

Do Consequences of Parental Job Displacement for Infant Health Vary Across Local Economic Contexts?



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This study examines the consequences of parental job displacement for birth outcomes and investigates how the effects vary with regional unemployment rates. We use Swedish register data and exploit plausibly exogenous variation caused by workplace closure to reduce the bias related to reverse causality and confounding. The differences in birth outcomes between children of parents who experienced job displacement and children of parents who were not displaced turn out to be quite modest. Even in the most disadvantaged regions, with the highest unemployment rates, parental job displacement is not harmful for health at birth. We relate these findings to the institutional setting in Sweden and discuss policy implications for the United States.

Keywords: job displacement, birth outcomes, crossover effects, register-based research

Job displacement has detrimental consequences for health not only within but also across generations. Although much of the literature on the “long arm” of children’s health at birth discusses its role in the intergenerational transmission of socioeconomic disadvantage (Almond, Currie, and Duque 2018; Currie 2011), few studies have investigated how parental job displacement affects outcomes

such as birth weight, low birth weight, preterm birth, or being small for gestational age. Moreover, knowledge is scant on how these effects vary across contexts, such as regions or countries. This article fills this gap in the literature by examining the effects of parental job displacement due to workplace closure on a range of birth outcomes in Sweden and investigates how these effects vary across regions. It also

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discusses the results from the Swedish context, which is characterized by a generous and universal welfare state, in the light of findings from previous research that focused on the United States, a country in which the unemployed and families with children receive much less support than in Sweden overall and where geographic variation in socioeconomic opportunities reinforces health inequalities (Chetty et al. 2014; Galster and Sharkey 2017).

Associations between the parental labor-market situation and birth outcomes of children have long been studied based on cross-sectional designs and small samples, but few studies have followed parents over time. Thus, overall, the literature is too restricted to draw causal conclusions (Catalano et al. 2011). To the best of our knowledge, only a few studies have used longitudinal data and adopted methods for causal inference: three focusing on unemployment and two on job loss. The findings presented by Helen Scharber (2014) suggest reduced average birthweights and increased risk of low birth weight among children whose mothers were unemployed at birth, though no such effects were found by Björn Högberg, Anna Baranowska-Rataj, and Jonas Voßmer (2023). David Dooley and Joann Prause (2005) show that maternal transitions from employment to unemployment reduced birth weight, while the effects on the risk of low birth weight were not statistically significant. Jason Lindo (2011) finds that fathers' job loss reduced children's weight at birth but did not significantly increase the risk of low birth weight. Although most previous studies examined the United States, Samantha Gailey and her colleagues (2021) focus on Denmark and find that a father's unexpected job loss during pregnancy increased the risk of low birth weight, but not preterm birth among male infants. A separate but related line of inquiry focused on health outcomes observed among adolescents. These studies indicate that in the U.S. context parental job losses lead to worsened physical and mental health of adolescents (Brand and Simon-Thomas 2014; Kalil and Ziol-Guest 2005; Schaller and Zerpa 2019). However, it is important to consider infant health because this early life outcome is a predictor of health in adoles-

cence and later in life and thus a potential mechanism behind the effects identified in previous research. Altogether, these mixed findings call for more in-depth investigations, using samples that are large enough to study relatively rare adverse birth outcomes, and that allow researchers to go beyond assessments of how parental job displacement affects children "on average." Further, more research on infant health—one of the key predictors of life chances (Ruiz-Valenzuela 2021)—is needed from contexts outside the United States to be able to understand whether the effects substantially differ between it and countries that have more generous and universal welfare states.

The consequences of parental job displacement may vary substantially not only across countries with different institutional settings, but also across regions with diverging unemployment rates. On the one hand, stronger competition for scarce jobs may cause elevated stress among parents-to-be and lead to stronger negative effects of job displacements. On the other, according to the social norm of unemployment literature, when job losses are common, social stigma is reduced and the experience of becoming unemployed is less distressful. Despite these contradictory theoretical arguments, we are not aware of any studies that solve this puzzle and examine whether regional unemployment rates alter the consequences of parental job displacement for infant health. Previous research on regional heterogeneity in the effects of job loss or unemployment has focused on the health outcomes of adults (Buffel, Missinne, and Bracke 2017; Clark, Knabe, and Rätzel 2010; Oesch and Lipps 2013; Stutzer and Lalive 2004). This study fills this gap by comparing how parental job displacements affect infant health in privileged and in economically disadvantaged regions.

Our study makes several contributions to the literature. First, whereas the literature on the health effects of job loss and unemployment has primarily focused on the individuals who are directly affected (Brand 2015), this study provides evidence of how the consequences of job loss may cross over between family members across generations. This topic is important for broader debates on the inter-

generational transmission of disadvantage in the United States, a country that historically used to stand out with high intergenerational mobility rates (Bailey et al. 2024), but in which the life chances of new generations today strongly depend on the socioeconomic success of their families of origin (Bratberg et al. 2017).

Second, thanks to the employer-employee links in Swedish registers, our data provide the opportunity to focus on parents who experienced job displacement due to workplace closure. This approach handles potential bias due to issues of reverse causality and confounding. Associations between job loss and infant health may capture both the genuine effects of losing a job on birth outcomes and any effects of health-related problems of children or mothers that may emerge even before or during a pregnancy, which also affect the labor market opportunities of parents. However, when an entire workplace closes it is unlikely that job loss will have occurred due to health-related issues in an employee's family.

Third, our large sample based on register data provides an opportunity to scrutinize regional effect heterogeneity for even rare events such as adverse birth outcomes. This is crucial because the previous literature highlights several distinct theoretical mechanisms on how geographical context might alter the effects of unemployment on health, and aggregate estimated effects might miss dissimilar or opposite effects across contexts (Aquino, Brand, and Torche 2022; Torche, Fletcher, and Brand 2022). Using register data with detailed information about the place of residence of parents, we have the opportunity to distinguish between specific theory-driven mechanisms that result in the moderating impact of regional unemployment rates at the level of the so-called functional regions. The concept of functional regions corresponds to commuting zones in the United States and concerns spatial entities that do not generally follow the administrative division of regions, but instead reflect the behavior of workers toward their places of residence and the location of their employment.

Fourth, previous research mostly sheds light on the consequences of parental unemployment and job loss in the United States (Dooley

and Prause 2005; Lindo 2011; Scharber 2014). Little is known, however, about the effects of job displacement in countries whose social policies improve social and living conditions in a more comprehensive way than in the United States. Providing research evidence from outside the United States is crucial for improving the design of its policies. Learning from the experiences of other well-developed countries can offer insights into heterogeneous effects across geographic contexts and is far less expensive than hypothetical large-scale intervention studies within the United States. As this article describes and quantitatively shows, job displacement in Sweden has very different implications for families than it does in the United States. Due to a relatively well-developed social safety net, Swedish workers' incomes are protected during a period of unemployment, and policies that enhance opportunities for re-employment reduce loss of earnings (Bertheau et al. 2022). Because health insurance is universal, opportunities for parents to benefit from health care during or after pregnancy are not tied to employment. These aspects of the institutional setting in Sweden stand in stark contrast to those in the United States, where the social safety net is much less generous and the health and well-being of children therefore depend on parental economic resources. Thus Sweden is an interesting case to study because it provides insights into how families are affected by job loss in a universal and comparatively generous welfare state, which may also reduce the differences across regions. Hence, the insights from our study contribute to the debates on social policies that could address the problem of social inequalities within and across regions in the United States.

THEORY AND HYPOTHESES

The Effects of Parental Job Loss on Birth Outcomes

Parental job loss may expose a family to the risk of unemployment and may therefore have lasting effects on family income, resulting in restrictions on accessing tangible and intangible goods such as nutritious foods, favorable housing conditions, and safe neighborhoods with green areas (Brand 2015). When these negative events occur around the time of pregnancy, the

impact of parental job loss on children's health operate mainly through parents' reactions to job loss rather than children's own reaction to parents losing jobs. Job loss carries social stigma, lowers self-esteem, and triggers stress and anxiety, particularly if it results in an extended period of unemployment (Jahoda 1981; Pearlin et al. 1981). By putting parents under severe strain, a job loss may affect a pregnancy, resulting in a poorer birth outcome. In addition, unemployment-related stress might trigger unhealthy behaviors such as smoking and alcohol consumption, also during pregnancy (De Cao, McCormick, and Nicodemo 2022; Everding and Marcus 2020; Nizalova and Norton 2021). Such unhealthy behaviors are forms of relaxation that regulate mood (Pampel, Krueger, and Denney 2010) and may be more easily accessible for disadvantaged social groups compared to other forms of coping such as physical exercise. The resulting exposure to toxic substances can, in turn, inhibit fetal growth and reduce gestational length. Following these insights, we propose the following hypothesis:

H1: Maternal and paternal job displacement due to workplace closure have a negative effect on birth outcomes.

The consequences of parental job losses for children have long been of interest for social science research, not least since the Glen Elder's classic study on the consequences of parental economic struggles for family-level processes and child development (Elder 1981). However, the focus of this literature has so far been on outcomes such as skills, school grades, and educational achievements (Kalil and Zioguest 2008; Peter 2016; Rege, Telle, and Votruba 2011; Stevens and Schaller 2011). Literature reviews highlight that health outcomes of children remain understudied (Ruiz-Valenzuela 2021; Brand 2015). Infant health is particularly relevant in this regard because human capital-related outcomes observed early in life may be antecedents of poorer outcomes observed later in childhood. This underscores the importance of examining how parental job losses affect infant health, which constitutes a potential driver of the effects identified in previous research.

Effect Heterogeneity by Regional Unemployment Rates

Previous research offers competing hypotheses regarding the magnitude of the effects of job loss across regional contexts with varying levels of economic disadvantage (Aquino, Brand, and Torche 2022; Torche, Fletcher, and Brand 2022). In the following, we outline two mechanisms related to the moderating role of unemployment rates, namely, the expected chances of parental reemployment and the social norm of unemployment. These mechanisms are theoretically expected to operate at the level of functional regions.

Unemployment rates may affect the magnitude of the effects of parental job loss due to the reduced chances of parental reemployment, which entails extended periods of unemployment. Higher regional unemployment rates mean stronger competition for scarce new jobs. Facing competition with many unemployed peers for few new jobs, parents may anticipate more difficulties with reemployment and longer periods of unemployment. This may contribute to higher levels of stress and anxiety (Ananat, Gassman-Pines, and Gibson-Davis 2008) and ultimately result in poorer birth outcomes. These arguments call for considering unemployment rates at the geographical scale of job search of the unemployed, that is, in functional regions. After a job loss, an unemployed person typically searches for a new job not only in their area of residence, but also in neighboring locations within commuting distance. These arguments lead to a hypothesis:

H2: The negative effects of job displacement due to workplace closure on birth outcomes are larger in functional regions with high levels of aggregate unemployment.

Although the mechanisms pertaining to low opportunities for reemployment in functional regions suggest that higher unemployment rates aggravate the effects of parental job loss, a contradictory prediction can be derived from the literature on the social norm of unemployment (Clark 2003; Clark, Knabe, and Rätzl 2010). The experience of a job loss may be less stressful when it is shared with others in an in-

dividual's immediate community. Previous research has long recognized that people construct or interpret their economic situation and social status by comparing themselves with "relevant others" (Festinger 1954), and social comparison theory has been very influential for research on the social determinants of health (Buunk and Gibbons 2007). Although job loss might be strongly stigmatizing in contexts of nearly full employment, social attitudes toward the unemployed might be less negative in regions in which a lack of work is more common. In addition, long-lasting harsh living conditions and multiple burdens in disadvantaged regions may lead to adaptation and to the development of protective strategies (Brand 2015; Torche, Fletcher, and Brand 2022). As a result, families in such regions may be less heavily affected by parental job loss. These theoretical ideas motivate the following hypothesis:

H3: The negative effects of job displacement due to workplace closure on birth outcomes are larger in functional regions with low levels of aggregate unemployment.

INSTITUTIONAL BACKGROUND

To contextualize this study, we describe some key aspects of the institutional background in Sweden relative to the United States. This aids the interpretation of our main findings and opens a debate on how countries with different institutional configurations may learn from each other in order to improve social and living conditions. As Thomas DiPrete and Patricia McManus (2000, 364) argue, the total consequences of a job loss on income are a function of the direct effect of lost earnings and the compensating effect of public support. Studies show that both of these effects are weaker in Sweden than in the United States, with potential benefits for the health of infants among parents who experience job loss. This is likely not only because Sweden and the United States differ in terms of general levels of social spending on health, welfare, and insurance against adverse outcomes. Indeed, comparative analyses also show that Sweden's social welfare expenditures were 28 percent relative to GDP, 12.2 percentage points higher than U.S. public spending (Fishback 2022). Even more impor-

tant, however, the two countries are on opposite ends of the spectrum of governmental provision of the support and services for their populations. As a result, although Swedish social policies tend to be universal, the U.S. safety net is more porous, creating more uncertainty among vulnerable population subgroups.

In Sweden, the replacement rates of unemployment benefits are higher, and qualification criteria are less strict than in the United States. The average replacement rates of unemployment benefits over the years covered by our study amounted to 73 percent in Sweden versus 59 percent in the United States, and the duration of entitlement to unemployment benefits excluding times of means-tested assistance amounted to sixty weeks in Sweden and forty weeks in the United States (Scruggs, Jahn, and Kuitto 2017). Accordingly, the risk of poverty following unemployment is twice as high in the United States as in Sweden. As David Brady, Ryan Finnigan, and Savine Hübgen (2017) show, the risk of falling into poverty following unemployment in the United States is one of the highest in the Organization for Economic Cooperation and Development (OECD), more than 42 percentage points, whereas in Sweden it is 20 percentage points; this difference can be partly explained by discrepancies in welfare generosity as well as by coverage of unemployment insurance programs across these two countries.

Although the generosity of unemployment benefits and related forms of financial support in Sweden protect displaced workers and their families from negative financial consequences of job loss or unemployment in the short term, in the long term, policy measures that increase the chances of reemployment and shorten the duration of unemployment are also relevant. Reemployment rates after job displacement are approximately 20 percentage points higher in Sweden than in the United States, and short- and long-term earnings losses are less than half as large (OECD 2019). As Antoine Bertheau and his colleagues (2022) show, thanks to prompt reemployment, only a limited number of Swedish workers who become displaced from their jobs experience long-term earning losses and their earnings are only around 10 percent lower than those ob-

served pre-displacement. By comparison, in the United States, two years after a worker's displacement, earnings decline on average by 21 percent (Lachowska, Mas, and Woodbury 2020; Quintini and Venn 2013). As explained, the duration of unemployment and the earning losses may have consequences not just for parents, but also for the health of their children.

Other institutional differences between Sweden and the United States that are relevant concern the organization of health-care services. Public health-care services in Sweden are universal and comprehensive, resulting in low levels of socioeconomic inequality in the use of health care. Thus, even though the United States ranks second highest among OECD countries when it comes to out-of-pocket per-capita spending on health care (OECD 2019), these direct household expenditures are much lower in Sweden. Estimates of financial hardship associated with out-of-pocket health-care payments, the so-called incidence of catastrophic spending on health, show that in the United States this incidence amounts to 7.4 percent, in Sweden it amounts to 1.8 percent, putting Sweden at the bottom of this ranking. Sweden also has a comprehensive institutional system that offers a range of services for parents, including parental education, family counseling, and maternity centers, and these services are not conditional on employment or earnings.

Overall, the greater generosity, universalism, and public subsidization of services in Sweden than in the United States means that Swedish families depend less on employment for access to essential goods and services. In the United States, both monetary benefits and nonmonetary services are often tied to employment through (subsidized) corporate fringe benefits, whereas in Sweden they are largely tax financed and provided to all citizens as a social right. This means that job loss has broader implications for the health and well-being of American families. Moreover, the monetary value of subsidized services is far greater for low-income (such as jobless) families, and these services are more generous in Sweden. All of this suggests that the key proximate determinants of infant health—such as income and access to health and prenatal care—are

less affected by job loss in Sweden than in the United States.

Against this background, it could be assumed that the effects of job displacement in Sweden for individual health may be generally limited. However, previous research suggests otherwise. Involuntary job loss increases the risk of hospitalization due to alcohol-related conditions, traffic accidents and self-harm, as well as shortened life expectancy (Eliason 2014; Eliason and Storrie 2009a, 2009b, 2010). However, an important and still unanswered question remains as to whether the consequences of job loss cross over to the next generation.

DATA AND METHODS

We use Swedish longitudinal register data available at Umeå SIMSAM Lab (Lindgren et al. 2016). These data combine information from the Medical Birth register, which contains health-related information on births in Sweden, the Longitudinal Integrated Database for Health Insurance and Labor Market Studies (LISA), comprising annual educational and labor-market data, and the Business and Workplace register (FAD), including information on workplaces. Unique personal identifiers allow us to link the data from the different registers and the records of children and parents.

For our study, these data have several advantages. First, in contrast to self-reported birth weights used in previous studies (Dooley and Prause 2005; Lindo 2011), the Medical Birth register provides high-quality data on birth outcomes that are reported by professional obstetricians and midwives (Källén and Källén 2003). Second, LISA data allow us to link workers to workplaces, enabling us to objectively define job displacement due to workplace closure based on vanishing workplace identifiers and worker flows (Fackler, Müller, and Stegmaier 2018), which represents an improvement over previous studies that used self-reported indicators of job loss (Lindo 2011) or examined transitions from employment to unemployment (Dooley and Prause 2005). Third, our data include geographic coordinates, which allows us to consider unemployment rates at the level of functional regions. We construct functional regions connecting families' regions of residence and employment to reflect opportunities to

commute and link them to official data on unemployment rates (Karlsson and Olsson 2006). This is an important advantage given that administrative boundaries do not necessarily overlap with geographic boundaries of commuting to work. Moreover, unlike in surveys, bias due to sample attrition, losing a follow-up for individuals who changed the place of residence or nonresponse, is not a problem in our data.

We selected an analytic sample of children born between 1997 and 2017, the maximum observation period for which data are available for all the covariates. The focus on workers with children implies that our sample is conditional on (future) parents only. This means that we cannot consider the health of infants who were not born for reasons related to parental job displacement. This issue is addressed by choosing an appropriate time window of the analyses and further discussed in the final section. If job displacement causes postponement of childbearing, and these postponement effects are stronger among parents whose children's health would be potentially more strongly affected by a job displacement, our results understate the genuine negative impact of job displacement on birth outcomes. For children to be included, at least one parent must be in paid employment during the year before birth. This ensures that the parent is at risk of job displacement and that workplace closure does not reflect the closure of the parent's business. We separately analyze the effects of job displacement of mothers and fathers. The sample of children with complete data is 1,520,473 births for maternal job displacement and 1,491,592 births for paternal job displacement. It is somewhat larger for the former because it includes single mothers who are not married, partnered, or cohabiting or cases where no information is available on the father. In other words, we estimate the effects of both maternal and paternal job loss in couples, but only the effect of maternal job loss if the mother is single. Overall, we observe 13,595 and 17,305 job displacements of mothers and fathers, respectively. For more detail, see table A.1 and the online supplement: S1 provides detail on the con-

struction of the sample; S2 compares birth outcomes in different components of our analytical sample.¹

Birth Outcomes

The Medical Birth register contains a set of relevant indicators of health at birth. In addition to birth weight (in grams), we define indicators of low birth weight (< 2,500 grams), preterm birth (< thirty-seven weeks) and being small for gestational age (SGA), a proxy measure of fetal growth restriction, as our outcomes. The latter refers to a birth weight that deviates more than 2 standard deviations from what would be expected given gestational length. The outcomes we study in this article are interrelated. Thus, studying multiple outcomes within one study provides a more comprehensive picture. However, to some extent these outcomes also have differential etiologies (Torche 2011). Adverse life course events such as a job displacement experienced by a parent are related to maternal stress, which may initiate a chain of events leading to premature birth (Hobel 2004). For instance, maternal stress leads to the production of hormones such as cortisol. These hormones are produced in both the mother and in the fetus, and they are related to premature birth (Goldenberg et al. 2008). Overall, this means that job displacement is directly related to the risk of a preterm birth. They may also lead to a chain of behavioral and biological changes such as foregoing prenatal health care and adopting less healthy behaviors, which inhibit fetal growth. Fetal growth, in turn, affects gestational age, and prematurity can result in low birth weight. Thus, job displacement can be indirectly related to low birth weight. However, some stressors also reduce birth weight independently of gestational age by reducing maternal and fetal weight gain during pregnancy. Thus, low birth weight may be a function of prematurity, growth restriction, or both, but the proximate biological pathways behind prematurity and growth restriction also partly differ. Research highlights the role of immunological processes for prematurity, and the role of placental blood flow and fetal nutrition for growth restriction (Torche and Rauf 2021).

1. For the online supplement, see <https://www.rsfjournal.org/content/10/1/57/tab-supplemental>.

Maternal and Paternal Job Displacement Due to Workplace Closure

Our key treatment is parental job displacement due to workplace closure. Research shows differential mechanisms driving the effects of maternal and paternal job losses, and although a majority of studies suggest that fathers' job losses are more detrimental (Ruiz-Valenzuela 2021), some studies suggest the opposite (Carneiro et al. 2022). To make sure that our estimates do not mask underlying differences across parental gender, we estimate separate models corresponding to maternal and paternal job losses. A focus on job displacement due to workplace closure reduces issues of reverse causality and confounding. Children's health at birth does not lead to workplace closure. Regarding confounding, parental characteristics that affect birth outcomes (such as a parent's chronic illness) are unlikely to affect the risk of experiencing workplace closure (Brand 2015). In accordance with established definitions (Fackler, Müller, and Stegmaier 2018), we consider a workplace with four or more workers to be closed in one year if its identifier disappears by the next year and the maximum clustered outflow (MCO) of workers across years is less than 30 percent of the original workforce. Clustered outflows refer to groups of workers who move from one workplace to another over two consecutive years, and the MCO is the largest outflow. This condition ensures that workers in a workplace that disappears do not move together to a new workplace in large numbers, which would indicate, for example, a merger rather than a closure. An MCO is not meaningful for workplaces with fewer than four workers, but because most workplaces that disappear belong to this category, we follow Daniel Fackler, Steffen Müller, and Jens Stegmaier (2018) for our main analysis and consider these workplaces closed if all workers move to new workplaces or if the new workplace has more workers than the closed one. In the sensitivity analyses, we examine whether our results differ if we exclude workplaces with fewer than four workers to account for the fact that the assumption that job displacement is beyond the control of the individual worker may be less plausible for small workplaces. In addition, workplace identifiers that disappeared from

one year to the next may reappear in later years in our data (see table S3 online). Although we are confident that our definition, which combines a disappearing workplace identifier with worker flow criteria, identifies workplace closures, in our sensitivity analyses, we combine it with that of Marie Gartell, Ann-Christin Jans, and Helena Persson (2010) and consider workplaces closed only if, in addition to our previous criteria, their identifier remains absent for two additional consecutive years. Based on these definitions, our key treatments—maternal or paternal job displacement in the year before birth ($t-1$)—equal one if the respective parent was employed at a closing workplace and zero if they were not. This means that the control group includes children of workers who separate from their job for other reasons and is not restricted to children of workers who remain continuously employed. Thus we avoid bias due to conditioning on future outcomes (Krolikowski 2018). We have annual data on workplace identifiers and identify workplace closure as a workplace identifier disappearing from one year to the next, that is, between year $t-1$ and $t-0$, with $t-0$ being the year of birth. This means that it is possible that a job displacement occurred, or a worker was notified of the coming displacement, before conception. Nevertheless, the window to postpone childbearing is not large, and therefore the selection bias should not be substantial.

Regional Unemployment Rates

Our data include identifiers for between sixty and seventy-two functional regions, which correspond to U.S. commuting zones. The choice of this unit of aggregation is motivated theoretically by arguments on the spatial nature of job search (Bilal 2021; Eriksson, Hane-Weijman, and Henning 2018; Kuhn, Manovskii, and Qiu 2021) as well as by empirical research showing that the effects of aggregate economic conditions for health outcomes tend to be more substantial at the more aggregate level (Lindo 2015). The identifiers of functional regions are linked to data from the Swedish Public Employment Agency, which refer to the total number of individuals in each functional region and year that they are registered as unemployed and seeking work at the Swedish Public Em-

ployment Agency (van den Berg, Paul, and Reinhold 2020). Based on these data, we calculated proportions of the unemployed in the total population in the functional region.

Most studies on the moderating role of regional unemployment use it as a continuous variable and assumed linear interaction effects and common support (Hainmueller, Mumolo, and Xu 2019). Instead, we use a more flexible approach and categorize regional unemployment rates measured in year (t-1) into quintiles. Regional unemployment rates range from 0.58 and 12.87 percent for municipalities to 1.28 and 12.87 percent for functional regions (for the ranges of the quintiles, see table S4 online). This enables us to conduct separate analyses for five subgroups to show how parental job displacement affects children's birth outcomes depending on regional unemployment rates. Given the absence of theoretical arguments for a specific categorization, we base our subgroups on the empirical distribution of regional unemployment rates. We use quintiles because they balance the need for a sufficiently refined distinction of regional unemployment and allow for enough treated and control observations within each subgroup, enabling us to precisely estimate the conditional average treatment effects on the treated (CATT). In sensitivity analysis elsewhere, we test coarser (terciles) or more refined (septiles) categorizations (see tables S5 and S6 online).

Theoretical and Empirical Estimands of Causal Effects

Our goal is to estimate the causal effects of parental job displacement due to workplace closure on birth outcomes of children. Using the notation for potential outcomes (Rubin 1974), our theoretical estimand (Lundberg et al. 2021) for hypothesis H1 can be more precisely defined by averaging (1) the unit-specific causal effect $\delta_i = Y_i(1) - Y_i(0)$, that is, the difference in child *i*'s birth outcome Y_i in year *t* if its mother or father had been displaced ($D_i = 1$) instead of not displaced ($D_i = 0$) in the year before the child's birth (t-1), over (2) the target population of interest. The latter includes all children born in Sweden from 1997 to 2017 who had a mother or father who experienced job displacement due to workplace closure. This corresponds to

the average treatment effect on the treated (ATT) $\tau_1 = E(Y_i(1) - Y_i(0) | D_i = 1)$. A simple way to estimate the ATT of parental job displacement would be to calculate the difference in means of the observed birth outcomes of children born to displaced and nondisplaced parents. However, these estimates would only be unbiased if the potential outcomes $Y_i(0)$ were unconditionally independent of job displacement D_i . Although this assumption is more plausible when focusing on job displacement due to workplace closure rather than to job loss in general (Lindo 2011), or relative to transitions from employment to unemployment (Dooley and Prause 2005), child, parental, and workplace characteristics remain that may causally affect the risk of experiencing workplace closure as well as potential birth outcomes (Brand 2015), thereby violating the assumption.

To address this issue of confounding, we use entropy balancing combined with linear regression adjustment on the balanced sample as our estimation strategy (Hainmueller 2012), relying on the conditional independence assumption (CIA), that is, $Y_i(0)$ being independent of D_i after conditioning on covariates X_i . Similar to other reweighting methods, such as propensity score matching (PSM), entropy balancing reweights the control group observations to balance the treatment and control group on covariates. Unlike PSM, however, it does not require the repeated cycle of (re)specifying and (re)estimating the propensity score (model), selecting a matching algorithm, and checking for balance (Hainmueller 2012, 25), as it computes balancing weights to meet prespecified targets. In our main analysis, we require a balancing tolerance of 0.01 for all covariates in terms of mean, variance, and skewness. Moreover, entropy balancing does not result in a redefinition of the parameter of interest because no method for defining and restricting common support has been established. We perform entropy balancing separately for the job displacement of mothers and fathers and match the children of displaced and nondisplaced parents exactly by birth year to account for confounding due to the time period affecting the risk of job displacement and birth outcomes. After entropy balancing, we estimate linear regression models with covariates X_i on the bal-

anced sample with standard errors clustered at the level of mothers to account for any dependencies between siblings. This does not change the estimate of the ATT because the covariates are mean independent of the treatment, but it may further reduce the standard errors. Entropy balancing is implemented using the `-kmatch-` ado in Stata 17.1 (Jann 2017).

A crucial step in estimating causal effects using a conditioning estimator is to select the covariates needed to satisfy the CIA (Morgan and Winship 2015). Drawing on insights from causal graphs, our adjustment set included child, parental, and workplace characteristics measured in (t-2) that we assume to be confounders, that is, to affect the risk of job displacement and birth outcomes (Elwert and Winship 2014). We also took care to avoid possible bad controls such as infant sex, which may be a mediator that is influenced by maternal stress due to parental job displacement and may itself affect birth outcomes (Catalano and Bruckner 2005). All variables including those covariates considered confounders are presented in table S9 in the online supplement. Possible confounders include child characteristics such as birth order, which may influence parental risk of job displacement as well as birth outcomes; parental characteristics, taking into account, for example, parents' educational and labor market biographies or family structure; and workplace characteristics such as age, which affect the risk of workplace closure and also performance (Coad 2018) and may therefore indirectly affect birth outcomes through parents' stress levels. A more detailed rationale for the adjustment set and each covariate is provided in appendix 3 in the online supplement. Any causal interpretation of our results is based on the assumption that after adjustment for these covariates, the CIA is satisfied or, equivalently, that no further confounding is measured. Most continuous covariates were included as such, but because functional form specifications are difficult to justify theoretically, in the sensitivity analyses we also tested a more flexible categorical specification (see tables S7 and S8 online).

To test hypotheses 2 and 3, we rely on the same steps as outlined, but focus on the condi-

tional average treatment effects on the treated (CATT) $\tau_2 = E(Y_i(1) - Y_i(0) | D_i = 1, U_i = u_i)$ where U_i indicates the quintile of the regional unemployment rate in year (t-1). Entropy balancing and regression adjustment are performed as previously, but now separately for each quintile of the regional unemployment rate. We focus on how effects differ between subgroups of children defined by regional unemployment rates rather than on the treatment effect of a joint intervention on D_i and U_i , implying that any effect heterogeneity we estimate may be either due to a joint effect of job displacement and regional unemployment or to noncausal reasons for effect heterogeneity. For example, if children whose parents were displaced in regions with a high level of unemployment have worse birth outcomes than children in regions with a low level, the discrepancy may be due to a causal effect of the regional unemployment rates or other characteristics that cause a high level of regional unemployment and affect birth outcomes.

RESULTS

We start with a description of the sample used for the analyses in order to have an overview of the socioeconomic profile of children with parents who experienced job displacement (the treatment group) and the way they differ from children whose parents did not experience job displacement (the control group) in table 1. Regarding birth outcomes, the differences between the treatment and control group were rather modest. For instance, the incidence of low birth weight was 4.1 percent among children whose mothers experienced job displacement and 3.9 percent in the control group. The proportions corresponding to paternal job displacement were 4.2 percent versus 4.0 percent in the treatment and control group, respectively. The proportion of preterm births amounted to 6.0 percent among children whose mothers experienced job displacement and was only 0.4 percentage points lower in the control group. The proportions for paternal job displacement were 6.1 percent versus 5.6 percent in the treatment and control group, respectively. Regarding small for gestational age, among children whose mothers experienced job displacement incidence was not elevated,

and among children whose fathers experienced job displacement the increase was only 0.3 percent.

The descriptive evidence presented in table 1 also provides us with the sociodemographic profiles of the treatment and control groups for selected covariates. Children in the treatment group were more likely to be born by mothers younger than twenty-five, from an immigrant background, and with less educational attainment. We can also observe that the treatment and control groups differ in terms of maternal labor-market difficulties, as reflected in a higher number of days of unemployment, as well as in a higher amount of unemployment benefits and social assistance received prior to job displacement. Mothers of children from the treatment group also had lower employment-related incomes and disposable incomes two years prior to birth and were more likely to have experienced previous job displacement and to be in poorer health, as indicated by more days of sick leave. The treatment group includes relatively more children with mothers whose firms were younger, smaller, and mainly operating in the wholesale and retail trade, transportation and storage or accommodation and food service activities. Only limited differences are found in the regional unemployment rate in the year of birth between treated and untreated mothers.

Among children whose fathers experienced job displacement, we find similar sociodemographic differences in terms of country of birth, level of educational attainment, and prior labor market experience. Similar to mothers, fathers from the treatment group were disadvantaged in terms of incomes two years before birth, previous displacement, as well as sickness days. Differences between fathers from the treatment and control group regarding firm and workplace characteristics and regional unemployment rates were similar to those observed for mothers.

Apart from balancing the characteristics of the focal parent losing a job, we also balanced for the characteristics of the spouses of these persons. For the sake of brevity, these and some other variables are not presented in table 1 as the differences largely reflect the sociodemographic profile of the focal parents with the

same gender. Table S9 in the online supplement shows the complete version of table 1.

The pre-displacement characteristics presented were used for entropy balancing to render the children of displaced and nondisplaced parents comparable. Before moving to the main results, we briefly comment on how income-related characteristics changed in the year of job displacement to provide an illustration of what job displacement meant for the parental labor-market situation and incomes. The following results concern job displacement of parents during the entire period from 1996 to 2017 rather than just on displacement in the year before birth. Even though our research questions do not focus on career outcomes after job displacement for all parents, we consider this description a form of empirical validation of our analyses. According to the evidence provided in table S10 in the online supplement, the risk of unemployment and the number of days of unemployment increased substantially among mothers in the treatment group. This was accompanied by a drop in earnings and an increase in the income from unemployment benefits. However, disposable income did not drop, probably partially because of the substitutional role of unemployment benefits. Fathers who experienced job displacement saw even more substantial increases in the risk of unemployment than mothers, but a similarly small decline in earnings. At the same time, income from unemployment benefits almost doubled in this group. We also observed some increases in the income from self-employment. Overall, somewhat surprisingly, displaced fathers showed an increase in disposable income. These results are consistent with the key points from the institutional background section, in which we argue that a job displacement in Sweden does not entail such a significant reduction in family income as in the United States.

In the next step, we applied entropy balancing procedures to estimate the average treatment effects on the treated of maternal and paternal job displacement on birth outcomes and test hypothesis H1. The results from the analysis of these average effects in Sweden are presented in figure 1. They show that parental job displacement has, on average, zero or small ef-

Table 1. Descriptive Statistics on Outcomes and Selected Covariates for Treatment and Control Groups Before Balancing

Variable	Year	Categories	Maternal Sample		Paternal Sample	
			Control Group	Treatment Group	Control Group	Treatment Group
Child data						
Birth weight	t-0		3,543	3,524	3,549	3,538
LBW	t-0		0.040	0.044	0.039	0.040
PTB	t-0		0.058	0.061	0.057	0.061
SGA	t-0		0.019	0.020	0.019	0.018
Birth order of child	t-0	1	0.445	0.449		
		2	0.380	0.367	0.396	0.379
		3	0.134	0.129	0.140	0.148
		>3	0.041	0.055	0.048	0.066
Parent data						
Age category	t-2	<21	0.034	0.065	0.011	0.015
		21-25	0.199	0.250	0.123	0.134
		26-30	0.387	0.347	0.329	0.312
		31-35	0.285	0.246	0.322	0.308
		36-40	0.088	0.083	0.151	0.154
Country of birth	—	>40	0.008	0.009	0.064	0.077
		Sweden	0.886	0.837	0.874	0.806
		EU	0.034	0.040	0.034	0.044
		Other	0.081	0.122	0.092	0.150
Household status	t-2	Single	0.444	0.473	0.403	0.398
Civil status	t-2	Married	0.315	0.303	0.340	0.370
		Divorced or widowed	0.035	0.045	0.034	0.046
NUTS region	t-2	Never married	0.651	0.651	0.626	0.584
		11	0.257	0.303	0.239	0.296
		12	0.159	0.153	0.164	0.152
		21	0.084	0.067	0.087	0.065
		22	0.135	0.131	0.136	0.140
		23	0.205	0.186	0.205	0.180
		31	0.074	0.078	0.078	0.077
		32	0.036	0.036	0.037	0.039
Education level	t-2	33	0.051	0.046	0.053	0.050
		ISCED<3	0.073	0.149	0.094	0.156
		ISCED 3-4	0.419	0.515	0.500	0.523
		ISCED>4	0.508	0.336	0.406	0.321
Registered unemployed	t-2		0.187	0.307	0.137	0.251
Days registered unemployed	t-2		12.7	25.1	12.9	27.7
Job displacement	t-2		0.009	0.025	0.013	0.036
Employment status	t-2	Not employed	0.044	0.094	0.023	0.059
		Employed	0.952	0.886	0.971	0.904
		Self-employed	0.003	0.021	0.006	0.037
Total employment-related income, in SEK	t-2		182,068	150,142	264,707	223,231
Wage earnings, in SEK	t-2		154,089	118,157	252,028	200,251

Table 1. (continued)

Variable	Year	Categories	Maternal Sample		Paternal Sample	
			Control Group	Treatment Group	Control Group	Treatment Group
Business income, in SEK	t-2		502	2,715	1,365	6,813
Unemployment benefits, in SEK	t-2		3,666	6,441	3,449	6,792
Social assistance, in SEK	t-2		478	1,181	488	1,396
Disposable income, in SEK	t-2		150,413	130,863	203,431	177,741
Sickness days	t-2		6.65	8.97	3.21	4.86
Parental leave days	t-2		44.34	40.33	10.37	7.80
Industry sector (ISIC code)	t-1	A	0.005	0.015	0.012	0.028
		B, C, D, E	0.091	0.061	0.244	0.108
		F	0.008	0.014	0.060	0.078
		G, H, I	0.195	0.343	0.249	0.327
		J	0.030	0.038	0.063	0.067
		K	0.032	0.022	0.031	0.022
		L	0.008	0.015	0.008	0.016
		M, N	0.206	0.256	0.190	0.265
		O, P, Q	0.382	0.144	0.112	0.038
		R, S, T, U	0.043	0.092	0.031	0.052
Age of plant, in years	t-1		14.1	4.9	13.6	4.6
Age of firm, in years	t-1		13.1	4.1	11.3	3.4
No. of workers at plant	t-1		531	70	426	40
Regional unemployment rate	t-1		3.78	3.95	3.82	3.94

Source: Authors' tabulation.

Note: Swedish register data; t = year of birth. Treatment status always measured in t-1. SEK = Swedish krona, adjusted to 2008 prices.

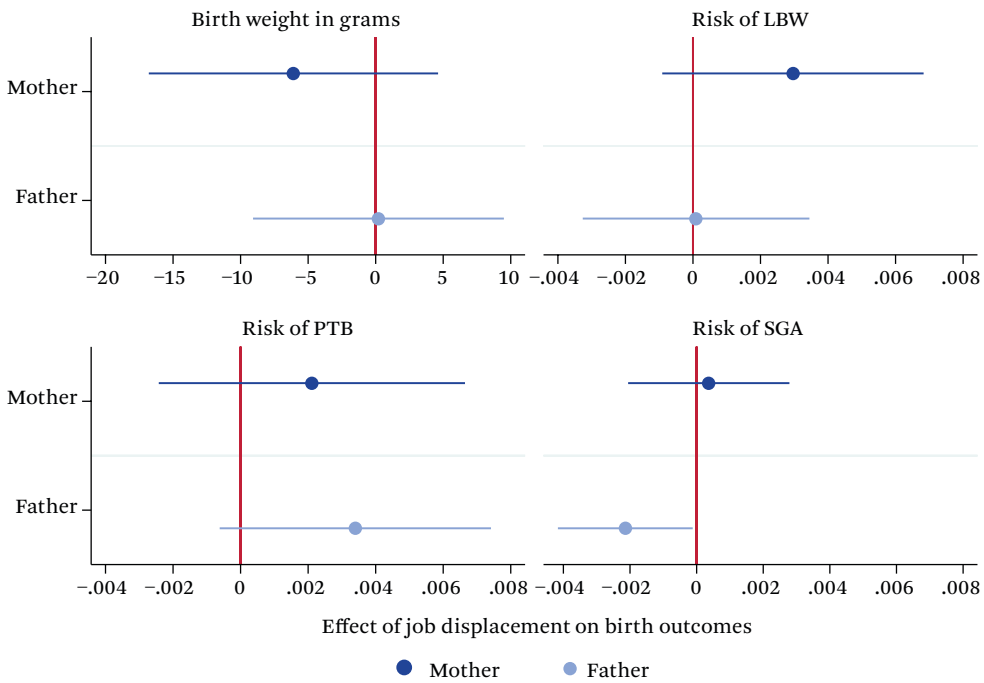
fects on birth outcomes. For mothers, the effects on birth weight, risk of low birth weight and risk of preterm birth point in the expected direction but are very small and not statistically significant, while the effect on SGA is close to zero. For fathers, we find virtually no effects on birth weight and low birth weight, a small but statistically insignificant increase in the risk of preterm birth, and a small but statistically significant reduction in the risk of being small for gestational age. Thus, we reject hypothesis H1, which states that maternal and paternal job displacement due to workplace closure has, on average, negative effects on birth outcomes.

To test hypothesis H2, we examined the regional differences in the effects of parental job displacement. The effects in figure 2 are grouped according to quintiles of the functional regions' unemployment rate (with the first quintile having unemployment rates at the

level of 1 to 3 percent and the fifth quintile at the level of 5 to 13 percent). Contrary to hypothesis H2, which states that higher unemployment rates in functional regions should aggravate the negative effects of parental job displacement, we do not observe substantially stronger negative impacts of job displacement in the higher quintiles. If we only look at the size of the estimated risks of low birth weight and preterm births, we see a nonlinear pattern, in which the risks of adverse birth outcomes increase with higher unemployment rates, and then decrease again in the top unemployment rate quintile.

Hypothesis H2 predicts that the effects would be stronger in regions with higher unemployment rates. Hypothesis H3 claims the opposite based on the literature on the social norm of unemployment. The results presented in figure 2 do not provide support for that hy-

Figure 1. Effects of Maternal and Paternal Job Displacement due to Workplace Closure on Birth Outcomes



Source: Authors' tabulation.

Note: Swedish register data. LBW = low birth weight, PTB = preterm birth, SGA = small for gestational age. Horizontal bars indicate 95 percent confidence intervals. The point estimates and standard errors are reported in table A.2.

pothesis either. Overall, based on our evidence, both H2 and H3 are rejected, because any patterns that may be discernable are nonlinear and not consistent across birth outcomes. Hence, none of the results are consistent with higher unemployment decreasing or increasing the overall effects. Moreover, most estimates are small and the uncertainty of these estimates is quite large compared to the small differences between them in terms of point estimates.

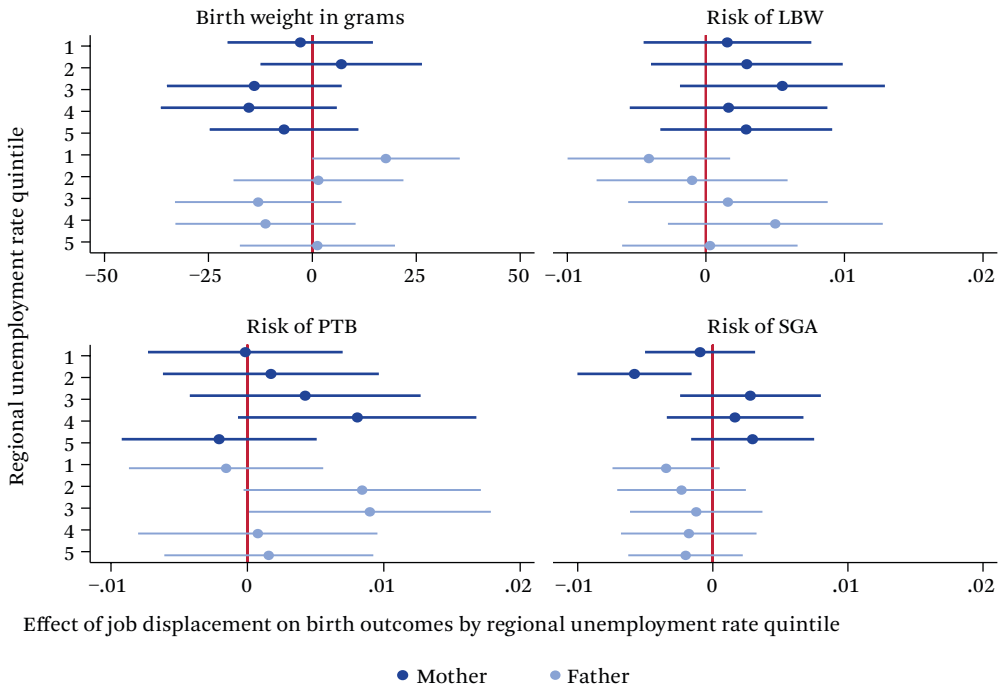
We carried out sensitivity analyses to test whether job displacements lead to decisions *not to have children*, a mechanism that could potentially lead to a sample selection bias. Our results show that job displacement is not strongly related to a probability of not having a child after a job loss (see table S11 online). The relative risk amount to about 0.004, and even though they are statistically significant, with our sample of close to one hundred mil-

lion observations, the conventional 5 percent statistical significance threshold is not a very meaningful indicator of whether the estimates are substantively important. The estimates are modest in absolute terms, indicating that job displacement is associated with an approximate 0.37 percentage point reduction in the probability of childbearing. Hence we do not find strong evidence suggesting that workers who experience job displacements decide to postpone childbearing or refrain from family formation altogether in anticipation of adverse birth outcomes. We also carried out additional analyses comparing birth outcomes of siblings before and after a job loss. The results from these robustness checks confirm our conclusions (see tables S13 and S14 online).

DISCUSSION

A large body of literature shows that job displacement is harmful for the health of individ-

Figure 2. Effects of Paternal and Maternal Job Displacement due to Workplace Closure on Birth Outcomes by Unemployment Rates in Functional Regions



Source: Authors' tabulation.

Note: Swedish register data. LBW = low birth weight, PTB = preterm birth, SGA = small for gestational age. Horizontal bars indicate 95 percent confidence intervals. Point estimates and standard errors are reported in table A.3.

uals. This raises the question of the conditions under which the effects of job displacement go beyond individuals who experience it and affect new generations (Brand 2015). This article examines the effects of parental job displacement on birth outcomes using Swedish register data. By focusing on parental job displacement due to workplace closure, we address potential concerns regarding reverse causality and bias due to confounding. The article also examines contextual heterogeneity, thereby looking beyond population-level average effects that could otherwise mask dissimilar effects across socioeconomic contexts (Aquino, Brand, and Torche 2022; Torche, Fletcher, and Brand 2022). It conceptualizes context on two levels. First, it provides evidence of regional heterogeneity within Sweden, shedding light on the moderating role of reemployment opportunities or the social norm of unemployment. Second, it offers suggestions of whether an appropriate social pol-

icy mix might restrict the health-related consequences of job displacement for future generations in the United States by comparing findings from this study for Sweden with research on the effects of job losses and unemployment on infant health in the United States.

Our findings show that the differences in birth outcomes between children of parents who experienced job displacements and children of parents who were not displaced turn out to be quite modest. For instance, the risk of low birth weight was 0.3 percentage points larger among children whose mothers experienced job displacement than those in the control group, and the corresponding difference concerning paternal job loss was close to zero. To place these differences in comparison with the United States, Jason Lindo (2011) shows that in the United States, the differences in the risk of low birth weight between infants whose fathers experienced job displacement and those

who did not amount to 1.8 percentage points. That study did not examine the effects of maternal job loss. The estimates from Helen Scharber (2014) based on administrative records for Texas suggest that a difference between the risks of low birth weight among employed and unemployed mothers of 3 percentage points. Regarding the results from analyses that treated birth weight as a continuous outcome, David Dooley and Joann Prause (2005) find an effect of maternal unemployment on birth weight of -185 grams, which compares with -6 grams in our study, which is close to an effect of paternal job displacement of 23 grams that Samantha Gailey and her colleagues (2021) in Denmark report. Hence, the effects observed in Sweden are at least an order of magnitude lower compared to the U.S. Since studies focused on the U.S. quoted here adopt a research design similar to ours, in that the focus is on involuntary job losses and methods for causal inference, it is unlikely that the disparities in the findings are driven by methodological differences. What does the comparison of the results for Sweden and the United States tell us about the role of the policy context in shaping the effects of job displacement on infant health or the intergenerational transmission of social inequalities more generally?

These results could be related to how job loss affects the economic situation of individuals and their families in Sweden, a country with a relatively generous safety net, universal health care, and policies that shorten the duration of unemployment. Reflecting on these findings might be particularly useful for improving the social and living conditions in the United States, where support for families, including those families with unemployed parents, is far more limited than in the Nordic countries. Combined with research that highlights the importance of supporting unemployed parents (Kessler and Hevenstone 2022; Noghanibehambari and Salari 2020), our findings suggest the importance of a social policy mix that improves the situation of the unemployed and their families, thus restricting the health-related consequences of job displacement for future generations.

Exploring regional differences of the effects of parental job displacement, we tested theo-

retical hypotheses related to, first, expected chances of parental reemployment and, second, the social norm of unemployment. We found no monotonic increase or decrease in the magnitude of the effects of parental job displacement across unemployment rates measured at the level of functional regions. Hence we could not accept any of these two theoretical hypotheses as a complete explanation of the observed empirical patterns. Our findings may be related to the policy in Sweden, where the government offsets most of the municipal and regional revenues that are lost (André et al. 2021). Again, this is different from Anglo-Saxon contexts (Glasmeier 2000), raising questions on how policies that reduce regional inequalities in the United States could potentially help individual workers and their children. Recent research in the United States shows substantial geographic variation in social and living conditions (Chetty et al. 2014; Galster and Sharkey 2017) and highlights how exposure to differential geographic contexts matters for children's life chances (Chetty, Hendren, and Katz 2016). Our findings demonstrate that it is possible to create welfare state settings that provide limited health penalty for job displacements not only on average, but also for most of the population, including those who happened to be born in more disadvantaged geographic areas.

Although this study has a number of strengths, it is not without weaknesses. Most important, our analyses assume that job displacements do not have spillover effects on parents who are themselves not displaced but who share the same residential location as the displaced parents. Recent research raises doubts as to whether such an assumption is valid, particularly when job losses are concentrated in time and space (Gassman-Pines, Gibson-Davis, and Ananat 2015). Thus our estimates may be biased because birth outcomes might also be affected by the job losses of parental peers, coworkers, or neighbors. In addition, our analyses focus on parents but do not consider couples who may have decided to postpone parenthood or who separated as a consequence of job displacement. Research shows that such responses in families are not uncommon (Di Nallo et al. 2022), also in the Swedish context

(Eliason 2012). Couples who decided not to stay together due to a job displacement (and therefore decided not to have children) may represent a particularly vulnerable group, less well equipped with the economic or psychological resources to handle a family crisis. Thus, the effects of job displacement on birth outcomes may have been stronger for this group, had they decided to have children, than for the group that did have children and for whom we observe birth outcomes.

Despite these limitations, this study offers a number of important insights, particularly from the perspective of countries such as the United States that have room for improving use of economic resources for the sake of the future generations. This study finds that parental job displacement has zero or small average effects on health at birth in Sweden, and that these effects do not vary systematically depending on contextual unemployment rates. The nonexistent or small average effects are in line with other studies from Sweden and Denmark (Gailey et al. 2021; Högberg, Baranowska-Rataj, and Voßemer 2023; Mörk, Sjögren, and Svaleryd 2020), but diverge strongly from the large effects found in comparable studies from the United States (Dooley and Prause 2005; Lindo 2011; Scharber 2014). We argue that this partially reflects differences in labor-market policy

and welfare state characteristics. Relative to the United States, Swedish (and Danish) labor market policies facilitate better reemployment opportunities and buffer negative income shocks following job loss or unemployment (Brady, Finnigan, and Hübgen 2017; DiPrete 2002; Gangl 2006), and more generous and universal welfare states make access to essential goods and services less dependent on employment and earnings (Brady and Bostic 2015; Marical et al. 2006). This in turn suggests that the negative effects of parental job loss or unemployment on infant health found in the United States could potentially be reduced by social policies, a conclusion further supported by research showing the strong positive effects of social policies on infant health among disadvantaged groups in the country (Strully, Rehkopf, and Xuan 2010). This raises the question whether adopting appropriate policies could provide institutional conditions under which children born in families exposed to job displacement are not negatively affected by economic adversity. Our results also show that these patterns are universal and are also present in the most disadvantaged regions with high unemployment rates. Thus, social policies may be beneficial in terms of reducing inequalities, not only across socioeconomic groups but also across spatial contexts.

Table A.1. Information on Variables Used in the Analyses

Variable	Description
Child Outcomes	
Birth weight, in grams	Birth weight, in grams
Low birth weight (LBW)	Dummy coded. Birth weight < 2500 grams
Preterm birth (PTB)	Dummy coded. Born before week 37
Small for gestational age (SGA)	Small for gestational age
Treatment	
Parental job displacement <i>Conditions</i>	1 = Job displacement due to workplace closure Only workers with paid employment as their main source of income are included. Self-employed and non-employed are excluded. Only children with complete data on all three birth outcomes are included. For analyses of father's job displacement, only children born to mothers who are not single are included.
Child data	
Birth year	Child birth year, categorical, range 1997–2017
Birth order of child	Birth order of child, 4 categories. 1,2,3 = 1,2,3. >4 = 4
Parent data – Socio-demographics	
Age category	Parent age, recoded into six categories <21, 21–25, 26–30, 31–35, 36–40, >40
Country of birth	Three categories: Sweden, Europe, outside Europe
NUTS region	8 categories, one for each NUTS3 region.
Household status	Dummy coded. 1 = Does not live with anyone aged 18 years or more.
Civil status	Three categories: Married, divorced/widowed, never married
Education level	Three categories: <ISCED 3, ISCED 3-4, >ISCED4
Parent data – Employment	
Registered unemployed	Dummy coded: 1 = Registered at unemployment office.
Days registered unemployed	Number of days registered at unemployment office
Job displacement	Job displacement due to workplace closure in t-2
Employment status	Three categories: Not employed, employed, self-employed
Sickness days	Number of days on paid sickness leave
Parental leave days	Number of days on paid parental leave
<i>Parent data – Income</i>	
Total employment-related income, in SEK	Total employment-related income, including social transfers, in SEK. Adjusted to consumer price index based on 1996 prices.
Wage income, in SEK	Income from paid employment, in SEK. Deflated with consumer price index to 1996 prices
Business income, in SEK	Income from own business, in SEK. Deflated with consumer price index to 1996 prices
Unemployment benefits, in SEK	Income from unemployment insurance, in SEK. Deflated with consumer price index to 1996 prices
Social assistance, in SEK	Income from social assistance, in SEK. Deflated with consumer price index to 1996 prices
Disposable income, in SEK	Total disposable income, in SEK (net of transfers and taxes). Individualized from household disposable income. Deflated with consumer price index to 1996 prices

Table A.1. (continued)

Variable	Description
Parent data - Workplace and firm level	
Industry sector (NACE code)	Industry sector of workplace, 10 NACE categories: A: Agriculture, forestry and fishing; B, C, D, and E: Manufacturing, mining and quarrying and other industries; F: Construction G, H, and I: Wholesale and retail trade, transportation and storage, accommodation and food service activities; J: Information and communication; K: Financial and insurance activities; L: Real estate activities; M and N: Professional, scientific, technical, administration and support service activities O, P, and Q: Public administration, defense, education, human health and social work activities; R, S, T, and U: Other services
Age of workplace, in years	Age of workplace (current year – year of establishment)
Age of firm, in years	Age of firm (current year – year of establishment)
No. of workers at workplace	Number of workers at workplace
Regional data	
Regional unemployment rate	Functional labor market regions unemployment rate in t-1
Moderating variables	
Regional unemployment rate quintile	Functional labor market regions' unemployment rate in t-1, grouped into 5 quantiles. Unemployment rate defined as total number of unemployed individuals as a proportion of the total population of the region.

Source: Authors' elaboration.

Table A.2. Effects of Parental Job Displacement on Birth Outcomes (Estimates for Figure 1)

		Birth Weight	LBW	PTB	SGA
Sample mean of outcome		3,542.85	0.0399	0.0580	0.0191
Mother's job displacement	ATT	-6.087	0.0030	0.0021	0.0004
	SE	5.463	0.0020	0.0023	0.0012
N (treated)		13,595	13,595	13,595	13,595
N (controls)		1,506,670	1,506,670	1,506,670	1,506,670
Father's job displacement	ATT	0.208	0.0001	0.0034	-0.0021*
	SE	4.737	0.0017	0.0020	0.0010
Sample mean of outcome		3,549.31	0.0387	0.0569	0.0185
N (treated)		17,305	17,305	17,305	17,305
N (controls)		1,474,287	1,474,287	1,474,287	1,474,287

Source: Authors' tabulation.

Note: SE = cluster robust standard error, clustered on mothers. LBW = low birth weight; PTB = preterm birth; SGA = small for gestational age. Birth weight is measured in grams, LBW, PTB, and SGA are binary variables, coded 1 when the outcome is observed.

* $p < .05$; ** $p < .01$; *** $p < .001$

Table A.3. Effects of Parental Job Displacement on Birth Outcomes by Regional Unemployment Rate Quintile (Estimates for Figure 2)

		Birth Weight	LBW	PTB	SGA
Mother's job displacement					
Quintile 1	CATT	-2.918	0.0016	-0.0002	-0.0009
	SE	10.498	0.0036	0.0043	0.0024
Quintile 2	CATT	6.941	0.0030	0.0017	-0.0058*
	SE	11.658	0.0042	0.0048	0.0025
Quintile 3	CATT	-13.963	0.0055	0.0042	0.0028
	SE	12.614	0.0044	0.0051	0.0031
Quintile 4	CATT	-15.282	0.0016	0.0080	0.0017
	SE	12.705	0.0043	0.0052	0.0030
Quintile 5	CATT	-6.808	0.0029	-0.0021	0.0030
	SE	10.737	0.0037	0.0043	0.0027
<i>N</i> (treated)		13,595	13,595	13,595	13,595
<i>N</i> (controls)		1,506,670	1,506,670	1,506,670	1,506,670
Father's job displacement					
Quintile 1	CATT	17.699	-0.0041	-0.0016	-0.0035
	SE	9.065	0.0030	0.0036	0.0020
Quintile 2	CATT	1.474	-0.0010	0.0084	-0.0023
	SE	10.427	0.0035	0.0044	0.0024
Quintile 3	CATT	-13.008	0.0016	0.0090*	-0.0012
	SE	10.224	0.0037	0.0045	0.0025
Quintile 4	CATT	-11.272	0.0050	0.0008	-0.0018
	SE	11.059	0.0040	0.0045	0.0026
Quintile 5	CATT	1.219	0.0003	0.0016	-0.0020
	SE	9.520	0.0032	0.0039	0.0022
<i>N</i> (treated)		17,305	17,305	17,305	17,305
<i>N</i> (controls)		1,474,287	1,474,287	1,474,287	1,474,287

Source: Authors' tabulation.

Note: See table A.2.

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