

Mothers' birth giving status and the division of parental leave

A comparison of adoptive and biological parents

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by

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Abstract

Mothers' longer time on parental leave after having children has been proposed as one reason for remaining gender inequalities in the labor market. This paper investigates the determinants of the unequal division of parental leave, specifically the argument that mothers take more parental leave as a consequence of pregnancy and breastfeeding. We compare the division of parental leave of biological parents (where the mother gave birth) to adoptive parents (where she did not), to assess to what extent the unequal division of childcare responsibilities can be explained by the physiological aspects of biological motherhood. We analyze Swedish register data on couples who had their first biological or adopted child in 1994 – 2009, and families that had both adopted and biological children. We find that the mother's share of parental leave is lower if the child is adopted. The difference is small, 80% versus 82%, although statistically significant. We thus conclude that going through a pregnancy increases the mothers initial parental leave, but the impact is minor. Instead, our results indicate that gender norms of mothers as caregivers and fathers as breadwinners is more likely to explain (at least part of) couples' division of parental leave.

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1 Introduction

Parenthood is one of the most important determinants of the unequal division of labor within families (Angelov et. al., 2016; Baxter, Hewitt, & Haynes, 2008; Yavorsky, Kamp Dush, & Schoppe-Sullivan, 2015). After childbirth, women take on the majority of caring tasks and typically interrupt or reduce their employment to a much greater extent than men (Paull, 2008; Schober, 2013). Mothers' longer parental leave and thus longer periods away from the labor market contribute to gender inequality as it slows down women's wage development and career advancement (Aisenbrey, Evertsson, & Grunow, 2009; Evertsson & Duvander, 2011; Evertsson, Grunow, & Aisenbrey, 2016; Kleven, Landais, & Sogaard, 2019). Even in countries where it is formally possible to share the parental leave evenly between parents, mothers still take the vast majority of parental leave days (Duvander, Lappegård, & Andersson, 2010; Evertsson & Boye, 2018; Rostgaard & Lausten, 2015). In Sweden, the country at focus in this study, parents enjoy 16 months of paid parental leave that can be divided between the parents any way they want, except for three months that are earmarked for each parent. Despite being known for its egalitarian ideology and generous family leave policies, mothers still use about 70% of the paid parental leave in Sweden (SCB, 2020b). It is therefore important to increase our understanding of the causes of the unequal division of parental leave.

There are several theoretical explanations as to why mothers take a larger share of parental leave. Specialization theory emphasize that the spouse with the highest labor market productivity – often the man in different sex couples – ought to specialize in paid labor and the spouse with the highest productivity at home ought to specialize in unpaid labor (Becker, 1981, 1985). Specialization however also takes into account mothers' biological investment, such as pregnancy, giving birth and (perhaps) breastfeeding, which can lead to differences in the use of parental leave between biological and adoptive parents (Becker, 1981, 1985). Gender theory explains mothers longer parental leave as a result of the fact that mothers are socialized as caregivers and homemakers and fathers as breadwinners (Downing & Goldberg, 2011). Although the reason differs, both theories predict that mothers will take more parental leave than fathers. Empirically, it is difficult to disentangle the relative importance of these theories. The aim of this study is to increase the understanding of which of these mechanisms that influence gendered divisions of labor after parenthood, by comparing the use of parental leave among biological parents to that of adoptive parents.

Research that compares adoptive and biological parents have typically used small samples (Ciano-Boyce and Shelley-Sireci, 2003; Goldberg et al., 2012; Holditch-Davis et al., 1999). There are three large-scale studies that compare the earnings effects of parenthood for biological and

adoptive parents (Andresen et al., 2021.; Kleven, Landais, & Søgaaard, 2021; Rosenbaum, 2021). They find a somewhat larger child penalty for biological mothers right after entering parenthood, but this difference disappears when matching biological and adopted parents on their pre-parenthood characteristics (Andresen et al., 2021.; Kleven, Landais, & Søgaaard, 2021). These studies, however, do not study parents' division of labor directly.

We add to the previous literature by studying how adoptive and biological parents divide their time spent on care for children, in the form of use of parental leave. We compare, first, biological and adoptive parents who are similar in pre-child characteristics, thus taking differences in observable characteristics (i.e. selection) into account. Second, we compare the division of parental leave for biological and adopted children in families that have at least one adopted and one biological child. By comparing the division of parental leave between different children within the same family, unobservable family characteristics are kept constant. Furthermore, we study the choice of timing of parental leave of adoptive and biological parents. Previous research indicates that Swedish mothers of biological children usually take the initial and longest parental leave, followed by a shorter period of parental leave for fathers (Eriksson, 2019). We explore to what extent this is the case for adoptive parents, in order to analyze if pregnancy influence the timing of parental leave.

This paper uses Swedish population-wide register data and study parents who adopted or had their first biological child between 1994 and 2009. We identify 144,479 biological and 5,467 adoptive first-time parents for whom we track parental leave use between 1994 and 2012. We focus on paid parental leave use within the first 3 years after the child is born or comes into the parents' care, which captures the vast majority of parental leave taken by both parents (Eriksson, 2019). Given that parents select into adopting a child and that adopting a child is not equivalent to having a biological child, comparing adoptive and biological parents implies challenges for identification because these couples differ on observed and unobserved characteristics. We use two strategies to make the comparison possible. First, an exact matching strategy is used in which 45,706 biological and 3,861 adoptive couples with similar characteristics are compared, thereby taking observable differences between adoptive and biological couples into account. Second, we compare parental leave use associated with having a biological child versus adopting a child within the same family ($n = 1,033$). The latter strategy controls for both observed and unobserved family characteristics that might affect the parents' choice. These two strategies combined gives an integral overview of how adopting a child or having a child biologically might affect parents' decisions of the use of parental leave.

2 Institutional Background

2.1 The adoption process in Sweden

To start the adoption process, a couple applies to the social services in their municipality where a social worker evaluates their suitability to adopt a child (MFOF, 2022a).¹ The legal requirements for adoption were, during the time period in focus, that both parents were above age 25 and married. The applicants' financial situation, the stability of their relationship, as well as physical and mental health are typically considered important for approval. If the couple receives consent from the municipality to adopt, they can proceed to one of the authorized adoption agencies. The chosen agency sends a request (and the social workers report) to a local organization in one or several countries from which the couple wishes to adopt. After sending this request there is usually some waiting time, sometimes several years.

When a child is available for adoption, the adoption organization contacts the applicants who must again apply to the municipality to get the adoption approved (MFOF, 2022b). Typically, the couple then travels to the child's country to retrieve the child at short notice: planning the timing of when to retrieve the child is usually impossible. The couple might be expected to stay in the child's country for one week up to a few months depending on the country.

Besides being a time-consuming process, adopting a child can also be expensive. In 2014, the total cost of adopting a child was approximately 230,000 SEK (\approx \$23,000) (ISF, 2016). To cover the expenses the couple can apply for an adoption allowance of up to 40,000 SEK (\approx \$4,000).

2.2 Parental leave regulations

The Swedish parental leave consists of 16 months of paid leave out of which 13 months are reimbursed at 80% of the parent's previous earnings and 3 months on a flat rate.² Until 2016 (which covers the period we study in this paper) there were two quota months for both parents, introduced in 1995 and 2002. The other months can be divided between the parents in any way they see fit, even on an hour-by-hour, basis. However, mothers take about 70% of all parental leave days (SCB, 2020b). Fathers' share of parental leave days has increased slowly from 0.5% in the introductory year of 1974, to 10% in 1995, and then gradually to 30% in 2020 (SCB, 2020b).

The rules for taking parental leave for adoptive and biological parents are essentially the same (Forsakringskassan, 2022a). There is, however, a difference in that biological mothers can go on parental leave from 60 days before the child's expected birth date and fathers from the child's

¹ This section focuses on adopted children who are born abroad because, from the 1970s, the majority of adoptions in Sweden have been from abroad (see figure A1, appendix A, for an overview of how many children are adopted within Sweden and from abroad).

² The information in this section was gathered from the Social Insurance Agency (forsakringskassan.se) and Statistics Sweden (scb.se).

actual birth date. For adopted children, on the other hand, both parents can use parental leave from the day that the child comes into their care. When having a biological child, the mother's partner gets 10 additional days of parental leave. The reimbursement level for these days is lower and these days have to be used within 60 days of the child's birth. Adoptive parents can share the 10 extra days between them as they wish. To get a consistent measure of parental leave across couple types, we exclude the 10 extra days from our measurement.³

The eligibility requirement for parental leave is legal residency in Sweden (Forsakringskassan, 2022b). All persons, regardless of earnings and employment status, can use parental leave. The level of benefits when on parental leave does however depend on the parents' expected earnings. Wage employees get 80% of previous earnings up to a ceiling, conditional on having been employed for at least 8 months before the child's birth or adoption. The ceiling increases every year, following an index. During the period under study, there was also a one-time significant increase in the ceiling level, in July 2006. At that time, the highest earnings level that would still make a person eligible to get 80% of previous earnings when on parental leave was increased from 297,750 SEK (\approx \$30,000) to 397,000 SEK (\approx \$40,000) a year in labor earnings.

For children born before 2014, biological parents could use their parental leave until the child turned 8 years old. Adoptive parents could use the leave for eight years from the day the child came into their care, but not after the child turned 10 years old (Forsakringskassan, 2022b).

3 Theory

3.1 Specialization theory

There are several theories that aim to explain couples' division of labor. Specialization theory rests on the assumption that the family benefits the most if the person who is most productive in the labor market specializes in paid labor and the person who is most productive at home production specializes in household labor and childcare (Becker, 1981, 1985). As men often earn more than women do and have a stronger position in the labor market, the most beneficial choice is often to let men spend time in paid work and women in household and childcare tasks. Hence, women will take longer parental leave than men. This financially rational decision making occurs irrespective of whether parents adopt or have a biological child and based on only this argument we would not expect a difference between adoptive and biological parents. There is however another factor that impacts adoptive and biological parents differently, i.e. physiological aspects of pregnancy. Biological mothers often breastfeed and spend time with their newborn while recovering from childbirth. In terms of influencing the couples' choice of specialization, being

³ This is also the standard in studies on Swedish parental leave (see e.g. Duvander et al., 2021; Ekberg et al., 2013)

able to breastfeed and thereby spending more time with the child right after birth, might give biological mothers an advantage (or increased “productivity”) in taking care of the young child, compared to the father. This can lead to specialization for biological parents also in cases where there are no or only weak financial motives for it. When it comes to adoptive parents, the mother does not have a larger physiological investment than the father. The absence of these physiological aspects of becoming a parent might imply that labor market productivity is an even more important predictor for how adoptive couples, compared to biological, divide their parental leave.

We therefore formulate the expectations that *in the absence of economic differences between adoptive and biological couples, parents of adopted children divide their tasks more equally compared to parents of biological children (H1a) and compared to biological parents, labor market productivity (i.e., income) is a more important predictor for the division of parental leave for adoptive parents in the sense that the share of parental leave of one partner decreases with their own income and increases with the income of his/her partner (H1b)*. Moreover, given a larger physiological investment for biological mothers compared to adoptive mothers, we expect that *mothers who had their child biologically take more parental leave than mothers who adopted their child (H1c)*.

We also explore differences in timing of parental leave between biological or adoptive mothers and fathers, i.e. when biological or adoptive parents take parental leave during the first three years after the child is born (for biological parents) or after the child comes into the parents’ care (adoptive parents). If pregnancy, giving birth and breastfeeding matters for the division of parental leave, we would expect that biological mothers take more parental leave than biological fathers in the first period of the child’s life. The most efficient choice for the household would then be to keep this division of labor over time as comparative advantages in paid and unpaid work increase with experience. We therefore expect that biological mothers take on the majority of childcare tasks for the full three years after the child is born. For adoptive parents, pregnancy and breastfeeding do not generate a need or reason to go on parental leave first. If we therefore compare biological couples to adoptive couples, we expect adoptive parents’ division of parental leave to be less skewed towards the mothers in the beginning and throughout the first years after the child comes into care of the adoptive parents. We will show patterns of adoptive and biological parents’ allocation of parental leave from the time that the child is born or came into the parents’ care. Because these are mostly descriptive results, we do not formulate specific hypotheses on the timing of parental leave.

Another theory explaining couples’ division of labor is relative resource theory, which entails that the partner with more resources (e.g., income & education) has more power to bargain their

way out of doing unwanted tasks (Blood & Wolfe, 1960). This theory has received some support in predicting how couples allocate their household tasks because these tasks are often considered unpleasant (Evertsson & Nermo, 2004; Raley, Bianchi, & Wang, 2012). However, childcare tasks are often considered more enjoyable (Poortman & van der Lippe, 2009), which makes predictions based on this theory more difficult. The results of a bargaining process can either be more or less time on parental leave depending on the parents' preferences. We therefore refrain from formulating hypotheses based on this theory but include indicators of relative resources in the analyses. If these indicators are important, they most likely reflect the dominant preferences of the partners who have the highest resources.

Another related aspect that can potentially affect couples' division of parental leave is whether or not the parents are above or below the earnings ceiling for eligibility to get 80% of their earnings when on parental leave.⁴ If one partner (e.g. the father) has earnings above the threshold, and the other (e.g. the mother) is below it, this affects the parents' relative parental leave benefit levels. In this case, the family would lose even more income if the higher earner (e.g., the father) would go on leave. If couples optimize to maximize their family income, such a situation will make it more likely that the family does not allocate much parental leave to the higher earning partner (e.g. the father). This also implies that a higher parental leave benefit level could potentially be used as a power resource in the negotiations when deciding on the division of parental leave. We do, however, not expect this fact to affect biological and adoptive parents differently, other things equal. However, given that many in our samples are high earners, we need to take this potential dynamic into account in interpreting our results with respect to how economic theories operate.

3.2 Gender theory

Gender theory emphasize that gender is a social construction and argues that the perpetuation of this construction can explain for example how couples divide their parental leave. Earlier formulations of theories on gender as a social construction focused on gender ideologies formed through socialization, i.e. processes containing ideas on what is "appropriate" male and female behavior (Coverman, 1985). More recent formulations focus instead on combining gender ideologies with the theoretical construction of "doing gender". Women and men "do gender" in order to reflect normative expectations of social identities as women and men in everyday practices of childcare, household, and labor market responsibilities (South & Spitze, 2016; West & Zimmerman, 1987). Mothers' caregiving responsibilities or fathers' primary presence in the

⁴ As explained in the institutional background section, wage employees get 80% of their earnings when on parental leave up to a ceiling, which increases every year following an index.

labor market can be seen as such expressions of prevailing gender norms that are formed by repeated, everyday interactions with others. These expressions occur irrespective of if parents adopted a child or are biologically related to the child. We would thus expect gender differences in how parents use their parental leave, but not differences between adoptive and biological parents. A similar prediction comes from the theory on gender identity by Akerlof and Kranton (2000). They state that individuals gain utility by acting to confirm behaviors and characteristics of the social category (i.e. gender) they are assigned to or identify with and lose utility if they act in a way that does not conform to their social category. Following the behavioral prescriptions for one's gender affirms one's identity as "a man" or "a woman". This is one reason why men and women are likely to divide their paid and unpaid labor in a gendered fashion. This theory would therefore predict that both biological and adoptive mothers do most (and as much) child care work in order to feel like, and be seen as, 'good' mothers. Again, this theory would lead to gender differences in the use of parental leave, but not differences between adoptive and biological parents. As an alternative to H1a, we therefore expect that *there is no difference in how (un)equal adoptive or biological parents divide their parental leave (H2a)*. Since mothers "do gender" by doing more childcare tasks and father "do gender" by performing more paid labor, and in order to test gender differences for both couple types, we also expect that *adoptive mothers and biological mothers take on a larger share of parental leave than adoptive fathers and biological fathers, respectively (H2b)*. Worth noting is that Sweden is a country with parental leave quotas for fathers and relatively progressive fatherhood norms. We therefore expect both type of fathers to take at least some period of parental leave, but based on gender theory, this should not differ for biological and adoptive fathers. As an alternative to H1c, we thus expect that *biological and adoptive mothers and biological and adoptive fathers take a similar number of parental leave days (H2c)*.

With respect to the timing of parental leave, gender theory would predict that the unequal division of labor, in which mothers "do gender" by taking on the caregiver role and thus more parental leave than fathers, does not differ over time. Contrary to a specialization theory, gender theory does not predict differences in the timing of parental leave between biological and adoptive parents. In both couples, mothers take the first period of parental leave, and this uneven division of labor persists throughout the first three years after the child is born or comes into the care of the adoptive parents.

3.3 Empirical evidence

Most previous research that compares adoptive and biological parents has used limited data with relatively few observations. They often find that – in line with specialization theory – adoptive parents share their household and childcare tasks more equally than biological parents (Holditch-

Davis et al., 1999). Studies comparing different-sex and/or same-sex adoptive and biological parents, have found that heterosexual couples' division of childcare is more unequal than that of lesbian biological parent couples, and that lesbian adoptive parents are the most egalitarian (Ciano-Boyce & Shelley-Sireci, 2003). This suggests that tasks may be most equally divided in the absence of biological mothers' comparative advantage and parental differences in gender (norms). Goldberg et al. (2012) who compares same-sex (n = 55 female, n = 40 male) and different-sex adoptive parents (n = 65) find that for all couple types, one partner took on more childcare responsibilities than the other, but that this inequality was larger for different-sex couples than for adoptive gay male or lesbian couples. Common for all these studies is that they use small samples and thus cannot adequately control for other differences in characteristics between adoptive and biological parents that may affect their behavior.

Most studies using larger sample sizes to evaluate the effect of giving birth on the division of childcare or parental leave, do so by comparing same-sex and different-sex couples. These studies show that biological motherhood is an important determinant for the division of parental leave, as birth mothers in same-sex couples and different-sex couples take more parental leave (Evertsson & Boye, 2018; Moberg, 2016). They also reveal that the sex of the partner matters for both couple types as birth mothers in female same-sex couples take less parental leave than mothers in different-sex couples (Evertsson & Boye, 2018).

There are, to our knowledge, three large-scale studies that compare adoptive and biological parents (Andresen et al., 2021; Kleven et al., 2021; Rosenbaum, 2021). They study the economic consequences of parenthood and show that biological mothers experience a somewhat larger reduction in income ('child penalty') than adoptive mothers directly after entering parenthood. Fathers' incomes in both couple-types are unaffected by having children. However, any differences in income between biological and adoptive parents disappeared in the longer run, and the short-run differences are not present when couples are matched on pre-parenthood traits (Andresen et al., 2021; Kleven et al., 2021). These studies assume that the gender inequality in economic consequences of parenthood stem from unequal divisions of care work, but they do not study this directly. By focusing on the use and division of parental leave, as a proxy for division of time spent on care work, this paper fills a crucial gap in knowledge. Moreover, our study takes into account differences between biological and adoptive parents both in observable (by matching) and unobservable characteristics (by studying families with both biological and adoptive children).

Very few studies have looked at the timing of parental leave for biological parents and there is, to our knowledge, no study on the timing of parental leave among adoptive parents. In Sweden, biological mothers take more parental leave in the first few years after the child is born, and

fathers take around 20% of all parental leave during the first two years after childbirth (Duvander & Viklund, 2019). Eriksson (2019) shows that despite the uniquely flexible Swedish parental leave system that allows couples to share parental leave on an hourly basis, most couples ‘take turns’ in the role as primary caregiver to the child. Mothers take the first parental leave, for about 8-14 months, and then fathers take parental leave for the following 3-6 months. This paper adds to current knowledge by investigating if the gendered allocation of parental leave for mothers and fathers can be explained by biological mothers giving birth and therefore needing to take the first period of parental leave, by comparing the timing of parental leave for couples where the mother gave birth to families where she did not.

4 Method

4.1 Sample & data

We use Swedish population-wide register data covering all residents in Sweden between 16 and 65 years old for the years 1990 to 2010. The multigeneration register, which links parents with their biological and adopted children, is used to identify couples that adopted or had mutual biological children until 2009. Cases where one parent is a biological parent, and one adopted the child (stepchild adoptions) are excluded. To measure the time spent on parental leave we use detailed information on the use of parental leave benefits from the Swedish Social Insurance Agency (Försäkringskassan). These data contain information on the exact dates on parental leave, by which parent it was taken, and for which child, during the years 1994 to 2012. Combining these data sources, we collect information on all couples who had mutual biological or adopted children between 1994 and 2009, and their use of parental leave for the first three years after the child was born or adopted. Our data allows us to study a period of three years post birth/adoption for all children, i.e. the period when the vast majority of parental leave is taken (Eriksson, 2019).

Couples where none of the parents took any parental leave are dropped from the sample (less than 1 percent of couples). We also deduct parental leave taken by biological mothers before the child’s birth, since no other parents can take this type of parental leave, and we primarily want to study division of parental leave where a parent is taking care of the child after birth.⁵ A limitation is that we do not have information about unpaid parental leave, a type of parental leave commonly used by parents while awaiting the child’s placement in formal child care or to prolong time spent at home (Hall et. al., 2018; Karimi et. al., 2012).

⁵ Since we do not know children’s exact date of birth, we deduct any parental leave taken before the child’s birth month. Including these days did not change our conclusions in any significant way. As we would expect, including these days leads to a little more parental leave taken (2 days on average) by biological mothers compared to adoptive mothers.

In order to make adoptive and biological parents as comparable as possible we only use information on parental leave for the couples' first child, since most adoptive parents are first time parents. For the same reason, we only include couples who are married and above 25 when becoming parents, since these were legal requirements for adoption. This leaves us with 144,479 couples who had their first mutual biological child and 5,467 couples who adopted their first child together.

For our analyses on the sample of families with both adopted and biological children, all couples who adopted at least one child and had at least one biological child together are selected. Again, couples where none of the parents took any parental leave for at least one child are excluded. This sample consists of 1,033 families with in total 1,191 biological and 1,135 adopted children.

4.2 Selectivity of the sample

Couples select into adopting children, either because they prefer adoption or due to medical reasons (Malm & Welti, 2010). There is thus selection into adopting based on preferences, medical conditions, or other requirements for adoption (such as income, good health, and marital stability). To adopt, couples must also be willing to go through the adoption process. Since many couples who adopt have first tried to have a biological child, they are usually older and have waited longer to become parents. Adoptive parents are thus likely to be different from biological parents in both observable (e.g., age, income) and unobservable (e.g., marital stability, preferences) characteristics, which could bias our results. We use two strategies to correct for potential selection bias.

First, we compare adoptive and biological parents that are as similar as possible based on observable characteristics. We use coarsened exact matching (CEM; Iacus, King, & Porro, 2012) to generate a sample of mothers and fathers who are as similar as possible in relevant characteristics (in our case: education level, type of education, birth year/year of adoption, age of parents),⁶ with the exception of having children biologically or by adoption. This method temporarily coarsens the data in groups and finds exact matches to reweight the analysis and drop cases for which no 'counterfactual' case exists in the data. This method does not correct for selection on unobservable characteristics, unless they are perfectly correlated with the matching variables, but it makes the comparison between couples more reasonable. This strategy reduces

⁶ Level of education: lower than high school, high school, and college; type of education: general basic/missing, humanities, pedagogical, social science, natural science, health care, agriculture/forestry, and military & civil service.

the sample to 45,706 biological and 3,861 adoptive couples (31 and 70 percent respectively of the original samples).⁷

Second, we study the use of parental leave in families who have both biological and adopted children, i.e. within-family differences in parental leave for biological and adopted children. By including family specific fixed effects, we control for unobserved family characteristics that can affect parents' parental leave, something that is not possible in the 'between couples' comparison. This method increases the internal validity of the estimates but decreases the external validity, since couples that have both adopted and biological children are a specific subsample of families that could be different from other families. Moreover, parents' behavior with one child might influence their behavior with their next child. The choices of parental leave division with two different children are therefore not independent. However, by controlling for the order of children, and comparing families who adopted or had a biological child first, we can control for the impact of the order in which children came into the family.⁸

Using both 'between' and 'within' couple comparisons of the division of parental leave for biological and adopted children, provide two different ways of testing our hypotheses, which increases the validity of our conclusions.

4.3 Measures

4.3.1 Dependent variables

We construct a measure indicating each parent's total use of parental leave days during the child's first three years in life or, in the case of adoption, during the first three years that the child was in the adopting parents' care (i.e. the first 36 months after the child's birth month/month of adoption).

Mother's share of parental leave is calculated as the mother's percentage of the parents' total number of net paid parental leave days, excluding leave used before the child's birth month.⁹

⁷ As a sensitivity analysis, we have also performed the matching on the partners' earnings levels in the year before having children, thereby comparing families with similar earnings levels and within-couple earnings differences. This led to very similar results and conclusions, available upon request.

⁸ As a sensitivity analysis, we ran the analyses separately for families that had a biological child first ($n = 560$) and for families that had an adopted child first ($n = 473$). Overall, the results show the same patterns as the ones reported in the full within-family sample in this paper. This means that we find no indication that having a first child biologically (or when the first child is adopted) substantively alters choices for parents' division of parental leave for a subsequent adoptive (or biological) child. Results are available upon request.

⁹ Paid parental leave can be used full time or part time. In the case when it has been used part time, the days are recalculated as full-time days. As a sensitivity analysis, all analyses were re-estimated using 1) gross days with any paid parental leave during the first 36 months, 2) net days during all observable years, and 3) gross days using all observable years. This exercise yielded similar (if not identical) results, the main difference being a higher baseline (mean number of total parental leave days used), leading to similar conclusions. Results are available upon request.

Mother's parental leave days and *father's parental leave days* consist of the number of net paid parental leave days taken by the mother or father, respectively, excluding parental leave used before the child's birth month.

4.3.2 Independent variables

Adopted indicates whether the parents adopted the child (1) or are the biological parents of the child (0).

Mother's earnings indicate yearly labor earnings in 1000' SEK (before taxes and adjusted for inflation). The earnings variables are mean centered in the analyses.

Mother's share of earnings indicates the mother's percentage of earnings of the total household earnings.

4.3.3 Control variables

Since the CEM matching strategy allows for variation between cut-offs in the matching variables, adoptive and biological parents in the 'between couples' sample can still differ somewhat on these variables. We therefore include these variables, as well as others, in our analyses.

Child's age of adoption. Adoptive couples often become parents of a child that is older than a new-born. The average age of adoption was 12 months in Sweden during the period we study (calculations using population register data). This can affect differences between adoptive and biological parents since, for example, a child may start pre-school sooner. In Sweden the minimal age to enter publicly subsidized pre-school is one year. Since pre-school is offered full-time, faster enrolment lowers the need for adoptive parents to take long periods of parental leave. We will therefore also show to what extent the length of parental leave of adoptive parents is affected by adopting an older child. Our data do not contain the date of birth or adoption but do contain year of birth and date of the first parental leave day used by the adoptive parents, which we use to calculate the child's approximate age of adoption.¹⁰ Adopted children who were born in the same year as the parents' first use of parental leave for that child are coded as *adopted in birth year*. Children for whom the parents started using parental leave in the year after the birth year are coded as *adopted in year after birth*. Finally, children whose adopted parents' first use of parental leave for the child happened later than the year after the child's birth are coded as *adopted in second year after birth or later*.

Year of birth/adoption controls for trends in parental leave over time. This variable is mean centered when added to the analyses.

¹⁰ We cannot control for age at adoption in months, because month of birth is only available for 15% of the sample. Running the analyses again on this sample controlling for age at adoption in months did not alter our conclusions.

Female child controls for whether the child is female (1) or male (0).¹¹

Age is measured in years. We control for mother's age in the year they adopted or had a biological child. Moreover, to check how relative resources might affect the division of parental leave, we control for differences in age (next to differences in income) measured as *mother is older* (≥ 3 years diff), *parents similar in age* (< 3 years diff, reference category) and *father is older* (≥ 3 years diff).

Education is measured as years of schooling. We control for mother's years of schooling and, to check how relative resources might affect the division of parental leave, we control for differences in education in terms of whether the *mother (is) higher educated* (≥ 3 years of schooling), *parents are similar in education* (< 3 years difference, reference category), or the *father (is) higher educated* (≥ 3 years).

Table 1. Descriptive statistics of the variables in our analyses for the matched sample of biological parents (n = 45,706) and adopting parents (n = 3,861).

	MEAN (SD)			MIN		MAX	
	Bio	Adop	diff	Bio	Adop	Bio	Adop
Dependent variables							
Mother's share of parental leave	82.04 (18.81)	80.05 (20.02)	-1.99***	0	0	100	100
Mother's parental leave days	300.41 (88.44)	290.95 (91.26)	-9.47***	0	0	420	420
Father's parental leave days	62.78 (63.34)	69.52 (67.91)	6.74***	0	0	420	420
Independent variables							
Adopted in birth year	-	0.31	-	-	0	-	1
Adopted in year after birth year	-	0.50	-	-	0	-	1
Adopted in second year after birth or later	-	0.19	-	-	0	-	1
Mother's earnings in 1000 SEK	256.14 (147.11)	249.58 (128.84)	-6.57**	0.1	0.1	4788	1782
Father's earnings in 1000 SEK	344.88 (233.23)	337.35 (197.33)	-7.53	0.1	0.1	9507	3264
Mother's share of earnings	43.67 (17.26)	43.24 (15.06)	-0.43	0.02	0.4	100	100
Controls							
Year of birth/adoption	2001.20 (4.17)	2001.20 (4.16)	0.01	1994	1994	2009	2009
Female child	0.49	0.50	0.01	0	0	1	1
Mother's age	34.17 (4.03)	34.68 (3.91)	0.50***	25	25	48	50
Father's age	36.28 (4.66)	36.45 (4.46)	0.17*	25	25	61	58
Mother's years of education	13.20 (2.42)	13.13 (2.39)	-0.07	6.6	6.6	20.4	20.4
Father's years of education	13.15 (2.60)	13.14 (2.59)	-0.02	6.6	6.6	20.4	20.4
Mother higher educated (≥ 3 yrs)	0.13	0.13	0.00	0	0	1	1
Parents similar in education (< 3 yrs diff)	0.75	0.75	-0.01	0	0	1	1
Father higher educated (≥ 3 yrs)	0.11	0.12	0.01	0	0	1	1

Note: Bio = biological parents; Adop = adoptive parents. Linear probability models are used to estimate differences between biological and adoptive parents. Significance levels indicated as: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

¹¹ We additionally controlled for country of origin of the (adopted) child. This variable was not significant and did not alter any of our conclusions.

Table 2. Descriptive statistics of the variables in our analyses for families that have both adopted and biological children (n = 1,033 families; n = 1,187 biological, n = 1,133 adopted children).

	MEAN (SD)			MIN		MAX	
	Bio	Adop	diff	Bio	Adop	Bio	Adop
Dependent variables							
Mother's share of parental leave	83.13 (18.85)	78.35 (21.71)	-5.00***	0	0	100	100
Mother's parental leave days	304.79 (88.23)	274.24 (96.16)	-32.03***	0	0	420	420
Father's parental leave days	60.70 (67.06)	74.23 (74.34)	14.59***	0	0	420	405
Independent variables							
Adopted in birth year	-	0.29	-	-	0	-	1
Adopted in year after birth year	-	0.45	-	-	0	-	1
Adopted in second year after birth or later	-	0.26	-	-	0	-	1
Controls							
Year of birth/adoption	2000.64 (4.17)	2002.45 (3.99)	1.94***	1994	1994	2009	2009
Female child	0.47	0.57	0.10**	0	0	1	1
Not the first child	0.54	0.58	0.05	0	0	1	1
Mother's age	34.55 (4.65)	35.44 (4.80)	0.73***	20	21	48	49
Father's age	36.43 (5.31)	37.19 (5.20)	0.73***	21	24	62	62

Note: Bio = when having a biological child; Adop = when adopting a child. Linear probability models are used to estimate differences between biological and adoptive children. Significance levels indicated as; * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

In the analyses that looks at parents who both have an adopted child and a biological child, we also control for whether the (biological or adopted) child is not (1) or is (0) the family's first child. This partially controls for whether parents' behavior in relation to one child affects their behavior in relation to their next child.¹²

Table 1 and 2 provide descriptive statistics of all variables used in our analyses for the matched sample and for the 'within families' sample, respectively. Column 1-3 in table 1 shows mean values and differences between adoptive and biological parents in the matched sample, in the analysis referred to as the 'between couples' sample (since we estimate differences between couples). Although some of the differences are statistically significant, they are of little economic significance. The largest difference is that adoptive mothers are about 6 months older when becoming mothers.¹³ For illustrative purposes, table A1 in the Appendix shows the descriptive

¹² Adding an interaction between 'not the first child' and the child being adopted did not change the overall results or conclusions. This variable was always statistically non-significant.

¹³ Biological and adoptive parents have very similar earnings levels in the matched sample. The only statistically significant difference is that adoptive mothers earn about 6,500 SEK (\approx \$650) less per year, with should be of little economic significance as the average is about 250,000 SEK (\approx \$25,000) per year. Testing for covariate balance between adoptive and biological mothers' and fathers' earnings for three more years before having children (from four to two

statistics for the full (non-matched) population of biological and adoptive parents, as well as any significant differences between the matched sample and full population of couples. Comparing table 1 with A1 reveals that adoptive mothers in the matched sample take 4 more days of parental leave than adoptive mothers in the full population. Biological fathers take about 2 parental leave days less in the matched sample compared to the full population. Moreover, compared to the full population, biological parents in the matched sample are more affluent and older when they have their first child. Adoptive parents in the matched sample are about one year younger than adoptive parents in the full population.

Table 2 provide descriptives statistics and differences in covariates for parents in the ‘within families’ comparison, i.e. who have both adoptive and biological children, at the time each child came into the parents’ care. The parents on average adopted a child later in the period under study and are slightly older when adopting than when they had a biological child.

4.4 Analytical strategy

4.4.1 ‘Between couples’ comparison

We estimate 4 linear regression models using *mother’s share of parental leave* as the dependent variable. Models 1.1 (without controls) and 1.2 (with controls) test whether adoptive parents divide their parental leave more equally than biological parents (H1a), or whether they do not differ in how equally they divide their tasks (H2a). Model 1.3 tests whether the age of the child at the time of adoption might explain differences in the division of parental leave between biological and adoptive parents. Model 1.4 adds interactions between the mother’s earnings, and the mother’s share of earnings, and whether the child is adopted or not, to test H1b, i.e. whether labor market productivity (i.e., income) is a more important predictor for the division of parental leave for adoptive parents than for biological parents. By looking at the constants, these models also provide information on whether (adoptive and biological) mothers take on a larger share of parental leave than (adoptive and biological) fathers (H2b).

We estimate six models with *mother’s parental leave days* (model 2.1, 2.2. and 2.3) and *father’s parental leave days* (model 2.4, 2.5 and 2.6) as the dependent variable to test differences in the number of parental leave days for biological and adoptive mothers and fathers (H1c & H2c). Models 2.1 and 2.4 are basic models that tests differences in days between adoptive and biological mothers (model 2.1) and fathers (model 2.4) without any controls. Models 2.2 and 2.5 add control variables. Models 2.3 and 2.6 shows how the child’s age at adoption affects the number of parental leave days taken by biological and adoptive parents.

year before having a first biological or adopted child, not shows in the table) reveal that any differences are always small in size and never statistically significant.

4.4.2 'Within families' comparison

For families that have both adopted and biological children, we run regression analyses with family-fixed effects to control for time invariant (observed and unobserved) family characteristics that can affect parents' use of parental leave. These analyses therefore only include control variables that vary between children over time. Since parenthood can in itself effect parents' earnings (especially mothers) we do not control for partners' income in the within family estimations and can therefore not test our hypothesis that income might be a more important predictor for the division of labor among parents who adopt a child (H1b). Models 3.1 – 3.2 has *mother's share of parental leave* as dependent variable and test whether couples divide their tasks differently depending on whether they adopted a child or had their child biologically (H1a & H2a) and provides us with information on whether mothers take more parental leave than fathers (H2b). Models 3.3 – 3.4 test differences in *mother's parental leave days* depending on whether couples had a biological child or an adopted child. Similarly, models 3.5 – 3.6 test if *father's parental leave days* depends on whether his child is adopted or biological (H1c & H2c).

5 Results

5.1 'Between couples' estimations

Table 3 shows differences in mother's share of parental leave between adoptive and biological couples. Model 1.1 shows that mother's share of parental leave is 1.99 percentage points lower for adoptive parents than for biological parents. These results are in line with hypothesis H1a, that adoptive parents divide their parental leave more equally than biological parents, although the difference is small. Moreover, mothers take the majority of paid parental leave in both couple types. Biological mothers take about 82% of all parental leave (as shown by the constant in model 1.1 and in descriptive table 1), and adoptive mothers about 80%. These results hardly change after adding control variables in model 1.2. Model 1.3 shows that there is no statistically significant impact of the child's age at the time of adoption on the mother's share of parental leave, e.g. of adopting a child in the year after birth or later instead of in its birth year.

Model 1.4 tests H1b, that the share of parental leave of a parent decreases with their own income and increases with the income of his/her partner, and that this is a more important predictor for the division of parental leave of adoptive than biological parents. We find that a higher income for biological mothers (-0.01) and adoptive mothers (-0.01 + 0.00 = -0.01) is associated with a minimal decrease in the mother's share of parental leave or – in other words – an increase in the father's share of parental leave. However, an increase in the mother's share of income by 1 percentage point is associated with an increase in a biological mother's share of parental leave

Table 3. Results of linear regression analyses estimating the effect of having an adopted child (the “adopted” parameter) on the mother’s share of parental leave, performed on the matched sample of biological parental couples (n = 45,706) and adopting couples (n = 3,861).

	Model 1.1 Mother’s share	Model 1.2 Mother’s share	Model 1.3 Mother’s share	Model 1.4 Mother’s share
Independent variables				
Adopted	-1.99*** (0.38)	-2.10*** (0.38)	-1.96*** (0.54)	-2.17*** (0.37)
Adopted in year of birth (ref)				
Adopted in year after birth year			-0.13 (0.68)	
Adopted in second year after birth or later			-0.43 (0.94)	
Mother’s earnings in 1000 SEK		-0.01*** (0.00)	-0.01*** (0.00)	-0.01*** (0.00)
Mother’s earnings in 1000 SEK * Adopted				0.00 (0.00)
Mother’s share of earnings		0.08*** (0.01)	0.08*** (0.01)	0.09*** (0.02)
Mother’s share of earnings * Adopted				-0.08** (0.03)
Controls				
Year of birth/adoption		-1.23*** (0.05)	-1.23*** (0.05)	-1.23*** (0.05)
Female child		0.10 (0.37)	0.11 (0.37)	0.11 (0.37)
Mother’s age		0.15** (0.06)	0.15** (0.06)	0.15** (0.06)
Mother older than father (≥ 3 yrs)		0.36 (0.78)	0.36 (0.78)	0.35 (0.78)
Mother and father similar in age (> 3 yrs diff) (ref)				
Father older than mother (≥ 3 yrs)		1.38*** (0.40)	1.38*** (0.40)	1.38*** (0.40)
Mother’s years of schooling		-0.85*** (0.10)	-0.85*** (0.10)	-0.86*** (0.10)
Mother higher educated than father (≤ 3 yrs)		1.22* (0.62)	1.22* (0.62)	1.22* (0.62)
Mother and father similar in education (> 3 yrs diff) (ref)				
Father higher educated than mother (≥ 3 yrs)		-0.04 (0.64)	-0.04 (0.64)	-0.05 (0.64)
Constant	82.04*** (0.21)	81.48*** (0.32)	81.48*** (0.32)	81.55*** (0.32)

Note: Significance levels indicated as; * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

days (0.09), but only a minimal change for an adoptive mother (0.09 – 0.08 = 0.01). Although these effects are statistically significant, they are small. The largest effect is for biological mothers’ share of earnings, but in order for their share of parental leave to decrease by, for example, 1 percentage points, biological mothers need to earn on average 116,000 SEK or \$11,600 more a year, a 45-percentage point earnings increase compared to their mean income in this sample.¹⁴

Table 4 shows the difference in the number of parental leave days between adoptive and

¹⁴ Calculations based on biological parents’ mean earnings (see table 1).

Table 4. Results of linear regression analyses estimating the effect of having an adopted child (the “adopted” parameter) on the number of parental leave days used by biological mothers (n = 45,706) and adoptive mothers (n = 3,861), and biological fathers (n = 45,706) and adoptive fathers (n = 3,861) in the matched sample.

	Model 2.1	Model 2.2	Model 2.3	Model 2.4	Model 2.5	Model 2.6
	Mother's days	Mother's days	Mother's days	Father's days	Father's days	Father's days
Independent variables						
Adopted	-9.47*** (1.77)	-10.15*** (1.71)	-6.30* (2.47)	6.74*** (1.30)	7.13*** (1.29)	8.73*** (1.94)
Adopted in year of birth (ref)						
Adopted in year after birth year			-3.16 (3.00)			-1.67 (2.37)
Adopted in second year after birth or later			-12.34** (4.22)			-4.21 (3.11)
Mother's earnings in 1000 SEK		-0.09*** (0.01)	-0.09*** (0.01)		0.04*** (0.01)	0.04*** (0.01)
Mother's share of earnings		0.39*** (0.06)	0.39*** (0.06)		-0.17*** (0.05)	-0.17*** (0.05)
Controls						
Year of birth/adoption		-6.71*** (0.24)	-6.69*** (0.24)		4.11*** (0.18)	4.12*** (0.18)
Female child		-0.52 (1.75)	-0.50 (1.75)		0.14 (1.28)	0.15 (1.28)
Mother's age		0.69** (0.27)	0.70** (0.27)		-0.59** (0.20)	-0.59** (0.20)
Mother older than father (≥ 3 yrs)		-4.85 (3.96)	-4.83 (3.96)		-0.78 (2.76)	-0.77 (2.76)
Mother and father similar in age (> 3 yrs diff) (ref)						
Father older than mother (≥ 3 yrs)		3.74* (1.86)	3.80* (1.86)		-5.52*** (1.36)	-5.50*** (1.37)
Mother's years of schooling		-5.55*** (0.48)	-5.54*** (0.48)		2.60*** (0.34)	2.60*** (0.34)
Mother higher educated than father (≤ 3 yrs)		6.28* (2.96)	6.28* (2.96)		-4.02 (2.15)	-4.02 (2.15)
Mother and father similar in education (> 3 yrs diff) (ref)						
Father higher educated than mother (≥ 3 yrs)		-5.39 (2.83)	-5.39 (2.83)		-1.15 (2.09)	-1.15 (2.09)
Constant	300.41*** (0.99)	301.43*** (1.47)	301.36*** (1.47)	62.78*** (0.71)	65.28*** (1.05)	65.26*** (1.05)

Note: Significance levels indicated as; * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

biological mothers (model 2.1 – 2.3) and adoptive and biological fathers (model 2.4 – 2.6). In line with hypothesis H1c, model 2.1 shows that biological mothers take about 9.5 days more parental leave than adoptive mothers. Biological mothers on average take about 300.5 days (shown by the constant in model 2.1 and in descriptive table 1) and adoptive mothers 291 days (300.41 – 9.47). Adoptive fathers take around 6.5 days more than biological fathers (model 2.4), using on average 69.5 days (62.78 + 6.74), whereas biological fathers use on average 63 days (as shown by the constant in model 2.4 and in descriptive Table 1). Differences between adoptive and biological parents change very little when adding control variables in model 2.2 or 2.5.

Model 2.3 and 2.6 in Table 4 test the impact of age of the child when adopted. We argue that since children in Sweden can start pre-school at age 1, adopting an older child could lower the need to take longer periods of parental leave. Model 2.3 shows that, compared to parents whose child come into the care of the adoptive parents in the year of birth, there is no significant difference if the child is adopted in the first year after birth, but if the child is adopted in the second year or later mothers take less parental leave. In that case, the adoptive mothers take about 18.5 days less parental leave than biological mothers (-6.30 - 12.34). This indicates that adoptive mothers feel a somewhat smaller need to stay on parental leave with an older child, although the decrease in parental leave days is only 4 percentage points compared to mothers who adopted a younger child (12.34/(300.41-9.47)). For adoptive fathers, the child's age at adoption does not have any statistically significant effect, and the point estimates are much smaller than for mothers. The control variables indicate that mothers share of parental leave decreases with every passing calendar year in the study period with 1.23 percentage point (table 3, model 1.2). With respect to number of days this means that mothers take approximately 7 days less parental leave and fathers 4 days more parental leave every passing year (table 4, model 2.2 and 2.5, respectively). This could partly be because during the years under study, Sweden implemented two quota months for fathers, in 1995 and 2002, at the same time reducing the mother's total days by 30, and the overall trend was for fathers to take more parental leave days (Johansson, 2010). With respect to relative resources, both age and schooling seem to matter. The mother's share and use of days increase and the father's days decrease with the mother's age, if the father is older (compared to the parents being of similar age), and if the mother is more educated than the father. The mother's share and use of days decrease and the father's days increase with the mother's years of schooling.

5.2 'Within families' estimations

Table 5 shows the analyses for families that have both adoptive and biological children. Model 3.1 shows that the mother's share of parental leave is about 5 percentage points smaller for an adopted child. Adding control variables that vary between children in model 3.2 reduces this point estimate to 3.65%, which is larger than what we found in the between couple comparisons (where it was 2%). In both samples, and in line with H1a, parents divide their tasks slightly more equally for an adopted than a biological child. Also in line with the 'between couples' comparison, and with hypothesis H2b, mothers take the majority of parental leave: 82% as indicated by the constant in model 3.2. As a comparison, in the 'between couples' comparison it was 80%. None of the variables indicating other characteristics of the child are statistically significant.

The results for the number of parental leave days show that mothers take around 305.5 days for a biological child (as shown by the constant in model 3.3) and 273.5 days (305.51 - 32.03)

Table 5. Results of linear regression analyses with family fixed effects estimating the effect of having an adopted child (the “adopted” parameter) on the mother’s share of parental leave and mother’s and father’s number of days on parental leave within families (n = 1,033) that have both biological (n = 1,191) and adopted (n = 1,135) children (i.e. in total 2,320 children).

Independent variables	Mother’s share		Mother’s days		Father’s days	
	Model 3.1	Model 3.2	Model 3.3	Model 3.4	Model 3.5	Model 3.6
Adopted	-5.00*** (0.90)	-3.65* (1.51)	-32.03*** (4.17)	-27.15*** (6.99)	14.59*** (3.13)	10.23 (5.44)
Adopted in year of birth (ref)		-		-		-
Adopted in year after birth year		-1.02 (1.88)		5.22 (8.66)		3.63 (6.62)
Adopted in second year after birth or later		0.22 (2.66)		-1.24 (12.12)		-1.89 (8.97)
Controls						
Year of birth/adoption		-0.58 (0.35)		-3.90* (1.64)		2.05 (1.24)
Female child		1.50 (1.17)		8.33 (5.27)		-5.33 (4.06)
Not the first child		0.37 (1.61)		-2.71 (7.68)		-4.13 (5.58)
Constant	83.24*** (0.44)	82.09*** (1.23)	305.51*** (2.04)	301.38*** (5.65)	60.18*** (1.53)	65.73*** (5.34)

Note: Significance levels indicated as; * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

for an adopted child (model 3.3), a 32-day difference. Fathers take around 60 days of parental leave for a biological child and around 74.5 days (60.18 + 14.59) for an adopted child (model 3.5). After adding control variables in model 3.4 and 3.6, the differences between the number of days taken for a biological child and an adopted child decreases to 27 days for mothers and 10 days for fathers. However, the parameters are no longer statistically significant. These parameters are on par with the between-couples comparisons for fathers but larger for mothers.¹⁵ In the between-couples comparison, adoptive fathers took 6.5 days more parental leave than biological fathers, and adoptive mothers took 9.5 days less parental leave than biological mothers. In support of H1c, mothers take more parental leave when they have biological children compared to when they adopted a child.

The variables indicating the child’s age at adoption (*adopted in year after birth* and *adopted in second year after birth or later*) are always small and statistically insignificant. We also

¹⁵ The difference in results for mothers in the ‘within family’ sample compared to the ‘between couples’ comparison cannot be explained by differences in the child’s age when adopted, year of birth or adoption, adopted children’s country of birth and gender, or the adopted child not being the family’s first child.

compared model 3.2, 3.4 and 3.6 to models without these variables (models not shown) resulting in similar sized parameters for the ‘adopted’ variable.

Overall, the conclusion based on the ‘within family’ and the ‘between couples’ estimations are similar: Parents who adopt divide their tasks more equally than parents who have a biological child (H1a), but this difference is small. Moreover, mothers with a biological child take more parental leave than mothers who adopt a child (H1c), while biological fathers take less than adoptive fathers. Lastly, we find that mothers take the majority of parental leave, irrespective of whether the child is adopted or biologically connected to their parents, which is in line with H2b.

5.3 Timing of parental leave

Figures 1a and 1b show the number of parental leave days used per month in the first three years after the child’s birth (for biological parents) or after the time when the child came into the care of the adoptive parents. This is displayed for the first child of biological and adoptive parents (the matched ‘between couples’ sample: figure 1a), and for families with both adopted and biological children (‘within families’ sample: figure 1b). Specialization theory predicts that mothers of biological children take more parental leave than biological fathers the first months of the child’s life because of their larger physiological investment. It would subsequently be the most productive for the household to keep this division of labor over time. Because there is no biological investment for mothers who adopt, the same theory leads to the expectation that adoptive parents divide their parental leave more equally from the beginning and throughout the first years of the child’s life. Gender theory, on the other hand, predicts that mothers take more parental leave than fathers and that this uneven division of labor persists throughout the first period of the child’s life, irrespective of whether children are adopted or biological.

For both samples, the timing of parental leave is remarkably alike for adopted children and for biological children. Figures 1a and 1b show that mothers take more parental leave than fathers throughout the first three years, and that biological mothers take slightly more parental leave than adoptive mothers. Additionally, fathers who adopt take more parental leave than biological fathers in the beginning of the child’s life, but biological fathers take more than adoptive fathers from the time the child turns 1 until the child is about 18 – 21 months old or has been in the adoptive parents’ care for that long. Lastly, after three years, differences between all parents are small to non-existent, probably because parents have used most of their parental leave. The differences in use of parental leave between mothers who adopt or have children biologically are small. Parents who adopt divide their parental leave almost as unevenly as parents who have biological children. We therefore conclude that the patterns we see are more congruent with gender theory: mothers take more parental leave from the beginning, irrespective of their child being biological or adopted, and this uneven division of labor persists throughout the first 3 years in the parents’ care.

5.4 Age of the child when adopted

To further explore how the age of the adopted child affects differences in the divisions of parental leave between adoptive and biological parents, we provide boxplots of the number of parental leave days used by biological and adoptive parents in the matched ‘between couples’ sample (figure 2a), and the number of parental leave days used by parents who both have adopted and

Figure 1a. Average number of paid parental leave days used per month by biological and adoptive mothers and fathers in the *matched (between families) sample*, over the child's age (biological children) or time spent in the parents' care (adopted children).

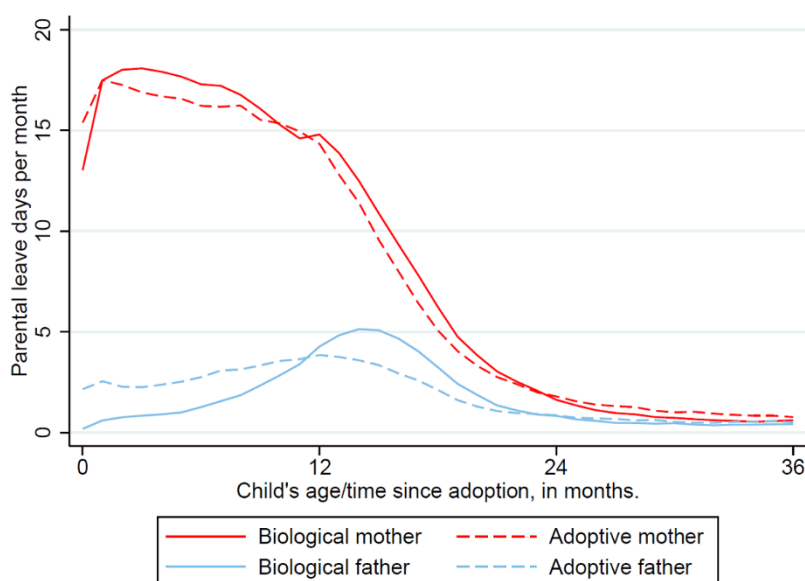


Figure 1b. Average number of paid parental leave days used per month by mothers and fathers in *families that have both biological and adopted children (within family sample)*, over the child's age (biological children) or time spent in the parents' care (adopted children).

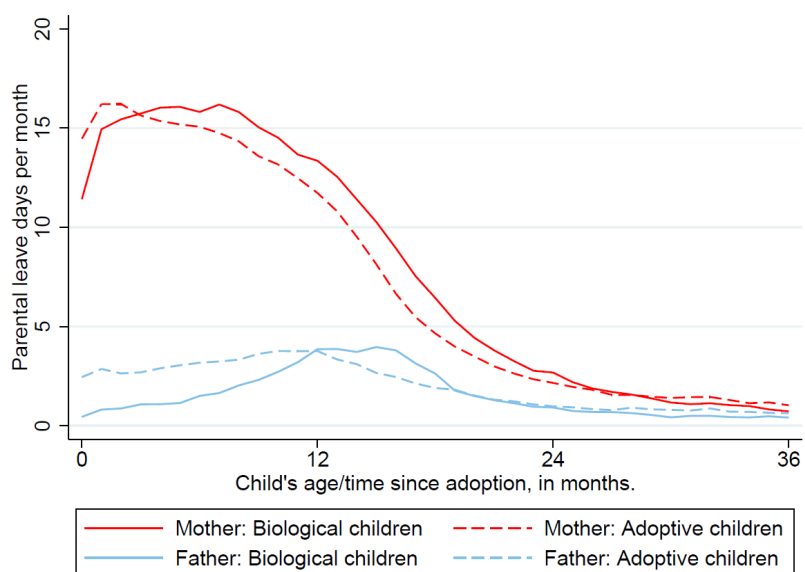


Figure 2a. Boxplots of number of paid parental leave days used by biological and adopting mothers and fathers in the *matched (between families) sample* over age (in years) when the child came into the parents' care.

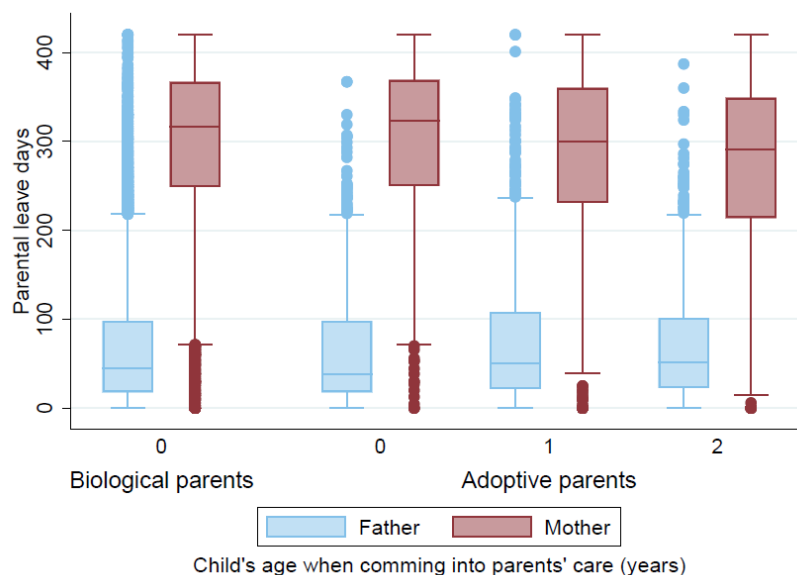
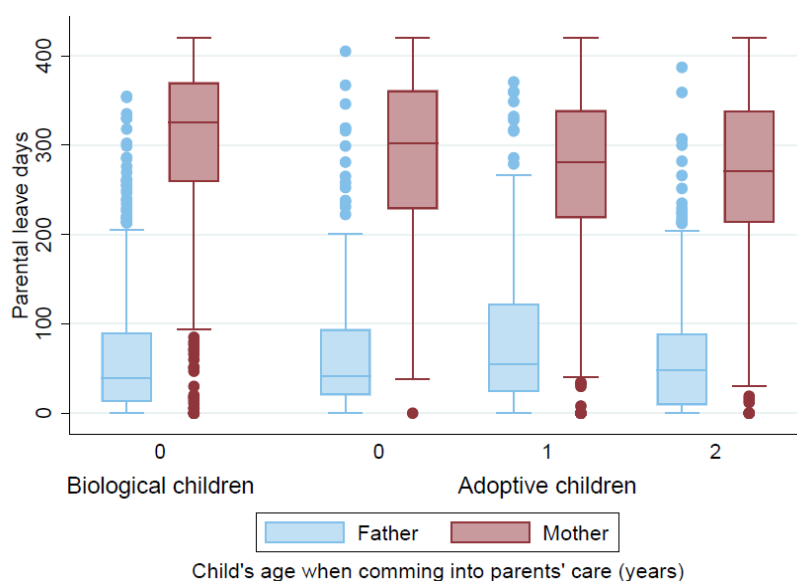


Figure 2b. Boxplots of number of paid parental leave days used by mothers and fathers in *families that have both biological and adopted children (within family sample)* over age (in years) when the child came into the parents' care.



biological children (figure 2b), over age of the child when it comes into the care of the parents. Each boxplot shows the number of parental leave days taken by biological parents or adoptive parents depending on the age (in years) when the child comes into the parents' care.¹⁶ The figures show that the distribution of the number of parental leave days (median and quantiles) do not primarily differ over the child's age when it comes into the parent's care, or whether the child is adopted or not, but by gender. For adoptive mothers, we see a decline in parental leave days if the child is older when adopted. However, the difference is small and we conclude that age at adoption does not explain much of how adoptive mothers and fathers allocate their parental leave, or the difference between them and biological parents.

6 Conclusions

Drawing on Swedish population register data this paper examines differences in how adoptive and biological mothers and fathers allocate their paid parental leave. By comparing parents who adopt or who have biological children, we shed light on how biological ties, gender norms and comparative advantages in the household and labor market influence the division of labor and number of parental leave days. To mitigate selection bias in observed and unobserved parental characteristics and to increase the validity of our results, we compared parental leave use (i) between adoptive and biological couples who are as similar as possible in observable relevant background characteristics (e.g., age, education), but for whom being a biological or adoptive parent differs, and (ii) within couples who have at least one biological and one adopted child. The latter allows us to account for unobserved family characteristics, something that is not possible in the 'between couples' comparison.

Based on specialization theory, we argued that because adoptive mothers are not pregnant or breastfeed, adoptive parents can be expected to divide their parental leave more equally than biological parents (H1a) and biological mothers can be expected to take more parental leave than adoptive mothers (H1c). In line with these hypotheses and with previous research (Ciano-Boyce & Shelley-Sireci, 2003; Goldberg et al., 2012; Holditch-Davis et al., 1999), we find a marginally more equal division of paid parental leave between adoptive parents and a slightly higher use of parental leave among biological mothers in both the between and within family comparisons. Adoptive mothers use about 9.5 days less of paid parental leave than biological mothers, and adoptive fathers use about 6.5 days more than biological fathers, indicating that adoptive parents shift some days from the mother to the father or that biological parents shift days from the father to the mother. Based on figure 1a and 1b, the additional days used by biological, compared to

¹⁶ Since few children are adopted beyond the first few years after birth, the box plots for children who are 2 years at adoption, also include children adopted at an older age.

adoptive, mothers are spread out over the course of the first three years of the child's life. Furthermore, since the average number of days used for mothers is 300, the 9.5 additional days constitutes only about 2 percentage points of the mother's share of parental leave days, which is about 82% for biological and 80% for adoptive mothers. This implies that the fact that mothers give birth cannot alone explain the overall division of parental leave between mothers and fathers.

We also argued that in the absence of the influence of biological factors, labor market productivity might be a more important predictor for the division of parental leave for adoptive couples (H1b). Based on our estimated parameters, labor market productivity (measured as the mother's earnings and her share of household earnings) seems to have little explanatory power for how adoptive or biological couples divide their parental leave. This does not mean that we can rule out that economic motives impact parents' division of parental leave in general, as we do not test this causally.

Based on gender theory, we argued that couples' enactment of gender perceptions – of fathers as the primary breadwinner and mothers as the primary caregiver and homemaker – occur irrespective of if parents adopted a child or are biologically related to the child. In line with this theory, our results clearly indicate that both biological and adoptive mothers take the majority of parental leave (80 vs 82% respectively). Mothers' primary caregiving role, regardless of (lack of) biological ties to the child, is reflected in the behavior of all mothers, both in the 'within' and 'between' families comparisons. We know from previous research that biological mothers take on the majority of parental leave (e.g., Duvander & Viklund, 2019; Evertsson & Boye, 2018), but this study shows that these gender differences cannot be explained by the fact that women carry the child, give birth and (perhaps) breastfeed. This result is also in line with the only previous large-scale studies comparing adoptive and biological parents (Andresen et al., 2021; Kleven et al., 2021; Rosenbaum, 2021), which concluded that the larger economic impact of parenthood for women cannot be explained by them giving birth to the child.

The influence of gender norms is also visible in the timing of the parental leave. Even though Sweden has a very flexible parental leave system, biological and adoptive parents (in both the between and within family comparisons) show a highly similar, gendered, pattern when it comes to when they go on parental leave. Biological mothers take most of the early parental leave, until the child is about one year old, and then the biological father takes about 3 – 6 months of parental leave, which is congruent with other findings from Sweden on biological parents (Eriksson, 2019). Adoptive mothers also take most of the early parental leave, until the child has been in the parents' care for about one year. Adoptive fathers use slightly more parental leave than biological fathers in the beginning, i.e. when the child comes into the care of the parents. Nevertheless, adoptive fathers' use of parental leave is still much lower than that of adoptive mothers.

Additional analyses, using boxplots, reveal that the gendered pattern of the division of parental leave stays virtually the same regardless of the child's age when adopted.

Although our results indicate that gender norms appear to heavily influence parents' division of childcare tasks, we cannot rule out that other factors may also influence parents' behavior. As mentioned above, the Swedish parental leave system contains a 'ceiling' earnings level above which parents are no longer eligible to the highest reimbursement rate. If one parent is above the ceiling, e.g. the father, and the other is below it, this constitutes another economic argument for an uneven division of parental leave. However, since we achieve balance on earnings across parent types in our matched sample, the 'ceiling' should affect adoptive and biological parents in the same way. Economic motives could in general still play a large role in how parents divide time on parental leave, in ways that are not studied in detail in this paper. For example, gender differences in use of parental leave could be a result of a perceived risk of discrimination in the workplace or sorting into occupations and jobs that offer better conditions to go on parental leave. Albrecht et. al. (1999) has shown that spending more time on parental leave can be detrimental for fathers' career advancement. These factors, however, lay outside the scope of our analysis. Although we have access to the universe of adoptive parents in Sweden, the number of observations limits the possibility to study patterns of heterogeneity, and in-depth analysis of the influence of covariates. This is especially true for the within family sample, which consists of only 1,033 couples. Also for the 'between couples' comparison, even after matching, there is still a risk of unobserved differences in characteristics. However, since our results are relatively similar when comparing divisions of parental leave between different families and between children in the same family, we do not think that selection bias is a major concern in our study.

Lastly, we are unable to observe work protected unpaid parental leave, which means that our measure of paid full-time parental leave days may not capture the full extent of parents' time at home with the child. This means we are likely to underestimate differences in the total amount of time on parental leave between mothers and fathers as mothers use more unpaid parental leave than fathers (Duvander & Viklund, 2019), but possibly also differences between biological and adoptive parents. Likewise, we cannot observe children's time of enrollment in formal childcare, or parents' time on vacation.

Overall, even though the Swedish parental leave system allows couples to share parental leave equally, mothers still take on the vast majority of parental leave, thus initially spending significantly more time with the child than the father. With the aim of identifying explanations for gender stereotyped division of labor when entering parenthood, our study shows that parents' task divisions appear to be heavily influenced by traditional gender norms, which outweigh the impact of physiological aspects of motherhood.

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Appendix

Table A1. Descriptive statistics of the full (unmatched) population of biological parental couples (n = 144,479) and adopting parental couples (n = 5,467) who had their first child together in Sweden between 1994 and 2009.

	MEAN (SD)		MIN		MAX	
Dependent variables	Bio	Adop	Bio	Adop	Bio	Adop
Mother's share of parental leave	81.48*** (19.94)	79.42 (21.24)	0	0	100	100
Mother's parental leave days	300.14 (91.77)	286.74* (95.05)	0	0	420	420
Father's parental leave days	64.83*** (66.92)	70.00 (69.12)	0	0	420	420
Independent variables						
Adopted in birth year	-	0.28***	-	0	-	1
Adopted in year after birth year	-	0.50	-	0	-	1
Adopted in second year after birth or later	-	0.22***	-	0	-	1
Mother's earnings in 1000 SEK	212.92*** (146.14)	242.38* (138.31)	0	0	10133	2318
Father's earnings in 1000 SEK	287.03*** (224.70)	326.80* (202.84)	0	0	25479	3264
Mother's share of earnings	43.20*** (22.79)	43.41 (18.62)	0	0	100	100
Controls						
Year of birth/adoption	2001.89*** (4.64)	2001.49** (4.17)	1994	1994	2009	2011
Female child	0.49*	0.53**	0	0	1	1
Mother's age	30.49*** (3.55)	35.90*** (4.47)	25	25	54	58
Father's age	32.94*** (4.58)	37.56*** (5.08)	25	25	73	60
Mother's years of education	12.26*** (2.90)	13.10 (2.51)	6.6	6.6	20.4	20.4
Father's years of education	12.35*** (2.85)	13.07 (2.67)	6.6	6.6	20.4	20.4
Mother higher educated (≥ 3 yrs)	0.14***	0.15**	0	0	1	1
Parents similar in education (< 3 yrs diff)	0.69***	0.71***	0	0	1	1
Father higher educated (≥ 3 yrs)	0.16***	0.14*	0	0	1	1

Note: Bio = biological parents. Adop = adoptive parents. We test weighted differences in means between the matched and unmatched samples of biological parents, and the matched and unmatched samples of adopting parents, respectively, using linear probability models (with all observations in the unmatched population assigned weight=1). Significance levels indicate; * $p < 0.05$. ** $p < 0.01$. *** $p < 0.001$.

Figure A1. The figure shows the birth year of children adopted jointly by couples in Sweden between 1964 and 2009, from within the country or from abroad. From the 1970s and onward far more children were adopted from abroad compared to within the country. The numbers decrease towards the end of the period partly because our data only contains information on children who were adopted in 2009 at the latest and children are typically not adopted in their birth year but later. Source: Authors calculations derived from population register data.

