

Parental Responses to Child Disability: Gender Differences and Mechanisms

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Abstract

This study investigates parental labor supply responses when their children have disabilities by utilizing a difference-in-differences design and Taiwanese population-wide administrative data. The results demonstrate that child disability reduces mothers' employment rate and annual earnings by 9% and 16%, which persists for a minimum of ten years. In contrast, fathers' labor supply remains largely unchanged. We explore the underlying reasons for the unequal career impact on mothers and fathers, both theoretically and empirically. Our results suggest that even if the mother is the primary earner, her career suffers more than the father's. This indicates that factors beyond relative earnings, like differential caregiving ability or social norms, are likely more pivotal in explaining these gender disparities. Finally, we also find that child disability leads to a higher probability of mothers visiting psychiatrists shortly after childbirth and negatively impacts subsequent fertility, while having no effect on marital dissolution.

JEL codes: D13, I38, J22

Keywords: Child Disability, Parental Labor Supply Response, Household Division of Labor

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1 Introduction

The birth of a child with disabilities can be a devastating shock for parents, leading to potential long-term damage to their careers. Parents may need to reduce work hours or leave their jobs to care for their disabled children, and the associated expenses of treatments and special care can cause financial strain. Such scenarios are reflected in statistics, with approximately 30.6% of families with disabled children in the U.S. living in poverty, compared to 19.4% for families without disabled children. This trend also holds true in Europe, despite its more generous social welfare policies.¹ Although child disability may have substantial impact on parents, there is a lack of empirical evidence on how families adjust their labor supply in response to such a shock. Most previous studies have focused on the impact of one's own or a spouse's health shocks on labor supply.² Only a few studies have examined the impact of child disability on parental labor supply, and there is still insufficient evidence on the relative impact on mothers and fathers, and the factors responsible for the differences.

Compared to health shocks experienced by an adult or her spouse, child disability can have more profound effects on the parent's labor supply. Parents of children with disabilities often face a difficult dilemma. On one hand, they need to spend more time caring for their child, which can require a reduction in labor supply. On the other hand, they also face financial pressures to pay for medical or treatment expenses, potentially leading to an increase in labor supply. This creates ambiguity in the prior effect of child disability on labor supply. Additionally, the response of mothers and fathers may differ asymmetrically, depending on market outcomes (*e.g.*, relative earnings) or cultural (*e.g.*, gender norms) factors. Moreover, it is difficult to establish causality as the child's disability may be influenced by unobservable factors related to parental income and

¹For example, in Denmark, the poverty rate for households having a disabled child is around 9.7% but only 6.5% for households without a disabled child. The corresponding numbers in Germany are 10.0% vs. 8.0%. See OECD Family Database for cross-country statistics at <https://www.oecd.org/els/family/database.htm> for details.

²They are, for example, Bound et al. (1999); Jiménez-Martín, Labeaga Azcona and Martínez-Granado (1999); Wagstaff (2007); García-Gómez (2011); García-Gómez et al. (2013); Cai, Mavromaras and Oguzoglu (2014); Lindboom, Llena-Nozal and van der Klaauw (2016); Trevisan and Zantomio (2016); Jeon and Pohl (2017); Dobkin et al. (2018); Lenhart (2019); Meyer and Mok (2019); Jones, Rice and Zantomio (2020); Fadlon and Nielsen (2021); Arrieta and Li (2023)

employment (*e.g.*, Currie and Hyson, 1999; Case, Lubotsky and Paxson, 2002; Currie and Stabile, 2003; Gertler, 2004; Currie, 2009; Hoynes, Miller and Simon, 2015; McGovern et al., 2017).

We investigate how fathers and mothers adjust their labor supply differently in response to their children's disabilities caused by congenital conditions. By focusing on congenital conditions, which are unlikely to be caused by parents' behavior, we can rule out the possibility that a child disability is influenced by unobservable factors that may also affect parental labor supply. We use long panels of administrative data to track the same individuals over a period of 15 years. Using a difference-in-differences (DID) design, we compare the labor market outcomes of parents with disabled children and those with healthy children before and after the timing of childbirth.

Three key findings emerge from the study. Firstly, the birth of a child with disabilities leads to a 9% and 16% decrease in the mothers' employment and earnings, which persist for at least 10 years after the childbirth. In contrast, the impact on fathers' labor market outcomes is small and not statistically significant.

Secondly, we develop a theoretical model to explain why mothers and fathers respond differently in the labor market when they have a disabled child. The model considers three factors that may affect parents' labor supply in the presence of a child with disabilities in a unitary household setting: (1) relative earnings; (2) differential caregiving ability; and (3) social norms. Comparative statics show that when considering market forces (*e.g.*, relative earnings) only the model is not able to explain why a mother engages in caregiving when she is the primary earners, as observed in our data. Incorporating non-market factors (*e.g.*, differential productivity in caregiving and gender norms) in the model helps reconcile this. We employ these analytical results to design our empirical analysis and interpret the empirical results.

Finally, we observe that mothers of children with disabilities are more likely to visit a psychiatrist during the first few years after childbirth. Furthermore, parents of such children have a lower likelihood of having a second child. But we did not find any evidence of an impact on marital stability. Since poor mental health, having more children, and unstable marriages can negatively affect labor supply, the lack of long-term effects on these outcomes suggests that the persistent

negative impact on mothers' labor market outcomes is unlikely mediated by these other outcomes.

This study contributes to the literature in several ways. Firstly, using high-quality administrative data, we investigate the gender differences in parental responses to children's disability shocks and explore potential mechanisms underlying this disparity. This issue has received little attention in the literature. Previous research on parental response to child disability concentrated almost exclusively on maternal labor supply and relied mostly on survey data (Salkever, 1982; Wolfe and Hill, 1995; Powers, 2001, 2003; Frijters et al., 2009; Burton et al., 2017; Laffers and Schmidpeter, 2020).³ More recent work using administrative data looked at parental labor supply response to various child health shocks, e.g., disabilities (Gunnsteinsson and Steingrimsdottir, 2019), cerebral palsy (Chen, Lin and Lo, 2023), type 1 diabetes (Eriksen et al., 2021), cancer (Adhvaryu et al., 2022; Vaalavuo, Salokangas and Tahvonen, 2023), and hospitalization (Breivik and Costa-Ramón, 2022). Most of these studies used data from Nordic countries.⁴ While the nature of the health shocks in these studies differ somewhat, they unanimously indicated that child health shocks have negative impacts on labor market outcomes for both parents, with the effects larger for mothers. What sets our study apart is our investigation of potential mechanisms that drive the differential impacts on mothers and fathers. We empirically investigate and interpret these results through the lens of a theoretical model.

Our study also makes a valuable addition to the literature on gender inequality and negative impact of having children (Budig and England, 2001; Kleven, Landais and Søgaaard, 2019; Sieppi and Pehkonen, 2019; Cortes and Pan, 2020; De Quinto, Hospido and Sanz, 2020; Musick, Bea and Gonalons-Pons, 2020; Berniell et al., 2021). Along this line of research, we focus on another

³Due to a lack of extended follow-up, these studies have limited capacity to examine parents' dynamic responses to children's adverse health conditions.

⁴Two recent working papers are most relevant to our work. The study by Gunnsteinsson and Steingrimsdottir (2019) employs Danish data to reveal a 5% and 13% decline in earnings for fathers and mothers, respectively, following the birth of a child with a disability. Our analysis, based on Taiwanese data, indicates an even more pronounced gender disparity in labor supply responses. Chen, Lin and Lo (2023) also use Taiwanese data, but they only examined child disabilities stemming from cerebral palsy. In contrast, our study examines the effect of a comprehensive set of child disabilities. We discover that parental reactions differ depending on whether the child's disability is physical or mental. Furthermore, when we narrow our focus to parents of children with cerebral palsy, our findings align closely with those reported by Chen, Lin and Lo (2023). A unique aspect of our study is the empirical investigation of potential mechanisms underlying the unequal impact on mothers versus fathers, which is guided by a theoretical model.

aspect of child panelty on parents' labor supply: the effects of children's permanent health shocks. Although there are ample findings of the relationship between parenthood and household sexual divisions of labor, less is understood about the effects of children's severe health shocks.

Lastly, our study is among the first to examine the effects of children's health shocks on parental labor supply in a non-Western country context. Most existing evidence is obtained based on data from Nordic countries. Although Taiwan and Nordic countries are similar in economic development, medical care quality and generosity of the social health insurance program, they differ with respect to gender norms and the social welfare system. Specifically, while there is a high degree of gender equality in Nordic countries, that in Taiwan is less equal, but is closer to the global average gauged by a standard measure of gender norms in the literature (Kleven et al., 2019).⁵ Moreover, Nordic countries have more generous social welfare systems compared to most other nations. This implies that our findings are more generalizable to high-income countries having a reasonably generous welfare system and a degree of gender equality not too different from the global average.

The remainder of this paper is organized as follows. In Section 2, we describe the institutional background of child disability and government support available to parents in Taiwan. In Section 3, we introduce our data and explain our sample selection process. In Section 4, we present our empirical strategy. Section 5 discusses the estimated results. In Section 6, we explore possible mechanisms behind our main findings on parents' labor supply responses. In Section 7, we examine other parental responses to child disability. Finally, we provide concluding remarks in Section 8.

⁵As reported by ISSP Research Group (2016), responding to the question "Do you think that women should work outside the home full-time, part-time or stay at home when there is a child under school age?" 34% survey respondents in Taiwan indicated that mothers should stay at home when they have preschool children, while only 5.7%, 16.7%, 12.5% and 11.9%, respectively, in Denmark, Finland, Norway, and Sweden provided a positive response. The global average is 33.5% and the U.S. figure is 33.9%.

2 Background

2.1 Government Support for Individuals with Disabilities

Taiwan's National Health Insurance (NHI) system provides subsidies to individuals with permanent and severe health conditions (including those with disabilities) by waiving the co-payments. This is mainly through the Catastrophic Illness Program (CIP).⁶ Individuals with severe health conditions can obtain a *Catastrophic Illness Certificate* from the NHI Administration based on their medical history assessment. While the only benefits of holding a *Catastrophic Illness Certificate* is co-payment waiving, low-income disabled individuals in Taiwan receive a cash subsidy from the government, depending on the household income this subsidy ranges from 3,628 NT\$ to 8,499 NT\$ per month. Additionally, the government also subsidizes disabled individuals' social insurance premiums, tuition fees, public transportation fares, and assistive equipment costs.⁷ However, the eligibility for these subsidies is limited, as only a small proportion (3% in 2014) of the Taiwanese population qualifies as low-income.

While these cash subsidies provided by Taiwan's government are meager, parents of children with disabilities bear the primary responsibility in caring for a disabled child, e.g., in-home rehab, providing basic care at home, and arranging transportation to rehabilitation, medical, or education facilities. This burden is further compounded by inadequate facilities for childcare and support for disabled children. For example, in 2019, only 221 welfare institutions provided services to children and teenagers under 18 years of age in Taiwan, while the population in need was around 52,000, resulting in limited access to these centers for children.⁸

Furthermore, compared to Nordic and OECD countries, Taiwan's public expenditure on childcare is relatively low. In 2017, Norway and Sweden allocated approximately 0.6% and 1.1%, respectively, of their total public expenditure to childcare (excluding education) for children under

⁶Established in 1995, the NHI system is a universal health insurance program that covers all citizens and permanent residents, with over 99% of eligible individuals enrolled in it.

⁷For a comprehensive list of social benefits for people with disabilities in Taiwan, see <https://www.sfaa.gov.tw/SFAA/Eng/Pages/VDetail.aspx?nodeid=237&pid=3792>.

⁸See Lin and Lin (2011) for a discussion on the case of mental disabilities in Taiwan.

six years old, while OECD countries on average spend 0.7% of GDP on childcare and early education (including parental leave benefits) in 2017. In contrast, Taiwan's expenditure for the same age group was only around 0.12% between 2017 and 2019.⁹ As a result, the Taiwanese government's support for childcare and children with disabilities is limited, which places a heavy burden on parents.

2.2 Gender Division of Labor and Social Norms

The lack of government support for childcare has placed a significant burden on family members, particularly parents. According to the *Children's Living Conditions Surveys*,¹⁰ 55.9% of preschool children (under six years old) received primary care from family members, with 91.4% of them primarily cared for by their parents. Although this percentage has decreased over time (Wang, 2011), in 2018, there were 45.2% of preschool children still relied on their family members as their primary caregivers, and 60.8% of these caregivers were parents. The situation is even more challenging for children under the age of 3, as their limited access to nurseries and kindergartens means that they are more likely to rely on their family members for care. There were 92.2% (82.4%) and 78.6% (48.1%) of the children under 3 years of age depended on their family members (parents) as major caregivers in the year 2001 and 2018, respectively.

In Taiwan, mothers assume the majority of responsibility for childcare. For example, in 2018, 31.1% of Taiwanese mothers with children aged 0-3 years took parental leave to care for their children, while only 5.1% of fathers did so. This disparity can be attributed to Taiwan's gender-biased social norms. Gender-biased social norms are not unique to Taiwan. Based on survey responses to the ISSP Research Group (2016) question "Do you think that women should work outside the home full-time, part-time, or stay at home when there is a child under school age?" (Kleven et al., 2019), Taiwan's gender-related social norms are near the global average. In Taiwan, 34.0% of survey respondents answered positively, which is close to the global average of 33.5% and the U.S.'s

⁹Information on Taiwanese government expenditures on children and teenagers can be found at <https://crc.sfaa.gov.tw/Statistics/Detail/2>.

¹⁰The 2001 and 2018 reports (in Chinese) are available on <https://stat.ncl.edu.tw/browse.jsp?p=00556037> and <https://dep.mohw.gov.tw/DOS/lp-5098-113.html>.

of 33.9%.¹¹ Less than 20% of respondents in Sweden (11.9%), Denmark (5.7%), Finland (16.7%), and Norway (12.5%) thought that women should stay at home. This indicates that Taiwan’s gender norm is similar to that in developed economies, except for Nordic countries, which have an exceptionally high level of gender equality.

3 Data and Sample

3.1 Data

Our study uses administrative data obtained from Taiwan’s Health and Welfare Data Science Center (HWDC) to conduct our analysis. Specifically, we use four sources of data from HWDC, which include: (1) the birth certificate registry; (2) National Health Insurance (NHI) enrollment records; (3) Catastrophic Illness Registry; and (4) NHI claim files for outpatient care. We use scrambled national identification numbers of individuals to link them across these data sources.

We obtain information on a child’s birth date and their parents’ scrambled national identification numbers from the birth certificate registry. Using the parents’ scrambled national identification numbers, we extract their socioeconomic characteristics such as age, gender, employment status, earnings, township of residence, and sectors of employment from the NHI enrollment records.¹²

The Catastrophic Illness Registry provides information on a patient’s scrambled national identification number and the date when the patient was diagnosed with a catastrophic illness, as well as the ICD code of the illness itself. It also contains information on a person’s *Catastrophic Illness Certificate* status, which enables us to determine whether or not a child has a government-certified disability. Further details on this will be discussed in Section 3.2.

We also make use of individuals’ outpatient claim files, which were submitted by medical service providers for reimbursement purposes. These records contain information on the date, types,

¹¹Interestingly, the same figures for South Korea (45.3%) and Japan (68.7%) are much higher than Taiwan’s.

¹²It is important to note that these enrollment records are collected and maintained by the NHI Administration for the purpose of premium collection and statistical analysis. The premium paid by an individual is determined by the information provided in the enrollment records, such as their earnings, sector of employment, and other relevant factors.

and quantity of service utilization,¹³ as well as diagnoses given by physicians. We use these outpatient records to construct the mental health outcomes of the parents.¹⁴

3.2 Definition of Disability

Our definition of disability is based on the disability classification adopted by the Taiwanese government, which follows *The International Classification of Functioning, Disabilities, and Health* (ICF) of the WHO. To be eligible for disability benefits, an individual must be certified by a county government as having one or more “disabilities”, which is determined through assessments conducted by authorized experts who examine the individual’s medical history and conduct a clinical assessment. See the upper panel of Table 1 for the ICF classification.

In our dataset, there is no information regarding an individual’s disabilities status. Our imputation of an individual’s disability status is based on whether or not he/she has a *Catastrophic Illness Certificate* (CIC). These certificates are issued by the government and can be either temporary (*e.g.*, cancer) or permanent (*e.g.*, cerebral palsy), depending on the nature of the medical condition. We consider child to have a disability if he/she has medical conditions which qualifies him/her for a permanent CIC and also fall under one or more of the disability categories in the ICF classification.¹⁵ The mapping between permanent catastrophic illnesses and disabilities based on ICF can be found in the lower panel of Table 1.¹⁶

¹³The quantity of services used can be converted into total expenses using the unit value of the services, which is determined by a global budget system.

¹⁴We define the mental disorders by using the following ICD-9 codes: 290-319.

¹⁵For some welfare programs, due to stigmatism some individuals may not enroll even if they are qualified, *e.g.*, the U.S. food stamp program which requires enrollees to present vouchers to cashier when using the food stamps. For the CIC program, stigmatism is unlikely to prevent participation by qualified individuals because CIC participants do not need to present a certificate or vouchers. The co-payment of a CIC holder is waived when presenting his/her NHI smart card to the hospital/clinic cashier and his/her NHI smart card does not have any feature signifying that he/she is a CIC holder. If stigmatism prevents some qualified individuals from participating in the CIC program, then some of the treated households (*i.e.*, having a disabled child) will be classified as control households. This would bias our estimates downward making our estimate a lower bound of the treatment effect.

¹⁶We use the following ICD-9 code to define each catastrophic illness in Table 1. 1) Infantile Cerebral Palsy: 343, 343.0, 343.1, 343.2, 343.4, 343.8, 343.9, 344; 2) Congenital Anomalies of Digestive System: 751, 751.1, 751.2, 751.20, 751.22, 751.3, 751.4, 751.5, 751.6, 751.61, 751.62, 751.68, 751.8, 751.9; 3) Psychoses with Origin Specific to Childhood: 299, 299.80, 299.90, 299.91; 4) Chromosomal Anomalies: 758, 758.1, 758.2, 758.3, 758.39, 758.5, 758.6, 758.7, 758.8, 758.9; 5) Renal Agenesis and Dysgenesis: 753.0, 753.1, 753.11, 753.12, 753.15, 753.19, 753.20, 753.21, 753.22, 753.23, 753.3; 6) Other Rare Diseases: 251.1, 270.1, 270.2, 270.3, 270.4, 270.6, 270.8, 270.9, 272.3, 275.3, 279.04, 287.1, 330, 330.8, 335.1, 416, 742.2, 751.69, 755.55, 755.59, 756, 756.4, 756.51, 757.31, 758.89, 759.5,

Defining disability in this manner provides a more accurate measure of a health shock. This approach reduces the level of heterogeneity in child health shocks in the study as all health shocks classified in this manner are both severe and permanent. Furthermore, to obtain a *Catastrophic Illness Certificate*, patients must undergo evaluations by physicians based on consistent criteria, which minimizes the classification's susceptibility to measurement errors.

More than 70% of individuals who hold a permanent *Catastrophic Illness Certificate* in our dataset are identified as disabled according to the ICF.¹⁷ The most prevalent categories of disability, accounting for approximately 60% of disability cases in this study, are cerebral palsy, autism spectrum disorder, and chromosomal anomalies (such as Down Syndrome).¹⁸ Families of individuals with these medical conditions must dedicate significant resources toward treatment, management, and rehabilitation. For instance, according to [Palisano et al. \(2010\)](#), family-centered care is still considered the preferred approach for cerebral palsy.

3.3 Sample

The treatment group in this study includes parents with a first child diagnosed with congenital disabilities before the age of three. To minimize the possibility of postnatal disabilities, we restrict our focus to disabilities diagnosed before age 3. Additionally, we avoid the confounding effects of previous births by focusing on firstborns' disabilities. The control group is comprised of parents whose children did not have any catastrophic illnesses during the study period, as indicated by the absence of a *Catastrophic Illness Certificate*, whether permanent or temporary. Our sample consists of a balanced panel of parents whose first children were born between 2004 and 2007 and

759.81, 759.89; 7) Congenital Muscular and Motor Neuron Disease: 742, 746.7; 8) Transplant Complications: 996, V427; 9) Congenital Lung Anomalies: 748.4, 748.5, 748.6, 748.60, 748.8; 10) Chondrodystrophy: 756; 11) Congenital Anomalies of Integument: 757.1, 757.39, 757.9; 12) Immune Mechanism Disorders: 279.00, 279.08

¹⁷Note that there are two illnesses that qualify for a permanent *Catastrophic Illness Certificate* but are not considered disabilities according to the ICF: congenital hypothyroidism (14.4% of total permanent *Catastrophic Illness Certificate* holders) and vasculitis (14.0%). These conditions are also not included in the control group either, as they have been issued *Catastrophic Illness Certificates*. For further details, please refer to Section 3.3.

¹⁸Cerebral palsy is a lifelong neurodevelopmental condition caused by brain lesions that often results in motor disorders. Autism Spectrum Disorders (ASD) are complex neurobiological disorders characterized by neuropsychological and behavioral deficits, which make it difficult for children to communicate and interact socially, and to exhibit a range of repetitive behaviors. Down Syndrome is a chromosomal disorder associated with intellectual disability and a wide range of medical, psychological, and social issues throughout life.

were tracked from the fourth year before their firstborn’s birth until the child reached age 10. This provides a sample period spanning 18 years, from 2000 to 2017. The treatment group includes 1,125 parent-child triads, while the control group consists of 262,320.

Table 2 presents the characteristics of parents in both the treatment and control groups, with earnings reported in constant 2016 NT\$. The pre-birth characteristics of both groups, including annual earnings, employment status, working sectors, and working months, are relatively similar. The differences in these characteristics, with the exception of parental age, are minor and statistically insignificant. Although the treatment group parents are slightly older, the difference is less than 2% and, thus, quite small.

To investigate whether the presence of a disabled child is related to pre-birth parental characteristics, we use OLS to regress the child disability dummy on a set of pre-birth parental labor market outcomes and demographic variables. The results presented in Table 3 show that parental age is a strong predictor of child disability, while the working months of fathers are mildly correlated with child disability (with a p -value of less than 0.1). We also conduct an F -test to examine the joint significance of the coefficients, and the results are shown at the end of Table 3. The F -test excluding age is not significant, with p -values of 0.43 and 0.72 for males and females, respectively, indicating that the differences between the treatment and control groups are mainly due to differences in age. These results imply that, conditional on parental age, having a disabled child is likely a random event and unrelated to pre-birth labor market outcomes. To account for age effects, we include a full set of parental age dummies in our empirical specifications.

4 Empirical Specifications

4.1 Event Study Analysis

For the event study analysis, we estimate the following model:

$$Y_{it} = \nu_i + \lambda_t + a_{it} + \sum_{\substack{k=-4 \\ k \neq -2}}^{10} \delta_k \cdot \mathbf{I}[t - E_i = k] \times Disabled_i + \varepsilon_{it}, \quad (1)$$

where i indexes individuals and t denotes calendar year. Our outcome variable of interest is denoted by Y_{it} and can represent employment (a dummy indicating working for at least one month per year or not) or annual earnings. We include a dummy variable $Disabled_i$ that takes a value of 1 when the individual i has a disabled firstborn. We denote the calendar year when he/she has the first child as E_i . Thus, the indicator variable $\mathbf{I}[t - E_i = k]$ equals 1 when t is k years from the firstborn. ε_{it} is an error term. Our sample consists of a balanced panel of individuals observed every year from $k = -4$ (four years before the birth of the first child) to $k = 10$ (ten years after the birth). The panel structure of the data allows us to control individual fixed effects, ν_i . In addition, we include calendar year fixed effects, λ_t , to capture year-specific common shocks that might affect labor market outcomes, such as the business cycle. Since age is a key determinant of an individual's labor supply and fertility decisions, we utilize the age fixed effects, a_{it} , to non-parametrically control for the age profile.

The key coefficients of interest in equation (1) are δ_k 's, which represent the difference in labor supply outcomes between the treatment and control groups in the k^{th} year relative to the baseline year. We set the baseline year to $k = -2$ such that the coefficient δ_{-2} is normalized to zero. To account for possible serial correlation, the coefficient estimates' standard errors are clustered at the individual level.

We can interpret the post-childbirth differences in labor supply between the treatment and control groups relative to baseline differences as the causal effect of having a disabled child if the following conditions hold. First, the labor market outcomes of the treatment and control groups follow a common trend before giving birth to the first child, implying that $\delta_{-1} = \delta_{-3} = \delta_{-4} = 0$. This precludes the possibility that post-childbirth differences in labor market outcomes arise from pre-existing unobserved differences between the two groups. We will examine the validity of this common trend assumption when we discuss the results. Second, the composition of the two groups does not change over time. This holds mechanically since we track two fixed groups of individuals.

4.2 Difference-In-Differences Design

In the subsequent analysis, we use the following DID design to obtain the average effects of having a disabled child.

$$Y_{it} = \alpha Disabled_i + \gamma Post_t + \theta Disabled_i \times Post_t + \mathbf{X}_i \boldsymbol{\beta} + a_{it} + \lambda_t + \nu_i + \varepsilon_{it}, \quad (2)$$

where Y_{it} is the outcome of interest (*i.e.*, employment or annual earnings) and the dummy variable $Post_t$ indicates the years after the first birth. The key variable of interest is the interaction term $Disabled_i \times Post_t$. Its coefficient θ reflects the average parental labor supply effect of child disability. Similar to equation (1), we include fixed effects for age (a_{it}), year (λ_t), and individual (ν_i). \mathbf{X}_i is a vector of predetermined covariates, *i.e.*, township of residence, employment status, working sector, annual earnings two years prior to first childbirth. We note that the effect of time-invariant variables X_i and $Disabled_i$ are absorbed by individual fixed effects ν_i under some specifications.

5 Family Labor Supply Responses to Child Disability Shocks

5.1 Graphical Evidence

Figures 1 and 2 display the evolution of employment and annual earnings, in constant 2016 NT\$, for the treatment group (*i.e.*, solid line with circles) and the control group (*i.e.*, solid line with squares) from four years before to ten years after the first child's birth. The vertical axis displays the outcomes at event time relative to the average outcome over the pre-birth period for each group.

Three key insights emerge from Figures 1 and 2. First, the trends in employment and earnings for both the treatment and control groups are similar and almost parallel before the birth of their first child, suggesting that the assumption of a common trend for the difference-in-differences (DID) design should be reasonable. Second, mothers with a disabled child are more likely to exit the labor market and experience a greater loss of earnings following childbirth compared to those with

healthy children. For mothers, the reduction in employment and earnings appear to be persistent for at least ten years after the birth of a disabled child. Third, in contrast, the decline in labor market outcomes of fathers in the treatment group relative to the control group is not obvious.

5.2 Main Results

In this section, we first use the event study analysis to examine the dynamics of the impact of child disability on parental labor supply. Then we use the DID design to summarize the average effect of having a disabled child.

Figures 3 and 4 display the event study results. The coefficients δ_k 's are scaled by the outcome average in the base year ($k = -2$) to show the percentage change from the baseline mean. The graphs indicate that mothers' labor market outcomes are adversely affected by the birth of a first child with disabilities. For mothers, the drops in employment and earnings show up immediately after the birth of a disabled child. Such negative effects on mothers' labor market outcomes are persistent. Specifically, the birth of a disabled child considerably reduces mothers' employment and earnings by 9% and 16%, respectively, in the long term (*i.e.*, 10 years after childbirth).¹⁹ In contrast, fathers' labor market outcomes undergo little change in response to the child's disability, with estimates that are both small in magnitude and statistically insignificant.

To further investigate how families adjust their division of labor in response to child disability, we conduct two event study analyses at the household level.²⁰ First, we construct four dummy variables: [i] both parents work; [ii] only father works; [iii] only mother works; and [iv] neither works, and estimate equation (1) for each of these four types of households. Figure 5a shows that the birth of a disabled child reduces the probability of both parents being in the labor market (*i.e.*, dual-earner family) by 6 to 10 percentage points, which is large relative to the baseline mean of 75%. In line with the findings from our analysis treating fathers and mothers separately, we find

¹⁹It is important to note that the variable for annual earnings considers all individuals, regardless of whether they were employed or not during the sample period. Therefore, the 16% decrease in earnings is attributed to a decrease in earnings among those who were employed as well as a reduction in the number of individuals remaining in the labor force. Based on the employment and earnings effect estimates of -9% and -16%, respectively, we can conclude that for employed mothers, the child's disability reduces their earnings by approximately 7%.

²⁰We include fixed effects for the average age of the mother and father in the household-level regression.

that fathers become the sole earners, and mothers leave the labor market in response to a child disability shock. Second, we also examined the effect of child disability on the relative income share between the father and the mother. The results reported in Figure 5b show consistent result that having a disabled child leads to an increase in the father's share of total family income.

In Table 4, we present the DID estimates for mothers (Panel A) and fathers (Panel B). The stability of the estimates in Columns (1) to (3) for employment and in Columns (4) to (6) for annual earnings suggests that the results are robust to different sets of control variables. Our discussion will focus on our preferred specification in Columns (3) and (6), where we include a set of age, year and individual fixed effects.

Panel A shows that having a disabled child leads to a 6.6 percentage point decline in the employment rates of mothers (or an 8.9% drop relative to the baseline mean), and their annual earnings drop by 40,271 NT\$ (or a 15.9% decrease relative to the baseline mean). The earnings drop could be due to a decline in earnings for those who remain employed (intensive margin) or a drop in the employment rate (extensive margin). Given the 8.9% drop in the employment rate of mothers, we infer that the earnings of employed mothers decrease by around 7.0%. Panel B shows that the employment rate of fathers drops by a mere 0.1 percentage points (or a 1.2% drop relative to the baseline mean), and their annual earnings drop by 2,301 NT\$ (or a 0.7% decrease relative to the baseline mean). These estimates are small and statistically insignificant, suggesting that labor market outcomes of fathers are not affected by child disability.

A comparison of the results for mothers (Panel A) and fathers (Panel B) reveals that a majority of the impacts are borne by mothers, which is consistent with the event study results discussed earlier. In contrast, most studies using Nordic data ([Gunnsteinsson and Steingrimsdottir, 2019](#); [Eriksen et al., 2021](#); [Adhvaryu et al., 2022](#)) indicate that the labor market outcomes of both mothers and fathers respond to child health shocks, even though the impacts on mothers are stronger.²¹

²¹ Among studies using Nordic data, [Breivik and Costa-Ramón \(2022\)](#) is an exception. They find maternal earnings suffer a substantial and persistent drop after a child's hospitalization or death, while the impact is insignificant for fathers with much smaller estimated effects. However, the health shock examined - childhood hospitalization or death - is relatively temporary, and their time horizon is limited to three years post-shock.

5.3 Robustness Checks

In this section, we discuss the results of the robustness analysis, where different empirical specifications and sample selection rules are adopted (see Table 5). As discussed in Subsection 3.3 of the paper, parents in the treatment group are slightly older than those in the comparison group. To address this concern, we follow Illing, Schmieder and Trenkle (2021) and use propensity score matching (PSM) to construct a control group with similar pre-birth characteristics as those in the treatment group.²² Estimates based on the matching sample, presented in Columns (1) and (5) of Table 5, are similar to our main results.

Another concern regarding our main estimates is that the treated parents have disabled children in different years (2004-2007), which might introduce bias into DID estimates. Recent advancements in DID design (De Chaisemartin and d’Haultfoeuille, 2020; Callaway and Sant’Anna, 2021; Goodman-Bacon, 2021; Sun and Abraham, 2021; Baker, Larcker and Wang, 2022) have pointed out that, when treatment timing varies, DID estimates might be biased since the control group could contain later-treated units. As a robustness check, we employ a two-step estimation strategy with a bootstrap procedure (CS-DID), proposed by Callaway and Sant’Anna (2021), and use never-treated as our control group.²³ The results obtained from the CS-DID estimation, as shown in Columns (2) and (6) of Table 5, are quantitatively similar to the main results.

Next, we investigate the sensitivity of our main results to different sample selection criteria. Although most of the disabilities examined cannot be easily detected through prenatal care check-ups, certain conditions, such as chromosomal disorders (*e.g.*, Down syndrome), can be identified early on, and parents may opt to terminate their pregnancy, potentially resulting in sample selection bias (*i.e.*, the treated parents in our sample are those who chose not to terminate their pregnancy despite the abnormality). To address this issue, we exclude parents with a disabled child diagnosed

²²We use the same set of predetermined covariates X_i and age dummies in PSM.

²³Specifically, the CS-DID estimator calculates the treatment effect of each cohort (*i.e.*, parents having a disabled child in different years) separately, then averages the results for all possible combinations, such that the treated parents are compared to those who have never been treated. In addition, we use inverse probability weighting or doubly-robust methods to re-weight the control group, and to ensure that the observed characteristics of all treated cohorts and the control group are balanced.

with chromosomal disorders. The results based on this sample, presented in Columns (3) and (7) of Table 5, are similar to the main findings.

Finally, we also examine the sensitivity of the main results to a single and more severe disability. To accomplish this, parents with a child having cerebral palsy are used as the treatment group to conduct a DID analysis. Cerebral palsy is a severe lifelong disability that affects posture, muscle tone, and movement and is the major child disability in the sample. The DID estimates are presented in Columns (4) and (8) of Table 5. Panel A shows that mothers' employment and annual earnings decrease by 11.7% and 20.9%, respectively, which is slightly larger than the main estimates reported in Table 4. This is likely due to the heavier time burden on parents with a child having cerebral palsy in comparison to other disabilities. However, fathers' employment rate and annual earnings are not impacted by having a child with cerebral palsy, as presented in Columns (4) and (8) of Table 5 Panel B. These findings are consistent with the main results reported in Table 4.

6 Mechanisms

In this section, we build a theoretical model to discuss possible mechanisms that could result in differences in how mothers and fathers respond to having a child with disabilities and investigate model's implications empirically.

6.1 Conceptual Framework

Consider a household consisting two parents and one child, and each parent has one unit of time that can be spent on labor market work and taking care of the child (to maintain the child's health). In a unitary household setting, the parents derive utility from consumption, denoted by c , and the child's health, denoted by h :

$$U(c, h) = (1 - \varphi) \ln c + \varphi \ln h - \delta g(l, \hat{l}). \quad (3)$$

The father and mother, respectively, supply l_f and l_m units of labor hours to the market, where

$0 \leq l_g \leq 1$ for $g \in \{f, m\}$. Their wage rates, w_f and w_m , are assumed to be exogenously given. The household's consumption is purchased from the market using their wage income. As a result, the consumption level denoted by c is determined by:

$$c = l_f w_f + l_m w_m \quad (4)$$

We assume that a household's decision making is governed by parents' relative productivity in the labor market and in home production, and social norms regarding gender division of household labor. Our specification of social norms in the model $\delta g(l, \hat{l})$ follow [De Silva and Tenreyro \(2020\)](#). $g(l, \hat{l})$ is a function that measures the deviation between an individual's chosen labor supply l and the prevailing social norms \hat{l} . We assume $\delta > 0$, representing a disutility from deviating from the social norms. That is, a household face penalties when the male parent is not employed full-time, as this diverges from the social norms. This setting is in line with recent studies ([Bertrand, Kamenica and Pan, 2015](#); [Kleven et al., 2019](#); [Bertrand, 2020](#); [Myong, Park and Yi, 2021](#); [Siminski and Yetsenga, 2022](#)) which suggest that the social norms play a significant role in the gender division of labor.

φ is a parameter governing the utility weight on child's health h , which is determined by endowment at birth h_e and parents' child health production h_p . A child's health endowment $h_e > 0$ is random draw from a positive support $[\underline{h}, \bar{h}]$. We interpret a low h_e as a permanent health shock. The parents may engage in child health production to compensate their child's low health endowment h_e . The output of is health production is denoted h_p , and the inputs are the child's health endowment and the parents' caregiving time:

$$h_p = \gamma_f(1 - l_f) + \gamma_m(1 - l_m) + h_e \quad (5)$$

where γ_f and γ_m represent the productivity levels of females and males in health production (i.e., caregiving ability), respectively.

We assume that

$$h = \min\{h_p, \bar{h}\} \quad (A1)$$

$$\underline{h} + \min\{\gamma_f, \gamma_m\} > \bar{h}. \quad (\text{A2})$$

While assumption (A2) is a regularity condition governing the relationship between h and h_p , assumption (A2) implies that child health production is handled by either parent alone.

(a) Gender-neutral social norms and equal caregiving ability

In the benchmark scenario, we set $\gamma_f = \gamma_m$ and $\delta = 0$, such that neither differential productivity in child health production nor social norms play a role. In Online Appendix B, we show that in this case, gender differences in labor supply is solely determined by relative market productivity (i.e., w_f vs. w_m). Specifically, a shock to child health predominantly affects the labor supply of the parent with relatively lower wage, regardless the gender.

(b) Gender-neutral social norms and unequal caregiving ability

As detailed in Online Appendix B, we find that if females are better in child health production than males ($\gamma_f > \gamma_m$), even primary-earning females may reduce their labor supply more than secondary-earning males in response to a child health shock.

(c) Gender-biased social norms and equal caregiving ability

When $\delta > 0$ and social norms come into play (i.e., household utility is penalized when the father work less than the mother in the labor market or when the mother provides less child health production input than the father), in face of a low h_e a mother will engage in child health production even if her wage is higher than the father.

6.2 Relative Earnings and Gender Effect

Our model suggests that in the scenario, where parental caregiving productivity is the same and social norms are gender-neutral, the parent earning less is typically the one who adjusts their labor supply in response to a child's health shock. When gender-biased social norms or differential child health productivity are introduced, we obtain a different production: mothers may still be more inclined to reduce their labor supply when a child experience a health shock, even if they are the primary earners.

Based on these insights from the model, we partition the sample into two subsamples: with one

consisting mothers who were the major earner before birth of the first child and other consisting fathers who were the major earner in the household.²⁴ The results are reported in Table 6. When fathers were the primary earners (see Panels A and B), having a child with disability reduced the employment rate of mothers by 6.4 percentage points (i.e., a 10.1% drop relative to the baseline mean) and decreased their annual earnings by 33,286 NT\$ (i.e., a 16.6% decrease from the baseline mean). These estimates are slightly larger than the baseline results, which showed an 8.9% and 15.9% decline in employment and earnings for mothers, respectively. Similar to the baseline results, fathers' labor market outcomes were almost unaffected by child disability when they were the primary earners. Interestingly, when mothers were the primary earners, childhood disability did have negative effects on fathers' labor market outcomes but the impact was still larger for mothers. The employment rate and annual earnings of mothers decreased by 7.7% and 15.4%, respectively (see Panel C), compared to the decreases of 6.6% and 9.6% in employment rate and annual earnings for fathers, respectively (see Panel D).

Our findings indicate that the way mothers and fathers adjust their labor supply for having a disabled child is partially influenced by how much each parent earns. This shows that market forces do have some impact on how caregiving duties are shared between parents. However, even when the mother earns more than the father, she still tends to take on a larger share of the negative impacts. This suggests that our empirical results align more closely with models that account for factors like differential caregiving ability or social norms.

To better understand how much relative earnings and gender-specific factors contribute to the differences in how mothers and fathers respond to having a disabled child, we pool the observations for mothers and fathers. We then use this pooled data to estimate the following regression model.

²⁴Primary earner is defined as the person whose earnings constitute more than half of total annual earnings of a household, measured two years before childbirth.

$$\begin{aligned}
Y_{it} = & \alpha_1 \text{Disabled}_i + \alpha_2 \text{Post}_t + \alpha_3 \text{Second}_i + \alpha_4 \text{Female}_i \\
& + \alpha_5 \text{Second}_i \times \text{Post}_t + \alpha_6 \text{Female}_i \times \text{Post}_t + \alpha_7 \text{Second}_i \times \text{Female}_i \\
& + \theta_1 \text{Disabled}_i \times \text{Post}_t + \theta_2 \text{Disabled}_i \times \text{Post}_t \times \text{Second}_i + \theta_3 \text{Disabled}_i \times \text{Post}_t \times \text{Female}_i \\
& + \mathbf{X}_i \boldsymbol{\beta} + a_{it} + \lambda_t + \nu_i + \varepsilon_{it},
\end{aligned} \tag{6}$$

In this setting, we extend equation (2) by adding two dummy variables and their interaction terms with Disabled_i and Post_t : 1) Second_i , which indicates whether an individual is a secondary earner²⁵; 2) Female_i , which represents a female individual. The coefficient θ_1 of $\text{Disabled}_i \times \text{Post}_t$ captures the effect of having a disabled child on the labor supply of the baseline group (i.e., primary-earning fathers). We are particularly interested in the interaction term between Second_i and $\text{Disabled}_i \times \text{Post}_t$. Its coefficient θ_2 measures the additional impact of child disability on labor market outcomes for parents who are secondary earners. This reflects adjustments in parental labor supply in light of relative labor earnings. Another key estimate is the coefficient θ_3 of $\text{Female}_i \times \text{Disabled}_i \times \text{Post}_t$, which indicates the additional impact of child disability driven by gender effects. This could be due to females having better caregiving abilities or social norms that encourage them to take care of children and discourage them from working.

The results are reported in Table 7. Columns (3) and (6) of the table reveal notable differences between the coefficients θ_2 and θ_3 , which measure the extra negative impacts of being a 'Secondary Earner' and 'Female,' respectively. Specifically, the coefficient θ_3 indicates that being 'Female' substantially amplifies the negative effects of child disability on both the employment rate and annual earnings. According to our estimates, this amplification is by 4.8 percentage points for the employment rate and by 37,175 NT\$ for annual earnings. In contrast, the coefficient θ_2 is considerably smaller and lacks statistical significance, highlighting a much small negative impact on labor supply when an individual is a 'Secondary Earner.'

²⁵A secondary earner is defined as a person whose earnings constitute less than half of the total annual earnings of a household, measured two years before childbirth.

These results reinforce the results in Table 6 that when mothers become the primary earners, it only slightly mitigates the decrease in their employment rate and annual earnings. Instead, our findings suggest that gender effects – where females might have a comparative advantage in caregiving tasks, or societal norms may discourage them from working when they have a disabled child – is likely a more important factor in explaining the gender difference in effects of having a disabled child.

6.3 Gender Effects: Caregiving Ability or Social Norms

In this section, we report two subgroup analyses to examine how caregiving ability and social norms could affect the gender difference in parental responses to child disability. Table 8 reports the DID estimates for mothers and fathers by type of disability, which is categorized into physical and mental disability. For the caring of a physically disabled child, fathers may be better suited for the physical labor involved in caring for such children. If caregiving ability indeed influences the division of labor, it is reasonable to expect that having a physically disabled child would also impact the labor supply of fathers.²⁶ In Panels A and B of Table 8, we observe that having a child with a physical disability negatively impacts the annual earnings of both mothers and fathers, decreasing them by 10% and 3%, respectively. For children with mental disability (e.g., autism), mothers have a comparative advantage in caring for such children. Consistent with this fact, Panels C and D show that when the child has a psychological disability, mothers face a dramatic 25% decline in their annual earnings, while fathers experience an 11% increase.

Table 9 presents the DID estimates for both mothers and fathers, broken down by the gender norms prevalent in their living counties. To gauge the measure of gender norms, we rely on individual responses to a question from the [ISSP Research Group \(2016\)](#) survey ([Kleven et al., 2019](#)): 'Do

²⁶According to [Ngai and Petrongolo \(2017\)](#), men tend to excel in physical tasks due to their greater brawn skills, while women have a comparative advantage in roles emphasizing communication and interpersonal abilities. Mental health caregiving requires unique interpersonal and cognitive skills, with a strong emphasis on empathy and understanding, as individuals with mental health challenges have complex emotional needs. As [Wampold \(2015\)](#) note, cognitive skills like empathy are crucial in mental caregiving. Additionally, [Azmat and Petrongolo \(2014\)](#) highlight gender differences in social attitudes related to altruism, fairness, and caring behavior, particularly in roles involving assistance and caregiving.

you think women should work outside the home full-time, part-time, or stay at home when there is a child under school age?’ We then calculate the percentage of respondents who chose ‘stay at home’ to assess the level of opposition to women working in each county. Based on these percentages, we classify counties into two categories: 1) Those less opposed to women working (where less than 35% chose ‘stay at home’); 2) Those more opposed to women working (where 35% or more chose ‘stay at home’). Our findings indicate that in counties less opposed to women working, the negative impact of child disability on mothers’ employment rates is slightly less severe—a 8% decrease as shown in Panel A—compared to an 9.5% decrease in counties more opposed to women working, as indicated in Panel C. In addition, the adversity of child disability on mothers’ annual earnings is analogous across both groups. Our results do suggest that the negative impact of child disability on mothers’ employment may be related to prevailing gender norms. However, given the relatively small variation in gender norms across counties in Taiwan, the differences in the negative effects observed here are also minor.²⁷

7 Other Parental Responses

The results discussed above show that the labor market outcomes of parents are affected by having a disabled child. However, having a disabled child may give rise to other adverse outcomes, and the baseline estimates we obtained may be influenced by these other outcomes. For instance, the mental health of parents may be negatively affected, which could worsen their employment and earnings. To understand the impact of child disability on other parental outcomes and how these outcomes can potentially affect parental labor supply, we will examine the effects of child disability on parental mental health, marital stability, and subsequent fertility.

²⁷The highest opposition to women working being in Yunlin County (41%) and the lowest in Miaoli County (22%), and most counties ranging between 30% to 40%.

7.1 Impacts on Mental Health

To examine the impact of child disability on parents' mental health, we use the event study specification in equation (1). The outcome is a measure of mental healthcare utilization, specifically whether the parent had a physician visit related to mental health. Figure 6 displays the event study results (i.e., the estimated coefficients δ_k) for physician visits to treat mental illness.²⁸ We find that having a disabled child results in a short-term decline in mothers' mental health. In the first four years after the birth of a disabled child, the probability of mothers visiting psychiatrists increases significantly by 2 percentage points, as shown in Figure 6a. However, this effect is temporary and disappears by the tenth year after the child's birth. Our results on the mental health outcome of mothers are consistent with Eriksen et al. (2021), and the temporary nature of the effect suggests that it does not exacerbate the impact of child disability on labor supply, which persists for at least 10 years.

In contrast, Figure 6b indicates that the fathers' probability of seeking mental healthcare remains unaffected, as all coefficient estimates are small and statistically insignificant. This finding differs from that of Eriksen et al. (2021), where fathers' probability of seeking mental healthcare also increased in the first few years following a child's disease onset, albeit to a lesser extent than mothers'. The study by Breivik and Costa-Ramón (2022), which use data from Finland and Norway, also find that children's health shocks negatively impact the mental health of both parents.

Our results suggest that the difference in mental health responses between mothers and fathers to having a disabled child may be explained by the fact that, in Taiwan, mothers are typically the primary caretakers of disabled children. This finding is consistent with our earlier analysis presented in Table 4, which indicates that mothers experience a more severe negative impact on labor market outcomes than fathers when their child has disabilities. The impact on mental health may be another channel that child disabilities affect mothers' income and employment. That is, in addition to devoting more time on caring for a disabled child, mothers' worse mental health may have further worsened their labor market outcomes.

²⁸Note that a visit is considered mental-health-related if the physician's major diagnosis is coded 290-319 (ICD-9).

7.2 Impacts on Marital Dissolution and Subsequent Fertility

We will now investigate how child disability affects the likelihood of parental marital dissolution and the probability of having subsequent children. The existing evidence on these issues is inconclusive. Some studies have shown that poor child health increases the chances of divorce (Reichman, Corman and Noonan, 2004; Swaminathan, Alexander and Boulet, 2006; Gunnsteinson and Steingrimsdottir, 2019), while others find that children’s health shocks have little effect on family stability (Breivik and Costa-Ramón, 2022). Similarly, the existing literature has mixed findings on the impact of children’s health shocks on subsequent fertility - some studies find a decreased likelihood of having another child after such shocks (MacInnes, 2008; Gunnsteinsson and Steingrimsdottir, 2019), while others suggest parents’ decision to have more children depends on whether the shock caused the child’s death (Adhvaryu et al., 2022).²⁹

To examine whether child disability affects marital stability and subsequent fertility, and how these factors may potentially affect parental labor supply, we employ the following linear probability model:

$$Y_i = \alpha \text{Disabled}_i + \mathbf{X}_i \boldsymbol{\beta} + a_i + \mu_t + \varepsilon_i. \quad (7)$$

where Y_i is a dummy variable indicating (i) a dissolution in parents’ marriage or (ii) having a second child within 10 years after the firstborn. Disabled_i is a treatment group dummy indicating that the firstborn has disabilities. \mathbf{X}_i is a set of pre-birth characteristics observed two years prior to the first birth. We also include fixed effects for age, a_i , and year of having firstborn, μ_t . Since our data do not provide information on parents’ separation or divorce, we measure marital stability by whether or not they live in different townships and exclude parents who had not lived in the sample township before child birth.³⁰ Restricting our sample to include only parents having the

²⁹Adhvaryu et al. (2022) finds that an increase in the probability of subsequent births for parents whose child died because of the cancer.

³⁰This definition is appropriate for our research purposes since couples who reside in different townships are more likely to be solely responsible for the care of their children. Using household registration data, which provides information on an individual’s marital status and place of residence, we have determined that our proxy measure accurately

same township of residence results in a sample of 226,917 households. There are 14% of parents who had not lived in the sample township before child birth and are hence excluded. Table A.1 of the Online Appendix shows the summary statistics for this sample. We find that there are only slight and mostly insignificant differences between the characteristics of treated and untreated parents.

Table 10 reports the results on marital dissolution (Columns (1) to (3)) and subsequent fertility (Columns (4) to (6)). The results indicate that child disability does not affect marital dissolution: the estimates are small and statistically insignificant. This finding is in line with the results from Breivik and Costa-Ramón (2022). The absence of an effect on marital dissolution implies that it is not a factor explaining parental adverse labor market outcomes.

The last three columns of Table 10 suggest that having a disabled firstborn child reduces the likelihood of having a second child by 3.5 percentage points, which represents a 5.4% decline from the baseline mean of 0.64. This finding is consistent with previous studies (MacInnes, 2008; Gunnsteinsson and Steingrimsdottir, 2019). For example, MacInnes (2008) provide qualitative evidence, based on small sample interviews, that parents of disabled children often have a reduced fertility rate due to the high burden of care associated with their child's disability. The financial burden resulting from reduced family income or the significant amount of time required to care for a disabled child could be reasons for the lower subsequent fertility rate among mothers with a disabled child. However, we could not pinpoint the exact reasons for this result.

The finding of a reduction in the likelihood of having a second child suggests that subsequent fertility behavior does not exacerbate the impact of child disability on parental labor market outcomes, given that additional children would have a negative impact on mothers' labor market outcomes. In fact, the subdued subsequent fertility behavior could alleviate the financial and time burden of caring for a disabled firstborn child, thereby mitigating the impact of child disability on parental labor market outcomes.

captures around 85% of marital dissolution. Unfortunately, we are unable to link household registration data with the NHI enrollment file.

8 Conclusion

This study uses a long panel of high-quality Taiwanese individual administrative data to investigate the effects of child disability on parental labor market outcomes. We employ a difference-in-differences design to compare the trend in labor market outcomes of parents with a disabled firstborn to those with a healthy child before and after the birth. Our results suggest that having a disabled child significantly reduces mothers' employment and earnings by 9% and 16%, respectively. This negative effect persists for at least ten years following the birth of a disabled child. In sharp contrast, the impact of child disability on the fathers' labor market outcomes is negligible and statistically insignificant.

In addition, we explore the mechanism of differential labor supply response of the father and the mother to the onset of their child's disability. To guide our empirical analysis, we develop a theoretical model which considers the effects of parents' differential productivity in the labor market and child health production, and gender-biased social norms. Using the insights from this theoretical model we design our empirical analysis of the mechanism and the interpretation of the results. We find that a mother experiences a larger reduction in employment and earnings compared to her husband, even if the mother is the primary earner in the family. Our analysis comparing the effects of being a mother (*i.e.*, gender effect) and being a secondary earner (*i.e.*, relative income effect) suggests that the "gender effect" is much larger than the "relative income effect" in explaining the divergent labor market outcomes between mothers and fathers.

We also investigate the impacts of child disability on other parental outcomes, such as mental health, marital dissolution and subsequent fertility. Our results indicate that mothers of a disabled child have a higher probability of visiting a psychiatrist during the first few years following child-birth, but the fathers' likelihood is not affected. Moreover, we find that child disability has a negative impact on subsequent fertility, but it does not affect marital dissolution. These results suggest that it is unlikely that parental mental health, marital stability, or subsequent fertility are channels through which child disability negatively and persistently affects mothers' labor market outcomes.

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Tables

Table 1: Catastrophic Illness and ICF

Disability Category	Disability Description	
1	Nervous System and Mental Functions	
2	Eye, Ear and Related Systems, and Sensory Functions	
3	Sound and Speech Systems	
4	Circulatory, Hematopoietic, Immune and Respiratory Systems	
5	Digestion, Metabolism and Endocrine Systems	
6	Urinary and Reproductive Systems	
7	Nerves, Muscles, Bone and Movement-Related Systems	
8	Integumentary and Related Systems	
Additional	Rare Diseases and Disabilities Identified by Central Authority	
Catastrophic Illness	Disability Category	Frequency
Infantile Cerebral Palsy	7	26.5%
Congenital Anomalies of Digestive System	5	19.3%
Psychoses with Origin Specific to Childhood	1	15.5%
Chromosomal Anomalies	1	15.0%
Renal Agenesis and Dysgenesis	6	10.7%
Other Rare Diseases	Additional	5.2%
Congenital Muscular and Motor Neuron Disease	7	2.3%
Transplant Complications	4,5,6	1.7%
Congenital Lung Anomalies	4	1.4%
Chondrodystrophy	7	1.2%
Congenital Anomalies of Integument	8	0.7%
Immune Mechanism Disorders	5	0.4%

Note: This table shows the correspondence of catastrophic illness, identified in the Catastrophic Illness Program of National Health Insurance, and disability, defined by Taiwan Ministry of Health and Welfare. The frequency is the total prevalence of a specific illness as a percentage of total cases of illness (N=1,125). The ICD-9 codes of catastrophic illness are listed in footnote 15.

Table 2: Descriptive Statistics for Treatment and Control Groups

	Male				Female			
	Treatment	Control	Difference	% Difference	Treatment	Control	Difference	% Difference
Age	30.743 (0.138)	30.227 (0.009)	0.516*** [0.136]	1.68%	27.811 (0.120)	27.253 (0.008)	0.558*** [0.116]	2.01%
Annual Earnings	359,754 (7,984)	344,483 (505)	15,271** [7,729]	4.24%	258,063 (6,432)	253,486 (422)	4,577 [6,462]	1.77%
Employment Rate	0.828 (0.011)	0.818 (0.001)	0.011 [0.012]	1.27%	0.731 (0.013)	0.732 (0.001)	-0.002 [0.013]	-0.24%
Monthly Earnings	31,915 (653)	30,348 (41)	1,567** [633]	4.91%	23,391 (539)	23,047 (35)	345 [535]	1.47%
Working Month	9.179 (0.141)	9.118 (0.009)	0.061 [0.143]	0.67%	7.954 (0.158)	7.886 (0.010)	0.068 [0.158]	0.85%
Public Sector Workers	0.050 (0.006)	0.051 (0.000)	-0.001 [0.007]	-2.84%	0.060 (0.006)	0.054 (0.000)	0.006 [0.006]	10.14%
Private Sector Workers	0.601 (0.015)	0.595 (0.001)	0.006 [0.013]	0.95%	0.530 (0.015)	0.541 (0.001)	-0.011 [0.015]	-2.04%
Living in Cities	0.660 (0.014)	0.650 (0.001)	0.010 [0.014]	1.45%	0.608 (0.015)	0.613 (0.001)	0.005 [0.015]	-0.75%
# of Households	1,125	262,320			1,125	262,320		

Note: Standard deviations are in parentheses, and standard errors are in brackets. All dollars are adjusted with the CPI and displayed in 2016 NT\$ (1 NT\$ ~ 0.032 US\$). Living in Cities means the share of individuals who live in the six main cities in Taiwan: Taipei City, New Taipei City, Taoyuan City, Taichung City, Tainan City, and Kaohsiung City. *** significant at the 1 percent level, ** significant at the 5 percent level, and * significant at the 10 percent level.

Table 3: Probability of Having Child with Disabilities and Individual Characteristics

	Having Child with Disabilities	
	Fathers	Mothers
Age	9.55e-05*** [3.01e-05]	0.000161*** [3.78e-05]
Annual Earnings	1.28e-09 [8.35e-10]	-1.24e-09 [1.09e-09]
Employment Status	0.00122 [0.000802]	-0.000713 [0.000639]
Working Month	-0.000125* [7.47e-05]	0.000114 [7.32e-05]
Public Sector Workers	-0.000574 [0.000694]	-0.000177 [0.000780]
Private Sector Workers	-0.000190 [0.000405]	-0.000479 [0.000484]
Living in Cities	-6.88e-06 [0.000277]	-0.000407 [0.000282]
Observations	263,445	263,445
R-squared	0.000	0.000
F-test(p-value)	0.01	0.02
p-value of F-Test(exclude age)	0.72	0.43

Note: This table reports a linear probability model showing the effect of having a disabled child on various covariates measured at two years prior to childbirth: Age, Annual Earnings, Employment Status, Months of Working, Sector of Employment, and Living in Cities or not. The outcome variable Pr_{it} takes the value of 1 when the individual has a disabled children and 0 otherwise. All dollars are adjusted with the CPI and displayed in 2016 NT\$ (1 NT\$ \sim 0.032 US\$). Note that the F-test excluding Age is not significant (p -values for males and females is 0.43 and 0.72, respectively), which indicates that differences between treatment and control groups are mainly caused by differences in age. Standard errors are in brackets. *** significant at the 1 percent level, ** significant at the 5 percent level, and * significant at the 10 percent level.

Table 4: Effects of Child Disability on Family Labor Supply

	Employment			Annual Earnings		
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: Female						
<i>Disabled</i> × <i>Post</i>	-0.074*** (0.011)	-0.066*** (0.011)	-0.066*** (0.011)	-40,631*** (5,133)	-39,513*** (5,113)	-40,271*** (5,295)
Baseline Mean		0.732			253,486	
Percent Change	-10.13%	-8.97%	-8.94%	-16.03%	-15.59%	-15.89%
Observations		3,951,675			3,951,675	
Panel B: Male						
<i>Disabled</i> × <i>Post</i>	-0.015* (0.008)	-0.011 (0.008)	-0.009 (0.008)	-2,835 (6,104)	-1,255 (6,075)	-2,301 (6,290)
Baseline Mean		0.818			344,483	
Percent Change	-1.77%	-1.36%	-1.16%	-0.82%	-0.37%	-0.67%
Observations		3,951,675			3,951,675	
Basic DID	✓	✓	✓	✓	✓	✓
Individual characteristics		✓			✓	
Year FE and Age FE		✓	✓		✓	✓
Individual FE			✓			✓

Note: This table reports the estimated coefficients of $Disabled_i \times Post_t$ in Equation (2). The outcome variable, Y_{it} , represents the labor market outcomes of interest: Employment Status and Annual Earnings of individual i at year t . Employment Status takes the value of 1 when the individual is working at least one month in a year and 0 otherwise. Annual Earnings are adjusted with the CPI and displayed in 2016 NT\$ (1 NT\$ ~ 0.032 US\$). The coefficient of $Disabled_i \times Post_t$ stands for the effect of having a disabled child on the treatment group compared to the control group. Columns (1) and (4) control for a treatment group dummy, $Disabled_i$, and a dummy indicating post-treatment period, $Post_t$. Columns (2) and (5) further include year fixed effects, age fixed effects, and a set of predetermined covariates measured at two years prior to childbirth: Employment Status, Annual Earnings, Working in Private Sector, Working in Public Sector, and Living in Cities. Columns (3) and (6) include the fixed effects for year, age, and individual. Standard errors are clustered at the individual level and are reported in parentheses. *** significant at the 1 percent level, ** significant at the 5 percent level, and * significant at the 10 percent level.

Table 5: Effects of Child Disability on Family Labor Supply: Robustness Checks

	Employment				Annual earnings			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Panel A: Female								
<i>Disabled</i> × <i>Post</i>	-0.078***	-0.068***	-0.067***	-0.086***	-36,730***	-36,835***	-41,691***	-53,062***
	(0.014)	(0.011)	(0.012)	(0.022)	(6,656)	(4,887)	(5,703)	(10,354)
Baseline Mean	0.716	0.732	0.732	0.732	244,864	253,486	253,486	253,486
Percent Change	-10.83%	-9.26%	-9.17%	-11.73%	-15.00%	-14.53%	-16.45%	-20.93%
Observations	33,750	3,951,675	3,949,710	3,939,060	33,750	3,951,675	3,949,710	3,939,060
Panel B: Male								
<i>Disabled</i> × <i>Post</i>	-0.013	-0.015*	-0.009	-0.022	1,725	-5,234	-1,445	-9,165
	(0.012)	(0.008)	(0.009)	(0.018)	(8,677)	(5,590)	(6,752)	(12,030)
Baseline Mean	0.818	0.818	0.818	0.818	355,433	344,483	344,483	344,483
Percent Change	-1.60%	-1.87%	-1.28%	-2.67%	0.49%	-1.52%	-0.42%	-2.66%
	33,750	3,951,675	3,944,100	3,939,060	33,750	3,951,675	3,944,100	3,939,060
Propensity score matching	✓				✓			
CS-DID estimates		✓				✓		
Different treatment group 1			✓				✓	
Different treatment group 2				✓				✓

Note: This table reports the estimated coefficients of $Disabled_i \times Post_t$ in Equation (2). The outcome variable, Y_{it} , represents the labor market outcomes of interest: Employment Status and Annual Earnings of individual i at year t . Employment Status takes the value of 1 when the individual is working at least one month in a year and 0 otherwise. Annual Earnings are adjusted with the CPI and displayed in 2016 NT\$ (1 NT\$ ~ 0.032 US\$). The coefficient of $Disabled_i \times Post_t$ stands for the effect of having a disabled child on the treatment group compared to the control group. All columns include a treatment group dummy $Disabled_i$, a dummy indicating post-treatment period $Post_t$, and the fixed effects for year, age, and individual. Columns (1) and (5) report the estimates that use propensity score matching (PSM) to construct a control group with similar pre-birth characteristics as those in the treatment group. Columns (2) and (6) report the estimates based on a two-step estimation strategy with the bootstrap procedure (CS-DID) proposed by Callaway and Sant'Anna (2021). Columns (3) and (7) report the estimates from the treatment group excluding parents having a disabled child with chromosomal disorders. Columns (4) and (8) report the estimates from the treatment group only including parents having a firstborn with cerebral palsy. Standard errors are clustered at the individual level and are reported in parentheses. *** significant at the 1 percent level, ** significant at the 5 percent level, and * significant at the 10 percent level.

Table 6: Effects of Child Disability on Family Labor Supply: By Breadwinners Status

	Employment			Annual Earnings		
	(1)	(2)	(3)	(4)	(5)	(6)
<i>Primary Earner: Male</i>						
Panel A: Female						
<i>Disabled</i> × <i>Post</i>	-0.075*** (0.014)	-0.064*** (0.013)	-0.064*** (0.014)	-34,196*** (5,841)	-32,468*** (5,832)	-33,286*** (6,033)
Baseline Mean		0.632			200,342	
Percent Change	-11.93%	-10.16%	-10.10%	-17.07%	-16.21%	-16.62%
Observations		2,679,525			2,679,525	
Panel B: Male						
<i>Disabled</i> × <i>Post</i>	0.001 (0.009)	0.004 (0.009)	0.005 (0.009)	5,867 (7,513)	6,725 (7,475)	5,365 (7,737)
Baseline Mean		0.895			409,320	
Percent Change	0.12%	0.42%	0.55%	1.43%	1.64%	1.31%
Observations		2,679,525			2,679,525	
<i>Primary Earner: Female</i>						
Panel C: Female						
<i>Disabled</i> × <i>Post</i>	-0.075*** (0.015)	-0.073*** (0.015)	-0.073*** (0.016)	-55,352*** (9,956)	-55,520*** (9,897)	-56,248*** (10,272)
Baseline Mean		0.944			365,406	
Percent Change	-7.90%	-7.69%	-7.73%	-15.15%	-15.19%	-15.39%
Observations		1,272,150			1,272,150	
Panel D: Male						
<i>Disabled</i> × <i>Post</i>	-0.045*** (0.017)	-0.044*** (0.016)	-0.043** (0.017)	-20,624** (10,365)	-19,193* (10,318)	-19,999* (10,682)
Baseline Mean		0.654			207,937	
Percent Change	-6.86%	-6.71%	-6.57%	-9.92%	-9.23%	-9.62%
Observations		1,272,150			1,272,150	
Basic DID	✓	✓	✓	✓	✓	✓
Individual characteristics		✓			✓	
Year FE and age FE		✓	✓		✓	✓
Individual FE			✓			✓

Note: This table reports the estimated coefficients of $Disabled_i \times Post_t$ in Equation (2) for two subgroups by the Primary Earner status, which is defined as an individual earning more than half of total annual earnings of a household (measured at two years prior to childbirth). The outcome variable, Y_{it} , represents the labor market outcomes of interest: Employment Status and Annual Earnings of individual i at year t . Employment Status takes the value of 1 when the individual is working at least one month in a year and 0 otherwise. Annual Earnings are adjusted with the CPI and displayed in 2016 NT\$ (1 NT\$ ~ 0.032 US\$). The coefficient of $Disabled_i \times Post_t$ stands for the effect of having a disabled child on the treatment group compared to the control group. Columns (1) and (4) control for a treatment group dummy, $Disabled_i$, and a dummy indicating post-treatment period, $Post_t$. Columns (2) and (5) further include year fixed effects, age fixed effects, and a set of predetermined covariates measured at two years prior to childbirth: Employment Status, Annual Earnings, Working in Private Sector, Working in Public Sector, and Living in Cities. Columns (3) and (6) include the fixed effects for year, age, and individual. Standard errors are clustered at the individual level and are reported in parentheses. *** significant at the 1 percent level, ** significant at the 5 percent level, and * significant at the 10 percent level.

Table 7: Relative Earnings Versus Gender Role

	Employment			Annual Earnings		
	(1)	(2)	(3)	(4)	(5)	(6)
<i>Disabled</i> × <i>Post</i>	-0.006 (0.009)	0.002 (0.008)	0.002 (0.009)	-1,702 (6,787)	-595 (6,752)	-1,699 (6,993)
<i>Disabled</i> × <i>Post</i> × <i>Female</i>	-0.053*** (0.014)	-0.049*** (0.014)	-0.048*** (0.014)	-37,395*** (8,627)	-37,090*** (8,585)	-37,175*** (8,895)
<i>Disabled</i> × <i>Post</i> × <i>Second</i>	-0.023* (0.014)	-0.023* (0.014)	-0.023 (0.014)	-2,668 (8,627)	-2,807 (8,585)	-2,750 (8,895)
Observations		7,903,350			7,903,350	
Basic DID	✓	✓	✓	✓	✓	✓
Individual characteristics		✓			✓	
Year FE and age FE		✓	✓		✓	✓
Individual FE			✓			✓

Note: This table reports the estimated coefficients of $Disabled_i \times Post_t$, $Disabled_i \times Post_t \times Female_i$ and $Disabled_i \times Post_t \times Second_i$ in Equation (6). The outcome variable, Y_{it} , represents the labor market outcomes of interest: Employment Status and Annual Earnings of individual i at year t . Employment Status takes the value of 1 when the individual is working at least one month in a year and 0 otherwise. Annual Earnings are adjusted with the CPI and displayed in 2016 NT\$ (1 NT\$ ~ 0.032 US\$). The coefficient of $Disabled_i \times Post_t$ captures the effect of a disabled child on the labor supply of the baseline group (*i.e.*, primary-earning fathers). The coefficients of $Disabled_i \times Post_t \times Female_i$ and $Disabled_i \times Post_t \times Second_i$ measure the additional effect of being mothers and being secondary earners, respectively. Columns (1) and (4) control for a treatment group dummy, $Disabled_i$, and a dummy indicating post-treatment period, $Post_t$. Columns (2) and (5) further include year fixed effects, age fixed effects, and a set of predetermined covariates measured at two years prior to childbirth: Employment Status, Annual Earnings, Working in Private Sector, Working in Public Sector, and Living in Cities. Columns (3) and (6) include the fixed effects for year, age, and individual. Standard errors are clustered at the individual level and are reported in parentheses. *** significant at the 1 percent level, ** significant at the 5 percent level, and * significant at the 10 percent level.

Table 8: Effects of Child Disability on Family Labor Supply: By Type of Disability

	Employment			Annual Earnings		
	(1)	(2)	(3)	(4)	(5)	(6)
<i>Physical Disability</i>						
Panel A: Female						
<i>Disabled</i> × <i>Post</i>	-0.051*** (0.009)	-0.046*** (0.009)	-0.046*** (0.010)	-26,492*** (4,404)	-26,014*** (4,394)	-26,453*** (4,547)
Baseline Mean		0.732			253,486	
Percent Change	-6.97%	-6.28%	-6.28%	-10.45%	-10.26%	-10.43%
Observations		3,955,125			3,955,125	
Panel B: Male						
<i>Disabled</i> × <i>Post</i>	-0.013 (0.009)	-0.012 (0.009)	-0.011 (0.009)	-10,497* (5,474)	-10,406* (5,438)	-11,121** (5,631)
Baseline Mean		0.818			344,483	
Percent Change	-1.58%	-1.46%	-1.34%	-3.04%	-3.02%	-3.22%
Observations		3,955,125			3,955,125	
<i>Mental Disability</i>						
Panel C: Female						
<i>Disabled</i> × <i>Post</i>	-0.126*** (0.028)	-0.102*** (0.028)	-0.101*** (0.029)	-67,611*** (15,778)	-63,696*** (15,672)	-65,493*** (16,270)
Baseline Mean		0.732			253,486	
Percent Change	-17.21%	-13.93%	-13.79%	-26.67%	-25.12%	-25.83%
Observations		3,937,350			3,937,350	
Panel D: Male						
<i>Disabled</i> × <i>Post</i>	-0.034 (0.017)	-0.017 (0.016)	-0.009 (0.017)	32,960* (17,222)	42,328** (17,252)	40,387** (17,820)
Baseline Mean		0.818			344,483	
Percent Change	-4.15%	-2.07%	-1.10%	9.56%	12.28%	11.72%
Observations		3,937,350			3,937,350	
Basic DID	✓	✓	✓	✓	✓	✓
Individual characteristics		✓			✓	
Year FE and age FE		✓			✓	
Individual FE			✓			✓

Note: This table reports the estimated coefficients of $Disabled_i \times Post_t$ in Equation (2) for two subgroups by type of child disability. The physical disability includes the following catastrophic illness: 1) Infantile Cerebral Palsy: 343, 343.0, 343.1, 343.2, 343.4, 343.8, 343.9, 344; 2) Congenital Anomalies of Digestive System: 751, 751.1, 751.2, 751.20, 751.22, 751.3, 751.4, 751.5, 751.6, 751.61, 751.62, 751.68, 751.8, 751.9; 3) Chromosomal Anomalies: 758, 758.1, 758.2, 758.3, 758.39, 758.5, 758.6, 758.7, 758.8, 758.9; 4) Renal Agenesis and Dysgenesis: 753.0, 753.1, 753.11, 753.12, 753.15, 753.19, 753.20, 753.21, 753.22, 753.23, 753.3; 5) Other Rare Diseases: 251.1, 270.1, 270.2, 270.3, 270.4, 270.6, 270.8, 270.9, 272.3, 275.3, 279.04, 287.1, 330, 330.8, 335.1, 416, 742.2, 751.69, 755.55, 755.59, 756, 756.4, 756.51, 757.31, 758.89, 759.5, 759.81, 759.89; 6) Congenital Muscular and Motor Neuron Disease: 742, 746.7; 7) Transplant Complications: 996, V427; 8) Congenital Lung Anomalies: 748.4, 748.5, 748.6, 748.60, 748.8; 9) Chondrodystrophy: 756; 10) Congenital Anomalies of Integument: 757.1, 757.39, 757.9; 11) Immune Mechanism Disorders: 279.00, 279.08. The mental disability includes the following ICD-9 code: Psychoses with Origin Specific to Childhood: 299, 299.80, 299.90, 299.91. The outcome variable, Y_{it} , represents the labor market outcomes of interest: Employment Status and Annual Earnings of individual i at year t . Employment Status takes the value of 1 when the individual is working at least one month in a year and 0 otherwise. Annual Earnings are adjusted with the CPI and displayed in 2016 NT\$ (1 NT\$ ~ 0.032 US\$). The coefficient of $Disabled_i \times Post_t$ stands for the effect of having a disabled child on the treatment group compared to the control group. Columns (1) and (4) control for a treatment group dummy, $Disabled_i$, and a dummy indicating post-treatment period, $Post_t$. Columns (2) and (5) further include year fixed effects, age fixed effects, and a set of predetermined covariates measured at two years prior to childbirth: Employment Status, Annual Earnings, Working in Private Sector, Working in Public Sector, and Living in Cities. Columns (3) and (6) include the fixed effects for year, age, and individual. Standard errors are clustered at the individual level and are reported in parentheses. *** significant at the 1 percent level, ** significant at the 5 percent level, and * significant at the 10 percent level.

Table 9: Effects of Child Disability on Family Labor Supply: By Social Norms

	Employment			Annual Earnings		
	(1)	(2)	(3)	(4)	(5)	(6)
<i>Less Against Female Working</i>						
Panel A: Female						
<i>Disabled</i> × <i>Post</i>	-0.0732*** (0.0142)	-0.0664*** (0.0140)	-0.0661*** (0.0145)	-47,411*** (7,569)	-46,478*** (7,541)	-47,345*** (7,812)
Baseline Mean		0.829			296,997	
Percent Change	-8.82%	-8.01%	-7.97%	-15.96%	-15.64%	-15.94%
Observations		2,251,575			2,251,575	
Panel B: Male						
<i>Disabled</i> × <i>Post</i>	-0.0175* (0.0106)	-0.0117 (0.0104)	-0.0095 (0.0107)	-1,073 (8,541)	2,366 (8,466)	-559.2 (8,776)
Baseline Mean		0.855			369,028	
Percent Change	-2.04%	-1.37%	-1.11%	-0.29%	0.64%	-0.15%
Observations		2,410,395			2,410,395	
<i>More Against Female Working</i>						
Panel C: Female						
<i>Disabled</i> × <i>Post</i>	-0.0863*** (0.0207)	-0.0758*** (0.0204)	-0.0754*** (0.0211)	-41,754*** (9,246)	-39,555*** (9,222)	-40,258*** (9,529)
Baseline Mean		0.796			259,082	
Percent Change	-10.83%	-9.52%	-9.47%	-16.12%	-15.27%	-15.54%
Observations		1,115,475			1,115,475	
Panel D: Male						
<i>Disabled</i> × <i>Post</i>	-0.0142 (0.0143)	-0.0114 (0.0139)	-0.0109 (0.0144)	-7,956 (9,011)	-7,985 (8,994)	-8,461 (9,293)
Baseline Mean		0.845			340,330	
Percent Change	-1.68%	-1.35%	-1.29%	-2.34%	-2.35%	-2.49%
Observations		1,219,335			1,219,335	
Basic DID	✓	✓	✓	✓	✓	✓
Individual characteristics		✓			✓	
Year FE and age FE		✓	✓		✓	✓
Individual FE			✓			✓

Note: This table reports the estimated coefficients of $Disabled_i \times Post_t$ in Equation (2) for two subgroups based on the gender norms prevalent in their counties of residence. The counties with a smaller percentage of people opposed to women working include Taipei City, New Taipei City, Taichung City, Tainan City, Hsinchu City, Hsinchu County, Miaoli County, Changhua County, Hualien County, Yilan County, and Chiayi City. The counties with a higher percentage of people opposed to women working include Pingtung County, Taoyuan City, Nantou County, Chiayi County, Yunlin County, and Kaohsiung City. The outcome variable, Y_{it} , represents the labor market outcomes of interest: Employment Status and Annual Earnings of individual i at year t . Employment Status takes the value of 1 when the individual is working at least one month in a year and 0 otherwise. Annual Earnings are adjusted with the CPI and displayed in 2016 NT\$ (1 NT\$ ~ 0.032 US\$). The coefficient of $Disabled_i \times Post_t$ stands for the effect of having a disabled child on the treatment group compared to the control group. Columns (1) and (4) control for a treatment group dummy, $Disabled_i$, and a dummy indicating post-treatment period, $Post_t$. Columns (2) and (5) further include year fixed effects, age fixed effects, and a set of predetermined covariates measured at two years prior to childbirth: Employment Status, Annual Earnings, Working in Private Sector, Working in Public Sector, and Living in Cities. Columns (3) and (6) include the fixed effects for year, age, and individual. Standard errors are clustered at the individual level and are reported in parentheses. *** significant at the 1 percent level, ** significant at the 5 percent level, and * significant at the 10 percent level.

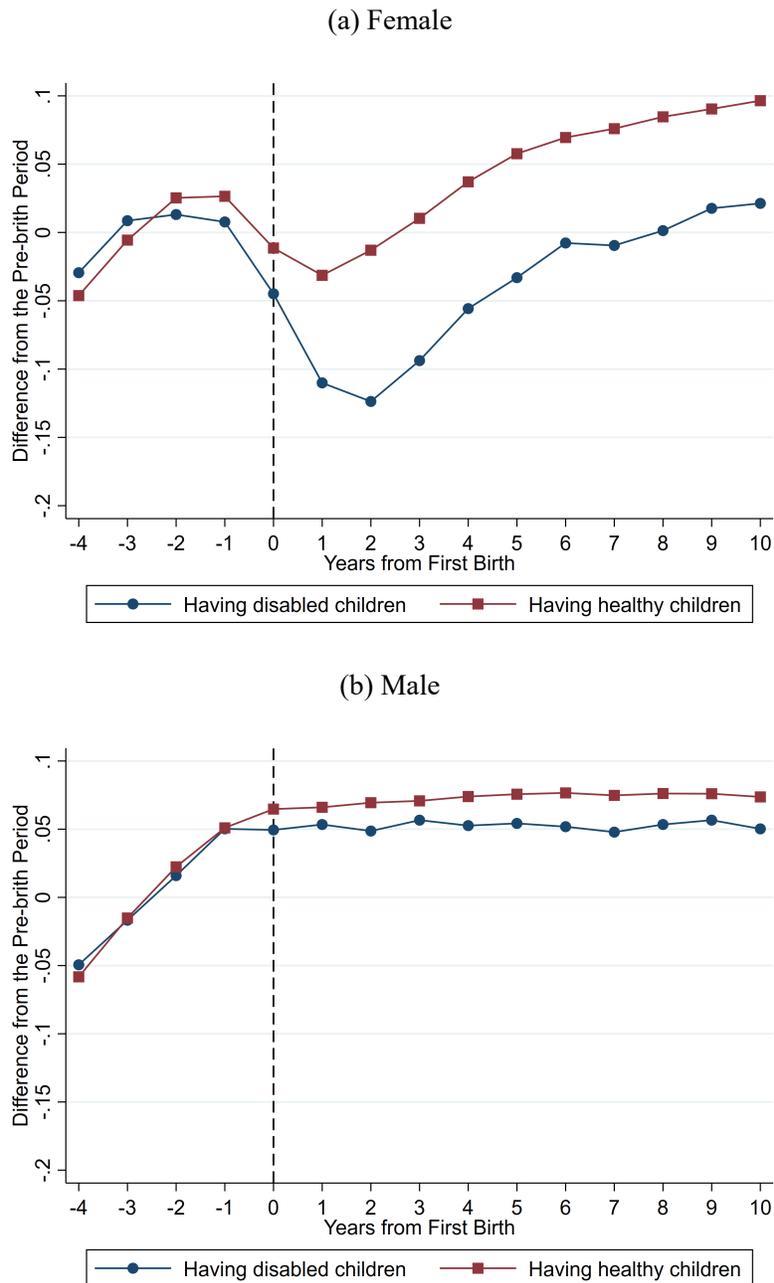
Table 10: Effects of Child Disability on Marital Dissolution and Subsequent Fertility

	Marital Dissolution			Subsequent Fertility		
	(1)	(2)	(3)	(4)	(5)	(6)
<i>Disabled</i>	-0.007 (0.015)	-0.007 (0.015)	-0.006 (0.015)	-0.052*** (0.015)	-0.036** (0.014)	-0.035** (0.014)
Baseline Mean		0.414			0.637	
Percent Change	-1.72%	-1.70%	-1.39%	-8.16%	-5.59%	-5.46%
Observations		226,917			263,445	
Year FE	✓	✓	✓	✓	✓	✓
Age FE		✓	✓		✓	✓
Individual characteristics			✓			✓

Note: This table reports the estimated coefficient of $Disabled_i$ in Equation (7). The outcome variable, Y_i , represents the demographic outcomes of interest: Marital Dissolution and Subsequent Fertility of a particular group i within 10 years after the birth of the first child. Marital Dissolution takes the value of 1 if the parents are not living in the same township/district and 0 otherwise. Subsequent Fertility takes the value of 1 if the parents have second child within 10 years after the birth of the first child. Columns (1) and (4) control for year fixed effects. Columns (2) and (5) further control for the age fixed effects. Columns (3) and (6) additionally include a set of predetermined covariates measured at two years prior to childbirth: Employment Status, Annual Earnings, Working in Private Sector, Working in Public Sector, and Living in Cities. Standard errors are reported in parentheses. *** significant at the 1 percent level, ** significant at the 5 percent level, and * significant at the 10 percent level.

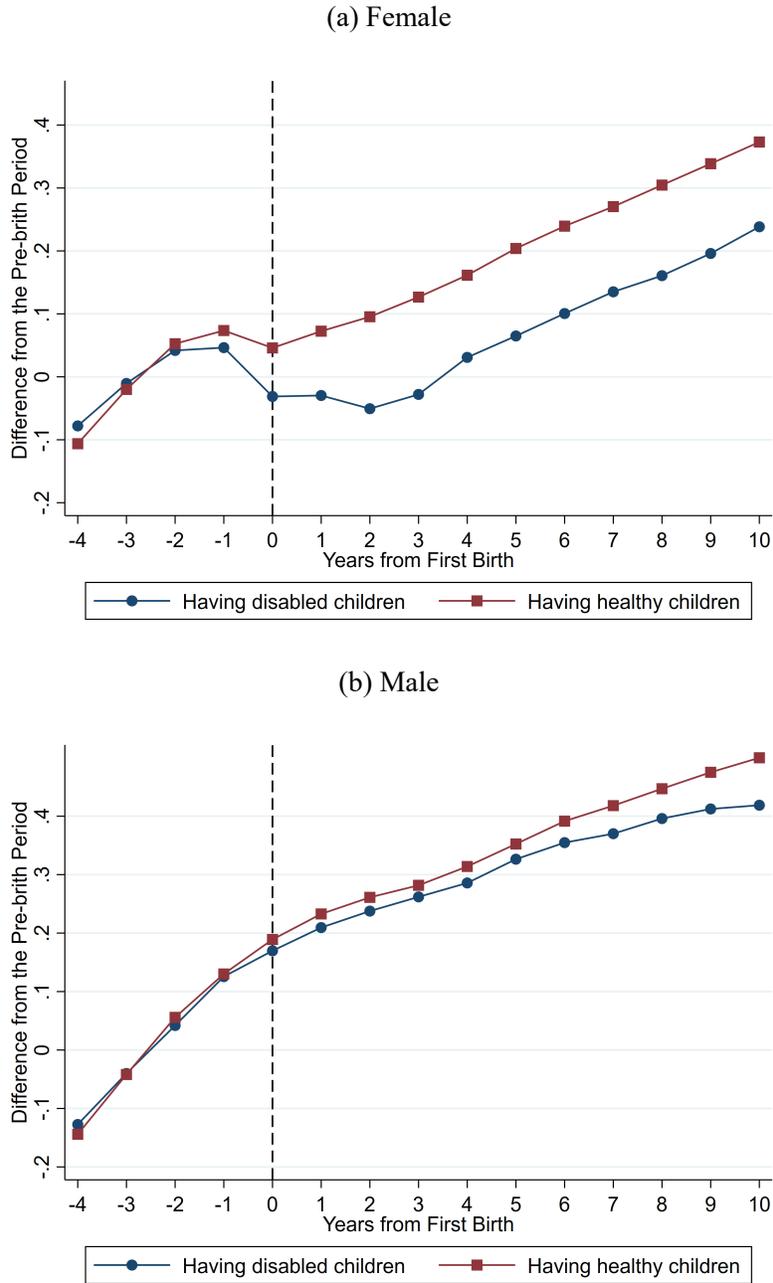
Figures

Figure 1: Trend in Employment Rate between Treatment and Control Group



Note: These figures compare the employment rates for the treatment group (*i.e.* solid line with circles) and the control group (*i.e.* solid line with squares) from four years before to ten years after the time of the first birth. Figures 1a and 1b are for females and males, respectively. The vertical axis displays the outcomes at event time k relative to the average employment rate over the pre-birth period ($k = -4$ to $k = -1$). The horizontal axis refers to the number of years from the first birth.

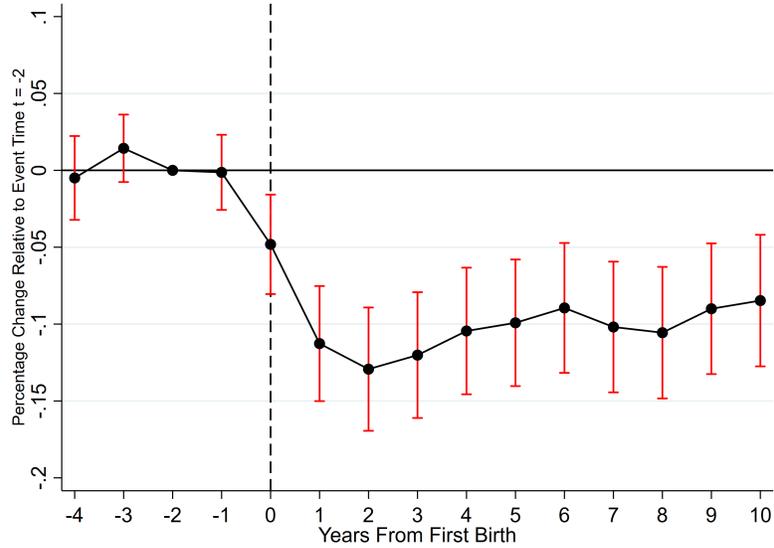
Figure 2: Trend in Annual Earnings between Treatment and Control Group



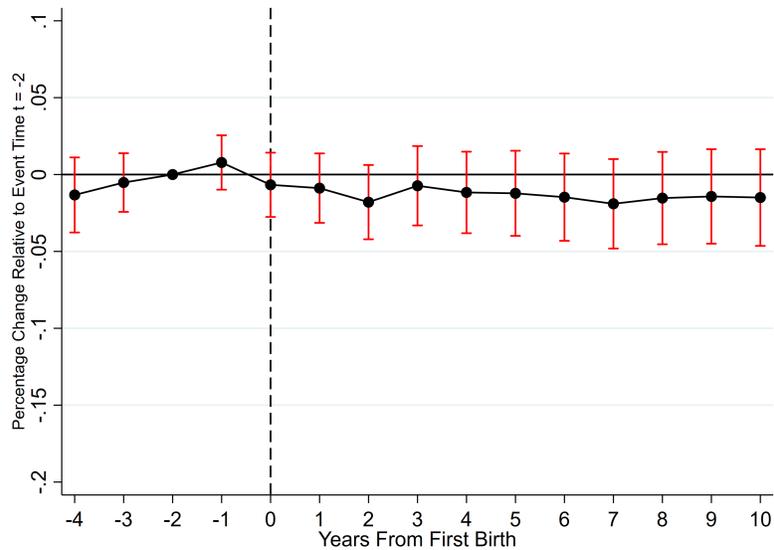
Note: This figure compares the annual earnings for the treatment group (*i.e.* solid line with circles) and the control group (*i.e.* solid line with squares) from four years before to ten years after the time of the first birth. Figures 2a and 2b is for females and males, respectively. The vertical axis displays the outcomes at event time k relative to the average annual earnings over the pre-birth period ($k = -4$ to $k = -1$). The horizontal axis refers to the number of years from the first birth.

Figure 3: Event-study Estimates: Employment Rate

(a) Female

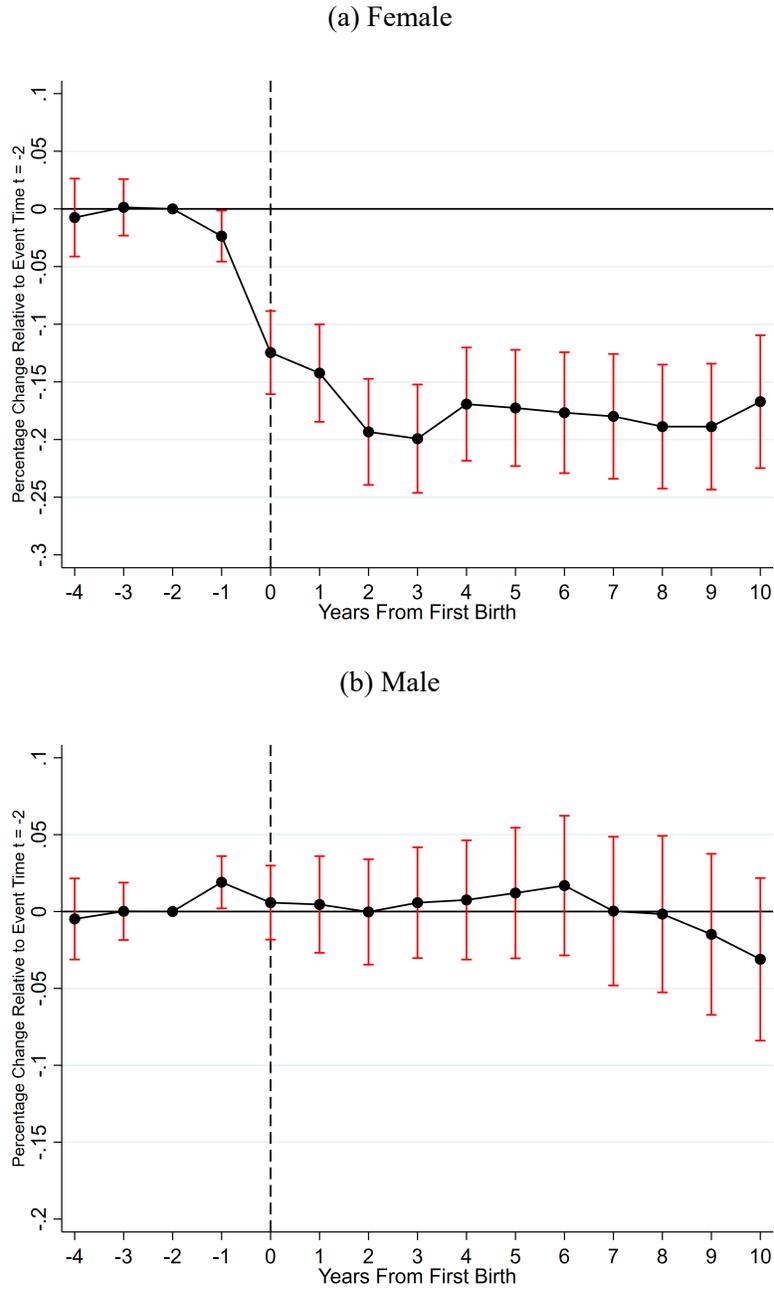


(b) Male



Note: These figures display the estimated δ_k in equation (1), scaled by the outcome average in the two years prior to the first birth. The treatment group consists of parents who had a firstborn child with disabilities (diagnosed before age 3). The control group includes parents whose children did not have any catastrophic illnesses (*i.e.*, did not have a *Catastrophic Illnesses Certificate*, either permanent or temporary) during the sample period. Figures 3a and 3b are for females and males, respectively. We plot the estimates from four years before to ten years after the time of the first birth. The outcome of interest is Employment Status, which takes the value of 1 when the individual works at least one month in a year and 0 otherwise. We use $k = -2$ as the baseline year such that the coefficient δ_{-2} is normalized to zero. The solid line denotes the point estimates. The vertical bars denote the 95 percent confidence intervals.

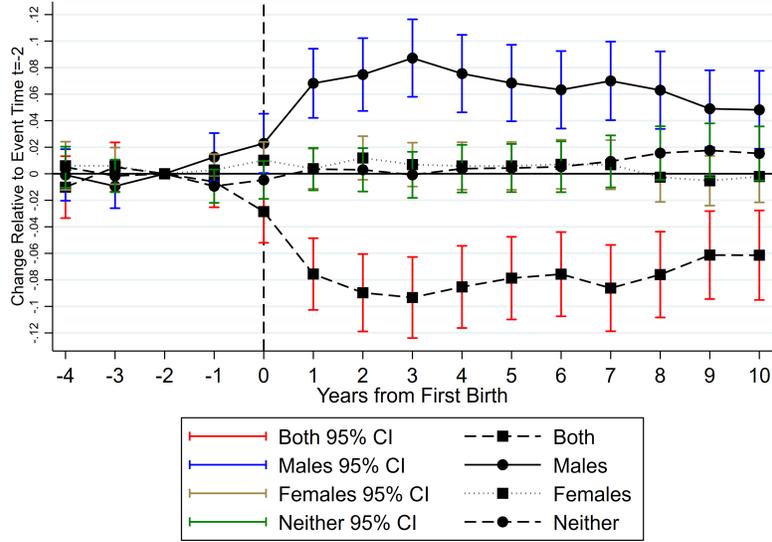
Figure 4: Event-study Estimates: Annual Earnings



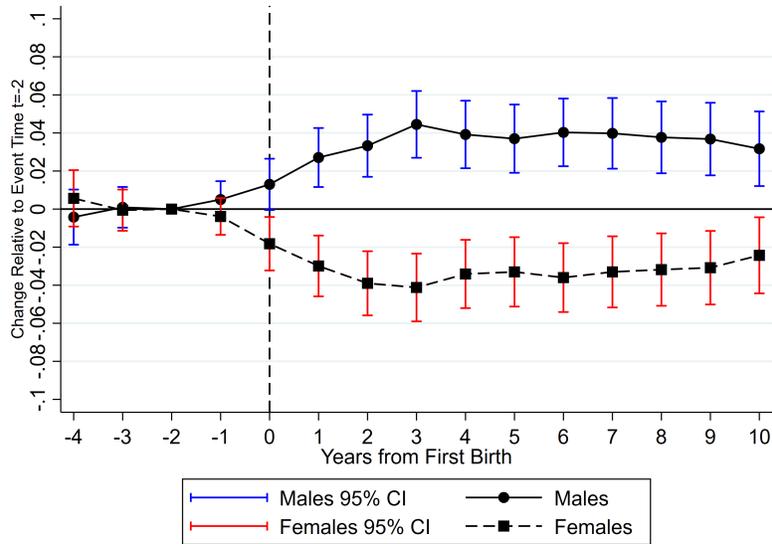
Note: These figures display the estimated δ_k in equation (1), scaled by the outcome average in the two year prior to the first birth. The treatment group consists of parents who had a first-born child with disabilities (diagnosed before age 3). The control group includes parents whose children did not have any catastrophic illnesses (*i.e.*, did not have a *Catastrophic Illnesses Certificate*, either permanent or temporary) during the sample period. Figures 4a and 4b are for females and males, respectively. We plot the estimates from four years before to ten years after the time of the first birth. The outcome of interest is Annual Earnings, which are adjusted with the CPI and displayed in 2016 NT\$ (1 NT\$ \sim 0.032 US\$). We use $k = -2$ as the baseline year such that the coefficient δ_{-2} is normalized to zero. The solid line denotes the point estimates. The vertical bars denote the 95 percent confidence intervals.

Figure 5: Responses of Labor Division

(a) Employment Decisions

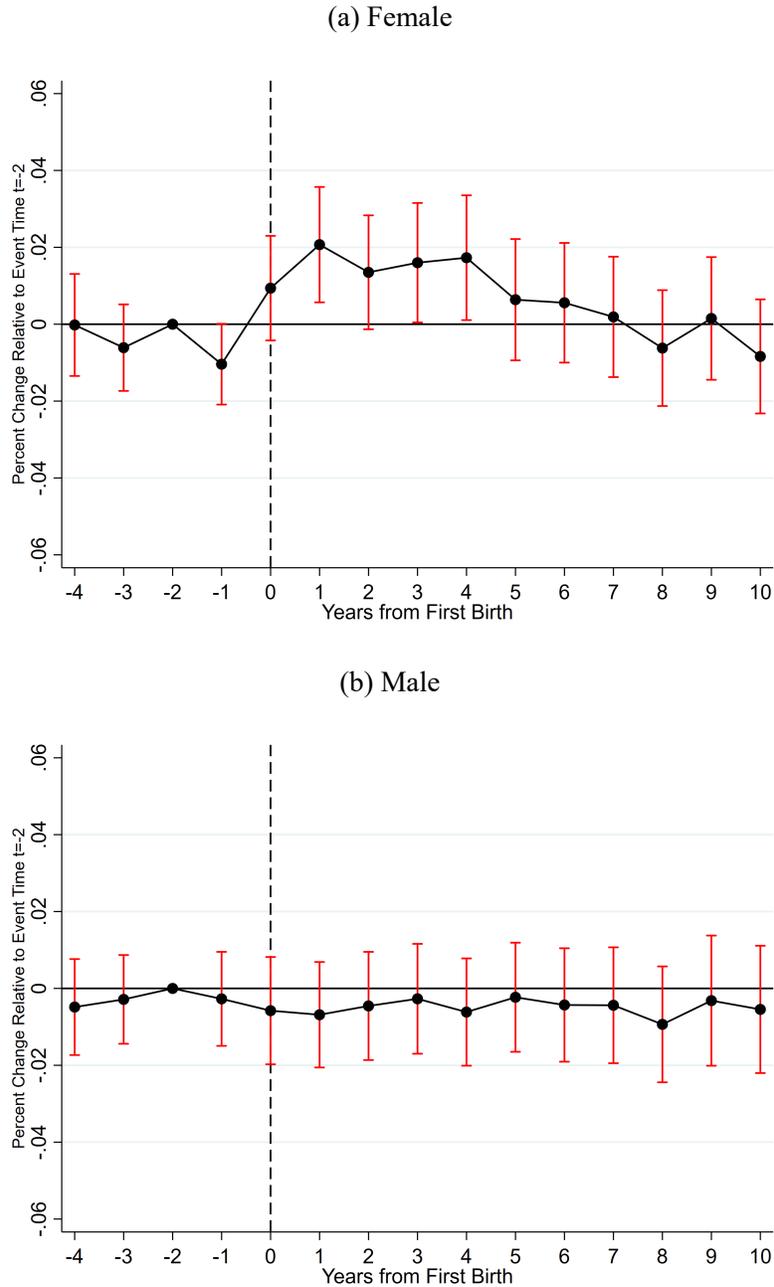


(b) Earning Share



Note: These figures display the estimated δ_k in equation (1) at household level. Figure 5a displays the results for household Employment Decisions where: 1) Both Work; 2) Only Father Works; 3) Only Mother Works; and 4) Neither Works. Figure 5b shows the results for the share earned by the fathers or mothers. The treatment group consists of parents who had a first-born child with disabilities (diagnosed before age 3). The control group consists of parents whose children did not have any catastrophic illnesses (*i.e.*, did not have a *Catastrophic Illnesses Certificate*, either permanent or temporary) during sample period. We use $k = -2$ as the baseline year such that the coefficient δ_{-2} is normalized to zero. The solid (dash) lines with circle (square) symbol denote the point estimates. The vertical bars denote the 95 percent confidence intervals.

Figure 6: Event-study Estimates: Any Visit for Mental Illness



Note: These figures display the estimated δ_k in equation (1). The treatment group consists of parents who had a first-born child with disabilities (diagnosed before age 3). The control group consists of parents whose children did not have any catastrophic illnesses (*i.e.*, did not have a *Catastrophic Illnesses Certificate*, either permanent or temporary) during sample period. Figures 6a and 6b are for females and males, respectively. We plot the estimates from four years before to ten years after the time of the first birth. The outcome of interest is whether an individual has any visit for mental illness in a year. The mental disorders are defined by the following ICD-9 codes: 290-319. We use $k = -2$ as the baseline year such that the coefficient δ_{-2} is normalized to zero. The solid lines denote the point estimates. The vertical bars denote the 95 percent confidence intervals.

Online Appendix: For Online Publication

Section A **Additional Tables and Figures**

Section B **Conceptual Framework: Details**

A Additional Tables and Figures

Table A.1: Descriptive Statistics: Sample for Effects on Marital Dissolution

	Male				Female			
	Treatment	Control	Difference	% Difference	Treatment	Control	Difference	% Difference
Age	30.590 (0.150)	30.093 (0.010)	0.498*** [0.14]	1.62%	27.502 (0.127)	27.007 (0.008)	0.495*** [0.123]	1.80%
Annual Earnings	345,324 (8,514)	332,192 (531)	13,131 [8,138]	3.80%	243,732 (6,708)	240,551 (444)	3,181 [6,799]	1.31%
Employment Rate	0.814 (0.013)	0.810 (0.001)	0.004 [0.013]	0.43%	0.715 (0.015)	0.714 (0.001)	0.001 [0.015]	0.19%
Monthly Earnings	30,628 (694)	29,318 (44)	1,310** [667]	4.28%	22,280 (565)	21,963 (37)	317 [565]	1.42%
Working Month	8.999 (0.156)	9.015 (0.010)	-0.016 [0.156]	-0.18%	7.744 (0.172)	7.657 (0.011)	0.088 [0.173]	1.13%
Public Sector Workers	0.046 (0.007)	0.046 (0.000)	-0.001 [0.007]	-1.49%	0.050 (0.007)	0.048 (0.000)	0.002 [0.007]	3.03%
Private Sector Workers	0.590 (0.016)	0.588 (0.001)	0.002 [0.016]	0.39%	0.529 (0.016)	0.531 (0.001)	-0.002 [0.016]	-0.30%
Living in Cities	0.653 (0.015)	0.645 (0.001)	0.008 [0.015]	1.21%	0.589 (0.016)	0.593 (0.001)	-0.003 [0.016]	-0.75%
# of Households	966	225,951			966	225,951		

Note: All dollars are adjusted with the CPI and displayed in 2016 NTD (1 NTD ~ 0.032 USD). Living in Cities means the share of individuals who live in the six main cities in Taiwan: Taipei City, New Taipei City, Taoyuan City, Taichung City, Tainan City, and Kaohsiung City. Standard deviations are in parentheses, and standard errors are in brackets. *** significant at the 1 percent level, ** significant at the 5 percent level, and * significant at the 10 percent level.