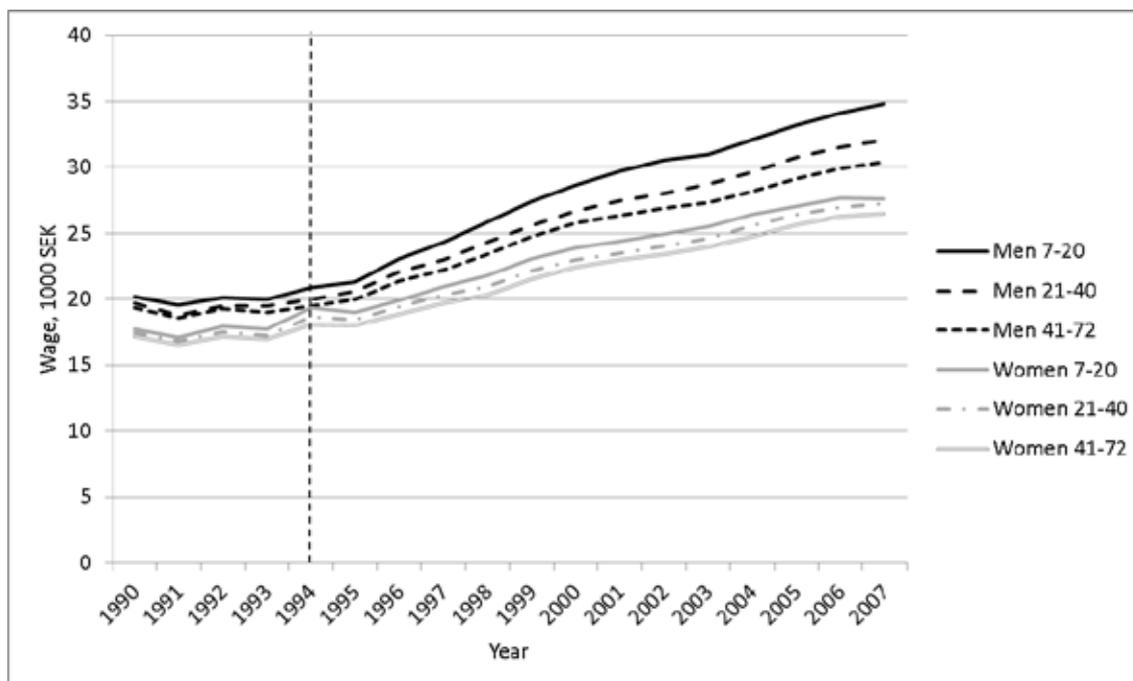
Figure 3. Women's and men's accumulated care leave days for the 13 years following the birth of their first child in 1994. Care leave taken during sibling birth years is not included



The above figures may suggest that women's wages are more strongly related to care leave, but Figure 4 suggests that this is not the case. The figure shows the wage trajectories of women and men according to care leave accumulation by 2007. To construct categories of care leave use that work for both women and men despite the large gender difference in care leave use, care leave is grouped into three categories delimited by the 25th, 50th and 75th percentile of men's and women's accumulated care leave, respectively. The men's percentiles constitute the lower bounds, and the women's percentiles are the higher bounds. For example, the group with the lowest number of accumulated care leave days used between seven days, which is the men's 25th percentile, and 20 days, which is the women's 25th percentile. Some cut points have been slightly adjusted so that the categories do not overlap. There are marked differences among the three groups of men, and wage growth was visibly stronger among men who used few days of care leave compared to men who used many leave days. The corresponding differences among women are barely visible. There are small extant differences in wage level, but not wage growth, between the groups before the birth of the first child. The parents who later used few leave days had a slightly higher

wage before parenthood compared with parents who subsequently used many leave days.

Figure 4. Wages for women and men before and after the birth of their first child in 1994 for groups with different amounts of accumulated care leave in 2007. Wages adjusted to the 2011 monetary value



7.2 The association between care leave and wage – OLS and FE regressions

Simple descriptions of the data suggest that women use more care leave and have a slower wage growth after the birth of their first child but that men's wages have a stronger relationship to care leave. Table 2 and Table 3 display the results of OLS and FE regressions of women's and men's log wage after the transition to parenthood and analyse the association with accumulated care leave. Table 2 shows the wage analysis for 1999, and Table 3 presents the wage analysis for 2007.

Table 2. Log wage in 1999 regressed on accumulated care leave by 1998 for parents who had their first child in 1994. OLS and FE regression. Clustered standard errors in brackets^a

	Men OLS	FE	Women OLS	FE
Accumulated care leave	-0.0051*** (0.0004)	-0.0032*** (0.0003)	-0.0015*** (0.0001)	-0.0005*** (0.0001)
Acc. care leave squared/100	0.0032*** (0.0000)	0.0021*** (0.0000)		
Accumulated parental leave	-0.0001** (0.0000)	-0.0000 (0.0000)	-0.0002*** (0.0000)	-0.0001*** (0.0000)
Unemployment	-0.0014*** (0.0002)	-0.0001 (0.0001)	-0.0010*** (0.0001)	-0.0001 (0.0000)
Sick leave	-0.0006*** (0.0001)	-0.0002 (0.0001)	-0.0002** (0.0001)	-0.0001* (0.0001)
Age of youngest child	0.0076** (0.0026)	-0.0109*** (0.0022)	0.0024 (0.0020)	-0.0079*** (0.0017)
No. of children	0.0162*** (0.0046)	0.0112** (0.0042)	0.0337*** (0.0062)	0.0082 (0.0054)
Education:				
Primary	-0.0650*** (0.0090)	0.1277* (0.0642)	-0.0329*** (0.0082)	0.0173 (0.0393)
Upper secondary	ref.	ref.	ref.	ref.
Short post-upper secondary	0.1478*** (0.0092)	-0.0315 (0.0245)	0.1186*** (0.0110)	0.0490** (0.0171)
Long post-upper secondary	0.3252*** (0.0076)	0.0995*** (0.0229)	0.1768*** (0.0038)	0.0704*** (0.0141)
Works in public sector	-0.2206*** (0.0065)	-0.0508*** (0.0089)	-0.1537*** (0.0047)	-0.0195** (0.0061)
Constant	3.2280*** (0.0151)	2.7974*** (0.0139)	3.1683*** (0.0154)	2.6736*** (0.0102)
N persons	7569	7569	10455	10455
N person years		15138		20910
R ² /R ² within	0.3077	0.6443	0.2899	0.6940

*** p<0.001, ** p<0.01, * p<0.05

^a Dependent variable: The natural logarithm of wage in 1999. In addition to the variables shown in the table, the FE regression includes a control for year.

Men's wage in 1999 was negatively related to the use of care leave according to both the OLS and the FE regressions (Table 2). The positive quadratic term shows that the association is curvilinear and steepest at lower usage rates. The FE regression controls for time-constant, individual characteristics. If such characteristics were the main cause of the association between care leave and wage found with the OLS, then the FE would show no or very weak associations. The association is smaller in the FE regression, but still statistically significant. Hence, the association between men's care leave and their wage is likely to be partly but not solely caused by selection of men with certain, stable characteristics into taking care leave or taking a great deal of leave.

Estimations, based on the FE regression, of the wage in 1999 of fathers with average levels on all control variables, and varying care leave use, give a sense of the size of the association. A father who had used 1 day of leave during 1993-1998, which is the first

quartile of fathers' leave use, had a 1.6 per cent higher wage in 1999 compared with the wage of fathers who used 6 days in total, i.e. the median accumulated leave among fathers. A father with a care leave use equivalent to the 3rd quartile, 13.5 days in total, had a 2.1 per cent lower wage in 1999 than fathers who used the median care leave.

The association between care leave and wage is significant but weak among women. The differences between the OLS and the FE suggest selection of certain women into taking care leave, but the association is significant with both estimation methods. The association is linear and implies that the wage in 1999 is 0.05 per cent lower with every additional day of care leave used in the period 1995-1998, as estimated by the FE regression. A woman with average levels on all control variables, who had taken an amount of care leave equivalent to the female first quartile of leave use, 5 days in total, had a 0.4 per cent higher wage in 1999 compared to a woman who had taken the median leave among women, 12 days. A woman who had taken the equivalent of the 3rd quartile of leave among women, 24 days, had a 0.7 per cent lower wage in 1999 than a woman who had used the median care leave among women. The gender difference is significant (tests not shown).

For the control variables, Table 2 shows negative associations between wage and other forms of time out, including unemployment, sick leave and parental leave, estimated with OLS regression. The associations with men's parental leave and sick leave and with women's and men's unemployment are, however, not significant in the FE analysis. Working in the public sector in 1999 is negatively associated with women's and men's wage in all models, as is the age of the youngest child except in the OLS analysis of women. The number of children is positively associated with wage, but this association is not significant in the FE analysis of women. Higher education, and particularly long post-upper secondary, is positively related to wage.

Table 3. Log wage in 2007 regressed on accumulated care leave by 2006 for parents who had their first child in 1994. OLS and FE regression. Clustered standard errors in brackets^a

	Men OLS	FE	Women OLS	FE
Accumulated care leave	-0.0040*** (0.0002)	-0.0032*** (0.0002)	-0.0010*** (0.0001)	-0.0006*** (0.0001)
Acc. care leave squared/100	0.0013*** (0.0000)	0.0000*** (0.0000)	0.0000*** (0.0000)	0.0000* (0.0000)
Accumulated parental leave	-0.0001*** (0.0000)	-0.0001* (0.0000)	-0.0002*** (0.0000)	-0.0001*** (0.0000)
Unemployment	-0.0020*** (0.0002)	-0.0001 (0.0001)	-0.0014*** (0.0001)	0.0001* (0.0000)
Sick leave	-0.0004** (0.0001)	0.0001 (0.0001)	-0.0002*** (0.0001)	-0.0001* (0.0001)
Age of youngest child	0.0019 (0.0016)	-0.0053** (0.0017)	-0.0061*** (0.0011)	-0.0097*** (0.0011)
No. of children	0.0424*** (0.0046)	0.0513*** (0.0047)	0.0214*** (0.0049)	0.0187*** (0.0048)
Education:				
Primary	-0.0685*** (0.0113)	0.1146*** (0.0267)	-0.0812*** (0.0111)	0.0534*** (0.0121)
Upper secondary	ref.	ref.	ref.	ref.
Short post-upper secondary	0.2245*** (0.0107)	-0.0921*** (0.0227)	0.1684*** (0.0114)	-0.0436** (0.0149)
Long post-upper secondary	0.3922*** (0.0092)	0.0470** (0.0161)	0.2442*** (0.0041)	0.0413*** (0.0066)
Works in public sector	-0.2520*** (0.0081)	-0.0583*** (0.0098)	-0.2169*** (0.0057)	-0.0658*** (0.0060)
Constant	3.4458*** (0.0231)	2.8637*** (0.0101)	3.4807*** (0.0188)	2.7311*** (0.0065)
N persons	7512	7512	11494	11494
N person years		15024		22988
R ² /R ² within	0.3435	0.7603	0.3496	0.8124

*** p<0.001, ** p<0.01, * p<0.05

^a Dependent variable: The natural logarithm of wage in 2007. In addition to the variables shown in the table, the FE regression includes a control for year.

The analysis in Table 2 concerns the possible effect on wage of care leave taken to care for young children early in the period. Table 3 analyses wage in 2007, 13 years after the first child was born, and displays long-term results. A negative but decreasing association between wage and care leave exists among both men and women and the gender difference in the association is pronounced and significant also after 13 years (significance tests not shown). The association is weaker in the FE analysis than in the OLS analysis, particularly among women, and so selection is one but not the only explanation for the lower wages among women and men who use more care leave. Compared to a man who had taken the median care leave among men, 21.5 days in total, a man who had taken the equivalent of the first quartile of men's leave use, 7.5 days, had a 4.2 per cent higher wage in 2007. A man who had taken the 3rd quartile of men's leave use, 43.5 days, had a 5.6 per cent lower wage (as estimated with FE

regression). Among women, the corresponding numbers were 1.2 per cent (for 25 days as compared to the median of almost 47 days) and -1.6 per cent (for 77 days), respectively. The control variables in Table 3 show the same basic pattern as in Table 2.

In summary, the results consistently show a stronger association between care leave and wage among men than among women. This indicates the impact of signalling; if care leave influenced wage only by influencing human capital accumulation, the association would be the same for women and men. Hence employers may expect fathers to take less care leave than mothers and interpret a higher leave usage as a signal of low work commitment.

7.3 Robustness check – publicly and privately employed

As noted above, employees in private firms with fewer than 500 employees are underrepresented in the data. This problem is likely to be most serious among men, who are more likely to be employed in private firms. Table 4 displays the results of separate analyses of publicly and privately employed women and men. The table displays the results of FE regressions (the OLS regression results were essentially the same). The models from the main analysis were used, but only the results for care leave are shown.

Table 4 Log wage in 1999 and 2007 regressed on accumulated care leave. By sector, FE regression. Clustered standard errors in brackets^a

	Men Public	Private	Women Public	Private
1999				
Accumulated care leave	-0.0020*** (0.0004)	-0.0049*** (0.0031)	-0.0010*** (0.0001)	-0.0005*** (0.0002)
Acc. care leave squared/100	0.0010*** (0.0000)	0.0038*** (0.0000)	0.0000*** (0.0000)	
Constant	2.7524*** (0.1927)	2.7440 *** (0.0209)	2.6481 *** (0.0091)	2.6662 *** (0.0255)
N persons	3613	4823	8188	3336
N person years	6359	8779	15307	5603
R ² within	0.6592	0.6642	0.7371	0.7081
2007				
Accumulated care leave	-0.0021*** (0.0003)	-0.0039*** (0.0003)	-0.0006*** (0.0001)	-0.0011*** (0.0002)
Acc. care leave squared/100	0.0012*** (0.0000)	0.0000*** (0.0000)	0.0000*** (0.0000)	0.0000*** (0.0000)
Constant	2.7910*** (0.0140)	2.8391 *** (0.1728)	2.6819 *** (0.0052)	2.6673 *** (0.0150)
N persons	3707	5014	9428	3767
N person years	6205	8819	17155	5833
R ² within	0.8101	0.7538	0.8549	0.8028

*** p<0.001, ** p<0.01, * p<0.05

^aDependent variable: The natural logarithm of wage in 1999 and 2007, respectively. Variables included in analyses but not displayed in the table include accumulated parental leave, unemployment, sick leave, age of youngest child, number of children, education and year.

The association between care leave and men's wage in both 1999 and 2007 is larger in the private sector, compared to the main results presented above, and smaller in the public sector. In 1999, the association for women in the private sector is similar to the main results. In the public sector, the association is curvilinear this year. In 2007, the association for women in the private sector is larger compared to the main results, as among men, whereas the association for women in the public sector is the same as in the main results. This test does not indicate that the main results above are driven by either the publicly or the privately employed. It does, however, indicate some differences between the sectors that could be interesting to analyse further in a future study.

8 Summary and conclusions

The Swedish parental leave system allows parents a large amount of care leave reimbursed at a rather high level. This rate is lower for high-income earners due to the income ceiling, but many parents do not directly lose a substantial amount of income during care leave. This study, however, shows an indirect connection between care leave and lower income, as care leave is associated with lower wages up to 13 years after the birth of the first child. This conclusion holds particularly true for men, who display a stronger association between care leave and wage than women.

Human capital depreciation as well as diminishing work effort or capacity are possible explanations for the association between care leave and wage (c.f. Albrecht et al. 1999; Sigle-Rushton and Waldfogel 2007; Stafford and Sundström 1996). Parents who often stay home from work may lose human capital or not gain human capital to the same degree as other employees. Parents who frequently stay home may experience a reduced work capacity if their work is constantly interrupted by days of care leave, particularly unplanned leave. Care leave is most likely to have these effects at high levels of absence. The association between care leave and wage is measured at significantly higher levels of care leave use among women than among men. Hence, the association between women's care leave and wage may reflect effects on human capital and reduced work capacity to a larger extent than does the association between men's care leave and wage. The significantly smaller association between care leave and wage among women compared to men is an indication that other explanations may be more important.

One likely explanation is signalling. Employers may view the use of care leave as an indication of employee work commitment and engagements outside of work. As suggested by Stafford and Sundström (1996), employers may expect women, not men, to take a great deal of leave; employers may perceive unexpected male behaviour to be a stronger signal of a lack of work commitment compared with expected female behaviour (see also, e.g., Albecht et al. 1999; Albrecht et al. 2015; Johansson 2010).

Selection is another possible explanation of associations between time out and wage. Parents who use numerous care leave days could be less committed to their work compared with other parents. This lack of commitment, rather than leave-taking behaviour, may influence wages. The results of this study suggest that such characteristics that are stable over time are one cause of the association between care leave and wage and that they may be a more important explanation among women than among men. However, they do not entirely explain the association. Notably, the analyses do not control for such characteristics that change over time, such as changes due to the experiences of parenthood. There are reasons to believe that mothers, notably mothers with children over the age of four (Evertsson 2013), do not have a lesser commitment to their work compared with other employees (Bielby & Bielby 1988; Cassirer & Reskin 2000; Kmec 2011; Marsden et al. 1993). However, changes in mothers' and fathers' commitment to work are either alternative or complementary explanations of the results presented here. A second alternative explanation of the association between care leave and wage is reversed causality. Because of wage levels, job characteristics and flexibility in well-paid jobs, parents in these jobs may be less inclined than low-paid parents to use formal care leave. The wage profiles are likely to be steeper among employees in well-paid jobs, particularly among the relatively young employees who become first-time parents, which may be one explanation of the results presented here. Differences between parents at different points in the income distribution also point to the possibility that care leave may be of different importance for the wage in different socioeconomic groups, as has been found to be the case for parental leave (Evertsson 2014). Future studies should investigate this further.

Employers' expectations of men's constant availability and presence seem to imply that the labour market penalty of care leave is larger for fathers than for mothers. A change in the division of care leave could alter employer expectations. Although care

leave is more equally divided between women and men compared with parental leave, women still take almost two thirds of leave (Statistics Sweden 2014). If more fathers, and fewer mothers, were to take a large number of care leave days, the signalling value of men's leave might be reduced. As a result, the association between care leave and men's wages would potentially be smaller. In addition, sharing could contribute to decreased statistical discrimination for all women due to employer expectations that every woman will become a mother and take on great childcare responsibility.

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