

# Parenthood, Family Friendly Workplaces, and the Gender Gaps in Early Work Careers\*

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## Abstract

We consider the role that workplace attributes play in accounting for the divergence in the careers of women and men, with the onset of parenthood. We exploit matched employer-employee data from Sweden to characterize a model-based index of workplace “family friendliness” and analyze the effect of more family friendly workplaces on the career gaps between mothers and fathers. We find that exogenously moving mothers to more family friendly workplaces would raise their wages and labor income. In contrast, such moves would entail reductions in the same outcomes for fathers, resulting in sizeable improvements in the parental gender gap in wages and income. At the same time, working in more family friendly workplaces would not reduce the penalty to wage rates earned by women with their transition to motherhood (i.e., the motherhood penalty), but it would reduce the motherhood penalty to earned income by facilitating mothers working more hours. Furthermore, the benefits of family friendly workplaces appear to come at the expense of the occupational skill progression of mothers relative to non-mothers, impeding mothers’ ability to climb career ladders over the longer run. Finally, using auxiliary data based on a survey, we find that jobs – as defined by our index – are more substitutable for one another in family friendly workplaces. This substitutability of workers in more family friendly workplaces appears to be the mechanism that facilitates mothers’ ability to balance work and family responsibilities in such workplaces. At the same time, it also may partially explain our finding that more family friendly workplaces slow mothers’ occupational skill-progression.

**Keywords:** Gender gaps, parenthood, family friendly workplaces

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# 1 Introduction

Despite the gender convergence in labor force participation rates, educational levels, and occupations observed over the last few decades, significant gender gaps persist in all industrialized countries (Blau and Kahn, 1992, 1995, 1996, 2003, 2017). A large economics literature suggests that the earnings and wage growth of women are negatively affected by childbearing (see e.g. Angrist and Evans, 1998; Bronars and Grogger, 1994; Fitzenberger, Sommerfeld, and Steffes, 2013),<sup>1</sup> and that male and female earnings diverge at the onset of parenthood (Bertrand, Goldin, and Katz, 2010; Angelov, Johansson, and Lindahl, 2016; Kleven, Landais, and Sogaard, 2018).

In trying to explain the source of the wage penalty to mothers, an early literature focused on the role of employer discrimination (Becker, 1971; Neumark, Bank, and Van Nort, 1996; Bertrand and Mullainathan, 2004) and foregone investments in human capital (Mincer and Polachek, 1974).<sup>2</sup> A more recent literature explores the role of sorting across high- and low-paying jobs and firms for explaining the gender wage gap (Loprest, 1992; Hospido, 2009; Del Bono and Vuri, 2011; Card, Cardoso, and Kline, 2016; Sorkin, 2017; Barth, Kerr, and Olivetti, 2017). A related literature suggests that occupations, jobs and workplaces may differ with respect to the temporal flexibility that they provide women, especially mothers, in their work and thereby account for some of the gender differences in career choices and outcomes (Bertrand, Goldin, and Katz, 2010; Goldin and Katz, 2011, 2010; Flabbi and Moro, 2012; Goldin, 2014; Cardoso, Guimarões, and Portugal, 2016; Cortes and Pan, 2018), and of women with and without children (Felfe, 2012b,a; Herr and Wolfram, 2012; Adda, Dustmann, and Stevens, 2017). Finally, recent work has examined the importance of gender differences in negotiation skills (Babcock and Laschever, 2003), in the willingness to compete (Niederle and Vesterlund, 2007), and in social norms with respect to appropriate behaviors and work-related activities (Bertrand, 2011; Kleven, Landais, and Sogaard, 2018; Bertrand, Kamenica, and Pan, 2015) in accounting for male-female wage differences.

This paper considers the role that the *characteristics, or attributes, of workplaces and/or jobs* in which one works play in accounting for the divergence in the careers of women and men, in terms of the wage and non-wage attributes of jobs, with the onset of parenthood. We do so for at least three distinct, but related, reasons. First, as noted above, recent studies by Goldin and co-authors (Bertrand, Goldin, and Katz, 2010; Goldin and Katz, 2011, 2010; Goldin, 2014; Goldin and Katz, 2016) have focused on the role of “workplace flexibility” or the “family-friendliness” of workplace amenities, as playing a large role in the

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<sup>1</sup>Using an alternative identification strategy, Hotz, McElroy, and Sanders (2005) find that teenage childbearing does not have a persistent negative effect on earnings over teen mothers’ life cycle.

<sup>2</sup>See Altonji and Blank (1999) for a survey of this earlier literature.

gender differences in wages between women and men. Much of this work (Felfe, 2012b,a) has focused on differences across occupations in the intensity and flexibility of hours of work as a (dis)amenity of jobs to account for the gender gap in wages. But the jobs in which women work compared to those of men differ not only with respect to occupation but, as we show below, also with respect to the establishments in which they work and the attributes of those workplaces.

Second, there is a much wider array of attributes of jobs than the intensity and flexibility of hours of work that may be valued differently by men and women and by parents and non-parents, including the structure of the management of workplaces, the skill and gender composition of a workplace's workforce, the proximity of the workplace to workers' home, etc. Again, as we show below, differences in these attributes of jobs and workplaces play a central role in understanding gender gaps in early work careers.

Third, our interest in the role of workplaces is motivated by the findings of Abowd, Kramarz, and Margolis (1999)<sup>3</sup> with respect to the existence of firm-level premia in wages and by the recent work of Card, Cardoso, and Kline (2016) and Sorkin (forthcoming) that demonstrates the important impact of firm-level bargaining and sorting on the gender wage gap. In closely related work, Bayard et al. (2003) and Cardoso, Guimarães, and Portugal (2016) show that part of the gender wage gap found in the U.S. and Portugal, respectively, can be attributed to women being segregated into low-paying jobs and occupations within firms.

To analyze the impact that differences in the attributes of workplaces and jobs have on the early work careers of women and men and mothers and fathers, we exploit rich employer-employee matched data sets for Sweden. With respect to gender gaps in wages, earnings and other labor market outcomes and the family friendliness of the workplaces and jobs in which they work, Sweden is a particularly interesting country to study. Since the 1970s, Sweden has introduced a series of policy reforms to facilitate the combination of parenthood and careers.<sup>4</sup> The financial support to workers with young children and mandated job protections during parental leave are universal, extensive, and cover both mothers and fathers. Despite the generous duration of job-protected parental leave with governmentally-paid parental leave benefits, Sweden still has a gender gap in the wages of parents. Examining the wages and non-wage attributes of workers' jobs in this policy context provides insights into the tradeoffs faced by new parents over and above those that are addressed by universal family policies.

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<sup>3</sup>See also Barth et al. (2016) and Card et al. (2018).

<sup>4</sup>See Björklund (2006) for a description of changes to the Swedish family policies from the 1960s onwards, and Jaumotte (2004) for a characterization of family leave policies in different OECD countries.

Our paper makes three contributions to the literature on gender and parenthood gaps in work careers and to our understanding of the role that job and workplace attributes play in them. In the first, we develop a model-based index of the family friendliness of workplaces. To do so, we characterize a model of job/workplace choice and the timing of parenthood over the life cycle in which women and men before becoming parents and after they enter parenthood choose their jobs and workplaces based on preferences over the wages and non-wage attributes of workplaces and jobs. These preferences, which vary by gender and parenthood status, characterize workers' marginal willingness to pay (MWP) for the latter attributes.<sup>5</sup> Our model motivates an econometric strategy for estimating these preferences/MWPs using individuals' workplace-to-workplace transitions. In particular, we employ a fixed-effects conditional multinomial logit model which separately identifies these MWP valuations from unobserved person-specific productivity and taste parameters that also influence the observed workplace choices over workers' early careers.<sup>6</sup>

We use the resulting estimates of MWP of workplace/job attributes of mothers to construct an index of the family friendliness for each Swedish workplace in our data. Based on this index, we find that family friendly workplaces are much more likely to be in the private versus government and municipal sectors, are more likely to be populated by medium- and low-skilled workers than professionals and tend to consist of workplaces in which many of their workers have the same occupation compared to less family friendly workplaces. We also find that while young workers transition to more family friendly workplaces over their early careers, once women become mothers they are much more likely to work in family friendly workplaces compared to fathers.

In our second contribution, we estimate impact that working in more family friendly workplaces has on wages, hours of work, labor earnings and the skill content of occupations<sup>7</sup> for mothers and fathers and how these impacts differ by gender and parenthood status. Previous work – most notably Goldin and her co-authors (Goldin, 2014; Goldin and Katz, 2010, 2011) – has viewed wage differences between women and men as compensating differentials (Rosen, 1986) that result from the interplay between preferences for various job and workplace attributes, such as temporal flexibility in jobs or occupations,

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<sup>5</sup>See Wiswall and Zafar (2018) for an alternative strategy for estimating the workplace preferences and MWP for them using the responses of undergraduate men and women to questions about hypothetical jobs that differ in workplace attributes.

<sup>6</sup>See Sorkin (forthcoming) who uses the employer-to-employer job transitions to reveal worker preferences over firms and their wage and non-wage attributes using matched worker-workplace administrative data for the U.S. See also Liu (2016) who uses employer-to-employer transitions and those into and out of unemployment to identify gender differences in hours of work and its role in explaining the gender wage gap in the U.S.

<sup>7</sup>The skill-content of one's job has been found to be a predictor of their opportunities for subsequent career advancement.

and the costs to employers of providing them.<sup>8</sup> Our objective is different from this previous literature. Herein, we seek to identify the causal effect of changing the workplace attributes that mothers prefer, on labor market outcomes of mothers and fathers and the gender gaps in and parenthood penalties to these outcomes. Our index of family friendliness characterizes a *bundle* of attributes that make up workplaces and jobs in them and weights these bundles by how mothers' value them based on where they choose to work. Our estimates of changes in the index allow us to measure whether moving to such work environments would improve the labor market attainment of parents, especially mothers, close parental gender gaps in outcomes and reduce the penalties of parenthood compared to working in less accommodating workplaces. The extent to which changes in workplace environments are found to improve these outcomes highlights a different mechanism for improving mothers' and parents' work careers compared to governmental- or employer-provided parental leaves, parental leave benefits, child care access and child care subsidies that have been the focus of previous research (Ruhm, 1998, 2011; Waldfogel, 2001).<sup>9</sup>

We find that exogenously moving mothers to more family friendly workplaces would modestly prove their wages, contracted hours of work and labor market earnings. For fathers, in contrast, such moves would entail reductions in wages and income. Since mothers are the main caretakers of children, this could explain why workplace family friendliness mainly benefits mothers. Consistent with this, we also find that moving to more family friendly workplaces would yield sizable improvements in the parental gender gaps in wages and labor income, although it would have no to small effects on the corresponding gaps in contracted hours of work and the skill-content of jobs. We also examine how workplace family friendliness affects the *motherhood penalty*, that is, the difference in career outcomes between mothers and women without children. We find that such changes in workplaces would reduce the motherhood penalties to contracted hours of work and labor income but would exacerbate the penalties to wage rates and the skill-content of the jobs in more family friendly workplaces. The latter findings suggest potentially long run adverse effects working in more family friendly workplaces on wage growth over career due to the lower skill-content of job in such workplaces. Furthermore, the extent to which mothers disproportionately sort into more family friendly jobs may explain growth in career gaps over the career between men and women. Thus, while there do appear to be tangible benefits of working in more family friendly work environments for mothers, these benefits may not end up enhancing their

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<sup>8</sup>See also Flabbi and Moro (2012) who use a search and bargaining model to characterize gender wage differences for job flexibility, measuring such flexibility by whether women are able to work part time.

<sup>9</sup>We note that Bianchi (2011) documents how workplaces in the U.S. have changed over time to accommodate the increasing labor force participation of young mothers.

careers in the longer term.

In our third contribution, we take a closer look at the features of working in family friendly workplaces to better understand our findings for the impacts of working in them for parents' labor market outcomes. As noted above, Goldin (2014) argues that having flexibility in one's job when women enter parenthood, especially when their children are young, is crucial to reducing the gap in their wages relative to men.<sup>10</sup> Thus, it is of interest as to whether the workplaces we classify as more family friendly reflect this greater flexibility. To examine this, we use supplementary data which measures the flexibility of jobs, including control over the hours when one can work and periods when one can take time off. This data source also allows us to measure how easily jobs are substitutable for one another, by measuring the "autonomy" of jobs. We compare these measures of temporal job flexibility and substitutability with our index of workplace family friendliness.

We find a stark negative relationship between the extent of job autonomy and the family friendliness of workplaces. Moreover, working in more family friendly workplaces is not associated with having greater temporal flexibility in one's job. Rather, workers with more temporal flexibility in their jobs are more likely to work in workplaces where jobs involve performing tasks that are not easily transferable across co-workers, i.e., jobs in which workers are less substitutable in production. As we argue below, this latter set of findings are consistent with those in Goldin and Katz (2016) concerning their explanation for the gender evolution of the pharmacist occupation in the U.S.

The remainder of the paper is organized as follows. In [section 2](#) we describe the various data sources we use and the composition of our analysis samples of Swedish women and men over their early careers. In [section 3](#) we use these data to describe differences by gender and parenthood status in the wage and non-wage attributes of Swedish jobs and workplaces. As we show, while women and men start out with jobs and workplaces that are vary similar, once they become parents, mothers, and to a lesser extent fathers, end up in very different ones.

In [section 4](#), we lay out our model of job and workplace choice and the timing of parenthood over the early careers of women and men to characterize gender- and parenthood-specific preferences over jobs and workplaces. We use the model to characterize an econometric strategy for producing selection-adjusted estimates of these parameters, as well as their the marginal willingness to pay analogues, and present separate estimates by gender and parenthood. We also discuss the construction of our index of the family friendliness of the workplaces using these estimates and show that our index captures the

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<sup>10</sup>See also Cortes and Pan (forthcoming) for recent evidence on the returns to working long hours and the gender wage gap.

sorting of the jobs and workplaces men and women transition to after the onset of parenthood, found in [section 3](#).

In [section 5](#) we outline an estimation strategy for and present estimates of the impacts of moving workers to more family friendly workplaces on the wages, hours of work, the labor incomes, and the skill-content of jobs for mothers and fathers early in their careers. In [section 6](#) we present results for assessing the relative importance of job flexibility, autonomy and substitutability for the jobs and workplaces in which mothers work. Finally, we offer concluding comments in [section 7](#).

## 2 Data

The analysis is based on a matched employer-employee data set created by combining several Swedish population-wide administrative registers. We use the multi-generational register, which links children to their biological parents, and provides information on the birth year, birth month, and birth parity of all children born before 2008 for the entire Swedish population. To these data we match individual longitudinal information on demographic and background characteristics – such as age, sex, region of residence, educational attainment, and country of origin – from the LOUISE register. LOUISE also includes annual labor income drawn from tax registers for each individual, with zero-income reported for periods of non-work.<sup>11</sup>

We match this information to a linked employer-employee register that contains all employed individuals in Sweden, with unique identifiers for their employers and establishments, or *workplaces* at which they are employed. More precisely, we link information about the establishment at which a person works, as this measure the person’s workplace and allows us to measure its characteristics. Establishments are physical workplace locations and may differ from the firm or employer of a worker, as a firm/employer may have more than one establishment, e.g., a bank may have more than one branch or a unit of government may have more than one office. That said, throughout the paper we shall use the terms establishment, workplaces and firms to refer the same entity, namely a workplace.

The time-unit for our analysis is a calendar year, i.e., all observations represent person-workplace-year units. In reality, a person can work in more than one workplace/establishment in a year or have multiple employment spells for the same workplace in a year. To obtain one person-workplace obser-

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<sup>11</sup>The multi-generational register allows linking couples with joint children, and the LOUISE register identifies married couples with or without joint children. For non-married, cohabiting couples, however, the data only allows linking individuals in couples if they have joint children. Thus, the data enables the identification of couples prior to having children only for a subset of couples (cohabitation is a very common alternative to marriage unions in Sweden). For this reason we abstract from modeling the role of spouses in the job decisions of workers in our model presented in [section 4](#).

vation per year, we sum the income observations for the same employer per person-year, and retain the workplace at which the worker earned their main income. In the majority of the cases, this implies that we retain one observation per person-workplace-year. For the very few cases of individuals who move establishments or workplaces of the same firm within a year, we record the workplace for that year as where the individual earns their main income. Thus, our analysis data identifies within- and between-workplace movers across years, but not within-year/within-firm mobility.

For each person-workplace-year pair, we then match information on wage rates and occupational codes from the Wage Structure Statistics, collected by the Swedish National Mediation Office. The Wage Structure Statistics is an annual survey of establishments that collects information on “contracted” work hours, occupations, and full-time equivalent monthly wage rates for each employee that worked at least one hour during the measuring month. A worker’s annual contracted work hours is stipulated in an individual’s annual employment contract and indicates whether the individual is scheduled to work full-time or some fraction of full-time. Contracted work hours does not measure how many hours a worker actually works in a given period, as it does not take account of temporary time off from work due to parental leave or sickness absence, for example. How much time an individual spends working is reflected in their annual labor income, which measures their actual labor earnings. Thus, taking account their monthly wage rate, an individual’s annual income a good summary measure for their annual labor supply.

The occupational classification standard, SSYK, is a four-level hierarchical scheme that is based on the International Standard Classification of Occupations (ISCO), with some adaptations to the Swedish labor market. We use the first three digits of the SSYK to identify a person’s occupation category. The skill requirements of the occupations range between 1 and 4, and correspond to the ISCED’s categorization, where occupations with level 1 require skills comparable to those attained with only 5 years of schooling, and level 4 occupations require skills comparable to those attained from college education (although the skills need not be attained through formal education). In [Appendix A](#) we provide the levels of education corresponding to the skill requirements at each level of the skill content index of the occupational classification (see [Table A.2](#)). In [Appendix A](#), we also display the skill level required for each major occupation group in the SSYK. As shown in [Table A.3](#) of this Appendix, the highest level of skill is required for occupations within the group containing “legislators, senior officials, and managers”. As we explain in detail in [Appendix A](#), the educational level associated with each occupational skill level does not mean that the occupation requires the equivalent formal schooling; the worker may

have obtained the required skills through work experience. This is important as it implies that variation in occupational skill content within individuals over their early careers is not primarily derived from obtaining more education; it is derived from moving up or down the occupational ladder, or altogether changing jobs.

All establishments and organizations within the public sector (government, county council, and municipality) are covered in the Wage Structure Statistics. For the private sector, all firms with 500 employees or more are covered, while a random sample is drawn on firms with fewer than 500 employees. (As noted above, firms of any size may have multiple establishments.) The sampling is stratified based on a cross-classification of industry and establishment size, with the end result covering around 50 percent of all private sector workers in Sweden. The Wage Statistics also includes sample weights that allow calculation of aggregate statistics that are nationally representative.<sup>12</sup>

In terms of workplace characteristics, the linked employer-employee data set includes industry classification (NACE), establishment size, and workplace location (municipality). We exploit the richness of our data to construct a wide range of additional workplace attributes. Specifically, we characterize the workforce of individuals' workplace (excluding the focal worker's characteristics) using data on *all* individuals employed at their workplace, with the aid of the matched employer-employee data set combined with demographic information from LOUISE, and from the wage- and occupation information from the Wage Structure Statistics. This allows us to measure the skill and gender composition and the occupational diversity at each workplace, e.g., the share of workers with a managerial position. Finally, for a sub-sample of firms in the manufacturing sector, our data includes information on value added per worker, both at the firm and workplace level.

The employer-employee, LOUISE, and Wage registers cover the time period 1985 through 2007. However, the occupational classification is only available from 1996 onwards.

## 2.1 Analysis Sample & Summary Statistics

Our interest is in the wages, hours of work, income and the characteristics of jobs and workplaces and career progression at the outset of workers' careers. To this end, we construct a sample of individuals

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<sup>12</sup>Part of our empirical strategy relies on within-person variation in the attributes of the establishments/workplaces in which they work, which means that only individuals who appear in the wage structure statistics multiple years help identify the coefficient of interest. To deal with the sampling issue, we use an imputed measure of wages for workers for whom we observe an employment in the employer-employee full-population data set, but who are missing in the wage structure statistics. In [Appendix A](#) we describe the imputation strategy and compare the wage structure with imputed missing wage information to the true wage distribution.

who first enter the labor market as of 1996 or later.<sup>13</sup> We restrict our analysis to cohorts of workers entering after 1996, since the earliest year we have data on workers' occupation is 1996. We further restrict the sample to individuals whose first child was born *after* entering the labor market. Thus, all individuals in our sample enter the labor market without children, and subsequently become parents at some point during the observation period. That is, our sample consists only of women and men who were observed to have become parents by 2008. Net of these sample restrictions, we end up with 328,812 unique individuals.

[Table 1](#) displays summary statistics, separately by gender and measured in the year of labor market entrance. Comparisons of columns (1) and (2) show that female workers are slightly younger than male workers when they enter the labor market. This age difference might be attributed to women finding a first job more quickly compared to men, as shown by the average number of years between the completion of highest attained education and finding a first job. Consistent with Bertrand, Goldin, and Katz (2010), wages of male and female workers in our sample are relatively similar at the onset of the career, with an initial raw wage gap of only 5 log points. Contracted work hours are somewhat lower for women, who work, on average, 87% of a full-time equivalent job compared to 0.95 for male workers. Despite a relatively small gender wage gap, there are large gender disparities in the sector of employment. Around 48 percent of women start their careers in the public sector (county council, municipality) or government sectors, with the remaining 52 percent working in the private sector. For men, the corresponding numbers are 26 percent in the public sector and 74 percent start out in the private sector.<sup>14</sup>

In [Table 2](#) we take a closer look at the attributes of the jobs and workplaces of female and male workers at the onset of their careers. The results show that the establishments at which the typical female worker is employed is characterized by a lower average wage, lower wage dispersion, lower contracted work hours and a larger number of employees compared to the typical male's workplace. The difference in the share of female employees at men's and women's workplaces is striking, with roughly 66 percent of a woman's co-workers being female compared to 36 percent for men. Thus, there is significant gender segregation across workplaces in Sweden. Moreover, women's workplaces seem to

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<sup>13</sup>We define labor market entry as the first job after completing the highest attained level of education, that lasted at least four months, and yielded earnings exceeding three times the 10th percentile of the full wage distribution. Details are provided in [Appendix A](#).

<sup>14</sup>The sample sizes vary in [Table 1](#) and [Table 2](#) due to some variables being drawn from population-wide data, and others from the Wage Structure Statistics which includes the universe of public sector employees, but only around half of all private sector workers. Therefore, we apply sample weights to all statistics calculated for variables drawn from the wage register. The reported sample sizes are, however, the unweighted sample sizes.

exhibit a flatter organizational structure, as the share of employees with a managerial position is lower at the typical female’s workplace. There so is a somewhat lower occupational diversity at the workplace of women as measured by the number of distinct occupational titles. However, there is not a large difference in the skill composition across men’s and women’s workplaces.<sup>15</sup>

Thus, the descriptive evidence provided in Tables 1 and 2 indicates that male and female wages do not differ to a large extent at the outset of their careers, but the jobs of men and women and the establishments in which they work do differ with respect to several important non-wage attributes. In the next section, we take a closer look at how wages and non-wage attributes of men and women workers transition over the career, especially with their entry into parenthood.

### **3 Wage & Non-Wage Attributes of Jobs & Workplaces Observed over the Transition to Parenthood**

In this section we provide an empirical description of the relationship between wages and the attributes of the jobs and workplaces in which men and women work and parenthood status. We make no attempt to adjust these estimates for selective differences in labor market productivity or tastes. Such adjustments are developed in section 4.

#### **3.1 Differences in Work Career Outcomes by Gender and Parenthood**

To illustrate how wages and other career outcomes evolve for male and female workers in Sweden, Table 3 compares the log wages, contracted work hours, annual labor income and occupational skill-content of men and women, before and after becoming parents. Panel A displays the means and differentials for all women and all men, while Panels B and C repeat these estimates for non-parents (i.e., men and women before they become parents) and for parents (i.e., after they have had children). The gender differences in this table are unadjusted, i.e., they are simple differences in means.

With respect to log wages, the overall gender gap for our sample is 13%. Consistent with our findings in Table 1 it is lower for non-parents [10.09%], but the gap widens considerably among parents [15.78%]. The widening of the gender wage gap with parenthood is found in Angelov, Johansson, and Lindahl (2016). There also is an overall gender gap in contracted work hours of 9%, again with the gap for non-parents being smaller [6.09%] and for parents being larger [13.56%]. With respect to annual labor

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<sup>15</sup>The proportion medium skilled workers in Table 2 refers to the shares of a workplace’s workers with occupations requiring skill level 2. These shares, along with those for low-skilled workers (skill level 1), professionals (skill level 3) and managers and senior officials are found in Table A.2 of Appendix A.

income, which reflects both wage rates and actual hours worked, we find an unadjusted overall gender gap of 141,288 SEK which is a 38% gap relative to men’s income. The gap in labor income also is smaller among non-parents [59,548.8 SEK or 18.1% of men’s income] and much larger among parents [225,739.6 SEK or 53% of men’s income], where this latter gap in income between mothers versus fathers reflects the fact that mothers take much more time off in the form of parental leave than do fathers. Finally, with respect to the occupational skill-content index described in the previous section, there is a gender gap for all men and women [0.0498], one that is slightly smaller among non-parents [0.0403] and larger among parents [0.0645], although all of these gaps, as a percentage of men in each group are relatively small.

### 3.2 Differences in Workplace Attributes by Gender and Parenthood

As seen in [Table 2](#), the jobs of men and women differ with respect to several non-wage attributes already at the start of their careers. But how do women’s and men’s job and workplace choices, i.e., choices of the non-wage attributes of jobs, evolve over the life cycle? To address this, we estimate a simple difference-in-differences specification, regressing a set of workplace attributes on an interaction term between being female and having at least one child, while controlling for age and calendar year effects. The resulting coefficients on this interaction term from each regression are presented in [Table 4](#). We find that the wages and average contracted work hours of co-workers are lower in the workplaces of mothers compared to those of men and non-parent women. Motherhood also is negatively associated with the share of managers at mothers’ workplaces, the share of the workforce with professional occupations, and the within-workplace wage dispersion. Moreover, the share of female co-workers, share of part-time workers, and the share of female co-workers with young children are positively related with parenthood for female workers. Finally, the firm growth rate and the firm-level value added per worker also is negatively associated with motherhood, suggesting that women may be more likely to move to lower productivity workplaces after becoming parents than male and/or non-parent workers.

### 3.3 Transition to Parenthood & Career Outcomes

Given the findings in [Table 4](#), we next examine how the career outcomes of men and women change as they transition to parenthood. To do so, we employ an event-study approach in the spirit of Kleven, Landais, and Sogaard (2018). Let  $G_{ist}^g$  denote an outcome for individual  $i$  of gender  $g$  that occurred in calendar year  $s$  when  $i$  is age  $t, t \geq t_0$ , where  $t_0$  is the age of entry into the workforce. We want to examine how outcomes change before and after the birth of  $i$ ’s first birth. Using the notation developed

in [section 4](#), we let  $\kappa_i^g$  denote the age at first birth, or the beginning of childrearing, for individual  $i$  of gender  $g$ . Then, we construct a (unbalanced) panel of observations for individuals over ages  $\kappa_i^g - 5, \dots, \kappa_i^g + 10$  and estimate the following equation:<sup>16</sup>

$$G_{ist}^g = \eta_0^g + \sum_{j=-4}^{10} \eta_{1j}^g \mathbb{1}\{t = \kappa_i^g + j\} + \sum_{k=1}^K \eta_{2k}^g t^k + \sum_{\ell=0}^L \eta_{3s}^g \mathbb{1}\{s = Year_0 + \ell\} + v_{ist}^g, \quad (1)$$

where  $\mathbb{1}\{t = \kappa_i^g + j\}$  is the indicator function for age  $t = \kappa_i^g + j$ ;  $\sum_{k=1}^K \eta_{2k}^g t^k$  is a polynomial function of age  $t$ ;  $\mathbb{1}\{s = Year_0 + \ell\}$  is an indicator for (calendar) year,  $s$ , in which the individual is age  $t$ , where  $Year_0$  is the year in which the oldest cohort in the sample was age 15; and the outcomes ( $G$ ) are wage rates, contracted work hours (measured as the percentage of full-time), the yearly income earned from market work, and the skill-level of one's occupation. Thus in (1) the  $\eta_{1j}^g s$ ,  $j = -4, \dots, 0, \dots, 10$ , measure the *deviations* of outcome  $G$  relative to five years before that birth ( $j = -5$ ), netting out age ( $t$ ) and calendar year ( $s$ ) effects. We estimate (1) separately for female ( $g = 1$ ) and male ( $g = 0$ ) workers for each labor market outcome,  $G$ , and restrict our analysis sample to those women and men who gave birth to their first birth within the first ten years after labor market entry.<sup>17</sup>

Since almost all women are on parental leave during the year of birth of their first child,<sup>18</sup> we have very few observations on the variables obtained from the wage structure register in the year of childbirth for women. Moreover, those that are present at the workplace in the year of the birth are likely to be a select group of mothers.<sup>19</sup> To avoid this source of selectivity, we impute missing information in the year of childbirth using the preceding year's values of the workplace attributes and own wages, conditional on being employed in the same workplace in the two adjacent  $\kappa$  years. We perform this imputation for women only, since very few fathers are absent from the workplace in the year of the birth of their first child.

[Figure 1](#) depicts the *percentage deviations* in labor market outcomes relative to five years before their first birth ( $j = -5$ ) for women and men. The graphs plot the estimated coefficients on the  $\mathbb{1}\{t = \kappa + j\}$

<sup>16</sup>While we do not observe the full panel of observations over ages  $\kappa_i^g - 5, \dots, \kappa_i^g + 10$  for each individual in our sample, we are able to construct synthetic life cycles due to that the inflow of individuals to the labor market and into parenthood occurs at different calendar points in time for our sample.

<sup>17</sup>In [Figure B.1 of Appendix B](#) we display the distribution of the timing of first births, defined as the number of years elapsed between labor market entry and the first birth, for the women and men in our sample, as well as the distribution of ages at first births by gender.

<sup>18</sup>All parents in Sweden are entitled to up to 480 days of government-mandated paid parental leave with job protection, and nearly all mothers take-up parental leave benefits.

<sup>19</sup>Recall that the Wage Structure Statistics only covers workers with at least one hour of work during the survey month, so that wage observations for individuals on e.g., parental leave are censored. However, the matched employer-employee data set includes all individuals with an employment, allowing us to identify the workplaces of those that are absent from work during the survey month of the Wage Structure Statistics.

variables ( $j = -5, \dots, 0, \dots, 10$ ) from (1) divided by predicted values of the four labor market outcomes, where the predicted values also adjust for age ( $t$ ) and year ( $s$ ) and where the values for  $j = -5$  are equal to zero for both females and males. As one can see in [Figure 1-A](#), there is not a sizable difference in the *trends* in average wage rates across gender in the years preceding first births, but immediately after the first birth women's wages fall behind males' wages (which do not change after having their first child). Ten years after the first child is born, women have approximately 15 percent lower wages compared to five years before they gave birth to their first child. Panel (B) shows the corresponding results for contracted work hours, and shows that women resort to part-time work after the first child is born, whereas no change is found for men. Panel (C) shows that in terms of earnings, there is a substantial drop in women's earnings immediately upon becoming a parent, and their earnings do not catch up even 10 years after birth. Finally, panel (D) shows that, before first birth, the average skill-level of men's and women's occupations are parallel, but start to diverge in the second year after birth, with women's skill progression falling behind men's to an increasingly larger extent over time. These findings are suggestive that childbearing has very different impacts on the careers of male and female workers, with an apparent "mommy-track" consistent with evidence from previous studies.

### 3.4 Transition to Parenthood & Workplace Switching

Finally, given the findings of differences in the workplace attributes of mothers in [Table 4](#), we examine the extent to which women and men change workplaces around the time of their first births. To do so, we estimate the specification in (1), where, instead of labor market outcomes, the outcome variable is whether an individual's workplace changes from one year to the next, conditional on being employed. The estimated probabilities of switching workplaces by age for this specification are presented in [Figure 2](#). While men's job-to-job mobility steadily decreases over the life cycle, women's job-to-job mobility appears to be closely linked to the timing of parenthood, with lower mobility in the years immediately surrounding birth, but higher mobility before.

## 4 Modeling Worker Preferences for Jobs & Workplaces for Constructing an Index of Family Friendly Workplaces

The descriptive analyses presented in [section 3](#) suggest that the entry into parenthood results in differences in the attributes of jobs and workplaces of both women and men. In this section, we develop a

model-based strategy for measuring the family friendliness of workplaces in Sweden.

Jobs and workplaces are characterized by a set of observed attributes, over which workers have preferences, which can vary by a worker's gender and whether or not they are parents. Our econometric strategy for estimating worker preferences is based on a revealed preferences strategy, using data on the observed choices of whether to remain in their incumbent job and workplace or change it. Below, we outline a model of worker choice that guides our estimation approach. The model is based on a set of assumptions about the labor market environment which are grounded in Swedish laws and regulations governing parental leave, employment and worker rights. As discussed below, these laws and regulations constrain workers' choices in significant ways.

We allow preferences over jobs and workplaces to differ by the gender and parenthood status of workers. The timing of the entry into parenthood is subject to choice, but also is influenced by the inherent stochastic nature of the human reproductive process. Below, we characterize the features of a simple model of the timing of entry into parenthood and the arrivals of first births and their consequences for estimating job and workplace preferences that are conditional on parenthood.

As noted in [section 1](#), job and workplace preferences can be used to characterize a worker's marginal willingness to pay (MWP) for non-wage attributes. While such measures have been the focal point of past analyses of gender wage differences, we use these MWPs for mothers to construct a measure of an index of the "family friendliness" of workplaces. Below, we describe the construction of our index of family friendliness for every Swedish workplace in our data and examine the nature of worker sorting by the family friendliness of workplaces as young men and women transition into parenthood, and how the labor market outcomes of women and men vary by the family friendliness of the establishment in which they work. We postpone until [section 5](#) a discussion of how we identify and estimate the causal impacts that working in more family friendly jobs and workplaces have on these labor market outcomes for mothers and fathers.

## **4.1 Choices of Jobs & Workplaces and Timing of Parenthood**

### **4.1.1 Parenthood & Childbearing**

In this section we characterize the onset of parenthood and the children over the life cycle. We postpone to [section 4.1.5](#) a discussion of the decision of exactly when individuals enter parenthood.

All individuals, indexed by  $i$ , begin their labor market careers at age  $t_0$ , the age at which an individual completes their education and enters the labor market. Throughout, we index the gender of individual  $i$

with the indicator  $g_i$ , where  $g_i = 1$  is a *female*, so that  $1 - g_i = 1$  denotes a *male*. Let  $p_{it}$  denote the indicator of individual  $i$  being in the *state of parenthood* at age  $t$  and, consistent with the individuals in our analysis sample, all of them are not parents at  $t_0$ , i.e.,  $p_{t_0} = 1$ . The state of parenthood ( $p_{it} = 1$ ) starts at that age when an individual begins *trying to have their first birth*.<sup>20</sup> Entering parenthood is an irrevocable decision, i.e., once  $p_{it} = 1$ ,  $p_{i,t+s} = 1$  for  $s = 1, 2, \dots, T - t$ , where  $T$  is the age of death. Individuals in the state of parenthood keep trying to have children until they succeed. Let  $\tau$  denote the *age of the onset of parenthood*, i.e.,  $\tau$  is the age such that  $p_{i,\tau-k} = 0, k = 1, 2, \dots, \tau$ , and  $p_{i,\tau+k'} = 1, k' = 0, 1, 2, \dots, T - \tau$ .

Let  $c_{it'}$  denote the indicator for being in the *state of having children* at age  $t'$  and let  $\kappa$  denote the age at which  $i$  first has children, or  $i$ 's *age at first birth*. Similar to the state of parenthood, the state of having children ( $c_{it} = 1$ ) is an absorbing state. Thus,  $c_{i,\kappa-\ell} = 0, \ell = 1, 2, \dots, \kappa$ , and  $c_{i,\kappa+\ell} = 1, \ell' = 0, 1, 2, \dots, T - \kappa$ . It follows that the state of parenthood not only includes the period after the arrival of one's first child,  $t > \kappa_i$ , but also the period one is trying to conceive the first birth, i.e.,  $t \in (\tau_i, \kappa_i)$ .

While individuals in our model can choose when they start trying to be a parent, they cannot choose the exact date when they actually become one. In particular, while births can be avoided, i.e., contraception is assumed to be perfect, births are stochastic events, occurring at random after women start trying to become pregnant. Consider an individual at age  $t$ . Births occur probabilistically. Let  $e, e \in (0, 1)$ , denote the probability that a pregnancy occurs at the end of age  $t$ . It follows that the probabilities for individual  $i$  to become pregnant and have their first birth, conditional on being and not being a parent as defined above is given by:

$$\begin{aligned} \text{Prob}(c_{it} = 1 \mid p_{it} = 0) &= 0, \\ \text{Prob}(c_{it} = 1 \mid p_{it} = 1) &= e. \end{aligned} \quad (2)$$

It follows that the probability that a parent who is trying to have their first birth will wait exactly  $k$  years before succeeding is given by:

$$\text{Prob}(c_{i,t+k} = 1 \mid p_{it} = \dots = p_{i,t-k} = 1 \ \& \ c_{i,t+1} = 0 = \dots = c_{i,t+k-1} = 0) = (1 - e)^{k-1}e, \quad (3)$$

and that the difference between  $\kappa$  and  $\tau$ , is a random interval governed by a stochastic birth process discussed above.<sup>21</sup> While, as discussed in section 4.1.5 below, we allow the age of entry is the state

<sup>20</sup>Trying to have children can be characterized as couples no longer using contraception during sexual intercourse.

<sup>21</sup>We assume that all subsequent births after the first are governed by the same birth process defined in (2) and (3).

parenthood to be a choice made by individuals (with their spouses or partners), we note that preceding assumptions about the stochastic nature of the birth process imply that the age of entry into the state of childhood is, in part, random. The latter randomness helps to identify selection-adjusted estimates of the preferences of workers over the attributes of their jobs and workplaces.

#### 4.1.2 Jobs & Workplaces and Worker Preferences over Them

A *job* is defined as a position located in *firm* – or, more accurately, *workplace* –  $f$  in which an individual works. We assume that a job that an individual holds, or may seek, at age  $t$  is completely characterized by the vector of characteristics,  $(w_{ift}, \mathbf{z}_{ift})$ , where  $w_{ift}$  denotes the wage that  $i$  receives at age  $t$  from a job that is located at workplace  $f$  and  $\mathbf{z}_{ift}$  denotes the vector of non-wage attributes of that job and workplace. Note that some of the non-wage attributes of a job are characteristics that are specific to the person holding that job, such as the occupational category of the job, e.g., professional, technician, etc., while others are characteristics specific to the workplace  $f$ , firm and its work environment, such as the sector in which the workplace is located (e.g., private or public), its size, or the gender composition of the workplace’s workforce.

We assume that individuals make their parenthood and job choices so as to maximize expected utility. Furthermore, as noted above, we simplify the ways in which job and workplace choices and childbearing interact over the life cycle in the way they characterize individuals’ per period preference functions.

Individuals are assumed to have the following per period utility functions over working in a job at workplace  $f$  at age  $t$ :

$$U^p(w_{ift}, \mathbf{z}_{ift}, \phi_i, \zeta_{it}^p) \equiv \phi_i + \theta_0^p + \theta_1^p w_{ift} + \theta_2^{p'} \mathbf{z}_{ift} + \zeta_{it}^p, \quad (4)$$

where  $(w_{ift}, \mathbf{z}_{ift})$  are the observable traits of a job in workplace  $f$  at age  $t$ ;  $\phi_i$  is age-invariant person-specific parameter that characterizes their other preferences and/or a worker’s innate abilities that affect their returns to working in any job;<sup>22</sup> and  $\zeta_{it}$ , is a transitory preference shock, which we assume to be independently and identically distributed over time. Note that the preference function in (4) and its parameters are allowed to differ by individual  $i$ ’s parenthood status,  $p$ , and by individual  $i$ ’s gender. Consistent with the assumptions in section 4.1.1, we allow an individual’s preference function to switch from that for a non-parent ( $p = 0$ ) to that for a parent ( $p = 1$ ) before the actual occurrence of a birth ( $c_{it} = 1$ ) in order to characterize job and workplace choices made in anticipation of first births.

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<sup>22</sup>In principle, we can allow  $\phi_i$  to vary with parenthood status,  $p_{it}$ . In the empirical analysis discussed below, we discuss the consequences of relaxing this invariance assumption on  $\phi_i$ .

The marginal utilities of wages and other job and workplace attributes for working in job/workplace  $f$ ,  $\theta_1^p$  and  $\theta_2^p$ , respectively, can be used to characterize an individual's *marginal willingness to pay* (MWP) out of wages for attribute  $k$  of a job/workplace of parents and non-parents:

$$\theta_{2k}^p / \theta_1^p, p = 0, 1, \quad (5)$$

#### 4.1.3 Types of Job and Labor Force Transitions

An individual's job can change for a number of reasons. It can change over the course of working in a particular workplace or as the result of changes in the workplace itself. Furthermore, a worker can leave, or be forced to leave, employment altogether. In this section we characterize the types of transitions we account for in our model, but we begin with a discussion of those that we do not.

An important feature of the Swedish welfare state is a set of laws and regulations which create incentives and worker rights that constrain work-related transitions of individuals. For example, under Swedish job protection laws it is difficult for employers to fire or layoff workers, especially if the (female) worker is pregnant or for parents with a newborn or young child (Teknikföretagen, 2012; L&E Global Sweden, 2017). While individuals in Sweden do experience spells of unemployment and being out of the labor force, the risk of becoming unemployed before and after the birth of a child is low due to three key features of the Swedish government's parental leave program. First, the parental leave benefits received when someone takes such leave is a function of one's wage and employment history, creating a strong incentive to establish such a history before beginning parenthood and taking a parental leave. Second, when parents do take parental leave they remain an employee of the workplace they left – albeit recorded as working zero hours – since, by law, they can return to the workplace and their position at the end of their leave. (This leave may be taken, with benefits, for up to 18 months after a birth and intermittently until each child reaches age eight.) Third, during those first eight years, a parent has the right to reduce their contracted hours of work to less than full-time and employers must accommodate this request. Finally, we note that these policies apply to both mothers and fathers.

Thus, most of the action in job turnover in Sweden around the onset of parenthood is due either to the changing of jobs within a workplace or to changing workplaces (and jobs). Studying the job mobility patterns in Europe, Japan, and in the US, Borghans and Golsteyn (2012) find that job-to-job mobility<sup>23</sup> in Sweden is at the European average, that job-to-job transition rates are the same across the genders,

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<sup>23</sup>Job-to-job mobility in this study include changes in employers and/or in titles of the function or job description.

and that voluntary job-to-job mobility is the main reason for mobility in Sweden, around 91% of all mobility. As can be seen in [Figure 3](#), we see that among the women and men in our sample the rates of transitions to and from non-employment are very low both before and after their first births and that workplace-to-workplace transitions dominate the movements of members of our sample. We note that the corresponding figure in other countries is lower than in Sweden, e.g., voluntary job-mobility in the US is estimated to account for 62% of job movements.

Given these findings, we ignore transitions to and from unemployment and not-in-the-labor-force, as well as layoffs and firings, in the modeling of labor market turnover used to estimate worker job and workplace preferences of Swedish women and men in our sample.

The two remaining sources of year-to-year job turnover for Sweden are:

- (a) *within workplace* job changes, i.e.,  $(w_{ift}, \mathbf{z}_{ift})$  changes from  $(w_{ift}, \mathbf{z}_{ift})$  to  $(w_{if,t+1}, \mathbf{z}_{if,t+1})$  or
- (b) *workplace-to-workplace* job changes, i.e.,  $(w_{ift}, \mathbf{z}_{ift})$  changes from  $(w_{ift}, \mathbf{z}_{ift})$  to  $(w_{if',t+1}, \mathbf{z}_{if',t+1})$  due to the move from workplace  $f$  to workplace  $f'$ .

Within workplace job changes are due to individuals moving up (or down) *internal* job ladders or changes in the workplace itself due to changes in the profitability of the firm or growth in the establishment's workforce. While the latter may be exogenous to the individual, the literature characterizes the latter transitions be the result of a worker's acquisition of firm-specific human capital (Becker, 1962; Lazear, 2009) and/or job assignment via internal promotions based on their abilities (Gibbons and Waldman, 1999b,a; Lazear and Oyer, 2013). With respect to workplace-to-workplace transitions – often referred to as either “job-to-job” or “employer-to-employer” transitions – the literature has viewed them as the sorting of workers across firms via job search (Garibaldi and Moen, 2010; Garibaldi, Moen, and Sommer-voll, 2016) and find that they are a sizable share of labor force flows (Davis and Haltiwanger, 1999) and are important for wage growth and productivity (Lentz and Mortensen, 2005; Postel-Vinay and Robin, 2002; Sorkin, forthcoming).

In our modeling to recover worker preferences over job/workplace attributes, we focus on workplace-to-workplace transitions for several reasons. First, we have much less information about the internal mechanisms for within-workplace transitions, making it difficult to separate out more exogenous year-to-year changes in job/workplace attributes from those that result from workplace-specific human capital acquisition or job ladders. Second, while previous models of labor market turnover – see Sorkin (forthcoming) among others – face similar data restrictions and employ various assumptions to sepa-

rate out these factors, we establish below that we can identify worker preferences solely off of observed workplace-to-workplace transitions.<sup>24</sup> The latter do require some assumptions about how workers make their decisions to change workplaces, to which we now turn.

In our model, we allow workers to search for new workplaces (and jobs) via a *job lottery*. Job lotteries have been used as a mechanism in bargaining models of labor markets with on-the-job search to “convexify” the payoff space, where the lotteries are over wage offers (Shimer, 2006; Bonilla and Burdett, 2010). Employment lotteries are used in macro models of labor markets to deal with the indivisibility of labor supplied when all agents are homogeneous (Hansen, 1985; Rogerson, 1988; Ljungqvist, 2002). The cost of entering the lottery is  $r$ , denoted in units of utility.<sup>25</sup> The lottery will produce a new job,  $(w_{if,t}, \mathbf{z}_{if,t})$ , that is drawn from a distribution of jobs,  $F_t(w_{f'}, \mathbf{z}_{f'})$ , which is known to agents. Individuals must decide to enter the lottery before seeing the actual draw and they must accept this new offer, regardless of whether it is dominated, *ex post*, by the terms of one’s  $t - 1$  job,  $(w_{if,t-1}, \mathbf{z}_{if,t-1})$ .

Job lotteries provide a mechanism for individuals to change workplaces in our model and allows us to account for workplace-to-workplace turnover that we see in our data (Figure 3) in a theoretically manageable way.<sup>26</sup> We note that this mechanism also allows for the common finding in other studies of labor market turnover that some workers change to jobs that have lower wages and/or less desirable job and workplace attributes relative to one’s previous job.

#### 4.1.4 Decision Rule for Changing Workplaces

Consider the decision rule for whether an individual changes their workplace. At each age  $t$  and conditional on either being in the state of non-parenthood ( $p, p = 0$ ) or parenthood ( $p = 1$ ), individual  $i$  makes a decision as to whether to change her/his job or remain in their incumbent job by comparing the value of remaining in their incumbent job with the value of entering the job lottery to obtain a new workplace and job.

A key feature of the decision to change workplaces is how workers form expectations about the job/workplace that this job lottery is expected to produce. Let  $(E_{it}(w), E_{it}(\mathbf{z}))$  denote individual  $i$ ’s expectation at age  $t$  of the wage and non-wage attributes of the job that the lottery would produce. We assume that the environment in which workers make their decisions is temporally stationary, but we

<sup>24</sup>Below, we comment on estimates of these preferences based on an empirical specification that also includes within-workplace job changes.

<sup>25</sup>Note that we implicitly assume that at age  $t_0$ , i.e., an individual’s first job and its attributes, is generated by such a lottery.

<sup>26</sup>An alternative to the use of job lotteries as the mechanism for changing workplaces would be to allow for search in which actually see a job offer from another employer/workplace and decide whether or not to take it.

allow for individual differences in these expectations.<sup>27</sup> As a result,  $F_t(w_{f'}, \mathbf{z}_{f'}) = F(w_{f'}, \mathbf{z}_{f'})$ , so that  $(E_{it}(w), E_{it}(\mathbf{z})) = (E_i(w), E_i(\mathbf{z}))$ .

Let  $V(\phi_i, \mathbf{g}_{ift})$  denote the *value of employment* to individual  $i$  with characteristics  $\phi_i$  in workplace  $f$  with job characteristics  $\mathbf{g}_{ift}$  and let  $L(\phi_i, r)$  denote the worker's *value of the job lottery* with cost  $r$ . These two values are characterized by the following functions:

$$V^p(\phi_i, \mathbf{g}_{ift}) = U^p(\mathbf{g}_{ift}, \phi_i) + \beta E \max [V^p(\phi_i, \mathbf{g}_{if', t+1}), L(\phi_i, r)] \quad (6)$$

and

$$L^p(\phi_i, r) = r + E_i U^p(\mathbf{g}, \phi_i) + \beta E \max [V^p(\phi_i, \mathbf{g}_{if', t+1}), L(\phi_i, r)] \quad (7)$$

where  $\beta$  is the discount rate. Note that the last term in each of these valuation functions is the same, characterizing the expected value of the decisions they make from age  $t + 1$  onward. Let  $\Delta J_{it}$  be indicator for whether  $i$  chooses to change employers, i.e., enter the job lottery, at age  $t$ . Then  $\Delta J_{it} = 1$ , if and only if:

$$\begin{aligned} L^p(\phi_i, r) - V^p(\phi_i, \mathbf{g}_{ift}) &= E_i U^p(\mathbf{g}, \phi_i) + r^p - U^p(\mathbf{g}_{ift}, \phi_i, \zeta_{it}^p) \\ &= r^p + \theta_1^p [E_i(w) - w_{ift}] + \theta_2^p [E_i(\mathbf{z}) - \mathbf{z}_{ift}] + \zeta_{it}^p \\ &= \psi_i^p - \theta_1^p w_{ift} - \theta_2^p \mathbf{z}_{ift} + \zeta_{it}^p > 0 \end{aligned} \quad (8)$$

where third line in (8) follows from linear specification of  $U^p$  in (4) and where

$$\psi_i^p \equiv \theta_0^p + \theta_1^p E_i(w) + \theta_2^p E_i(\mathbf{z}), \quad (9)$$

is a person-specific fixed effect and  $\Delta J_{it} = 0$  if inequality in (8) is  $\leq 0$ . As we discuss below in section 4.2, the decision rule for workplace changes in (8) facilitates a relatively straightforward strategy for estimating the parameters,  $\theta_1^p$  and  $\theta_2^p$ , that we use to construct our index of the family friendliness of workplaces in Sweden.

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<sup>27</sup>The latter assumption allows individuals to condition their job/workplace decisions on their personal knowledge, which may vary by their education, knowledge of local labor market conditions, etc., when making their forecasts about the wages and non-wage attributes of jobs that would be generated if they chose to enter the job lottery.

#### 4.1.5 The Decision to Enter Parenthood

As noted above, the decision of individuals to enter the state of parenthood is likely to be endogenous. In [Appendix C](#), we characterize the decision-rule for choosing at what age over their life cycle to enter this state. There, we establish the latter rule in terms of the per-period payoff function in (4) and its parameters. Thus, in principle, one uses the latter rules in conjunction with those for the within-parenthood job change decision rule in (8) to characterize those job changes that coincide with the entry into parenthood. (Recall from [Figure 2](#) that many job changes, especially for women, coincide with first births.) However, as we argue in [Appendix C](#), the decision rule for the timing of first births are highly non-linear in the parameters of  $U^p(w_{ift}, \mathbf{z}_{ift}, \phi_i, \zeta_{it}^p)$  in (4), including the individual-specific fixed effects, which greatly complicates their estimation. Accordingly, in the next section, we restrict ourselves to data on within-parenthood job changes to identify these parameters.

#### 4.2 Estimating Worker Preferences over Wage & Non-Wage Attributes of Jobs & Workplaces

In this section we characterize the identification and strategy for estimating the MWP parameters for parents, i.e.,  $\theta_1^p$  and  $\theta_2^p$ . Intuitively, we want to examine parents' decisions to change jobs, since such observable changes induce observable variation in  $w$  and  $\mathbf{z}$ . We use the workplace change decision rule in (8) to form our estimator, treating the  $\phi_i$ s in (9) as individual-specific fixed effects. This allows us to hold constant the individual's permanent intrinsic productivity, workers' occupations and other factors, such as tastes, allowing the factors captured by  $\phi_i$  to differ by parenthood status, i.e.,  $\phi_i^0$  need not equal  $\phi_i^1$  for individual  $i$ . We also exploit our assumption that the birth process is stochastic. Finally, we restrict ourselves to the job changes that occur in the interval  $(\tau, \kappa)$  to identify parental preferences over jobs in an attempt to avoid the confounding effects of non-random changes in jobs that result from the presence of an infant, e.g., changing jobs to be closer to where one lives.

To proceed, we also invoke a distributional assumption for the transitory taste shocks. In particular, we assume that  $\zeta_{it}^m$  has a type 1 extreme value distribution that is independent across an individual's life cycle. It follows conditional on parenthood status,  $p = 0$  for non-parents and  $p = 1$  for parents, our model of job changes has a fixed-effects logit specification. It can be estimated using the conditional fixed effects estimation strategy of Chamberlain (1980), where we treat the  $\psi_i^p$ s as incidental parameters which need not be directly estimated.

In the empirical implementation of our model, we note that some of the measures of characteristics of workplaces in  $\mathbf{z}_{ift}$ s, such as the share of female co-workers in one's workplace, are not direct measures of job or workplace amenities, the focus of research on compensating wage differentials, but, as with the share of female co-workers in a workplace, are the aggregation of workers' endogenously-determined labor market choices. Below, in section 4.4, we return to this issue and consider the potential consequences of this observation for estimation of workers' preferences for workplaces and jobs.

Unfortunately, we do not directly observe the onset of parenthood for women in our sample, i.e., we don't observe the age  $\tau$  such that  $p_{i,\tau-1} = 0$  and  $p_{i\tau} = 1, t = 0, 1, \dots, T - \tau$ . All we observe is the age of the onset of childbearing, i.e.,  $\kappa$ . To solve this problem, we assume that age  $\kappa - k$ , where  $k$  is a fixed lag length, falls in the interval  $(\tau, \kappa)$  for all  $i$ . This allows us to make use of all of the above results by using  $\tilde{\tau} = \kappa - k$  in place of  $\tau$  and appropriately redefining the interval of parenting without the arrival of the first birth from  $(\tau, \kappa)$  to  $(\tilde{\tau}, \kappa)$ . To define  $\tilde{\tau} = \kappa - k$ , we explored different values for  $k$ , examining whether the pre-parenthood and immediate post-parenthood changes in jobs for men and women looked markedly different, i.e., produced different estimates of the parameters in 8. Based on this exploration, we settled on using  $k = 2$  as the lag length for defining  $\tilde{\tau}$ . We note that we did not obtain substantially different results for a lag length of  $k = 1$ .

The same fixed-effects logit strategy can be applied to the job changes of women and men *before* they enter parenthood, i.e., during the period  $(t_0, \tilde{\tau})$ . We present estimates of  $\theta_1^p$  and  $\theta_2^p$  for non-parent women and men below.

Finally, we note that we also estimated a version of this model in which we allowed changes in *both* workplaces *and* jobs within workplaces to identify the parameters,  $\theta_1^p$  and  $\theta_2^p$ . While we argued against using the latter variation in identifying these parameters above, we find that the resulting estimates are not quantitatively very different from those based on only using between workplace variation. Furthermore, they produce very similar values of the family friendliness index defined below and of the effects of the family friendliness of workplaces that we define and present in section 5 below. It appears that once one control for person-specific fixed effects the particular sources of within-person variation in workplaces and jobs one uses are largely random.

### 4.3 Estimates of MWP for Non-Wage Job & Workplace Attributes

In Table 5 we present estimates of the marginal utility parameters,  $\theta_1^{(g,p)}$  and  $\theta_2^{(g,p)}$ , in the per period utility function in (4) for women *before* they enter parenthood [ $(g, p) = (1, 0)$  and  $= (0, 0)$ ] in columns (1)

and (2), respectively, and for women and men *after* they enter parenthood [ $(g, p) = (1, 1)$  and  $= (0, 1)$ ] in columns (3) and (4), respectively. Looking across the estimated marginal utilities for wages and non-wage attributes of jobs, there appears to be substantial differences by gender and by parenthood status. For example, that the marginal utility of the (log) wage worker  $i$  received, is higher for non-parents than for parents and for women versus men, although the gender gap is larger among non-parents than parents. Given these differences in the estimated marginal utilities of wages, we focus on assessing the gender and parenthood status differences in the estimated MWP of these attributes.

As noted above, many of the attributes of jobs and workplaces included in our specification of the utility function in (4) may not be viewed as direct measures of workplace and job amenities by most economists, but rather as the aggregations of individuals' labor market choices. Recall our earlier reference to using the share of female co-workers as one of our attributes. The results in Table 5 show that mothers and fathers value the gender composition of their workplace differently. However, despite the highly gender-segregated labor market in Sweden, there was no statistically significant difference in this valuation among non-parents. Both of these results are not unexpected, as we are holding occupation, productivity, and other covariates fixed. The reason for the differences between mothers and fathers in the valuation of the share of women in one's workplace is likely related to mothers' dual work and family commitments. If mothers are rational, they will search for jobs that are more easily combined with family so, conditional on everything else, the share of female workers is likely to be higher in those workplaces that mothers favor. Thus, most of the variables displayed in Table 5 should not be viewed as job amenities, *per se*, but as indicators or correlates of more traditional, but unmeasured, workplace/job amenities. The fact that these job amenities stem from choices does not mean that we have a reverse causality problem in the estimation of the impacts of working in family friendly workplaces on the labor market outcomes of parents presented below (see section 5), since the MWP estimates used to construct our family friendliness index are estimated using data immediately prior the arrivals of first births.

Using these parameter estimates and the formula in (5), we construct estimated MWPs for each of the non-wage attributes by gender and parenthood status. These estimates are displayed in Table 6, again separately for mothers and fathers and women and men who have not yet reached parenthood. In addition, we provide, in columns (5) – (8), gender differences in MWPs for parents [column (5)] and differences by parenthood status within genders [columns (6) and (7)].

Given our estimation strategy, these estimates net out differences in productivity between women and men and parents and non-parents. Furthermore, our fixed-effects estimation strategy nets out dif-

ferences in occupations by gender and parenthood that might bias how non-parents and mothers and fathers value attributes of jobs and workplaces. Examining the MWP estimates in Table 6, it is clear that notable differences between mothers and fathers and parenthood differences for mothers and fathers in the valuation of jobs and workplaces remain. For instance we see that mothers, relative to fathers, value workplaces that have a larger share of female co-workers with young children, and larger proportion of female co-workers in general. And, relative to non-parent women, women place less value on wage dispersion and on workplaces with a larger proportion of highly educated co-workers.

Taken together, the estimates of the MWPs in Table 6 indicate that gender and parenthood both matter in what individuals value in jobs and their workplaces. Furthermore, as noted above, these differences are over and above any differences in preferences for jobs, and possibly workplaces, that are attributable to gender differences in preferences, as has been the focus of much of the earlier literature (Bertrand, Goldin, and Katz, 2010; Goldin and Katz, 2011; Goldin, 2014; Goldin and Katz, 2016).

#### 4.4 Indexing the Family Friendliness ( $FF$ ) of Workplaces

As noted above, we use the estimates,  $\hat{\theta}_{1,CML}^p$  and  $\hat{\theta}_{2,CML}^p$ , that were estimated with data on the job choices of mothers during the interval  $(\tilde{\tau}, \kappa)$  to form the index of the family friendliness of workplace  $f$  in year  $s$ ,  $FF_{fs}$  as follows. First, for each worker  $k$  in workplace  $f$  in year  $s$ , we calculate the following worker-specific index:

$$FF_{kfs} = \left[ 1 + \exp \left[ \left( \frac{\hat{\theta}_{2,CML}^{(1,1)}}{\hat{\theta}_{1,CML}^{(1,1)}} \right)' \mathbf{z}_{kfs} \right] \right]^{-1}, \quad (10)$$

which measures a transformation of the valuation worker  $k$  would place on the non-wage attributes of their job in workplace  $f$  ( $\mathbf{z}_{kfs}$ ), where the valuation is based on the willingness to pay that a mother  $[(g, p) = (1, 1)]$  has for these attributes. Then the family friendly index for the job/workplace  $f$  in which a particular individual  $i$  in our analysis sample is working in year  $s$ , i.e.,  $FF_{ifs}$ , is defined as the average of the  $FF_{kfs}$ s for all  $N_{fs}$  workers – women and men – working in workplace  $f$  in year  $s$ :<sup>28</sup>

$$FF_{ifs} \equiv \frac{1}{N_{fs} - 1} \sum_{k \in (f,s)} FF_{kfs}. \quad (11)$$

We use the MWP estimates for mothers in Table 6 to construct the worker-specific  $FF_{ifs}$  in (10) – re-

<sup>28</sup>We also have created versions of  $FF_{ifs}$  below where we sum the individual indices over all workers in each workplace except for individual  $i$ 's index, and note that our results are not sensitive to the inclusion of  $i$  in forming the workplace-level family friendliness index.

ardless of the gender of worker  $i$  – and, thus, to construct an  $FF_{fs}$  for each workplace  $f$  in each year  $s$  included in our analysis. We do so for the following reason. While the dual earner family is now the most common family form in the OECD countries,<sup>29</sup> there is a great deal of evidence indicating that the responsibilities for childrearing, especially the time-intensive components, continue to be shared unequally by mothers and fathers. Women are both active in the labor market and perform the majority of household work, while men predominantly specialize in market work (Boye, 2008; Booth and Van Ours, 2009; Evertsson and Duvander, 2010; Tichenor, 1999). More effort in home production in general implies less time and effort is available to spend in market work. Time use studies in Sweden consistently show that time spent on market work is higher for men, but that total time worked (market and non-market work) is about the same for women as for men (Statistics Sweden, 2009). This result is well in line with time-use studies from the U.S., Germany, and the Netherlands (Burda, Hamermesh, and Weil, 2008). It also is well established that an unequal gender division of household and market work emerges first when couples become parents (Van Der Lippe and Siegers, 1994; Sanchez and Thomson, 1997; Gauthier and Furstenberg, 2002; Gjerdingen and Center, 2005; Baxter, Hewitt, and Haynes, 2008), and that fertility decreases women’s labor supply.<sup>30</sup>

In our estimation of workplace family friendliness, we analyze women who change jobs two years prior to having their first child. We argued in section 4.2 that job changes in this interval may better identify the MWP of parents for the attributes of jobs. However, the “burden” of dual roles of family and a work career may, for some women, become apparent only after giving birth to their first child, when job changes are made to reconcile family obligations and work. Such a pattern is consistent with that shown in Figure 2, with greater workplace mobility for women in the four years following the first birth compared to the years immediately before it. This pattern suggests that if our index captures something that characterizes the family friendliness of jobs and workplaces, we should see an increase in job mobility of mothers (relative to fathers) to workplaces that are more family friendly based on our index.

To evaluate this conjecture, we estimate a version of the event-study specification in equation (1), using the family friendliness index ( $FF$ ) of the workplace in which men and women work at each age as the outcome variable. Specifically, we classify workplaces by whether their index is above the 25th

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<sup>29</sup>The employment rate for mothers with children below the age of 15 in the Sweden was 80.8 percent in 2010 (OECD, 2017), and according to the U.S. Bureau of Labor Statistics (2011), the U.S. labor force participation of rate of mothers with children under the age of 18 was 71.3 percent in March 2010.

<sup>30</sup>See, for example, Angelov, Johansson, and Lindahl (2016); Angrist and Evans (1998); Jacobsen, III, and Rosenbloom (1999); Fitzenberger, Sommerfeld, and Steffes (2013).

or 50th percentile cut points of the  $FF$  distribution. The results are displayed in [Figure 4](#). We see that there is a clear increase in the probability of working at a family friendly workplace among women after they have their first child. This result is not surprising, given that our index is constructed using the preferences of mothers. But, what is of more interest is that the family friendliness of the workplaces that mothers and fathers choose differ after their first births and this difference is larger the higher is the threshold defining family friendliness, with women, relative to men, moving to workplaces in the upper tail of the distribution of family friendliness once they become mothers. This, combined with the finding that the job and workplace attribute preference coefficients of mothers and fathers are statistically different, make clear that our index is capturing the workplace and job attributes that matter to mothers as they attempt to balance work and family.

Note also that the likelihood of working in family-friendly workplaces/jobs increases for both men and women after they begin their work careers, but that such jobs are equally attractive for women and men prior to the arrival of their first birth. However, the likelihood of working in family friendly starts to diverge by gender immediately after the first birth, a pattern that is very similar to that shown in [Figure 2](#) with workplace mobility. Given the observed gender divergence *before* parenthood in contracted work hours, labor income, and (to some extent), wage rates seen in [Figure 1](#), the parallel pre-parenthood trends in the mobility of men and women to family friendly jobs in [Figure 4](#) suggests that our strategy of using job changes that occur immediately before the first birth and of controlling for person-specific fixed effects appears to be successful in netting out any productivity- or occupational differences between men and women in the estimation of our family friendly index.

#### 4.4.1 Characteristics of Workplaces across the Distribution of $FF$

In [Table 7](#), we examine the characteristics of workplaces located at different places in the distribution family friendliness,  $FF_f$ . We divide workplaces into quartiles of the family friendliness index distribution and display the workplace attributes for each quartile. In Panel A of [Table 7](#) we display of the characteristics of workplaces that were included in the index, while Panel B displays workplace characteristics that were not included in the index.<sup>31</sup> We include this second set of characteristics to see if our  $FF$  index indeed manages to capture heterogeneity across workplaces in their non-wage attributes beyond those used in its construction.

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<sup>31</sup>The workplace attributes included to estimate the parameters for the MWP of mothers,  $\theta_1^p$  and  $\theta_2^p$  in (4), do not fully overlap with attributes listed in [Table 7](#). This is because to construct the  $FF$  index, we include workplace attributes for which we have full coverage due to being drawn from the population-wide data.

Examining [Table 7](#), one sees that the within-workplace wage dispersion is almost monotonically decreasing with workplace family friendliness. Moreover, family friendly workplaces appear to be more specialized, as the share of co-workers with the same occupational title increases monotonically with the workplace family friendliness index, and the number of occupational titles decreases monotonically. There also are differences with respect to the skill composition of the workplaces' employees: more family friendly workplaces are associated with a lower fraction of workers with highly skilled occupations, such as professionals and associate professionals and technicians, and significantly higher fraction of workers with medium-skilled jobs. The similarity of occupations and their skill content are consistent with family friendly workplaces having relatively compressed within-workplace wage distributions. At the same time, this similarity of occupations suggest that there is less scope for climbing the career ladder – and, thus, for wage growth – within family friendly workplaces. In [Table D.1](#) of [Appendix D](#) we display the most common occupational category of workplaces in the lower end of the *FF* distribution is comprised by professionals (e.g. teaching professionals and public service administrative professionals), while the most common occupation groups in the upper end of the *FF* distribution are those in service or shop sales occupations, and various manufacturing jobs. Finally, more family friendly workplaces are more likely to be located in the private, rather than government or municipal, sectors.

To summarize, all of the evidence points to women transitioning to family friendly workplaces as they become mothers. Such workplaces may be more accommodating to workers with children, in terms of attributes that make market work more easily combined with family responsibilities. In [Table 7](#), we found that workplaces in the upper part of the family friendliness distribution were characterized by a larger fraction of part-time workers, a lower wage dispersion, and a lower skilled and more specialized workforce.

## **5 Impacts of Working in More Family Friendly Workplaces on the Career Outcomes of Parents**

In this section we examine what the impact of working in more family friendly workplaces has on the wages, contracted hours of work, actual labor earnings and the skill-content of jobs of mothers and fathers, on the parental gender gaps, and the penalties of motherhood and fatherhood on these outcomes. Our objective is to estimate the causal effects of moving workers from less to more family friendly workplaces on these labor market outcomes, based on our index of family friendly workplaces. Isolating

such causal impacts requires us to control for individual differences in workers' unmeasured (by the econometrician) productivities and tastes. Below, we characterize a fixed-effects estimation strategy which, much like the one used to identify worker preferences over workplace attributes in section 4.2, exploits within-person changes in workplaces and jobs to identify these effects. We then present our estimated impacts on the labor market outcomes of mothers and fathers and the gender gaps of parents and the parenthood penalties for these outcomes and discuss their implications. We conclude this section with a discussion of some checks on the robustness of our findings to alternative specifications of our outcome equations and of an assessment of the exogeneity of the variation in individuals' workplaces and jobs over their early careers.

## 5.1 Estimating the Impacts of Working in More *FF* Jobs/Workplaces on Labor Market Outcomes

As noted above, our interest is in estimating the effects of exogenously moving workers from less to more family friendly workplaces on the labor market outcomes of mothers and fathers, on the parental gender gaps in these outcomes and the parenthood penalties associated with labor market attainment in workers' early work careers. Let  $y_{it}$  denote individual  $i$ 's outcome (e.g., wages, earnings, etc.) at age  $t$ , where, when appropriate, we further index these outcomes by  $(g, p)$  for the gender and parenthood status of individual  $i$  at age  $t$ , i.e.,  $y_{it}^{(g,p)}$ . The causal effects of moving from the least family friendly workplaces, which we define as those in the bottom quartile of the *FF* distribution (*FF* Q1), to higher quartiles of the distribution (*FF* Q $k$ ,  $k = 2, \dots, 4$ , on the labor market outcomes of *mothers* and *fathers*, respectively, are defined as:

$$\varphi_k^{(1,1)} \equiv E(y_{it}^{(g,p)} | g = 1, p = 1, FF = Qk) - E(y_{it}^{(g,p)} | g = 1, p = 1, FF = Q1), \quad (12)$$

$$\varphi_k^{(0,1)} \equiv E(y_{it}^{(g,p)} | g = 0, p = 1, FF = Qk) - E(y_{it}^{(g,p)} | g = 0, p = 1, FF = Q1). \quad (13)$$

It follows that the causal effects of moving to more family friendly workplaces on the *parental gender gap* is defined to be:

$$\lambda_k^{(.,1)} \equiv \left[ E(y_{it}^{(g,p)} | g = 1, p = 1, FF = Qk) - E(y_{it}^{(g,p)} | g = 0, p = 1, FF = Qk) \right] - \left[ E(y_{it}^{(g,p)} | g = 1, p = 1, FF = Q1) - E(y_{it}^{(g,p)} | g = 0, p = 1, FF = Q1) \right]. \quad (14)$$

Finally, we define the causal effects of moving to more family friendly workplaces on the *penalties to*

*motherhood* and *fatherhood*, respectively, as:

$$\begin{aligned} \mu_k^{(1,\cdot)} &\equiv \left[ E(y_{it}^{(g,p)} | g = 1, p = 1, FF = Qk) - E(y_{it}^{(g,p)} | g = 1, p = 0, FF = Qk) \right] \\ &\quad - \left[ E(y_{it}^{(g,p)} | g = 1, p = 1, FF = Q1) - E(y_{it}^{(g,p)} | g = 1, p = 0, FF = Q1) \right], \end{aligned} \quad (15)$$

$$\begin{aligned} \mu_k^{(0,\cdot)} &\equiv \left[ E(y_{it}^{(g,p)} | g = 0, p = 1, FF = Qk) - E(y_{it}^{(g,p)} | g = 0, p = 0, FF = Qk) \right] \\ &\quad - \left[ E(y_{it}^{(g,p)} | g = 0, p = 1, FF = Q1) - E(y_{it}^{(g,p)} | g = 0, p = 0, FF = Q1) \right], \end{aligned} \quad (16)$$

We note that we are not interested in identifying the causal effects of either the parental gender gap or the penalties of parenthood associated with different labor market outcomes at various points of the  $FF$  distribution, *per se*, but only in identifying the causal effects of *changing* the family friendliness of these constructs. Below, we discuss the sources of variation that we will use to identify these latter causal effects.

In order to identify the above causal effects, we estimate the following individual-specific fixed effect regression function for each labor market outcome:<sup>32</sup>

$$\begin{aligned} y_{it} &= \alpha_i + \delta_1 c_{it} + \delta_2 c_{it} \mathbb{1}\{g_i = 1\} + \sum_{k=2}^4 \delta_{3+k-2} FF_{it}^k + \sum_{k=2}^4 \delta_{6+k-2} FF_{it}^k \mathbb{1}\{g_i = 1\} \\ &\quad + \sum_{k=2}^4 \delta_{9+k-2} FF_{it}^k c_{it} + \sum_{k=2}^4 \delta_{12+k-2} FF_{it}^k c_{it} \mathbb{1}\{g_i = 1\} + \gamma_1 X_{it} + \gamma_2 X_{it}^2 + \varepsilon_{it}, \end{aligned} \quad (17)$$

which is estimated by pooling observations on mothers and fathers and non-parents and where  $\alpha_i$  is an individual fixed-effect,  $c_{it}$  is an indicator variable for whether individual  $i$  has experienced their first birth at age  $t$ ,  $\mathbb{1}\{g_i = 1\}$  is an indicator for whether individual  $i$  is a woman and  $X_{it}$  is the years of work experience  $i$  has at age  $t$ . It follows that the causal impacts defined in (12) – (16) are the following

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<sup>32</sup>We have tested this model specification against one that allows for individual- and parenthood-specific fixed effects for each of the labor market outcomes that we consider. We reject the more restrictive model for wage rates and labor income, and marginally reject it for contracted working hours and occupational skill content. The  $F$ -statistic for these tests are 0.97, 0.84, 1.17, and 1.35 for wages, labor income, contracted working hours, and occupational skill content, respectively. The results are available upon request.

functions of the parameters in (17):

$$\varphi_k^{(1,1)} = \delta_{3+k-2} + \delta_{6+k-2} + \delta_{9+k-2} + \delta_{12+k-2}, \quad (18)$$

$$\varphi_k^{(0,1)} = \delta_{3+k-2} + \delta_{9+k-2}, \quad (19)$$

$$\lambda_k^{(\cdot,1)} = \delta_{6+k-2} + \delta_{12+k-2}, \quad (20)$$

$$\mu_k^{(1,\cdot)} = \delta_{9+k-2} + \delta_{12+k-2}, \quad (21)$$

$$\mu_k^{(0,\cdot)} = \delta_{9+k-2}, \quad (22)$$

for  $k = 2, \dots, 4$ .

The specification in (17) that includes person-specific fixed effects,  $\alpha_i$  and, thus, presumes that within-worker changes jobs and/or workplaces that generate changes in the value of the  $FF_{it}^k$ s over time are random vis-à-vis the other unobserved factors captured in  $\varepsilon_{it}$ . This is consistent with the identification strategy used to estimate the workplace preferences parameters in the utility functions in (4) discussed in section 4.2. Note, however, that in the estimation of the parameters in (17) we use both within-person variation of job changes within a workplace as well as changes in workplaces to identify these parameters. As discussed at the end of section 4.2, we found that using both sources of within-person variations in job and workplace changes, versus only the latter, to estimate the parameters of the utility functions of workers in (4) produced very similar results.

More formally, using these sources of within-person variation in workplace and job changes to estimate the specification in (17) requires that the following *exogeneity conditions* hold:

$$\begin{aligned} E \left[ (\varepsilon_{it} - \varepsilon_{i,t-1}) \left( FF_{it}^k - FF_{i,t-1}^k \right) \mid X_{it} \right] &= 0, \\ E \left[ (\varepsilon_{it} - \varepsilon_{i,t-1}) \left( FF_{it}^k \mathbb{1}\{g_i = 1\} - FF_{i,t-1}^k \mathbb{1}\{g_i = 1\} \right) \mid X_{it} \right] &= 0, \\ E \left[ (\varepsilon_{it} - \varepsilon_{i,t-1}) \left( FF_{it}^k c_{it} - FF_{i,t-1}^k c_{i,t-1} \right) \mid X_{it} \right] &= 0, \\ E \left[ (\varepsilon_{it} - \varepsilon_{i,t-1}) \left( FF_{it}^k c_{it} \mathbb{1}\{g_i = 1\} - FF_{i,t-1}^k c_{i,t-1} \mathbb{1}\{g_i = 1\} \right) \mid X_{it} \right] &= 0, \text{ for } k = 2, \dots, 4, \end{aligned} \quad (23)$$

The conditions in (23) require that any changes in the  $FF^k$ s, and their interactions with childhood status ( $c_{it}$ ) and gender ( $g_i$ ), for individuals is not a response to innovations in the idiosyncratic components of  $y$ . For example, if  $y$  is an individual's wage, (23) requires that any idiosyncratic changes in an individual's wages, such as a cut in one's wages, does not generate a worker's decision to change workplaces and, thus, result in a change in the family friendliness of their workplace. Similarly, (23) requires that such a

wage change (cut) does not lead to a worker’s decision to have a child. Rather, our model assumes that the decisions to change jobs or have a birth at age  $t$  are driven by a combination of an individual’s permanent factors that affect their preferences and productivities, as well as totally random factors that result from the stochastic process generating birth occurrences (see equation (2) in section 4.1.1). In [Appendix E](#), we provide evidence on the reasonableness of the conditions in (23) needed for our identification strategy based on controlling for person-specific fixed effects. We return this matter in section 5.3.

Below, we present estimates of the parameters of the specifications in (17) for each of the four labor outcomes. We present estimates of the causal effects defined in (12) – (16) in terms of the parameters in (17) for each labor outcome.

As we discussed in section 4.1.5, the timing of entry into parenthood – and thus an individual’s parenthood status – is endogenously determined, although the timing of first births, conditional on entry into parenthood, is assumed to be exogenous. As a result, the identification of the effect of parenthood status (i.e., the parenthood penalty) in (17), is contentious. However, as noted above our focus is not on identifying the effects of parenthood *per se*, but rather the effects of changes in the family friendliness of workplaces on the penalties of parenthood for women and men. And, following the logic of the identification of worker preferences in section 4.2, the effects of these changes in the family friendliness of workplaces are identified by the within-individual variation in workplaces (and their family friendliness) in which individuals work over their early careers.

## 5.2 Estimates of Impacts of Moving to More *FF* Workplaces/Jobs on Labor Market Outcomes

In this section we present the results of the estimation of selection-adjusted impacts of *FF* on the monthly wage rates, contracted working hours, annual labor income, and the occupational skill content for mothers and fathers. Columns (1) – (4) in [Table 8](#) present the coefficient estimates from the individual-fixed effects specification in (17) for, respectively, the log of monthly full-time equivalent wage rates, contracted hours of work (measured as the fraction of full-time hours), annual labor income and the index of the skill-content of workers’ jobs.

Using these estimates, we present, in [Table 9](#), estimates of the impacts of exogenously moving from less (*FF* Q1) to more (*FF* Q4) family friendly workplaces for each of the impacts defined in (18) through (22). The rows labeled “*FF* Q1” display estimates of the age- and calendar-year adjusted mean outcomes for the impacts defined in each of the columns, while the subsequent rows labeled “Difference from *FF* Q1” give the effects of moving to the three higher quartiles of the *FF* distribution of workplaces. Finally,

the rows labeled “%Δ from *FF* Q1 to *FF* Q4” display the percentage change in the various columns of the move from *FF* Q1 workplaces to those in *FF* Q4. In what follows, we discuss the findings for the various labor outcomes for each set of impacts displayed in Columns (1) – (4).

### 5.2.1 Impact on Outcomes for Mothers and Fathers

In columns (1) and (2) of [Table 9](#) we present estimates of the impacts of being assigned to workplaces/job in *FF* Q2, Q3, and Q4 relative to *FF* Q1 on the labor outcomes of *mothers* and *fathers*, respectively, i.e.,  $\varphi_k^{(g,1)}$ ,  $g = 1, 2, k = 2, \dots, 4$ . We find that, in terms of wages, mothers would always *gain* by moving up the *FF* distribution, with the largest gain observed between the lowest and highest quartile of workplace family friendliness. However, relative to the mean wage rate of women in *FF* Q1, this increase in wage rates is small; 0.09 percent. For fathers, on the other hand, moving to a workplace in the upper tail of the *FF* distribution would have a *negative* effect on their wages. The differential impact on mothers and fathers suggests that workplace family friendliness primarily benefits mothers, likely because they are the main caretakers of children and, therefore, the group for which family friendliness may facilitate the combination of market work and raising a family.

With respect to contracted hours of work (Panel B of [Table 9](#)), moving from *FF* Q1 to *FF* Q4 would slightly increase contracted hours of both mothers (1.1 percent) and fathers (0.9 percent). For mothers, the net effect of increased wage rates and contracted hours of work results in a positive effect on their annual earned income from market work (Panel C) of 3.5 percent. However, for fathers, the net effect of moving to *FF* Q4 of the slightly higher contracted work hours and lower wage rates would reduce total earned income by 3.8 percent, relative to the mean earnings of fathers in *FF* Q1.

Finally, we estimate the impact of exogenously moving mothers and fathers from workplaces in *FF* Q1 to workplaces in the upper quartiles of the *FF* distribution on their occupational skill content. In [Table 7](#) we found that more family friendly workplaces were characterized by a specialized workforce, with fewer distinct occupational titles within the workplace, and an overall lower skill level compared to workplaces in the lower end of the *FF* distribution. Therefore, moving to more family friendly workplaces would reduce the scope for occupational upgrading. Indeed, moving from *FF* Q1 to *FF* Q4 would reduce the skill-content of jobs by the same percentage for both mothers and fathers (1.6 percent).

Given the differential impacts of moving from *FF* Q1 to *FF* Q4 on the wage rates and earnings of mothers vis-à-vis fathers, the next section examines how such moves would affect the gender gaps in labor outcomes between women and men with children.

### 5.2.2 Impacts on Parental Gender Gaps

With respect to wages, the opposing effects of exogenously moving an average mother and an average father from *FF* Q1 to *FF* Q4 would yield a *reduction* in the parenthood gender gap (Column 3 of [Table 9](#)) by almost 15 percent. Moreover, the parenthood gender gap in contracted hours also is reduced, albeit by only 0.4 percent.

With respect to annual labor income, the combination of improving the gender gap in wages while reducing it for contracted hours of work implies that the differential impacts of moving from the lowest to the highest quartiles of the workplace family friendliness distribution would yield a sizable *reduction* in the parenthood gender gap in total income by roughly 15 percent.

Finally, with respect to the occupational skill-content of jobs, we find that moving the average parent from *FF* Q1 to *FF* Q4 would reduce the parental gender gap, albeit only by 0.7 percent.

Thus, while the consequences of moving to more family friendly workplaces has relatively modest impacts on the labor outcomes of mothers and fathers displayed in Column (1) and (2) of [Table 9](#), the gender gaps between mothers and fathers are improved for all four of the labor outcomes, with especially sizable reductions in the parental gender gaps in wages and labor income.

### 5.2.3 Impacts on Penalties for Motherhood and Fatherhood

Based on the results presented in the preceding subsection, we conclude that mothers would benefit from working in more *FF* workplaces and they benefit more than do fathers. However, women may not benefit overall from moving to more family friendly workplaces, if such moves do not reduce the penalties that they experience as mothers relative to their labor market careers before becoming parents. In this section, we investigate how the within-gender parenthood penalties are affected by moving from workplaces in the lowest quartile of the *FF* distribution to more family friendly workplaces. The results discussed below are presented in columns (4) and (5) of [Table 9](#).

While exogenously moving an average mother from *FF* Q1 to *FF* Q4 had positive impacts on her wages, the same move would *increase* the motherhood penalty to wages. That is, moving to more family friendly firms would reduce the wages of mothers relative to those of their non-parent women counterparts. At the same time, moving to the most family friendly workplaces would reduce the motherhood penalty to contracted hours of work by almost 44 percent. This reduction in the hours penalty to motherhood yields a net reduction in the motherhood penalty to earned labor income of 6.5 percent. Thus, in contrast to the results of moving to the most family friendly workplaces for mothers' income, the re-

duction in the *motherhood penalty* to earned income is driven by the sizable increase in contracted hours, even though such a move increases the motherhood penalty to wage rates. Finally, moving to the most family friendly workplaces would *increase* the motherhood penalty to the occupational skill-content of jobs by almost 11 percent (see Col. (4) in Panel D of [Table 9](#)). The fact that moving to more family friendly workplaces would reduce the skill-content of jobs is likely to account for some, if not all, of the increase in the motherhood penalty to wage rates noted above.

Finally, working in more family friendly workplaces would worsen the fatherhood penalties to both wages and annual labor income, as well as have fathers work more hours than their non-father counterparts. Furthermore, in contrast to the motherhood penalty, moving to more family friendly workplaces would improve the skill-content of the jobs of fathers relative to non-fathers by 19.4 percent. This latter finding suggests that the overall adverse consequences of moving to more family friendly firms for fathers relative to non-fathers may be ameliorated over time, given that having jobs with more skill-content are likely to produce higher rates of wage growth. Furthermore, these findings and the fact that women are more likely than men to transition to more family friendly workplaces after becoming a parent (see [Figure 4](#)), appear to provide a partial explanation for the gender gaps in career progression over the life cycle that have been found in other studies (e.g. Angelov, Johansson, and Lindahl, 2016; Bertrand, Goldin, and Katz, 2010; Barth, Kerr, and Olivetti, 2017; Adda, Dustmann, and Stevens, 2017; Albrecht et al., 2018).

### **5.3 Robustness Checks: Controlling for Industries & Sectors, Occupations, and Exogeneity of Workplace Mobility**

In this section, we describe several checks on the robustness of our findings presented above on the impacts of working in more family friendly workplaces on the labor market outcomes of mothers and fathers and to the validity of conditions we require to hold in their estimation.

We begin by examining the extent to which the effects of working in family friendly workplaces on the labor market outcomes of parents, the parental gender gap and the penalties to parenthood are actually driven by differences in industries and/or sectors in which individuals work rather than the characteristics and nature of workplaces, *per se*. For example, Swedish union confederations and employers' industry associations may negotiate different working conditions by industry that may differ in their family friendliness. To assess this possibility, we re-estimated the individual-specific fixed effects specifications for (17), adding dummy variables for the industry and sector (private, municipal and fe-

deral governments) of the workplaces of workers to this specification. The resulting coefficient estimates are presented in [Table E.1](#) of [Appendix E](#) and estimates of the impacts of effects of moving to more family friendly on the outcomes of married men and women, the parental gender gaps and the penalties to parenthood for our four labor outcomes are found in [Table E.2](#). The estimates in the latter table that control for industry and sector differ little from those in [Table 9](#), indicating that our findings concerning the effects of moving workers to more family friendly workplaces are driven largely by differences in workplaces and not the industry or sector in which women and men work.

We also examine whether the estimated impacts of family friendliness discussed in [Section 5.2](#) reflect, in part or largely, differences in the occupations in which men and women worked and, *per se*, not differences in the organization and structure of workplaces. The previous literature on gender differences in the labor market has found an important role for gender differences in occupations in accounting for gender gaps in the labor market outcomes (Bayard et al., 2003; Bertrand, Goldin, and Katz, 2010; Goldin and Katz, 2011; Goldin, 2014; Goldin and Katz, 2016; Cardoso, Guimarães, and Portugal, 2016; Blau and Kahn, 2017; Cortes and Pan, 2018).<sup>33</sup> Furthermore, as discussed above, we find that exogenously moving workers to more family friendly workplaces systematically affect the skill-content of their jobs/occupations. Thus, it is possible that the effects of changing workplace family friendliness are not just effects of differences in how workplaces are organized and structured, but may be, in part or principally, the effects of differences in the composition of occupations used in such workplaces.

To assess this second possible explanation for our findings, we re-estimated (17) including dummy variables for the occupations of workers. The estimates for this specification are found in [Table E.3](#), where we do not estimate this augmented version of (17) for the occupational skill-content of jobs since these measures are, by construction, a function of occupations. We also present, in [Appendix E](#), the impact estimates of moving to more family friendly workplaces, net of occupations, that correspond to those for the first three of our labor outcomes presented in [Table 9](#). Again, we find that the estimated impacts of moving to more family friendly workplaces, here controlling for workers' occupations, are qualitatively and quantitatively very similar to those found in [Table 9](#). Thus, it appears that our findings with respect to the impact of exogenously changing workers' on mothers and fathers, the parental gender gaps and the penalties associated with parenthood reflect something about how workplaces are organized and structured and not simply differences in the occupations found in such workplaces.

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<sup>33</sup>As noted in the Introduction, Bayard et al. (2003) and Cardoso, Guimarães, and Portugal (2016) find that part of the gender wage gap found in the U.S. and Portugal, respectively, can be attributed to the segregation of women into low-paying occupations within firms.

We conclude this section with an assessment of the validity of the exogeneity conditions in (23). These conditions require that any changes in  $FF_{it}^*$  for individuals is not a response to innovations in the idiosyncratic components of the outcome variable. Here, we provide some evidence on the reasonableness of these conditions in (23) based on our estimation strategy in which we control for person-specific fixed effects. The strategies that we use for assessing the plausibility of these exogeneity conditions are similar to those used in Card, Cardoso, and Kline (2016). Specifically, if workers' decisions to change jobs are driven by their permanent factors affecting their preferences or productivities, and not by responses to idiosyncratic changes in, say, their wage rates, the wage trends should be stable – i.e., not exhibit dips or peaks – prior to changing jobs. Moreover, we expect no systematic difference in the wage trends prior to job changes between individuals switching between different workplace types defined by  $FF$ . Therefore, we study the wage trends in the three years prior to and one year after a job switch for individuals who switch from workplaces in the lowest quartile of the  $FF$  distribution to workplaces in the upper part of the distribution. Similarly, we look at the same trends of workers switching from workplaces in the uppermost quartile of the  $FF$  distribution to workplaces in the lower ends of this distribution. We separate out job changes made *before* parenthood (when women and men are non-parents) from the workplace changes that we observe during the first three years *after* individuals have given birth to their first child (when they are parents).

The results of this exercise are presented in [Figure E.1](#) and [Figure E.2](#) in [Appendix E](#) for non-parents and parents, respectively. We draw several conclusions based on these graphs. First, the wage trends prior to changing jobs are very stable for both genders and for all types of job-switchers, suggesting that individuals are not changing jobs as responses to idiosyncratic changes to the wage rate. Second, although there are differences in the wage levels between workers moving from workplaces in the lowest quartile of the  $FF$  distribution to those in its upper quartiles, the *trends* are very similar across all types of switchers, and across gender. Third, with few exceptions, the wage trends are roughly parallel not only within but also across parenthood status. Finally, we note that job changes – for most parenthood-gender-workplace-type combinations – appear to be associated with wage increases, suggesting that workers make decisions about job changes based on comparative advantage. The latter finding poses no issues for the identification strategy that we use due to the triple differencing by gender- and parenthood statuses in specification (17).

## 6 Workplace Family Friendliness, Job Flexibility and Substitutability of Jobs

Recent studies have argued that *temporal job flexibility* is a key determinant of differences in the career choices and outcomes of women and men, and of women with and without children (Goldin, 2014; Herr and Wolfram, 2012; Flabbi and Moro, 2012).<sup>34</sup> In this paper, we did not account for the temporal flexibility of jobs in the construction of the index of workplace/job family friendliness. Rather, our index was based on a set of more direct measures of a workplace's structure and performance and the composition of its workforce. In this section we examine more closely how our family friendliness index is related to measures of temporal job flexibility as well as the substitutability of jobs within workplaces in an attempt to better understand the mechanisms by which where individuals work affect gender gaps and parenthood penalties.

To this end, we use a supplementary data set; the Swedish Living Conditions Survey (ULF/SILC), to study how job flexibility and the degree of substitutability varies with our index. The SILC survey is conducted annually and covers 11,000–13,000 nationally representative individuals per year. Respondents are asked about various issues concerning their health status, financial situation, housing arrangements, and the characteristics of their jobs. The survey is matched with individual register data on occupation and industrial classification. We extract four variables that measure different dimensions of *temporal* job flexibility: the extent to which workers are free to decide (a) when to start and end their workday, (b) when during the day to take breaks, (c) when during the year that their vacations are scheduled, and (d) the physical location of work (e.g., the possibility to work from home).

To obtain a measure of whether jobs in workplaces are easily substitutable across workers, we extract a separate set of variables from SILC that measure varying dimensions of a worker's "autonomy" in their jobs. We include measures of the extent to which the worker is free to: (i) plan their own work, (ii) to structure their own work, (iii) to decide how to allocate hours across different tasks, and (iv) to decide the general direction of their work. Jobs that give workers more autonomy are arguably less substitutable across workers, as they imply more discretion on the part of the worker in how the tasks should be structured and performed.

The SILC survey does not contain firm identifiers, and cannot be matched on an individual level to our main data set. Instead, we collapse these job characteristics by (2-digit) industry affiliation, which are then matched to our analysis data. The variation in job characteristics derived from SILC are thus at

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<sup>34</sup>In related work, Pertold-Gebicka, Pertold, and Datta Gupta (2016) study employment adjustments around childbirth in Denmark and find that women are more likely to switch from the private to the public sector after birth, and that part of this job mobility can be explained by occupational characteristics such as the convexity of pay and time pressure.

the industry level. Nevertheless, because our main data set covers firms in all sectors and industries, we are able to analyze how firm family friendliness varies with the job characteristics in SILC.

In [Appendix F](#) we examine how workers' responses in the SILC survey described above vary with the family friendliness quartiles (see [Table F.1](#)). We also examine how an additional set of measures collected in the SILC survey about whether workers feel their jobs are stressful and whether workers work during the day, evenings/nights, or in shifts to see how these measures vary across our index of family friendliness. We find that jobs in the upper end of the family friendliness distribution tend to be less stressful, are more likely to have irregular hours of work or shifts, and give workers less freedom to structure and plan their work.

To arrive at a summary measure of job flexibility and job autonomy, we construct indices of the two variables using principal components analysis.<sup>35</sup> [Figure 5](#) displays how the averages of these indices vary across the distribution of our *FF* index. With respect to job autonomy – the converse of jobs in which workers are easily substituted – there is a stark negative relationship between the extent of job autonomy and the family friendliness of jobs for both women and men. Thus, jobs that score higher on the family friendliness index are arguably substitutable across workers relative to jobs that are less family friendly. Interestingly, family friendly jobs do not seem to be equivalent to flexible jobs. Rather our evidence indicates a non-monotonous relationship, with the most flexible jobs appearing between the 20th and the 40th percentiles of the *FF* distribution, i.e., in the same part of the distribution where wages were observed to be the highest. Hence, contrary to what might be expected, family friendly jobs do not necessarily entail greater flexibility. Rather, jobs that are more autonomous (and less substitutable across workers) require more intensive work schedules (at the workplace or from home), entail tasks that are not easily transferable across co-workers, and, by extension, appear to be less easily combined with family responsibilities.

To further validate our *FF* index and describe what goes into a family friendly job, we return to the SILC database and construct the same indices of job flexibility and job autonomy, and tabulate these across occupational categories. The results for these tabulations are found in [Table F.4](#) of [Appendix F](#). We find that that jobs that score highly on the job autonomy and job flexibility indices tend to be jobs with high skill requirements – namely legislators, senior officials and managers, professionals, technicians etc. – while jobs that require little or no formal training or experience, or jobs that are likely to be of a routine or manual nature – e.g., plant and machine operators and assemblers and elementary occupations –

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<sup>35</sup>The results for this construction are found in [Table F.2](#) and [Table F.3](#) of [Appendix F](#).

score lower on both job autonomy and job flexibility. These findings are in line with our previous results showing that family friendly workplaces are characterized by predominantly private sector workplaces that have a low- to medium-skilled workforce.

Taken together, our findings in this section suggest that the most temporally flexible jobs are not necessarily the most family friendly ones. Thus, giving women, notably mothers, more temporal flexibility in their jobs may not be sufficient, by itself, to close the gender wage gap. Rather, job flexibility seems to go hand-in-hand with jobs that are less substitutable across workers and potentially increases what Goldin (2014) refers to as the non-linearity of wages with respect to hours worked (see also Cortes and Pan, forthcoming).

This latter finding of greater substitutability of jobs across workers in more family friendly workplaces is consistent with findings on the evolution of the pharmacist occupation studied by Goldin and Katz (2016). These authors argue that, due to technological advances and changes in the organizational structure of the pharmacy industry, pharmacists are much more substitutable for one another in today's pharmacies. They show that these changes have led to more women and mothers in this occupation, a lower gender wage gap with little or no penalty to part-time work, and to an occupation that is now a much more family-friendly and gender egalitarian profession.<sup>36</sup> Our evidence on the importance of substitutability of workers in jobs and its consequences for the gender gaps in early careers indicates that this phenomena applies more than just to occupations, but to workplaces as well. And, our results suggest that "flexibility in production" – rather than "flexibility in work hours" – is key in reducing the work penalties to motherhood and the gender gaps in the work careers of women.

## 7 Conclusion

The last several decades have seen a closing of the gender gaps in labor force participation and in educational attainment. However, significant gender gaps in wages persist in all industrialized countries. Recent evidence suggests that the remaining gender wage gap can largely be accounted for by motherhood, as women, compared to men, continue to have primary responsibility for child rearing. Along

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<sup>36</sup>These findings also are in line with those of Azmat and Ferrer (2017), who study gender gaps among associate lawyers in the U.S. Though the work by lawyers may have changed by the advances made in information technology, substitutability is arguably low as it is hard to take over clients from colleagues. Azmat and Ferrer (2017) show that male lawyers work more hours than female lawyers, and that gender gaps in performance (measured as annual hours billed and the amount of new client revenue brought to the firm) can explain around 50 percent of the earnings gap. These gender differences in performance are severely affected by the presence of preschool-aged children in the household. Our evidence points to a greater pervasiveness of the substitutability of workers and its consequences for the gender gaps in early careers, with it occurring not just within certain occupations but also within and across workplaces and workplaces in different industries and sectors.

with the other Nordic countries, Sweden has long been at the forefront of introducing policies aimed at facilitating the combination of a career and family. To date, Sweden offers job protected parental leave with governmentally paid leave benefits to both mothers and fathers. Despite these universal and gender neutral family policies, the gender wage gap in Sweden is pronounced, persistent and, consistent with evidence for other countries, emerges with the onset of parenthood. Thus, it appears that the challenges facing mothers to combine family responsibilities with market work are not fully addressed by such family policies. This paper considers the role played by the workplace environment and the attributes of jobs in these workplaces in accounting for the divergence in the careers of women and men with the onset of parenthood. To this end, we exploit a rich matched employer-employee longitudinal data set from Sweden that includes a wide range of worker characteristics and workplace wage and non-wage attributes.

We find that childbearing has very different impacts on the careers of male and female workers after the onset of parenthood, with women falling behind men in terms of wages, working hours, labor income, and occupational progression. While women are as likely to switch workplaces as men early in their careers, women's job mobility, relative to that for men, *increases* with the onset of parenthood. To examine the roles for the workplace environment in affecting where parents work and in explaining the wage differences of women and men and of mothers and fathers, we develop a model-based index of the "family friendliness" of Swedish workplaces, where the latter index is a function of a large set of workplace-level characteristics that are revealed to differentially attract women and men based on their parenthood status.

We find that women, to a greater extent than men, switch to more family friendly workplaces after their first birth and that exogenously moving mothers from the lower to the upper tails of the family friendliness distribution of workplaces would raise their wages and labor market earnings. For fathers, in contrast, such moves would entail reductions in the same outcomes, thereby resulting in sizeable reductions in the parental gender gap in wages and income, but would not change the gender gap in contracted work hours. In addition, we find that the income penalty to motherhood – that is, the change in labor income at the transition into motherhood – also would decline with improvements in the family friendliness of workplaces. This reduction in the motherhood penalty comes as the result of facilitating mothers being able to work more hours, rather than improving the wages they receive relative to non-mothers.

Finally, we find that exogenously moving mothers to more family friendly workplaces would nega-

tively affect their occupational skill content, relative to non-mothers. Given our finding that women are more likely to transition to more family friendly workplaces after becoming a parent than is the case for men, these findings with respect to the skill-content of the jobs could provide a partial explanation for the observed increase in gender gaps in career progression over the life cycle.

Thus, while there does appear to be tangible benefits of working in more family friendly work environments for mothers, these benefits may not end up enhancing their careers in the longer term. This may be due to the fact that – as our data shows – family friendly workplaces exhibit a lower- to medium-skilled, and occupationally specialized workforce, lower within-workplace wage dispersion, and have altogether less room for climbing the career ladder. These patterns in the attributes of family friendly jobs and workplaces suggest that it is easier to substitute workers in jobs found in “family friendly” workplaces, thereby reducing the potential losses incurred on employers of workers with family responsibilities.

To corroborate this conjecture, we use data from a supplementary survey data set that measure the “autonomy” of jobs, which is arguably correlated with the degree of substitutability of jobs, as well as measures of “temporal job flexibility,” including ones concerning workers’ control over when they can work and when they can take time off. We find that there is a stark negative relationship between the extent of job autonomy and the family friendliness of jobs. Moreover, temporal job flexibility is not increasing with the family friendliness of jobs. Such flexibility seems instead to be found in jobs that require intensive working hours with tasks that are not easily transferable across co-workers, and in extension perceived by mothers to be less easily combined with family responsibilities. As such, neither temporal flexibility in one’s jobs nor access to universal paid parental leave with job protection may be sufficient to close the gender wage gap among parents.

Finally, while we find evidence of some benefits to mothers’ wages and labor income from working in family friendly workplaces early in their parenthood and in their work careers, it is less clear that working in such establishments benefit mothers in the longer run. In particular, our findings with respect to the consequences of working in a family friendly workplace for the occupational skill content of one’s jobs suggest that mothers may fall behind men in terms of the wages they earn over the course of their labor market careers.

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TABLE 1.  
Workers' characteristics at *labor market entry* by gender

	Women (1)	Men (2)	Observations (3)
Foreign born	0.111 (0.314)	0.124 (0.330)	324,712
Age	24.04 (3.818)	24.57 (4.371)	328,812
Highest Level of Education:			
Compulsory schooling	0.049	0.069	327,255
High school	0.354	0.396	327,255
College	0.597	0.535	327,255
Years between graduation & 1st job	1.291 (1.878)	1.620 (2.333)	328,812
<i>First Job/Workplace:</i>			
Log monthly wage	10.07 (0.208)	10.12 (0.246)	146,571
Contracted work hours, % of full-time	0.867 (0.241)	0.946 (0.161)	146,571
Annual labor income (1,000 SEK)	185.524 (89.283)	209.965 (117.499)	328,812
Occupational skill content	2.194 (0.549)	2.247 (0.574)	141,065
Job/Workplace in:			
Government sector	0.087	0.115	328,667
Municipal sector	0.397	0.142	328,667
Private sector	0.516	0.743	328,667
Number of individuals in full sample at entry	146,218	182,594	328,812

NOTES: The sample consists of individuals born 1957-1986, who entered their first employment in 1996-2007, and who had their first child after entering the labor market. The summary statistics are measured in the year of labor market entry for each individual. Wages and labor income are denominated in Swedish Kronor (SEK) and are deflated using 2013 consumer price index. (Annual labor income is recorded in 1,000 real SEK.) The sample sizes vary due to some variables being drawn from population-wide data and some variables from the wage structure statistics, which includes the universe of public sector workers but only around half of all private sector workers. We therefore apply sample weights to the statistics calculated for variables from the wage register.

TABLE 2.  
Workplace Attributes for workers' *entry jobs* by gender

	Women (1)	Men (2)	Observations (3)
Log mean co-worker wages	10.24 (0.225)	10.32 (0.237)	146,525
Mean work hours, % of full-time	0.874 (0.124)	0.938 (0.092)	205,126
Share managers	0.043	0.063	141,064
Share professionals	0.206	0.207	141,054
Share technicians	0.174	0.181	141,056
Share medium skilled	0.484	0.475	141,044
Share low skilled	0.073	0.052	141,063
Share with same occupation	0.488	0.496	141,021
Number of occupational titles	11.84 (10.51)	12.20 (10.39)	328,812
Wage dispersion p90/p50	1.364 (0.294)	1.396 (0.313)	205,126
Wage dispersion p90/p10	1.671 (0.486)	1.737 (0.529)	205,126
Share part-time workers	0.395	0.301	146,525
Share female co-workers	0.663	0.361	328,812
Share females with young kids	0.152	0.084	328,812
Share of workers with highest level of education:			
Compulsory schooling	0.165	0.186	327,803
High school	0.444	0.458	327,803
College	0.369	0.333	327,803
Share workers foreign born	0.133	0.126	324,712
Number of employees	726.4 (1,941.0)	628.5 (1,685.4)	328,812
Growth rate	0.143 (0.555)	0.173 (0.556)	306,563
Number of individuals in full sample at entry	146,218	182,594	328,812

NOTES: The sample consists of individuals born 1957-1986, who entered their first employment in 1996-2007, and who had their first child after entering the labor market. The summary statistics are measured in the year of labor market entry for each individual. Wages and labor income are deflated using 2013 consumer price index. The sample sizes vary due to some variables being drawn from population-wide data and some variables from the wage structure statistics, which includes the universe of public sector workers but only around half of all private sector workers. We therefore apply sample weights to the statistics calculated for variables from the wage register.

TABLE 3.  
Gender & Parenthood Differences in Work Career Outcomes

	Women (1)	Men (2)	Difference (1) – (2)
<i>A. All women &amp; men</i>			
Log monthly wage	10.29 (0.314)	10.42 (0.337)	-0.1301*** [0.0006]
Contracted work hours, % of full-time	0.881 (0.214)	0.971 (0.118)	-0.0900*** [0.0003]
Labor Income (1,000 SEK)	230.109 (161.178)	371.397 (251.167)	-141.2884*** [-.2506]
Occupational skill-content index	2.305 (0.579)	2.354 (0.622)	-0.0498*** [0.0011]
<i>B. Non-parents</i>			
Log monthly wage	10.21 (0.252)	10.31 (0.303)	-0.1009*** [0.0007]
Contracted work hours, % of full-time	0.907 (0.205)	0.968 (0.126)	-0.0609*** [0.0004]
Labor Income (1,000 SEK)	269.549 (145.107)	329.097 (215.781)	-59.5488*** [0.3084]
Occupational skill-content index	2.261 (0.563)	2.301 (0.591)	-0.0403*** [0.0014]
<i>C. Parents</i>			
Log monthly wage	10.40 (0.260)	10.56 (0.332)	-0.1578*** [0.0009]
Contracted work hours, % of full-time	0.838 (0.217)	0.973 (0.109)	-0.1356*** [0.0005]
Labor Income (1,000 SEK)	200.158 (174.135)	425.897 (289.617)	-225.7396*** [0.4600]
Occupational skill-content index	2.361 (0.594)	2.425 (0.655)	-0.0645*** [0.0018]

NOTES: The sample consists of individuals born 1957-1986, who entered their first employment in 1996-2007, and who had their first child after entering the labor market. 655,480 observations are used in Panel A, and 467,893 observations are used in Panel B. Wages are deflated using 2013 consumer price index. Standard deviations in parentheses, and standard errors in brackets. \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ .

TABLE 4.  
Differences in Workplace Characteristics for Mothers:  
Difference-in-differences estimates

Dependent variable:	Differential for Mothers (1)	Observations (2)
Log mean co-worker wages	-0.0101*** (0.0008)	1,119,466
Mean contracted work hours, % of full-time	-0.0070*** (0.0003)	1,524,230
Share managers	-0.0013*** (0.0003)	1,099,553
Share professionals	-0.0054*** (0.0010)	1,099,540
Share technicians	-0.0039*** (0.0008)	1,099,546
Share medium skilled	0.0184*** (0.0012)	1,099,491
Share low skilled	-0.0071*** (0.0005)	1,099,566
Share with same occupation	0.0193*** (0.0012)	1,099,392
Number of occupational titles	0.1830*** (0.0322)	1,592,812
Wage dispersion p90/p10	-0.0156*** (0.0017)	1,524,230
Share part-time workers	0.0291*** (0.0009)	1,119,466
Share female co-workers	0.0132*** (0.0006)	2,394,781
Share females with young kids	0.0065*** (0.0002)	2,394,781
Share compulsory schooling	0.0023*** (0.0003)	2,392,378
Share high school	-0.0003 (0.0005)	2,392,378
Share college	-0.0011 (0.0006)	2,392,378
Share foreign born	-0.0006 (0.0004)	2,373,937
Number of employees	25.500*** (4.323)	2,394,781
Firm growth rate	-0.0103*** (0.0013)	2,257,439
Value added per worker	-48.930*** (5.260)	822,430

NOTES: The table reports the coefficients on an interaction term between an indicator variable for *Female* and an indicator variable for being a *Parent*, in separate regressions using the variables listed in each row as dependent variables on gender and parenthood status, controlling for calendar year and age. \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ .

TABLE 5.  
Fixed effects logit estimates of parameters of per period utility function in (4)  
by gender and parenthood status

	Non-Parents		Parents	
	Women (1)	Men (2)	Women (3)	Men (4)
Log wage	10.420*** (0.286)	8.711*** (0.300)	6.815*** (0.113)	5.491*** (0.112)
Private sector	0.588*** (0.117)	0.117 (0.157)	0.027 (0.044)	0.109 (0.070)
Government sector	0.488*** (0.136)	0.079 (0.155)	0.183*** (0.061)	0.113 (0.077)
Share female co-workers w. young kids	-1.144*** (0.310)	-1.545*** (0.577)	-0.072 (0.142)	-0.499** (0.236)
Wage dispersion, p90/p10	0.475*** (0.077)	0.311*** (0.088)	0.131*** (0.032)	0.009 (0.038)
Firm growth rate	0.219*** (0.040)	0.329*** (0.047)	0.384*** (0.021)	0.510*** (0.023)
Firm size	-0.016 (0.018)	-0.021 (0.023)	0.023** (0.009)	0.023* (0.012)
Share high school educated co-workers	1.487*** (0.323)	1.977*** (0.430)	1.019*** (0.131)	0.569*** (0.118)
Share college educated co-workers	2.941*** (0.283)	2.589*** (0.366)	1.696*** (0.116)	1.163*** (0.117)
Share foreign-born co-workers	-0.295 (0.258)	0.134 (0.345)	0.083 (0.112)	-0.226* (0.126)
Share female co-workers	0.679*** (0.198)	0.851*** (0.256)	-0.006 (0.077)	-0.482*** (0.103)
Observations	13.660	8.236	49.874	35.996

NOTES: Fixed effects logit estimates of the parameters for the MWP of mothers,  $\beta_1^p$  and  $\beta_2^p$  that enter the job change decision rule in (8) for non-parent women and men and for mothers and fathers, respectively. The estimations also includes 21 dummy variables that capture industry affiliation. \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ .

TABLE 6.  
Marginal Willingness to Pay (MWP) estimates and Differences in MWP by gender & parenthood  
MWP ( $\hat{\theta}_{2k}/\hat{\theta}_1$ ): Differences in MWP

	Non-Parents		Parents		Mothers –		Fathers –	
	Women (1)	Men (2)	Women (3)	Men (4)	Fathers (5)	Non-Mothers (6)	Non-Fathers (7)	Fathers – Non-Fathers
Private sector	0.056	0.013	0.004	0.020	-0.016	-0.052	0.006	0.006
Government sector	0.046	0.009	0.027	0.021	0.006	-0.020	0.011	0.011
Share female co-workers w, young kids	-0.110	-0.177	-0.011	-0.091	0.080	0.099	0.086	0.086
Wage dispersion, p90/p10	0.046	0.036	0.019	0.002	0.018	-0.026	-0.034	-0.034
Firm growth rate	0.021	0.038	0.056	0.093	-0.037	0.035	0.055	0.055
Firm size	-0.002	-0.002	0.003	0.004	-0.001	0.005	0.007	0.007
Share high school educated co-workers	0.143	0.227	0.150	0.104	0.046	0.007	-0.123	-0.123
Share college educated co-workers	0.282	0.297	0.249	0.212	0.037	-0.033	-0.085	-0.085
Share foreign-born co-workers	-0.028	0.015	0.012	-0.041	0.053	0.041	-0.057	-0.057
Share female co-workers	0.065	0.098	-0.001	-0.088	0.087	-0.066	-0.185	-0.185

NOTES: Calculations of MWP use the marginal utility estimates,  $\hat{\theta}_2$  and  $\hat{\theta}_1$ , in Table 5.

TABLE 7.  
Workplace Attributes by Quartile of *FF*

	<i>FF</i> Q1 (1)	<i>FF</i> Q2 (2)	<i>FF</i> Q3 (3)	<i>FF</i> Q4 (4)
<i>A. Workplace characteristics used to estimate FF:</i>				
Private sector	0.363	0.693	0.682	0.851
Government sector	0.157	0.080	0.052	0.026
Municipality sector	0.480	0.227	0.266	0.123
Share female workers w. young kids	0.141	0.120	0.121	0.098
Proportion females	0.629	0.509	0.511	0.447
Growth rate	0.077	0.102	0.092	0.095
Workplace size	91.450	127.700	104.800	75.750
Share with at most high school	0.293	0.384	0.522	0.562
Share with some college or more	0.614	0.507	0.314	0.170
Share foreign-born	0.121	0.115	0.124	0.125
Wage dispersion p90/p10	1.765	1.860	1.692	1.559
<i>B. Workplace characteristics not used to estimate FF:</i>				
Share part-time workers	0.269	0.212	0.262	0.273
Share with same occupation	0.409	0.459	0.514	0.536
Number of 3-digit occupations	9.311	7.956	7.099	6.587
Share professionals	0.409	0.310	0.139	0.056
Share technicians & associate professionals	0.235	0.262	0.212	0.113
Share medium-skilled	0.229	0.308	0.516	0.663
Share low-skilled	0.036	0.023	0.035	0.075
Share with managerial title	0.062	0.069	0.071	0.066

NOTES: The table reports workplace attributes separately for workplaces belonging to different quartiles of the family friendliness index (*FF*) distribution.

TABLE 8.  
Estimates for Fixed-Effect Regressions of Gender, Parenthood Status, & Family Friendliness of  
Workplace on Career Outcomes

	Log monthly wage (1)	Contracted Work hours (2)	Annual labor income (3)	Occup. Skill Content (4)
Parent	0.0014 (0.0010)	-0.0270*** (0.0010)	-28.3020*** (1.1016)	-0.0121*** (0.0028)
Female × Parent	-0.0876*** (0.0012)	-0.0778*** (0.0015)	-146.7279*** (1.2653)	-0.0125*** (0.0034)
FF Q2	0.0133*** (0.0010)	-0.0040*** (0.0010)	-5.2116*** (1.2144)	-0.0309*** (0.0034)
FF Q3	0.0163*** (0.0011)	-0.0099*** (0.0011)	-4.8659*** (1.0559)	-0.0537*** (0.0039)
FF Q4	0.0252*** (0.0012)	-0.0117*** (0.0013)	-2.8633** (1.1701)	-0.0510*** (0.0043)
FF Q2 × Female	0.0036*** (0.0012)	0.0084*** (0.0015)	14.0352*** (1.3400)	0.0099** (0.0041)
FF Q3 × Female	0.0024* (0.0013)	-0.0181*** (0.0018)	5.4906*** (1.2117)	0.0262*** (0.0047)
FF Q4 × Female	0.0024* (0.0015)	-0.0254*** (0.0021)	2.4179* (1.3419)	0.0187*** (0.0053)
FF Q2 × Parent	0.0045*** (0.0012)	0.0068*** (0.0012)	10.2189*** (1.3544)	0.0257*** (0.0039)
FF Q3 × Parent	-0.0156*** (0.0012)	0.0171*** (0.0012)	-2.1575* (1.2618)	0.0221*** (0.0045)
FF Q4 × Parent	-0.0326*** (0.0012)	0.0205*** (0.0012)	-11.0380*** (1.2724)	0.0095** (0.0043)
FF Q2 × Parent × Female	-0.0138*** (0.0015)	-0.0208*** (0.0020)	-20.3428*** (1.5694)	-0.0087* (0.0049)
FF Q3 × Parent × Female	0.0008 (0.0016)	0.0165*** (0.0022)	4.7326*** (1.4911)	-0.0226*** (0.0056)
FF Q4 × Parent × Female	0.0142*** (0.0017)	0.0258*** (0.0025)	19.5299*** (1.5163)	-0.0178*** (0.0059)
Observations	1,454,527	917,008	1,454,527	896,646

NOTES: Additional controls (not reported) include polynomials in experience. The results are robust to allowing separate experience profiles by gender and parenthood status. Annual labor income is denominated in 1,000 real SEK. Standard errors are clustered at the individual level (reported in parentheses). \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$

TABLE 9.

Impacts of being (Randomly) Assigned to More Family Friendly Workplaces on Career Outcomes, Gender Gaps &amp; Parenthood Penalties

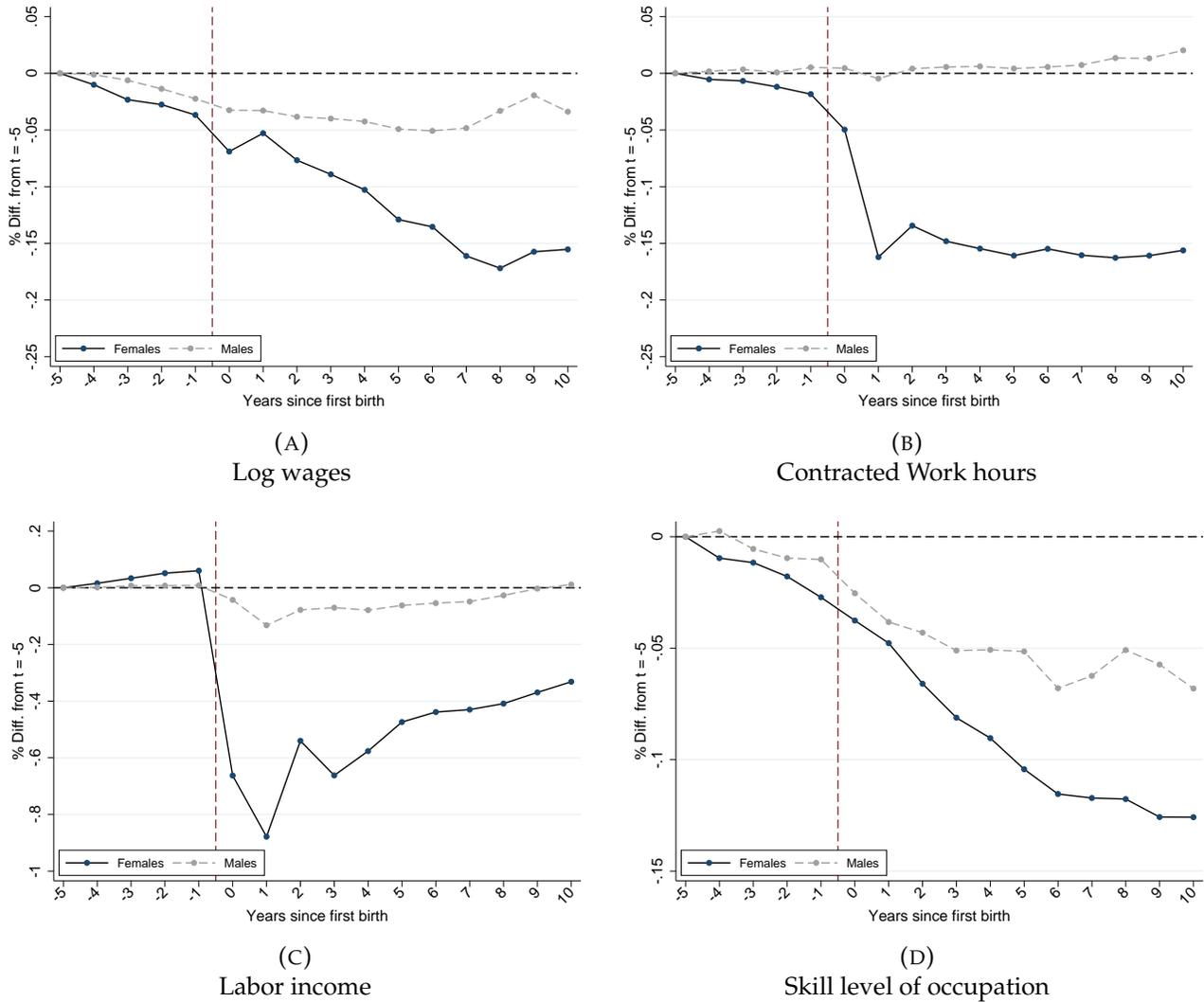
	Mothers (1)	Fathers (2)	Parental Gender Gap (3)	Motherhood Penalty (4)	Fatherhood Penalty (5)
<i>A. Log Monthly Wage:</i>					
FF Q1 <sup>1</sup>	10.258	10.371	-0.113	-0.068	-0.017
<i>Difference from FF Q1<sup>2</sup></i>					
FF Q2	0.008***	0.018***	-0.010***	-0.009***	0.005***
FF Q3	0.004***	0.001	0.003**	-0.015***	-0.016***
FF Q4	0.010***	-0.007***	0.017***	-0.018***	-0.033***
%Δ from FF Q1 to FF Q4 <sup>3</sup>	0.09%	-0.07%	14.7%	-27.1%	-191.8%
<i>B. Contracted Work Hours:</i>					
FF Q1 <sup>1</sup>	0.840	0.952	-0.112	-0.106	-0.015
<i>Difference from FF Q1<sup>2</sup></i>					
FF Q2	-0.010***	0.003***	-0.012***	-0.014***	0.007***
FF Q3	0.006***	0.007***	-0.002	0.034***	0.017***
FF Q4	0.009***	0.009***	0.000	0.046***	0.021***
%Δ from FF Q1 to FF Q4 <sup>3</sup>	1.1%	0.9%	0.4%	43.7%	136.7%
<i>C. Annual Labor Income:</i>					
FF Q1 <sup>1</sup>	228.227	370.380	-142.153	-130.000	-32.009
<i>Difference from FF Q1<sup>2</sup></i>					
FF Q2	-1.300*	5.007***	-6.308***	-10.124***	10.219***
FF Q3	3.200***	-7.023***	10.223***	2.575**	-2.158*
FF Q4	8.047***	-13.901***	21.948***	8.492***	-11.038***
%Δ from FF Q1 to FF Q4 <sup>3</sup>	3.5%	-3.8%	15.4%	6.5%	-34.5%
<i>D. Occupational Skill-Content:</i>					
FF Q1 <sup>1</sup>	2.469	2.605	-0.136	-0.076	-0.049
<i>Difference from FF Q1<sup>2</sup></i>					
FF Q2	-0.004*	-0.005*	0.001	0.017***	0.026***
FF Q3	-0.028***	-0.032***	0.004	0.000	0.022***
FF Q4	-0.040***	-0.042***	0.002	-0.008**	0.010**
%Δ from FF Q1 to FF Q4 <sup>3</sup>	-1.6%	-1.6%	0.7%	-10.9%	19.4%

NOTES: <sup>1</sup>The “FF Q1” row entries for each outcome are as follows: Columns (1) and (2) are the age- and calendar-year adjusted mean outcomes for mothers and fathers, respectively, who work in FF Q1 workplaces; Column (3) is the difference in these mean outcomes for mothers and fathers, respectively, who work in FF Q1 workplaces, i.e., the differences between Columns (1) and (2); Columns (4) and (5) are the age- and calendar-time adjusted motherhood- and fatherhood penalties.

<sup>2</sup>The “Differences from Q1” row entries are as follows: Column (1) is  $\varphi_k^{(1,1)}$ , Column (2) is  $\varphi_k^{(0,1)}$ , Column (3) is  $\lambda_k^{(\cdot,1)}$ , Column (4) is  $\mu_k^{(0,\cdot)}$  and Column (5) is  $\mu_k^{(1,\cdot)}$ ,  $k = 2, \dots, 4$ . The  $p$ -values for tests of whether the differences from FF Q1 are equal to zero, where \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ .

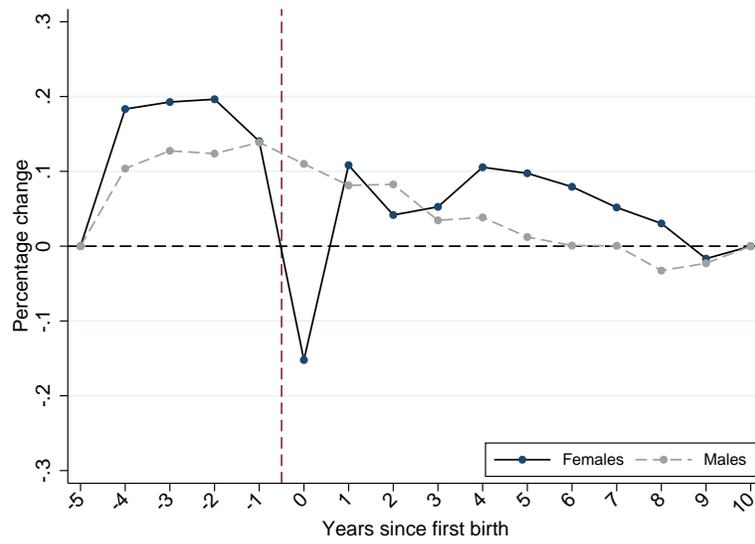
<sup>3</sup>Positive values for the percentage changes in the move from FF Q1 to FF Q4 workplaces represent *improvements* in career outcomes [Columns (1) and (2)] and *reductions* in parental gender gaps [Column (3)] and parenthood penalties [Columns (4) and (5)].

FIGURE 1.  
 Percentage differences in labor market outcomes for women and men before and after first birth  
 relative to 5 years before first birth



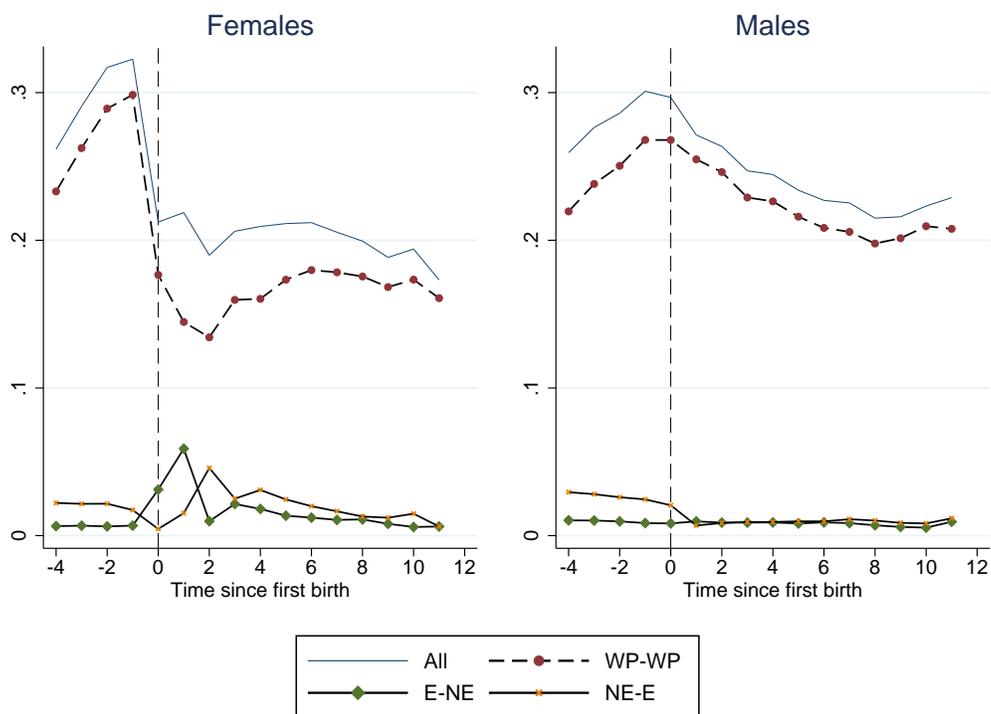
NOTES: Each graph plots the estimated coefficients on the  $1\{t = \kappa + j\}$  variables ( $j = -5, \dots, 0, \dots, 10$ ) from equation (1) in section 3 divided by predicted values of the four labor market outcomes, where the predicted values adjust for age ( $t$ ) and year ( $s$ ) and where the values for  $j = -5$  are equal to zero for both females and males.

FIGURE 2.  
Differences in probability of switching Workplace by years since first birth, relative to 5 years before first births



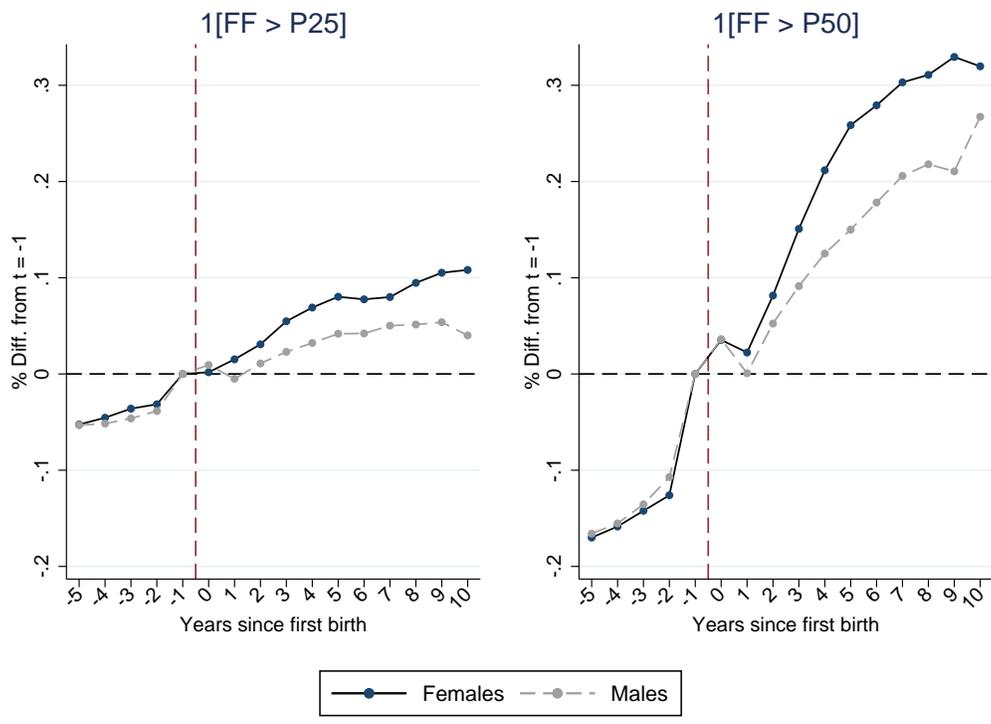
NOTES: Changes in the probability of workplace switching by years since first birth

FIGURE 3.  
Labor Market Transitions Before & After First Birth (Yr-to-Yr)



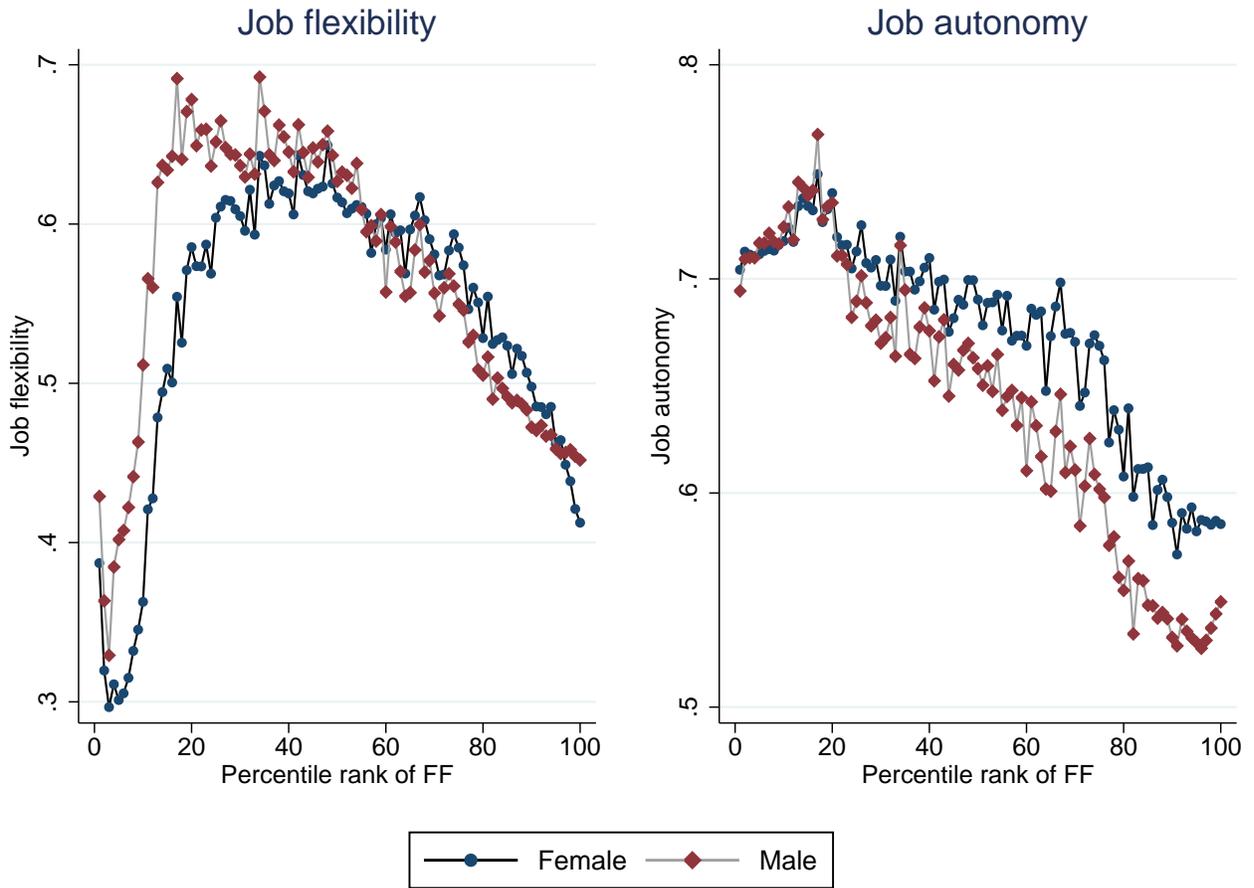
NOTES: "All" denotes all transitions; "WP-WP" denotes Workplace-to-Workplace transitions; "E-NE" denotes Employment-to-Nonemployment transitions; and "NE-E" denotes Nonemployment-to-Employment transitions.

FIGURE 4.  
 Changes in average family friendliness of workers' workplace (*FF*) and in probabilities of working at a workplace  
 from different parts of *FF* distribution by years since first birth.



NOTES: Each dot pertains to the estimated coefficients on the  $\mathbb{1}\{t = \kappa + j\}$  indicators in specification (1).

FIGURE 5.  
Job Flexibility and Job Autonomy by Percentile Rank of *FF*



**Parenthood, Family Friendly Workplaces,  
and the Gender Gaps in Early Work Careers**

**V. Joseph Hotz, Per Johansson & Arizo Karimi**

**Online Appendices**

## Appendix A Data Construction and Sampling Strategy

### Wage Data

We use multiple population-wide Swedish administrative registers to create a linked employer-employee data set. The analysis is based on individual longitudinal information on demographic and background characteristics from the LOUISE register, which contains annual labor income for each individual, with zero-income reported for periods of non-work. We link this information to a matched employer-employee register (RAMS) that contains all employed and self-employed individuals in Sweden, with plant identifiers. Wages are drawn from the Wage Structure Statistics, which report full-time equivalent monthly wage rates (measured in November of each year). We match wages to each person-plant-year pair, so that - in the case of multiple employments in one year - wages correspond to the wages earned at the main employer as derived from RAMS.

Wages are available for all individuals employed in the public sector, and for a sample of individuals in the private sector. The sampling is stratified by firm size and industry affiliation and the register includes sample weights that can be used to calculate aggregated statistics that are nationally representative. However, to get a balanced panel of individual wages, we use an imputed measure for the private sector, and for workers who due to e.g., temporary illness is absent from the workplace during the measuring month of the Wage Statistics, but for whom we observe an employment in RAMS.<sup>37</sup>

We obtain predicted wages from a log wage regression that controls for individual characteristics (sex, educational attainment, an indicator for public sector employment, age, and age squared). In addition, we include the worker's approximated monthly wage, which we derive from their annual earnings from the same employer, adjusted for the approximated number of months worked. The estimated regression equation is the following:

$$\log(w_{it}) = \alpha_0 + \beta_1 \log(w_{it}^{approx}) + \beta_2' x_{it} + \lambda_t + \zeta_{it} \quad (\text{A.1})$$

where  $x_{it}$  is a vector of personal characteristics,  $\lambda_t$  are calendar year dummies, and  $w_{it}^{approx}$  is the approximated monthly wage. We retrieve  $\hat{w}_{it}$ , and let this be the wage observation for workers who are non-sampled or absent from work during the measuring month of the Wage Statistics in a given year, and thus where we lack information on (true) monthly wage rates.

The annual earnings data - RAMS - has information about the first and last calendar months of an

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<sup>37</sup>We use a strategy for imputation similar to the one used by Hensvik (2012) on the same data sources.

employment spell in each year, but the register does not include hours worked. Using the start- and end-dates of an employment spell to calculate months worked will not predict monthly wage rates perfectly. In particular, monthly wage rates are likely to be underestimated for part-time workers with long employment spells. To address this issue, we restrict the sample in (A.1) to workers with an approximated wage within the 1st and 99th percentile of the true (nationally representative) wage distribution.

Table A.1 compares the true (nationally representative) log wage distribution to the predicted and imputed log wage distributions. The imputed wages look fairly similar to the true wage distribution. Nevertheless, we perform sensitivity checks by estimating our main wage regressions using the true wages with the sample weights.

TABLE A.1.  
Comparison between True and Imputed Wages

	(1) True	(2) Predicted	(3) Imputed
Mean	10.331	10.294	10.273
St.dev	0.304	0.276	0.310
10th percentile	9.966	9.925	9.884
50th percentile	10.308	10.298	10.263
90th percentile	10.736	10.655	10.671
Observations	1,169,801	2,487,748	2,795,663

NOTE: The table compares the true wage distribution with the distribution of predicted wages retrieved from estimating equation (A.1), and in column (3) the distribution of the new wage measure which imputes missing (true) wage observations with the predicted wages.

### Occupational Classification

Part of our analysis focuses on the occupational skill upgrading of workers over their careers. The information on occupational skill content is derived from the occupational classification, SSK. The classification standard divides occupations into one of four levels of skill content, which are defined in terms of the international educational classification standard ISCED 1976. The educational classification is used as a guideline for determining the qualification level of each occupation in SSK, but the qualification and skill needed to perform the occupation need not be obtained through formal education, but also can be obtained through experience. The skill content index thus measures the qualifications that the *occupation* requires, and not necessarily the level of education that the *worker* must have. Table A.2 describes in detail the education level that corresponds to the skills required in level 1- through level 4-occupations. Table A.3 illustrates the skill level of the major occupation groups in the classification standard. For example, the most skilled jobs refer to senior officials, managers, and legislators, while the second most

skilled jobs refer to specialists and professionals.

TABLE A.2.  
Description of occupational skill level

Skill level	Description
1:st	No educational or skill requirements
2:nd	Occupations requiring secondary schooling or equivalent skills obtained elsewhere
3:rd	Occupations requiring shorter post-secondary schooling (maximum 3 years) or equivalent skills obtained elsewhere
4:th	Occupations requiring longer post-secondary schooling (3-4 years or more) and an academic degree

NOTE: The table describes the skill level requirements in terms of the training required.

TABLE A.3.  
Required skill level for different occupation groups

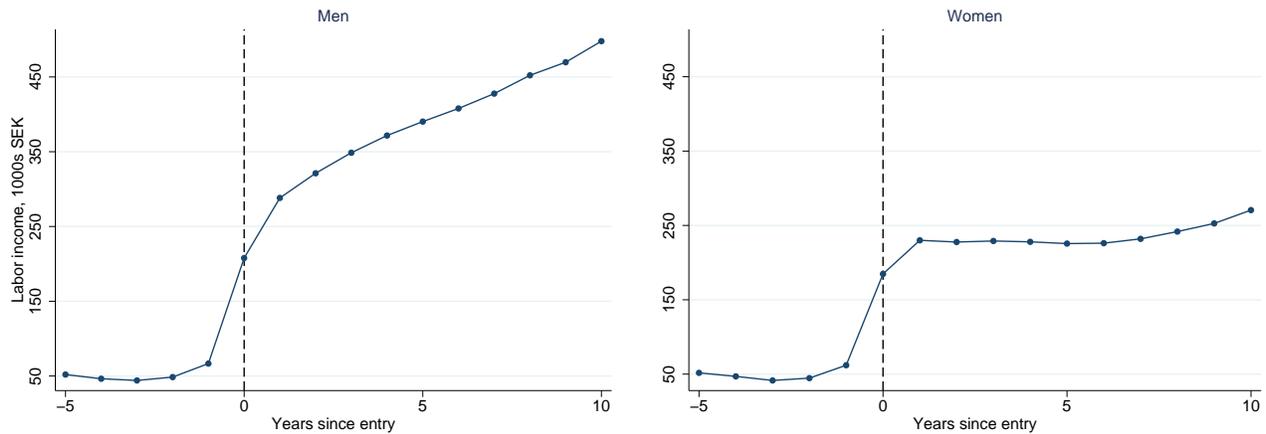
Occupation group	Skill level
Legislators, senior officials and managers	4:th
Work requiring theoretical specialist skills	3:rd
Work requiring shorter post-secondary schooling	2:nd
Clerical work	2:nd
Service-, nursing-, and sales occupations	2:nd
Agricultural, gardening, forestry, and fishing occupations	2:nd
Crafts occupations in construction and manufacturing	2:nd
Machine operators and assemblers, transportation services, etc.	2:nd
Elementary occupations	1:st

NOTE: The table describes the skill level requirements for occupation groups in SSYK.

### Sampling Strategy

We focus on individuals whom we observe the year of labor market entry, entry wages, and first occupation. We follow Kramarz and Skans (2014) and define labor market entry as the first job after completing the highest attained level of education that lasted at least four months, and yielded annual earnings exceeding three times the 10th percentile of the full wage distribution. Because the occupational classification standard in the Wage Statistics is available only from 1996, we restrict attention to individuals

FIGURE A.1.  
Labor income by time since labor market entry



who entered the labor market in 1996 or later. We further restrict the sample to individuals whose first child is born *after* entering the labor market.

To check that our definition of labor market entry is reasonable, [Figure A.1](#) plots the average annual labor earnings five years before labor market entry to ten years after labor market entry. For both men and women there is a discontinuous jump in earnings in the year of our defined labor market entry, with very low earnings before that year. [Table A.4](#) reports cumulative proportions of the sample securing a first stable job by years since graduation from highest attained education (compulsory schooling, high school, or college). Individuals with higher levels of education manage to find a first job sooner than individuals with low education.

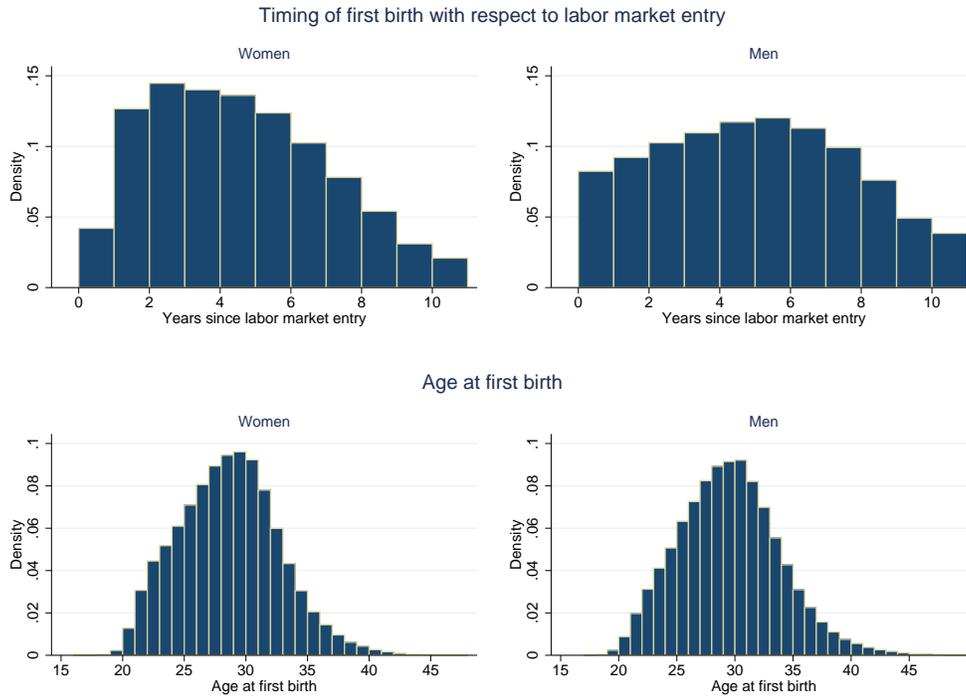
TABLE A.4.  
Years elapsed between graduation and labor market entry:  
cumulative proportions

Years since graduation:	(1) Compulsory School	(2) High School	(3) College
0	0.0033	0.2579	0.5895
1	0.0305	0.5455	0.8002
2	0.1127	0.7190	0.8936
3	0.3311	0.8223	0.9431
4	0.5709	0.8876	0.9699
5	0.7443	0.9274	0.9828

NOTE: The table reports the cumulative proportions of individuals in our sample who find a first stable job by years since graduation, separately for persons with at most compulsory schooling, high school, and college education.

## Appendix B Distributions of Timing and Age of First Births

FIGURE B.1.  
Timing of first birth with respect to labor market entry & age



NOTES: The figure shows men's and women's timing of first birth with respect to years since labor market entry (upper panel), and their age at first birth (lower panel).

## Appendix C Decision Rule for Entering Parenthood

Now consider the decision-rule for choosing to *enter the state of parenthood at age  $t$* , where  $p_{i,k} = 0$  for  $k = t_0, \dots, t - 1$ . Following notation in Hotz and Miller (1993) and Arcidiacono and Miller (2011), let  $d_{ikt}$  denote indicator variables for each of the four possible outcomes for the choices of  $(p_{it}, \Delta J_{it})$ , i.e.,  $d_{i1t} = 1$  if  $(p_{it} = 0, \Delta J_{it} = 0)$  and 0 otherwise;  $d_{i2t} = 1$  if  $(p_{it} = 0, \Delta J_{it} = 1)$  and 0 otherwise;  $d_{i3t} = 1$  if  $(p_{it} = 1, \Delta J_{it} = 0)$  and 0 otherwise, and  $d_{i4t} = 1$  if  $(p_{it} = 1, \Delta J_{it} = 1)$  and 0 otherwise. And let  $V_{it}$  denote the (unconditional) valuation of individual  $i$  at the beginning of age  $t$ , which is defined to be:

$$V_{it}(\mathbf{w}_{i,t-1}^{t_0}, \mathbf{z}_{i,t-1}^{t_0}, p_{i,t-1}, \phi_i, \zeta_{i,t-1}^{p_{i,t-1}}) \equiv E_t \left[ \sum_{j=t}^T \sum_{k=1}^4 \delta^{j-t} d_{ikj}^o U^{p_{ikj}^o}(w_{ij}, \mathbf{z}_{ij}, \phi_i, \zeta_{ij}^{p_{ikj}^o}) \right], \quad (\text{C.1})$$

where  $\mathbf{w}_{i,t-1}^{t_0}$  and  $\mathbf{z}_{i,t-1}^{t_0}$  are individual  $i$ 's vectors of wage and non-wage attribute histories, respectively, from  $t_0$  to  $t - 1$ ;  $\zeta_{i,t-1}^{p_{i,t-1}}$  is  $i$ 's idiosyncratic preference shock at age  $t - 1$  which depends on the value of  $p_{i,t-1}$ ,  $d_{ikj}^o$  denotes the optimal choices of  $d_{ikj}$  in all future periods, conditional on  $i$ 's information set at  $t$ ,  $(\mathbf{w}_{i,t-1}^{t_0}, \mathbf{z}_{i,t-1}^{t_0}, \phi_i)$ ; the  $\zeta_{ij}^{p_{ikj}^o}$ 's differ with the optimally chosen future parenthood status;  $\delta$  is the discount factor; and the expectation in (C.2) is taken over the future draws of  $\zeta$ s, the birth process, and the future draws on the jobs,  $(w_{ifj}, \mathbf{z}_{ifj})$ , that parents realize in (future) periods when they choose to enter the job lottery.

Let  $V_{it}^1$  denote individual  $i$ 's valuation, *conditional on entering parenthood at age  $t$* , which is given by:

$$V_{it}^1(\mathbf{w}_{i,t}^{t_0}, \mathbf{z}_{i,t}^{t_0}, \phi_i) \equiv \left[ \sum_{k=3}^4 d_{ikt}^o U^1(w_{it}, \mathbf{z}_{it}, \phi_i, \zeta_{it}^1) \right] E_t \left[ \sum_{j=t+1}^T \sum_{k=3}^4 \delta^{j-t+1} d_{ikj}^o U^1(w_{ij}, \mathbf{z}_{ij}, \phi_i, \zeta_{ij}^1) \right], \quad (\text{C.2})$$

where the first term in the product on the righthand side of (C.2) characterizes the utility payoff in age  $t$  from the job/workplace choice at that age. The second term in this product characterizes the expected payoff over the remaining periods of one's life, conditional on individual  $i$ 's age- $t$  information set.

Let  $V_{it}^0$  denote individual  $i$ 's valuation, *conditional on not having entered parenthood prior to age  $t$* , which is given by:

$$V_{it}^0(\mathbf{w}_{i,t}^{t_0}, \mathbf{z}_{i,t}^{t_0}, \phi_i) \equiv \left[ \sum_{k=1}^2 d_{ikt}^o U^0(w_{it}, \mathbf{z}_{it}, \phi_i, \zeta_{it}^0) \right] E_t \left[ \sum_{j=t+1}^T \sum_{k=1}^4 \delta^{j-t+1} d_{ikj}^o U^{p_{ikj}^o}(w_{ij}, \mathbf{z}_{ij}, \phi_i, \zeta_{ij}^{p_{ikj}^o}) \right], \quad (\text{C.3})$$

It follows that the decision rule for individual  $i$  to enter into parenthood at age  $t$  if and only if:

$$V_{it}^1(\mathbf{w}_{i,t}^{t_0}, \mathbf{z}_{i,t}^{t_0}, \phi_i) > V_{it}^0(\mathbf{w}_{i,t}^{t_0}, \mathbf{z}_{i,t}^{t_0}, \phi_i). \quad (\text{C.4})$$

Even under the assumption that the per-period payoff functions,  $U^p(w_{it}, \mathbf{z}_{it}, \phi_i, \zeta_{it}^p)$  are, themselves, linear in its arguments (see (4)), the conditional valuation functions,  $V_{it}^1$  and  $V_{it}^0$ , are not. This feature of the decision rule for parenthood in (C.4) has several implications for estimation.

First, the decision rule for entering parenthood at age  $t$  is not linear in the parameters. In particular, it is not linear in the  $\phi_i$ s. As a result,  $V_{it}^1 - V_{it}^0$ , i.e., the difference of the conditional valuation functions in (C.3) and (C.2), does eliminate  $\phi_i$ s from the decision rule in (C.4).

Second, the decision rules for the onset of parenthood require one to evaluate the expectations taken over the future payoffs imply that one must take account of the conditional expectation of the future idiosyncratic shocks, condition on making optimal decisions in the future i.e.,  $E(\zeta_{it} | d_{ikj}^0), j = t + 1, \dots, T$ , which, in general are not equal to 0. These conditional expectations also do not difference out of  $V_{it}^1$  and  $V_{it}^0$ , they require one to take a stand on the distribution of  $\zeta_{it}$ s, and are the resulting conditional expectation functions will, in general, depend on the parameters of  $U^p$  in (4) in a non-linear way.

In contrast, as we show in section 4.2, none of these issues arise when one uses the variation of workplace changes within parenthood to estimate (identify) the parameters of  $U^p$  using the decision rule in (8).

**Appendix D Additional Results on Workplace & Job Characteristics across Distribution of *FF***

TABLE D.1.  
Occupational major group distribution in the lower and upper part of the *FF* distribution

	(1) <i>FF</i> Q1	(2) <i>FF</i> Q4
<i>Occupational distribution (major groups), percent</i>		
Legislators, senior officials and managers	3.402	2.855
Professionals	62.161	8.664
Technicians and associate professionals	23.190	13.071
Clerks	2.900	10.914
Service workers and shop and market sales	6.093	23.426
Skilled agricultural and fishery workers	0.102	0.162
Craft and related trades workers	0.608	7.793
Plant and machine operators and assemblers	0.444	25.601
Elementary occupations	1.100	7.514
Total	100.000	100.000

NOTES: The table shows the distribution of occupational (major) groups for workplaces in *FF* quartile 1 and 4, respectively.

## **Appendix E Results on Robustness of Findings on Impacts of Family Friendliness on Career Outcomes**

In this Appendix we present coefficient estimates for specifications of equation (17) that includes controls for the industry and sector of their workplaces (Table E.1). We include estimates of the impacts of moving to more family friendly firms on the various labor market outcomes for each of these two specifications in and E.2. We also present results of assessments of the exogeneity of workplace and job mobility for non-parents and parents in Figures E.1 and E.2, respectively.

TABLE E.1.  
Estimates for Fixed-Effect Regressions of Gender, Parenthood Status, & Family Friendliness of  
Workplace on Career Outcomes, Controlling for Workplace Industries and Sectors

	Log monthly wage (1)	Annual Work hours (2)	Annual labor income (3)	Occup. Skill Content (4)
Parent	-0.0016 (0.0010)	-0.0202*** (0.0010)	-30.4065*** (1.1238)	-0.0097*** (0.0028)
Female × Parent	-0.0850*** (0.0012)	-0.0792*** (0.0015)	-146.7612*** (1.2878)	-0.0182*** (0.0034)
FF Q2	-0.0025** (0.0010)	-0.0021** (0.0009)	-11.6317*** (1.2939)	-0.0233*** (0.0033)
FF Q3	-0.0035*** (0.0010)	-0.0085*** (0.0011)	-12.0519*** (1.1313)	-0.0317*** (0.0039)
FF Q4	0.0016 (0.0011)	-0.0129*** (0.0012)	-11.9562*** (1.2570)	-0.0262*** (0.0043)
FF Q2 × Female	0.0119*** (0.0012)	0.0136*** (0.0014)	18.0889*** (1.3978)	0.0135*** (0.0041)
FF Q3 × Female	0.0115*** (0.0013)	-0.0057*** (0.0017)	10.2559*** (1.2780)	0.0252*** (0.0048)
FF Q4 × Female	0.0056*** (0.0014)	-0.0164*** (0.0021)	4.6314*** (1.4156)	0.0194*** (0.0054)
FF Q2 × Parent	0.0064*** (0.0012)	0.0045*** (0.0012)	11.3597*** (1.3932)	0.0253*** (0.0039)
FF Q3 × Parent	-0.0128*** (0.0012)	0.0148*** (0.0012)	-0.9343 (1.2967)	0.0232*** (0.0045)
FF Q4 × Parent	-0.0297*** (0.0012)	0.0195*** (0.0012)	-9.7767*** (1.2987)	0.0052 (0.0043)
FF Q2 × Parent × Female	-0.0184*** (0.0015)	-0.0210*** (0.0020)	-22.9365*** (1.6176)	-0.0059 (0.0049)
FF Q3 × Parent × Female	-0.0009 (0.0016)	0.0164*** (0.0022)	2.2699 (1.5494)	-0.0233*** (0.0058)
FF Q4 × Parent × Female	0.0153*** (0.0017)	0.0270*** (0.0025)	19.9975*** (1.5594)	-0.0143** (0.0060)
Observations	1,363,338	865,684	1,363,338	846,167

NOTES: Additional controls (not reported) include polynomials in experience, and 20 dummy variables indicating 2-digit industry classification and three dummy variables for sector (government, public, private). The results are robust to allowing separate experience profiles by gender and parenthood status. Annual labor income is denominated in 1,000 real SEK. Standard errors are clustered at the individual level (reported in parentheses). \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$

TABLE E.2.

Impacts of being (Randomly) Assigned to More Family Friendly Workplaces on Career Outcomes, Gender Gaps & Parenthood Penalties, Controlling for Workplace Industries and Sectors

	Mothers (1)	Fathers (2)	Parental Gender Gap (3)	Motherhood Penalty (4)	Fatherhood Penalty (5)
<i>A. Log Monthly Wage:</i>					
FF Q1 <sup>1</sup>	10.258	10.371	-0.113	-0.068	-0.017
<i>Difference from FF Q1<sup>2</sup></i>					
FF Q2	-0.003***	0.004***	-0.007***	-0.012***	0.006***
FF Q3	-0.006***	-0.016***	0.011***	-0.014***	-0.013***
FF Q4	-0.007***	-0.028***	0.021***	-0.014***	-0.030***
%Δ from FF Q1 to FF Q4 <sup>3</sup>	-0.07%	-0.3%	18.5%	-21.2%	-174.7%
<i>B. Contracted Work Hours:</i>					
FF Q1 <sup>1</sup>	0.840	0.952	-0.112	-0.106	-0.015
<i>Difference from FF Q1<sup>2</sup></i>					
FF Q2	-0.005***	0.002***	-0.007***	-0.017***	0.005***
FF Q3	0.017***	0.006***	0.011***	0.031***	0.015***
FF Q4	0.017***	0.007***	0.011***	0.047***	0.020***
%Δ from FF Q1 to FF Q4 <sup>3</sup>	2.0%	0.7%	9.5%	43.9%	130.0%
<i>C. Annual Labor Income:</i>					
FF Q1 <sup>1</sup>	228.227	370.38	-142.153	-130.000	-32.009
<i>Difference from FF Q1<sup>2</sup></i>					
FF Q2	-5.120***	-0.272	-4.848***	-11.577***	11.360***
FF Q3	-0.460	-12.986***	12.526***	1.336	-0.934
FF Q4	2.896***	-21.733***	24.629***	10.221***	-9.777***
%Δ from FF Q1 to FF Q4 <sup>3</sup>	1.3%	-5.9%	17.3%	7.9%	-30.5%
<i>D. Occupational Skill-Content:</i>					
FF Q1 <sup>1</sup>	2.469	2.605	-0.136	-0.076	-0.049
<i>Difference from FF Q1<sup>2</sup></i>					
FF Q2	0.010***	0.002	0.008*	0.019***	0.025***
FF Q3	-0.007**	-0.009**	0.002	0.000	0.023***
FF Q4	-0.016***	-0.021***	0.005	-0.009**	0.005
%Δ from FF Q1 to FF Q4 <sup>3</sup>	-0.6%	-0.8%	3.8%	-12.0%	10.6%

NOTES: <sup>1</sup>The “FF Q1” row entries for each outcome are as follows: Columns (1) and (2) are the age- and calendar-year adjusted mean outcomes for mothers and fathers, respectively, who work in FF Q1 workplaces; Column (3) is the difference in these mean outcomes for mothers and fathers, respectively, who work in FF Q1 workplaces, i.e., the differences between Columns (1) and (2); Columns (4) and (5) are the age- and calendar-time adjusted motherhood- and fatherhood penalties.

<sup>2</sup>The “Differences from Q1” row entries are as follows: Column (1) is  $\phi_k^{(1,1)}$ , Column (2) is  $\phi_k^{(0,1)}$ , Column (3) is  $\lambda_k^{(:,1)}$ , Column (4) is  $\mu_k^{(0,\cdot)}$  and Column (5) is  $\mu_k^{(1,\cdot)}$ ,  $k = 2, \dots, 4$ . The  $p$ -values for tests of whether the differences from FF Q1 are equal to zero, where \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ .

<sup>3</sup>Positive values for the percentage changes in the move from FF Q1 to FF Q4 workplaces represent *improvements* in career outcomes [Columns (1) and (2)] and *reductions* in parental gender gaps [Column (3)] and parenthood penalties [Columns (4) and (5)].

TABLE E.3.  
 Estimates for Fixed-Effect Regressions of Gender, Parenthood Status, & Family Friendliness of  
 Workplace on Career Outcomes, Controlling for Worker Occupations

	Log monthly wage (1)	Annual Work hours (2)	Annual labor income (3)
Parent	0.0193*** (0.0011)	-0.0268*** (0.0010)	-33.8282*** (1.438)
Female × Parent	-0.0535*** (0.0013)	-0.0780*** (0.0015)	-15.0174*** (1.6155)
<i>FF</i> Q2	-0.0016 (0.0013)	-0.0033*** (0.0010)	-14.7920*** (1.9081)
<i>FF</i> Q3	0.0035** (0.0014)	-0.0089*** (0.0011)	-7.1856** (1.5921)
<i>FF</i> Q4	0.0161*** (0.0016)	-0.0113*** (0.0013)	-3.1381 (1.9483)
<i>FF</i> Q2 × Female	0.0115*** (0.0015)	0.0097*** (0.0015)	22.2998*** (2.0349)
<i>FF</i> Q3 × Female	0.0123*** (0.0017)	-0.0140*** (0.0018)	8.1380*** (1.7634)
<i>FF</i> Q4 × Female	0.0092*** (0.0019)	-0.0230*** (0.0021)	5.1373** (2.1273)
<i>FF</i> Q2 × Parent	0.0162*** (0.0015)	0.0067*** (0.0012)	17.5070*** (1.840)
<i>FF</i> Q3 × Parent	-0.0110*** (0.0015)	0.0175*** (0.0012)	-2.2808 (1.6709)
<i>FF</i> Q4 × Parent	-0.0383*** (0.0016)	0.0209*** (0.0013)	-11.3979*** (1.7392)
<i>FF</i> Q2 × Parent × Female	-0.0187*** (0.0018)	-0.0220*** (0.0020)	-30.6629*** (2.1162)
<i>FF</i> Q3 × Parent × Female	-0.0027 (0.0019)	0.0152*** (0.0022)	-2.2496 (1.9825)
<i>FF</i> Q4 × Parent × Female	0.0133*** (0.0021)	0.0249*** (0.0025)	10.5843*** (2.0992)
Observations	847,683	847,683	847,683

NOTES: Additional controls (not reported) include polynomials in experience, and 29 dummy variables indicating 2-digit occupational group. The results are robust to allowing separate experience profiles by gender and parenthood status. Annual labor income is denominated in 1,000 real SEK. Standard errors are clustered at the individual level (reported in parentheses). \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$

TABLE E.4.  
Impacts of being (Randomly) Assigned to More Family Friendly Workplaces on Career Outcomes,  
Gender Gaps & Parenthood Penalties, Controlling for Worker Occupations

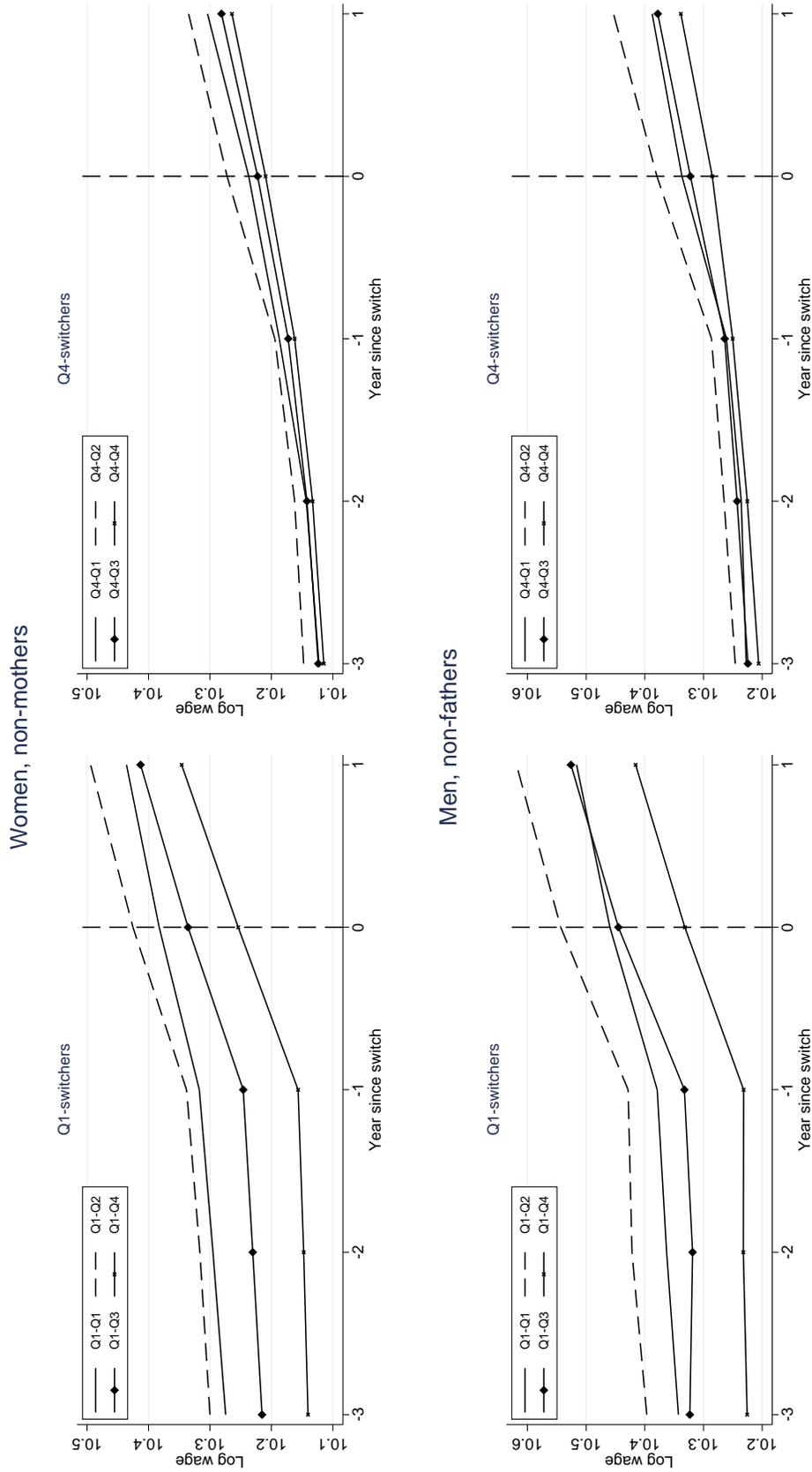
	Mothers (1)	Fathers (2)	Parental Gender Gap (3)	Motherhood Penalty (4)	Fatherhood Penalty (5)
<i>A. Log Monthly Wage:</i>					
<i>FF Q1</i> <sup>1</sup>	10.258	10.371	-0.113	-0.068	-0.017
<i>Difference from FF Q1</i> <sup>2</sup>					
<i>FF Q2</i>	0.007***	0.015***	-0.007***	-0.003***	0.016***
<i>FF Q3</i>	0.002**	-0.008***	0.010***	-0.014***	-0.011***
<i>FF Q4</i>	0.000	-0.022***	0.023***	-0.025***	-0.038***
%Δ from <i>FF Q1</i> to <i>FF Q4</i> <sup>3</sup>	0.00%	-0.2%	19.9%	-36.8%	-225.3%
<i>B. Contracted Work Hours:</i>					
<i>FF Q1</i> <sup>1</sup>	0.84	0.952	-0.112	-0.106	-0.015
<i>Difference from FF Q1</i> <sup>2</sup>					
<i>FF Q2</i>	-0.009***	0.003***	-0.012***	-0.015***	0.007***
<i>FF Q3</i>	0.010***	0.009***	0.001	0.033***	0.018***
<i>FF Q4</i>	0.012***	0.010***	0.002	0.046***	0.021***
%Δ from <i>FF Q1</i> to <i>FF Q4</i> <sup>3</sup>	1.4%	1.0%	1.7%	43.2%	139.3%
<i>C. Annual Labor Income:</i>					
<i>FF Q1</i> <sup>1</sup>	228.227	370.38	-142.153	-130.000	-32.009
<i>Difference from FF Q1</i> <sup>2</sup>					
<i>FF Q2</i>	-5.648***	2.715*	-8.363***	-13.156***	17.507***
<i>FF Q3</i>	-3.578***	-9.466***	5.888***	-4.530***	-2.281
<i>FF Q4</i>	1.186	-14.536***	15.722***	-0.814	-11.398***
%Δ from <i>FF Q1</i> to <i>FF Q4</i> <sup>3</sup>	0.5%	-3.9%	11.1%	-0.6%	-35.6%

NOTES: <sup>1</sup>The “*FF Q1*” row entries for each outcome are as follows: Columns (1) and (2) are the age- and calendar-year adjusted mean outcomes for mothers and fathers, respectively, who work in *FF Q1* workplaces; Column (3) is the difference in these mean outcomes for mothers and fathers, respectively, who work in *FF Q1* workplaces, i.e., the differences between Columns (1) and (2); Columns (4) and (5) are the age- and calendar-time adjusted motherhood- and fatherhood penalties.

<sup>2</sup>The “Differences from Q1” row entries are as follows: Column (1) is  $\varphi_k^{(1,1)}$ , Column (2) is  $\varphi_k^{(0,1)}$ , Column (3) is  $\lambda_k^{(:,1)}$ , Column (4) is  $\mu_k^{(0,:)}$  and Column (5) is  $\mu_k^{(1,:)}$ ,  $k = 2, \dots, 4$ . The  $p$ -values for tests of whether the differences from *FF Q1* are equal to zero, where \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ .

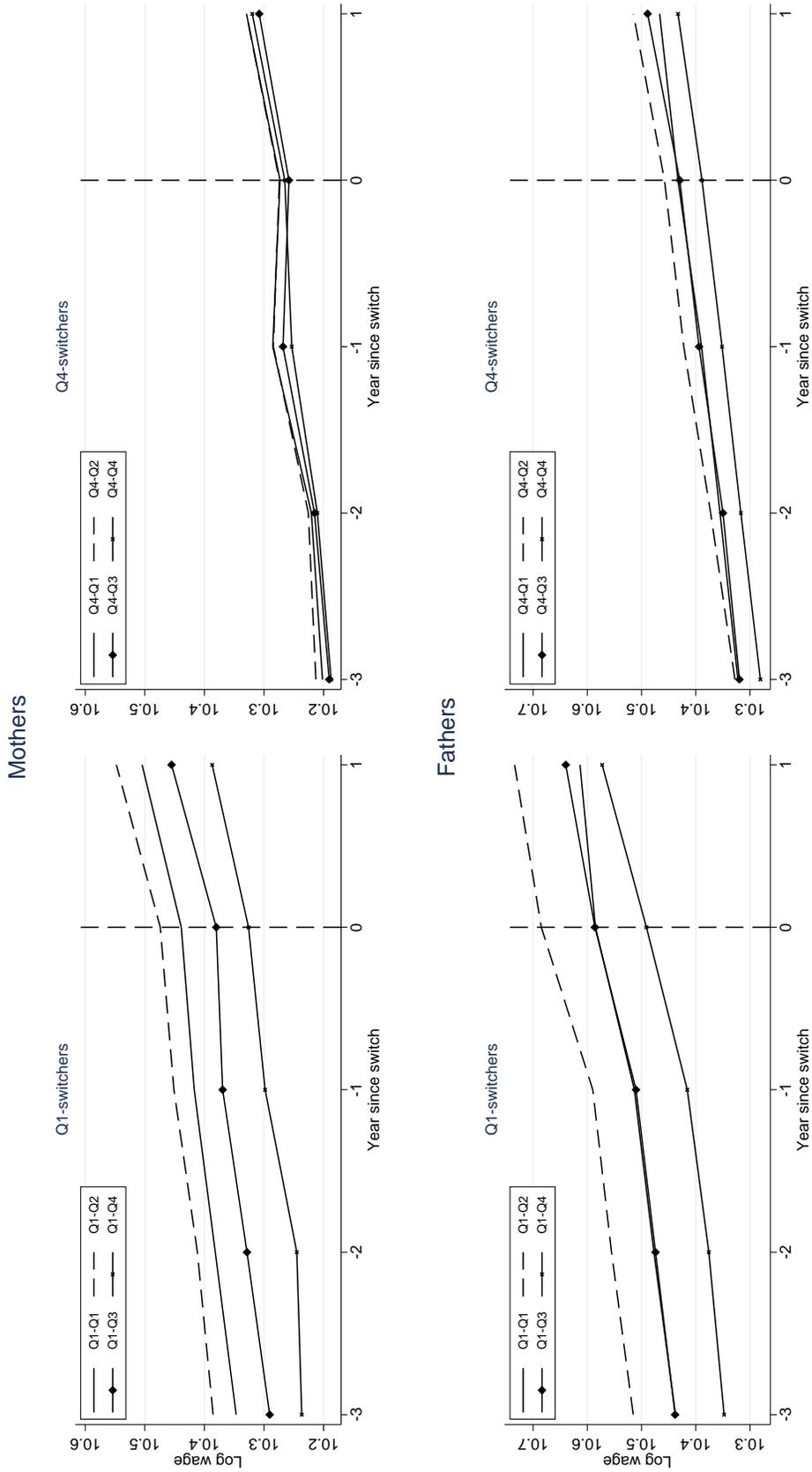
<sup>3</sup>Positive values for the percentage changes in the move from *FF Q1* to *FF Q4* workplaces represent *improvements* in career outcomes [Columns (1) and (2)] and *reductions* in parental gender gaps [Column (3)] and parenthood penalties [Columns (4) and (5)].

FIGURE E.1.  
Wage-trends Before Job Changes: Non-parents



NOTES: The figures show the wage trends 3 years before and 1 year after a job change, defined as changing employer, for women who are not yet mothers (upper panel), and men who are not yet fathers (lower panel). We pool all job-switches that we observe for any one worker over the early careers (before they become parents). The left-hand graphs depict the wage trends before and after job switches in which workers move from a workplace in the lowest quartile of the FF distribution to a workplace in the upper quartile of the distribution, and the right-hand graphs depict job switches from the uppermost quartile of the FF distribution to a workplace in the lower parts of the FF distribution.

FIGURE E.2.  
Wage-trends Before Job Changes: Parents



NOTES: The figures show the wage trends 3 years before and 1 year after a job change, defined as changing employer, for mothers (upper panel), and fathers (lower panel). We use the first job-change that an individual engages in after first becoming a parent, provided that the job-change occurs within three years after first birth. The left-hand graphs depict the wage trends before and after job switches in which workers move from a workplace in the lowest quartile of the FF distribution to a workplace in the upper quartile of the distribution, and the right-hand graphs depict job switches from the uppermost quartile of the FF distribution to a workplace in the lower parts of the FF distribution.

## Appendix F Further Tabulations on Job Flexibility and Substitutability from ULF/SILC Survey

TABLE F.1.  
Job characteristics from ULF/SILC by *FF* quartile

<i>FF</i> Quartile	(1) Q1	(2) Q2	(3) Q3	(3) Q4
<b><i>Freedom to decide</i></b>				
Start- and end-time of workday	4.913 (1.319)	5.683 (1.178)	5.493 (1.242)	5.026 (1.205)
Location of work	0.399 (0.076)	0.353 (0.097)	0.314 (0.116)	0.230 (0.132)
When to take breaks	0.696 (0.148)	0.803 (0.127)	0.801 (0.136)	0.764 (0.158)
When to take vacation	0.637 (0.236)	0.820 (0.169)	0.839 (0.151)	0.833 (0.135)
How to plan your work tasks	0.950 (0.036)	0.929 (0.052)	0.922 (0.063)	0.905 (0.076)
How to structure one's work	7.477 (0.509)	7.273 (0.720)	7.068 (0.925)	6.669 (1.024)
How to allocate your time across tasks	0.683 (0.129)	0.660 (0.223)	0.629 (0.253)	0.673 (0.213)
The general direction of work	5.456 (0.512)	5.470 (0.746)	5.331 (0.940)	5.003 (0.915)
<b><i>Working hours and time pressure of job</i></b>				
Stressful job	0.721 (0.130)	0.744 (0.195)	0.745 (0.242)	0.624 (0.303)
Fulltime	0.670 (0.237)	0.582 (0.329)	0.526 (0.359)	0.529 (0.336)
Part-time	0.239 (0.427)	0.205 (0.404)	0.321 (0.467)	0.324 (0.468)
Mostly daytime work	0.919 (0.098)	0.868 (0.122)	0.830 (0.148)	0.752 (0.185)
Evenings/nights	0.0149 (0.026)	0.0271 (0.036)	0.0349 (0.044)	0.0576 (0.070)
Shifts/irregular working hours	0.0660 (0.081)	0.105 (0.099)	0.135 (0.123)	0.190 (0.139)

NOTES: Means and (standard deviations).

TABLE F.2.  
Principal components analysis for job flexibility index

	Factor Loadings			
	(1)	(2)	(3)	(4)
Start & end workday	0.5489	0.1050	-0.8285	0.0347
Work location	0.1869	0.8887	0.2505	0.3353
When to take breaks	0.6109	0.0267	0.3791	-0.6945
When to take vacation	0.5390	-0.4454	0.3273	0.6356
Eigenvalues	2.467	1.121	0.356	0.055
Percent of variance	0.617	0.280	0.090	0.014

TABLE F.3.  
Principal components analysis for job autonomy index

	Factor Loadings			
	(1)	(2)	(3)	(4)
How to plan one's tasks	0.4784	0.4657	-0.6886	0.2830
How to structure one's work and tasks	0.5707	-0.2327	-0.0827	-0.7831
How to allocate working time across tasks	0.4618	0.5155	0.7137	0.1079
Affect the general direction of one's work	0.4819	-0.6806	0.0976	0.5431
Eigenvalues	2.808	0.696	0.423	0.073
Percent of variance	0.702	0.174	0.106	0.018

TABLE F.4.  
Degree of job flexibility and job autonomy by occupational category

Occupational group:	(1) Job Autonomy	(2) Job Flexibility
Legislators, senior officials and manager	0.881 (0.092)	0.820 (0.116)
Professionals	0.836 (0.103)	0.748 (0.179)
Associate professionals and technicians	0.783 (0.130)	0.648 (0.124)
Clerks	0.692 (0.119)	0.545 (0.123)
Service workers and shop and market sales workers	0.583 (0.180)	0.411 (0.163)
Skilled agricultural workers	0.638 (0.176)	0.351 (0.268)
Craft and related trades workers	0.661 (0.103)	0.523 (0.124)
Plant and machine operators and assemblers	0.558 (0.149)	0.418 (0.135)
Elementary occupations	0.590 (0.170)	0.444 (0.186)
Overall mean	0.705 (0.169)	0.574 (0.197)

NOTES: Means and (standard deviations).