**The effect of the 2021 CTC expansion on births: Evidence from a natural experiment**

Nicolò Cavalli,[*^] Chiara Allegri,[*] Maria Carla Fraioli[+]
[*] *Dondena Centre for Research on Social Dynamics and Public Policy, Bocconi University*
[^] *Department of Social and Political Sciences, Bocconi University*
[+] *European Commission*

## Background

In January of 2021, Population Development Review launched a series of essays on how the Covid-19 pandemic would impact the research agenda in demography (MacKellar and Friedman 2021). In the issue, Eva Beaujouan (2021) emphasised the need to move away from speculative comments and to 'think beyond the foot' (Trinitapoli 2021), leveraging freshly compiled data to understand how the pandemic affected demographic variables. Three years on, there is no question that the Covid-19 pandemic has, at least in the short run, affected not only deaths and life expectancy (Aburto et al. 2022) but also conceptions and births. Employing series from the Short-Term Fertility Fluctuations database for a set of 17 countries, Sobotka et al. (2023) have found that the number of births recorded 10 to 12 months after the start of Covid-19 fell in 12 out of 17 countries, for an average of 5.1% in November 2020, 6.5% in December 2020, and 8.9% in January 2021 when compared with the same months of 2019-2020. Looking at the ratio of births over the population for 22 high-income countries up to March 2021, a period that includes conceptions occurred during the first six months of the pandemic, and accounting for pre-existing trends for the years 2015 to 2019, researchers found that the Covid-19 pandemic was accompanied by a significant drop in crude birth rates in 7 out of 22 countries, with a strong decline in southern Europe (Aassve et al. 2021). Life courses, however, were not affected at the same rate in all countries; furthermore, recuperation occurs at vastly different rates (see Sobotka 2021). These are not unexpected facts. History points to the regularity that mortality peaks due to pandemics lead to birth troughs within a year, followed by surpluses in conceptions once mortality falls back either at or below pre-crisis levels (Pelloni 1998; Livi Bacci 2000). Throughout Covid-19, demographers have pointed to this regularity to warn that disruptions in economic and family life would alter childbearing decisions and pointed to role of policies in moderating the impact of the pandemic on the life course of people living in countries across different demographic stages and levels of socio-economic development (Aassve et al. 2020).

However, "countries have not been evenly exposed to the pandemic, they differ in social organization and demographic structure, and have not reacted in the same way" (Beaujouan 2021, p.9). Therefore, more recent papers have focused in investigating how institutional reactions might have moderated the fertility effect of the Covid-19 pandemic (see Nitsche and Wilde 2024 for an assessment and review). Plach et al. (2024) study the dynamics in crude birth rates across 25 high income countries, paying attention to the role played by existing regimes of public support and to that of the specific policy responses that countries have chosen to address the pandemic. In this paper, Plach and colleagues show that, in those countries were welfare regimes are weaker, birth rates were largely impacted by Covid-19, whereas countries with stronger welfare regimes have shown smaller losses in CBRs right after the first wave of the pandemic, for which we have data available, and stronger recuperations. These differences go above and beyond the effect of policy responses to the pandemic, which we find to have a direct role in offsetting the effects of Covid-19 on birth rates. During the pandemic, virtually all countries have increased their public support to young adults and families. According to Plach et al. (2024), whereas containment and closure policies during the pandemic are on average associated to lower fertility, economic support policies contributed to offsetting the detrimental effect of the pandemic on life courses (Plach et al. 2024). However, Winkler-Dworak et al. (2024) argue that the estimated effects on the impact of economic support policies on fertility were small and not significantly different from zero, without noticeable differences across the set of countries analyzed.

In this paper, we try to address this open question using a natural experiment. In particular, we test whether the extension of the Child Tax Credit of 2021 in the United States has impacted fertility. A body of research has focused on the economic and behavioral effects of the CTC expansion. It has been shown that the CTC has moved more than three million children out of poverty during the expansion months (Collyer et al. 2023). Moreover, research has found that among eligible households the expanded CTC had positive effects on food security and healthy eating, as well as on the likelihoods of starting learning new professional skills (Hamilton et al. 2022). Household consumption and spending on children increased in counties benefiting the most from the CTC expansion (Parolin et al. 2024). Among more disadvantaged families, financial security improved due to the expanded CTC, and, among families of color, investments in children's educational outcomes increased (Hamilton et al. 2022). On the other hand, the CTC expansion was found to have null effect on parental employment and labor force participation (Hamilton et al. 2022 and Ananat et al. 2024). Despite being targeted to families and affecting theoretically relevant channels for fertility, to date the effect of the expanded CTC on births has not been investigated.

**Data and Methods**

For our analysis of natality data, we use national-level birth micro-data from January 2015 to December 2022. These were retrieved from the National Center for Health Statistics (NCHS) Database, which provides statistics on each birth in the United States, including information on the birth's month and year, birth order (e.g., first or second child), as well as the mother's nativity, race, ethnicity, age, and educational background. Data are publicly available at https://www.cdc.gov/nchs/data_access/vitalstatsonline.htm. Although the primary focus of this analysis is on births that took place from 2020 through 2022, we also extended our examination to births occurring between 2015 and 2019. This broader timeframe allows us to analyze deviations in natality patterns prior to the pandemic's influence. Population estimates were retrieved from the U.S. Census Bureau's Database. In particular, the Census Bureau's Population Estimates Program (PEP) provides annual estimates of the population and its age, sex, and racial composition for the United States (states, metropolitan and micropolitan statistical areas) as well as for Puerto Rico and its municipios. Data are publicly available at https://www2.census.gov/programs-surveys/popest/.

To study the effect of the CTC expansion, we use a negative binomial regression model where our dependent variable the total count of births by month-year, for each demographic group that we can reconstruct from the birth dataset as a combination of age group, race, place of birth, education and parity status. These counts are regressed on a dichotomous indicator set to 1 nine months after the CTC expansion, for those periods when the expansion was active. Because the CTC expansion was temporary, the dummy is equal to 1 only from April to September 2022. We control for the demographic composition of the sample, for time trends in births and we include a Covid-19 dummy (equal to 1 after January 2020). In this way, our identification strategy relies on comparing the differences in number of births by parity, during the time of the additional cash transfer.

**Results**

Table 1 presents the results, starting from a simple model where we only regress the dichotomous CTC indicator over births (first row). In this model, we do not observe any significant relation between the policy expansion and birth counts; however, this effect appears to be positive and statistically significant at the 1% level once demographic controls are added (Column 2) and remains highly robust in terms of size of the coefficient as well as its statistical significance, once year and month fixed effects are added (Column 3). The statistical relationship between the timing of the CTC expansion and the count of births across socio-demographic groups remains significant at the 5% once we account for potential heteroskedasticity by means of robust standard errors (Column 4).

Table 1: effect of 2021 CTC expansion on births in the U.S.

| | **(1)** | **(2)** | **(3)** | **(4)** |
|---|---|---|---|---|
| | **Birth counts by demographic group** | | | |
| During CTC Expansion | -0.004 | 0.028** | 0.028** | 0.028* |
| | (0.016) | (0.010) | (0.010) | (0.013) |
| After CTC All periods | -0.036*** | 0.005 | 0.005 | 0.005 |
| | (0.009) | (0.006) | (0.006) | (0.008) |
| Demographic controls | NO | YES | YES | YES |
| Time | NO | NO | YES | YES |
| Robust SE | NO | NO | NO | YES |
| Observations | 1,032,483 | 1,032,483 | 1,032,483 | 1,032,483 |

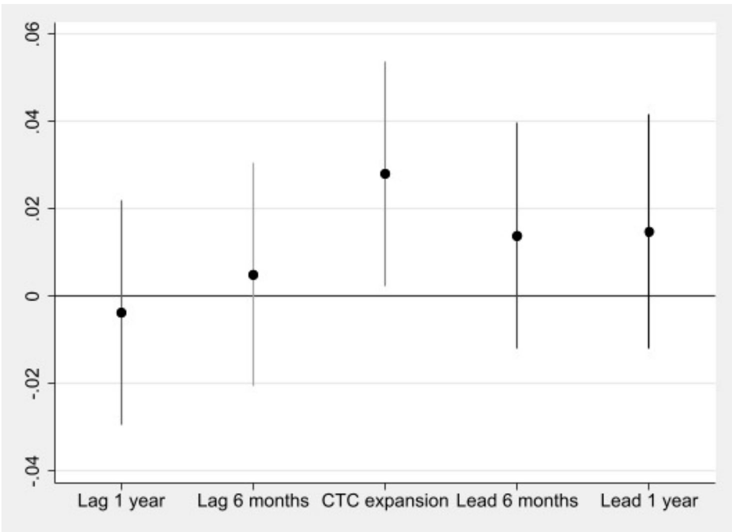
***p<0.001 ** p<0.01 * p<0.05; z-test from negative binomial in parentheses

In the second row of Table 1, we extend the timing of the CTC indicator to all year-months after April 2022. This allows us to establish a control trend, in order to check if our treatment indicator does not capture the effect of the policy per se, but trends in births occurring after or concurrently to the policy change. Results for these models do not allow us to observe any significant differential in the number of first- vs higher-order births, once appropriate controls are added to the model.

Comparisons across these two sets of models allows us to conclude that the change in birth counts between first- and higher-parities is observable and well defined only for the period of the CTC expansion, whereas it disappears once further periods are taken into account. This result suggests that, indeed, our model identifies a specific effect of the policy, situated only in those months where the cash treatment was in place. Results of this model suggest that the expected count of births increased by about 2.8%, holding all other variables constant, during the CTC expansion, for higher-parity births, compared to first-births. The overall effect of the policy in terms of additional births can be computed in about 32,000 [2,355- 61,176] additional births during the months of the policy.

Looking at Figure 1, it is possible to observe that the CTC treatment indicator is statistically associated to the count of births only in the period of the actual CTC expansion, while the confidence intervals overlaps the zero line for all other lag and lead models; indicating no relationship between our placebo treatments and the dependent variable. Results from these models are a powerful confirmation of our causal claim: first, because we show that there was no pre-treatment difference among the control and the treated (parallel trends); second, because we show that, for the periods after the expansion, the effect disappears and thus no intervening time trend is explaining our results; third, because lagging by 6-months at a time, we are considering the same time frame in different years, as well as different time frames in different years, thus reassuring us that our results are not driven by seasonal or time effects occurring at the same time of the policy expansion. In the full paper, we further explore heterogeneities by educational level.

Figure 1: effect of 2021 CTC expansion on births in the U.S.



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