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TAX CREDITS AND CHILD OUTCOMES: LESSONS FROM THE U.S., U.K., AND CANADA

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ABSTRACT

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Tax Credits and Child Outcomes: Lessons from the U.S., U.K., and Canada

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Abstract

Over the last several decades, there have been historic shifts in the structure of cash transfer programs in Western, developed countries, including the U.S., Canada, and U.K. For all three of these countries, the turn of the 21st century marked a shift away from unconditional cash transfer programs like traditional cash welfare, towards an emphasis on benefits that encourage or require work. In this paper, I review the evidence on the impact of tax credits on child outcomes, focusing on what is known about child-oriented tax credits in the U.S. (EITC, CTC), the U.K. (WFTC, CTC, WTC), and Canada (Canada Child Tax Benefit (CCTB), National Child Benefit (NCB), and the Canada Child Benefit (CCB). Overwhelmingly, the evidence from these three countries suggests that tax credits have positive impacts on children on a host of different outcomes, including infant birthweight, childhood health and achievement, educational attainment, wages, and poverty in adulthood. While there is a large, growing body of evidence on the impact of these tax credits on children, future work should further investigate the precise mechanisms through which tax credits impact child outcomes, the characteristics of children most impacted by these credits, and the importance of how frequently the credits are distributed.

JEL codes: H5; I38

Key words: Tax credits; child education, child health; child poverty

Data availability statement: All of the data used in this manuscript is publicly available. The author would be happy to assist other users in obtaining any of these data.

Introduction

Over the last several decades, there have been historic shifts in the structure of cash transfer programs in Western, developed countries, including the U.S., Canada, and U.K. For all three of these countries, the turn of the 21st century marked a shift away from unconditional cash transfer programs like traditional cash welfare, towards an emphasis on benefits that encourage or require work. Welfare reform and the expansion of the Earned Income Tax Credit (EITC) in the U.S, and the establishment of the Working Family Tax Credit (WFTC) in the U.K in the late 1990s are two such examples. This shift towards in-work benefits stemmed from growing criticisms throughout the 1980s and early 1990s that existing cash welfare systems created a "culture of dependence" by disincentivizing work, particularly among low-income, single mothers. Both the EITC and the WFTC were designed to provide cash support to low-income families, while also requiring work.

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In Canada, while tax credits for children are not contingent on a minimum level of employment, overhauls to the design of the child benefit system in the 1990s and 2000s were meant to provide income support to families without discouraging work.

Now that several decades have passed since these reforms took place, what do we know about their impact on the children of beneficiaries, in both the short- and long-term? Accounting for the long-term benefits of these programs is critical in conducting any cost-benefit analysis, with several recent studies illustrating how social programs "pay for themselves" by reducing government spending in the long term (e.g. Hendren and Sprung-Keyser 2020; Bastian and Jones 2021). Additionally, with the rising costs of raising children in these low-fertility countries, particularly in the presence of high inflation in the aftermath of the COVID-19 pandemic, understanding how these tax credits impact the well-being of low-income families is of first order importance in understanding the role of public policy in supporting low-income families.

In this paper, I review the evidence on the impact of tax credits on child outcomes, focusing on what is known about child-oriented tax credits in the U.S. (EITC, CTC), the U.K. (WFTC, CTC, WTC), and Canada (Canada Child Tax Benefit (CCTB), National Child Benefit (NCB), and the Canada Child Benefit (CCB). While there have been previous reviews of the EITC literature in the U.S. (e.g. Hotz and Scholz 2006; Nichols and Rothstein 2015) and the WFTC in the U.K. (e.g. Brewer and Hoynes 2019),[2] these reviews largely focus on the impacts on adult recipients rather than children.[3] To my knowledge, this is the first comprehensive review of the effect of these tax credits on child outcomes.

Overwhelmingly, the evidence from these three countries suggests that tax credits have positive impacts on children on a host of different outcomes. Studies have shown that tax credits increase infant birthweight, improve childhood health and achievement, increase educational attainment, increase wages, and reduce poverty in adulthood. While there is a large, growing body of evidence on the impact of these tax credits on children, there remain many unanswered questions, including the precise mechanisms through which tax credits impact child outcomes, the characteristics of children most impacted by these credits, and the importance of how frequently the credits are distributed. One of the key unanswered questions in this literature is the extent to which these improvements in child outcomes are driven by income or employment effects, or both. While recent work has taken steps to disentangle these mechanisms, much more work on this topic is needed. Given growing discussions around universal child benefits, understanding the mechanisms through which tax credits improve child outcomes is critical for informing the design of future cash transfer policies.

The rest of the paper is organized as follows. I begin in Section II with a brief discussion of the history of these tax credits and relevant reforms over time. In Section III, I discuss the empirical methods and data used to analyze the impacts of these credits. In Section IV, I describe a theoretical framework for how tax credits may impact child outcomes and the empirical evidence

[2] Hoynes, Joyce, and Waters (2023) discuss these issues in the UK context, but note that lack of direct evidence from the UK on child outcomes.

[3] Hoynes and Schanzenbach (2018) cover the literature on how social safety net programs impact child outcomes, but their review focuses on the evidence from the U.S. and covers a much broader array of safety net programs, including public health insurance, food assistance, and cash welfare.

we have in support of this framework. Section V reviews the literature on short-term (contemporaneous) outcomes for the second (child) generation, including poverty, health, and education, while Section VI reviews the evidence on the long-term outcomes, including educational attainment, health, employment, and earnings in adulthood. Finally, Section VII discusses some of the key challenges in this literature and remaining questions for future research. Section VIII concludes.

II. Background on policies

U.S.: Earned Income Tax Credit and Child Tax Credit

In the U.S., the vast majority of evidence on how tax credits impact children comes from the evaluation of the Earned Income Tax Credit (EITC).[4] The EITC was first implemented in 1975 and was designed to offset payroll taxes paid by low-income families with children. The credit was initially worth up to $500 (approximately $3,000 in 2023 terms). The basic benefit schedule has a trapezoidal shape (see Figure 1a), with benefits phasing-in as earnings increase up to the first kink point, after which benefits remain constant over a range of earnings. Once earnings reach the second kink point, benefits are phased out at a rate of about 21 cents on the dollar. The benefit size varies depending on how many children under the age of 19 (or 23 if a full-time student) reside in the household,[5] with larger benefits available to families with two or three children (there is no additional benefit for families with more than three children). In 2023, a married couple with three children and income below $63,398 (about 175% of the federal poverty line or 90% of median household income in the U.S.)[6] could be eligible for up to $7,430 (about 10% of median household income) in federal EITC benefits.

In addition to the federal EITC, several states within the U.S. have their own EITCs, which piggyback off of the federal credit. For the most part, states set their EITCs as a fraction of the federal EITC, such that anyone eligible for the federal credit would also be eligible for the state credit, though some states have their own benefit schedules or exceptions (see Appendix Table 1 for more details). As of 2023, 32 states had their own EITCs, which ranged in generosity from 3% to over 100% of the federal credit. Many states also changed the generosity of their benefits over time, with most states increasing the size of the benefit, while a few states have also reduced or eliminated their EITCs.

Benefits are claimed when filing annual taxes, which typically occurs in the first quarter of a given year (taxes are due around April 15), based on prior year's income and living arrangements. This means that families wait to receive benefits for up to 15 months after

[4] The Child Tax Credit (CTC), which was established in 1998, is also a large tax credit targeted at families with children, but for most of the credits' history, it has been targeted at middle-income families, with the lowest income families being completely ineligible for the benefit. At the time of writing there is not much empirical evidence on the CTC's impact on children since there have been few expansions to the credit that create a plausible quasi-experimental research design. With the temporary reform to the CTC in 2021, there will likely be more empirical evidence on this credit in the future.

[5] Children must reside in the household for at least six months in order to be claimed by a qualifying parent or relative. In tiebreaker cases, where a child splits their time between two households, a series of tiebreaker rules govern who is entitled to claim the child.

[6] https://www.census.gov/library/visualizations/2022/comm/median-household-income.html

establishing eligibility for the credit, and they receive their benefits as an annual lump sum. Up until 2010, EITC-eligible families could elect to receive an advance on their benefits on a more frequent basis through their employers, but less than 3% of filers used this option and it was discontinued in 2010. Every year, approximately $60 billion of federal EITC benefits are claimed by 26 million families (Internal Revenue Service 2024), with nearly half of families with children claiming the credit each year (Brewer and Hoynes 2019).

Figure 1b illustrates how policy changes to the federal and state EITC have impacted the average benefits that families are eligible for over time. The large, federal expansion to the credit in the early 1990s, which much of the early empirical research focuses on, marked the most dramatic increase in the benefit, resulting in a more than $1,000 increase in average benefits for families with two or more children.

The U.S. also implemented a Child Tax Credit (CTC) in the late 1990s, which provided a $400 per-child credit for children under the age of 17. Historically, the credit was nonrefundable and earnings restrictions (both upper and lower limits) meant that the credit reached only about half of children in the U.S (see Figure 1a for the benefit schedule as of 2014). The credit has been expanded several times since its inception and as of the 2023 tax year, it was worth up to $2,000 per child under the age of 17, with about 70% of all U.S. children eligible for the full benefit. For one year during the COVID-19 pandemic in 2021, the U.S. CTC was transformed into a near-universal child benefit, providing a $3,600 benefit for each child under the age of 6, and a $3,000 benefit for each child aged 6 to 17. Estimates suggest that about 90% of children in the U.S. were eligible for the benefit that year. Evidence on the impact of the CTC is quite limited, mostly due to methodological constraints, but a growing literature evaluates the impact of the 2021 reforms on child outcomes.

U.K.: Family Credit, Working Family Tax Credit, Working Tax Credit, and Child Tax Credit

The UK has had various tax credits in place for low-income working families. Much of the evidence from the U.K. is based on the transition from the Family Credit (FC) to the Working Family Tax Credit (WFTC) in the late 1990s, so this section primarily discusses those credits. However, beginning in 2003, the WFTC was divided into two separate credits: the Child Tax Credit (CTC), which was provided to families with children but is not based on employment, and the Working Tax Credit (WTC), which is based on employment, but not the number of children in the household (see Figure 1a for the benefit schedule as of 2016). Since 2016, the UK has also had a Universal Credit (UC) in place, which is intended to completely replace the WTC and CTC by 2024.

The Family Credit was implemented in 1988 and provided cash benefits for low-income families with children under the age of 16 (under age 20 if in full-time school) where an adult worked at least 16 hours per week. Unlike the EITC in the U.S., there was no phase-in rate to receive the full benefit. Instead, families receive the maximum benefit once they meet the 16-hours per week criteria. Benefits were also phased out at a steep rate, at a marginal tax rate of approximately 70 percent.

The Working Family Tax Credit replaced FC starting in 1999 (it was phased in between 1999 and 2000). WFTC was considerably more generous than the FC, particularly for families with children under age 10, provided benefits further up the income distribution, and had a lower phase-out rate (55 percent rather than 70 percent) relative to the FC. Families were still required to have at least one adult working at least 16 hours per week to claim any benefit. The WFTC also provided families with a substantial childcare subsidy, worth approximately 70% of childcare costs.

Importantly, the shift from the FC to the WFTC also came with a shift in which parent (by default) received the payment. Under the FC, payments went primarily to mothers, since the motivation of the credit was to increase spending on children and mothers were deemed more likely to spend the benefit on children compared to fathers. However, with the shift from the FC to the WFTC, the payment distribution mechanism also shifted, such that for many households, the father was now the primary recipient of the benefit, which could have shifted how families spent the money, in addition to the change in the value of the credit itself.

Similar to the EITC in the U.S., average benefits from the WFTC/WTC+CTC increased throughout the 1990s and early 2000s. Figure 2 illustrates how the average benefit for families with children evolved over this time period and after the shift to the WTC and CTC. Between 1992 and 2016, the average family benefit increased from about 3,500£ to nearly 7,500£. However, much of the literature I discuss below focuses on the implementation of the WFTC in the late 1990s, when the average credit increased from about 4,500£ to about 6,300 £ between 1998 and 2003.

Canadian Child Tax Benefits

Canada has a system of child benefits in place, which has changed over the last several decades. Historically, the Canada Child Tax Benefit (CCTB) was the primary child benefit in Canada and was in place between 1993 and 2015 (it was replaced by the Canada Child Benefit (CCB) in 2016). CCTB benefits are indexed to inflation and were worth about $1,500 per child in 2014. Benefits are distributed monthly over the course of the year, based on prior-year family income. For example, a family would receive their monthly benefits based on their 2013 family income between July 2014 and June 2015. All families with income below approximately $45,000 (CAD) receive the full benefit, after which benefits are phased out at a rate of 2% for one-child families, and 4% for two-or-more child families (See Figure 3a). Unlike the EITC and WFTC, families do not need earnings to qualify for the benefit, and all families with income below the phase-out threshold are eligible for the full benefit amount.

The National Child Benefit (NCB) program was a supplement to the CCTB and targeted at families transitioning off of cash welfare. Established in 1998 and initially worth $500 per child, by 2015 the benefit was worth $2,000 per child. The NCB is much more targeted towards lower income families, with the credit phasing out at a rate of 12.2% for a one-child household, 23% for a two-child household, and 33% for a three-child household beginning around $25,000 of net income in 2015 (See Figure 3a). Unlike the CCTB, which is a federal program, the NCB is a partnership between the federal and provincial governments. Provinces vary, for instance, in whether they subtract NCB benefits when estimating eligibility for other social assistance

programs, and Quebec did not officially participate in the NCB, though it has had its own supplemental program in place since 1997. This creates substantial province-level variation in the generosity of the NCB, which researchers have used to examine the impact of more generous credits on family outcomes.[7]

The Canada Child Benefit replaced the patchwork of national child benefits in 2016. As of 2022, the CCB offers benefits up to nearly $7,000 per child under the age of 6, and $6,000 for children between the ages of 6 and 17. The CCB begins to phase out at approximately $33,000 CAD. The phase-out rate varies between 7-23% depending on the number of children in the household; above $71,000 the phase-out rate declines to 3-10%, again, depending on the number of children in the household. Payments are distributed monthly via direct deposit, or check. People generally apply for benefits when their child is born, and families automatically receive the benefits as long as they meet eligibility requirements and file taxes each year.

Figure 3b illustrates how family benefits in Canada have evolved over time for two-child households in Ontario across different income levels. Between 1990 and 2014, average benefits (in 2014 real terms) increased from about $4,000 to approximately $14,000, with the steepest increase in benefits occurring for families with incomes below $25,000 beginning in the late 1990s.

III. Data and empirical methodologies

Empirical strategies

Given the rich variation in tax credit generosity in these three countries over time, researchers have implemented a variety of empirical strategies to estimate their causal effect on child outcomes. In each of these contexts, the main threat to identifying a causal effect is that receipt of tax credits is not randomly assigned. For instance, all of the tax credits that I discuss here have family income requirements; income itself is highly correlated with children's outcomes, making it difficult to disentangle the effect of the credit itself from family income and other, unobserved characteristics of eligibility. Analyzing the impact of these policies over time further complicates the story, as changes in earnings distributions and fertility patterns may render different portions of the population eligible for the credit over time. Much of the initial work on these tax credits studied their impact on a variety of child outcomes, directly addressing these concerns of endogeneity and how to interpret and generalize the findings. A more recent body of work has attempted to disentangle some of the mechanisms through which tax credits affect outcomes, which requires some additional assumptions and methodological challenges beyond merely concerns of endogeneity and generalizability. The set of challenges differs across the three different contexts, so I address each of them in turn below.

U.S.

Much of the early work on the EITC uses a difference-in-differences strategy exploiting a large change to the federal credit in the early 1990s that increased the size of the benefit for families

[7] Provinces also have their own benefits in place that are delivered as (mostly) monthly benefits. (Some provinces deliver these quarterly instead). Some are based on earnings, some are not, some have both.

with two or more children, relative to families with only one child (e.g. Eissa and Liebman 1996; Hoynes, Miller, and Simon 2015). This methodology relies on a common trends assumption, where we assume that trends in the outcome of interest would have evolved in parallel for families with two or more children, relative to families with no or only one child.

With a growing number of states in the U.S. that offer their own, supplemental EITC benefits, some studies compare outcomes of interest following the implementation and expansion of state EITCs (e.g. Baughman and Duchovny 2016). This identification strategy has been called into question in more recent years, with several studies illustrating methodological concerns of using staggered rollout of treatment across different groups to evaluate the impact of state policies (e.g. Goodman-Bacon 2021). However, most of the advancements in this literature do not yet have estimators that incorporate continuous treatment variables (e.g. variation in the size of state EITC benefits), and to my knowledge none of the EITC literature has attempted to incorporate these newer techniques into their analyses, so it is not clear how these concerns affect the interpretation of results from the state EITC literature.

Combining these two approaches, more recent research on the EITC uses a simulated benefit approach exploiting both federal and state policy changes to the EITC to simulate how the average credit changed over time for families depending on the state, year, and number of children in the household (e.g. Hoynes and Patel 2018; Bastian and Michelmore 2018). This approach is a natural extension of the more traditional difference-in-differences approach and has the advantage of using variation not only in the timing of expansions, but also the generosity of benefits. For instance, individuals residing in states that provide supplemental EITCs will experience a larger treatment of a federal expansion compared to individuals residing in states without their own EITCs, since state EITCs are often indexed to federal benefits. The simulated benefits approach is also useful in the EITC context because many states have changed the generosity of their benefits over time, making it difficult to use a more straightforward pre/post state policy implementation design. However, this research design is also subject to concerns about using staggered treatment variation, as discussed above.

To implement the simulated benefits approach, researchers typically take a nationally-representative sample of tax units in a given year, inflate earnings over the time period they wish to simulate benefits, and use tax calculators such as NBER's TAXSIM to simulate changes in EITC benefits over time that are driven solely by federal and state changes to the EITC over time. Additional variation stems from expansions that differentially impacted households with more children. This approach is useful in that it captures the plausibly random component of EITC variation while excluding potentially endogenous variation due to differences in the earnings distribution over time, or changes in fertility over time.

Beyond studying the direct impacts of the EITC, researchers have also used federal and state variation in EITC benefits over time to instrument for changes in family income, isolating the effect of income on child outcomes (e.g. Dahl and Lochner 2012; 2017). These studies assume that the only pathway through which the EITC affects the outcome of interest (e.g. test scores) is through changes in family income. This is a potentially strong assumption, given the several mechanisms through which tax credits likely impact children's outcomes, as I discuss in more detail in the next section.

Two other strategies also attempt to isolate the income effect of the EITC on child outcomes using regression discontinuity approaches. In the U.S., taxes are based on the prior calendar year's income and living arrangements. Individuals born just before the end of the tax year can be claimed as dependents just a few months after birth, while individuals who are born just after the end of a tax year (January) must wait up to 15 months before receiving tax credits. Researchers use this discontinuity to isolate the impact of receiving larger tax credits in the first year of a child's life on later-life outcomes. A few studies have also employed a regression kink design using the non-linearities of the EITC benefit schedule (e.g. Chetty et al. 2011; Manoli and Turner 2018). These studies require lots of precise data on taxable income and typically make use of administrative tax data. These studies compare the outcomes of individuals just above and below the two kink points of the EITC benefit structure (see Figure 1a) to isolate the impact of an exogenous shock to income on child outcomes.

Finally, more recently the EITC literature has expanded to examine the long-run impacts of exposure to the EITC in childhood on outcomes in adulthood. These studies typically take the approach of measuring changes in the generosity of the EITC (and in some cases, the CTC) over the course of one's childhood and comparing the outcomes of children exposed to larger or smaller EITC benefits (e.g. between birth and age 15). Most of these studies operationalize tax credit exposure in childhood by cumulating the maximum federal and state benefits available in each year of an individual's childhood, given the year, state, and number of children residing in the household each year, but a simulated benefits approach would work here as well. Using the maximum credit available requires making some assumptions about how changes in the maximum credit translate into changes in average benefits, making studies that rely on changes in the maximum benefits not directly comparable to studies that use simulated benefits. Additionally, due to the cumulative nature of tax credit exposure in these studies, it is not possible to examine pre-trends to validate the research design. In either strategy, variation in childhood EITC exposure is generated through several sources, based on the nature of the policy expansions, namely changes to benefits at the intersection of state, year, and number of children in the household over time.

Because of identification issues, there is little rigorous direct evidence on the impacts of the U.S. CTC on child outcomes. Much of the existing literature is based on the temporary reforms to the credit in 2021 or combined with EITC exposure. Researchers have evaluated the 2021 reform by comparing the outcomes of children before and after the monthly credit was dispersed in the second half of 2021, using variation in the credit amount by the number and ages of children in the household, or comparing to households without children.

U.K.

In the U.K., much of the evidence comes from evaluating the transition from the FC to the WFTC. However, this transition was part of a wider policy effort to reduce child poverty in the UK, as part of Prime Minister Blair's administration. At the same time that the WFTC was implemented, there were increases to the minimum wage, and expanded access to childcare and work supports. This makes it very challenging to identify the impact of the WFTC on family outcomes, so much of the research in this area evaluates how the bundle of policy changes over

this time frame impacted low-income families (who disproportionately benefited from these expansions) relative to higher-income families using a difference-in-differences approach.

Canada

Like the empirical strategies employed in the U.S., much of the evidence on the impact of Canadian child benefits on child outcomes uses a simulated benefit strategy based on reforms to the benefits in the late 1990s, particularly with the introduction of the NCB. These approaches are quite similar to those in the U.S. Researchers take a nationally-representative cross-sectional data set of tax units and use tax calculators to simulate the benefits across provinces, years, and household size (e.g. Milligan 2019). Like the simulated benefits in the U.S., this strategy has the advantage of relying only on exogenous policy variation to generate changes in tax credit generosity.

Data

One of the main challenges that has historically limited research on the impact of tax credits on child outcomes is lack of data. Most nationally-representative surveys in the U.S. and elsewhere focus on the adult population and do not contain much information on child outcomes such as health or education. For instance, in the U.S., two of the largest annual, nationally-representative surveys—the Current Population Survey (CPS) and the American Community Survey (ACS)—do not contain information about child health or development and have limited information on educational outcomes. Instead, researchers have relied on U.S. Vital Statistics data, which collects birth certificate information regarding infant health; panel surveys such as the National Longitudinal Survey of Youth (NLSY), the Panel Study of Income Dynamics (PSID) and the Fragile Families and Child Wellbeing Study (FFCWS), which collect rich information on child health, behavior, and cognitive development. These panel surveys are expensive to administer due to their intensive follow-up and are therefore based on small cohorts.

More recently, researchers have also taken advantage of restricted-use, administrative data on child achievement and earnings in the U.S. These data sources are useful in that they do not rely on self-reports and contain the universe of individuals residing in a district, state, or nationally. There is no national database in the U.S. that contains administrative data on child achievement at the individual level, so much of the evidence from administrative schooling data comes from individual school districts or states (e.g. Chetty et al. 2011; Barr et al. 2021). Administrative earnings data, on the other hand, is collected at the national level, but is only observed once children reach adulthood.

Similar challenges exist in Canada. There, researchers have relied on panel survey data such as the National Longitudinal Survey of Children and Youth (NLSCY) to measure child outcomes, and the Survey of Household Spending (SHS) to measure changes in household expenditures and spending on children.

IV. Theoretical Framework: How might tax credits impact child outcomes?

In this section, I discuss the primary mechanisms through which tax credits may impact child outcomes, and the empirical evidence on how tax credits affect these intermediary outcomes.

Consider a simple, two-period model of child outcomes modeled as a function of previous outcomes, parental income, and parental time:

$$F_t = f(I_t, T_t, F_{t-1})$$

where a child outcome of interest in time-period *t*, F_t, is a function of prior outcomes, F_{t-1}, as well as parental inputs of income, I_t, and time, T_t. Tax credits have the potential to affect children's outcomes by influencing both parental income and time inputs, often in offsetting directions. These impacts may also be dynamic since effects of tax credits on child outcomes in one time-period will likely affect outcomes in subsequent time-periods as well.

Tax credits directly impact parental inputs of income (I_t) by providing income transfers to families, often referred to as an income effect. There is a vast literature linking parental income with child outcomes, both descriptively as well as using more causal identification strategies (see, for instance, Duncan, Magnuson, Votruba-Drzal 2017). The mechanisms through which income affects children is less well-understood. In general, there are two hypotheses about how income impacts child outcomes. The first is through a "resources" channel (Mayer 1997), whereby increases in income allow families to purchase goods that serve as direct inputs to child outcomes, such as educational materials, more nutritious food, better schooling, access to health care, etc. Increases in income may also indirectly benefit children through a "family processes" channel, whereby income leads to improvements in parental health, stress, and relationship quality, all of which may lead to improvements in child outcomes.

On the other hand, increased income may not benefit children if it is not spent on goods that enhance child outcomes. For instance, if the increased income from tax credits is used to purchase more alcohol and tobacco, we might expect this to have negative impacts on child outcomes. Income also likely has heterogeneous effects on children across the income distribution. For instance, additional income for households living in poverty is likely to have a larger impact on expenditures and child outcomes compared to more affluent households. This is because a marginal dollar represents a larger fraction of income for poor households compared to more affluent households.

The distribution method of the credit itself may affect how families spend their tax benefits. In the U.S., tax credits are distributed as an annual lump sum during tax season, while in Canada and the U.K., child-oriented benefits are distributed more frequently, either on a weekly or monthly basis. Families may spend benefits differently from other sources of income depending on whether they are distributed as a lump sum or in smaller disbursements over a more regular interval. Larger lump sum payments can be used to make large, durable purchases, while regular monthly payments may be used on non-durable items like food and bills, and more generally allow families to smooth their consumption.

Tax credits will also impact child outcomes through their impact on parental time (T_t). This is often referred to as a substitution effect: the effect of a change in the time that parents spend with their children as compared to the counterfactual, which might mean more time spent with a non-parental caregiver, such as a formal childcare center or relative. Several of the tax credits discussed here have explicit employment requirements, which may impact child outcomes through changes in parental time spent with children (substitution effect), but also through changes in parental income (income effect).

The broader literature on the impact of maternal employment on children's outcomes is mixed (and much of it descriptive), with some causal evidence that maternal employment, particularly when children are very young, has negative consequences for children (e.g. Bettinger et al. 2014), with other evidence pointing to benefits of maternal employment on child outcomes (e.g. Gruber et al 2023). Because employment is often accompanied by changes in income, it is nearly impossible to disentangle the impact of changes in parental time spent with children from changes in income. The context and counterfactual childcare arrangement also play a role in predicting how parental employment affects children's outcomes. For instance, in places with lots of supports for working families, with access to high-quality, low-cost childcare options, parental employment may lead to improvements in child outcomes by increasing parental income and shifting children into higher-quality care. On the other hand, in places where affordable childcare tends to be of lower quality and higher quality care is unaffordable, increases in parental employment may have detrimental effects on child outcomes because of shifts into lower-quality care arrangements, as well as smaller changes in net income due to the increased childcare costs associated with employment. Finally, in cases where tax credits lead to reductions in parental employment, such as among married couples, the reverse pattern similarly generates ambiguous effects, depending on changes in family income and shifts in the relative quality of care arrangements.

Tax credits may also impact child outcomes indirectly by impacting the relationship between parents and children. For instance, if tax credits impact parental stress and health, this could lead to changes in parenting behavior and the overall relationship between parents and children. Finally, tax credits may also impact children by impacting family structure and living arrangements. How these changes impacted children is ambiguous. On the one hand, parental separation may lead to detrimental impacts on children through the loss of income and time spent with parents, as well as the emotional trauma from the separation. On the other hand, leaving an abusive relationship is likely to generate positive effects for children. In the remainder of this section, I discuss the empirical evidence on how tax credits impact these various inputs, before discussing the literature directly examining child outcomes.

Expenditures

Several studies have examined how families spend tax credits using a variety of different consumer spending data sources. In the U.S., research indicates that the EITC increases the purchase of fresh fruits and vegetables in the months following the disbursement of the annual credit (McGranahan and Schanzenbach 2013). Other studies show that the EITC increases the purchase of large, durable goods such as used cars (Barrow and McGranahan 2000; Goodman-Bacon and McGranahan 2008) and decreases debt holdings (Jones and Michelmore 2018).

More recent evidence based on the expansion of the CTC in 2021, which distributed half of the credit on a monthly basis, indicated that families spent a large share of the monthly benefits on household necessities such as food, housing, and child-related goods and services (Fisher, Schild, and Johnson, 2024; Schild et al. 2023). Families also used the monthly credit to pay down debt (Michelmore and Pilkauskas 2023), though Schild et al. (2023) found that households spent (rather than saved) $75 of every $100 in monthly benefits.

In Canada, Jones et al. (2019) find that the expansion of child benefits increased education-oriented spending, particularly among low-income families, through the purchase of items like computers and tuition. They also found increases in transportation costs, childcare, and home food consumption, all of which may indirectly impact children. One of the concerns with distributing social benefits as unrestricted cash is that recipients may spend the money on risky behaviors that do not improve child or family well-being. Jones et al. (2019) found no evidence of this phenomenon, and in fact found that more generous child benefits reduced spending on alcohol and tobacco.

In the UK, Gregg et al. (2006) similarly found that expansions to tax benefits in the late 1990s and early 2000s increased spending on food, housing, and transportation, in addition to spending on child-related items such as footwear, clothing, and books. Consistent with work in the U.S., the authors also found evidence of increased consumption of fruits and vegetables, and like Jones et al. (2019), they also found that tax credits reduced spending on alcohol and tobacco.

Taken together, the evidence suggests that tax credits may improve child outcomes both through direct investments in education and health, but also indirectly through consumption of goods that may improve longer-term financial well-being, such as housing and transportation.

Parental labour supply

Besides increasing income, one of the primary mechanisms through which tax credits may impact child outcomes is through their impact on parental labour supply. In both the U.S. and U.K., where tax credits are contingent on work, expansions have been linked with increases in employment among single mothers (e.g. Eissa and Liebman 1996; Brewer and Hoynes 2019; Meyer and Rosenbaum 2001; Schanzenbach and Strain 2021). Even when credits do not explicitly have minimum work requirements (such as the Canadian child benefits), the income effect from the benefits may affect parental labour supply. However, Baker et al. (2021) examined the impact of the introduction of the CCB on parental labour supply in Canada and found no evidence that the benefit decreased employment among single mothers relative to single women without children.

Employment responses may also vary depending on marital status. Married mothers typically have more elastic labour supply compared to unmarried mothers, and several of the tax credits discussed here have high marginal tax rates for secondary earners. Indeed, evidence from both the U.S. (Eissa and Hoynes 2004) and Canada (Schirle, 2015) indicate that tax credits slightly reduce the labour supply of married mothers. In the UK, the incentives to work among secondary earners are more complicated by minimum hours requirements at both the individual and couple

level. As such, the evidence suggests that the WFTC and FC did little to affect the labour supply of married mothers overall (Brewer et al. 2009; Francesconi, Rainer, and van der Klaauw 2009).

Parental health and family structure

In terms of how tax credits affect family relationships, in the U.S., Evans and Garthwaite (2014) found that the 1993 expansion of the EITC led to an increase in self-reported health of single mothers and a decrease in the number of poor mental health days. They also found that the EITC reduced risky biomarkers linked with inflammation. Gregg et al. (2009) similarly found improvements in the mental health of lone mothers following the transition to the WFTC in the U.K.

In the U.S., there is mixed evidence on how the EITC affects marriage and divorce, with the evidence pointing to fairly small impacts in either direction (e.g. Dickert-Conlin and Houser 2002; Herbst 2011; Michelmore 2018). In the U.K., there is also some evidence that reforms led to lower rates of re-partnering among single mothers, suggesting an uptick in single parenthood (Gregg et al. 2006).

In sum, by providing cash transfers to families, tax credits may improve child outcomes in both the short- and long-term. These effects should be particularly positive for children living in families with low incomes since income tends to matter more for low-income families relative to middle and higher-income families. On the other hand, tax credits that affect parental employment and time spent with children have theoretically ambiguous effects on child outcomes, depending on counterfactual child care arrangements.

V. Empirical evidence of the impact of tax credits on contemporaneous child outcomes

Having established that tax credits lead to increased expenditures, improved parental mental health, and increased labour supply and family income, I next review the evidence on how tax credits directly impact the children of beneficiaries. In this section, I focus on the contemporaneous impacts of tax credits on child poverty, health, and education.

Child poverty

One of the primary goals for the introduction and expansion of these tax credits was to provide more resources for low-income families with children. It is well-known that economic deprivation, or poverty, is associated with a host of negative outcomes for children in both the short and long-term, much of it thought to be causal (see, for instance, Duncan et al. 2017). Evidence that tax credits reduce child poverty, therefore, is indicative of improvements in other outcomes. Examining whether these tax credits were successful in increasing economic resources for children is of first-order importance in understanding their impact on child outcomes.

In the U.S., poverty is measured at an absolute level. In other words, the poverty line is not tied to national earnings trends. Static estimates of the impact of the EITC and CTC suggest that the credits raise more than 6 million people above the federal poverty line each year, more than half of whom represent children (Shrider and Creamer 2023). Hoynes and Patel (2018) find that this

number may underestimate the number of children lifted out of poverty by up to 50%, since this does not account for the additional impact of increased parental labour supply and income on reducing child poverty. Incorporating labour supply responses, Hoynes and Patel (2018) find that a $1,000 increase in federal credits reduce after-tax and transfer income poverty by 8.4 percentage points among single mothers with children.

In the U.K. and Canada, where poverty is typically measured on a relative basis (e.g. relative to median income), evidence also suggests that the expansions of tax credits led to reductions in child poverty. In the U.K., a static analysis suggests that the introduction of the WFTC in the late 1990s led to a substantial decline in child poverty of more than 30%, particularly among children residing in households where at least one parent was working (Piachaud and Sutherland 2001).

In Canada, Baker et al. (2021) examine the impact of the 2016 introduction of the CCB on child poverty for children residing with single mothers. The authors find that the credit reduced child poverty using a variety of different data sources and definitions of low-income. Overall, based on these findings of reductions in child poverty in the U.S., U.K., and Canada, we would expect to find improvements in other child outcomes due to these tax credits.

Infant health

Several studies have examined the impact of tax credits on infant and child health. In the U.S., evidence from the EITC and CTC indicates that the credits reduced the incidence of low birthweight and improved prenatal care. Hoynes, Miller, and Simon (2015), for instance, use three different estimation techniques taking advantage of the large expansions to the federal EITC in the late 1980s and early 1990s to estimate how exposure to the EITC in utero impacts infant birthweight. Using the EITC to instrument for changes in family income, they find that a $1,000 (2009 dollars) increase in income while in utero leads to a 2-3 percent decline in the likelihood of being born low birthweight, and a 6.4 gram increase in average birthweight. The authors also find that the EITC reduces the likelihood of having a pre-term birth and decreases the likelihood of having a 5-minute APGAR score below 8 (out of 10). As discussed above, the authors caution that this IV strategy makes a strong assumption that the only pathway through which the EITC affects infant birthweight is through changes in income, which may not hold in this case due to changes in parental labour supply. As such, they also provide estimates using a standard difference-in-differences, reduced-form approach, as well as an event study where they examine how changes in infant birthweight change over time following a given EITC expansion.

The authors explore several mechanisms to shed light on how the EITC affects infant birthweight, finding evidence in support of several different mechanisms: an increase in the likelihood of receiving prenatal care, the number of prenatal visits, and a decline in the likelihood of smoking and drinking while pregnant. The authors hypothesize that some of the improvements in prenatal care could be driven by shifting from public to private health insurance coverage, which has also been found elsewhere in the literature (Baughman and Duchovny 2016). Relating back to the child outcomes model discussed in Section IV, the results from this study suggest that the EITC improves infant birth outcomes by increasing parental income, which lead to increased spending on health care and reductions in expenditures on alcohol and tobacco, while having no impact on parental time use. The outcome of infant birthweight is

particularly convenient here for isolating the impact of income on child outcomes since there is no change in parental time from the perspective of the unborn child.

Several related papers corroborate the findings by Hoynes et al. (2015). Using a similar difference-in-differences strategy, Baker (2008) also finds that the EITC decreases the likelihood of being born low birthweight. Exploiting state variation in EITC implementation, Strully, Rehkopf, and Xuan (2010) also find that state EITCs increase infant birthweight. Both of these studies also find evidence of decreases in maternal smoking associated with the EITC. Two more recent papers examine the impact of local EITC benefit programs in New York State and Montgomery County, Maryland, and find that more generous EITC benefits reduce the incidence of low birthweight (Wicks-Lim and Arno 2017; Hill and Gurley-Calvez 2019).

Finally, recent evidence using the 2021 expansions to the CTC in the U.S. also found evidence that the payments improved infant birthweight. Using a simulated benefit strategy, Ruffini (2023) finds that a $100 increase in monthly CTC payments reduced the prevalence of low birthweight by 2 to 3 percent, much larger than the effects found in the earlier literature on the EITC. The author points out that the CTC expansion was distributed to families with children regardless of their employment, so may reflect larger benefits for more economically-disadvantaged households.

Childhood health insurance coverage and health

In addition to infant birthweight, there are also a few studies that have examined the contemporaneous impacts of the EITC on childhood health insurance coverage and health. Using a simulated benefit approach, Baughman and Duchovny (2016) find that a $100 increase in the median state EITC benefit leads to a 4-percentage point increase in the likelihood of having private health insurance among children aged 6 to 14, using data from the children of the National Longitudinal Survey of Youth (NLSY) 1979. This increase in private health insurance coverage is almost entirely offset by a decrease in the likelihood of having public health insurance, implying a shift in the type of insurance rather than an overall increase in insurance coverage.

Along with these increases in private health insurance coverage, Baughman and Duchovny (2016) also find that mother-rated child health status improves as a result of the EITC: a $100 increase in median state EITC benefits is associated with a 1.2 percentage point decrease in the likelihood of a mother reporting that her child (aged 6 to 14) is in fair or poor health; a 35 percent decrease relative to the mean. They also find a 3.4 percentage point increase in the probability that the mother reports that her child is in excellent health.[8] Using the same data, Averett and Wang (2018) also show that the EITC improves mother-reported health among children.

Finally, a few studies have examined the impact of tax credits on child maltreatment, finding evidence that tax credits reduce the incidence of child maltreatment. Perhaps the strongest evidence on this topic comes from a working paper by Rittenhouse (2022). The author uses 20 years of administrative birth record data and a regression discontinuity design to compare the

[8] Mother-reported health is not assessed for children younger than 6.

child maltreatment outcomes of individuals born just before the end of the tax year (December) to those born just after the end of the tax year (January). The author finds that this discontinuity is associated with an average increase in income of about $1,000 (2017 dollars) in the first year of life, driven mainly by tax credits such as the EITC and the CTC. A $1,000 increase in income in the first year of life decreases the number of referrals to CPS in the first three years of life by 3% and reduces the amount of time spent in foster care by about 8%.[9] Other studies, using different methods, have reached similar conclusions (e.g. Berger et al. 2017; Klevens et al. 2017).

Similar links between tax credits and childhood health have been found in Canada (Milligan and Stabile 2011). Using a simulated benefits approach, Milligan and Stabile (2011) show that child benefits significantly improve the physical health of boys, as well as the mental health of girls. They also find that the child benefit program improved maternal mental health, providing support for the hypothesis that both family resources and "family processes" improve child health. Additionally, while food insecurity rates are quite low in their sample (less than 5%), the authors find evidence that child benefits significantly reduced rates of food insecurity, particularly among boys. Since the Canadian child benefit programs are not based on employment, these effects are likely driven by increases in family resources, rather than changes in parental employment.

There is no evidence on the impact of in-work tax credits in the UK on child health, in part due to difficulty in identifying a credible research design. However, Gregg et al (2009) demonstrates that expansions to the generosity of the WFTC and FC in the late 1990s and early 2000s improved the mental health of single mothers, we might expect these effects to also positively impact child health.

Overall, the substantial body of evidence suggests that tax credits lead to contemporaneous improvements in infant and child health and health insurance coverage. The evidence cited here mostly relies on variation from the U.S. federal and state EITC programs, but using a variety of different estimation strategies, time periods, and analytic samples, there is substantial evidence indicating that tax credits improve infant birthweight, increase private health insurance coverage in childhood, and reduce the incidence of child maltreatment. Noteworthy, effects of tax credits on childhood health are independent of effects on infant health, since the evidence on childhood health relies on contemporaneous changes in EITC benefits. We would expect the improvements in infant health to have compounding effects on child outcomes in the longer term.

Finally, while nearly all of the evidence on infant health is measured using a reduced form estimate of the EITC, capturing potentially both income and employment effects, both Berger et al. (2017) and Rittenhouse (2022) attempt to isolate the impact of income itself through IV and RD strategies, respectively. Similarly, Ruffini (2023) uses the 2021 expansion of the CTC in the U.S., which was a pure cash transfer program for families with children (with no evidence of a negative impact on labour supply, e.g. Ananat et al. 2023; Enriquez et al. 2023) to identify the effects of income on infant birthweight. Finally, evidence from Canada, where benefits are not tied to employment, also suggests improvements in child health. Together, these findings provide suggestive evidence that tax credits improve child health by increasing family income.

[9] These effects persist up through at least age 8.

Education

Several studies examine how tax credits contemporaneously impact education outcomes, primarily focusing on childhood test scores. Dahl and Lochner (2012) use variation in the federal and state EITC to instrument for family income to examine the relationship between income and test scores. Using data from the NSLY79,[10] Dahl and Lochner (2012) find that a $1,000 (2000 dollars) EITC-induced increase in family income is associated with a contemporaneous 6% of a standard deviation increase in math and reading test scores among children aged 5 to 14. The authors find larger effects for children of unmarried mothers (8%) compared to married mothers (4%), and larger effects among Black and Hispanic children (8%) relative to White, Non-Hispanic children (1.5%, ns). Finally, effect sizes for boys (9%) were almost twice as large as those for girls (4%). Chetty, Friedman, and Rockoff (2011) use a regression kink design and administrative schooling data and find similar effects.[11] Using a simulated benefits approach and data from the NLSCY from 1994 through 2005, Milligan and Stabile (2011) found similar, positive effects of Canadian child benefits on test scores for children living with mothers who had no more than a high school diploma.

Finally, Manoli and Turner (2018) use a regression kink design based on the EITC benefit schedule to examine the effects of "cash on hand" in the year leading up to high school graduation on subsequent college enrollment. They find that an additional $1,000 (2015 dollars) in cash-on-hand in the semester prior to expected college enrollment increases college enrollment in the next academic year by 1.3 percentage points (4.3%).

The effects of tax credits on education outcomes discussed thus far are based off of changes in family income generated through changes in the generosity of tax credits, providing evidence that improvements in child outcomes are generated through increases in parental income. In some cases, these are driven by exploiting changes in benefits that are not likely accompanied by changes in labour supply (e.g. the regression kink design of Chetty et al. (2011) and Manoli and Turner (2018) or the Canadian child benefits analyzed in Milligan and Stabile (2011), which are not tied to labour supply) and in others are calculated using an instrumental variables strategy to isolate the impact of income on children's test scores (Dahl and Lochner 2012). However, in the case of the EITC in the U.S., the credit generates both an income effect as well as a substitution effect for families; it is unlikely that the exclusion restriction holds in this case.

A recent working paper by Agostinelli and Sorrenti (2021) attempts to disentangle the income effect from the substitution effect by using multiple instruments to estimate the impact of income and employment on child test scores. Using the same data as Dahl and Lochner (2012), the authors find that an additional $1,000 (2000 dollars) in family income (generated by the EITC) increases test scores by 4.4% of a standard deviation, but a 100-hour annual increase in work

[10] The authors restrict the sample to children observed in at least two consecutive interview waves between 1988 and 2000, who did not experience a change in parental marital status between the two-year intervals that their test scores were measured.

[11] Notably, Chetty, Friedman, and Rockoff (2011) examine the impact of tax credits on statewide test scores that children take as part of the public education system, while Dahl and Lochner (2012) use survey data that contains reading and math assessments for children aged 5 to 14.

hours *reduces* test scores by 6% of a standard deviation, presumably driven by a reduction in parental time spent with children.

As discussed in Section IV, child outcomes are a function of both time and income inputs from parents; increases in parental labour supply typically induce both a positive income effect but also a negative substitution effect through reductions in time spent with children. Depending on the magnitudes of the income and substitution effects, this could lead to positive, negative, or no impact on child outcomes. Agostinelli and Sorrenti (2021) predict that in the context of the U.S. EITC, the substitution effect dominates the income effect when hourly wages are less than $13.50 (2000 US dollars). That is, the overall effect of an increase in maternal labour supply on child outcomes is likely to be negative for those who earn less than $13.50 an hour but turn positive for higher wages.

Of course, as mentioned previously, the context is likely to be quite important for assessing the impact of tax credits on child outcomes and whether the income or substitution effect is likely to dominate. In the Norwegian context, for instance, recent work has found just the opposite of what Agostinelli and Sorrenti (2021) find—Nicoletti, Salvanes, and Tominey (2023) find that the income effect of increased maternal employment during childhood outweighs the substitution effect of reduced time spent with children, even for those with low wages. More broadly speaking, the quality of childcare relative to parental care is likely to be an important factor in assessing whether the income effect dominates the substitution effect of increasing maternal labour supply on children's outcomes.

Overall, evidence from both the U.S. and Canada indicate that tax credits have a contemporaneous, net positive impact on childhood test scores and postsecondary enrollment. As with the findings for child health, the evidence points to increases in family income as the primary channel through which tax credits improve child test scores, but these gains are likely muted by increases in maternal employment, which may decrease test scores (Agostinelli and Sorrenti 2021). I next turn to a discussion of the research that examines longer-term effects of tax credits on child outcomes.

VI. Empirical evidence of the impact of tax credits on long-term outcomes

Since much of the variation and expansion of these tax credits occurred in the 1980s and 1990s, it is now possible to examine the impacts of exposure to these credits in childhood on outcomes well into adulthood. Virtually all of this evidence comes from examining the impact of exposure to the EITC in the U.S.; to my knowledge, there is no empirical evidence on the longer-term effects of tax credits in Canada or the U.K.

Educational Attainment

Bastian and Michelmore (2018) provide some of the first, direct evidence on the long-term impact of exposure to tax credits in childhood on educational attainment in adulthood, encompassing both contemporaneous effects of tax credit exposure, as well as longer-term effects. Using federal and state variation in EITC generosity over time, the authors create measures of EITC exposure between birth and age 18 by summing up the maximum federal and

state benefits available in each year given the number of children residing in the household. The authors also examine how exposure at different points in childhood (0 to 5, 6 to 12, and 13 to 18) impacts long-term outcomes. Using data from the Panel Study of Income Dynamics (PSID) from 1975 through 2013, they find that an additional $1,000 (2013 dollars) of EITC exposure between ages 13 and 18 increases the likelihood of completing high school by 1.3% and completing college by 4.2%. Effects are larger among children growing up in lower income households, those with less educated parents, and Black children.

Chetty et al. (2011) extrapolate their findings on the effect of tax credits on test scores to predict how increases in test scores impact education outcomes in adulthood. They make this link using (separate) causal evidence on the link between teacher quality and test scores and then estimating the link between test scores and outcomes in adulthood. Using this procedure, Chetty et al. (2011) calculate an expected increase in college enrollment of 0.3 percentage points (0.8%) associated with a $1,000 increase in income generated by the EITC and CTC. However, this estimation does not account for other ways in which the EITC might increase college enrollment beyond increasing childhood test scores in a single year.

Together, the evidence suggests that exposure to tax credits in childhood increases educational attainment in adulthood through several potential pathways. Bastian and Michelmore (2018) estimate that exposure to the EITC in childhood increases college attainment by 4.2%, which is quite similar to the effect that Manoli and Turner (2018) estimate on initial college enrollment (4.3%), based on EITC exposure in the year leading up to high school graduation. Given that college graduation rates in the U.S. are only about 50%, this implies that less than half of the college attainment effect obtained by Bastian and Michelmore (2018) could be explained by the cash on hand in the year leading up to college.[12] Chetty et al. (2011) predict that the increase in contemporaneous test scores due to the EITC is likely to increase college enrollment by 0.8%, which can only account for a small share of the increase in college attainment found in Bastian and Michelmore (2018). This suggests there are several other potential channels such as improvements in childhood health, as well as longer-term increases in family income throughout childhood that may also increase educational attainment.

Earnings, Employment, and Poverty

Bastian and Michelmore (2018) also provide estimates of the impact of tax credits on earnings in early adulthood. They find that an additional $1,000 of EITC exposure between ages 13 and 18 increases earnings in the mid-20s by about $550 per year (2%, off of a base of $25,000). Using a similar approach as Bastian and Michelmore (2018), McInnis et al. (2023) find that a $1,000 increase in annual EITC exposure between birth and age 15 reduces the likelihood of living in poverty by 5 percentage points and increases employment by 3 percentage points between the ages of 25 and 45. Similarly, Jones et al. (2020) also use this approach to estimate the impact of

[12] A direct comparison between the estimates in Manoli and Turner (2018) and Bastian and Michelmore (2018) is difficult because of the different identification strategies used in the two analyses. Manoli and Turner's (2018) estimates reflect a $1,000 increase in income in the year before college; Bastian and Michelmore's (2018) estimates reflect a $1,000 increase in the maximum EITC between ages 13 to 18. They show that a $1,000 increase in the maximum EITC corresponds to roughly a $225 increase in own EITC benefits, suggesting that their estimates should be multiplied by 4 to be more comparable to those in Manoli and Turner (2018).

childhood exposure to the EITC on income mobility and employment using administrative tax records, and also find evidence that the EITC increases both mobility and employment in early adulthood.

Finally, Barr et al. (2022) use the regression discontinuity design based on date of birth as described above to investigate the impact of exposure to tax credits in the first year of life on earnings in adulthood. Using administrative tax return data, the authors find that this discontinuity leads to about a $1,300 (2015 dollars) difference in income received in the first year of life through tax credits for low-income families. This increase in income leads to a 1-3 percent increase in earnings in early adulthood (up to age 28, driven mostly by men), which is similar to the estimates from Bastian and Michelmore (2018), though Bastian and Michelmore (2018) find significant effects of EITC exposure between ages 13 and 18 on earnings in adulthood, while Barr et al (2022) identify their effects solely off of differences in tax credits in the first year of life.

Health and Family Formation

Given the strong correlation between education and health, a natural extension of the work examining the long-term benefits of tax credits on human capital is to examine long-term health impacts of tax credits. Braga, Blavin, and Gangopadhyaya (2020) examine how exposure to the EITC in childhood affects health outcomes in adulthood using the PSID. They find that a $100 (2017$) increase in annual EITC exposure over the course of childhood increases the likelihood of reporting good or excellent health by 1.7 percentage points (2.6%), decreases the likelihood of being obese by 0.8 percentage points (4.1%), and decreases functional limitations by 0.4 percentage points (9%).[13] They also show that EITC exposure reduces the likelihood of having no health insurance by 0.2 percentage points (2.6%), which is consistent with previous research (Baughman and Duchovny 2016).

Michelmore and Lopoo (2021) show that exposure to larger EITC benefits in childhood leads to delays in marriage and fertility among women in early adulthood. A one-time, $1,000 (2016$) increase in EITC exposure between birth and age 15 decreases the likelihood of having a first birth by age 20 by 2-3%, with similar declines in the probability of marrying by age 20. While the authors only examine births and marriage patterns up to age 30, their results suggest that these effects are primarily driven by a delay, rather than an overall decline in fertility among women. The authors find that this decline in teen fertility can largely be explained by increases in educational attainment, as documented by prior research (Bastian and Michelmore 2018).

Together, using variation in EITC benefit generosity over time and a variety of different empirical strategies, evidence from the U.S. indicates that exposure to tax credits in childhood leads to substantial improvements in human capital and health in adulthood. These improvements are likely driven by a combination of factors, such as improvements in childhood health and education, increases in permanent family income throughout childhood, as well as improvements in parental health.

[13] The authors also find suggestive evidence of declines in high blood pressure in later adulthood (ages 38-51). A $100 increase in annual EITC exposure throughout childhood was associated with a 1.4 percentage point (7.2%) decline in the incidence of high blood pressure between ages 38 and 51.

VII. Areas for future research

While there has been a great deal of research on the impact of tax credits on child outcomes, particularly in the last decade, there remain several unanswered questions in the literature. I highlight a few of these questions here.

Evidence from outside the U.S. context

The bulk of evidence on how tax credits impact children's outcomes comes from evaluating tax credits in the U.S., the EITC in particular. While there is also evidence from Canada on short-run children's outcomes, we lack evidence from Canada, the U.K., and elsewhere on how tax credits impact children in the long-run. This may stem in part from data limitations, and the fact that both Canada and the U.K. have changed their tax regimes several times over the last several decades, making it difficult to isolate the impact of any one expansion. Still, more work is needed to understand how tax credits affect children in the long run. This is particularly important for gaining a better understanding of the mechanisms through which tax credits improve child outcomes. For instance, in the U.S., where much of the evidence is driven by expansions to the EITC over time, the work requirements embedded in the tax schedule make it nearly impossible to disentangle whether effects of the EITC come from increases in family income, employment, or both. Researchers have begun to find ways to isolate the impact of income on children's outcomes by using multiple instruments (Agostinelli and Sorrenti 2021) or estimating the impact of an increase in family income in the first year of life on later life outcomes using a regression discontinuity design (e.g. Barr et al. 2022; Rittenhouse 2022). Still, more evidence is needed on the long-run impact of tax credits in the U.K., but also from Canada, where tax credits are not conditioned on work. More evidence on the long-term effects of unconditional cash transfers would be particularly informative for the U.S., where there have been debates more recently on the extent to which child-oriented tax credits should be conditioned on work.

Mechanisms

While more evidence from Canada and the U.K. on the long-term effects of tax credits on children's outcomes would shed light on the mechanisms through which tax credits impact children, more direct evidence would also be beneficial for informing future policy design. The similarity of findings from Canada and the U.S. on short-term outcomes for children provides suggestive evidence that tax credits improve children's outcomes primarily by increasing family income. Additionally, work by Agostinelli and Sorrenti (2021) raise concerns about the extent to which the positive impacts of the EITC are muted by the potential detrimental effects associated with increasing maternal labour supply, particularly for those working in low-wage occupations. This work, coupled with a growing body of evidence that unconditional cash transfers do not necessarily produce significant, positive impacts on family well-being (e.g. Pilkauskas et al. 2023; Jaroszewicz et al. 2022; Gennetian et al. 2022), raises questions about the precise mechanisms through which tax credits impact child outcomes in both the short and long term.

Heterogeneity

More work is also needed to understand heterogeneous treatment effects of tax credits on child outcomes. While some of the evidence cited here explores whether effects differ according to parental marital status, gender, and race of the child, more work is needed to understand who benefits the most from these tax credits, as well as who is left out. Two dimensions on which it would be useful to have further evidence on the impact of tax credits on child outcomes are: age of exposure and childhood family income. While some recent work has attempted to understand how the timing of exposure to the EITC matters (e.g. Bastian and Michelmore 2018; Braga et al. 2020), it is important to reconcile evidence that points to the importance of early life exposure (e.g. Hoynes et al. 2015; Barr et al. 2022; Rittenhouse 2022) and evidence that exposure during adolescence impacts later life outcomes (e.g. Manoli and Turner 2018; Bastian and Michelmore 2018; Braga et al. 2020). There are likely multiple critical windows in which it is most important to intervene, but further evidence is needed. Heterogeneity by age of exposure is not possible for all outcomes (for instance, outcomes that are age-specific such as infant birthweight). However, for other outcomes like childhood health and achievement, as well as longer-term outcomes like adulthood health and employment, more evidence on the importance of age of exposure is necessary.

Additionally, more research is needed on how effects vary according to childhood family income. This is particularly important to examine in the U.K. and the U.S, where benefits are contingent on employment. These minimum work requirements mean that the most economically vulnerable families may not receive benefits, and they may also be the population that stands to gain the most from benefits. Identifying heterogeneous impacts by family income is quite challenging, however, due to endogeneity concerns. Still, a deeper understanding of the heterogeneous effects of these tax credits by some measure of household economic disadvantage would shed light on the mechanisms through which tax credits affect child outcomes, as well as provide insights on whether these credits impact income inequality in either the short or long-term. One might approach this area by using pre-exposure measures of income, for instance, or predicted measures of permanent income, to address the concern of endogeneity of family income with respect to tax credit eligibility.

Importance of distribution frequency

Finally, more work is also needed on how the distribution method itself matters. With a couple of brief exceptions, the U.S. largely delivers tax credits as annual lump sums after families file taxes. In contrast, both the U.K. and Canada distribute benefits at more frequent intervals, either monthly or weekly. Research suggests that families spend lump sum income differently than other income (e.g. Halpern-Meekin et al. 2015). In the U.S., research shows that families spend their tax refunds on large, durable goods such as cars (Goodman-Bacon and McGranahan 2008), which might not be feasible if the credit were distributed monthly. Many low-income families in the U.S. say they prefer to receive their tax credits annually, as it serves as a forced savings mechanism (Halpern-Meekin et al. 2015). Experimental work also shows that families choose to receive lump sums even when offered the choice to receive the credit at a more regular interval (Jones 2010). Still, low-income families in the U.S. face substantial credit constraints and high rates of food insecurity (USDA 2023) and may benefit from receiving credits at more frequent intervals to help smooth consumption and reduce income volatility, which is also quite common

among low-income families (Maag Peters, Hannagan, and Lou 2017). In the U.K., qualitative evidence suggests that the introduction of the UC led to significant hardships among claimants because they often had to wait 5 or 6 weeks before receiving payments (Cheetham et al. 2019), illustrating the substantial credit constraints faced by the populations receiving these benefits.

The fact that several studies have shown the importance of receiving tax credits soon after birth, rather than one year later, points to the importance of the timing and distribution method itself, in addition to the income value of the credit (Barr et al. 2022; Rittenhouse 2022). More research on this topic is important for informing the design of future tax credits. The key challenge in this area is finding an exogenous source of variation in the distribution of tax credits. One promising area is to examine the temporary 2021 CTC in the U.S., which was distributed in both monthly installments (for half of the credit) as well as a lump sum (the remaining half, paid out at tax time). Gaining a better understanding of how households spent this benefit income differently (monthly versus lump sum) and their corresponding impact on child outcomes would be very informative.

VIII. Conclusion

Tax credits targeted at families with children have played a significant role in the social safety nets in the U.S., Canada, and U.K. over the last several decades. The period beginning in the 1990s marked a shift towards providing benefits while also encouraging (or not explicitly discouraging) work. In all three of these countries, reforms to these tax credits led to an increase in the labour supply of single mothers (e.g. Eissa and Liebman 1996; Meyer and Rosenbaum 2001; Gregg et al. 2006) while having only modest impacts on the labour supply of married women and men.

Now that several decades have passed since many of these reforms were enacted, we can evaluate how these benefits have impacted children's lives in both the short and long-term. Evidence from the U.S., U.K., and Canada suggest that exposure to more generous tax credits improve infant and childhood health, increase educational achievement and attainment, and increase employment and earnings in adulthood. As evidenced by work from Canada, as well as regression discontinuity estimates in the U.S. that exploit the timing of when families receive tax credits, these effects are likely driven at least in part by increases in family income. However, there is also evidence from the U.S. that changes in parental employment may also play an important role. For instance, employment increases access to private health insurance (Baughman and Duchovny 2016; Braga et al. 2020), which leads to improvements in infant birthweight (Hoynes, Miller, and Simon 2015), as well as childhood (Baughman and Duchovny 2016) and adulthood (Braga et al. 2020) health. On the other hand, increases in parental employment also lead to declines in time spent with children (Bastian and Lochner 2022), which could have detrimental impacts on child outcomes through, for instance, changes in childcare arrangements (Michelmore and Pilkauskas 2021).

Research on the impacts of tax credits on child outcomes has grown dramatically over the last decade, but several questions remain. For instance, nearly all of the evidence on the long-term effects of these credits is based on analyses of the EITC in the U.S. We lack rigorous evidence on

the long-term effects of child benefits in Canada and the U.K. While these three countries have lots of similarities, they also have many differences. More evidence from outside of the U.S. would bolster the existing evidence on the long-term impacts of tax credits, would shed light on potential mechanisms through which tax credits improve child outcomes, and would provide insight on how the distribution method itself (e.g. annual lump sums versus monthly benefits) impacts children. The challenge to advancing the literature in this direction is that both Canada and the U.K. have made several reforms to their child tax credits over the last several decades, making it difficult to isolate the impact of any one reform.

Future work should also focus specifically on disentangling the mechanisms through which tax credits impact child outcomes and the extent to which these effects are driven by income or employment effects or both. The tax credits I discuss here were all expanded during a time when there was an increasing emphasis on providing cash transfers to families who work, and a shift away from providing cash transfers to families who do not work. While the bulk of evidence suggests that these reforms led to positive impacts on children, the extent to which the work requirements have had negative impacts on families is less well-understood. In particular, we know little about how families with little or no employment were impacted by these credits. More research on these topics is necessary to gain a full understanding of the costs and benefits of designing tax credits with work requirements. The key challenge in advancing our knowledge in this area is finding a way to disentangle employment and income effects. Agostinelli and Sorrenti (2021) provide a promising strategy using multiple instruments for income and employment changes, but more work in this area is necessary.

The emerging literature discussed here adds to the growing evidence that public spending on social safety net programs "pay for themselves" by reducing spending on other social programs and by increasing tax revenue (Bastian and Jones 2021; Hendren and Sprung-Keyser 2020). The evidence summarized here suggests that tax credits can be an effective way to provide financial support to low-income families with children, while also paying long-term dividends by increasing the prospects of children growing up in low-income families.

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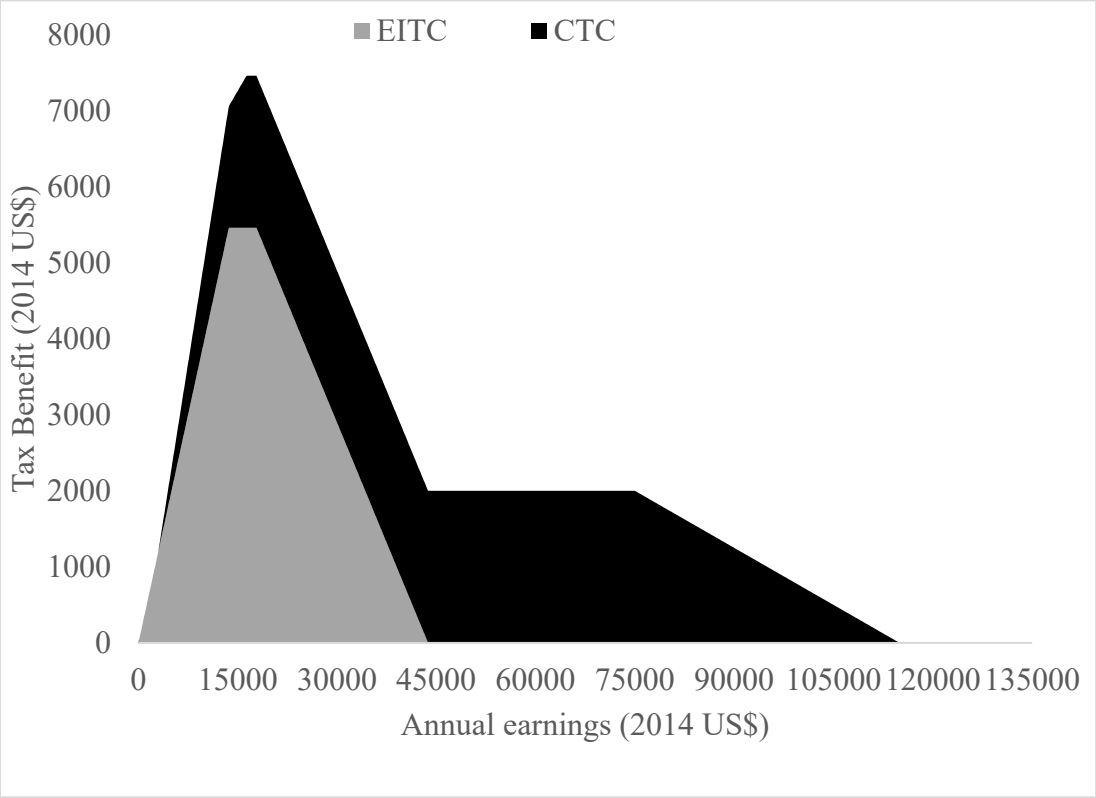
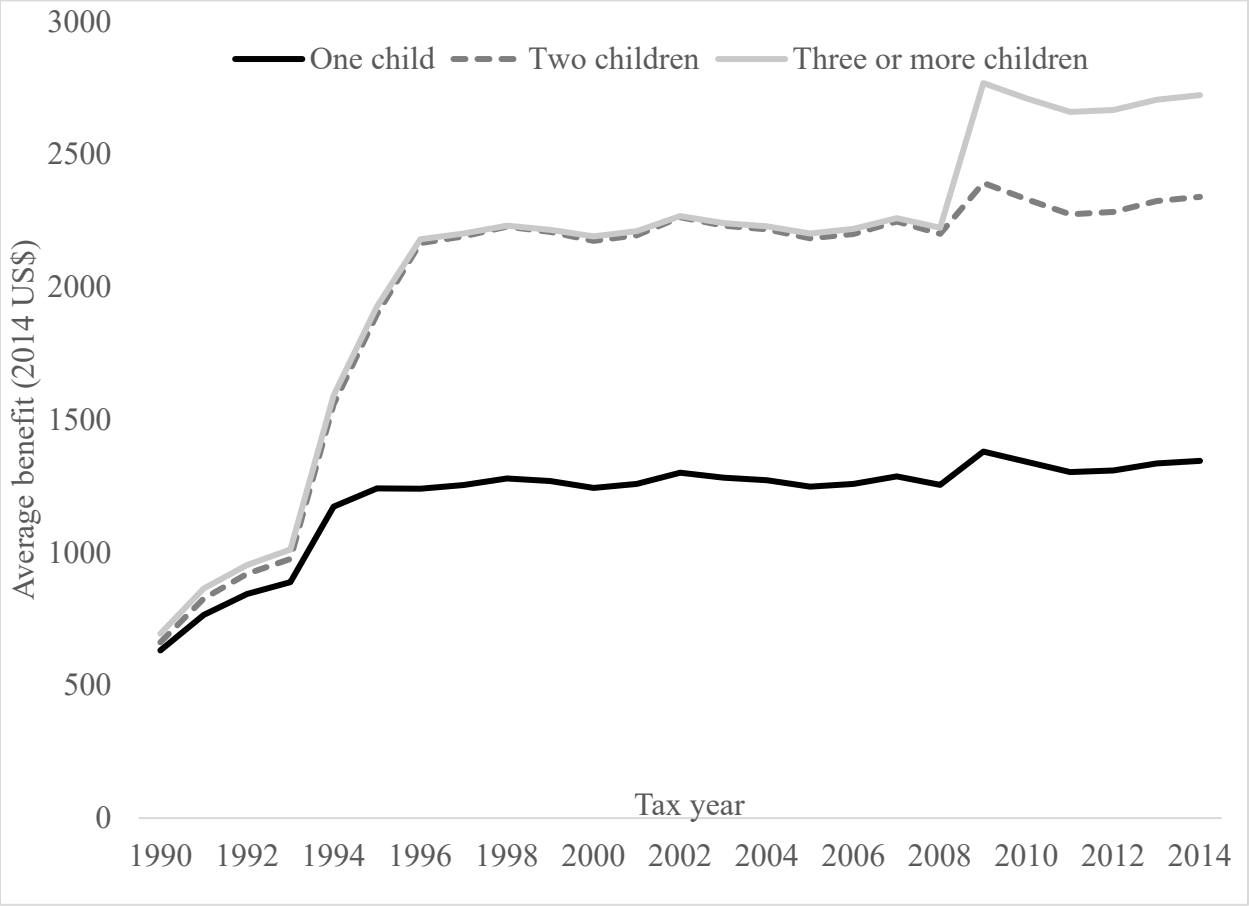
Figure 1a. EITC and CTC benefit schedule for head of household filer with two children, (2014 tax year)



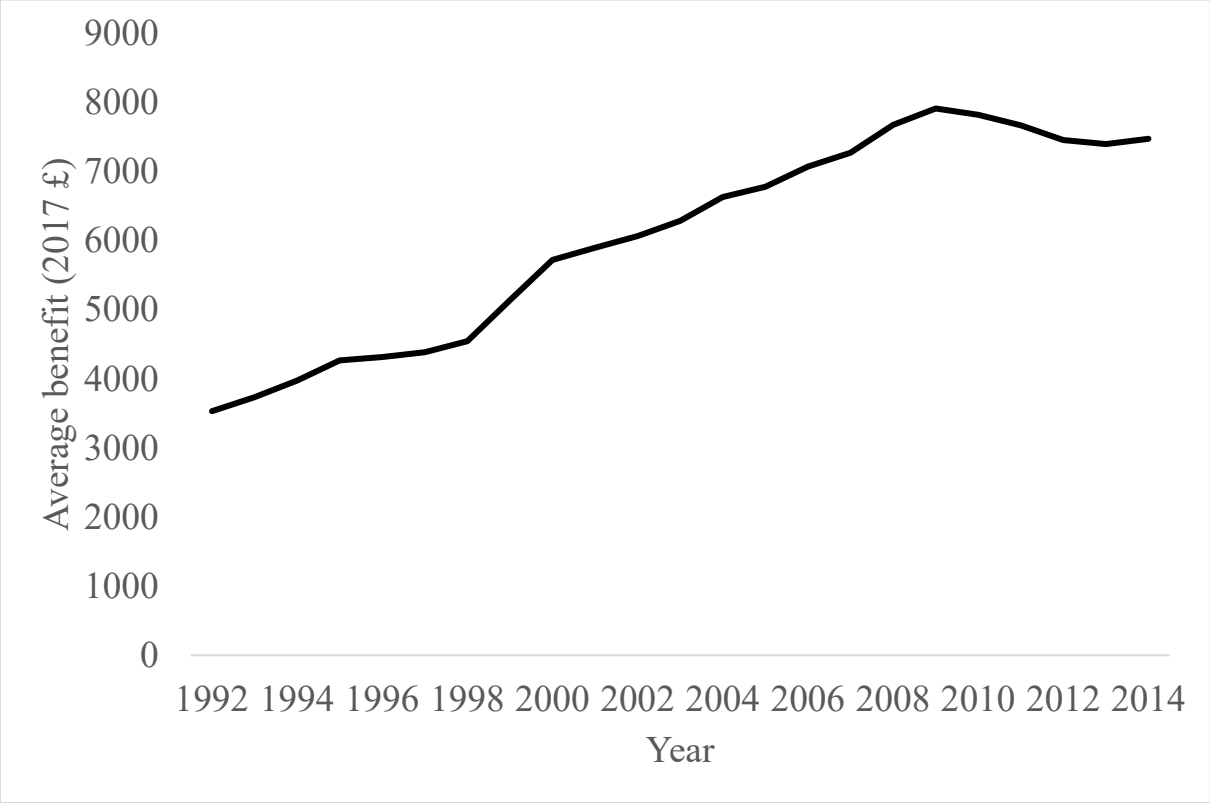
Source: Author's calculations

Figure 1b. Average combined federal and state EITC benefit over time among head of household filers, by number of children



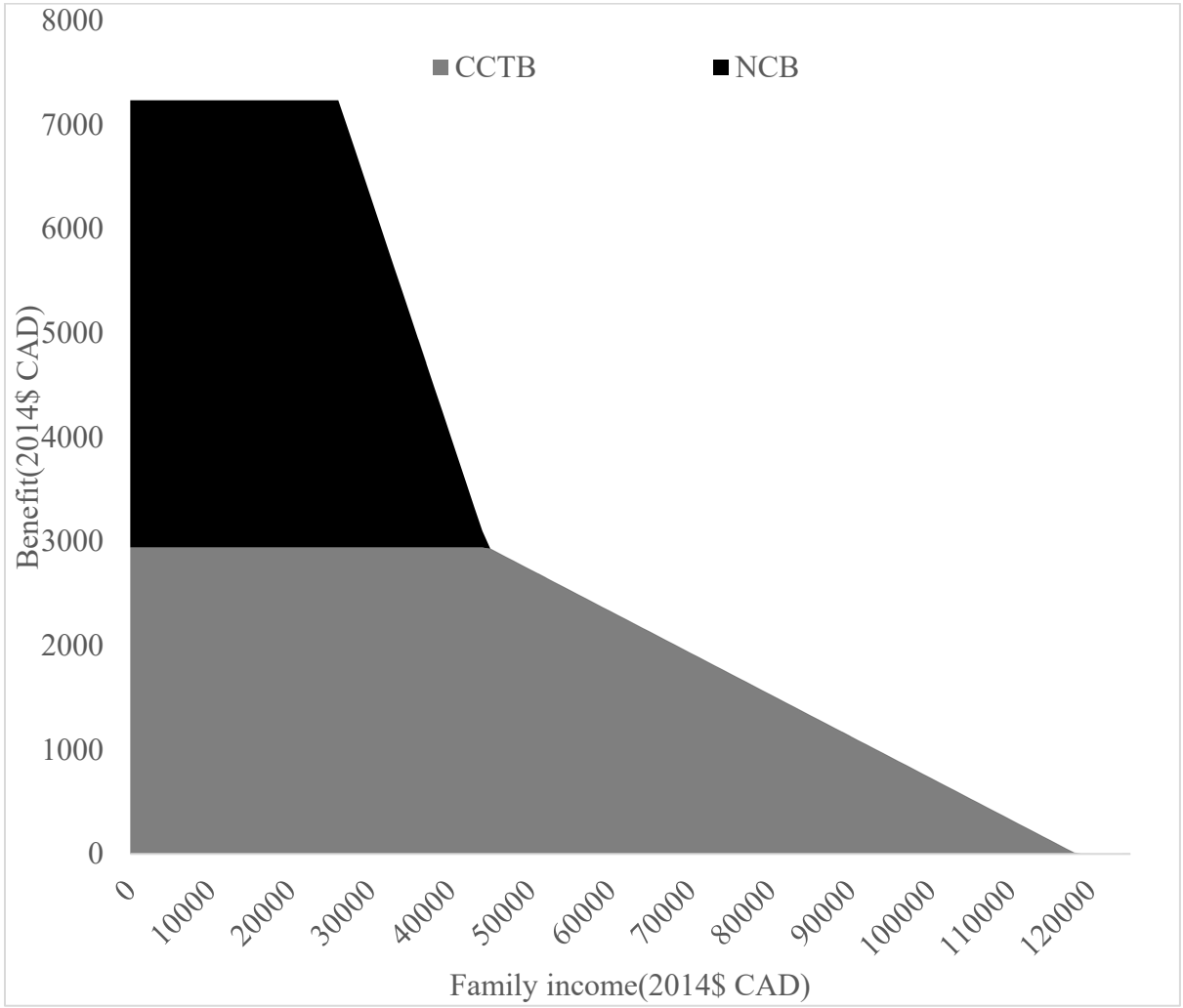
Source: Survey of Income and Program Participation 1996 and NBER's TAXSIM

Figure 2. Average UK working tax credit and child tax credit over time



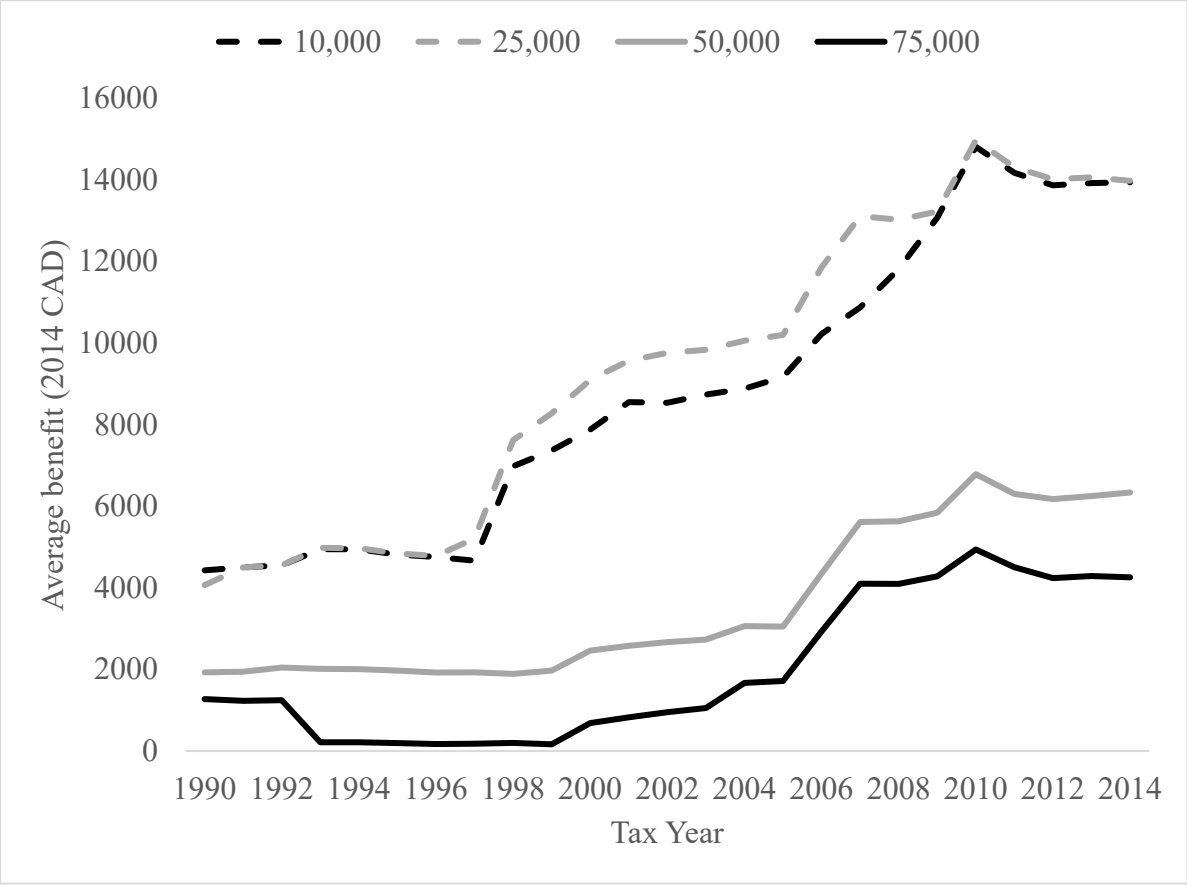
Source: Brewer and Hoynes (2019)

Figure 3a. Canadian child benefit schedule for household with two children (2014 tax year)



Source: Author's calculations.

Figure 3b. Average federal and provincial Canadian family benefits for household with two children living in Ontario, by family income and tax year (2014 CAD)



Source: Canadian Income Survey and 2019 CTaCS tax calculator (Milligan, 2019).

Appendix Table 1. State EITC generosity by year, expressed as a share of the federal EITC

Tax Year	CA[a]	CO	CT	DC	DE**	HI**	IL	IN	IA	KS	LA	ME**	MD
1986													
1987													
1988													
1989													
1990									0.05**				
1991									0.065**				
1992									0.065**				
1993									0.065**				
1994									0.065**				
1995									0.065**				
1996									0.065**				
1997									0.065**				
1998									0.065**	0.10			0.10
1999		0.085							0.065**	0.10			0.10
2000		0.10		0.10			0.05**		0.065**	0.10		0.05	0.15
2001		0.10		0.25			0.05**		0.065**	0.10		0.05	0.16
2002		0		0.25			0.05**		0.065**	0.15		0.05	0.16
2003		0		0.25			0.05	0.06	0.065**	0.15		0.05	0.18
2004		0		0.25			0.05	0.06	0.065**	0.15		0.05	0.20
2005		0		0.35			0.05	0.06	0.065**	0.15		0.05	0.20
2006		0		0.35	0.20		0.05	0.06	0.065**	0.15		0.05	0.20
2007		0		0.35	0.20		0.05	0.06	0.07	0.17		0.05	0.20
2008		0		0.40	0.20		0.05	0.06	0.07	0.17	0.035	0.05	0.25
2009		0		0.40	0.20		0.05	0.09	0.07	0.17	0.035	0.05	0.25
2010		0		0.40	0.20		0.05	0.09	0.07	0.18	0.035	0.05	0.25
2011		0	0.30	0.40	0.20		0.05	0.09	0.07	0.18	0.035	0.05	0.25
2012		0	0.30	0.40	0.20		0.05	0.09	0.07	0.18	0.035	0.05	0.25
2013		0	0.30	0.40	0.20		0.05	0.06	0.07	0.18	0.035	0.05	0.25
2014		0.10	0.275	0.40	0.20		0.10	0.09	0.14	0.17	0.035	0.05	0.25
2015		0.10	0.30	0.40	0.20		0.10	0.09	0.14	0.17	0.035	0.05	0.25
2016	0.85	0.10	0.275	0.40	0.20		0.10	0.09	0.15	0.17	0.035	0.05	0.26
2017	0.85	0.10	0.23	0.40[b]	0.20	0.20***	0.10	0.09	0.15	0.17	0.035	0.05	0.27
2018	0.85	0.10	0.23	0.40[b]	0.20	0.20	0.18	0.09	0.15	0.17	0.035	0.05	0.27
2019	0.85	0.10	0.23	0.40[b]	0.20	0.20	0.18	0.09	0.15	0.17	0.05	0.05	0.28
2020	0.85	0.10	0.23	0.40[b]	0.20	0.20	0.18	0.09	0.15	0.17	0.05	0.12[c]	0.45[d]
2021	0.45	0.10	0.23	0.40[b]	0.20	0.20	0.18	0.09	0.15	0.17	0.05	0.12[c]	0.45[d]
2022	0.45	0.25	0.305	0.70[b]	0.20	0.20	0.18	0.10	0.15	0.17	0.05	0.12[c]	0.45[d]
2023	0.45	0.25	0.23	0.70[b]	0.20	0.20	0.20	0.10	0.15	0.17	0.05	0.12[c]	0.28

Appendix Table 1 (cont.)

Tax Year	MA	MI	MN[c]	MO[**]	MT	NE	NJ	NM	NY	NC	OH[**]	OK[**]	OR
1986													
1987													
1988													
1989													
1990													
1991			0.10										
1992			0.10										
1993			0.15										
1994			0.15						0.08				
1995			0.15						0.10				
1996			0.15						0.20				
1997	0.10		0.15						0.20				0.05**
1998	0.10		0.25						0.20				0.05**
1999	0.10		0.25						0.20				0.05**
2000	0.10		0.25				0.10		0.23				0.05**
2001	0.15		0.33				0.15		0.25				0.05**
2002	0.15		0.33				0.18		0.28			0.05	0.05**
2003	0.15		0.33			0.08	0.20		0.30			0.05	0.05**
2004	0.15		0.33			0.08	0.20		0.30			0.05	0.05**
2005	0.15		0.33			0.08	0.20		0.30			0.05	0.05
2006	0.15		0.33			0.08	0.20		0.30			0.05	0.05
2007	0.15		0.33			0.08	0.20	0.08	0.30			0.05	0.05
2008	0.15	0.10	0.33			0.10	0.23	0.10	0.30	0.035		0.05	0.06
2009	0.15	0.20	0.33			0.10	0.25	0.10	0.30	0.05		0.05	0.06
2010	0.15	0.20	0.33			0.10	0.20	0.10	0.30	0.05		0.05	0.06
2011	0.15	0.20	0.33			0.10	0.20	0.10	0.30	0.05		0.05	0.06
2012	0.15	0.06	0.33			0.10	0.20	0.10	0.30	0.05		0.05	0.06
2013	0.15	0.06	0.33			0.10	0.20	0.10	0.30	0.05		0.05	0.06
2014	0.15	0.06	0.33			0.10	0.20	0.10	0.30	0.05	0.05	0.05	0.08
2015	0.15	0.06	0.33			0.10	0.20	0.10	0.30	0.05	0.05	0.05	0.06
2016	0.23	0.06	0.33			0.10	0.30	0.10	0.30[f]	0	0.10	0.05	0.08
2017	0.23	0.06	0.33			0.10	0.30	0.10	0.30[f]	0	0.10	0.05	0.08[g]
2018	0.23	0.06	0.33		0.03***	0.10	0.37	0.10	0.30[f]	0	0.10	0.05	0.08[g]
2019	0.30	0.06	0.33		0.03***	0.10	0.39	0.17	0.30[f]	0	0.30	0.05	0.08[g]
2020	0.30	0.06	0.33		0.03	0.10	0.40	0.17	0.30[f]	0	0.30	0.05	0.09[g]
2021	0.30	0.06	0.33	0.10***	0.03	0.10	0.40	0.20	0.30[f]	0	0.30	0.05	0.09[g]
2022	0.30	0.06	0.33	0.10***	0.03	0.10	0.40	0.20	0.30[f]	0	0.30	0.05	0.09[g]
2023	0.30	0.06	0.33	0.10	0.03	0.10	0.40	0.25	0.30[f]	0	0.30	0.05	0.09[g]

Appendix Table 1 (cont.)

Tax Year	RI	SC[**]	UT[**]	VT	VA[**]	WA	WI (1)	WI (2)	WI (3)
1986	0.22[**]								
1987	0.23**								
1988	0.23**			0.23					
1989	0.23**			0.25			0.05	0.25	0.75
1990	0.23**			0.28			0.05	0.25	0.75
1991	0.275**			0.28			0.05	0.25	0.75
1992	0.275**			0.28			0.05	0.25	0.75
1993	0.275**			0.28			0.05	0.25	0.75
1994	0.275**			0.25			0.044	0.208	0.625
1995	0.275**			0.25			0.04	0.16	0.50
1996	0.275**			0.25			0.04	0.14	0.43
1997	0.275**			0.25			0.04	0.14	0.43
1998	0.27**			0.25			0.04	0.14	0.43
1999	0.265**			0.25			0.04	0.14	0.43
2000	0.26**			0.32			0.04	0.14	0.43
2001	0.255**			0.32			0.04	0.14	0.43
2002	0.25**			0.32			0.04	0.14	0.43
2003	0.25			0.32			0.04	0.14	0.43
2004	0.25			0.32			0.04	0.14	0.43
2005	0.25			0.32			0.04	0.14	0.43
2006	0.25			0.32	0.20		0.04	0.14	0.43
2007	0.25			0.32	0.20		0.04	0.14	0.43
2008	0.25			0.32	0.20	0.10[***]	0.04	0.14	0.43
2009	0.25			0.32	0.20	0.10[***]	0.04	0.14	0.43
2010	0.25			0.32	0.20	0.10[***]	0.04	0.14	0.43
2011	0.25			0.32	0.20	0.10[***]	0.04	0.11	0.34
2012	0.25			0.32	0.20	0.10[***]	0.04	0.11	0.34
2013	0.25			0.32	0.20	0.10[***]	0.04	0.11	0.34
2014	0.25			0.32	0.20	0.10[***]	0.04	0.11	0.34
2015	0.25			0.32	0.20	0.10[***]	0.04	0.11	0.34
2016	0.13			0.32	0.20	0.10[***]	0.04	0.11	0.34
2017	0.125	1.25[***]		0.32	0.20	0.10[***]	0.04	0.11	0.34
2018	0.15	0.2083		0.36	0.20	0.10[***]	0.04	0.11	0.34
2019	0.15	0.4167		0.36	0.20	0.10[***]	0.04	0.11	0.34
2020	0.15	0.625		0.36	0.20	0.10[***]	0.04	0.11	0.34
2021	0.15	0.8333		0.36	0.20	0.18-0.56[***]	0.04	0.11	0.34
2022	0.15	1.0417	0.15	0.36	0.20	0.18-0.56[***]	0.04	0.11	0.34
2023	0.15	1.25	0.15	0.38	0.15	0.18-0.56[h]	0.04	0.11	0.34

Sources: Leigh(2010); Tax Policy Center (2023): http://www.taxpolicycenter.org/statistics/state-eitc-based-federal-eitc

**Denotes non-refundable credit.

***Announced but not implemented yet.

a: California has a different range of eligible income than the federal EITC.

b: DC's EITC for childless workers is worth 100% of the federal EITC and has a larger range of eligible income relative to the federal credit.

c: 25% for filers without dependent children.

d: 100% for filers without dependent children. Maryland also has the option of a 50% non-refundable EITC, but tax filers can only claim one credit.
e: Minnesota has a different structure to its state EITC that is not a direct share of the federal EITC starting in 2001. The average benefit level is listed from 2001 onward for Minnesota.

f: New York City has an additional EITC worth 5% of the federal credit.

g: Higher credit if qualifying child is under 3 (11% from 2017-2019; 12% from 2020 onward)

h: Washington's structure differs from the federal structure and credit will be calculated as a percentage of income, rather than a percentage of the federal EITC

Wisconsin has a different rate depending on the number of children in the household.