NBER WORKING PAPER SERIES

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Working Paper 34064
http://www.nber.org/papers/w34064

NATIONAL BUREAU OF ECONOMIC RESEARCH
1050 Massachusetts Avenue
Cambridge, MA 02138
July 2025

We are grateful to Ahmet Gulek, Martina Uccioli, and seminar participants at Stanford, Wharton, and Wisconsin for helpful comments. We thank Carine You and Rosa Kleinman for excellent research assistance, as well as Sarah Bögl and Iliriana Shala for research assistance at the Research Institute of Industrial Economics. The views expressed herein are those of the authors and do not necessarily reflect the views of the National Bureau of Economic Research.

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July 2025
JEL No. I1, J13

ABSTRACT

We characterize the causal impact of having a child with Down syndrome relative to having one without Down syndrome using event studies around birth and population-wide Swedish administrative data from 1990 to 2019. The incremental effect of having a child with Down syndrome is to increase the likelihood of parental co-habitation and subsequent child-bearing. These effects exist both in an environment with essentially no prenatal testing – where the birth of a child with Down syndrome is random conditional on maternal age – as well as once prenatal screening and testing is more common. In both contexts, total income also increases due to the presence of a generous allowance for families with a child with a disability, but the impact on labor earnings differs. In the "no-testing" environment, having a child with Down syndrome leads to a greater decrease in maternal earnings post-birth relative to having a child without Down syndrome, but this effect reverses sign once testing is available. Our results speak to the impact on families of a child with Down syndrome in a setting where families are largely insured against any additional financial costs.

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1 Introduction

The rapid development of health technologies that assess the chance of chromosomal abnormalities in a fetus are at the center of many demographic, policy, and ethical debates. By allowing parents to act on their preferences over their potential children's genetic characteristics, these technologies have spurred concerns over "designer babies" and the eradication of certain traits in the population (Zhang 2020). Health policies that influence the affordability, and hence the use, of these technologies can affect the prevalence of births with chromosomal abnormalities (Conner et al. 2025). Yet, we have relatively little direct empirical evidence about the impact on parents of having a child with chromosomal abnormalities.

We focus on the impact on parents of children with Down syndrome (Trisomy 21), a chromosomal abnormality which causes intellectual disability and structural differences and is the most common chromosomal abnormality in viable pregnancies. An overwhelming majority of pregnancies that are prenatally diagnosed with Down syndrome are terminated (Conner et al. 2012; Zhang 2020), which suggests that individuals carrying such a pregnancy may expect the arrival of a child with Down syndrome to negatively affect their lives.[1] Consistent with this view, responses from over 150 economists whom we surveyed in early 2025 predicted that the arrival of a child with Down syndrome would raise the likelihood of divorce and reduce the number of subsequent children the mother gives birth to.[2] On the other hand, survey evidence from Canada and South Korea document, respectively, a positive correlation between the presence of a Down syndrome child and parental statements that their child is easy to raise (Marcovitch et al. 1987) and that they receive support from their communities (Erickson and Upshur 1989); furthermore, in a survey of parents in the United States who have a child with Down syndrome, about four-fifths state that their outlook on life is more positive because of the Down-syndrome child (Skotko, Levine, and Goldstein 2011).[3]

We estimate the causal impact of having a child with Down syndrome relative to one without Down Syndrome on a broad swath of family outcomes, including parental relation-

[1] Of course, there are other possible interpretations. For example, expecting individuals may anticipate that the unborn child would lead an unhappy life, and thus act in accordance with altruism.

[2] Specifically, 65% of respondents predicted that the divorce rate would increase, 14% that it would decrease, and the remainder predicted no impact. For the mother's number of subsequent children, 68% predicted a decrease, 20% an increase, and the remainder predicted no impact. Appendix A provides more detail on the survey and its results.

[3] In addition, 97% say that they are proud of their child, and 95% that the siblings without Down syndrome have a good relationships with the Down-syndrome sibling. For more in-depth, anecdotal evidence on the experience of having a child with Down syndrome, see Bérubé (1998); Beck (1999); Kidder and Skotko (2001); Cohen, Nadel, and Madnick (2002); Zuckoff (2002); Soper (2007); Groneberg (2008); and Soper (2009). Further, Urbano and Hodapp (2007) document a negative correlation between the presence of a Down syndrome child and parental divorce in data from the state of Tennessee.

ship stability, subsequent child-bearing, parental earnings and income, and mental health. To do so, we overcome two key challenges. The first pertains to data; we leverage administrative data from Sweden that allows us to observe the universe of children born between 1990 through 2018 as well as whether or not they have Down syndrome, to link these children to their parents, and to trace many dimensions of the parents' lives and well-being from 1990 through 2019. In the spirit of Kleven, Landais, and Søgaard (2021), who compare changes in parental outcomes following the birth of a biological child and an adopted child, we use these data to compare changes in parental outcomes following the birth of a child with and without Down syndrome.

The second challenge is that mothers who give birth to children with Down syndrome tend to be older and have different socioeconomic status than mothers who give birth to children without Down syndrome (Stoneman 2007; Corrice and Glidden 2009; Hunter et al. 2013); this complicates the interpretation of simple comparisons of families with and without a child with Down syndrome (see, e.g., Urbano and Hodapp 2007). To address this, our empirical strategy exploits the fact that – in the absence of prenatal testing – the occurrence of Down syndrome in a fetus is as good as random, conditional on maternal age (Sherman et al. 2007; Oster and Fox 2024). Our primary analysis therefore focuses on an environment in which prenatal testing is essentially non-existent: births to mothers aged 34 or younger that occurred in 2005 or earlier. In this sample, which we refer to as the "no testing" sample, we observe approximately 1,000 births with Down syndrome and over 1 million without Down syndrome. Since pregnancies to mothers under 35 have a relatively low chance of Down syndrome, the rate of invasive testing - which carries a miscarriage risk - is very close to zero (less than 1% of births) in this sample. Therefore, consistent with Down syndrome being randomly assigned conditional on maternal age, a wide range of pre-pregnancy maternal characteristics are similar among mothers of the same age who give birth to a child with and without Down syndrome. In this "no-testing" environment, our estimates therefore reveal the population average effect of unexpectedly having a child with Down syndrome relative to having a child without Down syndrome.

Since the early 2000s, however, the rapid development of non-invasive prenatal screening technologies have reshaped expecting individuals' ability to obtain information about the health of the fetus without undergoing an invasive procedure – and, thus, without any risk of miscarriage. In Sweden, various regions introduced coverage for non-invasive screening starting in 2005, which had enormous effects on take-up of non-invasive screening, as well as effects on the rate of invasive testing (Conner et al. 2025). Affordable and widely available prenatal screening introduces the possibility of selection into who has a child with Down Syndrome, suggesting that the results from our no-testing environment may no longer be

applicable. We therefore also report results for births in 2005 or later, in which over half of mothers experience some prenatal screening or testing; we refer to this as the "prevalent-testing" environment (Graviditetsregistret 2019). In this sample, we observe approximately 1,200 births with Down syndrome and about 1.3 million births without Down syndrome. Here, pre-pregnancy maternal characteristics look different even conditional on age; mothers who give birth to a child with Down syndrome tend to have lower earnings and income, are more likely to be married to the child's father, and are less likely to have a college degree. Our estimates in this setting therefore recover the impact of having a child with Down syndrome on the (likely) selected set of parents who choose to forgo prenatal testing or to not terminate the pregnancy if the test reveals Down syndrome.

In both the no-testing and prevalent-testing environment, we find that relative to having a child without Down syndrome, having a child with Down syndrome reduces the likelihood of subsequent parental separation and increases subsequent child-bearing. For example, in the no-testing environment, the incremental effect of having a child with Down syndrome is to increase the probability of the mother living with the father five years after birth by 8.6 percentage points (standard error = 2.8) and to increase the number of subsequent births by 0.15 (standard error = 0.03) over the same time period. These effects represent a 40% greater increase in the probability of living with the father and a 25% greater increase in the number of subsequent births than the effect of having a child without Down syndrome.

Impacts on maternal labor earnings are more subtle. In the no-testing environment, the incremental impact of a birth with Down syndrome is to reduce average annual maternal earnings in the five years post-birth by a statistically significant *additional* 32%, while in the prevalent-testing environment the effect is reversed, with the incremental effect of a birth with Down syndrome being a statistically significant 30% *smaller* decline in maternal earnings. This may suggest that families who anticipate being better able to accommodate a child with Down syndrome, or to face less labor-market disruptions, are more likely to select into the sample when prenatal testing is prevalent. In contrast to the large incremental impacts on maternal earnings, we are unable to detect incremental impacts on paternal earnings in either environment.

In both environments we find that having a child with Down syndrome increases total income substantially, due to the presence of a generous allowance for families with a child with a disability. This transfer is intended to compensate families for additional costs that arise as a consequence of any special needs of the child. While we are unable to observe the extent of these costs directly, our results nonetheless speak to the impact on families of a child with Down syndrome in a setting where they may be largely insured against any additional financial costs of Down syndrome.

Finally, in the prevalent-testing sample we are also able to examine impacts on maternal and paternal mental health, as measured by prescription drugs fills for medication for anxiety or depression.[4] Our results suggest that the arrival of a child with Down syndrome – relative to a child without – causes a temporary, one to two year, increase in maternal consumption of these mental health drugs, but no longer-run difference, or any impacts on paternal consumption of these mental health drugs.

Our results contribute to a growing literature on the impact of childhood health shocks on family outcomes. There is substantial correlational evidence documenting worse labor market outcomes for parents in families where a child has a disability (see Stabile and Allin (2012) for a review of some of this literature), although the direction of causality is not clear given the evidence of a causal, positive impact of household resources on children's health (see, e.g., Gertler 2004, Currie 2009, Hoynes, Miller, and Simon 2015). More recently, several papers have exploited childhood health shocks to study the causal impact of childhood health on parental labor market outcomes in Northern Europe (Eriksen et al. 2021, Vaalavuo, Salokangas, and Tahvonen 2022, Adhvaryu et al. 2023, Breivik and Costa-Ramón 2024). These studies have found that that a range of childhood health shocks – such as cancer diagnoses, hospitalizations, and type-I diabetes diagnoses – decrease maternal labor market activity. Our paper contributes to this literature by studying a health shock that is coincident with the arrival of the child rather than one that emerges in childhood, and that – at least in the no-testing environment – is random conditional on maternal age. We also study a larger range of parental outcomes than typical, including not only parental labor market activity but also co-habitation, subsequent child-bearing, and mental health.[5] Unlike this existing literature, we do not exclusively find evidence of negative impacts on maternal labor market activity. In fact, in the prevalent-testing environment, we find that the arrival of a child with Down syndrome has a positive impact on maternal labor market outcomes.[6] Other related work studies the impact of childhood death on parental well-being (Berg, Lundborg, and Vikström 2017). More broadly, our work relates to the literature on the impact of health shocks – not only during childhood – on family behavior and well-being (see, e.g., Fadlon and Nielsen 2019, 2021).

[4]Data on prescription drugs are only available from July 2005 and onward.

[5]Adhvaryu et al. (2023) also study subsequent child-bearing, and Breivik and Costa-Ramón (2024) also study parental mental health.

[6]Adhvaryu et al. (2023) find that a child's cancer diagnosis increases subsequent child-bearing, but only in cases where the child's cancer diagnosis leads to death of the child (so-called "replacement fertility"). In our setting, the increase in subsequent child-bearing raises total family size. Breivik and Costa-Ramón (2024) show that a childhood hospitalization increases parental mental health visits shortly after the shock. This is consistent with the temporal increase in maternal mental health drug consumption that we observe, though we do not detect any statistically significant impact on fathers' mental health.

Our paper is perhaps most closely related to recent work that uses data from Taiwan to study the impact of the arrival of a child with cerebral palsy (CP), a childhood disability that is often – though not always – present at (or caused by circumstances during) birth (Chen, Lin, and Lo 2025), and to work that uses data from Denmark to study the impact of a broad set of childhood disabilities, some of which are present at birth (Gunnsteinsson, Seitelman, and Steingrimsdottir 2025). Contrary to our findings, these papers find that having a child with a disability increases parental separation and decreases subsequent child-bearing.[7]

More broadly, our paper relates to a large body of research across many countries that has estimated the impact of children on women's labor market outcomes (see, e.g., Angrist and Evans 1998; Bertrand, Goldin, and Katz 2010; Kleven, Landais, and Søgaard 2019a; Sieppi and Pehkonen 2019; Casarico and Lattanzio 2023; Cortés and Pan 2023; Kleven, Landais, and Leite-Mariante 2024), including in Sweden (Angelov, Johansson, and Lindahl 2016; Kleven, Landais, and Leite-Mariante 2024; Sundberg 2024).[8] To the extent that parents of children with Down syndrome would have preferred to terminate the pregnancy under full information, our work also relates to an emerging body of work documenting declines in maternal labor market activity following the birth of a child from an unplanned (Gallen et al. 2023) or undesired (Londoño-Vélez and Saravia 2024) pregnancy.

2 Setting and data

2.1 Setting

Down syndrome is the most common chromosomal abnormality in viable pregnancies. In our empirical setting, it occurs in approximately 0.1% of pregnancies that are carried to at least 11 weeks (Conner and Malcus 2017). The primary risk factor for the birth of a child with Down syndrome is advanced maternal age (Sherman et al. 2007; Coppedè 2016).

Individuals with Down syndrome have a higher incidence of many health conditions, including congenital heart defects and gastrointestinal malformations, learning disabilities and leukemia in childhood, and early-onset dementia in adulthood (Wiseman et al. 2009; Englund et al. 2013). They are affected by these conditions to a variable extent (Wiseman et al. 2009), and improved medical care for individuals with Down syndrome has contributed to a dramatic increase in life expectancy over the last couple of generations, to around 60

[7]Both papers also find a decrease in maternal labor force participation, which is consistent with the findings from childhood health shocks from Northern Europe referenced above. Further, Chen, Lin, and Lo (2025) finds that the arrival of a child with CP leads to a persistent increase in maternal depression.

[8]Goldin (2021) provides an in-depth overview of the relationship between career and family for women over the course of the last century.

years for children in the cohorts that we study (Englund et al. 2013).[9]

In our empirical context, children with Down syndrome overwhelmingly live with their parents (Englund et al. 2013). Families have the right to free schooling that is tailored to the needs and abilities of their child. Families also are eligible to apply for financial transfers, which we refer to as a "care allowance," that are intended to compensate for the additional costs that arise. Specifically, parents of children with needs that require "special supervision and care for a period of at least six months" are eligible to apply for the care allowance, which is paid out from the onset of the child's special need until June of the year the child turns 19 (Inspektionen för Socialförsäkringen 2021). Parents of children with a range of conditions receive the care allowance, including children with autism, Down syndrome, hearing problems, and ADHD. The care allowance amount awarded increasing in the care needs of the child above and beyond what would be expected for a child without special needs at the same age, but is not related to previous income or lost parental earnings (Inspektionen för Socialförsäkringen 2010, 2021). We thus study a setting where families may be largely insured against the additional *financial* costs that arise as a consequence of the child's health condition.

Like everyone else in Sweden, children with disabilities have access to nearly-free healthcare, with low copays. Parents of children with Down syndrome have access to twelve months of wage-replaced parental leave benefits which can be claimed by either parent, in multiple spells, until the child turns 8 years old; in practice, mothers take the majority of parental leave (Duvander, Haas, and Hwang 2017).[10]

2.2 Data sources and sample construction

We link several different data sets to construct the variables of interest. Appendix B provides more details on exact variable definitions.

The backbone of our data is an extract from the Swedish Population Register of all individuals who resided in Sweden at some point from 2000 through 2016 (Skatteverket, n.d.). For all women in this population, we obtain Medical Birth Records (MBR) from the National Board of Health and Welfare (Socialstyrelsen 2019) that contains information about all live births in Sweden from 1990 through 2018.[11] For each birth we observe the

[9] In addition to improvements in health care, the end of the practice of institutionalizing children with Down syndrome may also have contributed to increased life expectancy (Englund et al. 2013, Global Down Syndrome Foundation 2018).

[10] Toward the end of our time period the months of paid parental leave were increased from 12 to 15 months and the age of the child until which they could be claimed increased from 8 to 12.

[11] The MBR contains the universe of pregnancies carried 22 weeks or longer (28 weeks or longer for births prior to July 1, 2008). We restrict attention to live births.

mother and child identifiers, the exact date of birth, and singleton versus multiple birth indicators.[12] Importantly, the birth records also include the child's diagnoses at birth (ICD codes), which allows us to capture chromosomal abnormalities (when they exist); for births in 1995 and later, the birth records also contain information on whether the mother of each birth underwent invasive prenatal testing (either amniocentesis or chorionic villus sampling).

We also utilize several Swedish administrative registries that provide information on both parents and children. From the Swedish Population Register, we observe precise biological parent-child linkage information, which allows us to link each child identifier to the identifier of their biological father. We link biological mothers to their spouses using marital records and to their cohabiting partners using information about addresses and shared biological children. This allows us to construct annual measures of whether the mother is living with and/or married to the father of the child. We also link the biological parents of each child to Statistics Sweden's longitudinal database of individuals (LISA) from 1990 through 2019 (Statistics Sweden 2019) to obtain parental demographics, educational attainment, marital status, and various categories of calendar-year income (total income, earnings, unemployment insurance, parental leave compensation, care allowance, capital income, and transfers made to individuals who are studying). All income categories are measured at the individual level and we convert all monetary outcomes from Swedish Kronor to US dollars in 2018. The care allowance can be paid out to either parent and our data show the payments to each parent in each year so that we can define the care allowance at the individual level as the amount paid to that parent; in practice, mothers typically receive the bulk of the transfers.

Finally, from the National Board of Health and Welfare (Socialstyrelsen 2019) we obtain death records, inpatient and specialist outpatient records, and prescription drug records. The death records document all deaths through 2019 and thus allow us to track measures of child mortality. The patient records capture all inpatient visits from 1991 through 2019 and all specialist outpatient visits from 2002 through 2019. These records allow us to capture (for a robustness exercise) children who were not diagnosed with Down syndrome at birth, but who were subsequently diagnosed in the first three months after birth. The prescription drug records capture all fills from July 2005 through December 2019, and include information about the exact date of filling a drug and the drug's Anatomical Therapeutic Chemical (ATC) classification code. We use these prescription drug records to construct indicator variables for any purchase of a drug that is classified as anti-anxiety or antidepressant.

[12]The child identifier is missing for a small share of births where the child dies shortly after birth, before obtaining a social security number. This occurs for 0.1% of singleton births with Down syndrome and for 0.1% of singleton births with no chromosomal abnormalities. As we cannot link these children to their fathers, we exclude them from our main analysis.

Sample restrictions. The MBR contains information on almost 3.04 million live births with child identifiers in Sweden over our 1990-2018 time period. Of these, 3,946 (0.13%) are associated with some chromosomal abnormalities. Beginning with this initial sample, we make several sample restrictions that result in our final sample. Appendix Table A1 provides more details, and we summarize the key restrictions below.

We first restrict attention to singleton births, which comprise approximately 97% of births. We then restrict to the approximately 99% of remaining births that can be linked to a biological father identifier. To focus on the comparison of impacts of births of children with Down Syndrome to births of children without Down Syndrome, we drop 874 (24%) of the remaining births associated with chromosomal abnormalities because the chromosomal abnormalities are different from Down syndrome; we also drop approximately 0.1% of births with no chromosomal abnormalities because the family has a documented experience of other births of children with chromosomal abnormalities. After several other (very small) restrictions, our final sample consists of 2.9 million births, of which $2,805$ (0.10%) have Down syndrome and the rest have no documented history (to the child or other children in the family) of any chromosomal abnormalities.

Panel A of Figure 1 presents the time series of Down births over the 28 years of our sample. There are on average about one hundred Down births per year and their share has been mostly stable, at about 0.1% of live births.[13] Toward the end of the sample, there has a been a mild trend downwards, presumably due to the improvement in and greater availability of prenatal testing, which we turn to next.

2.3 Prenatal testing

Our analysis spans a period of dramatic change in prenatal testing. During the first half of our study period, the primary form of prenatal testing was an invasive diagnostic procedure – initially amniocentesis and later also chorionic villus sampling (CVS) – in which a needle is inserted into the womb to extract fetal cells (from which fetal DNA is subsequently extracted) from the amniotic fluid (amniocentesis) or placenta (CVS). These tests provide a definitive diagnosis of any fetal chromosomal abnormalities but, because they are invasive, the procedure carries a risk of inducing a miscarriage. As a result, invasive testing was typically not recommended to pregnant women, but was made available to those who requested it (Statens Beredning för Medicinsk Utvärdering 2006).

Starting in the early 2000s, advances in genetics have contributed to the development of

[13] It's unclear what is driving or what could be driving the sharp spike in Down births in 2006, which is roughly 5 standard deviations higher than the annual mean. As we show below, all our results are robust to dropping 2006 births from the sample.

non-invasive screenings for chromosomal abnormalities. Non-invasive screening poses no risk of miscarriage and costs less than an invasive diagnostic test, but it is also less informative about the presence of chromosomal abnormalities. In particular, unlike an invasive test, a non-invasive screen only provides an assessment of the chance of the presence of certain chromosomal abnormalities, not a definitive diagnosis. Non-invasive screening is therefore typically used to inform decisions about whether or not to conduct a subsequent invasive test. The advent of these non-invasive tests is likely responsible for the decline in the share of children born with Down syndrome, shown in Panel A of Figure 1. Indeed, starting in 2005, various regions in Sweden began introducing public insurance coverage for the new screenings, making them available to pregnant women for free or for a small copay.[14]

Panel B of Figure 1 presents the rate of invasive prenatal testing over time, overall and by maternal age. For pregnant women under age 35, a group associated with lower chance of carrying a fetus with Down syndrome (and chromosomal abnormalities more generally), the invasive testing rate prior to 2005 was less than 1%. After 2005 the invasive testing rate for women under 35 increased to approximately 2%, likely due to increased availability of non-invasive screening, which led to follow-up invasive tests among women whose screen indicated a higher chance of a chromosomal abnormality. For women aged 35 or higher, the rate of invasive testing was initially much higher, reflecting their higher baseline chance of the presence of a chromosomal abnormality. However, after 2005 invasive tests for these women declined due to the introduction of non-invasive prenatal screening, which allowed many of them to substitute from the riskier invasive procedure toward a safe non-invasive screening (Conner et al. 2025).

3 Empirical approach

3.1 Measurement approach

Our basic empirical approach is straightforward and in the spirit of Kleven, Landais, and Søgaard (2021) who compare parental outcomes following the birth of a biological child and an adopted child. In a similar manner, we compare parental outcomes following the births of children with Down syndrome ("Down") and children with no chromosomal abnormalities ("No Down").[15]

[14] In June 2005, Stockholm was the first region to introduce universal coverage for the first-generation non-invasive prenatal screening technology – nuchal translucency (NT) – and other regions added (universal or partial) coverage over time (Engström 2006).

[15] In practice, the set of "no Down" births exclude births with any chromosomal abnormalities (either Down or any other chromosomal abnormality). For brevity, however, we will refer to it as the "no Down" sample.

We denote each birth by i, which is associated with the year $d(i)$ in which it occurred and one of two types $j(i) \in \{No\ Down, Down\}$. While our baseline analysis considers all births, it will be instructive to illustrate the approach in the context of first births only. Within this simplified context, we consider the following j-specific event study, which we estimate separately for each $j \in \{No\ Down, Down\}$:

$$y_{it} = \gamma^{j(i)}_{r(i,t)} + \tau^{j(i)}_t + x'_{it}\alpha^{j(i)} + \epsilon_{it}, \tag{1}$$

where y_{it} is the family outcome of interest for birth i in calendar year t, $r(i,t) \equiv t - d(i)$ denotes the year relative to the birth of the child, τ^j_t are type-specific calendar year effects, and x_{it} is a vector of observable characteristics; in our baseline specification the x_{it} are indicator variables for maternal age (in years) in year t.

The main coefficients of interest are the γ^j_r's, which are indicator variables for years relative to the birth year. We normalize $\gamma^j_{-2} = 0$ so that all relative-year effects are measured relative to two years before birth (in order to accommodate possible pregnancy effects in the year before birth). For the primary event study analyses, we examine outcomes for five years pre-pregnancy (i.e. $-6 \leq r \leq -2$) and five years post-birth (i.e. $1 \leq r \leq 5$) and drop observations outside of this time window. We report (but generally ignore) outcomes in $r = -1$ and $r = 0$ since they reflect possible impacts of pregnancy and child-birth.[16] In this and all subsequent regression analyses, standard errors are clustered by mother.

To directly compare how outcomes evolve following a first birth for a child with Down syndrome relative to a first birth for a child with no chromosomal abnormalities, we pool the two types of births and estimate

$$y_{it} = \phi_{r(i,t)} + \theta_{r(i,t)} \cdot Down_i + \tau^{j(i)}_t + x'_{it}\alpha^{j(i)} + \epsilon_{it}, \tag{2}$$

where $Down_i$ is an indicator that takes the value of 1 if birth i has Down syndrome. The θ_r's capture the key coefficients of interest; we normalize $\theta_{-2} = 0$ so that all effects are measured relative to two years before birth.

In practice, first births only account for about two-fifths of the births with Down syndrome in our data. We will therefore also report results from estimating equations (1) and (2) separately for second births and for third and higher-order births. We will also pool all

[16] If we assume 9-month pregnancies and a uniform distribution of the date of birth within the calendar year, a woman is on average pregnant for 3.6 months of $r = -1$ (the year prior to the year of birth) and 5.4 months of $r = 0$ (the year of birth).

births of a given type j (either Down syndrome or not) in a single regression, by estimating

$$y_{it} = \gamma^{j(i)}_{r(i,t)} + \lambda^{b(i),j(i)} + \tau^{b(i),j(i)}_t + x'_{it}\alpha^{b(i),j(i)} + \epsilon_{it}, \tag{3}$$

where $b(i) \in \{1, 2, 3+\}$ captures the birth order associated with birth i. We allow for the outcome to depend on birth order, $\lambda^{b(i),j(i)}$, and for the relationship between the outcome and calendar year and the outcome and observable characteristics x_{it} to vary flexibility with birth order. The coefficients of interest, the γ^j_r coefficients, capture the type-specific relative-year average (across birth parity) effects, relative to two years prior to birth.

Likewise, to compare how outcomes evolve following a birth with Down syndrome relative to one with no chromosomal abnormalities, we extend equation (2) to cover other birth orders by estimating

$$y_{it} = \phi_{r(i,t)} + \theta_{r(i,t)} \cdot Down_i + \lambda^{b(i),j(i)} + \tau^{b(i),j(i)}_t + x'_{it}\alpha^{b(i),j(i)} + \epsilon_{it}. \tag{4}$$

This pooled specification maximizes statistical power on the coefficients of interest, the θ_r's, which capture the average impact of a birth with Down syndrome across *all* births with Down syndrome (regardless of birth parity) relative to all births without Down syndrome, again regardless of all birth parities.

Below, we will primarily report results from estimating equations (3) and (4). The key coefficients of interest, the θ_r's in equation (4), capture the average impact of having a child with Down syndrome relative to having a child with no chromosomal abnormalities. The key identifying assumption is that parental outcomes would have evolved similarly for both groups if they had both had a child without Down syndrome; we will assess the plausibility of this assumption by examining whether these outcomes were trending similarly for both groups *prior* to the birth of the focal child.

The insurance coverage of non-invasive prenatal screening that began in 2005, and the resultant, substantial rise in such screening documented by Conner et al. (2025), may affect both our estimates of θ_r and their interpretation. We will therefore report results for two different analysis samples that differ in the prenatal testing environment and hence in the interpretation of the coefficients of interest. Our primary analysis focuses on an environment in which prenatal testing is essentially non-existent, so it can be (almost) viewed as a world with no prenatal testing. Specifically, this no-testing environment consists of all births to younger women (34 years old or lower) in 2005 or earlier. As seen in Panel B of Figure 1, invasive testing rates in this sample were less than 1%. Given that non-invasive prenatal screening was also essentially non-existent, essentially no parents are obtaining precise prenatal information about the chromosomal abnormalities of their offspring. The potential

for selection into the sample – due to early termination of Down pregnancies – is therefore negligible; birth of a child with Down syndrome should be random, conditional on maternal age (and we show below that it is). This makes the interpretation of our results in this sample easy and straightforward: our estimates reveal the population average effect of unexpectedly having a child with Down syndrome relative to having a child with no chromosomal abnormalities.

At the same time, the results for this sample may be less applicable in more recent years, in which prenatal testing (including both invasive and non-invasive) is much more prevalent. We therefore also report results from a second, prevalent-testing environment, which contains all births after 2005 (through 2018, the last year of our sample).[17] In this environment, the sample of mothers who give birth to a child with Down syndrome is selected on parents who choose not to undergo prenatal screening or testing (or to not act on the information obtained). The impact of having a child with Down syndrome within this selected sample may be different than the population average impact, and is also of interest, given the widespread availability of prenatal testing in society today.

3.2 Summary Statistics

Table 1 reports summary statistics for all mothers, by Down status. We report results separately for births in the no-testing environment (Panel A), which consists of births in 2005 or earlier born to mothers ages 34 or younger, and for births in the prevalent-testing environment (Panel B), which consists of births in 2006 and later. We observe 928 births with Down syndrome in the non-testing environment, and 1,241 in the prevalent-testing environment; about two-fifths of children with Down syndrome are the mother's first child, about two-fifths are the second, and about one-fifth are the third child or later. The first row shows that maternal age at birth is markedly higher for children with Down syndrome, as would be expected given that the propensity to have a pregnancy with Down syndrome increases with maternal age (Conner and Malcus 2017).[18] To facilitate other comparisons across mothers by Down status, in the rest of the table rows we therefore re-weight the statistics for mothers of children without Down syndrome so that they have the same age distribution as mothers of children with Down syndrome. All of the maternal characteristics

[17] After 2005, the share of expecting parents who obtain information about the health of their fetus through prenatal non-invasive screening or invasive testing – and subsequently can make decisions about whether to keep the pregnancy based on this information – is much larger than the rate of invasive testing shown in Panel B of Figure 1. Conner et al. (2025) and Graviditetsregistret (2019) describe this in more detail.

[18] Appendix Figure A1 shows that we can nonetheless observe children with Down syndrome born to mothers of all ages.

are presented in the two years prior to birth.[19]

Panel A shows that in the no-testing environment, conditional on maternal age, mothers of children born with Down syndrome and mothers of children with no chromosomal abnormalities are similar on observables (two years prior to birth) – both substantively and statistically – including earnings, marital status, education, and birth parity. This is what we expected given the virtual non-existence of testing in this sample, and is thus consistent with our interpretation of the results for this sample representing the population average impact of having a child with Down syndrome.

By contrast, panel B shows that in the prevalent-testing environment, conditional on maternal age, mothers who give birth to children with Down syndrome are different on observables: prior to the birth, they are less likely to work (i.e. have any earnings), more likely to be married, and have lower educational attainment. These differences are not only statistically distinguishable but also substantively non-trivial. For example, mothers who give birth to a child with Down syndrome are 5 percentage points less likely to work two years prior to birth (relative to a mean of 86% among mothers who give birth to a child without Down syndrome), and are 4 percentage points more likely to have no college education (relative to the mean of 43% for mothers whose children do not have Down syndrome). This is consistent with selection into the sample of families with a Down syndrome child in the prevalent-testing sample, and it will affect our interpretation as we discuss below.

4 Results

We focus first on the no-testing environment, and then compare to what happens in the presence of prevalent testing.

Family relationships. Figure 2 shows the impact of having a child with Down syndrome relative to a child without Down syndrome on whether the mother lives with the father (panels A and B) and on the (cumulative) number of subsequent births (panels C and D). The left column (panels A and C) report results from estimating equation (3) separately for mothers who give birth to a child with Down syndrome (solid red lines) and those who give birth to a child without chromosomal abnormalities (dashed blue lines). The right column (panels B and D) report results from estimating equation (4), which shows the relative impact of a child with Down syndrome compared to a child without Down syndrome. Not surprisingly, in the years prior to birth, the probability of living with the (subsequent) father

[19] We choose two years prior to the year of birth since on average women are pregnant for part of the year prior to the birth year.

is increasing rapidly (panel A); this increase is the same for women who subsequently give birth to a child with or without Down syndrome.

Having a child with Down syndrome increases the probability that the mother and father of the child live together in the subsequent years. It also increases the number of subsequent births.[20] The impact on subsequent births is primarily driven by families whose second child has Down syndrome (Appendix Figure A2). That is, having a first child with no chromosomal abnormalities, followed by a second child with Down syndrome, substantially increases the probability that the mother will have a third child. When the first child has Down syndrome, the impact on subsequent births is much smaller, and when the Down child is the third or later child, there is no impact on subsequent births. By contrast, the impact of a child with Down syndrome on the probability that the mother and father still live together does not vary with birth order (Appendix Figure A3).

Economic outcomes. Figure 3 and Figure 4 present impacts on maternal labor market activity and income. Consistent with the so-called "child penalty" literature (Angelov, Johansson, and Lindahl 2016; Kleven, Landais, and Søgaard 2019b; Andresen and Nix 2022; Gallen et al. 2023; Kleven, Landais, and Leite-Mariante 2024), the blue line in panel A of Figure 3 shows that maternal earnings fall substantially following the birth of a child without Down syndrome. The red line in panel A, as well as panel B, indicates that this earnings decline is larger for mothers who give birth to a child with Down syndrome. Panels C and D indicate that both types of mothers experience a decline on the extensive margin of earnings, but there is less evidence of a differential effect on that margin. Despite the larger decline in maternal earnings for mothers who give birth to a child with Down syndrome, panels A and B of Figure 4 show that overall maternal income increases for mothers who give birth to a child with Down syndrome relative to those who give birth to a child without Down syndrome. Panels C and D show that this differential increase is essentially entirely driven by the sharp increase in the care allowance available to mothers who give birth to a child with Down syndrome.[21] Parental leave income, which typically is the main source of replacement income following childbirth in the context that we study, increases sharply after a birth among all mothers; however, the incremental impact among mothers of a child with Down syndrome is small (Appendix Figure A4, panels A and B). Similarly, the incremental impact of the birth of a child with Down syndrome on other, smaller components of income

[20] We can follow all parents in the no-testing for up to 14 years after the birth. The increased probability of living with the father persists – and indeed increases – over this time period, while the impact on the number of subsequent births slightly attenuates in the later years (Appendix Figure A5).

[21] Looking over the full 14 year horizon we can observe in this sample, the differential impact of a child with Down syndrome on maternal total income and on the care allowance remains, but the differential impact on maternal earnings attenuates in later years (Appendix Figure A6 and Appendix Figure A7).

is negligible (Appendix Figure A4, panels C through J).[22]

Magnitudes. Table 2 summarizes the estimates from these event study figures. For each outcome, the table reports the average prior to pregnancy (i.e. year -2), the estimated 5-year impact of a birth without Down syndrome, and the incremental 5-year impact of a birth with Down syndrome.

Panel A reports results for family relationships and subsequent children. Prior to the birth, about 50% of mothers are living with the subsequent father (column (1)); five years after the birth of a child without Down syndrome, this probability has risen by about 23 percentage points (column (2)). Interpreting this causally is tricky since there is an (expected) pre-trend of increasing probability of co-habiting with the eventual father of the child in the years prior to their birth (recall Figure 2, panel A). However, relative to mothers who give birth to a child without Down syndrome, mothers who give birth to a child with Down syndrome are 8.6 percentage points (standard error = 2.8) more likely to still be living with the father five years later (column (3)). In other words, the increase in the probability of parental co-habitation five years after birth is about 40% larger if the child has Down syndrome than if it does not; this represents the causal impact of a birth of a child with Down syndrome on couple stability.

Over this same 5-year post-birth period, mothers whose child does not have Down syndrome on average give birth to about 0.6 more children; the number of subsequent children is 0.15 (standard error = 0.03) – about 25% – higher for mothers who give birth to a child with Down syndrome.[23] As noted, this effect is most pronounced among mothers whose second child has Down syndrome: on average, after a second birth, mothers have 0.35 more children in the subsequent five years, but mothers whose second child has Down syndrome have an additional 0.27 (standard error = 0.05) subsequent children over the same time period. This represents a 77% increase in the number of subsequent children for this sub-population.

Panel B reports results for maternal economic outcomes.[24] For births without Down syndrome, maternal annual earnings fall on average by about $6,400 over the five years after birth, or about 45% relative to pre-birth earnings. However, for mothers who give birth to a

[22]For fathers, we find no differential impact of a child with Down syndrome relative to one without Down syndrome on labor market activity or income (Appendix Figure A8 and Appendix Figure A9) Indeed, consistent with the existing literature, we find that the birth of a child without Down syndrome also has little impact on any of these paternal outcomes.

[23]This effect is comparable in magnitude to the well-known impact on subsequent fertility of having first- and second-born children of the same gender. For example, Angrist and Evans (1998) find that women with two children of the same sex are seven percentage point more likely to have an additional child, corresponding to a 20% increase in the likelihood of having a subsequent child.

[24]Appendix Table A2 shows that for paternal economic outcomes, there is little impact of the birth of a child and little relative impact of the birth of a child with Down syndrome.

child with Down Syndrome, average maternal earnings in the five years after birth fall by an additional $2,060 (standard error = 590), which represents a 32% larger (in absolute value) decline. Some of this maternal earnings decline comes from an extensive margin decline in the probability of employment. For mothers who give birth to a child without Down syndrome, the annual likelihood of being employed falls on average by about 10 percentage points over the five years post childbirth (from 87% prior to birth).[25] For mothers who give birth to a child with Down syndrome, the annual likelihood of being employed falls on average by an additional 2.7 percentage points (standard error = 2.0) over the same time period.

Despite their $2,000 larger earnings decline, mothers who give birth to a child with Down syndrome have on average about $7,700 (standard error = 575) higher total annual income in the five years after giving birth relative to mothers who give birth to a child without Down syndrome. This almost entirely reflects the child care allowance.[26] As the child care allowance is intended to compensate families for additional care needs and expenses stemming from the special needs of the child, these large increases in total income may not represent higher disposable income for mothers who give birth to a child with Down syndrome.

Comparison to results under "prevalent testing." We report a parallel set of estimates for the prevalent-testing sample of births in 2006 or later. In this sample, 97% of births with Down syndrome are to parents who did not undergo invasive testing; only 3% of children with Down syndrome are born to parents who undergo invasive testing, learn that their child will have Down syndrome, and choose to retain the pregnancy.[27] Therefore, as in the no-testing sample, the vast majority of births with Down syndrome in this sample are still unexpected. However, we are now estimating the impact of a birth with Down syndrome on a non-random subset of parents. These are primarily parents who either choose not to undergo non-invasive prenatal screening – despite it likely being cheap and readily available – or parents who undergo non-invasive screening but then choose not to proceed to invasive testing (despite a non-invasive screening result suggesting a heightened probability of the presence of a chromosomal abnormality). This is likely a selected group of parents who either anticipate that they would keep a fetus with Down syndrome and therefore do

[25] These extensive and intensive margin estimates are similar to other estimates from Sweden (Kleven, Landais, and Leite-Mariante 2024; Sundberg 2024), although we note that we do not expect our estimates to be identical, as we do not restrict our analysis sample to firstborn children.

[26] Appendix Table A3 show the impacts on other components of income besides earnings and care allowance. The incremental impact of the birth of a child with Down syndrome on these other components is negligible.

[27] This rate is consistent with other estimates from the same setting that more than 95% of fetuses prenatally diagnosed with Down syndrome are aborted (Conner et al. 2012; Zhang 2020).

not acquire any information at all, or who place high enough a disutility on the risk of a miscarriage relative to the chance of having a child with Down syndrome to choose not to undergo subsequent invasive testing (Conner et al. 2025).

Table 3 summarizes the results. The first two columns repeat the results for the no-testing sample shown in Table 2, while the remaining columns report results for two other samples: the entire prevalent-testing sample (columns (3) and (4)), and women aged 34 or younger within the prevalent-testing sample (columns (5) and (6)); about one-half of the births with Down syndrome in the prevalent-testing sample are to women aged 34 and younger.[28] Differences between the results in the no-testing sample and the younger women in the prevalent-testing sample primarily reflect differences in the testing environment, while differences between the results from the full prevalent-testing sample and the no-testing sample may also reflect cross-sectional differences in impacts across women of different ages.

Despite the difference in the prenatal testing environment, our findings regarding the impact of having a child with Down syndrome relative to one without Down syndrome on the propensity of the mother and the father to live together and on subsequent births remain quite similar. Although the point estimates are smaller, we continue to estimate that mothers are more likely to live with the fathers after the birth of a child with Down syndrome relative to the birth of a child without Down syndrome, and similarly the number of subsequent births increases (again, primarily driven by cases in which the child with Down syndrome is the second birth).

Interestingly, however, impacts on maternal economic outcomes are now somewhat different. Whereas in the no-testing sample we found that having a child with Down syndrome (relative to having a child without Down syndrome) decreased annual maternal earnings by about $\$2,000$ per year on average over the five years post birth (standard error = 590), in the prevalent-testing sample we now find an opposite-signed effect (of a similar magnitude): the birth of a child with Down syndrome is estimated to *increase* maternal earnings by about $\$2,000$ (standard error = 841) relative to a birth of a child without Down syndrome. We also now find some evidence of an incremental increase on paternal earnings, whereas before there was no impact on paternal earnings. One possible hypothesis is that in the prevalent-testing context, selection yields a sample of families who feel, on average, better able to accommodate a child with Down syndrome, and therefore face less labor-market disruptions.

Parental Mental Health. In the prevalent-testing sample we are also able to estimate impacts on maternal and paternal mental health, as measured by prescription drugs fills for

[28] Appendix Figures A10 through A21 show the underlying event studies for the new analyses.

medication for anxiety or depression; these data are only available from July 2005 and after. Unlike our other outcomes, these data are available at the day level, and we are therefore able to look directly at 12-month segments relative to the exact date of birth; year -1 now indicates the 12 months prior to birth and year 0 now indicates the first 12 months of the child's life.

Figure 5 shows the results. For mothers, rates of depression and anxiety medication fall by about 3 percentage points in the year prior to birth ; this presumably reflects guidelines against use of some anti-depressants and anti-anxiety medications during pregnancy). Medication rates rise after birth; this likely reflects a combination of the return to pre-pregnancy medication as well as onset of post-partum depression. The incremental impact of having a child with Down syndrome is to increase maternal rates of medication for anxiety or depression by about 4 percentage points in the first 12 months after birth (about 40 percent relative to the pre-pregnancy mean for mothers of 0.093), but this incremental effect disappears after 12 months. This is suggestive of temporarily higher rates of post-partum depression or anxiety (or perhaps higher rates of diagnosis and treatment for these conditions) for mothers who give birth to a child with Down syndrome, but no longer-run difference.[29] For fathers there is no such pattern and if anything there is suggestive evidence of lower rates of medication five years after birth, although the difference is not statistically significant.

Subsequent testing. Finally, we examined how having a child with Down syndrome affects the propensity for invasive testing in subsequent pregnancies. The odds of having a child with Down syndrome are not increasing if a prior pregnancy involved a child with Down syndrome. Nevertheless, we find that having a child with Down syndrome substantially increases the probability of invasive testing for subsequent pregnancies. In the prevalent-testing period, the rate of invasive testing for a subsequent pregnancy rises by 17 percentage points if the mother had a prior birth with Down syndrome, off of a baseline of 3.6% for women whose prior births did not have Down syndrome.[30] We find even larger effects for the no-testing sample of women who gave birth at ages 34 or younger in 2005 or earlier. There, the subsequent invasive testing rate is 28 percentage points higher for a woman who had a prior birth with Down syndrome, off of a baseline of 0.7% for women whose prior births did not have Down syndrome.

[29] Another potential explanation for the short-run effect that we estimate is related to the fact that children with Down syndrome have physical characteristics that may render breastfeeding more challenging (Canadian Down Syndrome Society, n.d.). To the extent that mothers (or their physicians) are concerned that substances will pass into breast milk (Sachs et al. 2013), differences in breastfeeding rates may induce differences in the inclination to take mental health drugs during the first year post-partum.

[30] This estimate adjusts for age differences across mothers who give birth to children with and without Down syndrome. Conditional on age controls, other demographic controls have no impact.

It is not clear how to interpret the finding that having a Down syndrome child raises the likelihood for invasive testing in a subsequent pregnancy. It could represent a revealed preference measure indicating a parental preference to not have another child with Down syndrome; if so, the couple would terminate a pregnancy if the invasive test came back positive. Alternatively, it may reflect a demand for information, without any intent to terminate. Yet another interpretation is that this testing behavior stems from increased salience and/or differential recommendations from the healthcare providers to mothers with a prior pregnancy with Down syndrome.

Robustness. Appendix Tables A4 and A5 show that the results are largely unchanged when we undertake a series of robustness exercises in the no-testing and prevalent-testing samples, respectively. We present results for parental co-habitation, number of subsequent births, maternal earnings, and maternal total income. To facilitate comparison with our baseline estimates, the top row in each table repeats these estimates. Each subsequent row represents a single deviation from this baseline. The results remain largely unchanged across each of these alternative specifications.

First, we examine whether our results are affected by the higher mortality rate of children with Down syndrome. In the no-testing sample, for example, 6.39% of children with Down syndrome die within five years of birth, compared to 0.35% of births without Down syndrome.[31] This raises the possibility that some of the incremental impacts of having a child with Down syndrome – such as higher numbers of subsequent births – may reflect the impact of child mortality, rather than having a (living) child with Down syndrome. Row 2 of each table therefore presents results from samples that omit all children (with and without Down syndrome) who die within five years of childbirth. The fact that our results remain largely unchanged suggests that our baseline estimates reflect the incremental impacts of the much more common experience among families with Down children, namely, the presence of a live child with Down syndrome in the family.

Second, we examine the sensitivity of our results to our measurement of children with Down syndrome. In the baseline analysis, we code a child has having Down syndrome based on diagnosis codes in the medical birth records; this therefore requires that they are diagnosed at birth. However, a small share of children who are not diagnosed with Down syndrome at birth are diagnosed with the condition shortly after birth, either in connection with an inpatient diagnosis or a specialist outpatient visit; our baseline analysis classifies these children as not having Down syndrome. Row 3 therefore shows our results if we

[31] In the prevalent-testing sample, the corresponding numbers are 3.49% of births with Down syndrome and 0.21% of births without Down syndrome.

expand our definition of a child with Down syndrome to include children diagnosed at birth or within three months post-childbirth. This reclassification yields 6.79% more births with Down syndrome in the no-testing sample, and 12.89% more births with Down syndrome in the prevalent-testing sample (and equally fewer births without Down syndrome).

Third, we report results from a balanced panel, where we restrict the sample to the approximately 80% (65%) of births for whom we observe outcomes in the no-testing sample (prevalent-testing sample) throughout years -2 to +5. This allows us to identify the five-year effects off of the same sample, so that they are not contaminated by any potential heterogeneity in treatment effects and in the births that identify different relative years.

Finally, as shown in panel A of Figure 1, we see an unusual spike in births with Down syndrome in 2006. In the last row of Appendix Table A5, we therefore present estimates in which we drop all births in 2006. This restriction drops 12.25% of Down births and 7.28% of No-Down births.

5 Conclusion

Prenatal screening for Down syndrome is widespread, and the vast majority of prenatally diagnosed pregnancies are terminated (Conner et al. 2012). At the same time, survey evidence suggests that parents who do have a child with Down syndrome report positive outcomes and we have little direct empirical evidence of the impact on parents of having a child with Down syndrome.

This study begins to fill this gap. We use unique administrative data from Sweden that allow us to observe all children born from 1990 through 2018, with and without Down syndrome, and to trace parental outcomes both before and after the child's arrival. The early years of our data represent an environment with essentially no prenatal testing for mothers ages 34 and over, so that the birth of a child with Down syndrome was essentially random conditional on maternal age, while the more recent period features widespread prenatal screening and thus a selected set of parents who have a child with Down syndrome.

Our results on couple stability and subsequent fertility are at odds with the predicted effects of the arrival of a child with Down syndrome in a survey that we ran, among more than 150 scientists studying the economics of health and the economics of the family, in early 2025. To the extent that the survey results reflect a broader prior that the arrival of a child with Down syndrome would induce marital dissolution and reduce subsequent childbearing, our results offer a sharp counterpoint. Of course, these results are obtained in a setting where families are largely insured against any additional financial costs that arise from special needs of the child. Future research is needed to understand how the arrival of a child with Down

syndrome impacts families in settings with less insurance. Another important area for future work is to understand potential impacts on siblings (Currie et al. 2024).

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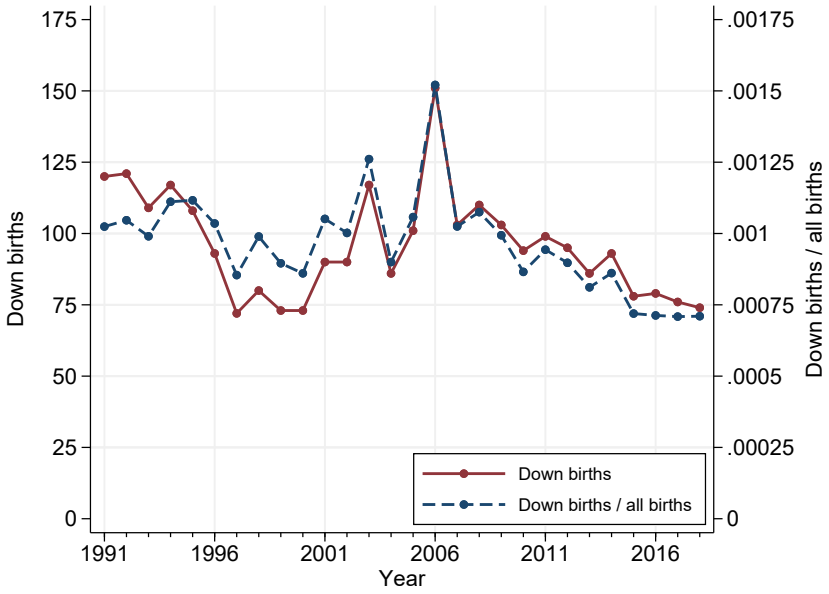
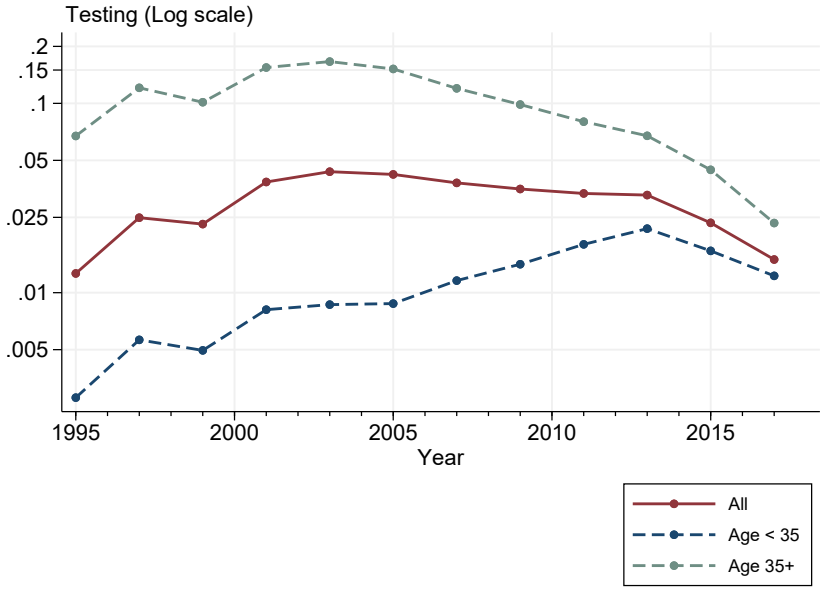
Figure 1: Trends in Births with Down syndrome and Invasive Testing

A. Births with Down syndrome

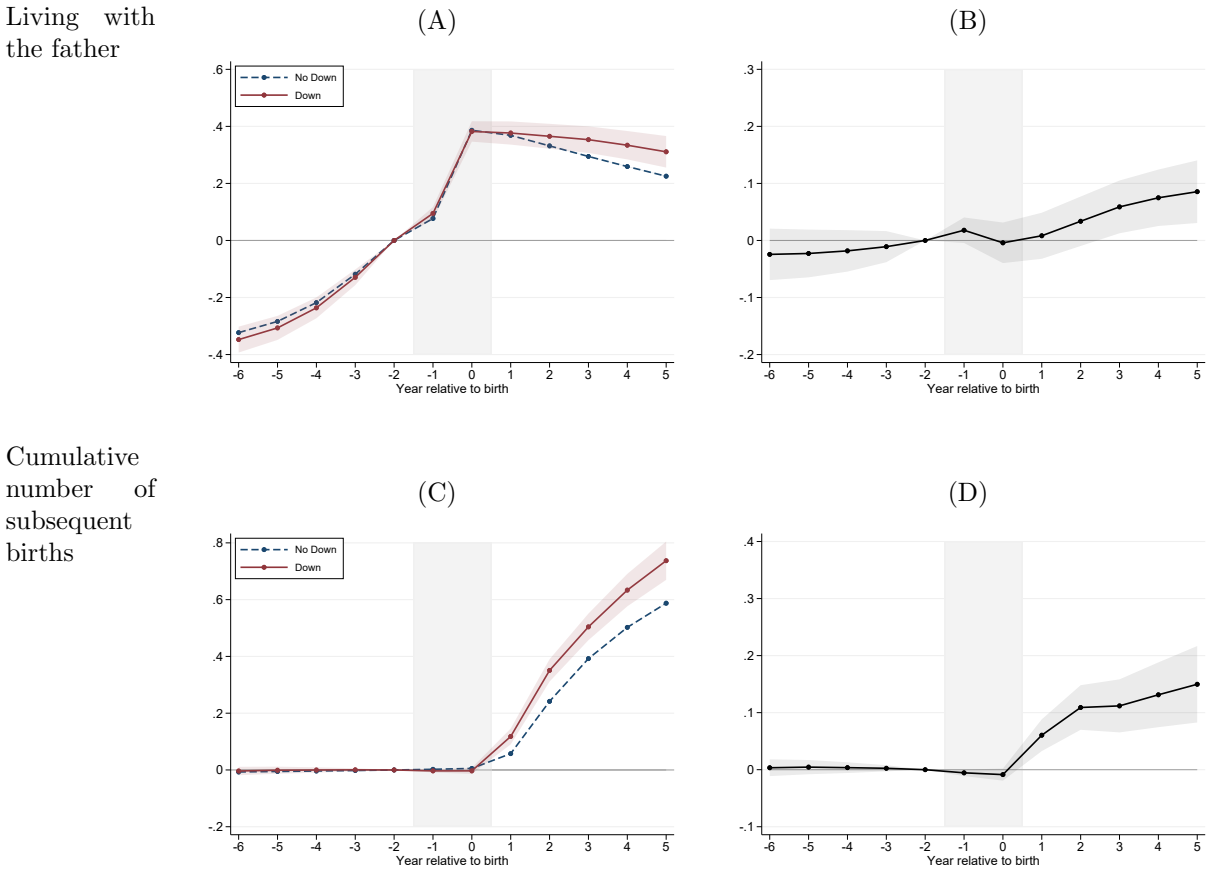


B. Invasive Testing Rates



Note: Panel A shows trends in the number and share of births with Down syndrome. Panel B shows the two-year average of an indicator for invasive testing by year (starting in 1995 when these data become available); invasive testing includes both amniocentesis and CVS testing. Panel A contains 2,805 births with Down syndrome and 2,909,021 births without Down syndrome; Panel B (restricted to births in 1995 and later) contains 2,347,221 total births, of which 1,825,392 are births to mothers ages 34 and younger, and 521,829 are births to mothers ages 35 and older.

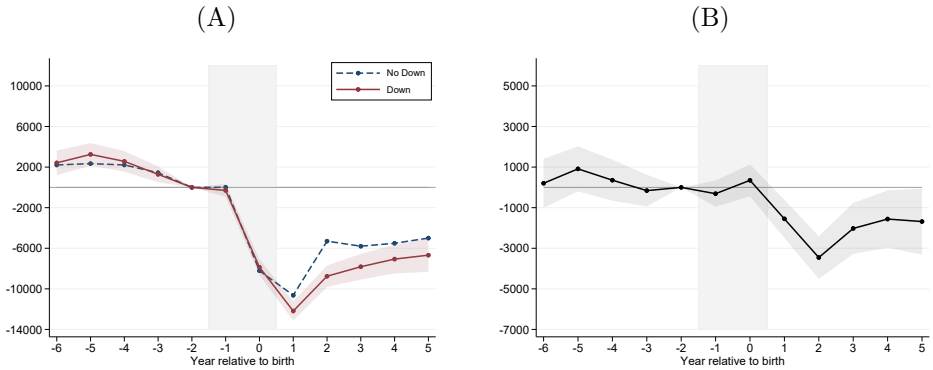
Figure 2: Living with Father and Subsequent Births (No-Testing Sample)



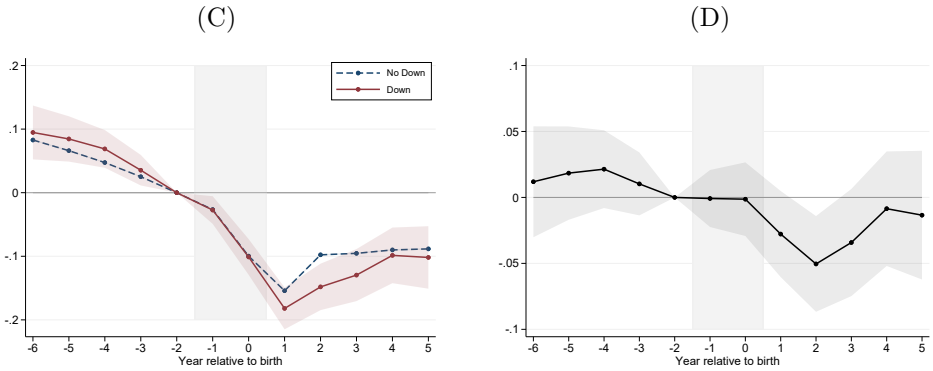
Note: Left column shows estimates of γ_r^j from equation (3) for births with and without Down syndrome separately; right column shows estimates of θ_r from equation (4) indicating the incremental impact of having a birth with Down syndrome, with 95% confidence intervals (constructed using standard errors clustered at the mother level) shaded around the estimates. Outcomes are normalized to 0 in year -2. Year 0 indicates the year of birth; on average the mother is pregnant for about 4.5 months of year -1 and year 0. The sample is restricted to the No-Testing sample, i.e. births in 2005 and earlier born to mothers ages 34 and younger, and consists of $N = 928$ births with Down syndrome and $N = 1,275,465$ births without Down syndrome.

Figure 3: Maternal Labor Market Outcomes (No-Testing Sample)

Earnings



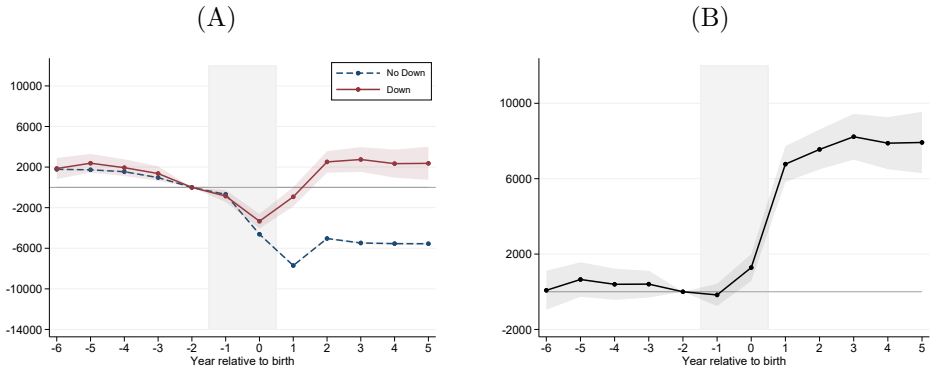
Any earnings



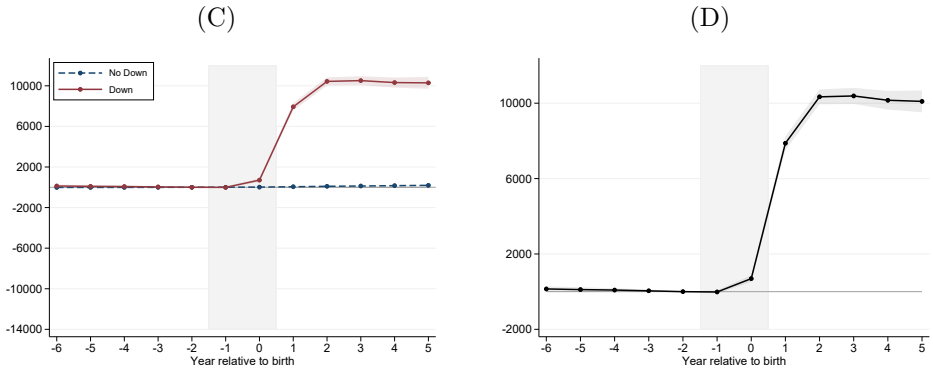
Note: See notes to Figure 2. All income levels are measured in 2018 USD.

Figure 4: Maternal Income (No-Testing Sample)

Total income

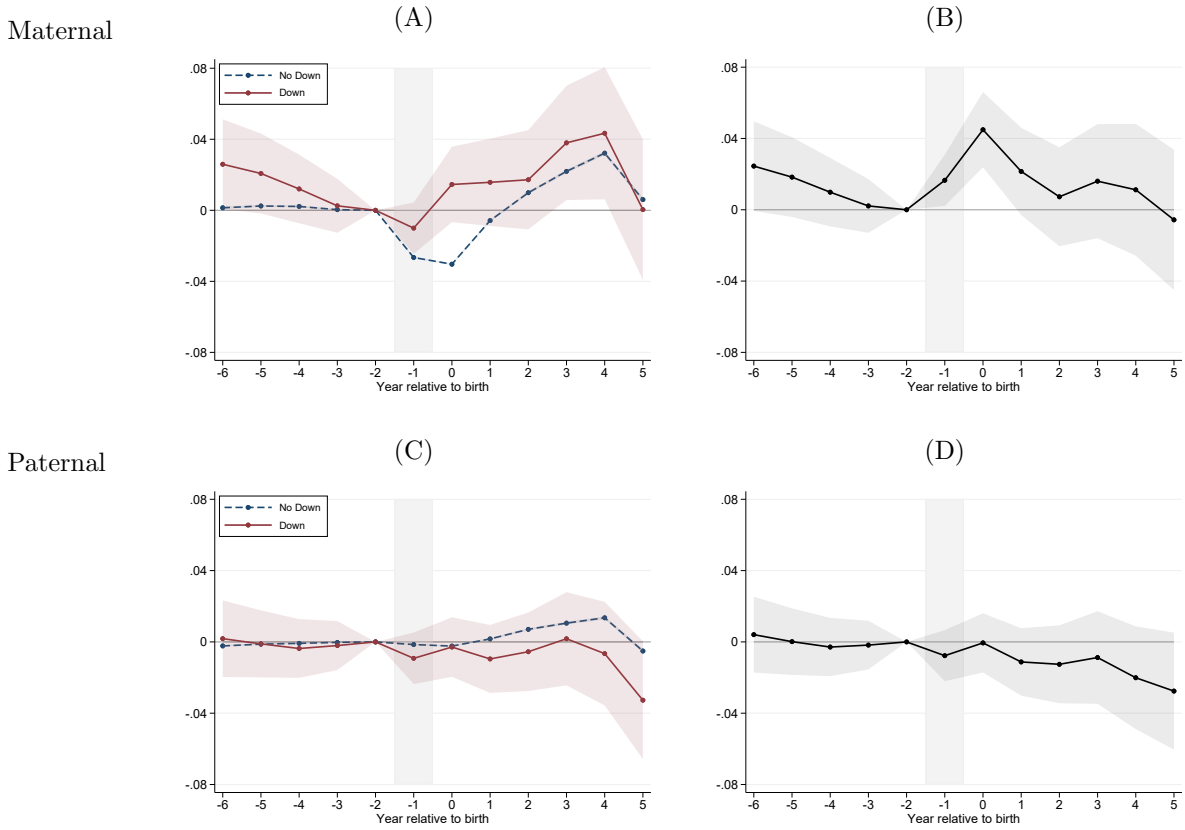


Care allowance



Note: See notes to Figure 2. All income levels are measured in 2018 USD.

Figure 5: Parental Drug Fills for Anxiety/Depression (Prevalent-Testing Sample)



Note: Left column shows estimates of γ_r^j from equation (3) for births with and without Down syndrome separately; right column shows estimates of θ_r from equation (4) indicating the incremental impact of having a birth with Down syndrome, with 95% confidence intervals (constructed using standard errors clustered at the parent level) shaded around the estimates. The outcome is an indicator for filling any drug in the given year for anxiety or depression (ATC codes starting with "N05" or "N06", respectively). Unlike for our other outcomes which are all measured over the calendar year relative to birth, here because we have data at the daily level, relative years since birth are defined using both the calendar year and month of birth, such that "year 0" is the set of 12 months following (and including) the child's month of birth, so that the pregnancy occurs entirely in "year -1". Once again, we normalize outcomes to 0 in year -2. The sample is restricted to the Prevalent-Testing sample, i.e. births in 2006 and later. For mothers (Panels A, B), the sample consists of $N = 1,241$ births with Down syndrome and $N = 1,368,623$ births without Down syndrome; for fathers (Panels C, D), the sample consists of $N = 1,232$ births with Down syndrome and $N = 1,359,233$ births without Down syndrome. The average probability of filling a drug for anxiety or depression in year -2 is 0.093 for mothers and 0.060 for fathers.

Table 1: Maternal Descriptive Statistics Across Samples

	Panel A: No-Testing Sample				Panel B: Prevalent-Testing Sample			
	Down	No Down*	Difference		Down	No Down*	Difference	
Maternal age in birth year	29.36	28.23	1.14	(0.14)	33.98	30.93	3.05	(0.16)
Birth parity								
First-born	0.40	0.42	-0.02	(0.02)	0.32	0.35	-0.03	(0.01)
Second-born	0.39	0.39	0.01	(0.02)	0.39	0.38	0.00	(0.01)
Third-born and higher	0.21	0.19	0.01	(0.02)	0.30	0.27	0.03	(0.01)
Maternal characteristics two years prior to birth year								
Income and earnings								
Earnings (thousands of 2018 USD)	14.72	14.93	-0.21	(0.45)	19.41	23.28	-3.88	(0.52)
Any earnings	0.86	0.87	-0.01	(0.01)	0.81	0.86	-0.05	(0.01)
Total income (thousands of 2018 USD)	19.09	19.49	-0.40	(0.41)	23.52	27.84	-4.32	(0.54)
Living together	0.54	0.54	0.00	(0.02)	0.66	0.66	0.00	(0.01)
Marital status								
Never married	0.61	0.62	-0.01	(0.02)	0.48	0.55	-0.07	(0.02)
Married	0.35	0.35	0.01	(0.02)	0.45	0.39	0.06	(0.02)
Divorced	0.04	0.03	0.01	(0.01)	0.07	0.06	0.01	(0.01)
Education								
No college	0.66	0.65	0.01	(0.02)	0.47	0.43	0.04	(0.02)
Some college	0.15	0.16	-0.01	(0.01)	0.14	0.14	0.00	(0.01)
Full college	0.17	0.17	0.00	(0.01)	0.36	0.41	-0.05	(0.01)
F-stat			0.39				7.97	
(Prob $\geq$ F)			(0.95)				(0.00)	
Number of births	928	1,275,465			1,241	1,368,623		

Notes: Table reports maternal summary statistics for the samples of births with and without Down syndrome. All maternal statistics other than age are reported for two years prior to the year of birth (relative year -2). Panel A is restricted to the No-Testing sample, i.e. births in 2005 and earlier born to mothers ages 34 and younger, and Panel B is restricted to the Prevalent-Testing sample, i.e. births in 2006 and later. In each panel, we report mean characteristics for births with and without Down syndrome respectively, and the "Difference" column reports the estimate and standard error of β from the bivariate regression $Y_i = \alpha + \beta \text{Down}_i + \epsilon_i$, where Y_i is the characteristic given in the row title and Down_i is an indicator for a birth with Down syndrome. The final two rows present the F-statistic and p-value from the multivariate regression $\text{Down}_i = \alpha + \beta \boldsymbol{X}_i + \epsilon$, where $\boldsymbol{X}_i$ is the vector of maternal characteristics (i.e. birth parity plus all maternal characteristics two years prior to the birth year). Standard errors are clustered at the mother level in all regressions. Maternal age and birth parity are available for all births; all other maternal characteristics, because they are measured in relative year -2, are only available for 81% of births in Panel A and 95% of births in Panel B. In addition, 2.6% of births are missing education.

* In all rows below "Maternal age", summary statistics for the sample without Down syndrome are reweighted to match the maternal age distribution of the sample with Down syndrome, and these same weights are applied to the regressions.

Table 2: Average Birth Effects (No-Testing Sample)

	Yr -2 mean	Yr 5 No-Down effect	Yr 5 incremental Down effect
	(1)	(2)	(3)
A. Relationships and Subsequent Births*			
Living with the father	0.507	0.225	0.086
		(0.001)	(0.028)
Subsequent births: all orders	0	0.587	0.150
		(0.001)	(0.034)
Subsequent births: first-born	0	0.824	0.140
		(0.001)	(0.050)
Subsequent births: second-born	0	0.345	0.265
		(0.001)	(0.053)
Subsequent births: third+	0	0.360	0.020
		(0.003)	(0.087)
B. Maternal Economic Outcomes (2018 USD)+			
Earnings	14,133	-6,447	-2,055
		(17)	(590)
Any earnings	0.867	-0.105	-0.027
		(0.001)	(0.018)
Total income	18,611	-5,864	7,671
		(44)	(575)
Care allowance	41	126	9,771
		(2)	(206)

Notes: Column (1) reports mean outcomes in relative year -2. Column (2) reports $\gamma_r^{No\text{-}Down}$ from equation (3) or (1) for births without Down syndrome and column (3) reports θ_r from equation (4) or (2). Standard errors (clustered at the mother level) are reported in parentheses below each estimate. The sample is restricted to the No-Testing sample, i.e. births in 2005 and earlier born to mothers ages 34 and younger, and consists of $N = 928$ births with Down syndrome and $N = 1,275,465$ births without Down syndrome. The sample of first births consists of $N = 367$ births with Down syndrome and $N = 593,279$ births without; the sample of second births consists of $N = 371$ births with Down syndrome and $N = 470,663$ births without; and the sample of third and higher order births consists of $N = 190$ births with Down syndrome and $N = 211,523$ births without.

*The reported "Yr 5 effect" is the estimate in relative year 5 (i.e. $\gamma_5^{No\text{-}Down}$ in column (2) and θ_5 in column (3)).
+The reported "Yr 5 effect" is the average effect over relative years 1-5 (i.e. the average of γ_1^{NoDown} through $\gamma_5^{No\text{-}Down}$ in column (2) and the average of θ_1 through θ_5 in column (3)).

Table 3: Average Birth Effects Across Samples

	No-Testing Sample		Prevalent-Testing Sample		Prevalent-Testing, Age $\leq$ 34 Sample	
	Yr -2 mean	Yr 5 incremental Down effect	Yr -2 mean	Yr 5 incremental Down effect	Yr -2 mean	Yr 5 incremental Down effect
	(1)	(2)	(3)	(4)	(5)	(6)
A. Relationships and Subsequent Births*						
Living with the father	0.507	0.086 (0.028)	0.622	0.060 (0.024)	0.590	0.037 (0.040)
Subsequent births: all orders	0	0.150 (0.034)	0	0.051 (0.025)	0	0.112 (0.045)
Subsequent births: first-born	0	0.140 (0.050)	0	0.006 (0.041)	0	0.049 (0.059)
Subsequent births: second-born	0	0.265 (0.053)	0	0.223 (0.039)	0	0.188 (0.072)
Subsequent births: third+	0	0.020 (0.087)	0	0.057 (0.051)	0	0.312 (0.160)
B. Maternal Economic Outcomes (2018 USD)+						
Earnings	14,133	-2,055 (590)	20,907	2,268 (841)	19,106	1,946 (1,045)
Any earnings	0.867	-0.027 (0.018)	0.854	0.048 (0.018)	0.849	0.014 (0.029)
Total income	18,611	7,671 (575)	25,157	12,586 (884)	23,107	12,078 (1,130)
Care allowance	41	9,771 (206)	55	9,895 (170)	31	9,962 (266)
C. Paternal Economic Outcomes (2018 USD)+						
Earnings	25,102	-62 (964)	34,848	1,154 (1,262)	32,580	3,066 (1,295)
Any earnings	0.909	-0.010 (0.013)	0.912	0.028 (0.013)	0.910	0.023 (0.018)
Total income	27,266	1,328 (922)	38,001	3,393 (1,379)	35,282	5,316 (1,380)
Care allowance	4	606 (80)	10	1,039 (103)	7	948 (132)

Notes: For each sample, table reports mean outcomes in relative year -2 along with θ_r from equation (4) or (2). Columns (1)-(2) contain results for the No-Testing sample, i.e. births in 2005 and earlier born to mothers ages 34 and younger; columns (3)-(4) contain results for the Prevalent-Testing sample, i.e. births in 2006 and later; and columns (5)-(6) contain results for the Prevalent-Testing sample, further limited to births born to mothers ages 34 and younger. Standard errors clustered at the parent level are reported in parentheses below each estimate. The sample in columns (1)-(2) contains $N = 928$ births with Down syndrome and $N = 1,275,465$ births without Down syndrome for mothers, and $N = 924$ births with Down syndrome and $N = 1,266,684$ births without Down syndrome for fathers; in columns (3)-(4) contains $N = 1,241$ births with Down syndrome and $N = 1,368,623$ births without Down syndrome for mothers and $N = 1,232$ births with Down syndrome and $N = 1,359,233$ births without Down syndrome for fathers; and in columns (5)-(6) contains $N = 644$ births with Down syndrome and $N = 1,034,709$ births without Down syndrome for mothers and $N = 638$ births with Down syndrome and $N = 1,026,109$ births without Down syndrome for fathers.

*The reported "Yr 5 Incremental Down effect" is the estimate in relative year 5 (i.e. θ_5).

+The reported 'Yr 5 Incremental Down effect" is the average effect over relative years 1-5 (i.e. the average of θ_1 through θ_5).

Online Appendix

A Expert Survey

We designed and ran a survey of economists to determine their priors on the effect of an unexpected birth of a child with Down syndrome (relative to the birth of a child with no chromosomal abnormalities) on family structure, subsequent childbearing, and maternal labor market outcomes.

The survey was sent to NBER affiliates in the Economics of Health and Children and Families programs in the first few months of 2025. Anonymous survey responses were collected with Stanford and MIT IRB approval. We sent a total of 367 surveys and received 164 responses.

Design. Our survey first asked respondents to share their professional role (from the list "faculty or post-doc", "researcher outside of academia", and "other") and their gender. We then asked three key questions in multiple-choice format (each with three choices). First, we elicited predictions about whether unexpectedly having a child with Down syndrome increases, decreases, or has no differential effect on a couple's likelihood of remaining together within five years, compared to if the same couple had a child without chromosomal abnormalities. Next, we asked whether unexpectedly having a child with Down syndrome increases, decreases, or leaves unchanged the number of subsequent children the mother gives birth to within the next five years, compared to if the same mother had a child without chromosomal abnormalities. Finally, we provided the information that a large body of research across many countries has documented that the (first) birth of a child decreases maternal labor market earnings, and we asked whether unexpectedly having a child with Down syndrome would lead to an even larger decline, a smaller decline, or a roughly similar decline.

Analysis Sample. Of the 164 responses that we received, we dropped 9 responses for which the three key questions were left unanswered. Our analysis sample contains the remaining 155 responses (of which one left blank the question on maternal earnings).

Summary statistics. In our analysis sample, 97% of respondents identified as faculty or post-docs, 1% identified as "other" (further described most commonly as "emeritus faculty" or "retired faculty"), and the remaining 2% as "researcher outside of academia." Among the 134 respondents who reported their gender, 66% are male and 34% female.

Results. Appendix Figures A22 and A23 summarize the responses to our survey for the full sample of respondents and separately by gender, respectively.

B Variable Definitions

Chromosomal abnormalities. We use the diagnosis codes in the Medical Birth Records (MBR), which capture diagnoses recorded at birth. In the beginning of our study period, the data records ICD-9 codes, and in subsequent years the data records ICD-10 codes (different regions switch coding at slightly different times).

We code a child as having Down syndrome if any of the child's diagnosis codes in the MBR begins with "Q90" (ICD-10) or begins with "7580," "758A," or "758.0" (ICD-9). We code a child as having a different chromosomal abnormality if any of the child's diagnosis codes begins with "Q9" (ICD-10) or begins with "758" or "72H" (ICD-9), but the child's diagnosis codes do *not* indicate Down syndrome.

We code a child as having no chromosomal abnormality otherwise.

Maternal age at birth. We observe maternal year of birth in the data from Statistics Sweden, and the child's date of birth in the birth records. We define maternal age at birth as the difference between the child's year of birth and the mother's year of birth.

Mother living with the father. Our outcome variable for whether the mother is living with the father is defined in terms of co-residence (rather than marital status, although couples who are married often live together). Co-residence information comes from the LISA panel from 1991 through 1999, and from the Swedish Population Register thereafter.

For the years 1991-2010, our data includes information about a woman's co-residing partner, defined as follows: (i) if she is married and lives at the same address as her spouse, then her spouse is the co-residing partner; (ii) if she is not married but lives at the same address as a man with whom she has at least one joint child, then this man is the co-residing partner; and (iii) if she is in a registered same-sex partnership (relevant in Sweden prior to 2009, when same-sex marriage was legalized), then the same-sex partner is the co-residing partner. For the years 2011 through 2019 we are able to also capture (iv) unmarried co-residing (i.e., cohabiting) partners who do not have any joint child.

We define an indicator for whether the mother is living together with the father of the child that takes the value of one if the mother is co-residing (as defined above) with the biological father.

We separately identify marital status using the civil status codes provided directly in the 1990-2019 LISA records.

Invasive testing. For births in 1995 and later, the MBR data contain indicators for whether the mother of each birth underwent either amniocentesis or chorionic villus sampling. We define our "invasive testing" indicator to take the value 1 if the mother underwent either of these tests and 0 otherwise.

Birth parity. We obtain information about birth parity directly from the Swedish Population Register.

Maternal (or paternal) total income. Total income is measured annually at the individual level and defined as the sum of the following components, all of which are obtained from the 1990-2019 LISA panel and converted from SEK to 2018 USD using exchange rates and inflation rates published by Sveriges Riksbank and Statistics Sweden (Sveriges Riksbank 2025 and Statistics Sweden 2025, respectively):

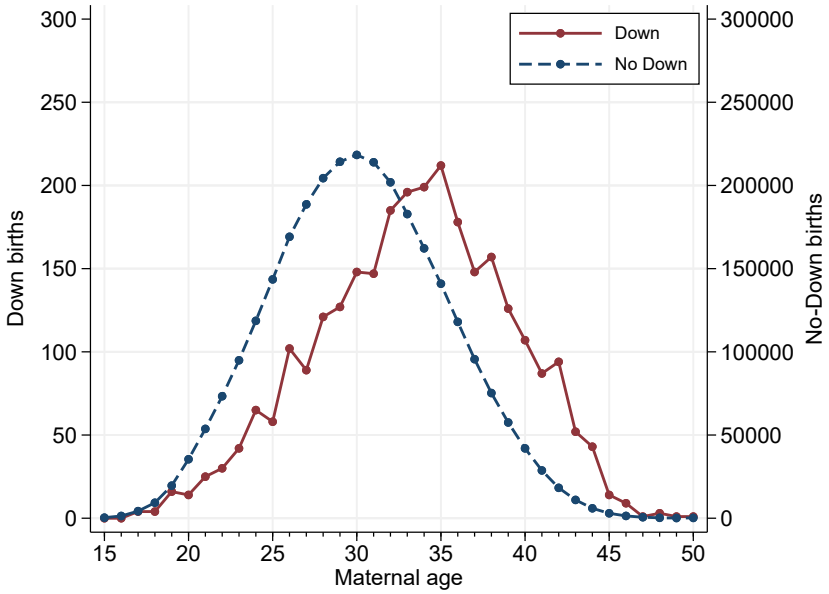
- **Work income:** We construct this measure as the sum of individual income from employment and individual income from self-employment.
- **Unemployment insurance:** We construct this measure as the sum of the two components of income provided during unemployment: the component due to individual unemployment and the component given via labor market policy measures: unemployment insurance payouts and transfers to unemployed individuals in programs aimed at enhancing their employability.
- **Parental leave:** We directly observe the amount of parental leave income received by each parent in the LISA panel.
- **Study income:** We directly observe transfers made to individuals who are studying in the LISA panel.
- **Capital income:** We directly observe income from capital in the LISA panel.
- **Care allowance:** Prior to 2019, parents of children with a disability that required special supervision and care for a period of at least six months were eligible for a transfer entitled *Vårdbidrag* until June of the year the child turns 19. Only one parent could apply for, and be awarded, the care allowance. However, upon award, the couple could choose to have the Social Insurance Agency pay a portion of the payment to the mother and a portion to the father. In the LISA data, we observe the individual amounts of Vårdbidrag paid to each parent, by calendar year, which we use as our outcome. In 2019, the last year of our data, parents could no longer apply for Vårdbidrag, but instead for two new transfer programs servicing parents of children with special needs, entitled *Omvårdnadsbidrag* and *Merkostnadsbidrag*. The eligibility rules changed, and now both parents could apply for, and be awarded, such transfers. In the LISA data, we observe the individual amounts of Omvårdnadsbidrag and Merkostnadsbidrag in 2019. Some parents who had been awarded Vårdbidrag prior to 2019 also kept these transfers in 2019. Thus, in 2019 we define care allowance as the sum of Vårdbidrag, Omvårdnadsbidrag, and Merkostnadsbidrag.[32]
- **Other taxable work-related income:** While parental leave is the most important work-related benefit for many of the families we study, there are also other taxable benefits that are linked to employment or self-employment, such as compensation for temporary sick leave, which we include in this "other" category. In addition, this category includes income from "passive ownership."

[32] See Inspektionen för Socialförsäkringen 2021 for more information about the care allowance and reform.

Maternal (or paternal) prescription drug fills for anxiety or depression. The National Board of Health and Welfare provides exact drug fill dates (day, month, year). We construct indicators that take the value 1 if the mother (father) filled any drug for anxiety or depression in various 12 months periods defined relative to the month and year of birth. We define anxiety and depression drugs as those with ATC codes whose first three digits are "N05" and "N06," respectively.

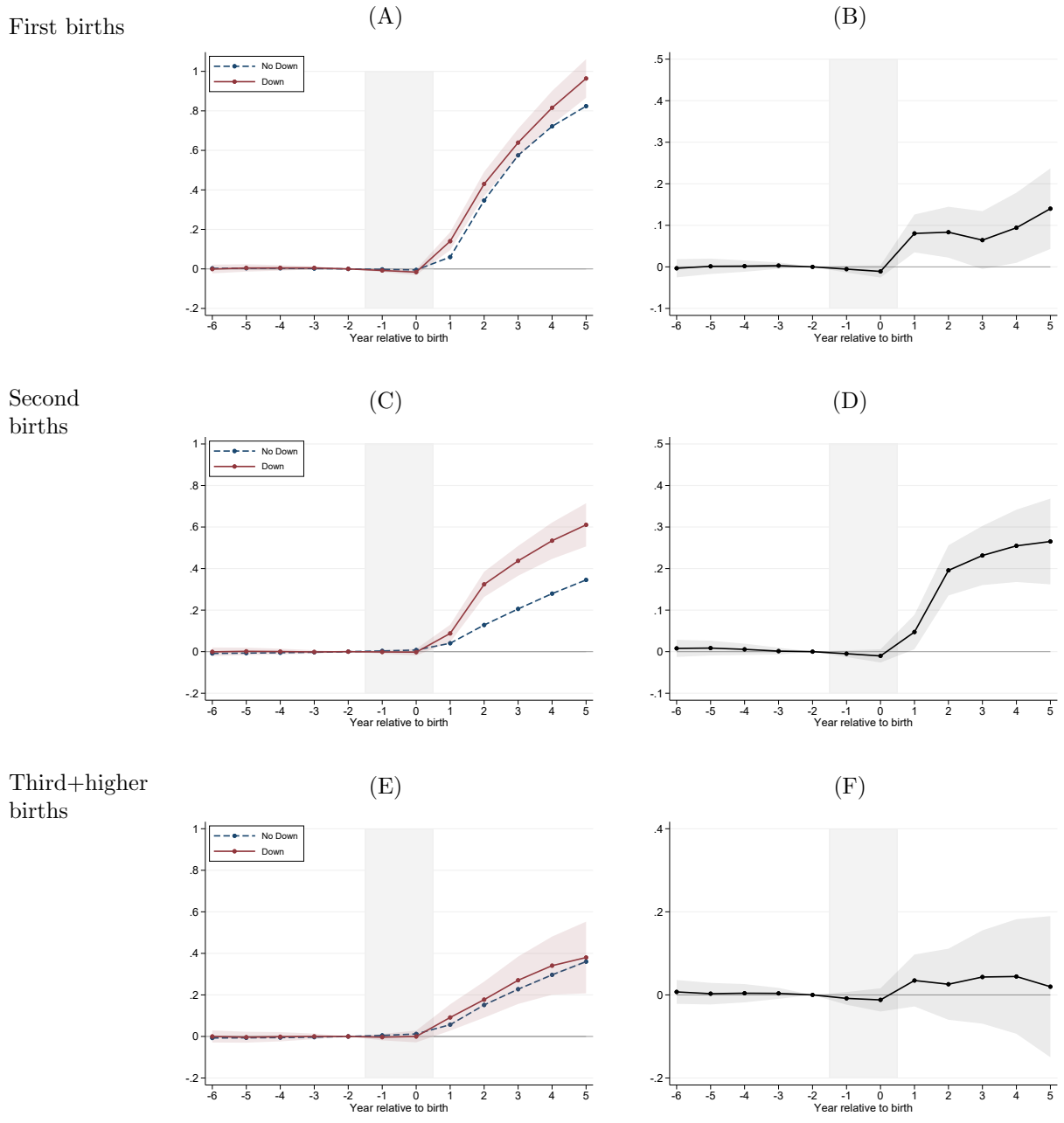
Child mortality. In our data from Statistics Sweden, we observe the date of death for any individual who has an individual identifier (i.e., who was ever assigned a social security number in Sweden) and who died through the end of 2019. Using the combination of birth and death dates, we define indicators for whether the child died within five years of birth.

Appendix Figure A1: Births with and without Down syndrome by Maternal Age



Note: Figure shows the number of births with and without Down syndrome by maternal age for our baseline sample, which consists of 2,805 births with Down syndrome and 2,909,021 births without Down syndrome. Ages below 15 and above 50 are binned at 15 and 50, respectively.

Appendix Figure A2: Cumulative Number of Subsequent Births, By Birth Order (No-Testing Sample)

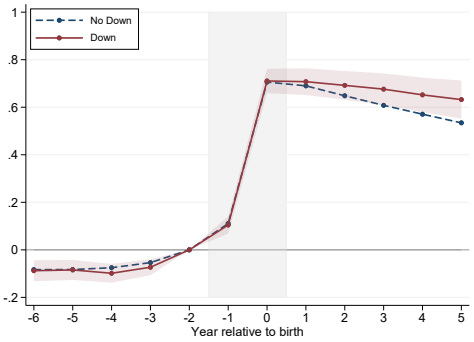


Note: Left column shows estimates of γ_τ^j from equation (1) for births with and without Down syndrome separately; right column shows estimates of θ_τ from equation (2) indicating the incremental impact of having a birth with Down syndrome, with 95% confidence intervals (constructed using standard errors clustered at the mother level) shaded around the estimates. Outcomes are normalized to 0 in year -2. Year 0 indicates the year of birth; on average the mother is pregnant for about 4.5 months of year -1 and year 0. The sample is restricted to the No-Testing sample, i.e. births in 2005 and earlier born to mothers ages 34 and younger. The sample of first births consists of $N = 367$ births with Down syndrome and $N = 593,279$ births without Down syndrome; the sample of second births consists of $N = 371$ births with Down syndrome and $N = 470,663$ births without Down syndrome; and the sample of third and higher order births consists of $N = 190$ births with Down syndrome and $N = 211,523$ births without Down syndrome.

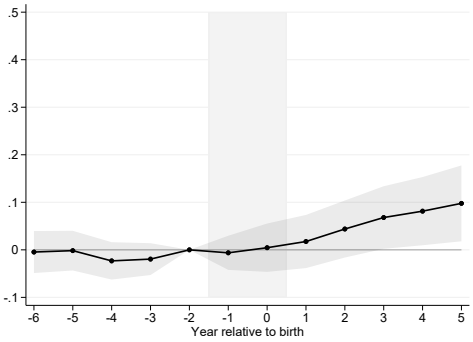
Appendix Figure A3: Living with the Father, By Birth Order (No-Testing Sample)

First births

(A)

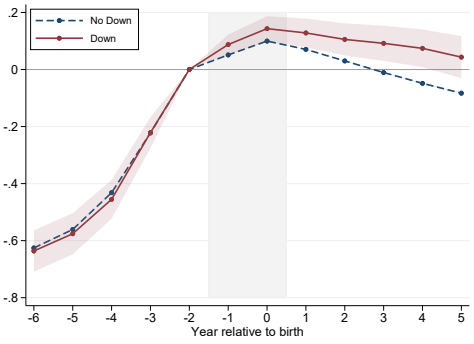


(B)

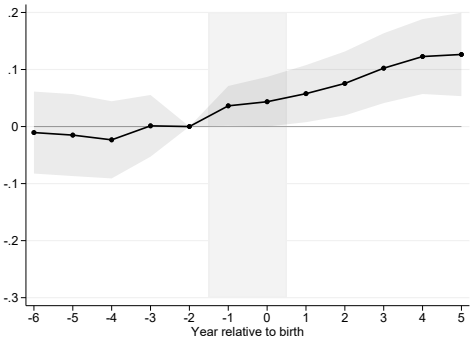


Second births

(C)

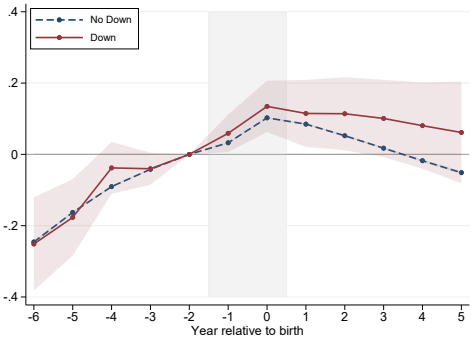


(D)

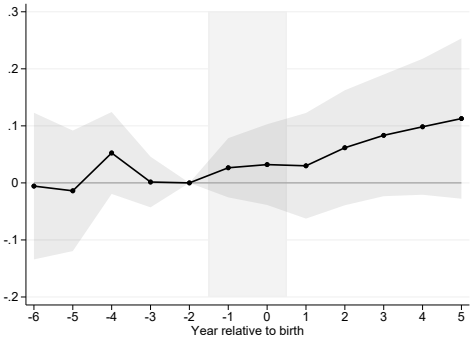


Third+higher births

(E)

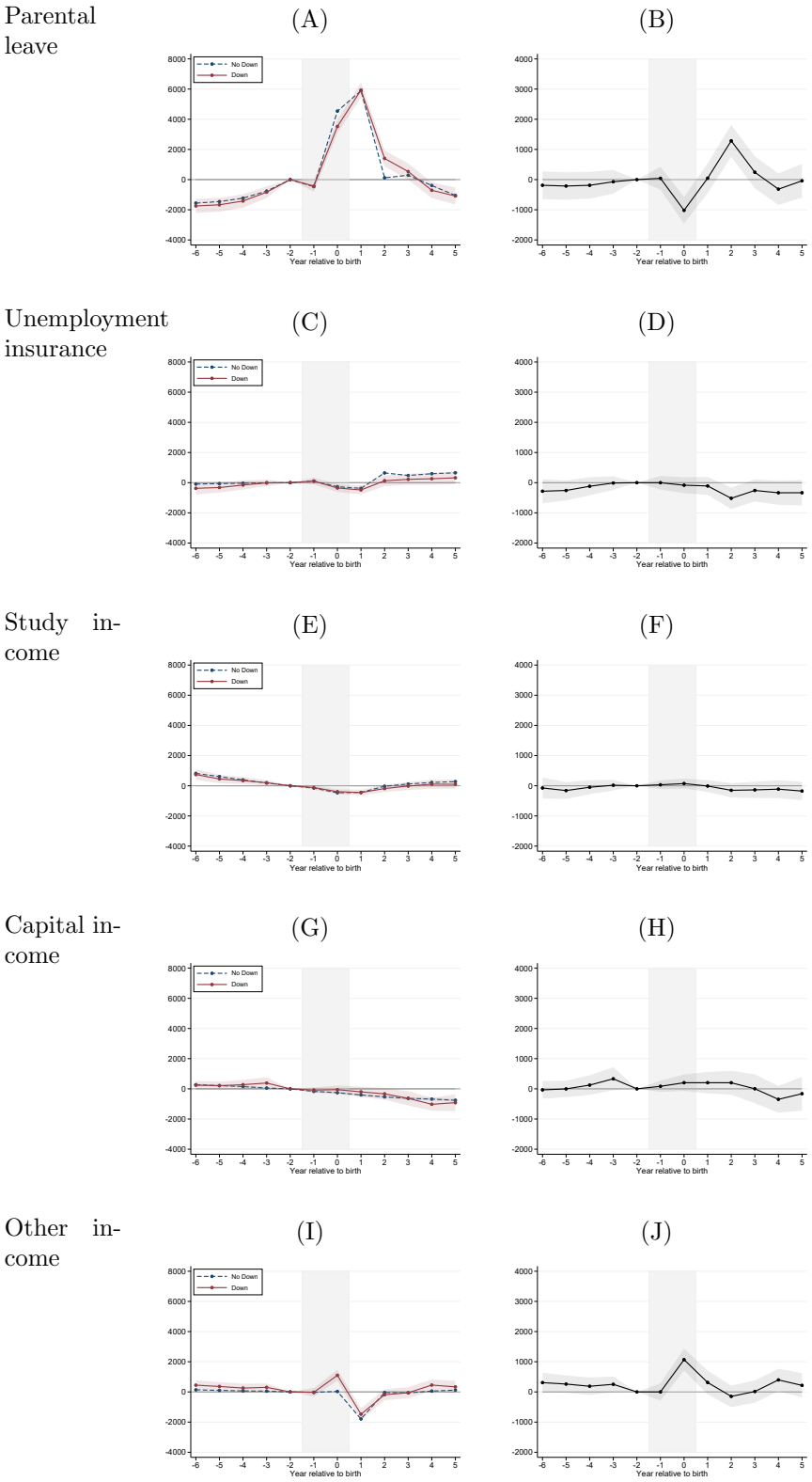


(F)



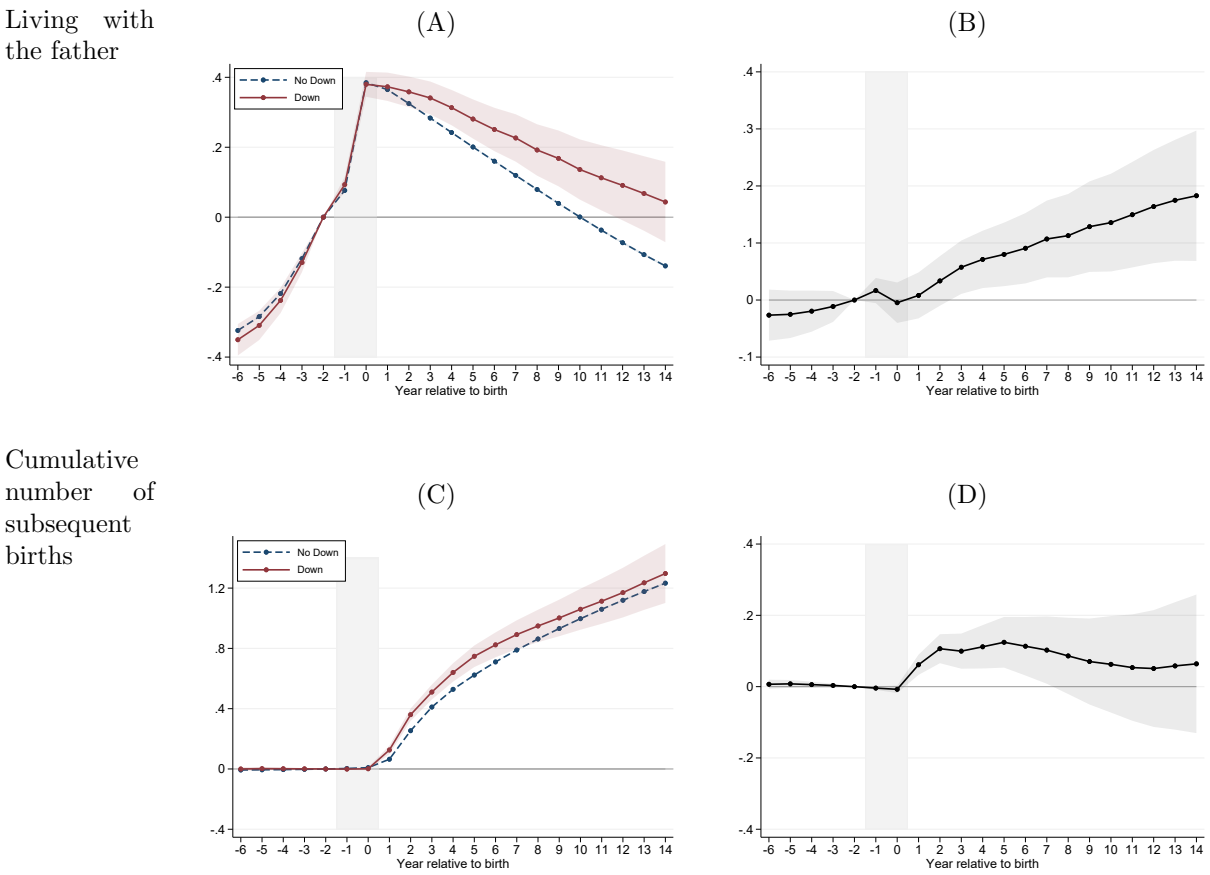
Note: See notes to Appendix Figure A2.

Appendix Figure A4: Other Maternal Income Components (No-Testing Sample)



Note: See notes to Figure 2. All income levels are measured in 2018 USD.

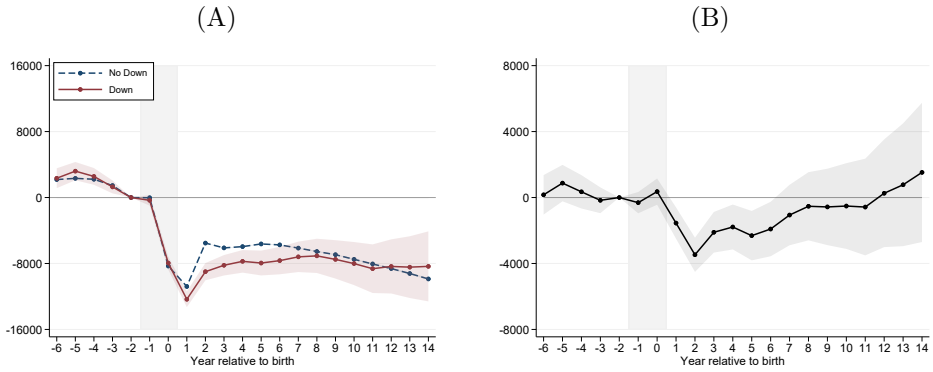
Appendix Figure A5: Living with Father and Subsequent Births, Longer-run (No-Testing Sample)



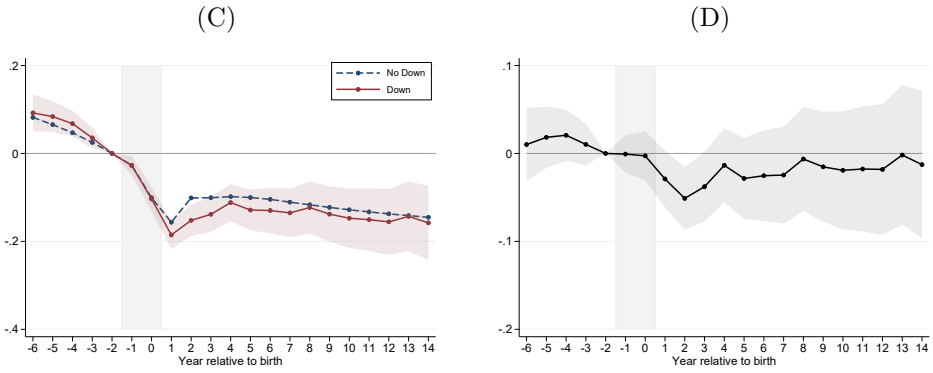
Note: See notes to Figure 2. This figure shows the same analyses but now expanding the sample window to include 14 years post-birth.

Appendix Figure A6: Maternal Labor Market Outcomes, Longer-run (No-Testing Sample)

Earnings



Any earnings

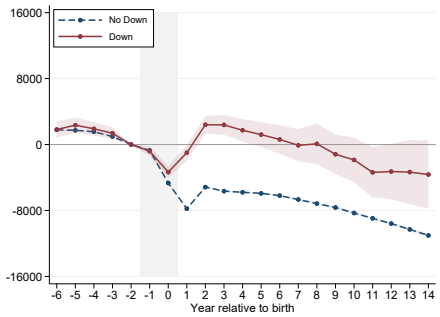


Note: See notes to Figure 3. This figure shows the same analyses but now expanding the sample window to include 14 years post-birth.

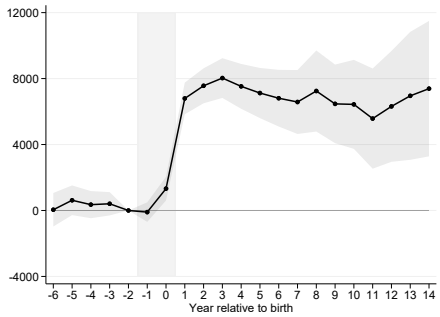
Appendix Figure A7: Maternal Income, Longer Run (No-Testing Sample)

Total income

(A)

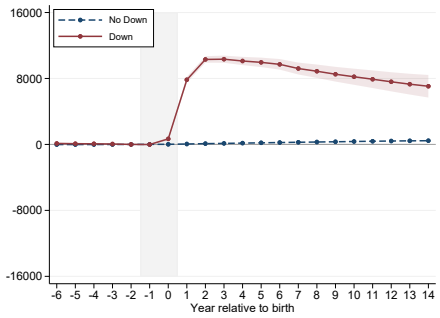


(B)

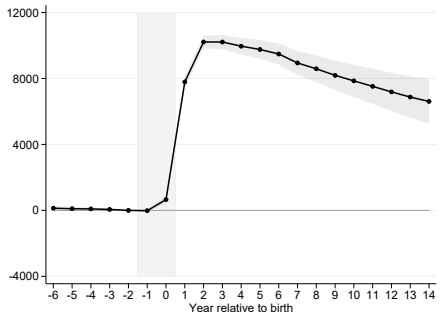


Care allowance

(C)

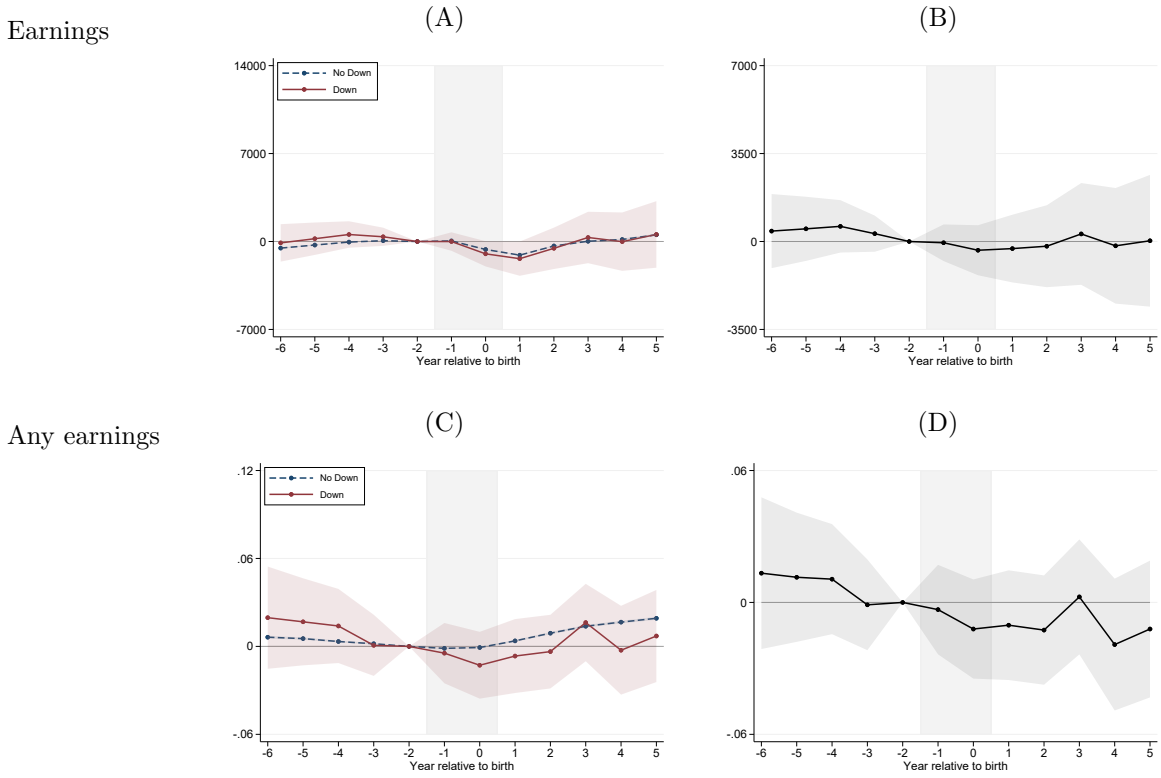


(D)



Note: See notes to Figure 4. This figure shows the same analyses but now expanding the sample window to include 14 years post-birth.

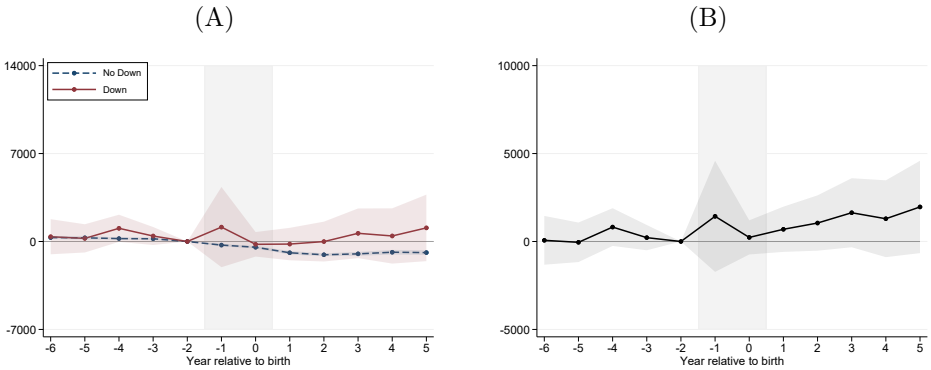
Appendix Figure A8: Paternal Labor Market Outcomes (No-Testing Sample)



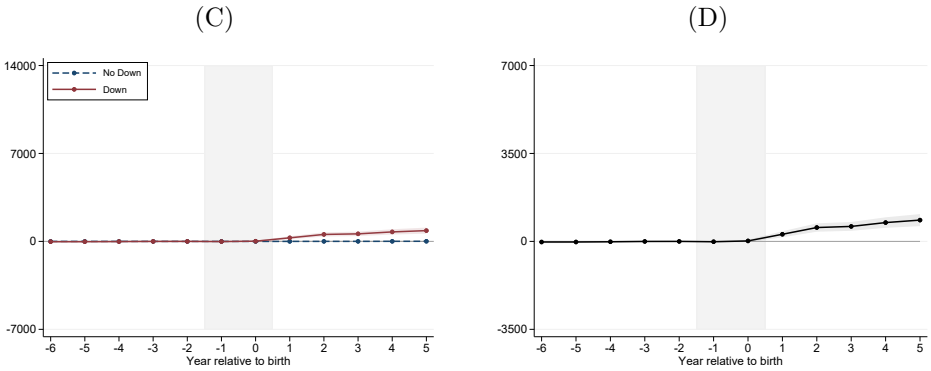
Note: See notes to Figure 3. The sample is restricted to the No-Testing sample, i.e. births in 2005 and earlier born to mothers ages 34 and younger, and consists of $N = 924$ births with Down syndrome and $N = 1,266,684$ births without Down syndrome.

Appendix Figure A9: Paternal Income (No-Testing Sample)

Total income

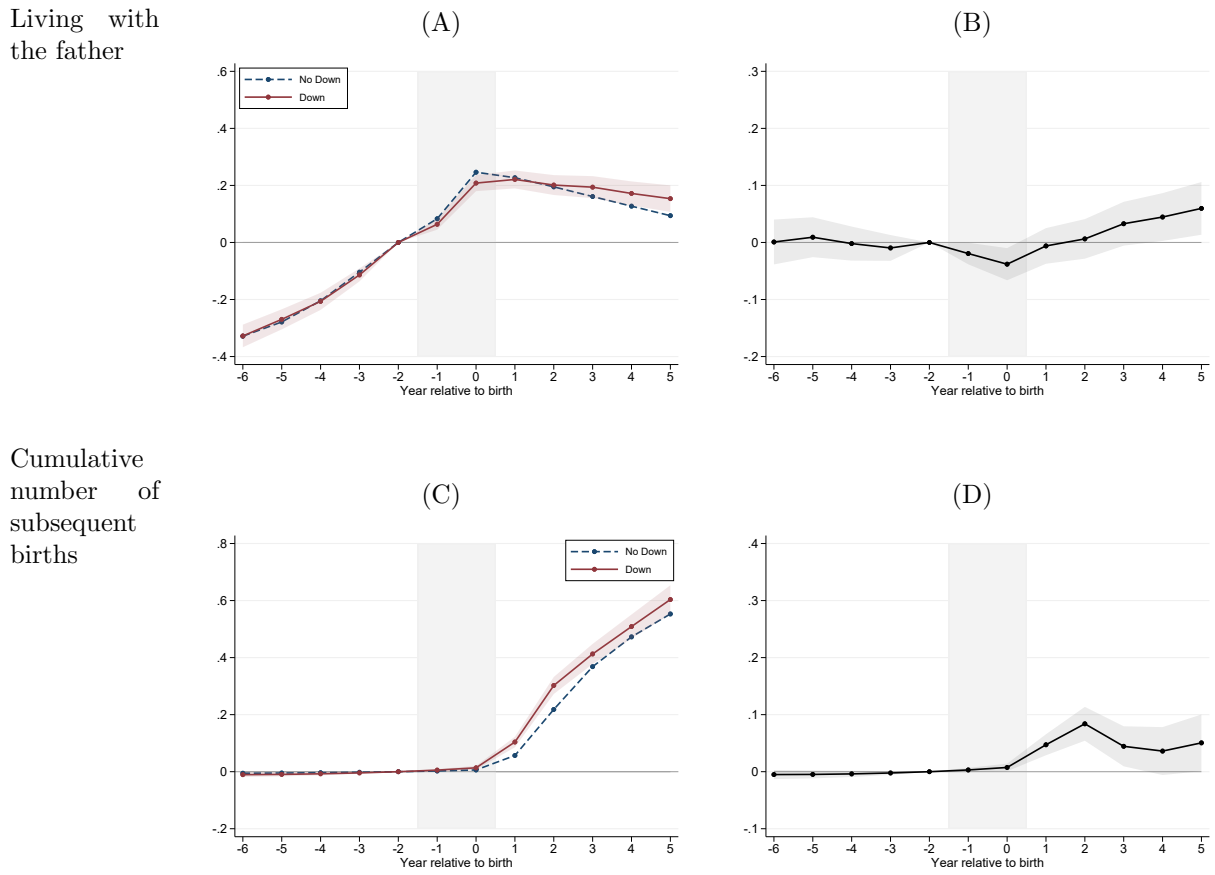


Care allowance



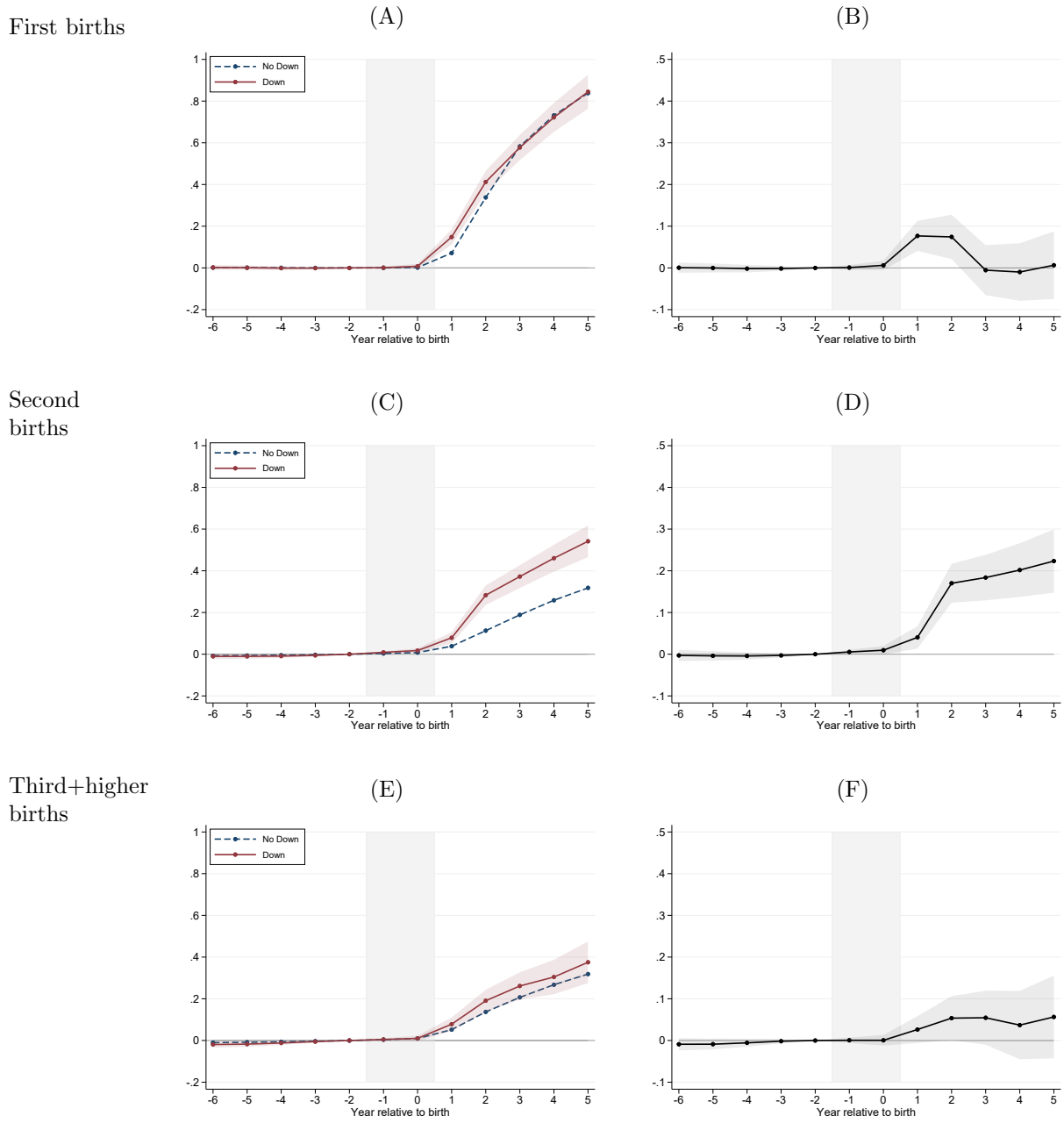
Note: See notes to Figure 3. The sample is restricted to the No-Testing sample, i.e. births in 2005 and earlier born to mothers ages 34 and younger, and consists of $N = 924$ births with Down syndrome and $N = 1,266,684$ births without Down syndrome.

Appendix Figure A10: Living with Father and Subsequent Births (Prevalent-Testing Sample)



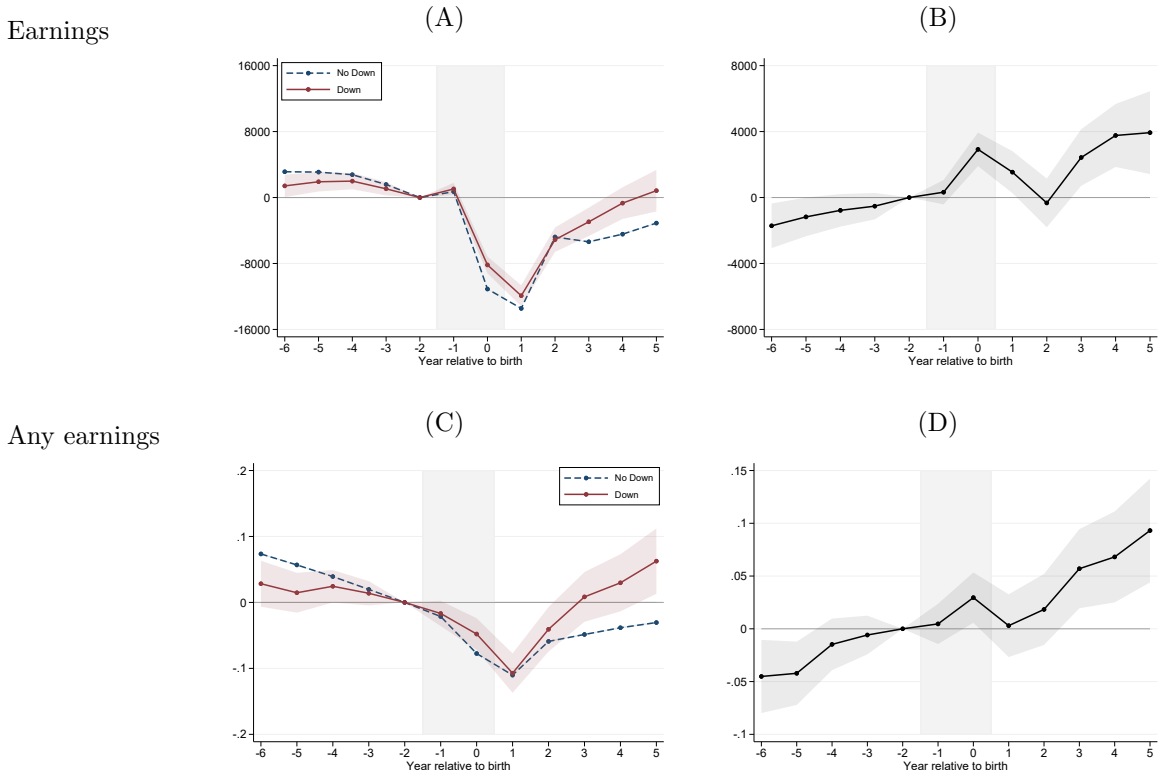
Note: See notes to Figure 2. This figure shows the same analyses but for the Prevalent-Testing sample, i.e. births in 2006 and later, consisting of $N = 1,241$ births with Down syndrome and $N = 1,368,623$ births without Down syndrome.

Appendix Figure A11: Cumulative Number of Subsequent Births, By Birth Order (Prevalent-Testing Sample)



Note: See notes to Appendix Figure A2. This figure shows the same analyses but for the Prevalent-Testing sample, i.e. births in 2006 and later. The sample of first births consists of $N = 405$ births with Down syndrome and $N = 598,885$ births without Down syndrome; the sample of second births consists of $N = 470$ births with Down syndrome and $N = 508,359$ births without Down syndrome; and the sample of third and higher order births consists of $N = 366$ births with Down syndrome and $N = 261,379$ births without Down syndrome.

Appendix Figure A12: Maternal Labor Market Outcomes (Prevalent-Testing Sample)

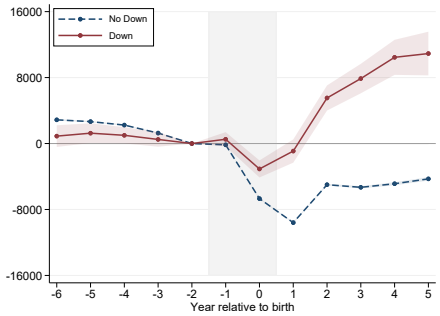


Note: See notes to Appendix Figure A10. All income levels are measured in 2018 USD.

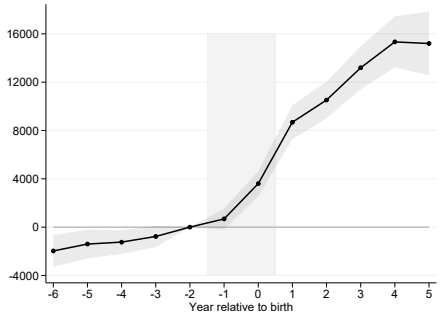
Appendix Figure A13: Maternal Income (Prevalent-Testing Sample)

Total income

(A)

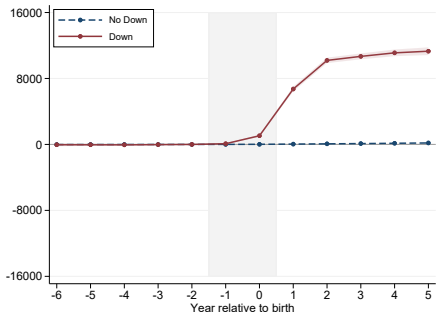


(B)

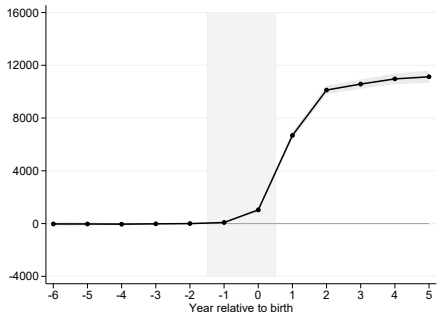


Care allowance

(C)

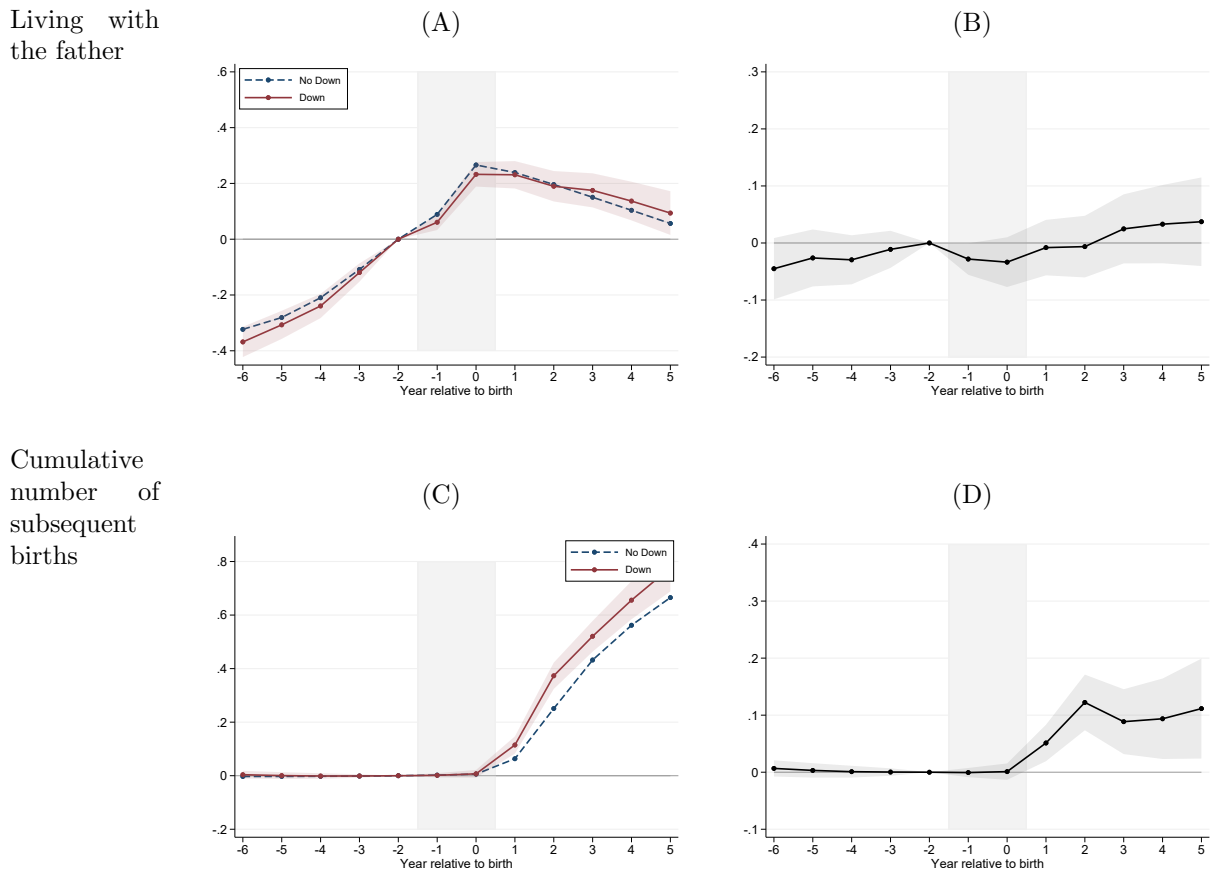


(D)



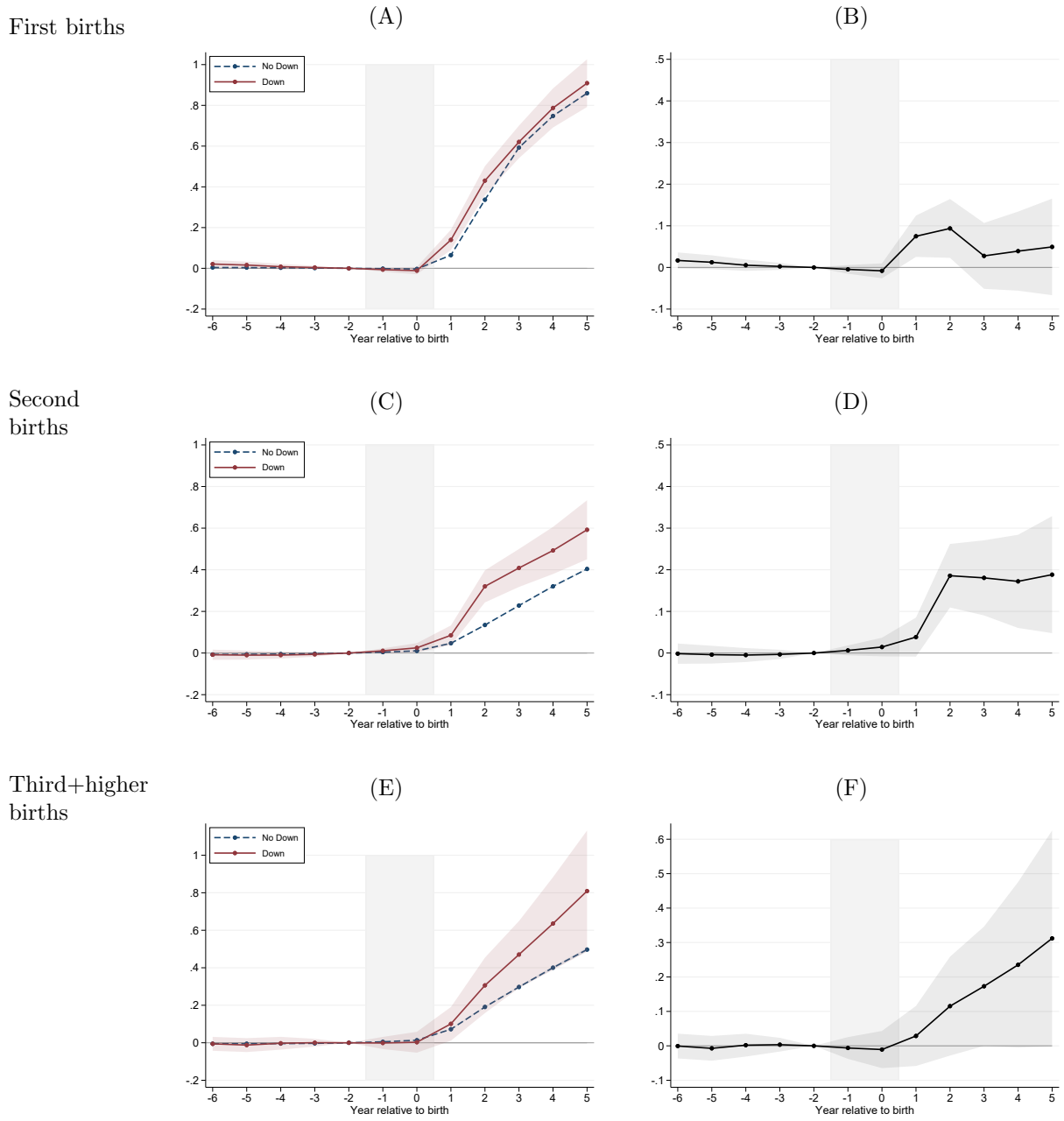
Note: See notes to Appendix Figure A10. All income levels are measured in 2018 USD.

Appendix Figure A14: Living with Father and Subsequent Births (Prevalent-Testing, Age ≤ 34 Sample)



Note: See notes to Figure 2. This figure shows the same analyses but for the Prevalent-Testing, Age ≤ 34 sample, i.e. births in 2006 and later born to mothers ages 34 and younger, consisting of $N = 644$ births with Down syndrome and $N = 1,034,709$ births without Down syndrome.

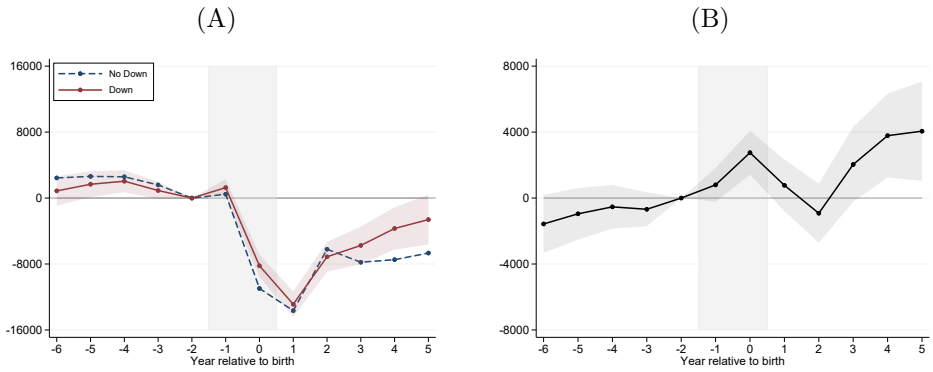
Appendix Figure A15: Number of Subsequent Births, By Birth Order (Prevalent-Testing, Age $\leq$ 34 Sample)



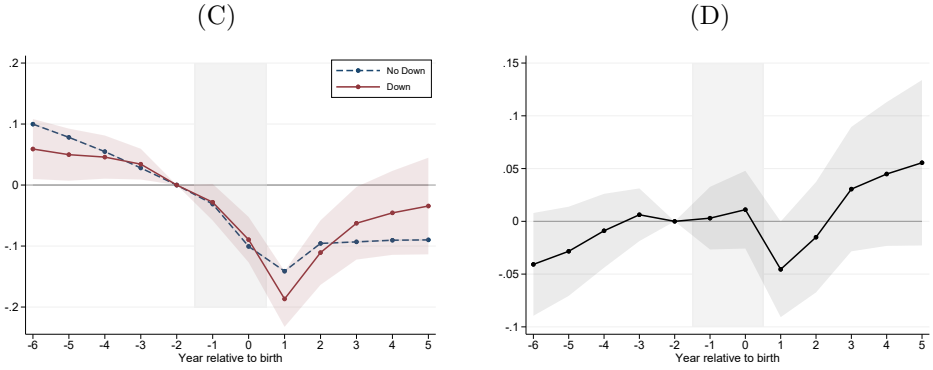
Note: See notes to Appendix Figure A2. This figure shows the same analyses but for the Prevalent-Testing, Age $\leq$ 34 sample, i.e. births in 2006 and later born to mothers ages 34 and younger. The sample of first births consists of $N = 285$ births with Down syndrome and $N = 517,595$ births without Down syndrome; the sample of second births consists of $N = 261$ births with Down syndrome and $N = 377,008$ births without Down syndrome; and the sample of third and higher order births consists of $N = 98$ births with Down and $N = 140,106$ births without Down syndrome.

Appendix Figure A16: Maternal Labor Market Outcomes (Prevalent-Testing, Age $\leq$ 34 Sample)

Earnings



Any earnings

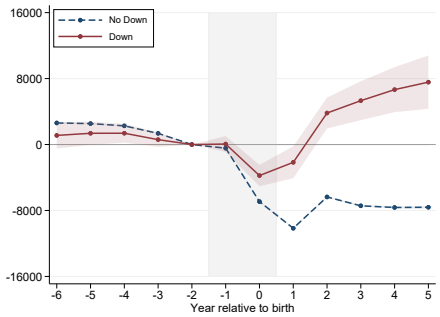


Note: See notes to Appendix Figure A14. All income levels are measured in 2018 USD.

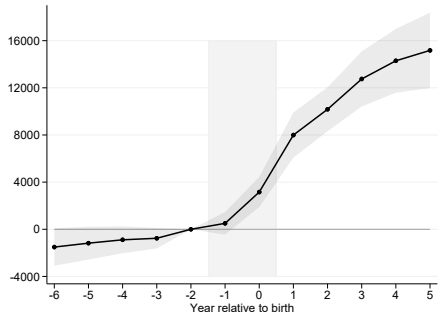
Appendix Figure A17: Maternal Income (Prevalent-Testing, Age $\leq$ 34 Sample)

Total income

(A)

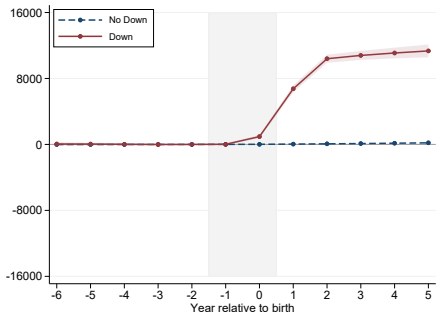


(B)

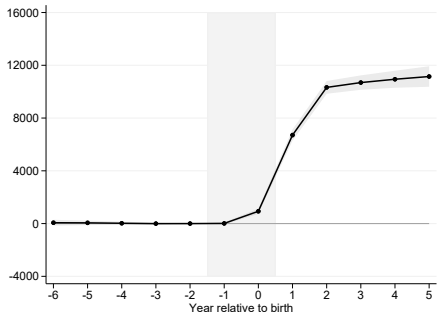


Care allowance

(C)



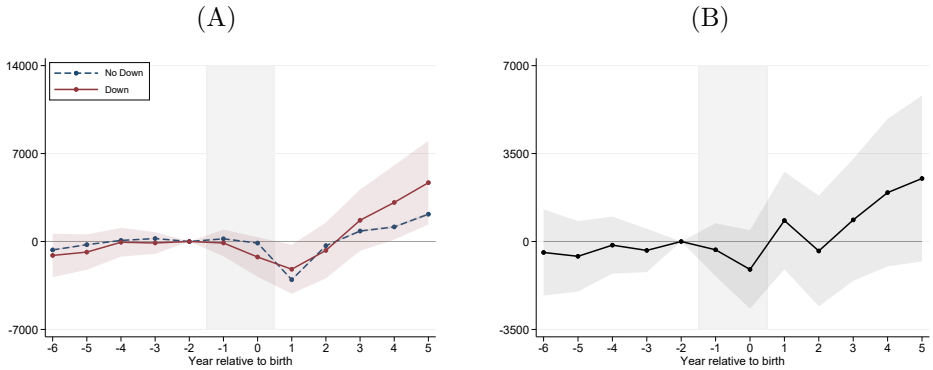
(D)



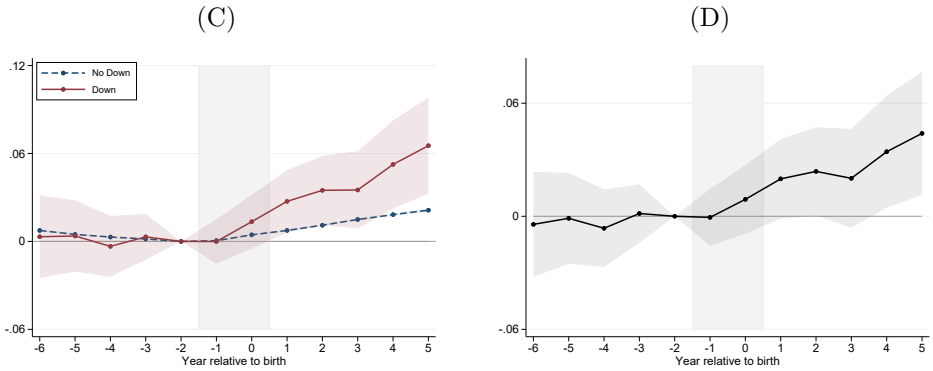
Note: See notes to Appendix Figure A14. All income levels are measured in 2018 USD.

Appendix Figure A18: Paternal Labor Market Outcomes (Prevalent-Testing Sample)

Earnings

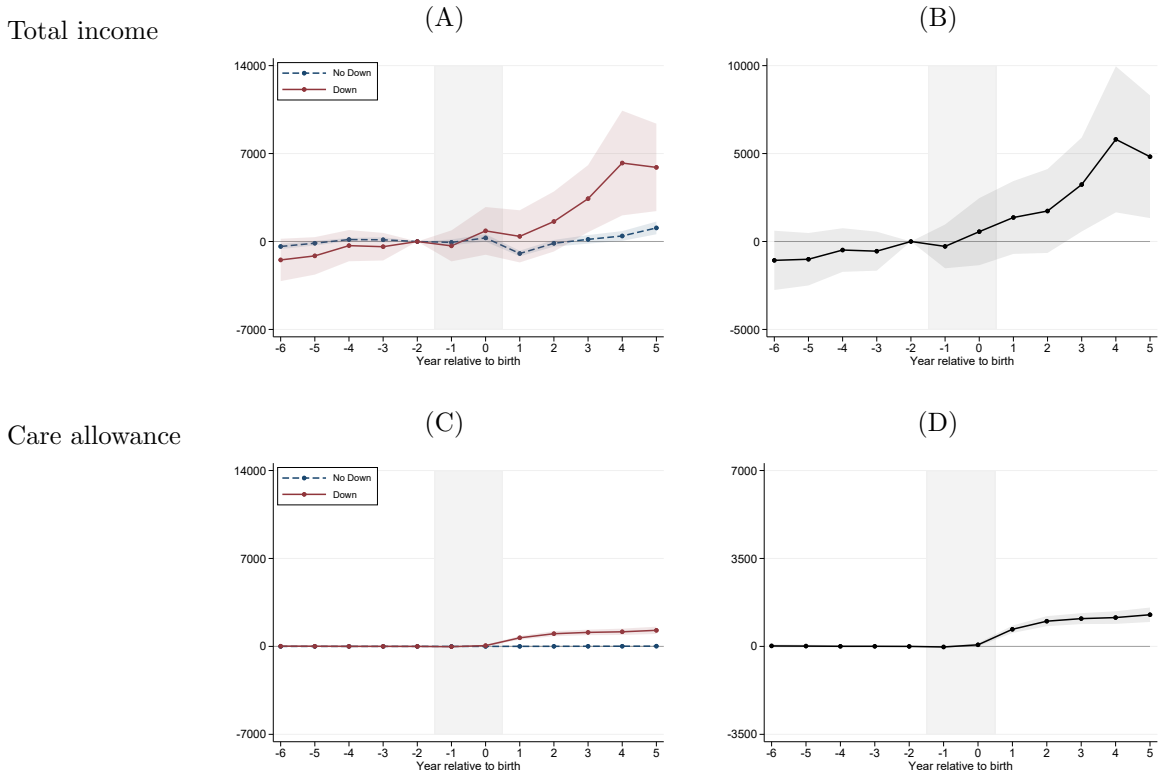


Any earnings



Note: See notes to Figure 3. The sample is restricted to the Prevalent-Testing sample, i.e. births in 2006 and later, and consists of $N = 1,232$ births with Down syndrome and $N = 1,359,233$ births without Down syndrome.

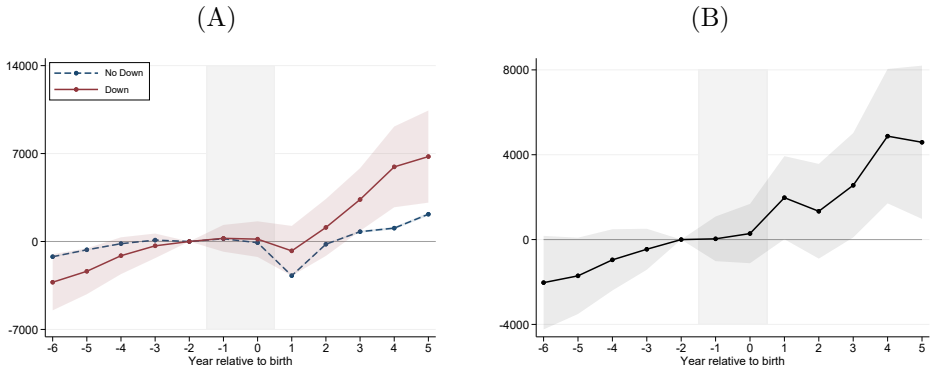
Appendix Figure A19: Paternal Income (Prevalent-Testing Sample)



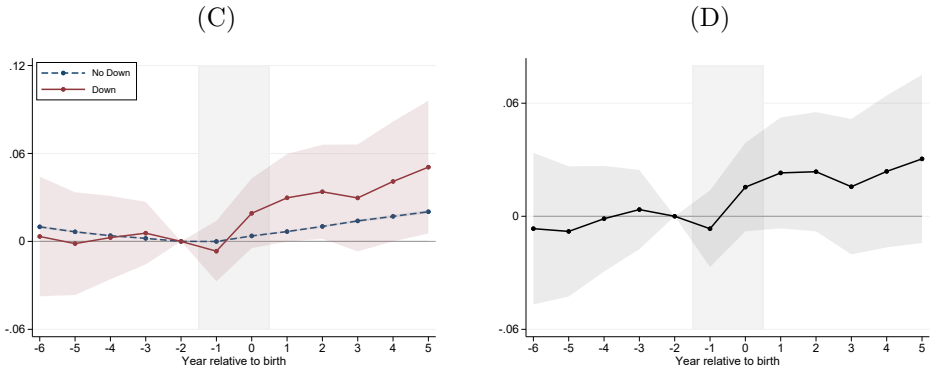
Note: See notes to Figure 3. The sample is restricted to the Prevalent-Testing sample, i.e. births in 2006 and later, and consists of $N = 1,232$ births with Down syndrome and $N = 1,359,233$ births without Down syndrome.

Appendix Figure A20: Paternal Labor Market Outcomes (Prevalent-Testing, Age ≤ 34)

Earnings



Any earnings

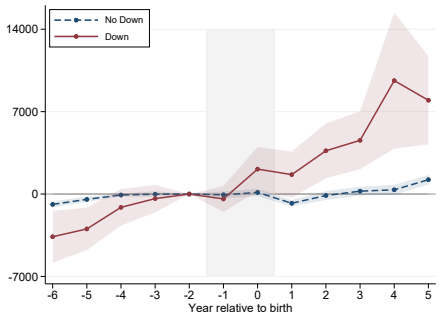


Note: See notes to Figure 3. The sample is restricted to the Prevalent-Testing, Age ≤ 34 sample, i.e. births in 2006 and later born to mothers ages 34 and younger, and consists of $N = 638$ births with Down syndrome and $N = 1,026,109$ births without Down syndrome.

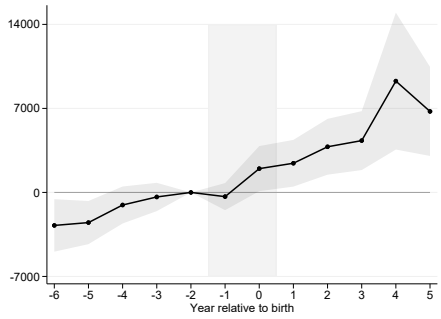
Appendix Figure A21: Paternal Income (Prevalent-Testing, Age ≤ 34)

Total income

(A)

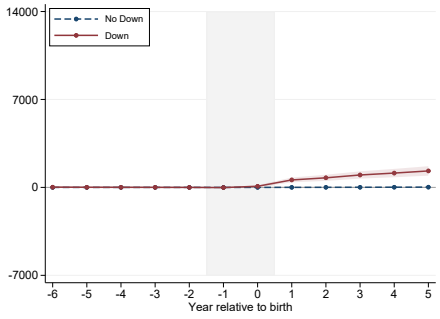


(B)

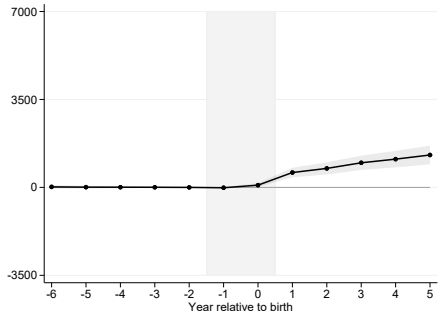


Care allowance

(C)



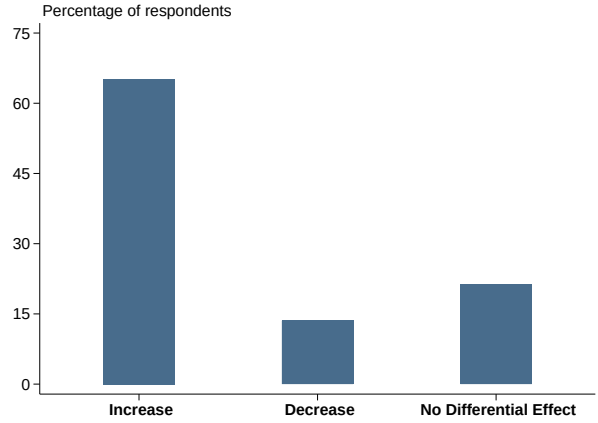
(D)



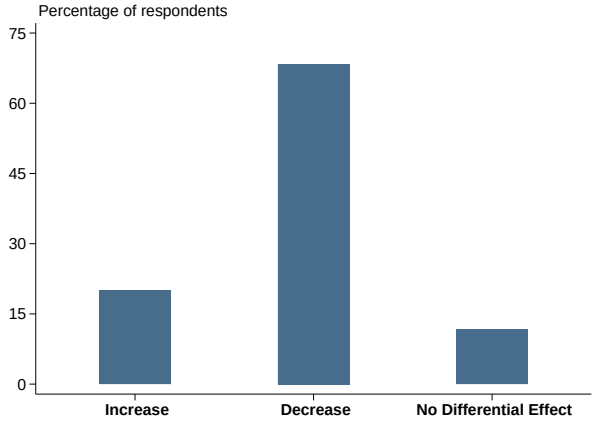
Note: See notes to Figure 3. The sample is restricted to the Prevalent-Testing, Age ≤ 34 sample, i.e. births in 2006 and later born to mothers ages 34 and younger, and consists of $N = 638$ births with Down syndrome and $N = 1,026,109$ births without Down syndrome.

Appendix Figure A22: Survey Results: Predicted Effect of an Unexpected Birth of a Child with Down syndrome

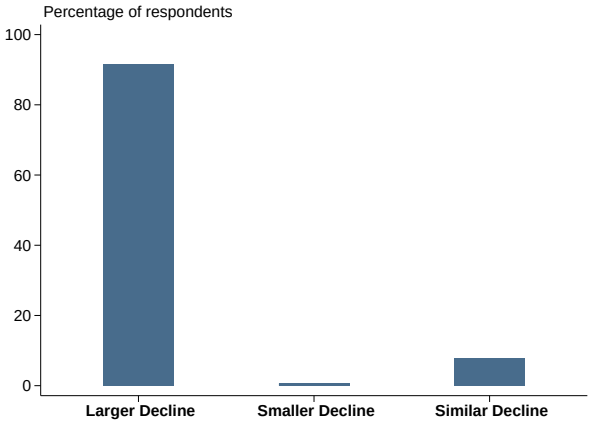
A. Likelihood of Separation/Divorce



B. Number of Subsequent Births



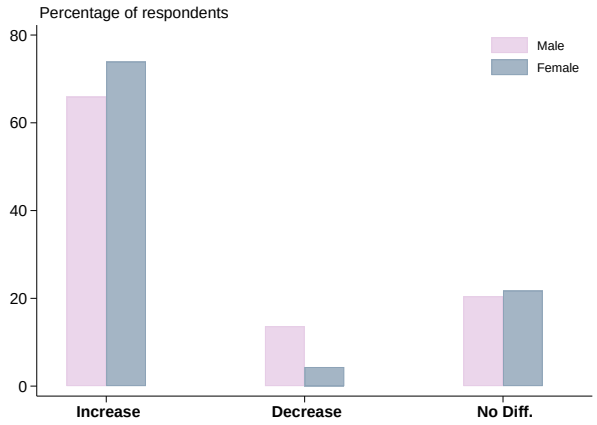
C. Decline in Maternal Earnings



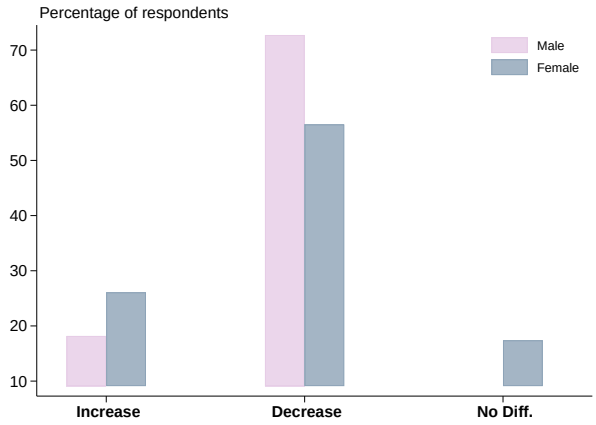
Note: Figure shows results from our expert survey. Panel A summarizes responses to a question about the predicted effect of an unexpected birth of a child with Down syndrome (relative to a birth with no chromosomal abnormalities) on the likelihood of separation/divorce within five years. Panel B summarizes responses to a question about the predicted effect of an unexpected birth of a child with Down syndrome (relative to a birth with no chromosomal abnormalities) on the mother's number of subsequent children. Panel C summarizes responses to a question about the predicted effect of an unexpected birth of a child with Down syndrome (relative to a birth with no chromosomal abnormalities) on the decline in maternal earnings. The analysis sample is 155 respondents (154 respondents in Panel C).

Appendix Figure A23: Survey Results by Gender: Predicted Effect of an Unexpected Birth of a Child with Down syndrome

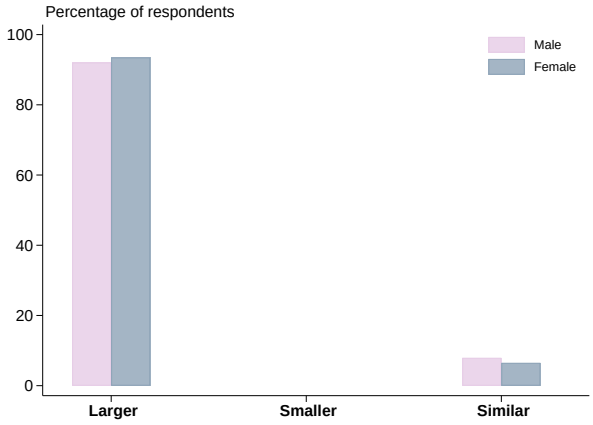
A. Likelihood of Separation/Divorce



B. Number of Subsequent Births



C. Decline in Maternal Earnings



Note: Figure shows results from our expert survey, by gender of the respondent. Panel A summarizes responses to a question about the predicted effect of an unexpected birth of a child with Down syndrome (relative to a birth with no chromosomal abnormalities) on the likelihood of separation/divorce within five years. Panel B summarizes responses to a question about the predicted effect of an unexpected birth of a child with Down syndrome (relative to a birth with no chromosomal abnormalities) on the mother's number of subsequent children. Panel C summarizes responses to a question about the predicted effect of an unexpected birth of a child with Down syndrome (relative to a birth with no chromosomal abnormalities) on the decline in maternal earnings. The analysis sample is the 134 respondents who reported their gender.

Appendix Table A1: Sample Restrictions

	CA (1)	Percentage (2)	No-CA (3)	Percentage (4)
Live births 1990-2018	3,946	100.0	3,034,485	100.0
Singleton	3,807	96.5	2,947,302	97.1
Matched to a father	3,691	93.5	2,915,650	96.1
Never has non-Down CA	2,817	71.4	2,914,191	96.0
No-CA: never has Down	2,817	71.4	2,910,184	95.9
Down: only one Down birth	2,811	71.2	2,910,184	95.9
Birth order ≤ 10	2,807	71.1	2,909,637	95.9
Minor panel restrictions	2,805	71.1	2,909,021	95.9
Analysis sample	2,805	71.1	2,909,021	95.9
First-born	894	22.7	1,249,532	41.2
Second-born	1,040	26.4	1,069,136	35.2
Birth order 3+	871	22.1	590,353	19.5

Notes: Table reports the number of births remaining after each step of the sequential sample restriction procedure. It reports this separately in column (1) and (3) for births with chromosomal abnormalities ("CA") and without chromosomal abnormalities ("No CA"), respectively; columns (2) and (4) report the percentage of each of the starting samples that remains after each step. We begin with the sample of live births in the Medical Birth Records born between 1990 and 2018, inclusive. "Matched to a father" refers to the births for whom we can identify the father in the data. "Never has non-Down CA" keeps only the births where the mother never has a birth with a chromosomal abnormality other than Down syndrome; this restricts column (1) to births with Down syndrome only. "No-CA: never has Down" drops the siblings of children with Down syndrome from the No CA sample. "Down: only one Down birth" removes mothers with more than one birth of a child with Down syndrome from the Down sample. "Birth order ≤ 10" keeps only the births with birth order at most 10. "Minor panel restrictions" drops births for which the mother is not observed in the raw income data in any year in [-6,5] relative to the birth.

Appendix Table A2: Average Birth Effects on Paternal Economic Outcomes, in 2018 USD (No-Testing Sample)

	Yr -2 mean (1)	Yr 5 No-Down effect (2)	Yr 5 incremental Down effect (3)
Earnings	25,102	-146	-62
		(31)	(964)
Any earnings	0.909	0.012	-0.010
		(0.000)	(0.013)
Total income	27,266	-935	1,328
		(70)	(922)
Care allowance	4	5	606
		(0)	(80)

Notes: Column (1) reports mean outcomes in relative year -2. Column (2) reports the average of $\gamma_1^{No\text{-}Down}$ through $\gamma_5^{No\text{-}Down}$ from equation (3) for births without Down syndrome, and column (3) reports the average of θ_1 through θ_5 from equation (4). Standard errors (clustered at the father level) are reported in parentheses below each estimate. The sample is restricted to the No-Testing sample, i.e. births in 2005 and earlier born to mothers ages 34 and younger, and consists of $N = 924$ births with Down syndrome and $N = 1,266,684$ births without Down syndrome.

Appendix Table A3: Average Birth Effects on All Components of Maternal Income, in 2018 USD (No-Testing Sample)

	Yr -2 mean (1)	Yr 5 No-Down effect (2)	Yr 5 incremental Down effect (3)
Total income	18,611	-5,864	7,671
		(43.93)	(575)
Earnings	14,133	-6,447	-2,055
		(17.17)	(590)
Care allowance	41.05	126	9,771
		(1.70)	(206)
Unemployment insurance	1,282	400	-310
		(4.93)	(172)
Parental leave	2,531	972	244
		(4.66)	(230)
Study income	738	28.10	-117
		(3.31)	(122)
Capital income	-477	-601	-19.93
		(40.89)	(173)
Other income	363	-344	159
		(4.04)	(154)

Notes: Column (1) reports mean outcomes in relative year -2. Column (2) reports the average of $\gamma_1^{No\text{-}Down}$ through $\gamma_5^{No\text{-}Down}$ from equation (3) for births without Down syndrome, and column (3) reports the average of θ_1 through θ_5 from equation (4). Standard errors (clustered at the mother level) are reported in parentheses below each estimate. The sample is restricted to the No-Testing sample, i.e. births in 2005 and earlier born to mothers ages 34 and younger, and consists of $N = 928$ births with Down syndrome and $N = 1,275,465$ births without Down syndrome.

Appendix Table A4: Yr. 5 Incremental Effect of a Child with Down syndrome: Robustness Checks (No-Testing Sample)

	Living with father* (1)	Subsequent births* (2)	Maternal earnings+ (3)	Maternal total income+ (4)	*N* Down	*N* No-Down
Baseline	0.086	0.150	-2,055	7,671	928	1,275,465
	(0.028)	(0.034)	(590)	(575)		
Drop deaths within 5 years	0.095	0.100	-2,050	8,285	869	1,271,030
	(0.029)	(0.034)	(619)	(590)		
Diagnoses up to 3 months post-birth	0.077	0.136	-1,996	7,739	991	1,275,084
	(0.027)	(0.033)	(574)	(556)		
Balanced panel	0.095	0.131	-1,912	8,362	745	1,016,455
	(0.031)	(0.038)	(672)	(624)		

Notes: Table shows estimates or averages of θ_r from equation (4). The outcome in each column is (1) an indicator for whether the mother is living with the father of the child, (2) the cumulative count of the mother's subsequent births after the focal birth, (3) maternal earnings, and (4) maternal total income defined as the sum of earnings, unemployment insurance, parental leave, care allowance, study income, capital income, and all other taxable work-related income. Standard errors (clustered at the mother level) are reported in parentheses below each estimate. The sample is restricted to the No-Testing sample, i.e. births in 2005 and earlier born to mothers ages 34 and younger.

*The reported "Yr 5 effect" is the estimate in relative year 5, i.e. θ_5.

+The reported "Yr 5 effect" is the average effect over relative years 1-5, i.e. the average of θ_1 through θ_5.

Appendix Table A5: Yr. 5 Incremental Effect of a Child with Down syndrome: Robustness Checks (Prevalent-Testing Sample)

	Living with father* (1)	Subsequent births* (2)	Maternal earnings+ (3)	Maternal total income+ (4)	*N* Down	*N* No-Down
Baseline	0.060	0.051	2,268	12,586	1,241	1,368,623
	(0.024)	(0.025)	(841)	(884)		
Drop deaths within 5 years	0.060	0.043	2,206	12,728	1,198	1,365,680
	(0.024)	(0.025)	(854)	(899)		
Diagnoses up to 3 months post-birth	0.037	0.052	2,057	12,531	1,401	1,367,789
	(0.023)	(0.024)	(784)	(822)		
Balanced panel	0.033	0.048	2,926	13,286	873	883,328
	(0.030)	(0.032)	(1,038)	(1,102)		
Drop 2006 births	0.051	0.057	2,300	13,029	1,090	1,269,492
	(0.026)	(0.028)	(953)	(989)		

Notes: Table shows estimates or averages of θ_r from equation (4). The outcome in each column is (1) an indicator for whether the mother is living with the father of the child, (2) the cumulative count of the mother's subsequent births after the focal birth, (3) maternal earnings, and (4) maternal total income defined as the sum of earnings, unemployment insurance, parental leave, care allowance, study income, capital income, and all other taxable work-related income. Standard errors (clustered at the mother level) are reported in parentheses below each estimate. The sample is restricted to the Prevalent Testing sample, i.e. births in 2006 and later.

*The reported "Yr 5 effect" is the estimate in relative year 5, i.e. θ_5.

+The reported "Yr 5 effect" is the average effect over relative years 1-5, i.e. the average of θ_1 through θ_5.