



Money, Birth, Gender: Explaining Unequal Earnings Trajectories following Parenthood

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Abstract: Using population register data from the Netherlands, we analyze the child penalty for new parents in three groups of couples: different-sex and female same-sex couples with a biological child and different-sex couples with an adopted child. With a longitudinal design, we follow parents' earnings from two years before to eight years after the arrival of the child and use event study models to estimate the effects of the transition to parenthood on earnings trajectories. Comparing different groups of couples allows us to test hypotheses related to three types of within-couple differences that are difficult to disentangle when studying only heterosexual biological parents: relative earnings, childbearing, and gender. Our results offer strong support for gender as the main driver of divergent child penalties. The gender of their partners is more consequential for mothers' earnings trajectories than is childbearing or the pre-parenthood relative earnings in the couple.

Keywords: child penalty; same-sex couples; adoptive couples; event study

THE transition to parenthood is a turning point for the household division of labor and a major determinant of the level and trends in gender inequality. A substantial body of research shows that the birth of a child increases inequality within different-sex couples, as mothers bear the brunt of unpaid work and face penalties in the labor market, whereas fathers' careers are barely affected and might even benefit from a premium (Baxter, Hewitt, and Haynes 2008; Evertsson and Boye 2016; Grunow, Schulz, and Blossfeld 2012; Musick, Bea, and Gonalons-Pons 2020; Yavorsky, Kamp Dush, and Schoppe-Sullivan 2015). The durable and unequal costs of parenthood are clearly shown by the earnings trajectories of parents in different-sex couples: five to ten years after the first child, mothers across several rich countries earn around 21 to 60 percent less than expected by their pre-parenthood earnings, whereas the impact on fathers is close to zero (Kleven et al. 2019a; Rabaté and Rellstab 2022). One study using Danish data concluded that the child penalty faced by mothers accounts for most of the contemporary gender gap in earnings (Kleven, Landais, and Sogaard 2019b).

Although the outcomes across the transition to parenthood are clearly gendered, it is less clear to what extent the underlying inequality-generating mechanisms rely on other attributes of partners—and, more importantly, on differences between partners—that might overlap or strongly correlate with gender. Theoretical and empirical accounts of parents' gendered division of labor have highlighted three types of within-couple differences that map onto within-couple inequality following parenthood. First, fathers have, on average, higher pre-parenthood earnings than mothers, so the gender divergence in earnings trajectories might be due to couples maximizing their joint income by “efficiently” specializing, that is, having the partner who makes less money do a larger share of unpaid work. Second, the biological

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circumstances of childbearing might provide practical and symbolic bases for the unequal work–care practices that shape diverging earnings trajectories. Third, the increase in inequality might result from couples performing and affirming gender differences through the division of paid and unpaid labor. The performance of gender among new parents might partially rely on or be reinforced by the economic disadvantage of mothers and the circumstances of childbearing, but analytically distinguishing these three factors is critical for improving our understanding of the unequal effects of parenthood. Given how persistent is the pattern we observe, a clear awareness of the drivers of this inequality is needed if we want to have a chance to address it.

However, when studying only different-sex biological parents it is difficult to disentangle these dimensions because they all lead to the same empirical prediction: any negative effects of parenthood on labor market outcomes will be stronger for mothers than for fathers. What happens, then, when differences in partners' attributes do not overlap or one of them is entirely absent? In this article, we investigate this question by comparing the earnings trajectories of new parents in three groups of couples in which gender, childbearing, and earnings are interrelated in various ways: (1) different-sex and (2) female same-sex couples who have a biological child and (3) different-sex couples who adopt a child—while further considering the relative earnings of partners before the transition to parenthood. Different- and same-sex biological parents have in common the fact that one partner goes through pregnancy, but only in the former does this overlap with gender categories. Biological and adopting different-sex couples, on the other hand, have the same gender composition but differ in whether the mother gives birth. By comparing these couples within the same institutional context, we can isolate the effects of each of the three types of within-couple difference.

We use rich administrative data covering the full population of the Netherlands, a country that provides a valuable context for studying the child penalty in different types of couples. First, the Netherlands is known as a very tolerant society and has long been at the forefront of extending legal protections to same-sex couples (Jaspers and Verbakel 2013; Waaldijk 2017). Thus, different-sex and (female) same-sex parents have access to similar resources—for example, leave entitlements—when dividing paid and unpaid work. Second, good-quality part-time jobs are common, and changing working hours within a job is relatively easy, which means that Dutch couples have a fair amount of flexibility to adjust employment across the transition to parenthood (Jaspers and Verbakel 2013; Khoudja and Fleischmann 2018). Because of part-time employment, the Netherlands combines a high level of female labor force participation with the predominance of the “one-and-a-half-earner” model in different-sex couples, in which one partner works full-time and the other—usually the woman—works part-time (OECD 2019; Visser 2002). Dutch administrative data provide us with high-quality longitudinal information and unusually large samples of adoptive ($N = 1,790$) and same-sex ($N = 1,377$) couples. We follow the earnings of parents in a 10-year window around the arrival of a child and employ an event study design to estimate the child penalty for each type of parent. Thus, our study adds to the broader literature uncovering longitudinal developments across the transition to parenthood and to a smaller body of research that has explored

these developments for same-sex and adoptive couples (Andresen and Nix 2022; Evertsson, Moberg, and Van der Vleuten 2022; Kleven, Landais, and Søggaard 2021; Rosenbaum 2021).

Background and Theory

Parenthood and Division of Labor in Same-Sex and Adopting Couples

We start with a discussion of the transition to parenthood for female same-sex couples who have a biological child and different-sex couples who adopt a child, with special attention to the Dutch context. For female same-sex couples, the path to biological parenthood involves either private insemination or medically assisted reproduction techniques, such as in vitro fertilization. Private insemination is not rare for same-sex couples in the Netherlands, even though access to fertility clinics has been available since the 1970s (Geerts and Evertsson 2022). Female same-sex couples were never excluded from medically assisted reproduction, but regulatory changes in 2002 and 2014 made it easier for social mothers to be recognized as legal parents when the sperm donor is unknown (Evertsson, Jaspers, and Moberg 2020). Furthermore, the basic mandatory health insurance covers the first three attempts of in vitro fertilization for each woman, which means that a female same-sex couple might be reimbursed for up to six attempts (Zorginstituut Nederland 2015). Thus, there are relatively low institutional barriers for female same-sex couples' transition to parenthood in the Netherlands, even though it might still be a long process that requires intensive planning.

Much like for couples going through medically assisted reproduction, becoming parents is usually a long-awaited transition for adopting couples. Because the adoption process can be slow and expensive, these couples tend to be highly selected on income and desire for parenthood. The process is especially complex and expensive when children are adopted from abroad, which was the case for more than 90 percent of adoptions in the Netherlands during the period covered by our study (Statistics Netherlands 2014). Under Dutch regulations, any adult up to 45 years old can apply for intercountry adoption (exceptions are made for older applicants under some circumstances), but joint applications are restricted to married couples (Adoptievoorzieningen n.d.). Applicants first go through a series of information meetings and an assessment of the family situation to obtain permission from the Dutch government, after which the contact with foreign authorities and eventual match between child and prospective parent(s) is mediated by private organizations. The entire process from initial application to the arrival of the child can take up to six years and cost tens of thousands of euros (Adoptievoorzieningen n.d.).

Upon becoming parents, Dutch couples have the same family leave rights regardless of their gender composition and of whether they are in a formal union, but regulations do differentiate between births and adoptions. Between 2005 and 2012, the period in which the couples in our sample became parents, an employed woman who gave birth was entitled to 16 weeks of maternity leave, paid at 100

percent of earnings up to a ceiling. Self-employed women were not eligible in 2005 but later became entitled to the same length of maternity leave, paid up to the minimum wage. The employed partner of the birth mother, or another person who acknowledged the child, was, irrespective of gender, entitled to two days of paid leave. In the case of adoption, on the other hand, each parent was entitled to four weeks of leave, paid at the same rate as maternity leave. Parental leave is restricted to employees, and statutory entitlements are the same for all types of parents: it is unpaid, can be taken until the child is eight years old and, between 2005 and 2012, varied from 13 to 26 times the number of weekly work hours (Groenendijk 2005; Groenendijk and Keuzenkamp 2012). Collective labor agreements might deviate from the statutory entitlements, so employees in some sectors have access to partially paid parental leave.

With regards to the division of labor, research spanning several countries has established that same-sex couples are more equal than different-sex couples by virtually any measure: same-sex couples more often have dual full-time employment, have more similar earnings and working hours, and share household tasks more evenly (e.g., Bauer 2016; Giddings et al. 2014; Jaspers and Verbakel 2013; Solomon, Rothblum, and Balsam 2005; Van der Vleuten, Jaspers, and van der Lippe 2021). When considering both parents and non-parents, the lower levels of inequality in same-sex couples are partially explained by the fact that they are less likely to have children. But same-sex couples are more equal even when they are parents. For example, in the Netherlands, the presence of children increases inequality in working hours for heterosexual, lesbian, and gay couples, but the effect is much weaker for lesbian couples (Jaspers and Verbakel 2013). In Sweden, lesbian couples share parental leave more equally than different-sex couples (Evertsson and Boye 2018). Furthermore, a few recent studies, mostly focusing on Nordic countries, have compared the child penalty in different-sex and lesbian couples and concluded that birth mothers in lesbian couples face weaker penalties than their heterosexual counterparts, whereas social mothers face stronger penalties than fathers (Andresen and Nix 2022; Evertsson et al. 2022; Moberg 2016; see also Rabaté and Rellstab 2022).

Research on the division of labor and earnings trajectories of adopting couples is more limited. Both partners in these couples are usually highly invested in the process of becoming parents (Goldberg 2010; Goldberg, Smith, and Perry-Jenkins 2012), but this does not seem to translate into equal sharing of childcare. The available evidence suggests that transitions to parenthood of different-sex adopting couples can be nearly as gendered as their biological counterparts'. Using Swedish register data, Moberg and van der Vleuten (2022) found that adoptive parents divide parental leave only slightly more equally than biological parents. The few studies comparing earnings trajectories for the two types of couples—all of them using Nordic countries' register data—found very similar child penalties for both sets of mothers, and lack thereof for fathers (Andresen and Nix 2022; Kleven et al. 2021; Rosenbaum 2021). The persistence of gender inequality in adoptive couples is further suggested by the studies of Ciano-Boyce and Shelley-Sireci (2002) and Goldberg et al. (2013), which found that heterosexual adoptive parents share childcare and housework less equally than gay and lesbian adoptive parents.

Why Does Gender Inequality Increase following Parenthood?

Explanations for the divergent effects of parenthood on the labor market outcomes of men and women are closely connected to the extensive literature about the household division of labor (for recent reviews, see Perry-Jenkins and Gerstel 2020; Sullivan 2021). We focus here on perspectives that are pertinent to within-couple differences in involvement with childcare vis-à-vis labor market work, because the need for caring for a child is the key change in household organization when couples become parents. Furthermore, we focus on supply-side explanations, as previous work has pointed out that the divergent earnings trajectories following parenthood are mostly a function of labor force participation and hours worked, rather than wage rates (Evertsson et al. 2022; Kleven et al. 2019b). Although we acknowledge that economic considerations, the biological circumstances of childbearing, and the performance of gender are intertwined both in theory and in practice, we formulate mutually exclusive hypotheses: they predict the patterns that would be observed if each of the three sources were the main driver of (divergent) child penalties.

Economic specialization. The first perspective that might explain the unequal earnings trajectories of parents is the economic theory of the family, more specifically Becker's (1991) specialization model, which highlights the role of financial considerations in couples' decision-making. In this framework, it is in the best interest of couples to maximize their joint utility by exploiting comparative advantages, so that each partner focuses on the type of work—paid labor or home production—in which she or he is the most productive of the two. Having children simply increases the incentives for this sort of efficient specialization, as the amount of work at home surges. In Becker's formulation, specialization is a gender-neutral mechanism to the extent that it does not depend on intrinsic differences between men and women. The "traditional" (i.e., gendered) division of labor, including the work and care practices of new parents, relied instead on the empirical fact that women usually had invested less in human capital and had worse labor market prospects than their male partners (Blossfeld and Drobnic 2001; for further discussion on this interpretation, see England and Budig 1998; Grunow 2021). It follows that, whenever mothers have higher earnings (or earnings potential) than fathers, the direction of specialization should be reversed.

Empirical evidence has generally provided little support for the specialization model: most different-sex couples do not efficiently specialize when the mother has higher earnings or is more educated than the father (Grunow 2021; Kuhhirt 2012; Schober 2013). Nevertheless, relative economic standing within the couple might still moderate the earnings trajectories of new parents. Furthermore, same-sex and adoptive parents offer an interesting test for the specialization model, as within these couples any financial considerations do not overlap with, respectively, gender differences and childbearing. If within-couple inequality following parenthood is driven mainly by couples maximizing their joint income, we expect the trajectories of parents to diverge based on the relative earnings observed before the child's arrival.¹ In other words, whoever in the couple, be it the (birth) mother or her partner, earns less before parenthood will focus relatively less on paid work after it. Thus, the first hypothesis for the earnings trajectories of new parents is as follows:

in all types of couples, the child penalty is stronger for the partner who has the lowest earnings pre-parenthood (H1).

Note that another common perspective on the household division of labor, the economic dependency or relative resources model (Brines 1994; Gupta 2007), highlights how relative earnings are related to couples' division of *housework*. In this model, relative earnings matter not because of efficiency, but because they are a measure of bargaining power: better labor market prospects allow partners to buy out of housework. This rests on the plausible assumption that most people want to do as little housework as possible. But, as others have pointed out (Evertsson and Boye 2018; Sullivan 2013), childcare is usually seen as a more pleasant and rewarding activity than housework, so it is not reasonable to assume a general preference for avoiding it. Without observing childcare preferences, it is not clear from a bargaining perspective whether and how changes in paid and unpaid work following parenthood depend on relative earnings. However, if we were to assume a general preference for avoiding childcare, the relative resources model would predict the same as economic specialization.

Birth. Another possible basis for unequal work-care practices of parents—and thus divergence in their earnings trajectories—is that, on a practical level, the transition to (biological) parenthood affects partners very differently: biological mothers, but not their partners, go through months of pregnancy, must recover from birth, and might breastfeed for months if not years. The role of childbirth as a source of inequality between new mothers and fathers may be interpreted through either an economic or a socio-psychological lens. Indeed, Becker's original formulation of the specialization model strongly emphasized biology as a basis of role differentiation in families: he argued that women have a comparative advantage in home production due to childbearing and are strongly committed to childcare because of their "heavy biological investment" (Becker 1991:37–8). Becker argued that efficient specialization does not *need* to rely on such biological factors, but, in practice, they are central in his discussion of comparative advantages within couples.²

From a socio-psychological perspective, on the other hand, childbirth matters for couples' work-care arrangements because it might underlie perceptions that caring for the child comes "naturally" to women, whereas involved fatherhood requires learning. Being a "good" mother is often associated with sacrificing for children and adapting to their needs; being a "good" father, on the other hand, might increasingly include doing a fair share of childcare, but it is generally less tied to a caregiving role (Collett, Vercel, and Boykin 2015; Evertsson and Boye 2016; Fox 2008; Miller 2007, 2011; Nuttbrock and Freudiger 1991). To be sure, these unequal parenting norms draw on broader essentialist notions about femininity and masculinity, so they can be understood as part of the performance of gender that we discuss in the next section. However, references to the specific circumstances of *biological* motherhood are frequent in the narratives of new parents, especially during the early stages of a child's life. For example, while navigating the challenges of caring for a newborn, parents in different-sex couples often argue that the child is more attached to and comfortable with the mother because there is a natural mother-child bond created by pregnancy and breastfeeding (Grunow and Evertsson 2019; Wiesmann 2010).

Furthermore, research has documented that the bodily changes during pregnancy are important to how women come to see themselves and are perceived by others as mothers (Bailey 2001; Park, Banchevsky, and Reynolds 2015).

In sum, the fact that a mother gives birth may structure the division of labor of parents either because it is a source of comparative advantages or because it adds to unequal parenthood norms and identities. If childbirth serves as an independent basis—that is, separate from relative earnings and the broader performance of gender—for the work–care practices of new parents, we expect adoptive parents to have more egalitarian trajectories than couples with a biological child. Therefore, taking childbirth as the main driver of the child penalty leads us to the following hypothesis: *birth mothers in both female same-sex couples and biological different-sex couples have stronger child penalties than adoptive mothers* (H2).

Gender. A final explanation for within-couple inequality following parenthood is that it is a result of couples “doing gender.” In this perspective, gender categories are continuously recreated in social interaction, and one way of enacting the male and female identities is by performing gender-stereotypical tasks (West and Zimmerman 1987; see Ridgeway 2011 for a similar interactionist approach). The gendered household division of labor might be understood as a prime example of this performance, as housework and childcare are considered “women’s work” (Brines 1994; Poortman and van der Lippe 2009). In other words, a doing gender approach explains the divergence in labor market outcomes of mothers and fathers by pointing out that the household division of labor is an important way of enacting the gender categories in the first place: the unequal division of care and paid work creates gender as much as the other way around. Different-sex couples can do gender through their division of labor before and regardless of becoming parents, but raising children brings about new possibilities for displaying femininity and masculinity.

If gender is the main basis of changes in within-couple inequality following parenthood, child penalties should vary the most as a function of the gender composition of couples. Same-sex couples are not free from gender norms, but it is harder for them to do gender by doing difference, and they might even be engaged in “undoing gender” (Evertsson, Kirsch, and Geerts 2021; Goldberg 2013). Therefore, the performance of gender is not expected to be an important source of within-couple inequality for same-sex couples. Different-sex adoptive parents, on the other hand, can do gender by doing motherhood and fatherhood, that is, adopting fairly distinct parental roles and identities. To the extent that enacting gender is a central aspect of parenthood in different-sex couples, adoptive parents might even compensate for the absence of pregnancy by making an extra effort to clearly divide work along gender lines. Our final hypothesis is then the following: *the child penalty is similar for biological and adoptive mothers in different-sex couples, and in both cases stronger than for birth mothers in female same-sex couples* (H3).

Note that all our hypotheses refer to *changes* in earnings after parenthood, which might add to or offset preexisting within-couple inequality. For example, the division of labor before parenthood might be as gendered in different-sex couples who eventually adopt a child as in those who eventually have a biological child. But, all else constant, if the arrival of a child increases gender inequality more in

biological than in adoptive couples, we have evidence of an independent effect of childbirth. If, on the other hand, the two groups of couples follow similar trajectories, we can conclude that they do motherhood and fatherhood mostly as part of doing gender.

Data and Method

Sample Construction

We use register data from the System of Social Statistics Datasets (SSD) of Statistics Netherlands (Bakker, van Rooijen, and van Toor 2014). The SSD covers the entire registered population of the Netherlands, and datasets containing a wealth of information on individuals and households can be linked by unique identifiers. In this study, we rely on several registers to identify couples' transitions to parenthood via birth or adoption and trace the earnings trajectories of each parent. We focus on couples who become parents between 2005 and 2012 due to the availability of the necessary data. First, we rely on annual income data that cover the period from 2003 to 2020, so we define 2005 as the lower limit for births and adoptions in order to observe the parents' earnings for at least two years before the arrival of the child. Second, records are available for adoptions that occurred between 1995 and 2012. We can observe transitions to parenthood occurring after that period and link (most) children born in the Netherlands to the birth mothers, but we cannot clearly identify adoptions and thus choose to restrict our sample to a common period for all types of parents. Therefore, we define 2012 as the end of the observation window for the transitions and follow couples' earnings for eight years after they became parents.

We start by identifying all children who were born or adopted in the Netherlands between 2005 to 2012. To compare biological and adoptive parents with similar childcare demands, we exclude adopted children who were more than three years old at the time of adoption. The children are then linked to different-sex or female same-sex couples who included at least one legal parent and in which both partners were 20 to 55 years old in the year of the transition to parenthood. We only consider the transitions to have occurred to a couple—rather than to a single parent—if the partners were living together before or within six months of the child's birth or adoption. We restrict our sample to couples experiencing only one event—either a birth or adoption—in a given calendar year. We further restrict our sample to first-time parents by excluding couples in which either partner had older (legal) children, irrespective of co-residence. Adoptions by female same-sex couples are also excluded from the sample, as the number of cases is very small. The basic municipal register files only record legal parent-child relationships, so we rely on data from the Perinatal Registration, which link births to mothers, to confirm the presence of the birth mother in couples and to distinguish between birth and social mothers in same-sex couples. Although we sometimes speak of biological parents when referring to (different-sex and same-sex) couples who experience a birth, this only means that the couple is formed by the birth mother and her partner. We cannot ascertain the biological relatedness of fathers—nor, in fact, of “social” mothers in same-sex couples, as reciprocal in vitro fertilization allows couples to

use the eggs of the non-birth mothers. Therefore the “biological” parents might include, for example, a birth mother and stepfather if they start living together no later than six months after the child’s birth.

There are no restrictions on the formal status of the parent’s union, so couples might be cohabiting, married, or in a registered partnership at the time of the child’s arrival.³ We also do not select cases based on subsequent family transitions—for example, new children, union dissolution—but in the online supplement we present additional results accounting for the arrival of a second child. Finally, our analyses are based on a balanced panel, so we only consider couples for which (1) the child is living in the Netherlands every year from birth or adoption to eight years later; (2) both partners are living in the Netherlands (not necessarily together) and have non-missing income information for every year from two years before to eight years after the transition to parenthood. Our full sample consists of 456,341 different-sex and 1,377 female same-sex couples who have a biological child and 1,790 different-sex couples adopting a child.

Measures

We use annual income information compiled by Statistics Netherlands from tax registers, which include people with zero income. Because we are interested in parents’ paid work, the outcome variable in our models is the *labor earnings* of individuals, comprising income from employment and self-employment. For the matching procedure described in the next section, we use the *individual gross income*, as it better captures the overall financial resources of parents. Besides earnings from labor, the gross income includes social security benefits and transfers—except for benefits, transfers, and other sources of income assigned to households rather than individual household members. In both variables, values are originally top-coded at one million euros, and we recode negative values—indicating net losses for business owners and the self-employed—to zero. All monetary values are adjusted to 2015 euros using the Consumer Price Index (Statistics Netherlands 2022). We compute the *(birth) mother’s pre-parenthood share of earnings* as the percentage contribution of the (birth) mother to the couple’s joint earnings over the two years before the arrival of the child.

We also use the tax register data to create a binary indicator for whether the main source of an individual’s earnings was *self-employment* in either of the two years before parenthood. We classify individuals into six *parent types* defined by being the (birth) mother or her partner in one of the three *couple types* (birth mother in a female same-sex couple, social mother in female same-sex couple, mother in biological different-sex couples, and so on). Both *calendar year* and *age* are used as categorical variables in our models, and the latter is measured as the age completed in the year of the child’s arrival. We do not use education in our analyses because this information is missing from the administrative registers for up to a third of parents, especially for older cohorts who left the educational system before Statistics Netherlands started compiling educational records for the full population. However, we present descriptive statistics on education by parent type in the online supplement.

Matching

The three types of couples included in our analyses can be very different from each other when becoming parents, and in ways that might influence their subsequent earnings trajectories. Some differences between same-sex and different-sex parents might be due to patterns of assortative mating (cf. Schwartz and Graff 2009; Verbakel and Kalmijn 2014), but the distinct pathways to parenthood also create considerable variation in sociodemographic characteristics across couple types. The road to parenthood is usually much longer for same-sex and, especially, adoptive parents, so they are on average older than their different-sex biological counterparts at the time of the child's arrival. Adoptive parents are also highly selected on income because of the financial costs of the adoption process. Therefore, the effect of parenthood might vary across types of couples in part because they were already very different from each other at the time of the child's arrival.

To compare couples who are as similar as possible in their pre-parenthood characteristics, we follow previous research in adopting a matching procedure (Andresen and Nix 2022; Evertsson et al. 2022). Matching is a non-parametric way of adjusting for confounding variables by creating "treatment" and "control" groups with similar distributions of those variables, and it is often used as pre-processing for the estimation of treatment effects with observational data (Ho et al. 2007; Stuart 2010). We use couples as units and create two separate matched samples: one with same-sex couples and the other with adoptive different-sex couples as treatment groups, with the control group consisting of biological different-sex couples in both cases. In other words, for each same-sex or adoptive couple, we aim to select appropriate matches from the larger pool of biological different-sex parents. More specifically, we use coarsened exact matching, a method that matches treatment and control units that have the same values on covariates, using grouped (i.e., coarsened) versions of the continuous ones. We match couples on seven variables, namely, the year of the child's arrival and three attributes of each partner: age at the year of birth or adoption (15 groups), average of the gross personal income in the two years before parenthood (100 groups), and the binary indicator for self-employment described above.

Event Study Models and Child Penalty

To estimate the child penalty, we use event study models, which, following the work of Kleven et al. (2019b), have become a standard tool for analyzing changes in labor market outcomes following parenthood (Andresen and Nix 2022; Evertsson et al. 2022; Kleven et al. 2021; Musick et al. 2020; Rabaté and Rellstab 2022; Rosenbaum 2021). These models capture change in the dependent variable around a given event with coefficients for the time relative to the event (*event time*) while controlling for other sources of temporal variation (age and calendar time). Here, the event of interest is the arrival of a child by birth or adoption and the event time varies from -2 to 8 years. Our main specification can be written as follows:

$$\begin{aligned}
 y_{it} = & \sum_{j \neq -1} \sum_p \alpha_{jp} \cdot I[j = t, p = \text{parent type}_i] + \sum_p \beta_p \cdot I[p = \text{parent type}_i] \\
 & + \sum_{\alpha} \sum_g \gamma_{\alpha g} \cdot I[\alpha = \text{age}_{it}, g = \text{gender}_i] \\
 & + \sum_k \sum_g \delta_{kg} \cdot I[k = \text{year}_{it}, g = \text{gender}_i] + \varepsilon_{it},
 \end{aligned} \tag{1}$$

where y_{it} measures the earnings of individual i at event time t . The α_{jp} parameters capture the event time effects for each parent type, with the year before the transition to parenthood (-1) as the reference category; β_p accounts for differences in earnings levels by type of parent; $\gamma_{\alpha g}$ and δ_{kg} are gender-specific age and calendar year fixed effects (i.e., age and year are included as categorical variables).

We are interested in the α_{jp} parameters, that is, in how earnings of parents vary as a function of time relative to the transition to parenthood, net from age and period fluctuations. In their absolute scale (2015 euros), these effects might be difficult to compare because the earnings levels vary between types of parents, especially between men and women. Therefore, again based on Kleven et al. (2019b), we define the penalty as $P_{jp} = \frac{\hat{\alpha}_{jp}}{E[\hat{y}_{it}|j=t, p=\text{parent type}_i]}$. More specifically, the denominator in the previous formula is obtained by first predicting earnings for all observations using the main effects of parent type and the gender-specific age and year effects (i.e., parameters β_p , $\gamma_{\alpha g}$, and δ_{kg} in Eq. [1]) and averaging by event time and parent type. In another model specification, we interact parent type and the event time indicators with the (birth) mother's pre-parenthood share of earnings—in three categories: less than 40 percent, 40 to 60 percent, and more than 60 percent—and compute the child penalties accordingly. The child penalty can be interpreted intuitively as the percentage difference, at each event time, between the observed earnings and the earnings predicted for someone of the same gender, age, and pre-parenthood earnings.

Results

Descriptive Statistics

Table 1 shows descriptive statistics for the full and the two matched samples. Beginning with the full sample, we highlight a few characteristics that help illustrate how the three types of couples differ at the time of the first child's arrival. First, different-sex biological parents are the youngest, with the mothers in these couples being the only group with an average age below 30 at the transition to parenthood. Adoptive parents, on the other hand, have the latest transitions, which reflects their long road to parenthood: on average, the mother is 36.6 and the father is 38 years old at the time of adoption. Same-sex couples are somewhat in the middle with both mothers being close to 34 years old, on average, at the transition. Previous research for the Netherlands (Jaspers and Verbakel 2013; Verbakel and Kalmijn 2014) has shown that, when pooling couples with and without children, the average age gap is wider in same-sex than in different-sex couples. The fact that we find the opposite

Table 1: Descriptive statistics

	Unmatched			Matched 1			Matched 2		
	Biological different-sex parents	Female same-sex parents	Adoptive different-sex parents	Biological different-sex parents	Female same-sex parents	Adoptive different-sex parents	Biological different-sex parents	Female same-sex parents	Adoptive different-sex parents
(Birth) mother									
Age at birth/adoption	29.72	33.86	36.58	33.07	33.20	35.43	35.54	35.54	35.54
Income before birth/adoption (EUR) ^a	37,117.57	47,743.95	39,724.97	43,555.64	43,704.91	38,410.15	38,204.74	38,204.74	38,204.74
Self-employed (%)	4.72	8.42	8.66	2.69	2.70	2.90	2.91	2.91	2.91
Partner									
Age at birth/adoption	32.26	33.84	38.02	33.30	33.26	37.23	37.27	37.27	37.27
Income before birth/adoption (EUR) ^a	51,252.84	47,195.92	68,558.89	45,795.61	45,650.15	61,755.63	61,936.06	61,936.06	61,936.06
Self-employed (%)	11.79	7.19	11.40	3.99	3.96	6.08	6.05	6.05	6.05
Event year	2008.51	2008.81	2007.54	2008.83	2008.82	2007.50	2007.50	2007.50	2007.50
(Birth) mother's pre-parenthood share of earnings (%) ^b									
Less than 40 percent	42.89	21.06	59.33	21.03	20.54	56.24	57.28	57.28	57.28
40 to 60 percent	47.12	54.97	34.30	60.76	59.73	39.61	38.69	38.69	38.69
More than 60 percent	9.99	23.97	6.37	18.21	19.73	4.16	4.03	4.03	4.03
N	456,341	1,377	1,790	38,642	1,110	33,086	1,339	1,339	1,339

^a Average annual gross income in the two years before the arrival of the child (adjusted to 2015 euros).

^b Share of the joint earnings in the two years before the arrival of the child.

Notes: Couples were matched by coarsened exact matching using event year, and age, income, and self-employment for each partner (see text for details). For all matching variables, differences between control (different-sex biological parents) and treatment groups (same-sex or adoptive parents) in the matched samples are not statistically significant at conventional levels.

by only considering parents suggests that the association between age similarity and the likelihood of having children is stronger among same-sex couples.

Same-sex couples are also very similar when it comes to income before birth, which contrasts with the significant gap in the pre-parenthood income of mothers and fathers in different-sex couples. Besides the absolute income levels, this is clearly shown by the (birth) mother's share of the couple's earnings in the two years before the transition. In more than half of same-sex couples, the birth mother contributed to 40 to 60 percent of earnings. This somewhat equal earnings contribution of partners before parenthood occurred in 47 percent of different-sex biological couples and 34 percent of adoptive couples. As an indication of how selective the adoption process is, adoptive parents have considerably higher joint income than other couples. In fact, the average pre-parenthood income of adoptive fathers is 34 percent higher than that of biological fathers, who are the second highest earners among parents. On the other hand, the two types of fathers are similarly likely to be self-employed, and more so than all types of mothers. Table S1 in the online supplement shows that female same-sex parents have the highest educational achievement among all parents.

A comparison between the statistics of the full and the matched samples in Table 1 shows that the matching procedure was successful in achieving covariate balance while retaining sufficient sample sizes. For example, the first matched sample consists of 38,642 biological different-sex couples matched to 1,110 female same-sex couples. This means that there were no suitable matches for 267 same-sex couples of the full sample, but each of the remaining is matched to, on average, 35 different-sex couples with very similar pre-parenthood characteristics. For both mothers and fathers in biological different-sex couples, the average age at birth is higher in the matched than in the full sample. Matching to female same-sex couples also raises the average income of mothers in biological different-sex couples while decreasing the income of fathers. Thus, within-couple differences in age and income are, just like in same-sex couples, very small in the biological different-sex couples included in the first matched sample. Matching to adoptive couples, on the other hand, selects biological parents who, on average, are older and have larger within-couple income gaps than in the full sample. Finally, note that matching reduces the prevalence of self-employment for all types of parents while also making it virtually identical in the relevant pairings. In both matched samples, we achieve covariate balance: the mean difference between treatment and control groups is statistically insignificant for all seven matching variables. In summary, the couples in each matched sample are almost identical in the selected pre-parenthood characteristics, which ensures that these characteristics do not explain observed differences in the trajectories following parenthood.

The similarity in pre-parenthood characteristics of matched couples is further illustrated by Figure 1, which presents the descriptive earnings trajectories for each type of partner in the full and matched samples. In the latter, the earnings of paired parents (e.g., adoptive and biological fathers) are almost indistinguishable in event times -2 and -1 . This figure also anticipates descriptively the main patterns obtained with the event study models and discussed in the next section.

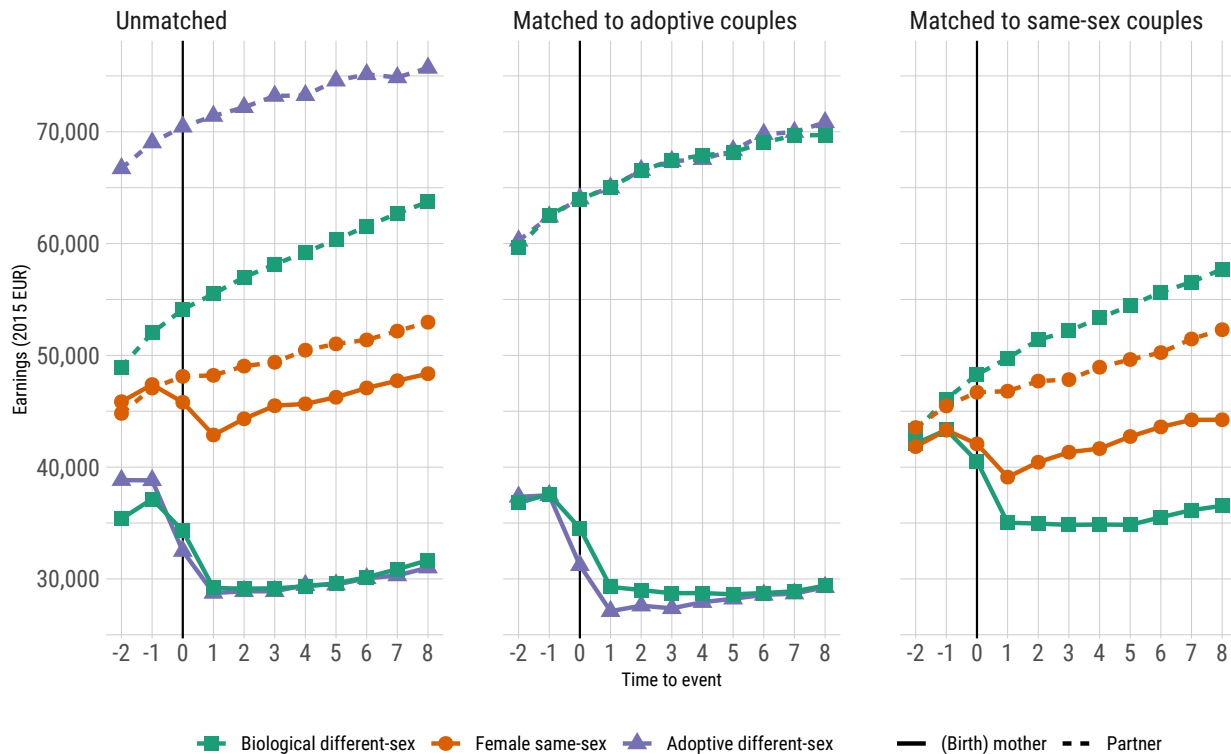


Figure 1: Earnings trajectories across the transition to parenthood.

Child Penalty Estimates

Figures 2 and 3 plot the child penalty in earnings for each type of parent as a function of time relative to birth or adoption. Estimates shown in Figure 2 were obtained from the model that interacts the event time indicators with both parent type and mother's share of earnings before the arrival of the child. This model was estimated for the full (unmatched) sample and allows us to test our first hypothesis, which concerns the role of relative earnings pre-parenthood. Figure 3, on the other hand, plots the results from the main specification shown in Equation (1), estimated separately for each matched sample. Recall that the penalty is simply a rescaled version of the event time coefficients, with the scale parameter being the average earnings predicted at each event time for each parent type considering only the gender-specific age and year trends.

Before addressing our hypotheses, we highlight a few general patterns in the estimated penalties. First, there is barely a fatherhood penalty for men in either biological or adoptive couples. In the full sample (Figure 2), biological fathers who earned more or about the same as their partners before parenthood have a small, stable penalty: for example, if the mother's pre-parenthood share was less than 40 percent, father's earnings in year 5 were 3.7 percent less than expected given the age and year trends; if the mother's share was between 40 and 60 percent, the father's penalty in year 5 was 1.8 percent. All other groups of fathers enjoy a premium.

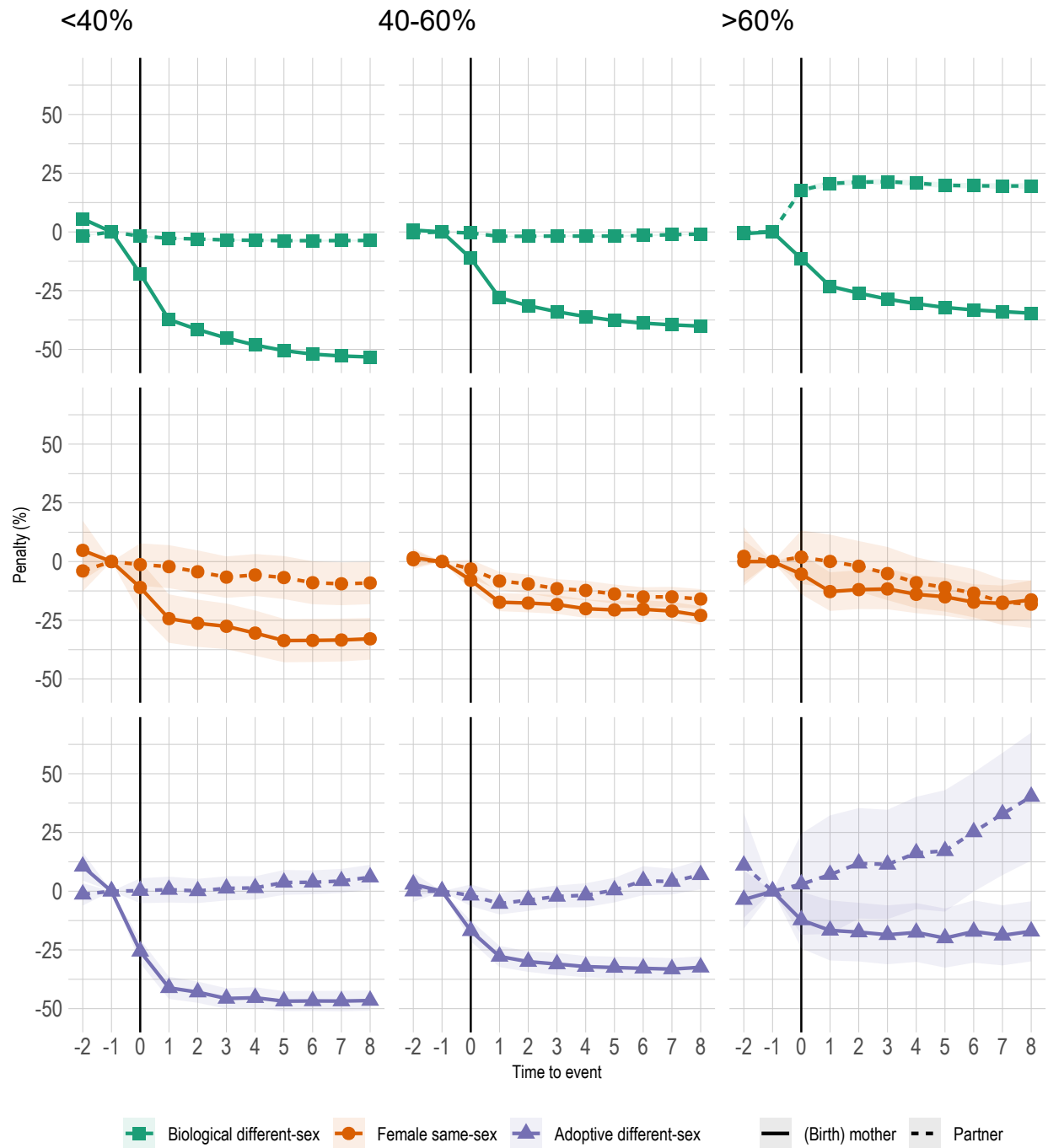


Figure 2: Child penalty for (birth) mothers and their partners, by (birth) mother's pre-parenthood share of earnings, full sample.

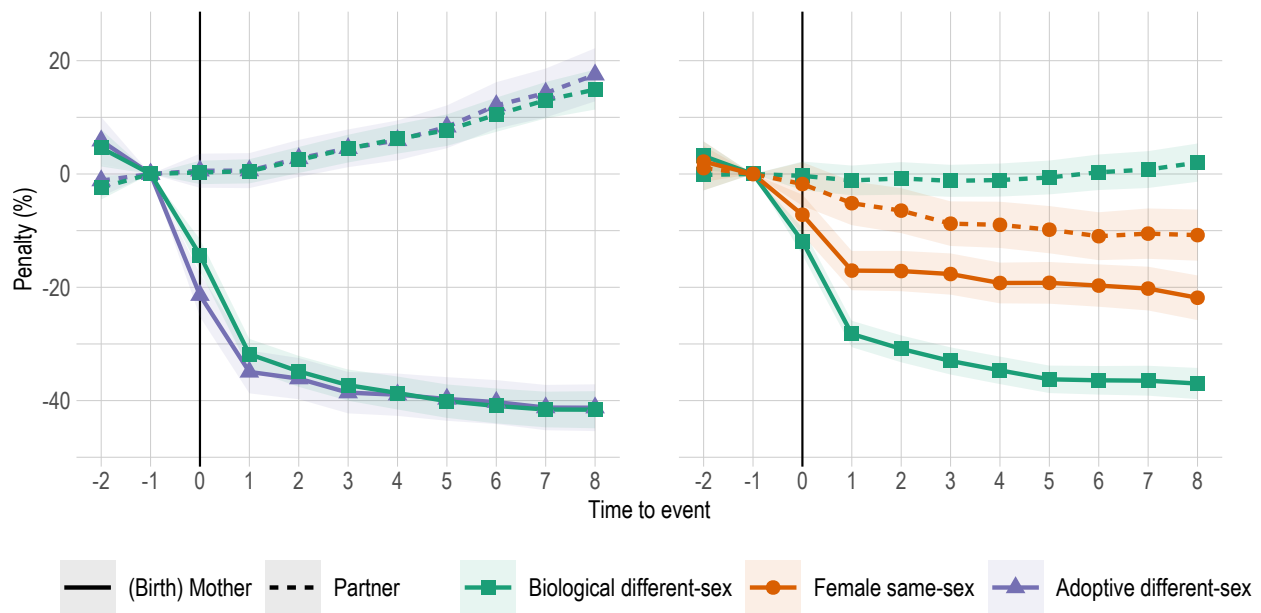


Figure 3: Child penalty for (birth) mothers and their partners, matched samples.

On the other hand, all mothers experience a penalty to some extent, which shows no signs of a rebound: after it arises, the child penalty for all groups of women either remains stable or gets worse over time. This is true even for social mothers in same-sex couples, which clearly sets their trajectories apart from those of the fathers in different-sex couples. Note that this does not mean that women's real earnings only decrease or stagnate after parenthood. What Figures 2 and 3 show is that, within our observation window, Dutch mothers never narrow the gap between their real earnings and what they were expected to make in the absence of children. In most countries for which similar estimates are available, the penalty for women weakens over time (Evertsson et al. 2022; Kleven et al. 2019a), but a pattern of stability similar to what we find has been documented for the United States and the United Kingdom (Kleven et al. 2019a). Also note that effects appear mostly beginning in year 1, which is likely the result of two factors: events occurring in later months (e.g., a birth in December) should have a smaller impact on the earnings received in year 0, and the fully paid leave offers protection against loss of earnings in the first weeks of parenthood.⁴

To address our first hypothesis, we look at how the child penalty varies depending on the (birth) mothers' share of pre-parenthood earnings, as shown in Figure 2. This analysis relies on the full sample because it does not entail comparisons across the three groups of couples: we are interested in how the strength of child penalty in, for example, different-sex biological couples, maps onto the past earnings contribution of parents. In other words, do couples "efficiently" specialize by having the partner with the lowest earnings take a proportionally bigger hit in their income? Figure 2 shows that this is not the case.

For women in different-sex couples, the cost of parenthood is indeed negatively correlated with their previous financial contribution. Five years after giving birth, a biological mother who had been the main provider in the couple (more than 60 percent of pre-parenthood earnings) faced a penalty of 32 percent in her earnings; if she and her partner had somewhat similar earnings (40 to 60 percent), her penalty was 38 percent; and if the partner was the main provider, her penalty reached 51 percent. For adoptive mothers, these penalties were 20, 33, and 47 percent, respectively. But we do not observe a corresponding pattern for fathers. Rather than efficient specialization, what we find is compensation: when mothers are the main providers before parenthood, fathers experience a high parenthood premium, likely because they increase their labor supply to offset the loss of mothers' income. An example of this would be a couple in which she switches from full- to part-time work after the child's arrival, whereas he does the opposite. Among same-sex couples, the penalties for birth and social mothers become more similar as the birth mother's pre-parenthood share increases. In fact, for most of the observation window, the estimated penalties for birth and social mothers are statistically different only for couples in which the birth mother contributed less than 40 percent of pre-parenthood earnings.

These results show that having larger financial contributions before the child's arrival does mitigate (birth) mothers' disadvantage, but it does not come close to eliminating (in different-sex couples), let alone reversing (in all couples), the gap between their and their partners' penalties. Therefore, we find no support for the hypothesis of earnings-based efficient specialization (H1).

We now turn to the results for the matched samples presented in Figure 3, which allow us to test the other two hypotheses. We can assess the role of the biological circumstances of the transitions to parenthood by comparing the child penalty for parents in adoptive couples with that of their biological counterparts. Our results show that adoptive mothers do not have weaker penalties than biological mothers. In fact, as shown in the left pane, the matched mothers of the two sets of different-sex couples have virtually the same trajectories after the arrival of the first child. For example, they both have a penalty of 40 percent at year 5 after parenthood. If anything, adoptive mothers face a larger penalty than biological mothers in the year of the transition (21 vs. 14 percent), likely because of the shorter paid leave available to the former. Although direct comparisons across the matched samples should be taken as suggestive only, it is worth noting that the penalty for birth mothers in same-sex couples (right pane) is 19 percent at year 5. These results lead us to reject the hypothesis of childbearing as the main basis for divergent earnings trajectories of mothers and fathers (H2). Also, note that adoptive fathers do not have stronger penalties than biological fathers or social mothers. Again, fathers follow a remarkably similar earnings trajectory whether their partners gave birth or not.

Finally, we can assess the role of gender differences by comparing different-sex biological parents with their female same-sex counterparts, as shown in the right pane of Figure 3. In same-sex couples, both social and birth mothers face penalties, although the drop in earnings is bigger and occurs faster for the latter. Taking year 5 again as a reference point, the penalty is 19 percent for the birth mother and 10

percent for the social mother. On the other hand, different-sex couples, even though they are very similar to same-sex couples in pre-parenthood characteristics, follow the usual pattern of a large penalty for the mother (36 percent in year 5) and a negligible effect for the father. Thus, compared with their different-sex counterparts, within-couple inequality is smaller among female same-sex parents both because birth mothers pay a lower price for parenthood if their partner is female and because social mothers also face penalties, whereas fathers do not. Combined with the striking similarity between biological and adoptive different-sex parents, this finding makes it clear that the gender composition of couples is key for inequality following parenthood. Taken together, these results offer strong support for the hypothesis of gender as the main basis for divergent earnings trajectories of new parents (H3).

Our substantive conclusions are robust to different ways of looking at the earnings trajectories of parents. Matching improves the comparability of couples, but the patterns we observe also apply to the estimates obtained with the full, unmatched sample. This avoids concerns with conclusions being based on a selected subsample of different-sex couples. Indeed, some of the main patterns—for example, similar trajectories of adoptive and biological mothers in different-sex couples, a smaller gap between partners in same-sex couples—are evident even in the simple descriptive trajectories of the unmatched sample (first panel of Figure 1). Although computing child penalties is useful for interpreting the changes as differences from expected earnings, the original coefficients of the event study models (Figures S1 and S2 in the online supplement) lead to the same conclusions about our hypotheses. Results also hold when modeling the (birth) mother's share of couple earnings—a direct measure of within-couple inequality—instead of absolute earnings for each partner (Figure S3 in the online supplement). Finally, the patterns observed here are not driven by differences in couples' likelihoods of having subsequent children. Figure S4 in the online supplement shows that our conclusions hold when estimating penalties separately for couples who have or do not have a second child in the eight years following the arrival of the first child.

Discussion

This article examined the earnings trajectories of first-time parents in three groups in the Netherlands: different-sex and female same-sex couples who had a biological child and different-sex couples who adopted a child. Although it is well established that labor market outcomes for men and women in heterosexual couples diverge after (biological) parenthood, our study is among the first to analyze other types of couples in the same methodological framework (see also Andresen and Nix 2022; Evertsson et al. 2022; Kleven et al. 2021; Rosenbaum 2021). Comparing these groups allowed us to assess how the earnings trajectories of new parents map onto three major sources of within-couple differentiation, namely, relative earnings pre-parenthood, childbirth, and gender. Each of these factors has been highlighted by different explanations of the unequal division of labor among new parents, but disentangling their effects has been hardly possible in previous research. To the best of our knowledge, the only study to have also estimated the child penalty

for all three types of couples that we studied here is by Andresen and Nix (2022), who used Norwegian administrative data and explored other outcomes in addition to earnings. The basic patterns that we find here—namely, that adoptive and biological different-sex parents have similar trajectories, which are more unequal than those observed for female same-sex couples—are consistent with their results. On the other hand, Andresen and Nix (2022) control for within-couple labor market advantages but do not provide estimates of how they moderate the earnings trajectories.

We first addressed the hypothesis of efficient specialization based on earnings, which predicted that, in all types of couples, the partner who earned less before parenthood would face a steeper penalty (H1). We find that the magnitude of the penalty for (birth) mothers does vary by their previous contribution to joint earnings: the higher their pre-parenthood share of earnings, the lower the penalty. In same-sex couples where both mothers contributed about equally or the birth mother contributed more to pre-parenthood earnings, the penalty for the birth mothers is only slightly stronger than—and, for the most part, not statistically different from—the penalty for social mothers. But there is no indication of partners facing stronger penalties than (birth) mothers when the latter contribute to a larger share of pre-parenthood earnings. In different-sex couples, a substantially higher cost of parenthood for mothers is evident even when they were the primary earners before the arrival of the child. Thus, we find no support for the specialization hypothesis. These results are in line with previous research showing that (heterosexual) couples fail to efficiently specialize when the mother has higher earnings potential (Grunow 2021).

Childbirth is also not the main driver of inequality for new parents. Both an economic perspective—which sees childbearing as a source of comparative advantages for women—and a socio-psychological perspective—which casts pregnancy and breastfeeding as bases for distinct motherhood and fatherhood norms and identities—predict that birth mothers would have stronger penalties than adoptive mothers in different-sex couples (H2). What we find, instead, is that mothers in different-sex couples have similar penalties regardless of childbearing, whereas fathers have similar premiums whether their partners gave birth or not. Note that the difference in child penalty between birth and social mothers shows that childbirth does matter for labor market outcomes and can indicate the construction of different motherhood identities within female same-sex couples (Evertsson et al. 2022; Reimann 1997). What our results show, on the other hand, is that childbearing is not the key driver of—and, as indicated by the similarity between adoptive and biological mothers partnered to men, not even a necessary condition for—the increase in within-couple inequality following parenthood.

Our results offer strong support for the doing gender hypothesis (H3). Not only is the key prediction of this hypothesis—that the child penalty would be stronger for mothers in different-sex couples than for birth mothers in same-sex couples—confirmed, but all relevant comparisons point to gender being the overwhelming source of within-couple inequality following parenthood. Birth mothers in same-sex couples have a weaker penalty than birth mothers partnered with men, even though the two groups have the same leave rights and, in the matched sample, are very

similar in pre-parenthood characteristics. The comparison between the partners of these two groups of women is also revealing: even when matched on relevant attributes, they have diverging trajectories, as social mothers pay a parenthood penalty but fathers do not. On the other hand, adoptive and biological mothers in different-sex couples have the same penalty, even though the former did not go through pregnancy and can divide leave more equally with their partners. Although we formulated mutually exclusive hypotheses, another way of stating these results is that, as an organizing force for the division of labor of new parents, gender is neither substantially reinforced by childbirth nor offset by women's earnings advantage.

In sum, for women becoming mothers as part of a couple in the Netherlands, the gender of their partners is more consequential for their earnings trajectories than childbearing or the pre-parenthood relative earnings. Our study advances the understanding of gendered transitions to parenthood, but it is not without limitations. First, because we rely on administrative data, we observe neither gender identity nor sexual orientation. Second, we focused on change in the earnings of parents—which is useful as a summary measure of the cost of parenthood—but further measures such as working hours and the take-up of parental leave can provide a more detailed picture of how different types of couples arrange work and care. Finally, although we provide supplemental analysis distinguishing couples who have a second child, we do not account for further aspects of family trajectories that might moderate the child penalty, such as union dissolution and female same-sex parents taking turns to give birth.

Notes

- 1 Note that although research (e.g., Kim, Tamborini, and Sakamoto 2018) has found short-term earnings to be a good proxy for long-term earnings, couples wanting to maximize joint income might take other attributes (e.g., education, occupation, job security) into account when assessing the economic potential of each partner.
- 2 The extent to which Becker's formulation relies on biology and gendered socialization is debatable, as they only appear as important factors when reinforcing—rather than offsetting—gender differences in human capital (England and Budig 1998). The sole focus on different-sex biological parents arguably contributes to this ambivalence.
- 3 To identify two people as a cohabiting couple, Statistics Netherlands relies on legal or administrative ties—other than marriage and registered partnership—that point to a partnership. These include, among others, being listed as partners in tax fillings, pension schemes, and (mandatory) health insurance, as well as being the legal parents of a child. The criteria also apply retrospectively, so that, for example, two people who start living together in 2010 and establish a legal relationship indicating partnership (e.g., becoming legal parents of a child) in 2012 will be considered to have been a couple since 2010. Therefore, all couples included in our sample have some sort of connection suggesting a committed relationship. For example, a woman who gives birth while living with a roommate with whom she has no ties that indicate a partnership is not considered as being in a couple.
- 4 The distribution of events across calendar months is similar across types of couples.

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