

The Initial Effects of the Expanded Child Tax Credit on Material Hardship

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Abstract: The transformation of the Child Tax Credit (CTC) into a more generous and inclusive monthly payment marks a historic, albeit temporary, shift in the American welfare state's treatment of low-income families. To investigate the initial impact of the monthly CTC payments on material hardship among families with children, this study applies a series of difference-in-difference estimates using Census Household Pulse Survey microdata collected from April 14 through August 16, 2021. Our findings offer three primary conclusions regarding the initial effects of the monthly CTC payments. First, the CTC payments strongly reduced food insufficiency: the initial payments are associated with a 7.5 percentage point (25 percent) decline in food insufficiency among low-income households with children. Second, the effects of the CTC on food insufficiency are concentrated among families with 2019 pre-tax incomes of less than \$35,000, and the CTC strongly reduces food insufficiency among low-income Black, Latino, and White families alike. Third, increasing the coverage rate of the CTC is critical for further reducing material hardship. Self-reported receipt of the CTC suggests the lowest-income households were less likely than higher-income families to receive the first CTC payments. As more children receive the benefit in future months, levels of material hardship may decline further. Even with imperfect coverage, however, our findings suggest that the first CTC payment was largely effective at reducing food insufficiency among low-income families with children.

INTRODUCTION

In March 2021, the United States (U.S.) Congress passed the American Rescue Plan (ARP), which included a large expansion of the Child Tax Credit (CTC). The ARP increased the benefit values of the CTC, removed the earnings requirement and made the benefit fully refundable, and shifted the distribution schedule from a once-per-year payment of the CTC to monthly payments. The first monthly payment was distributed to families of 59.3 million children in July 2021, while the second payment reached 60.9 million children in August 2021 (U.S. Department of Treasury, 2021a). The CTC expansion marks a notable shift in the American welfare state's treatment of low-income families; however, the program is implemented only for one year and, in the absence of Congressional renewal, will expire in 2022. As such, timely and reliable evidence is critical for informing policymakers, researchers, and the public of the CTC's short-term consequences. This study investigates the effects of the expanded CTC on material hardship among families with children in the initial weeks after the first CTC payment.

A large body of research shows that children who grow up in families with higher incomes perform better across a host of measures of both short- and long-term development and well-being (Brooks-Gunn and Duncan, 1997; Chaudry and Wimer, 2016). And a smaller but growing body of literature attempts to understand whether these relationships are causal, given the fact that lower- and higher-income families may differ on numerous fronts besides income alone. Most of these studies use so-called "natural experiments," which attempt to identify quasi-random variation in income to see whether that exogenous change predicts changes in important child outcomes. This growing literature is so far consistent in finding that enhanced incomes and reduced poverty causally impact children's short- and long-term development and well-being (Duncan, Morris and Rodrigues, 2011; Wimer and Wolf, 2020; Garfinkel et al., 2021).

There are two primary channels through which increases in income are thought to impact children's outcomes (NAS, 2019). The *family stress* channel posits that the absence of resources increases stress, which compromises healthy parenting and other family relationships, resulting in worse child outcomes. The *family resources* channel posits that increased income allows parents to purchase or invest in various things that enhance child development and well-being (e.g., books, toys, enriching activities, academic supports, safer neighborhoods, etc.). Each channel assumes that an increase in income would change aspects of the home environment in the shorter term, and that these effects would accumulate over time into more positive child outcomes.

This study seeks to add to this burgeoning literature by looking at the short-term impacts of the CTC, which now extends income support to children historically left out of the full benefit of the credit (Collyer, Harris and Wimer, 2019; Goldin and Micheltore 2020). We apply difference-in-difference estimates to take advantage of (1) the fact that effects of the policy differ between households with children and those without, and (2) that households with children benefit differentially based on the ages of their children, number of children, and pre-reform income levels.

The Expanded Child Tax Credit

Since the mid-1990s, the American welfare state has relied more on in-kind transfers, such as benefits from the Supplemental Nutrition Assistance Program (SNAP), and work-conditional transfers, such as benefits from the Earned Income Tax Credit (EITC), relative to cash-based income support (Bauer et al., 2018; Hoynes, 2019; Pac et al., 2017). As a result, share of children in families with very little cash income has grown (Shaefer & Edin, 2013). The lack of cash-based assistance and the comparatively high rate of child poverty sets the U.S. apart from other high-income countries, most of which have some form of child allowance (Curran, 2015; Garfinkel et

al., 2016; Shaefer et al., 2018). The expansion of the CTC thus represents a historic deviation from the direction of the U.S. welfare state throughout the past three decades.

Prior to the expanded CTC, tax filers could receive a maximum CTC of \$2,000 per child per year, but it was not fully refundable.¹ One in three children did not receive the full benefit value because their families did not earn enough to qualify. Children with single parents, those in rural areas, Black and Latino children, and those in larger families were disproportionately ineligible for the full credit (Curran and Collyer, 2020; Collyer, Harris, and Wimer, 2019). Following similar parameters to the American Family Act (a bill first introduced in both the Senate and House of Representatives in 2017 and reintroduced in 2019), the ARP has temporarily transformed the CTC into a nearly-universal child allowance for 2021.² Specifically, the ARP includes three fundamental changes to the CTC. First, it makes the CTC available to almost all children, including those in families with the lowest incomes previously excluded, by removing the earnings requirement and making the credit fully refundable. Second, it raises the maximum annual credit amounts to \$3,000 for children ages 6-17 and \$3,600 for children under age 6. Third, beginning mid-July 2021, it delivers the credit in monthly installments of up to \$250 per older child or up to \$300 per younger child, for a period of six months.³

One challenge facing the introduction of the expanded CTC is that not all eligible children automatically receive the payments. Families who did not file taxes in the prior year, presumably due to having an income below the tax-filing threshold, generally must register with the Internal

¹ See additional information on the history of the Child Tax Credit, see Crandall-Hollick (2021), Crandall-Hollick (2018), and Garfinkel et al. (2016).

² The expansion to the CTC in the ARP mirrors the proposed reforms in the American Family Act (AFA) with one exception: in the AFA, the credit would begin to phase out for heads of household with earnings above \$120,000 or and joint filers with Adjusted Gross Incomes (AGI) over \$180,000. In the ARP, the credit begins to phase out for families with AGIs above \$112,500 or \$150,000 per year, depending on filing status, but it only phases out until matching the credit values that a family would receive under prior law. This alteration was made because the Biden administration committed to not raising taxes for those with incomes below \$400,000 per year.

³ Because the payments began halfway through the year, families will receive half of the full amount of their credit in 2021 and the remainder when they file taxes in 2022.

Revenue Service (IRS) in order to receive benefits. Several estimates suggest that the total number of children in eligible tax units is around 64 to 67 million children (Parolin et al., 2021b), more than the 60.9 million to whom the IRS distributed CTC payments to in August 2021. Put differently, the first payments did not reach all eligible families. As we discuss in our *Data and Methods* section, we take several steps to account for the imperfect coverage of the initial CTC payment when evaluating the policy's effects on hardship.

Despite the challenge in reaching full coverage, early research suggests the expanded CTC has potential to generate large reductions in child poverty (Center on Poverty and Social Policy, 2021; Marr et al., 2021; Acs and Werner, 2021; Parolin et al., 2021a; Wheaton et al., 2021) and may contribute to reductions in economic hardship (Perez-Lopez, 2021). Thus far, however, it remains unclear whether the expanded CTC has plausibly causal effects. This study investigates that possibility, using household data released in the initial weeks following the first CTC payment, to assess the policy's effects on material hardship among families with children.

DATA AND METHODS

Data Source: This study uses data from the Census Household Pulse Survey (Pulse). The U.S. Census Bureau introduced the Pulse in April 2020 to begin collecting up-to-date and nationally-representative information on the social and economic wellbeing of households across the U.S. The Census Bureau randomly selects addresses to participate in the Pulse, then sends either an email or a text message to the contact information associated with the household. The message prompts the recipient to participate in a 20-minute online survey asking questions related to education, employment, food security, housing, and more. The data have been used to track trends in material hardship, subjective wellbeing, and other social and economic indicators throughout the pandemic (Bauer et al., 2020; Bitler et al., 2020; Morales et al., 2020;

Schanzenbach and Pitts, 2020; Ziliak, 2021; Cai et al., 2020, Twenge and Joiner, 2020). Our particular focus in this analysis centers on the hardship data, but there is potential to use the Pulse data to explore the relationship between the CTC monthly payments and subjective wellbeing (see Appendix E).

We use Pulse data collected between April 14, 2021 (three months before the start of the monthly CTC) through August 16, 2021 (waves 28-35). The first payment of the expanded CTC was delivered to recipients on July 15, 2021, which falls prior to the beginning of Wave 34 of the Pulse (which spans July 21 to August 2, 2021). The second payment was delivered on August 13, 2021. Our total sample size is 411,613 respondents.

One limitation of the Pulse is that it is conducted online-only (often sent via text message with a link to complete a survey online), which may exclude segments of the population who lack reliable internet connection. We provide descriptive statistics on the respondents in Appendix I. The descriptive statistics show that the Pulse sample closely mirrors population estimates from the U.S. Current Population Survey.

Sample Criteria: We exclude all households in the Pulse who have imputed values of number of children in the household, as error in the imputed values could bias our estimates. In our sample, 1.3 percent of all responses featured imputed values of the number of children. Given that the expanded CTC should benefit lower-income households more so than higher-income households, we restrict our primary estimates to households with a 2019 pre-tax income of under \$35,000 (“low-income families”). In subsequent estimates, however, we also display results when assessing the effect of the CTC on all households under \$25,000 and at different income bins up to \$200,000 in 2019 pre-tax income. We also display subgroup analyses to estimate the effects of the CTC by race and ethnicity.

Receipt of the CTC: As noted, the first two payments of the CTC did not reach all children in eligible families. Though the Department of Treasury reports that 60.9 million children (around 83 percent of all children) received the second payment, the Pulse includes its own question of whether the household received a CTC payment (U.S. Department of Treasury, 2021a). We thus begin our *Findings* section with a descriptive portrait of coverage rates as reported in the Pulse.

Indicators of Material Hardship: Table 1 presents our primary measures of material hardship. Our material hardship indicators include household food insufficiency, difficulty with expenses, and not being caught up on rent or mortgage payments. We operationalize each of these indicators as a binary variable using the criteria described in the right-most column of Table 1. In a parallel exercise, we explore early indications of the relationship between the new CTC monthly payment and three measures of subjective wellbeing, including confidence in paying the rent/mortgage, frequent anxiety, and frequent worrying. These results are included in Appendix E; as the monthly CTC payments continue and more data becomes available, this represents an area for continued investigation. In general, however, we would expect measures of subjective wellbeing to be more sensitive to continued receipt of monthly payments rather than just the initial payments.

Table 1: Overview of primary hardship indicators

Type	Prompt	Qualifying Responses
Household food insufficiency	In the last 7 days, which of these statements best describes the food eaten in your household?	<i>Sometimes</i> or <i>often</i> not enough to eat
Difficulty with expenses	In the last 7 days, how difficult has it been for your household to pay for usual household expenses, including but not limited to food, rent or mortgage, car payments, medical expenses, student loans, and so on?	<i>Somewhat</i> or <i>very</i> difficult.
Not caught up on rent [or mortgage]	Is this household currently caught up on rent [or mortgage] payments?	No.

Methods: We estimate difference-in-difference models to assess the effect of the expanded CTC on our outcomes of interest, as defined in Equation (1).

$$y_i = \beta_1 PostCTC_i + \beta_2 Treatment_i + \beta_3 (PostCTC * Treatment)_i + \beta_4 X_i + \varepsilon_i \quad (1)$$

The outcome variable is one of our hardship indicators (separate models for each). *PostCTC* is a binary indicator of whether the time of survey occurred after July 15, 2021, the day on which the expanded CTC was first administered. We specify our treatment variable, *Treatment*, in two separate ways. First, we operationalize a binary treatment indicator measured as whether the household has children (value set to 1) or is childless (value set to 0). Given that our sample is limited to households reporting a 2019 pre-tax income of under \$35,000, we assume (but cannot directly test) that the vast majority of households with children in this subsample are eligible to receive the monthly CTC. Childless households, in contrast, do not directly benefit from the reform.

For our second treatment indicator, we estimate models using a continuous indicator of treatment intensity to capture the fact that the effects of the CTC are likely to vary by age of the

children (as families with children under age 6 receive larger monthly benefit values), the number of children in the home, and the relative value of the new CTC benefits compared to what the family likely received from the CTC prior to the reform. We cannot consistently observe the age of each child in a given household in the Pulse, nor do we have information on pre-reform CTC receipt.⁴ Thus, we use data from the 2019 U.S. Current Population Survey to estimate the mean pre- and post-reform benefit values for bins defined by the number of adults in the household (ranging from 1 to 10), the number of children in the household (ranging from 0 to 10), and eight category pre-tax income bins (from under \$25,000 annually scaling up to more than \$200,000 per year). We compute the mean pre-reform refundable CTC benefits as observed for each family unit in the CPS ASEC. We then simulate the *additional* post-reform benefits that each family is eligible for (not yet taking into account imperfect coverage in benefit distribution) using detailed policy rules from the CTC reform as specified in the 2021 American Rescue Plan. We subtract the pre-reform benefit value from the post-reform benefit value to create a “net benefit” indicator for each family unit. We then adjust the net benefit indicator for family size using the modified OECD equivalence scale.⁵ Finally, we calculate the weighted mean of the size-adjusted net benefit value for each of the bins defined above. We then import this value into the Pulse, matching on the number of adults, number of children, and 2019 pre-tax income category of the Pulse respondents. We provide more details and descriptive statistics on the indicator in Appendix B.

⁴ Wave 34 of the Pulse does have binary variables of whether children are under 5 or between 5 to 11. Given that the data are not consistently available throughout the waves included in this analysis, however, we cannot use it in our estimations or creation of the treatment indicators.

⁵ The modified OECD scale begins with a value of 1 for a single adult, then adds 0.5 for each child in the home and 0.3 for each additional adult in the home. Alternative family-size adjustments include the square-root equivalence scale or dividing by a family-size-adjusted poverty-threshold, such as that of the U.S. official poverty measure.

In a sensitivity test, we also produce an alternative version of our treatment intensity indicator that matches the July 2021 coverage rate of the CTC – 59.3 million children – as reported by the U.S. Department of Treasury. Specifically, we scale down coverage from all likely-eligible children to match the reported numbers of children receiving the CTC by state, following the procedure in Parolin, Collyer, Curran, and Wimer (2021b). Within each state, we adjust coverage so that it is the lowest-income tax units who are removed first, representing the fact that lower-income tax units are less likely to have filed taxes in the prior year and, thus, are less likely to receive the benefits automatically (Cox, et al., 2021). In our *Findings* section, we also present observed coverage rates from the Pulse among households with children by income bin; these results corroborate the claim that the lowest-income households with children were less likely to receive the benefit in July 2021. We present the results from our sensitivity tests in Appendix B, but we note that they do not vary meaningfully from the results of our primary analyses.

In Equation (1), we control for the age, sex, and education status of the household head, and we include state fixed effects (captured in vector X). In each estimate, β_3 is our primary coefficient of interest, as it informs us, when using the binary treatment indicator, of whether households with children faced a larger (or smaller) difference in the outcome relative to childless households after the introduction of the CTC.

While Equation (1) provides us the intent-to-treat effect (or the effect of the treatment on the full treatment group, regardless of whether they report actually receiving the CTC), we also provide estimates of the treatment effect on the treated (or the local average treatment effect). To do so, we estimate two-stage least squares models (2SLS) using the treatment group identifier as an instrumental variable and observed receipt of the treatment as the endogenous variable. When

applying our binary treatment, observed receipt of the treatment reflects whether the family reports in the Pulse that it actually received the monthly CTC payment(s). When applying our continuous treatment indicator, the observed treatment in the 2SLS model is the family's projected net benefit increase from the CTC. Because levels of the benefit receipt of the CTC are not directly measured in the Pulse, we apply our projected value of the net CTC benefit based on the family's income, number of children, and number of adults (as defined above) as the observed treatment; however, we convert the projected benefit value to zero for families reporting that they did not receive the CTC payment.

FINDINGS

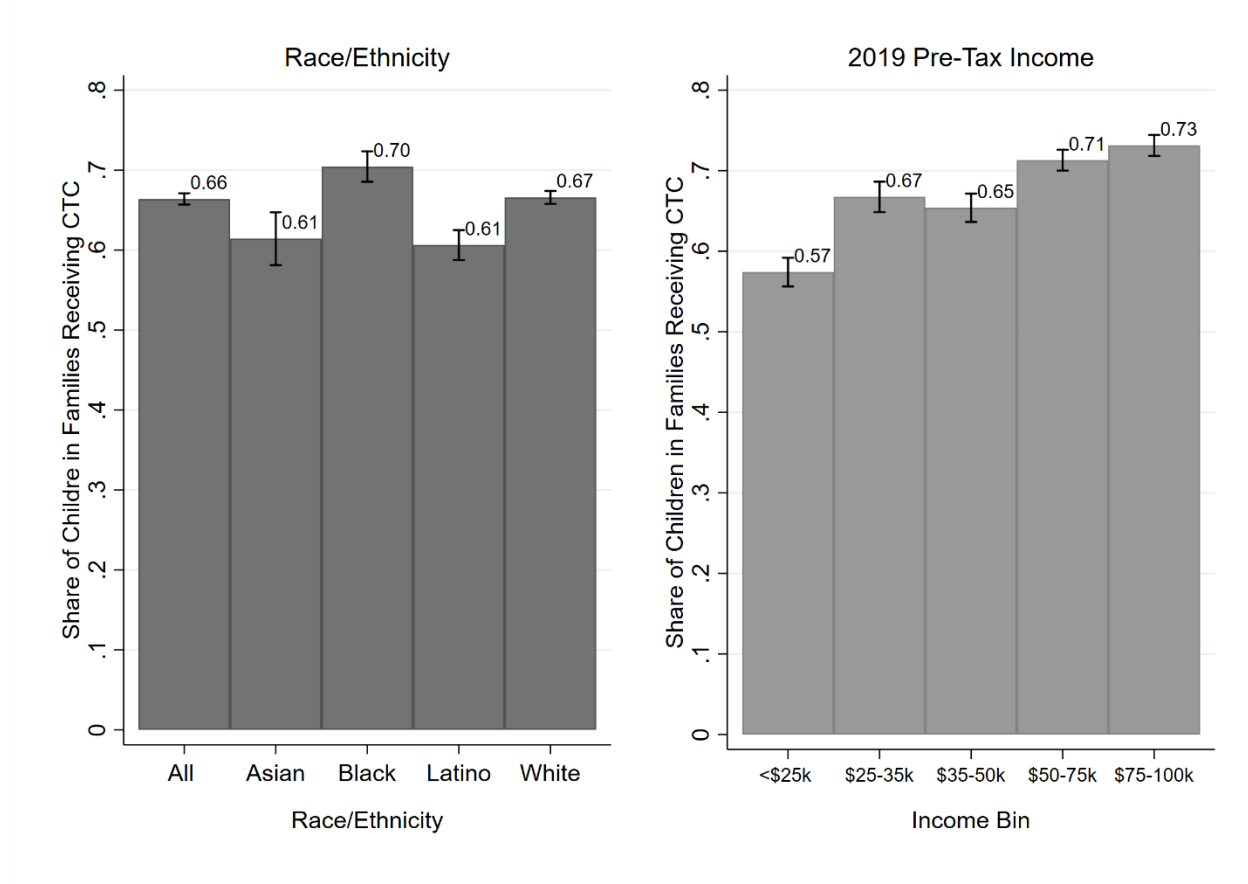
Our Findings section proceeds in three parts. First, we discuss reported receipt of the CTC in the Pulse and compare this to administrative reports from the U.S. Department of Treasury. Second, we present descriptive findings on trends in material hardship. Third, we present the results of our difference-in-differences estimates.

Reported Receipt of the Child Tax Credit

As noted, the U.S. Department of Treasury reports that 59.3 million children received the first CTC payment in July 2021, while 60.9 million received the second payment in August 2021 (U.S. Department of Treasury, 2021a). Estimates from the Pulse, however, suggest that 66 percent of children were in households that report receiving the initial CTC payment. This is equivalent to approximately 48 million children, or 12 million fewer than the IRS reports. The discrepancy could be due a number of factors: sampling bias in the Pulse, benefit underreporting in the Pulse, overestimation of children served from the Department of Treasury, or general measurement error. Regardless of cause, all results should be interpreted with this discrepancy in

mind. Moreover, the coverage rate is likely to increase in subsequent months, considering that 1.6 million additional families received the benefit in August relative to July (Department of Treasury, 2021b).

Figure 1: Share of children in families receiving the first or second payment of the Child Tax Credit (self-reported receipt from responses of Census Household Pulse Survey)



Note: Race and ethnicity refers to that of the household head in which the child lives. Coverage rates are across the entire sample of households with children and are not limited to eligible households, as eligibility cannot be inferred with precision in the Pulse.

Figure 1 breaks down reported CTC receipt rates by race and ethnicity (left panel) and 2019 pre-tax income bin (right panel). As noted, 66 percent of all children are in households that report receipt of the first or second payment of the CTC in the Pulse, including 61 percent of Asian children, 70 percent of Black children, 61 percent of Latino children, and 67 percent of White children. Keep in mind that the sample here is not limited to *eligible* family units, and that

not all children in the U.S. are eligible; thus, the reported means should be interpreted as general coverage rates and not take-up among the eligible.

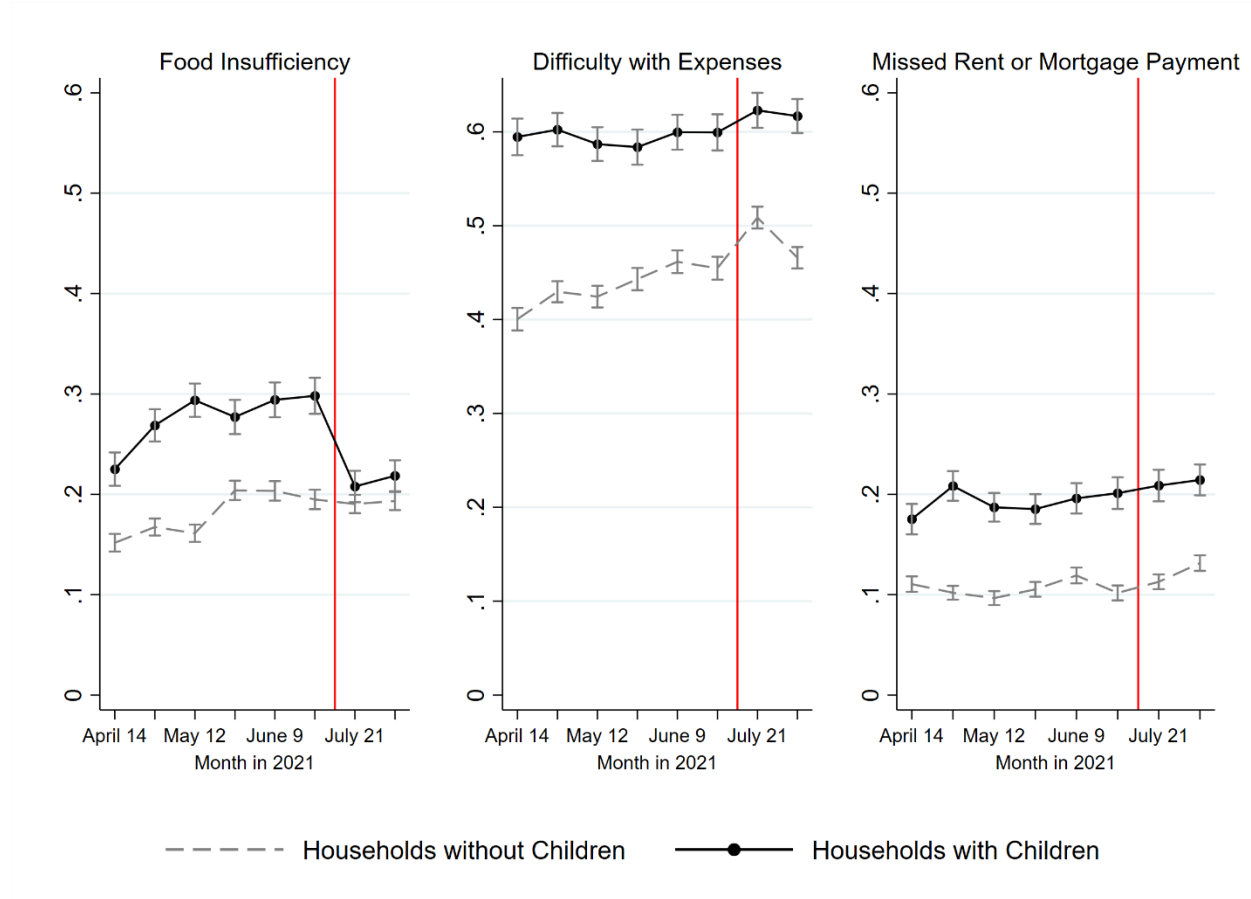
The results by income bin (right panel) suggest that families with children that had 2019 pre-tax incomes below \$25,000 are less likely than higher-income families to have received the benefit. According to the Pulse data, just over half (57 percent) of children in families with incomes under \$25,000 received the first or second payment. Rates of (self-reported) receipt rise as incomes rise. Among families with earnings between \$25,000 to \$35,000, more than two-thirds (67 percent) of children received the benefit. Among families with incomes between \$75,000 and \$100,000, approximately three-quarters (73 percent) of children received the payment.

Given the comparatively low coverage rates among the lowest-income families, it is unlikely that the initial effects of the CTC match the potential effects if coverage were greater, or the future effects assuming that coverage does, indeed, expand. As such, the results below should be interpreted as the immediate effects with imperfect coverage. Presumably, any effects observed in the results below will increase as more families receive the benefit in subsequent months.

Descriptive Findings

Figure 2 presents descriptive trends from April 2021 through August 2021 for each of the outcomes for childless households (dashed gray line) and households with children (solid black line) with 2019 pre-tax incomes below \$35,000. The red vertical line in each figure marks the first payment of the expanded CTC.

Figure 2: Trends in hardship for low-income households with and without children (April 14 to August 16, 2021; households with less than \$35,000 in 2019 pre-tax income)



Note: Red vertical line represents the date of the first payment of expanded Child Tax Credit. See Table 1 for definition of each outcome. Sample limited to households with 2019 pre-tax income under \$35,000.

Food insufficiency (left panel) is consistently higher for low-income households with children relative to low-income childless households for the entire period considered. From April through to the end of June 2021, both groups see slight increases in food hardship, with low-income childless households reaching 19.5 percent in June compared to 29.8 percent for low-income households with children. After the first payment of the CTC, however, food insufficiency remains relatively stable for low-income childless households (around 19 percent), but declines from 29.8 percent to 20.8 percent for households with children in late July 2021. In mid-August, the point estimate rises slightly to 21.8 percent. The change from late-June to mid-

August marks an 8 percentage point, or 27 percent, decline in food insufficiency for low-income households with children.

The middle panel shows that low-income households with children tend to face much higher rates of difficulty with expenses relative to childless households (in late June 2021, 59.9 percent to 45.5 percent, respectively). These gaps do not meaningfully change after the first payments of the CTC.

Households with children are also more likely to have missed rent or mortgage payments (right panel) over the entire period considered. As with difficulty in meeting expenses, the gaps in missed rent or mortgage payments do not change notably after the initial CTC payments.

Estimation Results

Table 2 presents the results from our difference-in-differences estimates using our binary treatment (which, as described in the prior section, is set to a value of one for households with children) among our subsample of households with pre-tax income of \$35,000 or less in 2019.

Our initial analysis, presented in Columns 1-3 of Table 2, assumes that all households with children under the \$35,000 threshold are eligible to receive the CTC (regardless of whether they actually report receiving the benefit). The secondary analysis, presented in Columns 4-6 of Table 2, presents the 2SLS estimates of the treatment effect on the treated (those who report receiving the CTC payments).

Table 2: Difference-in-differences estimate of effect of expanded CTC on hardship among households with 2019 total pre-tax income below \$35,000; **binary treatment**

	Intent to Treat Effect			Average Treatment Effect on the Treated		
	1: Food Insufficiency	2: Difficulty w/ Expenses	3: Missed Rent or Mortgage	4: Food Insufficiency	5: Difficulty w/ Expenses	6: Missed Rent or Mortgage
Household with Children	0.06*** (0.01)	0.11*** (0.01)	0.06*** (0.01)	0.06*** (0.01)	0.11*** (0.01)	0.07*** (0.01)
Post-July 15	0.01 (0.01)	0.05*** (0.01)	0.02* (0.01)	0.01 (0.01)	0.05*** (0.01)	0.02* (0.01)
Household with Children X Post-July 15	-0.075*** (0.02)	-0.02 (0.02)	0.00 (0.01)	-0.14*** (0.03)	-0.05 (0.03)	0.01 (0.03)
Pre-Treatment Mean among HH w/ Children in Subsample	0.276	0.594	0.192	0.276	0.594	0.192
Reported CTC Receipt among HH w/ Children in Subsample	52.7%	52.7%	52.9%	52.7%	52.7%	52.9%
Observations	76,523	76,582	76,085	76,523	76,582	76,085

Note: All models include state fixed effects and control for age, education, and sex of household head. Sample limited to respondents in Pulse reporting 2019 pre-tax income of below \$35,000. Treatment effect on the treated measured using two-staged least squares regression with treated respondents (those reporting receipt of CTC) as the endogenous variable and treatment group (low-income households with children) as instrumental variable. Robust standard errors in parentheses. † $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Consistent with the descriptive trends, our results suggest a significant decline in food insufficiency for households with children relative to childless households pre- versus post-rollout of the monthly CTC (see Column 1). Specifically, the results suggest that the intent-to-treat effect amounts to a 7.5 percentage point decline in food hardship for households with children relative to childless households after the treatment. This is consistent with the descriptive statistics observed before. For context, the effect size is around one-fourth the pre-treatment mean of food insufficiency among households with children in the sample (pre-

treatment mean of 27.6 percent). Relative to the rate of food insufficiency in late June (29.8 percent), the effect of the CTC marks a 25 percent decline in this form of hardship.

The effect of the CTC among the treated (families who report receiving the benefit), as shown in Column 4 of Table 2, is a 14-percentage point decline, or around 50 percent of the pre-treatment mean of food insufficiency for households with children in the sample. Put simply, the first two CTC payments are associated with a substantial decline in food insufficiency among low-income households with children.

Households with children also appear to experience a small decline in the difficulty with expenses relative to childless households (see Columns 2 and 5 of Table 2); however, the effects are not statistically significant. Moreover, the magnitude of the effect is notably smaller than that of food insufficiency, consistent with the descriptive trends.

Similarly, our results suggest that the CTC does not have immediate effects on missed rent or mortgage payments among low-income households with children. This null effect is perhaps unsurprising given evidence that families receiving the benefit are more likely to have spent their payments on food items (Perez-Lopez, 2021), and that as of this writing our results estimate the effects of the initial CTC payments.

Table 3: Difference-in-differences estimate of effect of expanded CTC on hardship among households with 2019 total pre-tax income below \$35,000; **continuous indicator of treatment intensity**

	Intent to Treat Effect			Average Treatment Effect on the Treated		
	1: Food Insufficiency	2: Difficulty w/ Expenses	3: Missed Rent or Mortgage	4: Food Insufficiency	5: Difficulty w/ Expenses	6: Missed Rent or Mortgage
Net Gain from CTC	0.03*** (0.00)	0.06*** (0.00)	0.04*** (0.00)	0.03*** (0.00)	0.06*** (0.00)	0.04*** (0.00)
Post-July 15	0.01 (0.01)	0.05*** (0.01)	0.02* (0.01)	0.01 (0.01)	0.05*** (0.01)	0.02 (0.01)
Net Gain from CTC X Post-July 15	-0.04*** (0.01)	-0.01 (0.01)	0.00 (0.01)	-0.06*** (0.01)	-0.01 (0.01)	0.00 (0.01)
Pre-Treatment Mean among HH w/ Children in Subsample	0.276	0.594	0.192	0.276	0.594	0.192
Reported CTC Receipt among HH w/ Children in Subsample	52.7%	52.7%	52.9%	52.7%	52.7%	52.9%
Observations	75,943	76,004	75,512	75,943	76,004	75,512

Note: Treatment intensity indicators are divided by 100 for easier interpretation of coefficients. All models include state fixed effects and control for age, education, and sex of household head. Treatment effect on the treated measured using two-staged least squares regression with estimated received benefit value among families reporting receipt of the CTC as the endogenous variable and treatment indicator (potential net benefit value of CTC) as instrumental variable. Sample limited to respondents in Pulse reporting 2019 pre-tax income of below \$35,000. Robust standard errors in parentheses. † $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

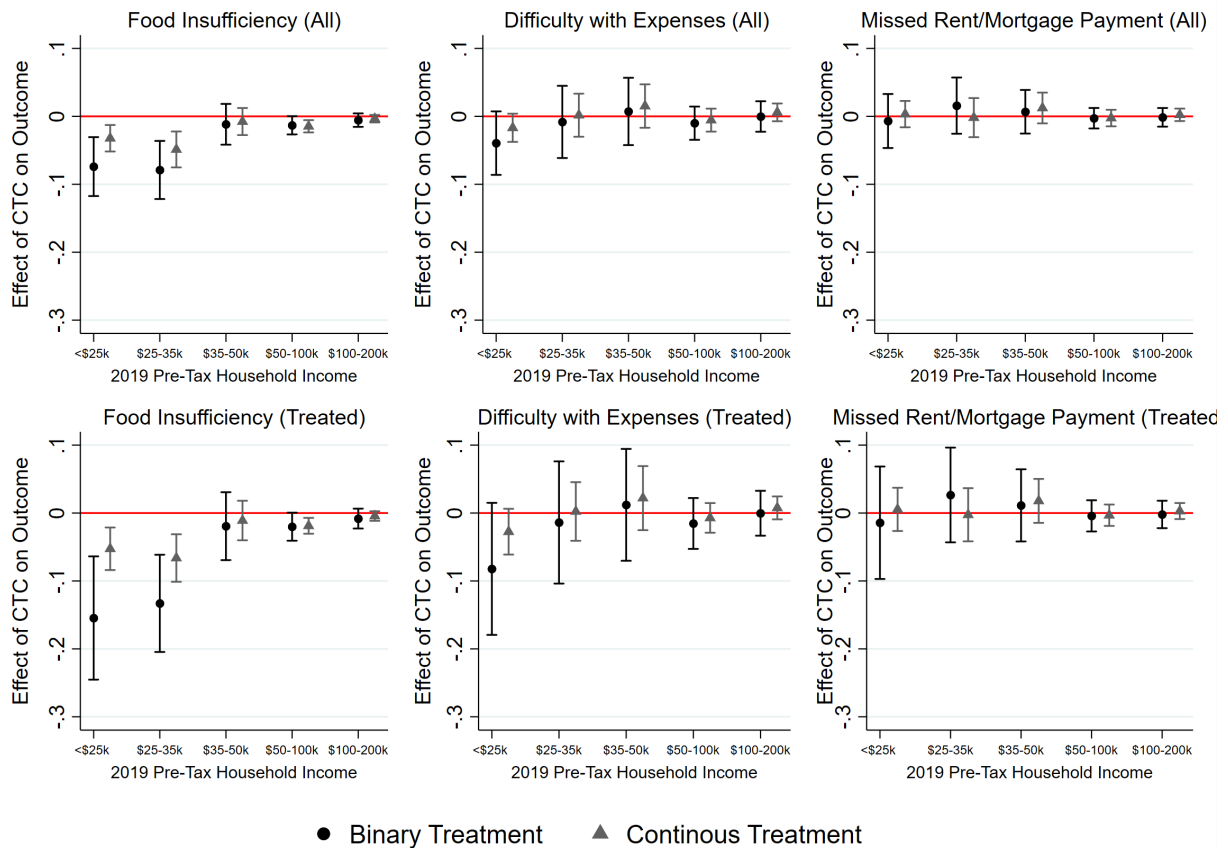
Table 3 now applies our continuous indicator of treatment intensity for the CTC specifically among households with children. Recall that the treatment intensity indicator captures variation based on pre-tax income and household size (see Appendix B for more details). The findings are consistent with those from Table 2. Looking at food insufficiency, the results suggest that a \$100 size-adjusted increase in CTC treatment intensity is associated with a 4-percentage point decline in food insufficiency among families with children (Column 1 of Table 3). The treatment effect on the treated (Column 4 of Table 3) is instead 6 percentage point.

Put differently, a \$100 net increase in CTC benefits (adjusted for family size) is associated with a 6-percentage point, or roughly 22 percent, decline in food insufficiency for low-income families with children who report receiving the CTC.

To contextualize this finding, note that a standard monthly benefit payment for a single parent with a 7-year-old child is \$250, or \$192 after equivalizing for family size. Using the effect magnitude from the treatment effect on the treated estimates, a standard payment for this single parent is thus associated with an 11.5 percentage point ($192 * 0.06 / 100$) reduction in the likelihood of food insufficiency after receiving the initial CTC payments. The estimated reduction effect is, of course, even stronger for families with higher size-adjusted benefit values.

In contrast to the CTC's effects on food insufficiency, however, its effects on difficulty with expenses and missed rent or mortgage payments are again smaller and insignificant (see Columns 2, 3, 5, and 6 of Table 3).

Figure 3: Estimated effect of CTC on outcome by 2019 pre-tax household income cutoff and treatment specification



Note: Y-axis plots coefficients from interaction of treatment indicator and post-treatment dummy, similar to results from Tables 1 and 2. All models include state fixed effect and age, education, and sex controls. Separate estimates run for each income group displayed on Y-axes.

Recall that the sample in our primary analyses was limited to households with 2019 incomes under \$35,000. Figure 3 relaxes that condition and instead visualizes the effect of the CTC across the income distribution. Each point in Figure 3 represents the coefficient from the interaction terms for our binary treatment (black circle) and continuous treatment (gray triangle) when including households with 2019 incomes under \$25,000, then between \$25,000 to \$35,000, \$35,000 to \$50,000, \$50,000 to \$100,000, and \$100,000 to \$200,000. The upper row presents the

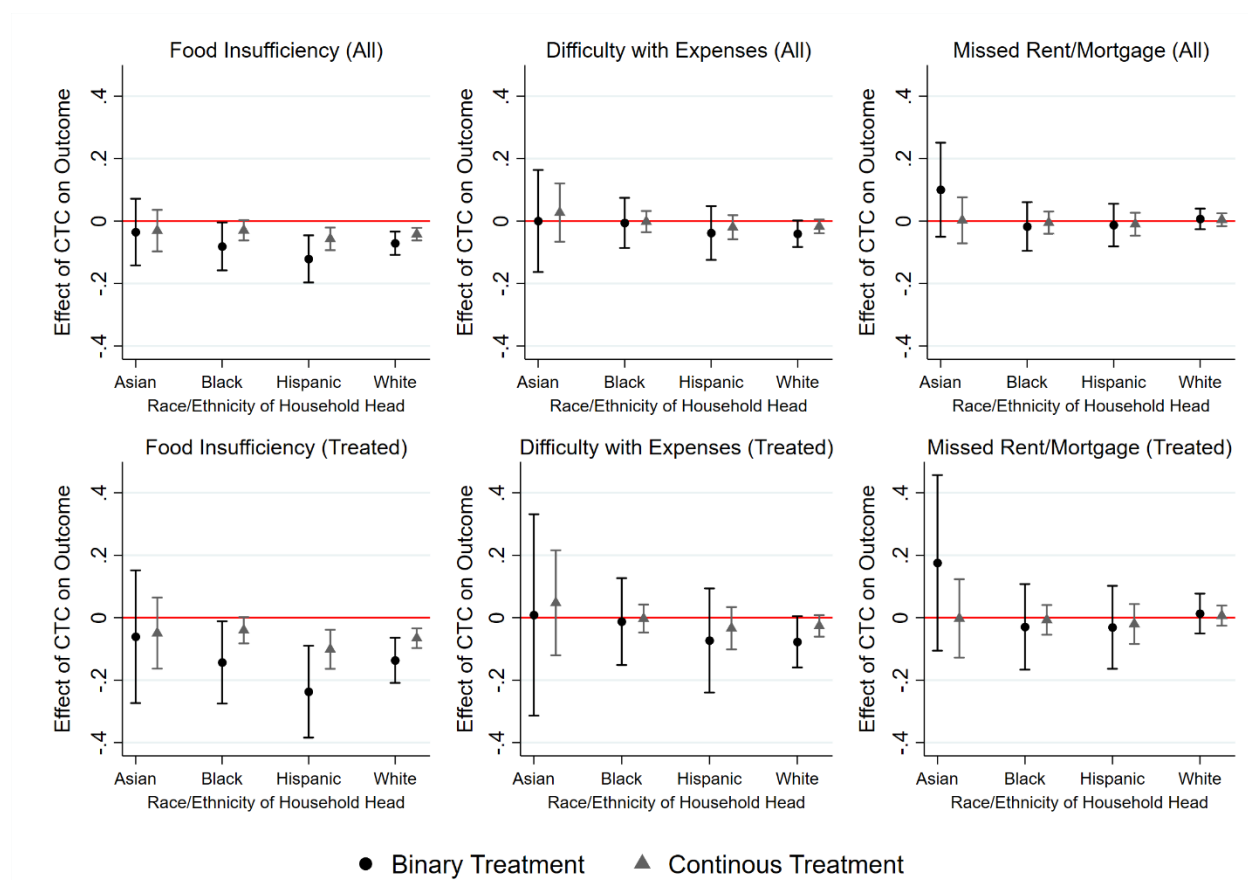
intent-to-treat effects, while the lower row presents the effects among families reporting receipt of the CTC.

The findings, in short, demonstrate that the CTC is particularly effective at reducing food insufficiency for households with children with 2019 pre-tax incomes below \$25,000 and between \$25,000 to \$35,000. At higher income bins, the policy has no statistically significant effect. The results are relatively consistent with examining the effects among the treated. These patterns emphasize that the CTC is particularly effective at reducing food hardship among lower-income families.

The middle and right panels of Figure 3 show the null effects across the income distribution of the initial CTC payments on difficulty with expenses and missed rent or mortgage payments.

Figure 4 presents the results by race and ethnicity. We again limit the sample the household heads of the specified race and ethnicity, and then apply the same treatment conditions as in our primary analysis. The upper-left panel suggests that the intent-to-treat effects of the CTC on food insufficiency are primarily channeled among Black, Hispanic, and White families. Similarly, the lower-left panel finds negative and significant reduction effects among Black, Hispanic, and White families, but not Asian families (though point estimates are negative for Asian families, though not statistically significant). Put differently, low-income Black, Hispanic, and White families alike saw decreases in food hardship as a result of the initial monthly CTC payments.

Figure 4: Estimated effect of CTC on outcome by race and ethnicity and treatment specification



Note: Y-axis plots coefficients from interaction of treatment indicator and post-treatment dummy, similar to results from Tables 1 and 2. Sample limited to households with 2019 income under \$35,000. All models include state fixed effects and age, education, and sex controls. Separate estimates run for each group displayed on Y-axes.

The middle and right panels of Figure 4 again suggest that the first CTC payments did not have notable effects on missed difficulty with expenses or missed rent/mortgage payments.

Sensitivity Tests

A potential threat to our analysis is the effect of seasonality on differential hardship and wellbeing outcomes for households with children relative to childless households. For example, general conditions in July, such as summer vacation for many school-age children, may shape hardship in a way that affects our conclusions. Our read of the evidence suggests that this is unlikely: prior findings suggest that summer vacations tend to worsen food hardship for

households with children, given the absence of school meals (Huang, Barnidge, and Kim, 2015). Nonetheless, to test for the effects of seasonality and to add a placebo test to our analysis, we replicate our results using the same months (April through early August) but using the 2020 version of the Pulse. We designate July 15, 2020, as the timing of our treatment and otherwise apply the same treatment specifications as in our primary analysis. The results, presented in Appendix D, show insignificant effects of either treatment for families of any income level (Figure D1) and for families of any race and ethnicity (Figure D2). These findings rule out that seasonality is driving our findings and strengthen the likelihood that the expanded CTC is, indeed, responsible for the improved economic conditions of households with children after July 15, 2021.

DISCUSSION & CONCLUSION

The transformation of the Child Tax Credit into a more generous and inclusive monthly payment marks a historic, albeit temporary, shift in the treatment of low-income families with children within the U.S. welfare state. To identify the early impacts of the monthly payments on material hardship, this study applied a series of difference-in-differences estimates using microdata from the Census Household Pulse Survey (Pulse). The findings represent only the initial effects of the first two CTC payments; thus, they should not be interpreted as the final effects of the CTC, particularly given that coverage of the program will likely expand in subsequent months. Nonetheless, our findings from the initial payments lead to three primary conclusions.

First, we find that the initial CTC payments strongly reduced food insufficiency among low-income families with children. Specifically, we found that the initial CTC payments are associated with a 7.5 percentage point (25 percent) decline in food insufficiency. The effect size

increases to 14 percentage points (around 50 percent) when evaluating the effect of the CTC on the families who report receiving the payments. Estimates from our treatment intensity indicator suggest that a \$100 increase in size-adjusted CTC benefits is associated with a 6-percentage point, or roughly 22 percent, decline in food insufficiency among families receiving the benefit. These changes mark substantial declines in food hardship. As a result, the share of all low-income families with children (regardless of whether they received the first CTC payment) experiencing food insufficiency dropped from 29.8 percent just before the first CTC payment to 20.8 percent after the first payment. For all households with children (regardless of income), the rate of food insufficiency fell from 13.4 percent to 9.4 percent. The first CTC payment did not appear to reduce the share of families who missed a rent or mortgage payment. This is perhaps unsurprising: rent arrears make up a much larger sum than the typical monthly CTC payment (Aurand and Threet, 2021), and most families receiving the CTC payment report spending the benefits on food items (Perez-Lopez, 2021).

Second, we find the effects of the CTC on food insufficiency are concentrated among families with 2019 pre-tax incomes below \$35,000; perhaps unsurprisingly, the first payments had little effect on food insufficiency among higher-income groups, as these income groups are less likely to face hardship in the first place. Moreover, the effects on food insufficiency are broadly consistent across low-income White, Black, and Hispanic families with children.

We also find that increasing the coverage rate of the CTC is important for further reducing material hardship. Though the Department of Treasury reports that around 83 percent of children in the U.S. received the second CTC payment, self-reported receipt from the Pulse is closer to two-thirds of all children (U.S. Department of Treasury, 2021a). Notably, the lowest-income families in the Pulse (those reporting 2019 pre-tax incomes of under \$25,000) report the lowest receipt rate

of the CTC. This aligns with concerns that children in households who have not filed recent federal taxes – including those in families with very low incomes, disconnected from work or public supports, and/or other challenges – are at greatest risk of missing out on the initial rounds of monthly payments (Cox et al., 2021). We acknowledge, however, that the number of children reached by the monthly payments is likely to increase with time. Consider that between July and August 2021, the number of children receiving the CTC increased by 1.6 million (US Department of Treasury, 2021b).

Given the likelihood of rising coverage rates in the future, we anticipate that the results in the present analysis provide only a preview of the potential consequences of the CTC expansion. As more children receive the benefit in future months, food hardship, and perhaps other forms of material hardship, may decline further. From the present analysis, we nonetheless conclude that the first payments of the CTC were largely effective at reducing food insufficiency among low-income families with children.

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APPENDICES

APPENDIX A: Descriptive Statistics and Comparison to CPS ASEC

Table A1: Descriptive statistics in Census Household Pulse Survey compared to the Current Population Survey

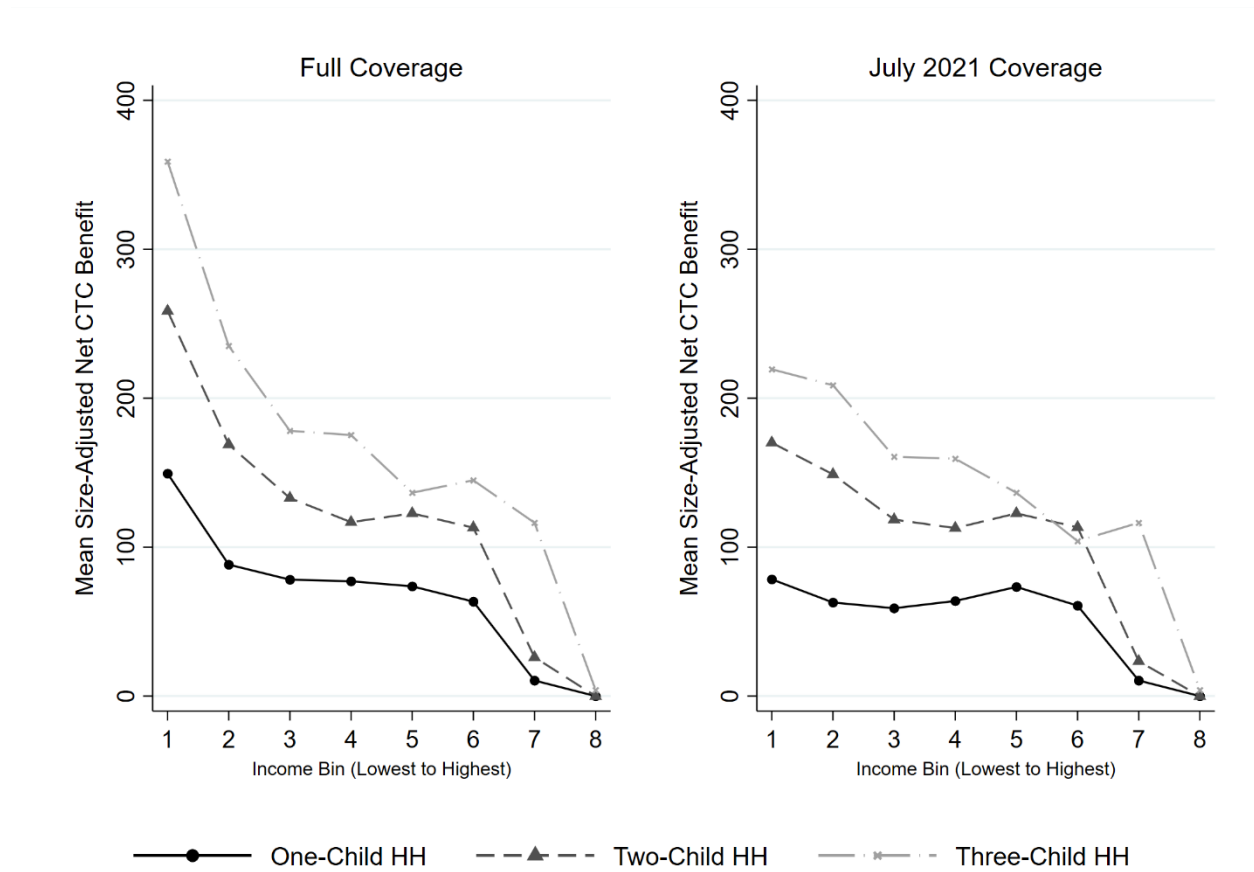
	Census Household Pulse Survey			Current Population Survey 2019
	All (April to August 2021)	Before July 15, 2021	After July 15, 2021	Annual, 2019
Female	52.2%	52.3%	51.5%	51.7%
No High School Degree	6.6%	6.6%	6.6%	12.0%
College Degree	34.7%	34.8%	34.2%	30.3%
Age	50.0	50.0	49.7	47.0
Married	57.9%	58.0%	57.0%	51.7%
Children in HH (Binary)	36.4%	36.5%	35.4%	35.4%
Hispanic	15.2%	15.1%	15.7%	15.5%
Black	10.9%	11.0%	10.9%	12.4%
Asian	5.6%	5.5%	6.1%	6.1%
2019 Income: \$0-25,000	14.3%	14.1%	15.4%	16.9%
2019 Income: \$25,000-100,000	54.5%	54.7%	53.5%	52.2%
2019 Income: \$100,000+	31.2%	31.2%	31.1%	30.9%

Note: Pulse estimates from all survey respondents in specified month(s). CPS estimates from sample of 18 to 88 year old individuals in ASEC survey (matching the age span of respondents in the Pulse).

APPENDIX B: Continuous Indicator of Treatment Intensity

Our continuous indicator of treatment intensity captures variation in expanded CTC benefits based on age of the children, the number of children in the home, and the relative value of the new CTC benefits compared to what the family likely earned from the existing CTC prior to the reform. As detailed in the manuscript, we use data from the 2019 U.S. Current Population Survey to estimate the mean pre- and post-reform benefit values for bins defined by the number of adults in the household (ranging from 1 to 10), the number of children in the household (ranging from 0 to 10), and eight-category pre-tax income bins (from under \$25,000 annually scaling up to more than \$200,000 per year). We then import this value into the Pulse, matching on the number of adults, number of children, and 2019 pre-tax income category of the Pulse respondents. Below, we visualize the mean size-adjusted net CTC benefits by income bin and family size.

Figure B1: Mean size-adjusted net CTC benefits per month by number of children in household and income bin



Note: Income bins are staggered from (1) under \$25,000, (2) \$25,000 - \$34,999, (3) \$35,000 - \$49,999, (4) \$50,000 - \$74,999, (5) \$75,000 - \$99,999, (6) \$100,000 - \$149,999, (7) \$150,000 - \$199,999, and (8) \$200,000 or more.

Figure B2: Mean size-adjusted net CTC benefits per month by number of children in household and family type among families with 2019 pre-tax income below \$35,000

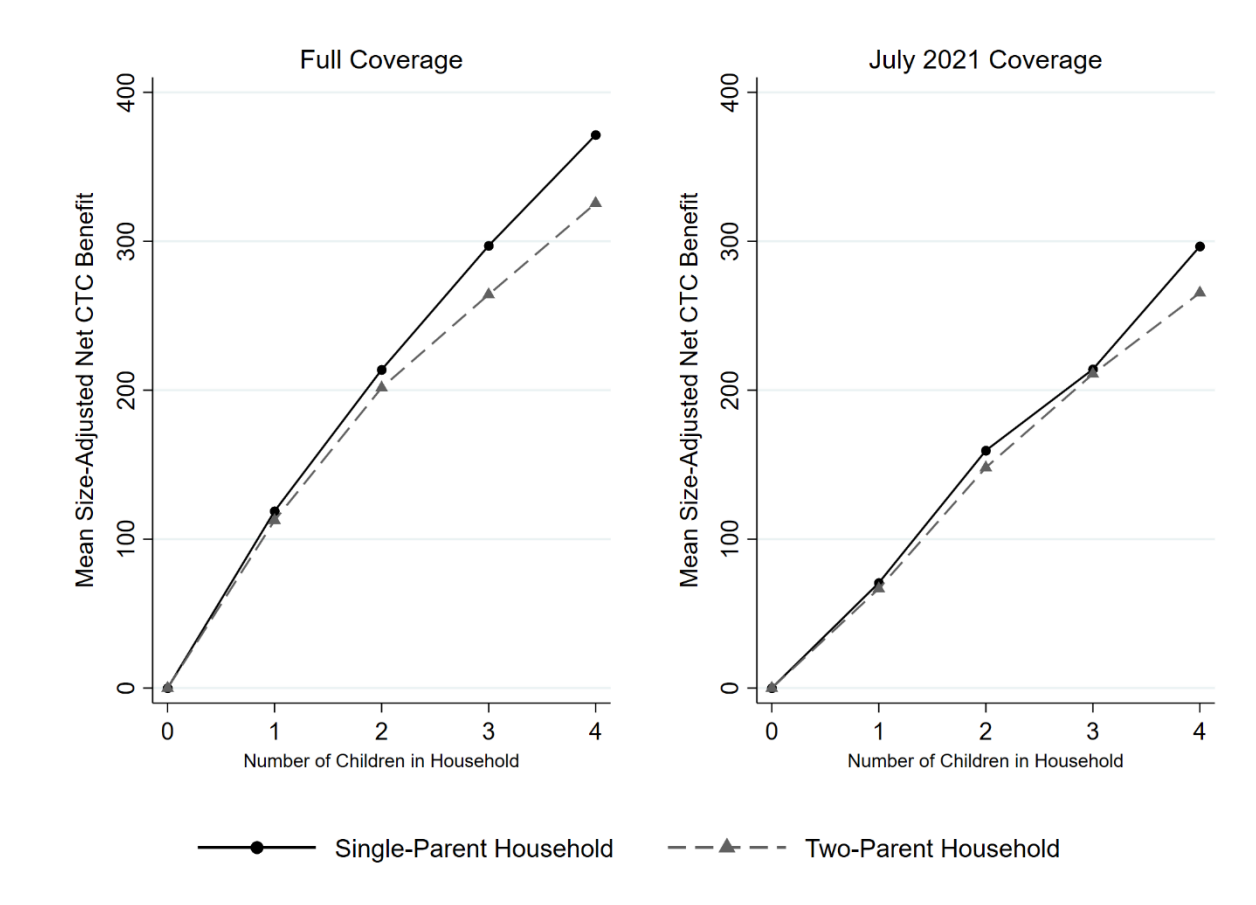
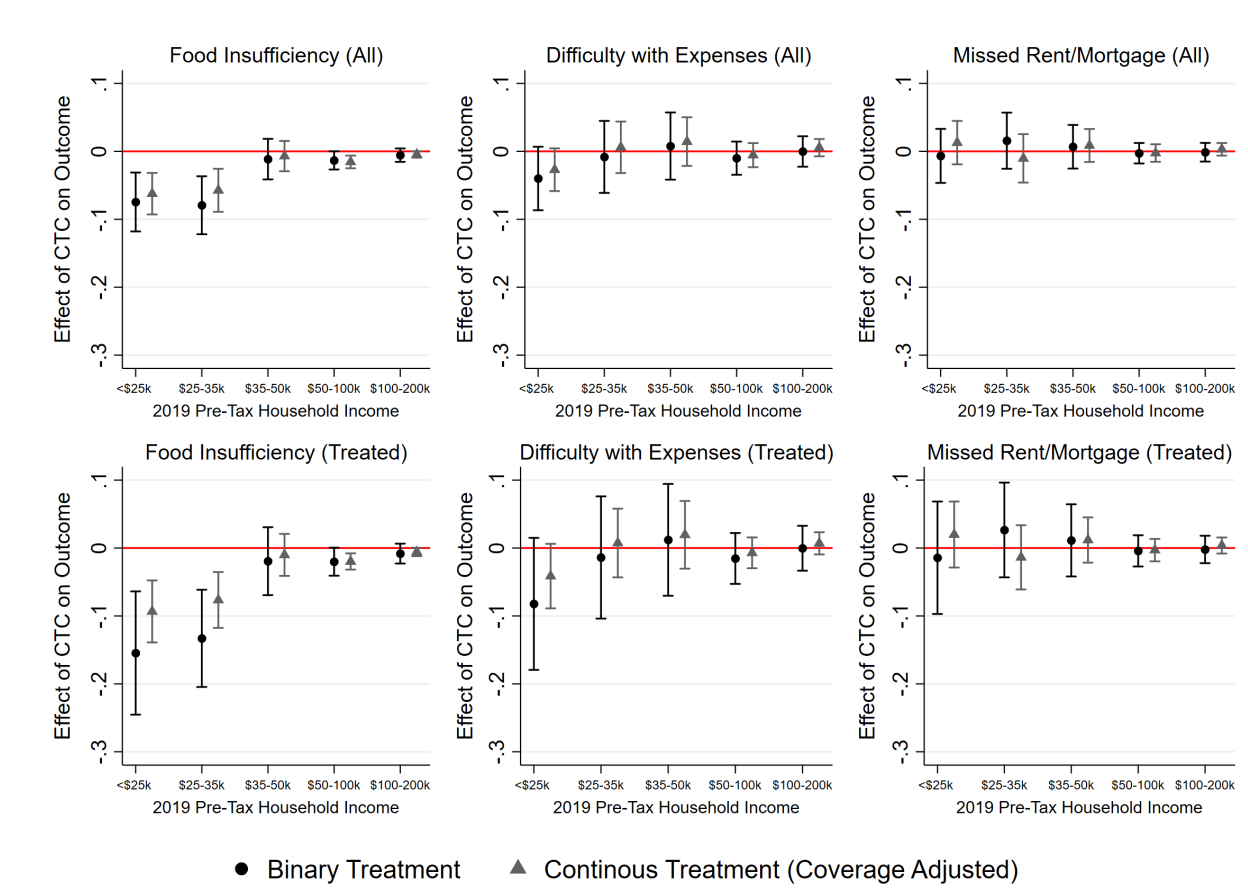


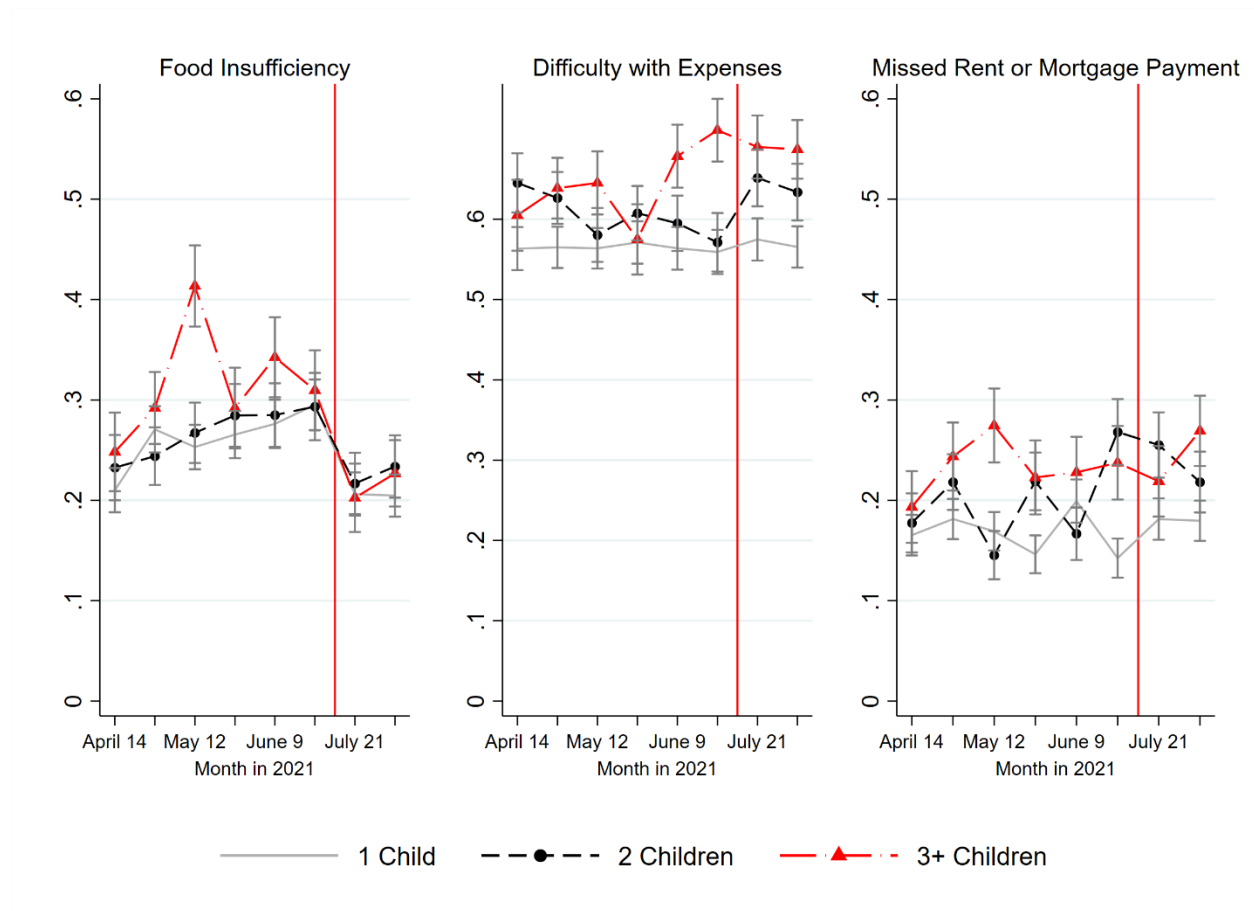
Figure B3: Estimated effect of CTC on outcome by 2019 pre-tax household income cutoff and alternative treatment specification: **coverage-adjusted CTC treatment intensity**



Note: Y-axis plots coefficients from interaction of treatment indicator and post-treatment dummy, similar to results from Tables 1 and 2. All models include state fixed effects and control for age, education, and sex. Separate estimates run for each income group displayed on Y-axes.

APPENDIX C: Descriptive trends in hardship and wellbeing by number of children

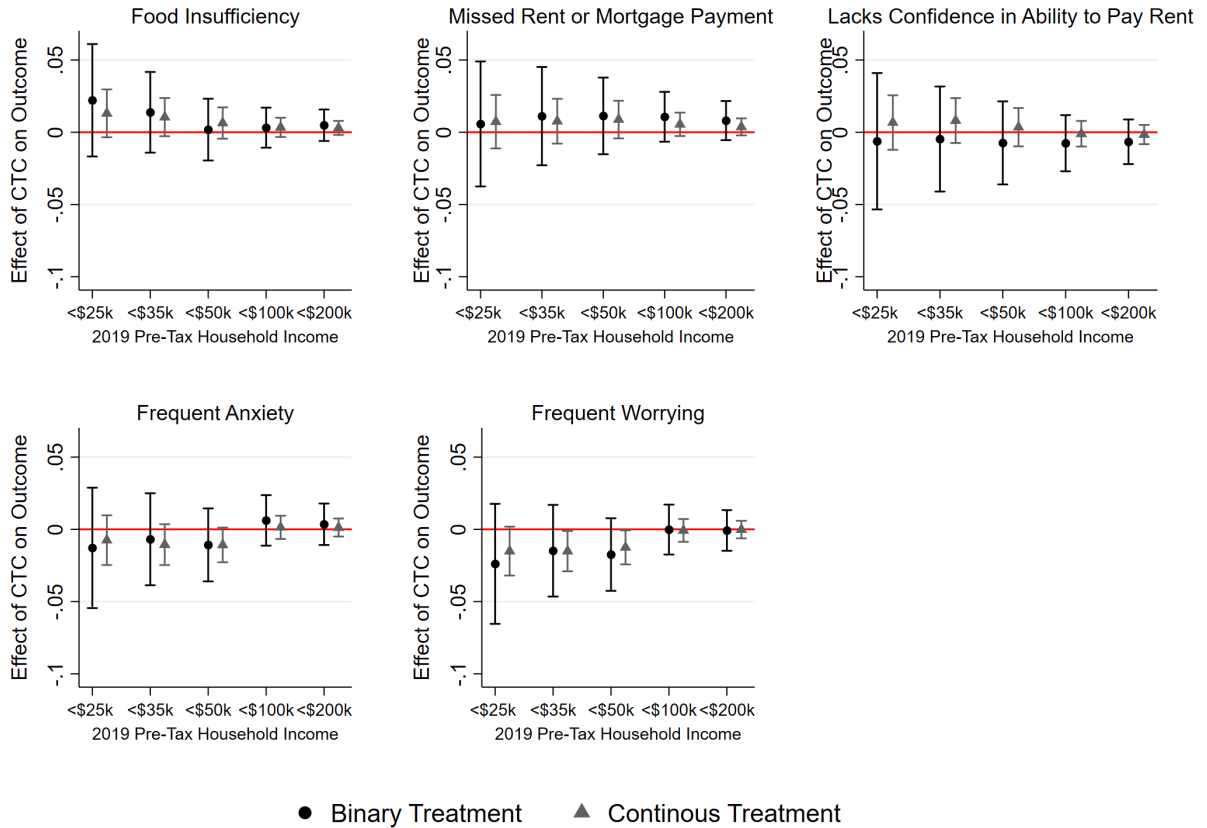
Figure C1: Trends in hardship and wellbeing for households with children, by number of children (April 14 to August 16, 2021; pre-tax 2019 incomes below \$35,000)



Note: Red vertical line represents first payment of expanded Child Tax Credit. See Table 1 for definition of each outcome. Sample limited to households with 2019 pre-tax income of less than \$35,000.

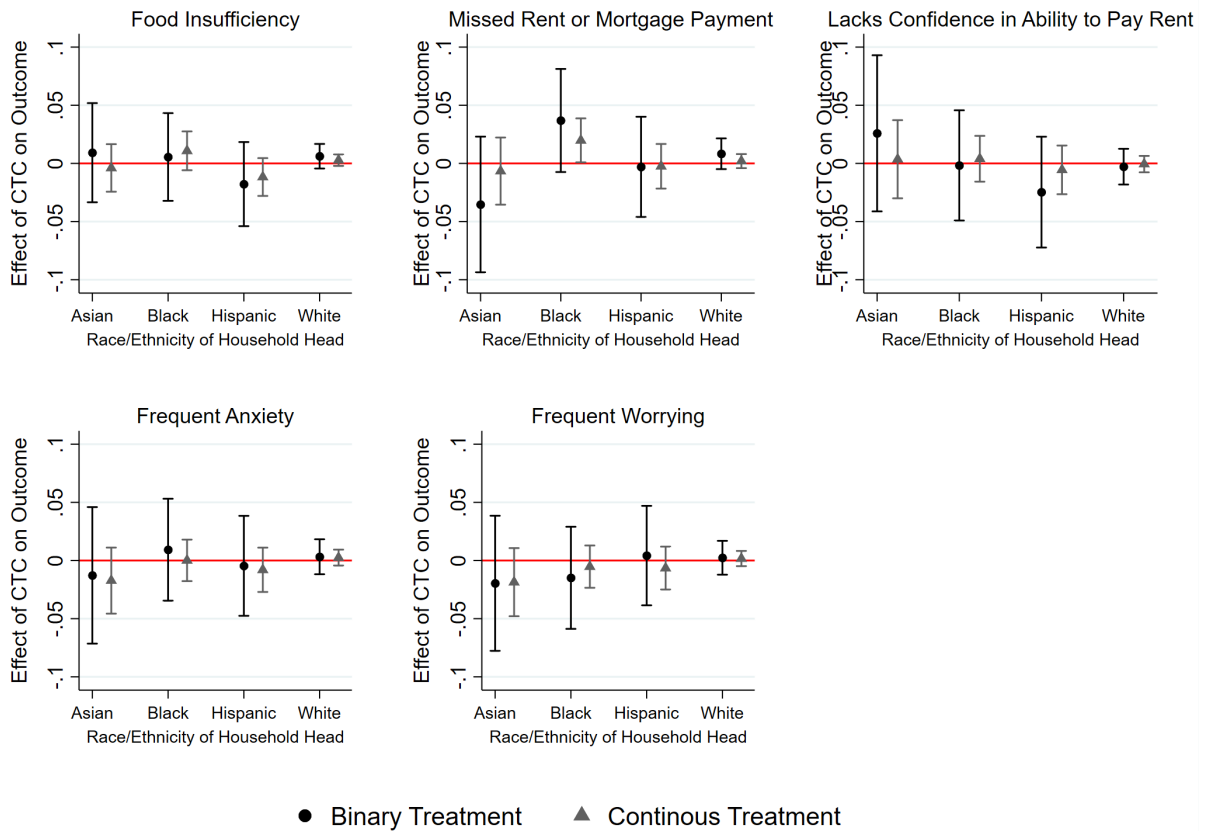
APPENDIX D: Placebo and Seasonality Tests

Figure D1: Seasonality test in 2020 sample (April 23-July 21, 2020): Binary treatment set to post-July 15, 2020 and continuous treatment equivalent to primate analysis; estimates by income cutoff



Note: Y-axis plots coefficients from interaction of treatment indicator and post-treatment dummy, similar to results from Tables 1 and 2. All models include state fixed effects and control for age, education, and sex. Separate estimates run for each income group displayed on Y-axes.

Figure D2: Seasonality test in 2020 sample (April 23-July 21, 2020): Binary treatment set to post-July 15, 2020 and continuous treatment equivalent to primate analysis; estimates by race/ethnicity



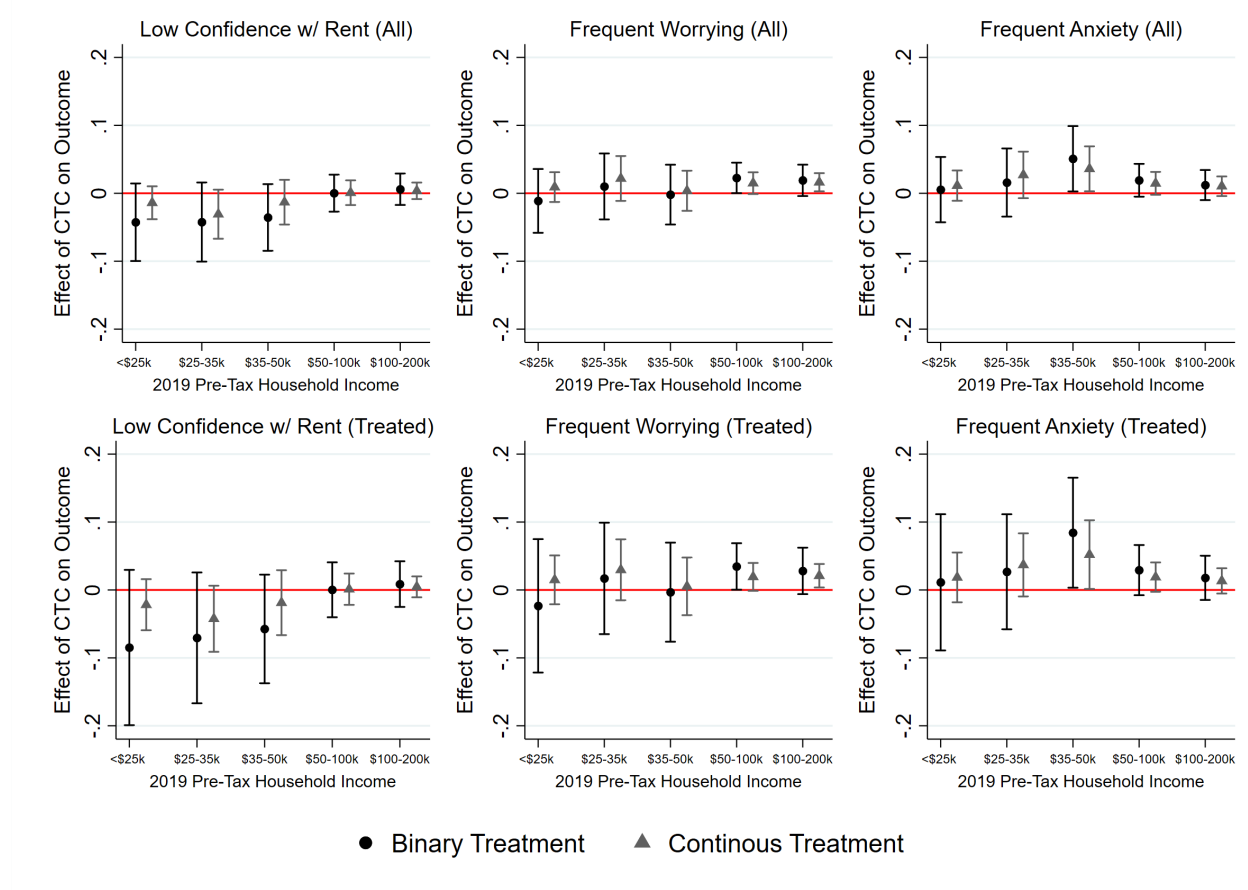
Note: Y-axis plots coefficients from interaction of treatment indicator and post-treatment dummy, similar to results from Tables 1 and 2. All models include state fixed effects and control for age, education, and sex. Separate estimates run for each group displayed on Y-axes.

Appendix E: Effects on Subjective Wellbeing

The findings below present an extra set of analyses focused on subjective wellbeing. The indicators are defined as follows:

<i>Subjective Wellbeing</i>		
Lack of confidence in paying the rent or mortgage	How confident are you that your household will be able to pay your next rent or mortgage payment on time? Select only one answer.	<i>Not at all or slightly confident.</i>
Frequent Anxiety or Worrying	Over the last 7 days, how often have you been bothered by the following problems ... Feeling nervous, anxious, or on edge?	<i>More than half the days or nearly every day.</i>
Frequent Worrying	Over the last 7 days, how often have you been bothered by the following problems ... Not being able to stop or control worrying?	<i>More than half the days or nearly every day.</i>

Figure E1: Estimated effect of CTC on subjective wellbeing by 2019 pre-tax household income cutoff and treatment specification



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