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Economic Considerations and Occupational  
Conditions of Work

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**Abstract:** While most types of unpaid work have become considerably more equally divided over decades, child care that requires leave from paid work is still extremely gender specialized. Understanding conditions of paid work that can make leave-taking for both parents possible is crucial to halt the onset of gender specialization in couples. In this study, Sweden is utilized as a context in which the family policy constellation provides a real opportunity for both fathers' and mothers' leave-taking. The number of parental leave weeks taken by the father and the mother in the first two years of the child's life is analyzed using administrative register data for 29,366 couples having their first child in 2009. Multi-level cross-classified models with each couple nested in 112 father and 111 mother occupations are used to estimate effects of conditions of work that have been hypothesized to hinder fathers' leave-taking. Career costs, job insecurity and flexibility explained little variation in father leave. The strongest predictor was the father's occupational skill level, i.e., the higher the skill level required for the occupation, the more leave fathers take. As would be expected from gendered norms and behavior and resulting gendered assumptions of care at the workplace, some of the conditions of work favorable for mothers' leave-taking are not transferrable to fathers.

**Keywords:** child care, parental leave, Sweden, occupations, multi-level modelling

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## **Introduction**

The transition to parenthood has emerged as a key life-course event for understanding how couples reproduce a gendered division of labor. In the most gender-equal contexts, differences in unpaid work are vanishing for couples without children (Statistics Sweden 2013). As the first child is born however, a particularly potent kind of unpaid work is introduced: child care that cannot be ‘fit in’ around paid work (Bianchi et al. 2012: 60). Most couples respond to this kind of child care by extreme gender specialization; women increase unpaid work and decrease paid work while men’s time allocations remain rather static. A gender equal transition to parenthood, in which both women and men take leave off work to care for their children, could therefore halt the reproduction of gender inequality in the labor market as well as in the family.

Most explanations for extreme gender specialization in leave-taking stem from the domain of paid work. Earnings differentials remain the main suggested predictor for gender specialization, in which leave-taking by the lowest earner minimizes the costs to leave-taking. A focus on the immediate earnings losses frames too narrowly the way in which paid work constrains time for child care. First, the long-term effects of child care on earnings as well as concerns about job security must be factored in. Second, the occupations that generate earnings also generate a diverse set of conditions of work that may independently facilitate or constrain opportunities for care. Finally, gender normative structures and their associated behaviors produce remarkably different gender assumptions of care, so that conditions of work favorable to women’s care-giving may not be that easily transferable to men’s.

In this study, fathers’ and mothers’ leave-taking is considered not only in relation to immediate economic constraints but also longer-term career costs and concerns about job security. Conditions of work associated with specific occupations that could be important for accommodating family responsibilities -- share of potential leave-takers, demand for high-skill workers, and the occupation’s task- or time-orientation, are investigated. Parental leave weeks taken by Swedish fathers and mothers in the first two years of the child’s life are analyzed using administrative register data for 29,366 couples having their first child in 2009. Detailed information on occupations of both mothers and fathers allow for the use of multi-level cross-classified models with each couple nested in 112 father and 111 mother occupations. Conditions of work are added as occupational-level predictors.

## **Theory**

A young child requires 24/7 care and so directly affects both paid and unpaid work (Bianchi et al. 2012). While women's unpaid work can and has been reduced to a large extent over the last decades, creating a more gender equal division of labor (Bianchi et al. 2000), a complete reduction in parental care is not desirable from the perspective of the parents, the child or society at large (Gornick & Meyers 2008). The reproduction of gender inequality at the transition to parenthood is therefore likely to remain or even grow in importance as compared to other activities.

Parents' leave-taking is shaped on multiple societal levels (Hobson 2014). At the national level, family policies set the boundaries of father leave. In the context of a particular national policy, the occupation and workplace function as gendered opportunity structures regulating parents' capabilities to utilize those policies. At the individual and couple-level, economic constraints may hinder the realization of parental leave rights independent of gender norms. On all levels, real opportunities for parents to make work and family choices are limited by gendered norms and their associated gendered behavior; by whether the parent is expected to take long leave (mothers) or short/no leave at all (fathers). Couple- and occupational-level opportunities and constraints on parents' leave-taking are explored further below, generating specific hypotheses on how a particular dimension of paid work may facilitate or hinder leave-taking.

### ***Economic considerations in parental leave***

#### ***Immediate income loss***

Economic considerations in caregiving have traditionally been assumed to be driven by couple specialization. New Home Economics originally predicted extreme couple specialization, determined only by the rank of earnings within the couple (Becker 1991). In short, the highest earner is theorized to specialize in paid work while the lowest earner specializes in unpaid work, regardless of the initial earnings proportions. Although this kind of extreme specialization is rarely considered in recent sociological studies on overall gender division of labor (Lachance-Grazela & Bouchard 2010), the division of care that requires an absence from paid work is still extremely gender specialized. The argument of specialization by rank is also one of the most frequent explanations provided by parents as to why only

mothers take leave (Grunow & Evertsson 2016). Although the theoretical arguments are gender-neutrally specified, arguments of the earnings rank alone does not seem to transfer across gender as couples headed by female earners typically do not exhibit an inverted specialization by gender (Brines 1994).

As couple specialization is relaxed however, we may expect to find an association between earnings and leave-taking also for the higher earner. At the individual level, earnings and leave-taking are linked by two opposing effects: increasing affordability as a positive effect of earnings and opportunity costs as a negative effect. While low-income women often describe leave-taking as determined by affordability (Millar & Ridge 2013), leave-taking of high-income women is rather explained through opportunity costs (Gustafsson et al. 1996). There is some evidence that affordability dominates for most fathers, while opportunity costs dominate only for top-earners (Sundström & Duvander 2002).

Hypothesis 1A: Fathers whose income is lower than their partners take more leave than others.

Hypothesis 1B: Low-income and high-income mothers and fathers take less leave than others.

### ***Careers and lifetime earnings***

Current earnings reflect only partially the potential for lifetime earnings. Lower earnings following parental leave are well-documented across all industrialized countries for women (Gangl & Ziefle 2009) as well as for men (Rege & Solli 2013). Awareness of these outcomes is captured in parents' explanations for an unequal division of parental leave (Hobson et al. 2011). Because parents in careers typically have made larger labor market investments than others, taking leave may be perceived as a more negative 'signal' to the employer and thus a risk of missing out on future career possibilities. Expectations of leave-taking have large potential to accentuate career costs for fathers as even a leave that would be considered very short for mothers may signal lower work commitment for fathers (Rege & Solli 2013; Albrecht et al. 1999). Although a number of studies have documented the career costs of leave (Budig, Misra & Boeckmann 2012), the effect of *potential* costs on leave-taking has not been previously investigated.

Hypothesis 2: Career potential is negatively related to leave-taking, more so for fathers than mothers.

### *Job insecurity*

An increasing precariousness in the labor market cuts across earnings levels, possibly creating a sense of insecurity that may hinder leave-taking (Hobson, Fahlén & Takács 2011). In parents' reports, job loss considerations have been articulated even among those parents who stated that they would be able to afford leave-taking by the father (Plantin 2007). Because gender norms continue to prescribe that fathers bear greater responsibility for providing for the family, we may expect job precariousness to have a greater effect on fathers' leave-taking than mothers'.

Hypothesis 3: Precarious employment is negatively related to leave-taking, more so for fathers than mothers.

### *Occupational conditions and parental leave*

Regardless of economic considerations, occupational conditions of work may provide opportunities for leave-taking for fathers as well as mothers. In the discussion below, the gender composition of the workforce, the competition for skilled work, and flexibility (time-versus task) are identified as particularly important for the decision to take leave.

### *Gender composition of work force*

Gendered work organizations are conceptualized as adhering to a 'separate spheres' doctrine, based on a belief of a boundary between work and family. Employers assume that workers are fully committed to their workplaces and so make little effort to facilitate caregiving (Haas & Hwang 2007). Within such organizations, the pressure to introduce family friendly policies and practices may arise in two ways. They may result from how caregivers or potential caregivers seek jobs with non-monetary benefits, such as a lower penalty for leave-taking or opportunities to work part-time upon return from leave (Hook & Pettit 2016). It could also be that the sheer number of caregivers (mothers) in a workplace forces the workplace to develop routines to handle leave-taking. Although evidence is mixed as to whether female dominated occupations provide more formal work-family support there is some indication that informal

support is higher in companies with larger shares of women (Haas & Hwang 2007). Because a large share of women means that the workplace routinely handles long mother leaves, the shorter leaves typically taken by fathers should be facilitated even more.

Hypothesis 4: Share of gender-prescribed potential caregivers (women) is positively related to leave-taking

#### *Demand for high-skilled labor*

Comparative welfare research offers a somewhat competing explanation for fathers' leave. As fathers actively begin to challenge gender norms and to strive to care personally for their children (Javornik & Kurowska 2017), the labor market resources and skills traditionally valued in the 'separate spheres' labor market may instead bolster claims to leave-taking. High-skilled fathers are in a stronger position to make care claims at the workplace by being viewed as 'indispensable' (Peper et al. 2013). The need for highly skilled workers at the workplace may put firms under pressure to initiate firm-level family policies in order to attract such workers (den Dulk et al. 2013). Drawing on social justice theory, labor market resources may also be connected with a 'sense of entitlement' to make care claims (Hobson 2013) creating a recursive process in which leave-taking by some facilitates leave-taking by others with similar resources. The same arguments do not apply to mothers because they are already viewed as legitimate care-givers. Neither claim has been empirically tested in micro-level research (Javornik & Kurowska 2017: 618).

Hypothesis 5: Fathers' occupational skills are positively related to their leave-taking.

#### *Flexibility: Task- vs. time-orientation*

The dominant framework for understanding how different kinds of jobs intersect with family life is the ecological conceptual framework (Voydanoff 2005) in which work-family balance is defined as 'the degree to which an individual is able to *simultaneously* balance the temporal, emotional, and behavioral demands of both paid work and family responsibilities' (Hill et al. 2001:49, emphasis added). Although parental leave is arguably one of the most important policies for the reconciliation of work and family life, it is not clear whether facilitators for simultaneous balancing of work and family are also functional for taking full-

time leave (Begall & Mills 2011). While Hobson, Fahlén & Takács (2011) documented that parents in time-oriented jobs claimed that they had no opportunities to adjust their schedule to daily family demands, these parents still seemed able to permanently reduce their work hours. Parents in task-oriented jobs however, who had the most flexibility in adjusting their work schedule with the only requirement being getting the task done, made claims of limited flexibility in the long run. Because the effect of time-/task-orientation on leave-taking seems to differ by the length of leave we may expect differences by gender such that a task-oriented job may lengthen a short father leave period while it may shorten a long mother leave period.

Hypothesis 6: Fathers in task-oriented occupations take more leave than others; mothers in task-oriented occupations take less leave than others.

Because only one parent is needed to care for a child, the opportunities and constraints of either parent may influence the leave-taking of the other, through reducing or increasing the first parent's leave-taking. If fathers' leave-taking is short, mothers' leave-taking will only marginally affect the time in which the child is in parental care. If fathers' leave-taking extends a couple of months, however, and parents strive for a certain minimum time in which the child is in parental care, there will be a negative association between the two parents' time on leave.

Hypothesis 7: Effects of fathers' work conditions on mothers' leave-taking will be mediated by the fathers' own leave-taking, and vice-versa.

### **The Swedish case**

In Sweden, earnings-related job-protected parental leave and universally provided public child care combine to produce a context in which almost all children are cared for by their parents one to two years after birth. Parents are provided a total of 390<sup>1</sup> parental leave days paid at 80 percent of current earnings and children are eligible for highly subsidized public childcare from 12 months of age. Usage of these two parental benefits is almost universal. Paid parental leave was used for 99.7 percent (own calculations) of all children born in Sweden in 2009; on average, only around 11 paid days are left unused at the end of the

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<sup>1</sup> All forms of salary and wages are converted to a daily rate for 365 days per year and that is the amount that is paid for each day claimed, including days that are not normally worked.



eligibility period (SSIA 2010). 88 percent of two-year olds are enrolled in publicly subsidized child care (Swedish National Agency for Education 2015).

Much in the Swedish parental leave system is designed to facilitate father care. From its introduction in 1974, parental leave was gender-neutral, i.e., either parent could take any part of the leave within the total available. The introduction of the first ‘daddy month’ in 1995 was aimed specifically at protecting the father’s right to care (Duvander & Johansson 2012). Although the reform was gender-neutrally formulated - 30 days were reserved for each parent and could not be given to the other parent - it effectively introduced a ‘use-it-or-lose-it’ incentive for fathers. Another reserved month was introduced in 2002 and a third in 2016. Several additional aspects of the parental leave system facilitate father care. Because fathers are typically the higher earners, earnings-related benefits substantially decrease differences in income loss between parents with unequal earnings. Because mothers are typically those who would drop out of the labor market, job-protection facilitates both parents staying in the labor market and allows care to be passed to the other parent upon return to work. Publicly subsidized child care facilitates both parents staying in the labor market but also reduces the total length of absence. Finally, the policy program is supported by Swedish parents’ general rejection of gendered norms in caring. Unlike other countries in Europe, Swedish couples who do not share care work equally are those who must defend their choices (Grunow & Evertsson 2016).

The Swedish parental leave system allows for a large degree of flexibility. There are no restrictions on timing of leave; days may be claimed at any point in time during the child’s first seven years and any number of unpaid job-protected leave days can be claimed during the first 18 months of the child’s life. Most parents mix their paid leave with unpaid leave so that the total leave period becomes longer than the 390 earnings-replaced days. The possibility to take unpaid leave also has the potential to reduce the correspondence between total mother leave and total father leave. Unlike paid days, unpaid days used by one parent will not reduce days available for the other.

Further restrictions on leave include a cap and a floor in the earnings replacement. Annual earnings above 428,000 SEK (about 61,000 USD) are not replaced. About 10 percent of mothers and 25 percent of fathers are estimated to have earnings higher than the cap (SSIA 2011). Employer-provided benefits that cover 80 to 90 percent of the above-cap earnings are,

however, common (SSIA 2011). The floor is regulated by the requirement that a minimum of 98,400 SEK be earned over a period of at least 8 months to qualify for earnings replacement. If income is irregular over the period before birth, the earnings-replaced benefit may therefore be much lower than the corresponding full-time income. If the earnings requirement is not fulfilled, parents receive a low flat rate (180 SEK or 26 USD per day, about 9,500 USD per year).

## Data

Administrative registers from the Swedish Social Insurance Agency provide parental leave data for all couples having a first child in Sweden in 2009, the most recent year made available. Each parent's leave is measured as the number of full-time parental leave weeks taken during the first two years of the child's life. To capture "full time" parental leave, efforts have been made to ensure that the parent on leave was absent from work to act as the solo-caregiver of the child during the week. Because only paid days are recorded in the administrative system, a week of full-time leave-taking is defined as a week in which the parent took at least three days of paid parental leave while the other parent took no days at all.

*Income* was measured by the declared annual income to the Swedish Tax Agency in the year before the child was born (2008)<sup>2</sup>. Although wages would be preferred, only annual income is available through the administrative registers. Following the theoretical discussion above, two measures were constructed. First, a measure for income rank within the couple was created as an indicator of which parent had the higher income (1 for father higher, 0 otherwise). Second, to capture non-linearity created by affordability and opportunity costs, income deciles were also used.

*Career potential* was measured as the difference between the 80<sup>th</sup> and 20<sup>th</sup> salary percentile by ISCED-97 educational level and field (380 unique combinations). Data were obtained from the 2009 Structure of Earnings Survey (cf. Hällsten 2010) (n=977,373). Measures were based on salaries of workers ages 40-55 years to reduce the influence of group size differences by age.<sup>3</sup> Unlike the other measures of work conditions included in the study, the

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<sup>2</sup> Annual income in the year before birth may be affected by a birth early in the year. All models were run also for income in year 2007 with only slight difference in results.

<sup>3</sup> In order to ensure stable estimates, only combinations including more than 50 employees were used for the calculations. Out of the 380 unique combinations available in the dataset, 105 included less than 50 employees. 163 fathers and 266 mothers belonged to one of these unique combinations; their salary spread was calculated using the 2-digit educational field.

measure of career potential refers to educational training rather than occupation because a career is typically characterized by the progression through different occupations. Earnings dispersion by educational training sets limits to the possible salaries for individuals with that particular training, including the availability of managerial positions and their accompanying salary increases.

*Occupational* information was retrieved from the Occupational Register maintained by Statistics Sweden. Occupations are classified based on the Standard for Swedish Occupational Classification (SSYK) 1996. SSYK 1996 is the Swedish national adaptation of the 1988 International Standard Classification of Occupations (ISCO-88) and its corresponding European version ISCO-88 (COM) published by the International Labour Office in Geneva. Employers are required by law to provide the occupational information to Statistics Sweden (Statistics Sweden 2010). In the ISCO-88 classification schedule, occupations are classified using 1) kind of work or job performed and 2) skill. A job is defined as a set of tasks and duties executed and an occupation is a set of jobs whose main tasks and duties are similar (International Labour Organization 2018). Skill reflects ‘the complexity and range of the tasks and duties involved’, and skill specialization, reflecting the ‘field of knowledge required, the tools and machinery used, the materials worked on or with, as well as the kinds of goods or services produced’ (ILO 2018). Using this classification, 113 occupations are distinguished at the three-digit level. Among those parents having their first child in 2009, fathers held 112 of these occupations and mothers 111.

The measure for *job insecurity* was drawn from the Swedish Labor Market Survey (n=206,400). For each of the 102 available occupational groups, job insecurity was measured as the share of workers holding a temporary versus a permanent contract. When the share of workers on a permanent contract is low, the pool of workers available to compete for the position of the absent parent is high. Large numbers of respondents are required to provide stable estimates for each occupational group. 11 percent of fathers and 6 percent of mothers work in small-size occupational groups for which 2-digit occupational codes provide more stable numbers<sup>4</sup>.

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The inclusion of these couples did not change the results. A smaller age spread reduces the influence of group size differences on the overall spread but increase the number of small sized educational groups. Salary dispersions for age 45-49 have been calculated and tested with no influence on the results.

4. Couples for which only 2-digit information was available were maintained in the sample to limit exclusion but all models were run separately including only on the couples with 3-digit information. The overall results remained the same.

*Share of female workers* was drawn from each occupation in the 2009 Structure of Earnings Survey and calculated as the share of women, ranging from 0 to 100 percent. Measures were stable on the 3-digit level for all 113 available occupations.

Two indicators were drawn from the Occupational Information network (O\*NET) classifications, the successor to the Dictionary of Occupational Titles (DOT). Developed by the United States Department of Labor's Employment and Training Administration, the O\*NET database provides numerical rankings for a number of cognitive, interpersonal and physical skills as well as characteristics of work for 802 occupations (Handel 2016). O\*NET is based on the US Standard Occupational Classification (SOC) that corresponds to ISCO-88. Because the Swedish occupational classification system includes far fewer occupations than the US system (113 as compared to 802), scores are averaged over US occupations included in the same Swedish occupational group. Because of the similarity in occupational structures across time and space, even referred to as the 'Treiman constant' (Hout & DiPrete 2006), global measures of skill levels and job autonomy are likely transferrable to Sweden from the U.S. context.

*High-skilled labor* was measured in terms of the basic skills required for the occupation. Basic skills are those transversal skills that may be valuable for a larger part of the labor market. Basic skills are measured as an index comprised of items measuring 'Reading Comprehension', 'Active listening', 'Writing', 'Speaking', 'Mathematics' and 'Science' ('What level of knowledge of [specified skill] is needed to perform your current job?'), measured on a scale of 1 to 7) (alpha 0.91).

*Flexibility* (time versus task-orientation) was measured as an index from the items 'In your current job, how much freedom do you have to make decisions without supervision?' (no, very little, limited, some, a lot of freedom) and 'How much freedom do you have to determine the tasks, priorities, or goals of your current job?' (no, very little, limited, some, a lot of freedom) (alpha 0.90).

Measurement values by each occupation for all four occupational variables are listed in the Appendix. The measure for flexibility was, not surprisingly, highly correlated with skill level (Pearson's correlation coefficient 0.73). Although the correlation is acceptable in models

including only a pair of variables correlated to this extent, issues of multicollinearity may arise in full models. Results for models including both measures will be shown but interpreted with caution.

An individual-level workplace characteristic, *employment sector* (Private, public and self-employed) is also included. Private and public sector employment was derived from workplace information in the ‘RAMS’ register maintained by Statistics Sweden (2016) and self-employment derived for those reporting income from an own firm to the Income and Tax Register (Statistics Sweden 2016). Previous research has shown that public employment is more ‘family-friendly’ than private employment (Bygren & Duvander 2006) while self-employment is considerably less so (Anxo & Ericson 2015).

The models also include several characteristics of couples that may be associated with occupational choice and opportunities, as well as choices regarding parental leave. These data were retrieved from the administrative registers. *Age at child’s birth* is measured in years. Preliminary analyses demonstrated that non-linearity in parental leave use by parents’ age is captured by a three-level categorical variable distinguishing the youngest two quintiles from the middle quintile and above. *Foreign-born* is measured in the categories ‘both parents native-born’, ‘foreign-born father, native-born mother’, ‘foreign-born mother, native-born father’ and ‘both parents foreign-born’. *Educational level* was derived from the Swedish ‘SUN2000’ coding scheme (equivalent to the International Standard Classification of Education, ISCED 97) and categorized as primary (maximum nine years of schooling), secondary (10-12 years), and tertiary (college education of at least three years). *Union status at birth* was categorized as ‘out-of-union’<sup>5</sup>, ‘cohabiting’ and ‘married’. Couples were classified by their union status on the day of birth: as married if they were recorded as married in the Civil Status Register, cohabiting if they were registered at the same address in the Swedish Total Population Register and out-of-union if they were registered at different addresses.

The population under study is different-sex couples registered in Sweden and having their first child in 2009<sup>6</sup>. In order to study couple dynamics of leave-taking, only couples in which

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<sup>5</sup> Out-of-union births were not excluded as parental leave eligibility depends on custody and not residence. No information on custody was available in the dataset. Overall results are the same in models excluding out-of-union births.

<sup>6</sup> The full dataset includes children born 1994 and forward so ‘first-born’ are those in which none of the parents had another child in this period. Parents with other children older than 14 years old may thus be classified as ‘first-born’.

both parents were in the labor market were selected. Out of the 43,165 couples having their first child in 2009, 11,914 included one or both parents not registered as in the labor market in November the year before birth (Swedish register-based labor market statistics, RAMS). In 5,670 couples only the father was in the labor market, in 2,800 only the mothers and in 3,744 neither parent was in the labor market. Among couples in which both parents were registered as in the labor market, 1,721 couples (5.1 percent) were excluded because occupational information was missing from the registers for either the father or the mother<sup>7</sup>. Because the dataset contains no information on eligibility for earnings-related paid leave, no couples were excluded on the basis of low income. Exclusions of the right-hand tail outliers in the distribution of leave weeks were those 299 couples (0.7 percent) in which the father took more than 40 weeks of leave or the mother took more than 90 weeks of leave. The total selection of couples amounts to 29,366 couples.

## Method

Because the aim of the study is to estimate the relationship between the couple-level outcome, parental leave weeks, and explanatory variables at the couple as well as the occupational level, a multi-level model is used for the analyses. Because couples are clustered within fathers' as well as mothers' occupations and the two occupations are not nested in themselves, I use multi-level models in which each couple is nested within a two-way cross-classification of the father's occupation by the mother's occupation (Leckie 2013)

Multi-level models decompose the total variance in leave weeks into separate couple-level and occupational-level variance components. Using multiple subscript notation (Leckie 2013), the residuals are therefore split between occupational-level<sup>8</sup> effects of fathers,  $e_{occ_{father}}$ , mothers,  $e_{occ_{mother}}$ , and a remaining couple-level residual error term  $e_{couple(occ_{father}, occ_{mother})}$  so that:

$$leave\_weeks_{couple(occ_{father}, occ_{mother})} = \beta_0 + \beta_i X_{i,couple} + \beta_j X_{j,occ_{father}} + \beta_k X_{k,occ_{mother}} + e_{occ_{father}} + e_{occ_{mother}} + e_{couple(occ_{father}, occ_{mother})}$$

<sup>7</sup> The occupational codes were retrieved from the occupational register in the year before birth (2008). For 165 couples, occupational information was missing for either the father or the mother in the year before birth and so was retrieved from the occupational register in the year of birth.

<sup>8</sup> The higher level for models of career potential is educational training instead of occupational belonging.

Where  $occ_{father}$  indexes all father occupations ( $occ_{father} = 1, 2, 3, \dots, 112$ ),  $occ_{mother}$  all mother occupations ( $occ_{mother} = 1, 2, 3, \dots, 111$ ) and  $couple_{(occ_{father}, occ_{mother})}$  all couples ( $couple_{(occ_{father}, occ_{mother})} = 1, 2, 3, \dots, 29,366$ ) cross-classified in father's occupation,  $occ_{father}$  by mother's occupation,  $occ_{mother}$ .  $leave\_weeks_{couple_{(occ_{father}, occ_{mother})}}$  is the number of leave weeks taken by the parent (the father in the models for father leave and the mother in the models for mother leave),  $\beta_0$  is the overall mean of leave weeks taken,  $\mathbf{X}_{i,couple}$  is a vector of couple-level covariates,  $\mathbf{X}_{j,occ_{father}}$  is a vector of father occupational-level covariates and  $\mathbf{X}_{k,occ_{mother}}$  is a vector of mother occupational-level covariates. Residuals at both levels are assumed to be normally distributed with a zero mean;  $e_{couple_{(occ_{father}, occ_{mother})}} \sim N(0, \sigma_{e_{couple}}^2)$  and  $e_{occ_{father}} \sim N(0, \sigma_{e_{occ_{father}}}^2)$  and  $e_{occ_{mother}} \sim N(0, \sigma_{e_{occ_{mother}}}^2)$ . The between-occupation variance therefore reflects the deviation of each occupation from the overall mean while the remaining couple-level variance reflects the couple deviation from the mean for the combination of mother's and father's occupation. By this approach, the intercept of each occupation in the data is allowed to vary around the overall intercept, i.e. the overall mean of leave weeks taken. In the multilevel model literature, this is commonly referred to as 'random effects', reflecting the randomness in the probability model at the group level. Although the statistical literature offers conflicting advice on how to label these effects, the term 'fixed effects' is typically reserved for coefficients that are not in themselves modelled (Gelman & Hill 2007: 245-246). In this study I follow Rabe-Hesketh & Skrondal (2012) and refer to the addition of occupational-level random intercepts as 'random effects'. The estimation technique applied is Maximum Likelihood Estimation. Stata 15.1 is used for all analyses (StataCorp 2017).

## Results

### *Descriptive Statistics*

Table 1 presents descriptive statistics for couple-level and occupational-level measures. The mean number of leave weeks used by fathers is around 10 weeks. Just over 25 percent of the fathers take no leave weeks at all while another 25 percent take more than 18 weeks. The large number of fathers taking no leave weeks skews the distribution of father leave weeks<sup>9</sup>.

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<sup>9</sup> Because one-fourth of the fathers take no leave weeks at all, the outcome may be considered censored at 0 such that the true value of the number of leave weeks is an unobserved continuous latent variable that may take on negative values (Fu et al. 2009). One option for such a situation would be to use a selection model such as the tobit model. In this particular

Mothers' leave weeks are approximately normally distributed around the average 45 weeks with a standard deviation of around 16 weeks.

Table 1. Descriptive statistics of couple-level and occupational-level variables.

<b>OUTCOME</b>		Mean	St.dev.	1st quartile	Median	3rd quartile
Father leave weeks		10.2	10.3	0	7	18
Mother leave weeks		44.7	15.5	35	46	56

<b>COUPLE-LEVEL</b>		Frequency	Percent	Mean	St. dev.	Median
Fathers' age				31.8	4.9	31
Mothers' age				29.7	4.4	30
Country of birth	Both native	23 593	80.3			
	Foreign fa, native mo	2 051	7.0			
	Foreign mo, native fa	2 222	7.6			
Fathers' education	Both foreign-born	1 500	5.1			
	Primary	2 016	6.9			
	Secondary	15 296	52.1			
Mothers' education	Tertiary	12 054	41.1			
	Primary	1 180	4.0			
	Secondary	12 123	41.3			
Union status	Tertiary	16 063	54.7			
	Cohabitation	18 407	62.3			
	Out of union	1 894	6.4			
	Married	9 258	31.3			
Income father (1000s SEK)				342.4	181.2	318.9
Income mother (1000s SEK)				269.5	117.1	261.1
Highest earner	Mother	8 025	27.3			
	Father	21 341	72.7			
Father's sector of employment	Private	23 468	79.9			
	Public	3 961	13.5			
	Self-employed	1 937	6.6			
Mother's sector of employment	Private	17 537	59.7			
	Public	11 194	38.1			
	Self-employed	635	2.2			

<b>OCCUPATIONAL-LEVEL</b>		Mean	St. dev.	Median	Min	Max
Careers and lifetime earnings by educational training (measured by earnings spread in 1000s SEK) <sup>o</sup>		12.70	7.00	11.01	0.33	37.71
Job insecurity (measured by share with temporary contracts in occupation)		0.15	0.09	0.12	0.02	0.39
Gender composition of work force (measured by share of women in occupation)		0.38	0.28	0.32	0.01	0.96
Demand for high-skilled labor (measured by basic skills index)		3.5	0.7	3.5	1.7 <sup>oo</sup>	5.3
Flexibility (measured by task- vs time-orientation index)		4.0	0.3	4.0	3.0	4.8

<sup>o</sup>: The measures represent the range of educational fields held by fathers. Measures for mothers were identical except for a very minor difference in mean (12.4) and median (10.8).

<sup>oo</sup>: No fathers held the occupation with the lowest skill level (1.7) so the lowest value observed for fathers' occupations were the second lowest (2.2).

application though, the only substantial difference between such a model and the one currently used is that the mean estimate for number of leave weeks is much reduced. As a result of how fathers taking zero weeks are instead considered taking a negative number of weeks, the mean number of leave weeks used in the model with only the intercept is reduced to 7.8 weeks (as compared to the overall average of 10 weeks). Because the effect sizes were largely the same across the models (the only notable difference being the coefficients for tertiary education and sector of employment that were up to one week larger in the tobit models), the estimates that better represent the observed amount of leave weeks used by Swedish fathers was chosen.



Because couples were selected based on labor market participation, couples are on average older, more highly educated and less often foreign-born than all first-time parents (Statistics Sweden 2017). Around 6 percent of all couples were not living together and 31 percent were married. Income was, as expected, higher among fathers than mothers although the mother was the higher earner in one fourth of the couples. More fathers than mothers were in the private sector or self-employed. The skill level and flexibility of occupations were normally distributed with a narrower range for flexibility (3 to 4.8) than for skill level (1.7 to 5.3). Career potential and job insecurity exhibited skewed distributions with more occupations concentrated on the lower end of the scales.

### ***Model results***

Table 2 presents coefficients and standard errors from a series of models for the number of leave weeks taken by the father in the first two years of the child's life. Table 3 presents the same set of models for mother leave weeks. The presentation focuses on father's leave-taking, with references to mother leave weeks when appropriate. As elaborated further below, a major finding of the current study is the very low degree of variation in mother leave weeks in relation to couple- and occupational-level conditions.

Table 2. Model results for *father* leave weeks used during the first two years of the child's life.

				Model 1		Model 2				Model 3	
		Bivariate models, no occupational random effects for couple-level variables. <i>Intercept, i.e. group mean, in italics</i>		Full single-level model: All couple-level variables, no occupational random effects		Baseline model: All couple-level variables, occupational random effects, no occupational-level variables		All couple-level variables, each occupational-level variable added separately		Full model including couple-level and occupational-level variables	
<b>COUPLE-LEVEL VARIABLES</b>		Coef.	S.e.	Coef.	S.e.	Coef.	S.e.	Coef.	S.e.	Coef.	S.e.
Intercept				5.12	0.67	6.08	0.71			6.19	0.70
Father's Age	19-27 years (ref)	<i>7.16</i>	<i>0.14</i>								
	28-29 years	2.60	0.21	0.46	0.21	0.38	0.20			0.37	0.20
	30 and above	3.98	0.16	0.49	0.19	0.36	0.18			0.36	0.18
Mother's Age	19-25 years (ref)	<i>6.47</i>	<i>0.14</i>								
	26-28 years	2.68	0.19	0.23	0.20	0.21	0.19			0.19	0.19
	29 and above	5.21	0.16	0.70	0.20	0.46	0.20			0.43	0.20
Country of birth	Both native (ref.)	<i>10.41</i>	<i>0.07</i>								
	Foreign fa, native mo	-0.69	0.24	-0.86	0.22	-0.95	0.22			-0.97	0.22
	Foreign mo, native fa	0.33	0.23	-0.39	0.21	-0.51	0.21			-0.52	0.21
	Both foreign-born	-3.48	0.27	-3.42	0.26	-3.49	0.26			-3.52	0.26
Father's Education	Primary (ref)	<i>6.47</i>	<i>0.22</i>								
	Secondary	1.49	0.23	0.43	0.23	0.36	0.22			0.35	0.22
	Tertiary	7.22	0.24	3.56	0.25	2.47	0.25			2.34	0.25
Mother's Education	Primary (ref)	<i>5.75</i>	<i>0.29</i>								
	Secondary	1.38	0.30	0.57	0.29	0.63	0.29			0.61	0.29
	Tertiary	7.10	0.30	3.52	0.30	3.25	0.31			3.10	0.31
Union status	Cohabitation (ref)	<i>9.85</i>	<i>0.08</i>								
	Out of union	-2.48	0.25	-1.55	0.23	-1.47	0.23			-1.48	0.23
	Married	1.65	0.13	0.19	0.13	0.09	0.12			0.07	0.12
Father's income in deciles*male highest earner				See Figure 1 and Appendix	See Appendix	See Appendix	See Appendix			See Figure 1 and Appendix	See Appendix
Mother's income in deciles*male highest earner				See Appendix	See Appendix	See Appendix	See Appendix			See Appendix	See Appendix
Father's Sector of Employment	Private (ref)	<i>10.00</i>	<i>0.07</i>								
	Public	3.74	0.17	1.51	0.17	1.54	0.22			1.34	0.22
	Self-employed	-4.46	0.24	-4.31	0.23	-4.20	0.23			-4.19	0.23
Mother's Sector of Employment	Private (ref)	<i>10.00</i>	<i>0.08</i>								
	Public	0.53	0.12	0.08	0.12	0.47	0.15			0.35	0.15
	Self-employed	0.51	0.42	1.44	0.38	1.37	0.39			1.40	0.39

\_\_Table continues on next page\_\_

Table 2 (continued). Model results for *father* leave weeks used during the first two years of the child's life.

			Model 1		Model 2				Model 3	
	Bivariate models, no occupational random effects for couple-level variables <i>Intercept, i.e. group mean, in italics</i>		Full single-level model: All couple-level variables, no occupational random effects		Baseline model: All couple-level variables, occupational random effects, no occupational-level variables		All couple-level variables, each occupational-level variable added separately		Full model including couple-level and occupational-level variables	
<b>OCCUPATIONAL-LEVEL VARIABLES</b>	Coef.	S.e.	Coef.	S.e.	Coef.	S.e.	Coef.	S.e.	Coef.	S.e.
Careers and lifetime earnings of fathers (measured by earnings spread on natural-log scale)	1.29	0.38					0.56	0.33	n/a	
Careers and lifetime earnings of mothers (measured by earnings spread on natural-log scale)	2.36	0.35					0.60	0.28	n/a	
Job insecurity of fathers (measured by share temp. contracts in occupation on natural-log scale)	0.50	0.42					0.50	0.28	0.16	0.25
Job insecurity of mothers (measured by share temp. contracts in occupations on natural-log scale)	-0.65	0.39					0.02	0.23	0.16	0.20
Gender composition of work force of fathers (measured by share of women in occupation in 10s)	0.61	0.09					0.33	0.06	0.26	0.06
Gender composition of work force of mothers (measured by share of women in occupation in 10s)	0.05	0.10					-0.06	0.06	-0.09	0.05
Demand for high-skilled labor of fathers (measured by basic skills index)	2.30	0.38					0.92	0.29	1.69	0.38
Demand for high-skilled labor of mothers (measured by basic skills index)	3.09	0.26					1.32	0.21	1.53	0.30
Flexibility of fathers (measured by task- vs time-orientation index)	2.07	0.87					-0.04	0.61	-2.53	0.75
Flexibility of mothers (measured by task- vs time-orientation index)	4.69	0.65					1.57	0.46	-0.62	0.57
between-occupation variance (fathers) <sup>°°</sup>	7.93	1.27			3.07	0.56			1.78	0.36
between-occupation variance (mothers) <sup>°°</sup>	5.69	1.01			1.34	0.30			0.66	0.18
remaining couple-level variance <sup>°°</sup>	90.16	0.75			84.80	0.70			84.79	0.70
log-likelihood <sup>°°</sup>	-108003		-107502		-107019				-106979	
Number of couples	29366		29366		29366		29366		29366	
Number of father occupations	112		112		112		112		112	
Number of mother occupations	111		111		111		111		111	

<sup>°</sup>: As a career typically involves the transition between occupations, these variables are nested in educational level and field.

<sup>°°</sup>: First column refers to multi-level model with intercept only.

Note: All continuous variables means-centered.

Table 3. Model results for *mother* leave weeks used during the first two years of the child's life.

				Model 1		Model 2				Model 3	
		Bivariate models, no occupational random effects for couple-level variables. <i>Intercept, i.e. group mean, in italics</i>		Full single-level model: All couple-level variables, no occupational random effects		Baseline model: All couple-level variables, occupational random effects, no occupational-level variables		All couple-level variables, each occupational-level variable added separately		Full model including couple-level and occupational-level variables	
<b>COUPLE-LEVEL VARIABLES</b>		Coef.	S.e.	Coef.	S.e.	Coef.	S.e.	Coef.	S.e.	Coef.	S.e.
Intercept				54.77	1.04	52.60	1.09			52.34	1.08
Father's Age	19-27 years (ref)	<i>48.17</i>	<i>0.21</i>								
	28-29 years	-2.25	0.31	0.21	0.32	0.27	0.32			0.27	0.32
	30 and above	-4.65	0.24	-0.52	0.29	-0.44	0.29			-0.44	0.29
Mother's Age	19-25 years (ref)	<i>48.83</i>	<i>0.21</i>								
	26-28 years	-2.76	0.29	0.46	0.31	0.42	0.31			0.46	0.31
	29 and above	-5.77	0.24	0.29	0.32	0.56	0.32			0.63	0.32
Country of birth	Both native (ref.)	<i>44.43</i>	<i>0.10</i>								
	Foreign fa, native mo	1.51	0.36	1.70	0.34	1.71	0.34			1.73	0.34
	Foreign mo, native fa	-0.50	0.34	0.38	0.33	0.45	0.33			0.45	0.33
	Both foreign-born	4.35	0.41	4.42	0.40	4.45	0.40			4.45	0.40
Father's Education	Primary (ref)	<i>49.59</i>	<i>0.34</i>								
	Secondary	-2.47	0.36	-1.02	0.35	-0.95	0.35			-0.93	0.35
	Tertiary	-8.73	0.37	-3.93	0.38	-2.69	0.39			-2.48	0.40
Mother's Education	Primary (ref)	<i>51.21</i>	<i>0.44</i>								
	Secondary	-2.64	0.46	-1.90	0.45	-1.83	0.45			-1.80	0.45
	Tertiary	-9.87	0.45	-6.21	0.47	-5.65	0.48			-5.43	0.48
Union status	Cohabitation (ref)	<i>45.49</i>	<i>0.11</i>								
	Out of union	2.85	0.37	1.76	0.36	1.66	0.36			1.67	0.36
	Married	-3.02	0.20	-1.41	0.20	-1.32	0.20			-1.28	0.20
Father's income in deciles*male highest earner		See Figure 2 and Appendix		See Appendix		See Appendix				See Figure 2 and Appendix	
Mother's income in deciles*male highest earner		See Appendix		See Appendix		See Appendix				See Appendix	
Father's Sector of Employment	Private (ref)	<i>45.74</i>	<i>0.25</i>								
	Public	-4.19	0.27	-1.62	0.27	-1.58	0.32			-1.37	0.33
Mother's Sector of Employment	Private (ref)	<i>43.72</i>	<i>0.17</i>								
	Public	-1.50	0.19	-0.92	0.19	-0.86	0.24			-0.72	0.24
	Self-employed	-8.38	0.62	-9.00	0.60	-8.67	0.61			-8.71	0.61

—Table continues on next page—

Table 3 (continued). Model results for *mother* leave weeks used during the first two years of the child's life.

			Model 1		Model 2				Model 3	
	Bivariate models, no occupational random effects for couple-level variables <i>Intercept, i.e. group mean, in italics</i>		Full single-level model: All couple-level variables, no occupational random effects		Baseline model: All couple-level variables, occupational random effects, no occupational-level variables		All couple-level variables, each occupational-level variable added separately		Full model including couple-level and occupational-level variables	
<b>OCCUPATIONAL-LEVEL VARIABLES</b>	Coef.	S.e.	Coef.	S.e.	Coef.	S.e.	Coef.	S.e.	Coef.	S.e.
Careers and lifetime earnings of fathers (measured by earnings spread on natural-log scale)	-1.16	0.42					-0.02	0.30	n/a	
Careers and lifetime earnings of mothers (measured by earnings spread on natural-log scale)	-3.65	0.53					-0.83	0.32	n/a	
Job insecurity of fathers (measured by share with temp. contracts in occupation on natural-log scale)	0.19	0.40					0.15	0.27	0.18	0.26
Job insecurity of mothers (measured by share with temp. contracts in occupations on natural-log scale)	0.84	0.61					-0.10	0.39	-0.82	0.31
Gender composition of work force of fathers (measured by share of women in occupation in 10s)	-0.34	0.09					-0.07	0.07	-0.03	0.07
Gender composition of work force of mothers (measured by share of women in occupation in 10s)	-0.04	0.15					0.15	0.09	0.24	0.08
Demand for high-skilled labor of fathers (measured by basic skills index)	-2.56	0.34					-1.13	0.30	-1.81	0.41
Demand for high-skilled labor of mothers (measured by basic skills index)	-4.65	0.39					-2.41	0.34	-1.79	0.45
Flexibility of fathers (measured by task- vs time-orientation index)	-3.30	0.78					-0.71	0.61	2.11	0.79
Flexibility of mothers (measured by task- vs time-orientation index)	-8.40	0.89					-4.14	0.71	-1.58	0.88
between-occupation variance (fathers) <sup>oo</sup>	5.67	1.10			1.93	0.45			1.23	0.35
between-occupation variance (mothers) <sup>oo</sup>	13.47	2.48			3.96	0.87			1.49	0.41
remaining couple-level variance <sup>oo</sup>	218.12	1.81			209.61	1.73			209.60	1.73
log-likelihood <sup>oo</sup>	-120923		-120555		-120265				-120228	
Number of couples	29366		29366		29366		29366		29366	
Number of father occupations	112		112		112		112		112	
Number of mother occupations	111		111		111		111		111	

<sup>o</sup>: As a career typically involves the transition between occupations, these variables are nested in educational level and field.

<sup>oo</sup>: First column refers to multi-level model with intercept only.

Note: All continuous variables means-centered.

The first column of Table 2 presents estimates from bivariate models for all variables in the analysis. Older, more educated, married fathers working in the public sector take on average more leave than others. Notably, tertiary educated fathers take more than twice as long leave as primary educated fathers, around 14 compared to 6.5 weeks. Fathers in couples in which both parents were foreign-born, the birth was out of union and the father is self-employed take substantially less leave on average. Interestingly, in couples in which only one parent was foreign-born, the father did not take much less leave than in couples in which both parents were born in Sweden. For maternal leave-taking, most gradients were reversed but of similar size so that those couple characteristics that were found to increase father leave decreased mother leave to similar extent. Only self-employment had similar effects for

fathers and mothers; self-employed fathers and mothers took much less leave than others. While leave-taking was no different among fathers by the mother's sector of employment, mothers with publicly employed fathers took less leave and mothers with self-employed fathers took more leave. (Bivariate associations with income and occupational-level variables are discussed further below.)

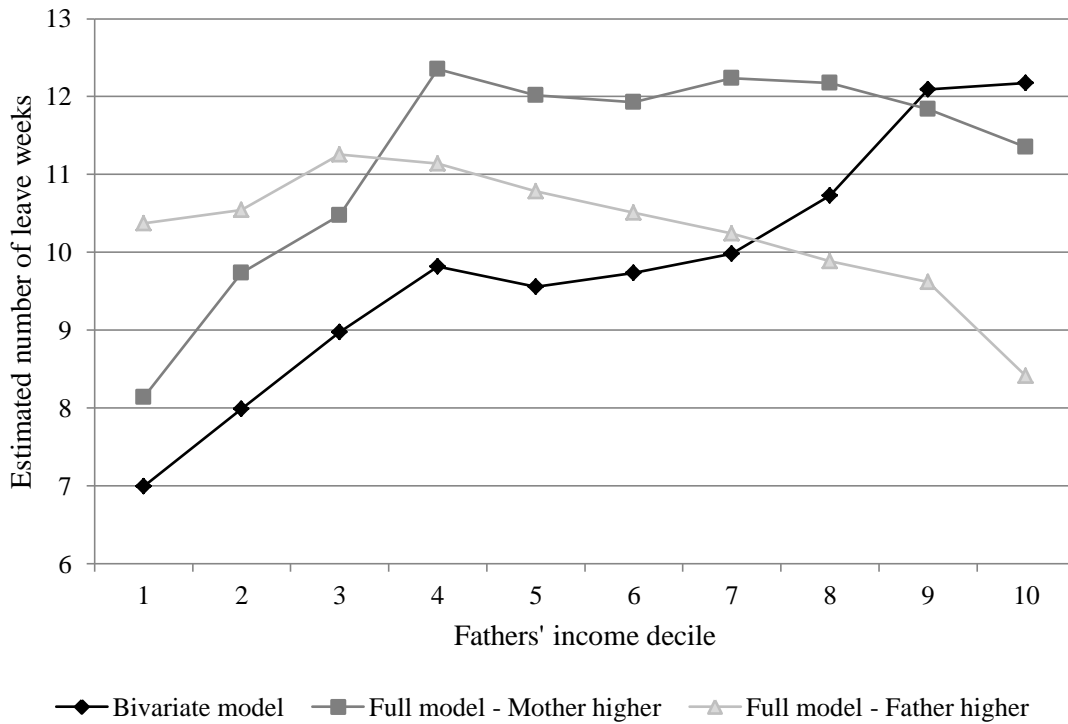
The second column of Table 2 displays estimates from Model 1, in which all couple-level variables are included but no occupational random effects. As expected, most of the relationships are reduced in comparison to the bivariate estimates. Differences by age are explained almost completely by other characteristics. Differences by education are halved but remain substantial. The difference in father's leave between couples with both parents born in Sweden as compared to those in which both parents are born abroad largely remain, meaning that the differences by origin could not be explained by other factors that clearly differentiate these groups, such as educational and income differences. Maternal leave-taking showed a similar pattern of reductions in relationships. Only the much lower leave use by self-employed mothers and fathers could not be explained by other couple-level characteristics.

The third column shows the baseline multi-level model, with all couple-level covariates and each couple cross-classified in the occupation of the father and the mother. In the fourth column, each occupational-level variable has been added separately to the baseline model. The final column includes the full model, with all couple-level and occupational-level variables.

When controlling for occupational random effects, the couple level coefficients change very little. This means that the effect of these variables is about the same within occupations as for all occupations. The only exception is tertiary education of the father, in which the overall difference between primary and tertiary educated fathers of 3.7 weeks is only 2.6 weeks within occupations. This is mirrored in maternal leave-taking, in which the reduction in leave-taking by mothers partnered with tertiary educated fathers is 2.5 weeks within occupations as compared to the overall difference of almost four weeks. This suggests that some of the difference in leave-taking by fathers' education results from educational sorting into occupations.

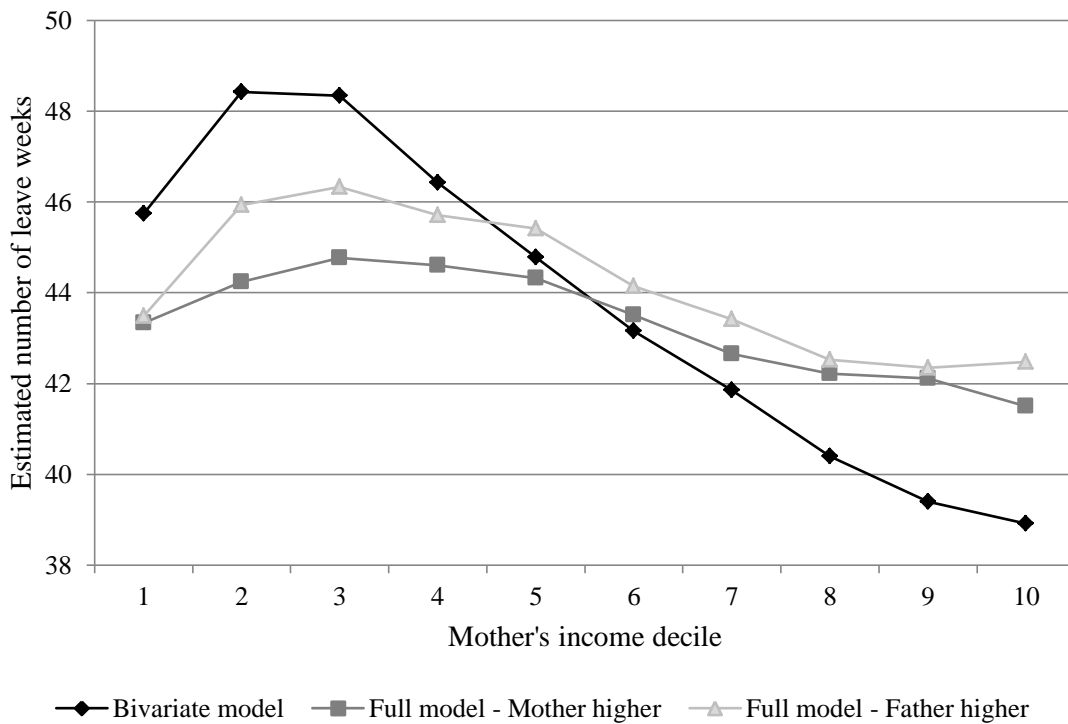
Figure 1 shows the estimated average number of father leave weeks as calculated from the bivariate model, including only father's income decile, and the full model that includes also income rank and an interaction between income decile and rank. Estimates from Model 1, with all couple-level variables, and Model 2, with couple-level variables and occupational random effects, were similar to those of the full model and so are presented only in the appendix. The similarity in effects across these models suggests that income has a similar effect within occupations as it has for all occupations combined.

Figure 1. Estimated number of *father* leave weeks by father's income decile. Full model includes two-by-ten interaction of an indicator for the highest earner and father's income decile.



Note: Estimated average leave weeks refer to predicted average leave weeks calculated over all observations for each combination of the two-by-ten interaction, holding all other variables in the model as observed.

Figure 2. Estimated number of *mother* leave weeks by mother's income decile. Full model includes two-by-ten interaction of an indicator for the highest earner and mother's income decile.



Note: Estimated average leave weeks refer to predicted average leave weeks calculated over all observations for each combination of the two-by-ten interaction, holding all other variables in the model as observed.



Turning to the bivariate model first, we see that higher income fathers in Sweden take more leave than lower income fathers. Fathers with the lowest income take about 7 weeks of leave, compared to just over 12 weeks for those with the highest income. In the full model, however, the pattern is reversed for the higher income deciles, in which higher income is associated with less leave-taking, especially for fathers whose income is higher than their partner's. For low-income fathers with lower incomes than their partners, the increase in leave-taking over the first four deciles is instead sharper than in the bivariate. Among these fathers, leave-taking increases from around 8 weeks to more than 12 weeks from the fathers with the lowest income to deciles 4 and above. Income rank produces a difference of two weeks' leave but only for fathers in income decile four and above. Among the low-income fathers, those whose income is lower than the mother's take even fewer weeks of leave than those with an income higher than the mother.

Figure 2 shows the same set of models with mother leave weeks as the outcome. As shown for the other couple-level characteristics, the bivariate model shows the opposite pattern to that of father leave. Over most of the income range, the higher the income of the mother, the less leave she takes. In the full model however, the same inverted u-shape as found for father leave is found also among mothers. For mothers, however, leave-taking is depressed only for the lowest income deciles. The decrease in leave-taking for higher income mothers is more pronounced than for fathers, regardless of whether her income is lower or higher than the father's income. Overall, though, mother's leave-taking is very compressed across income and ranges only between around 42 weeks to just over 46 weeks.

Column 1 of Table 2 shows that father leave-taking is higher in educational fields with larger career earnings potential. Fathers coupled with mothers who have high career potential take more leave, consistent with mother's career potential reducing her own leave (Column 1, Table 3). Both differences are, however, accounted for almost completely by other characteristics of the couple (Column 2, Table 2). Mother's leave is negatively associated with father's career potential but not when other couple-level characteristics are controlled. Her own career potential has only a modest effect in the multivariate model<sup>10</sup>.

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<sup>10</sup> Although it would be possible to enter indirect costs in the full model by a four-way cross-classification (father's occupation by mother's occupation by father's educational training by mother's educational training), the strong relation between educational training and occupation would make the model over-specified.

No differences are found in fathers' or mothers' leave-taking by the share of temporary contracts in the occupation, i.e. job insecurity. A reduction in mother's leave-taking by her own occupation's job insecurity is found in the full model but the reduction represents a difference of only 2.5 weeks over all levels of job insecurity.

In the bivariate model, the difference in father leave weeks between occupations with only men to those with only women is estimated at around 6 weeks. In the full model, with all occupational-level covariates held constant, the difference is reduced to around 2.5 weeks. Mother's leave weeks are not associated with the percentage of women in the occupation in the bivariate model. In the full model, a small statistically significant effect appears but represents a difference of only 2.5 weeks for mothers in occupations with only men to those with only women. No evidence was found for the influence of share of women in the mother's occupation on the father's leave weeks, or vice-versa.

Occupational skill level was positively associated with father leave. In the bivariate models, the difference in leave-taking between fathers in the most highly skilled occupations to those with the lowest skill was around 7 weeks. In the full model, the difference was reduced to around 5 weeks. Interestingly, an unexpected effect of high-skilled occupations on mothers' leave-taking was also found. In the full model, the difference between occupations with the lowest to the highest skill level was around 6 weeks. Moreover, net of their own occupational skill levels, fathers coupled with mothers working in the highest skilled occupations take around 4.5 weeks less than those coupled with mothers in the lowest skilled occupations. Similarly, mothers coupled with fathers working in the highest skilled occupations take 6 weeks less than those in the lowest skilled occupations.

The bivariate models also show a positive gradient in leave-taking by the degree of task-orientation. Fathers working in most task-oriented occupations take around 4 weeks more leave than those working in the most time-oriented occupations. When the other occupational-level variables are added however, the effect of task-orientation on father leave-taking is reversed. In the full model, the most time-oriented occupations take 4.5 weeks less leave than the most task-oriented. The reversal occurs when the high-skill measure is added to the model (not shown here). That is, high skill, high-autonomy occupations were driving the positive effect of autonomy while autonomy in itself is negatively related to father leave. As these measures are so highly correlated, however, the results must be interpreted with

caution. Because all other coefficients in the full model change only little by including the flexibility measure, it was include in the full model as represented in Tables 2 and 3. For mothers, leave-taking was considerably lower in task-oriented occupations in the bivariate although the relationship was much reduced in the full model. No evidence was found for the influence of mother's flexibility on fathers' leave weeks; very minor differences were observed for father's flexibility on mother's leave weeks.

## **Discussion**

The Swedish parental leave system offers a context in which fathers have real opportunities to engage in active child care, care that requires their absence from paid work (Bianchi et al. 2012). In most other contexts, fathers' caregiving is severely constrained by their assumed responsibility for economic support and the incompatibility between working and caring at the same time. Variability within this context can therefore be traced at the couple level to features of the parents' work environments.

Although Swedish parental leave benefits are aimed at compensating for income loss, both mothers' and fathers' leave are associated with income prior to birth. When the father is the lower earner in the couple, his leave-taking is about two weeks longer at most income levels. Although a clear difference, it is of course far from any reversal in gender specialization. Affordability and opportunity costs extend to fathers as well as mothers by depressing leave-taking at both ends of the income spectrum. Although the bivariate association is the completely opposite for fathers and mothers, i.e., high income fathers take more leave while high income mothers take less leave, the income gradients are more similar when controls for differences in mothers' and fathers' occupations are added. Affordability, the primary concern at low income levels, is more prominent for fathers and affects a larger part of the income spectrum. Affordability effects also depend on the father's income rank: low-income fathers with income less than that of the mother take especially few weeks of leave. For mothers, affordability seems prominent only for those with the very lowest incomes, regardless of whether their income is higher or lower than the father's.

Opportunity costs, the primary concern at higher income levels, were found to be more prominent for mothers' leave-taking, and visible already around the median income. For fathers, there is some sign of opportunity costs only for those with the highest incomes, and

the effects did not depend on whether the father's income was higher or lower than that of the mother. While average leave-taking for fathers varied substantially across income groups, differences for mothers were stunningly small.

There was no gradient in leave-taking by career potential (life-time earnings). Of course, a career is not only defined by increases in earnings. Individuals may rather define a career as a trajectory of different positions, possibly occupations, such as a move into management. Because upward mobility is often associated with an increase in earnings, the measure used here should at least partially capture such occupational trajectories. It may be that those with high career potential postpone their childbearing until the point at which their career is already 'matured' and there is no longer any perceived risk of stagnation or downward mobility following a leave period. Still, one might have expected a difference between parents with educational training that offers almost fixed salaries to those in which salary levels may be adjusted based on performance. The lack of any association suggests that parents in career jobs do not themselves perceive 'signaling' to be higher in career occupations, or at least that their leave decisions are not hindered by the potential for such 'signaling'.

No gradient was found in leave-taking in relation to job insecurity, measured by the occupation's share of temporary contracts. It is of course possible that precariousness (temporary contract) at the individual level may reduce fathers' and possibly mothers' leave, but no such measure is available in Swedish register data. Because individuals may postpone parenthood until receiving a permanent contract, the occupational-level degree of temporary contracts may also poorly reflect the individual's own situation.

Family friendliness as represented by the share of potential leave-takers (women) in the occupation is associated with fathers' as well as mothers' leave-taking. Although occupations with a large share of women routinely handle leave periods of around one year, they do not seem to generate the same length of leaves among fathers. Fathers in occupations dominated completely by women take on average around 13 weeks of leave (three weeks more than fathers in occupations completely dominated by men), very far from the average 46 weeks taken by mothers in the female-dominated occupations. Of course, a labor market horizontally segregated by gender makes the occupations with larger shares of women predominantly found in health and caring, occupations in which we would expect individuals

with preferences for caring activities to be found. Any heterogeneity in the preference for caring activities remain unobserved in the models presented here, so the gradient in share of women captures some of this heterogeneity. Because the amount of extra work handling a leave period should not vary by gender, gendered norms and behaviors surrounding leave-taking is arguably strong also in female-dominated occupations.

Skill levels in fathers' occupations were associated with longer leave, consistent with the argument that resources valuable in the labor market enable fathers to make claims for care work. Any unobserved differences in labor market motivation by skill level would lower rather than accentuate the observed association. Although register data do not allow for direct observations of the mechanism through which skill levels influence leave-taking, the theoretical justification is grounded in qualitative evidence (Hobson 2014). Other possible mechanisms linking skill level to leave-taking would be parental resources as an investment in children. Research linking parent's educational level to child care (Bonke & Esping-Andersen 2011) asserts that parents with more resources invest more in their children because it is a more profitable investment in the child's future. Based on this argument, however, we would expect the total parental leave period to be longer for parental couples with higher skill levels. That is not what the study finds; instead the evidence suggests that these couples redistribute leave from the father to the mother.

The measure of time vs. task-orientation used in this study was highly correlated with skill level so its effects in the full model must be interpreted with caution. The fact that fathers in task-oriented occupations took more leave than those in time-oriented occupations appeared to be due to the positive association with skills. Net of the occupation's skill level, time-orientation was associated with more leave-taking. These results confirm the importance of distinguishing between different dimensions of a 'family-friendly job'. When only one characteristics of the context of paid work is included, several characteristics reflecting labor market resources are positively connected with father's leave-taking, be they income, career jobs, skills or task orientation. As other characteristics are added however, only skill level remains positive.

The relationship between leave-taking and the context of paid work is clearly gendered. Gendered norms that attribute child care responsibilities to women mean that the conditions of work facilitating mother leave are not transferable to fathers. The difference is shown most

clearly for occupational skill levels, in which the skill level of fathers' occupations was positively associated with their leave-taking while the opposite was found for mothers' leave-taking. This however does not need to mean that the underlying mechanism for how skill levels operate is different. The higher skill level may instead provide opportunities to deviate from gendered norms and behavior. For fathers, deviating may mean to take longer leave than expected. For mothers, deviating may mean to take shorter leave than expected. Although gender-neutrally formulated, a leave policy used to a large extent by mothers has the potential to reinforce gendered norms. Mothers with greater occupational resources may be in a better position to return to the labor market even in a situation in which the employer and co-workers expect a longer absence.

For many variables in the model, the gradient for fathers' leave-taking was of similar size as for mothers. For example, the 2.5 week average increase in leave for fathers with tertiary education was mirrored by a 2.5 week decrease in leave for mothers coupled with tertiary-educated fathers. If parents aim for a certain parental care length, we would expect the deviation from the ten leave weeks taken by the father to have a compensating rather than a multiplicative effect on mother's leave-taking, and that is what was observed. Of course, the consequences of father's leave-taking have the possibility to reach beyond the mere reduction in mother's leave-taking. We may expect threshold effects already at the average ten weeks of father leave in terms of the recognition of the father's caregiving role at the workplace.

The occupations defined in this study are a bundle of different jobs that are similar in terms of tasks performed and skill). Each of the occupation-level characteristics may vary on the individual level such that individual skill may be above or below the average skill of the occupation. These differences are known to the individual as well as to employers. Thus, the occupational level indicators may underestimate effects of work conditions on parental leave-taking. On the other hand, in comparison with self-assessed individual skill, the O\*NET measures reflect overall standing in the labor market that may be especially useful for communicating skill levels in the typical situation in which the full skill set is unknown to the employer.

Characteristics of paid work are crucial for understanding how parents may take leave to care for their children. Effects of work conditions are, however, moderated by strong expectations of gendered caregiving. Conditions of work found in previous research to facilitate or hinder

mother's leave do not appear to be directly transferrable to fathers. Either differentials are much smaller – e.g., fathers in female-dominated occupations take much less leave than mothers -- or reversed – e.g., that skill levels of mothers are negatively related to mother's leave while positively related to father's leave. Overall, while paid work and caring are often pitted against each other for mothers, for fathers it seems that the more advantaged fathers are also those who can make greater choices in caring. Conversely, fathers with a labor market disadvantage, with low income working in low-skilled occupations, also seem hindered in their leave-taking.

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## Appendix

Table A1. Measures at the occupational level.

Standard for Swedish Occupational Classification (SSYK96)	Occupation description	Share of temporary contracts	Share of women in occupation	Basic skills index	Flexibility index
		to all contracts			
011	Armed forces	9.8	3.9	3.7	4.2
111	Legislators and senior government officials	32.5	40.7	5.1	4.2
112	Senior officials of special-interest organisations	32.5	40.4	5.1	4.2
121	Directors and chief executives	1.7	10.5	4.6	4.8
122	Production and operations managers	1.8	33.8	3.7	4.3
123	Other specialist managers	1.7	29.7	3.7	4.4
131	Managers of small enterprises	2.7	30.7	3.6	4.5
211	Physicists, chemists and related professionals	21.1	40.7	4.9	4.3
212	Mathematicians and statisticians	5.9	40.2	5.3	4.2
213	Computing professionals	5.0	23.7	4.3	3.9
214	Architects, engineers and related professionals	5.4	21.3	4.8	4.2
221	Life science professionals	25.0	49.5	5.1	4.6
222	Health professionals (except nursing)	18.7	50.8	4.9	4.6
223	Nursing and midwifery professionals	7.9	91.1	3.7	4.1
231	College, university and higher education teaching professionals	34.2	45.2	5.2	4.7
232	Secondary education teaching professionals	16.0	53.3	4.5	4.3
233	Primary education teaching professionals	13.7	77.0	3.8	4.0
234	Special education teaching professionals	16.5	83.2	4.2	4.3
235	Other teaching professionals	20.7	57.8	4.2	4.4
241	Business professionals	5.9	54.0	3.9	4.2
242	Legal professionals	12.1	49.3	4.6	4.6
243	Archivists, librarians and related information professionals	15.4	72.7	4.2	4.2
244	Social science and linguistics professionals (except social work professionals)	33.9	57.4	4.4	4.4
245	Writers and creative or performing artists	19.3	52.4	3.8	4.1
246	Religious professionals	11.4	39.6	4.4	4.8
247	Public service administrative professionals	9.8	60.0	3.9	4.2
248	Administrative professionals of special-interest organisations	11.4	49.0	3.9	4.2
249	Psychologists, social work and related professionals	15.7	80.4	4.4	4.4
311	Physical and engineering science technicians	4.3	17.3	4.1	4.0
312	Computer associate professionals	7.6	23.2	3.4	4.0
313	Optical and electronic equipment operators	10.3	25.9	3.6	4.0
314	Ship and aircraft controllers and technicians	5.6	8.5	4.2	4.3
315	Safety and quality inspectors	5.6	19.1	3.7	4.2
321	Agronomy and forestry technicians	12.3	18.9	4.3	4.1
322	Health associate professionals (except nursing)	15.7	83.7	3.7	4.0
323	Nursing associate professionals	10.7	90.2	3.3	4.2
324	Life science technicians	12.3	91.5	4.3	4.1
331	Pre-primary education teaching associate professionals	7.9	92.6	3.4	3.9
332	Other teaching associate professionals	37.7	46.5	4.2	4.4
341	Finance and sales associate professionals	6.2	37.4	4.0	4.4
342	Business services agents and trade brokers	7.7	51.4	3.8	4.3
343	Administrative associate professionals	12.1	79.9	3.5	4.1
344	Customs, tax and related government associate professionals	9.8	76.8	4.2	4.2
345	Police officers and detectives	9.8	25.2	3.7	4.2
346	Social work associate professionals	20.2	64.8	3.6	4.2
347	Artistic, entertainment and sports associate professionals	34.9	42.6	3.3	4.0
348	Religious associate professionals	9.8	29.6	4.5	4.3
411	Office secretaries and data entry operators	8.9	95.7	3.6	3.9
412	Numerical clerks	10.4	91.5	3.8	4.1
413	Stores and transport clerks	10.3	21.0	3.7	4.0
414	Library and filing clerks	33.8	76.1	3.6	3.8
415	Mail carriers and sorting clerks	16.5	37.8	3.6	3.8
419	Other office clerks	13.1	80.4	3.4	4.0
421	Cashiers, tellers and related clerks	35.0	82.1	3.4	3.5
422	Client information clerks	21.8	81.7	3.6	3.4
511	Travel attendants and related workers	29.1	64.7	3.3	3.9
512	Housekeeping and restaurant services workers	27.3	61.6	2.4	3.7
513	Personal care and related workers	22.4	88.2	3.2	3.8
514	Other personal services workers	14.7	79.7	3.2	4.3
515	Protective services workers	18.5	26.2	3.7	4.1

Table A1 (continued). Measures at the occupational level.

Standard for Swedish Occupational Classification (SSYK96)	Occupation description	Share of temporary contracts to all contracts	Share of women in occupation	Basic skills index	Flexibility index
521	Fashion and other models	22.5	70.9	1.7	3.3
522	Shop and stall salespersons and demonstrators	22.5	62.0	3.1	4.0
611	Market gardeners and crop growers	38.6	19.5	3.7	4.2
612	Animal producers and related workers	18.6	22.0	3.7	4.5
613	Crop and animal producers	30.3	15.6	3.4	4.2
614	Forestry and related workers	30.8	7.1	2.7	4.1
615	Fishery workers, hunters and trappers	30.3	2.2	2.6	4.4
711	Miners, shotfirers, stone cutters and carvers	10.6	3.3	3.0	3.6
712	Building frame and related trades workers	12.2	1.0	3.6	4.1
713	Building finishers and related trades workers	9.5	4.8	3.1	4.0
714	Painters, building structure cleaners and related trades workers	9.3	4.5	3.0	3.9
721	Welders, sheet-metal workers, structural-metal preparers and related trades workers	9.1	2.3	3.3	3.8
722	Blacksmiths, tool-makers and related trades workers	7.7	5.2	3.0	3.7
723	Machinery mechanics and fitters	7.3	1.4	3.5	3.8
724	Electrical and electronic equipment mechanics and fitters	7.4	4.7	3.7	4.1
731	Precision workers in metal and related materials	9.7	11.9	3.5	4.2
732	Potters, glass-makers and related trades workers	9.7	36.4	3.0	3.8
733	Handicraft workers in wood, textile, leather and related materials	9.7	63.4	3.1	4.1
734	Craft printing and related trades workers	9.7	39.7	3.3	3.9
741	Food processing and related trades workers	24.1	19.1	2.8	3.7
742	Wood treaters, cabinet-makers and related trades workers	17.4	13.1	2.6	3.9
743	Garment and related trades workers	17.4	67.3	3.0	3.8
744	Pelt, leather and shoemaking trades workers	17.4	26.5	2.2	3.7
811	Mineral-processing-plant operators	4.6	3.0	3.1	3.7
812	Metal-processing-plant operators	4.6	11.2	3.0	3.8
813	Glass, ceramics and related plant operators	4.6	20.8	2.8	3.7
814	Wood-processing- and papermaking-plant operators	4.6	11.4	2.9	3.7
815	Chemical-processing-plant operators	4.6	16.2	3.4	4.0
816	Power-production and related plant operators	4.6	4.8	4.0	4.1
817	Industrial-robot operators	4.6	13.1	3.3	3.7
821	Metal- and mineral-products machine operators	6.5	11.1	2.8	3.6
822	Chemical-products machine operators	9.1	33.0	2.9	3.6
823	Rubber- and plastic-products machine operators	9.1	28.0	2.9	3.4
824	Wood-products machine operators	9.1	15.0	2.6	3.8
825	Printing-, binding- and paper-products machine operators	11.9	18.5	2.7	3.8
826	Textile-, fur- and leather-products machine operators	9.1	54.6	2.3	3.4
827	Food and related products machine operators	15.2	39.2	2.6	3.6
828	Assemblers	8.7	26.0	2.9	3.6
829	Other machine operators and assemblers	13.9	27.3	2.7	3.5
831	Locomotive-engine drivers and related worker	12.9	8.9	2.9	3.9
832	Motor-vehicle drivers	13.7	6.6	2.7	3.8
833	Agricultural and other mobile-plant operators	12.2	3.2	3.1	4.1
834	Ships' deck crews and related workers	12.9	4.2	3.3	3.9
911	Street vendors and market salespersons	24.6	30.9	2.7	4.1
912	Helpers and cleaners	22.0	78.9	2.6	3.3
913	Helpers in restaurants	30.3	79.7	2.6	3.3
914	Doorkeepers, newspaper and package deliverers and related workers	22.6	23.2	2.7	4.0
915	Garbage collectors and related labourers	24.6	6.8	2.8	3.7
919	Other sales and services elementary occupations	24.6	38.4	2.8	3.7
921	Agricultural, fishery and related labourers	24.4	31.4	2.7	4.1
931	Mining and construction labourers	22.7	3.8	2.9	3.5
932	Manufacturing labourers	22.3	38.3	2.5	3.0
933	Transport labourers and freight handlers	23.9	10.7	3.0	4.0

Table A2. Coefficients for income variables in Table 2 and 3.

		OUTCOME: FATHER LEAVE WEEKS								OUTCOME: MOTHER LEAVE WEEKS							
		Bivar.		Mod. 1		Mod. 2		Mod. 3		Bivar.		Mod. 1		Mod. 2		Mod. 3	
		Coef.	S.e.	Coef.	S.e.	Coef.	S.e.	Coef.	S.e.	Coef.	S.e.	Coef.	S.e.	Coef.	S.e.	Coef.	S.e.
Father's income	1st decile (ref)	6.99	0.23							45.16	0.10						
	2nd decile	1.00	0.33	1.68	0.37	1.58	0.36	1.60	0.36	-1.46	0.50	-1.92	0.58	-1.87	0.57	-1.90	0.57
	3rd decile	1.98	0.33	2.43	0.42	2.29	0.41	2.33	0.41	-2.64	0.49	-3.42	0.65	-3.44	0.64	-3.47	0.64
	4th decile	2.83	0.31	4.30	0.44	4.23	0.43	4.21	0.43	-2.73	0.47	-3.82	0.68	-3.68	0.68	-3.66	0.68
	5th decile	2.57	0.30	3.83	0.47	3.86	0.46	3.87	0.46	-2.85	0.45	-4.06	0.73	-3.97	0.72	-3.95	0.72
	6th decile	2.74	0.29	3.77	0.49	3.79	0.48	3.79	0.48	-3.36	0.44	-3.89	0.76	-3.78	0.76	-3.74	0.76
	7th decile	2.99	0.28	4.15	0.53	4.09	0.52	4.09	0.52	-4.01	0.43	-4.47	0.82	-4.21	0.82	-4.14	0.82
	8th decile	3.73	0.28	4.52	0.56	4.02	0.55	4.03	0.55	-4.54	0.42	-4.84	0.87	-4.17	0.86	-4.11	0.86
	9th decile	5.10	0.28	4.52	0.61	3.67	0.61	3.70	0.61	-6.10	0.42	-5.40	0.96	-4.61	0.95	-4.52	0.95
	10th decile	5.18	0.27	3.86	0.76	3.21	0.75	3.22	0.75	-6.61	0.42	-4.72	1.18	-4.15	1.17	-3.96	1.18
Mother's income	1st decile (ref)	8.10	0.16							45.48	0.12						
	2nd decile	-0.81	0.22	-1.45	0.71	-1.32	0.70	-1.35	0.70	2.68	0.34	0.74	1.11	0.87	1.10	0.91	1.10
	3rd decile	-0.45	0.22	-2.64	0.70	-2.55	0.69	-2.60	0.69	2.59	0.34	1.37	1.10	1.36	1.09	1.44	1.09
	4th decile	0.80	0.23	-2.30	0.71	-2.22	0.70	-2.29	0.70	0.68	0.35	0.99	1.11	1.22	1.10	1.28	1.10
	5th decile	2.53	0.24	-1.48	0.70	-1.46	0.69	-1.53	0.69	-0.96	0.36	0.50	1.10	0.89	1.09	0.99	1.09
	6th decile	3.17	0.25	-1.87	0.71	-1.90	0.70	-1.98	0.70	-2.59	0.38	-0.53	1.11	0.07	1.10	0.19	1.10
	7th decile	4.20	0.26	-1.20	0.72	-1.54	0.71	-1.60	0.71	-3.89	0.40	-1.60	1.12	-0.78	1.11	-0.67	1.11
	8th decile	5.63	0.27	-0.73	0.73	-1.35	0.72	-1.43	0.72	-5.34	0.41	-2.22	1.14	-1.29	1.13	-1.11	1.13
	9th decile	7.21	0.27	0.43	0.74	-0.38	0.73	-0.49	0.73	-6.35	0.42	-2.57	1.15	-1.45	1.15	-1.21	1.15
	10th decile	7.34	0.30	0.63	0.78	0.02	0.78	-0.11	0.78	-6.82	0.46	-2.89	1.22	-2.12	1.22	-1.83	1.22
Income rank	Mo highest (ref)	11.33	0.11							48.66	0.34						
	Fa highest	-1.54	0.13	0.35	0.81	0.38	0.79	0.36	0.79	1.38	0.20	-3.43	1.26	-3.40	1.24	-3.39	1.24
Father's income*Income rank	2nd*fa highest			-1.49	0.78	-1.40	0.76	-1.43	0.76			1.17	1.21	1.14	1.20	1.20	1.20
	3rd*fa highest			-1.55	0.78	-1.42	0.76	-1.45	0.76			2.22	1.21	2.30	1.20	2.36	1.19
	4th*fa highest			-3.72	0.77	-3.50	0.76	-3.45	0.76			2.98	1.20	2.87	1.19	2.87	1.19
	5th*fa highest			-3.70	0.78	-3.49	0.77	-3.46	0.77			3.46	1.22	3.51	1.20	3.50	1.20
	6th*fa highest			-4.00	0.79	-3.68	0.77	-3.65	0.77			3.35	1.23	3.29	1.22	3.28	1.21
	7th*fa highest			-4.55	0.81	-4.25	0.80	-4.22	0.80			3.76	1.26	3.66	1.25	3.64	1.25
	8th*fa highest			-5.10	0.83	-4.55	0.81	-4.52	0.81			4.63	1.29	4.35	1.28	4.33	1.28
	9th*fa highest			-5.04	0.87	-4.47	0.85	-4.45	0.85			5.08	1.36	5.01	1.34	5.02	1.34
	10th*fa highest			-5.73	0.98	-5.20	0.96	-5.18	0.96			5.25	1.53	5.22	1.51	5.18	1.51
	Mother's income*Income rank	2nd*fa highest			0.71	0.75	0.61	0.73	0.63	0.73			1.73	1.17	1.56	1.15	1.53
3rd*fa highest				1.94	0.74	1.81	0.73	1.84	0.73			1.56	1.16	1.48	1.14	1.40	1.14
4th*fa highest				1.87	0.75	1.75	0.74	1.78	0.74			1.18	1.18	0.96	1.16	0.94	1.16
5th*fa highest				2.08	0.75	1.78	0.74	1.78	0.74			0.83	1.17	0.93	1.16	0.94	1.16
6th*fa highest				3.06	0.77	2.65	0.75	2.65	0.75			0.46	1.19	0.49	1.18	0.48	1.18
7th*fa highest				3.22	0.78	2.84	0.77	2.83	0.77			0.66	1.22	0.59	1.20	0.61	1.20
8th*fa highest				4.10	0.80	3.68	0.79	3.68	0.79			0.08	1.26	0.15	1.24	0.15	1.24
9th*fa highest				4.02	0.83	3.43	0.81	3.43	0.81			0.04	1.29	0.08	1.28	0.07	1.28
10th*fa highest				3.40	0.91	3.02	0.89	3.06	0.89			1.12	1.42	0.85	1.40	0.83	1.40

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