ORIGINAL ARTICLE

The Earned Income Tax Credit as supplementary food benefits and savings for durable goods

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Abstract

The Earned Income Tax Credit (EITC) transferred more than $67 billion to taxpayers in 2016. We estimate changes in spending that occur following EITC disbursement. We make three key advances in identifying the effect: using estimated EITC dollar benefits to differentiate the impact of low from high benefits; estimating the impact by liquid assets; and, employing a triple-difference model around the 1993 expansion and a separate triple-difference model over the number of children. We find that the EITC acts as supplementary SNAP benefits for those with small EITC benefits, while those with larger benefits increase spending on durables, particularly automobiles.

KEYWORDS
consumption, durables, Earned Income Tax Credit, food spending

JEL CLASSIFICATION
D12, I38, H24

1 | INTRODUCTION

The Earned Income Tax Credit (EITC) is one of the largest anti-poverty programs for working age adults with children, transferring more than $67 billion per year (IRS, 2017). In 2018, the EITC along with the Child Tax Credit lifted 5.6 million individuals out of poverty, including over 3 million children, and reduced the severity of poverty for another 16.5 million people, including 6.1 million children (Center on Budget and Policy Priorities, 2019). The EITC transfers result in several beneficial impacts for recipients based on both the direct impact of the transfers but also through increasing earnings and employment. The greatest impacts tend to be for households with earnings up to the threshold phaseout part of the schedule ($18,340 dollars of earnings per year for a two dependent child household), which are more likely to be female-headed single parent households, as well as for households without a member previously in the labor force (Dickert et al., 1995; Eissa & Hoynes, 2006). There is some evidence that likelihood of EITC receipt increases in economic downturns—enabling it to act as a social safety net (Bitler et al., 2017). Other benefits of the EITC include positive impacts on children's test scores (Chetty et al., 2011; Dahl & Lochner, 2008). Work has also shown beneficial impacts on birth weight (Hoynes et al., 2012; Strully et al., 2010), on maternal health, and on health related behaviors more broadly (Evans & Garthwaite, 2010; Hamad & Rehkopf, 2015). Benefits for health, however, do not occur for all health-related outcomes. Using EITC benefits as an instrument, research has found that higher income from the EITC increased the likelihood of women being obese (Schmeiser, 2009), and there is mixed evidence related to the EITC and smoking (Averett &

Wang, 2013; Kenkel et al., 2014). These beneficial findings have not, however, determined whether there are consumption mechanisms through which these changes occur.

The purpose of this paper is to estimate changes in spending associated with EITC disbursement. Over 27 million tax units received the EITC in 2016, with an average benefit of $2455 (IRS, 2017). Because beneficiaries of the EITC generally have low tax liabilities, the benefit is typically received as a lump sum tax refund. Those receiving the tax refund tend to file their taxes early, with the modal month of receipt February, followed by March. This well characterized timing of disbursement is the basis for estimating parameters of association between amount of EITC and different categories of consumption. Our quasi-experimental approach utilizing seasonality of assessment of consumption contrasts with other EITC literature which examines federal expansions over time and the differential benefits based on family size (Hoynes & Patel, 2018). The advantage of our approach is in a much more proximal contrast between those exposed and not exposed, within the same calendar year, rather than across the many years of federal EITC expansions. With this approach, we are estimating the short-term (within a year) differences that occur in consumption with EITC receipt, rather than longer-term consumption trends over a multi-year period.

While seasonality of receipt with respect to the measurement of consumption can be considered exogenous, EITC receipt itself is not, and therefore our parameter estimates cannot be considered causal estimates. To address this limitation, we fit a wide range of specifications, including triple difference models, examining differences by number of dependents, and using education as a proxy for EITC receipt, and evaluate the balance of evidence across different model specifications.

Three prior studies have used the seasonal nature of the EITC disbursement to examine associations with short-term consumption, finding seasonal patterns associated with consumption of durable goods (Barrow & McGranahan, 2000), with monthly spending on vehicles increasing by 35% in February (Goodman-Bacon & McGranahan, 2008). Using the Consumer Expenditure (CE) Survey Diary, other work showed increases in food related expenditure in February (McGranahan & Schanzenbach, 2013). Another study found evidence that the EITC along with other safety net programs was associated with food insecurity, suggesting that food expenditures are positively impacted by the EITC (Schmidt et al., 2016). A related study shows that EITC recipients also save some of the increase in after-tax income from the EITC. Jones and Michelmore (2018) find that the likelihood of having money in a checking or savings account increases, and the amount of savings increases by about $700. In addition, they find some support that the EITC decreased unsecured debt.

Our current analyses make several key contributions building on this prior work. First, by using the CE Survey data with imputed earnings and taxes from Fisher et al. (2015), we examine impacts on consumption at different levels of EITC qualification level, rather than only whether someone qualified. We do this not for the purpose of inference, but to estimate associations of EITC with consumption at different levels of EITC benefits. The estimated dollar value of EITC benefits the household is eligible to receive is important given the wide range of EITC generosity, allowing us to evaluate the potential for nonlinear associations. We further explore interactions with household liquidity, which was not done in prior work. We also use more disaggregated spending categories which is important given prior work showing category specific differences in consumption. For example, qualitative work has described greater spending after receiving the EITC refund on children's clothing (Romich & Weisner, 2000), and using more disaggregated categories of consumption we can disentangle spending on child, adolescent, and adult apparel. Additional qualitative work found about one in five EITC recipients planning to spend to buy or repair an automobile (Smeeding et al., 2000). Goodman-Bacon and McGranahan (2008) examine more detailed spending categories as well but do not have the better measure of income, and they do not test the sensitivity to the dimensions we consider here.

Finally, we include CE data prior to 1997. Including earlier years allow us to conduct triple difference models, exploiting the fact that the largest expansion of the federal EITC occurred with the Omnibus Reconciliation Act in 1993, which became fully phased in by 1996 (Rothstein, 2005). We are further able to examine number of dependent children as an additional model specification, given the substantial differences in EITC generosity for households with one versus two or more dependent children that occurred following this same expansion (Figure 1), as used in other work on EITC impacts (Hoynes et al., 2012).

Our findings have relevance for social and economic policy surrounding EITC design and implementation. The analysis of specific consumption categories allows us to assess whether there tend to be patterns of short-term consumption that are consistent with being detrimental or beneficial to well-being. This is important since work has shown that income gains, including those associated with government transfers, can sometimes be associated with poor health outcomes (Dobkin & Puller, 2007). Answering this question has relevance for whether EITC should be changed to a different form of reimbursement for improved social welfare benefits. For example, to maximize well-being among participants should there be greater incentives to take the EITC disbursement throughout the year instead of as one lump sum payment? Because we estimate the amount of EITC qualified for, we can also examine whether these
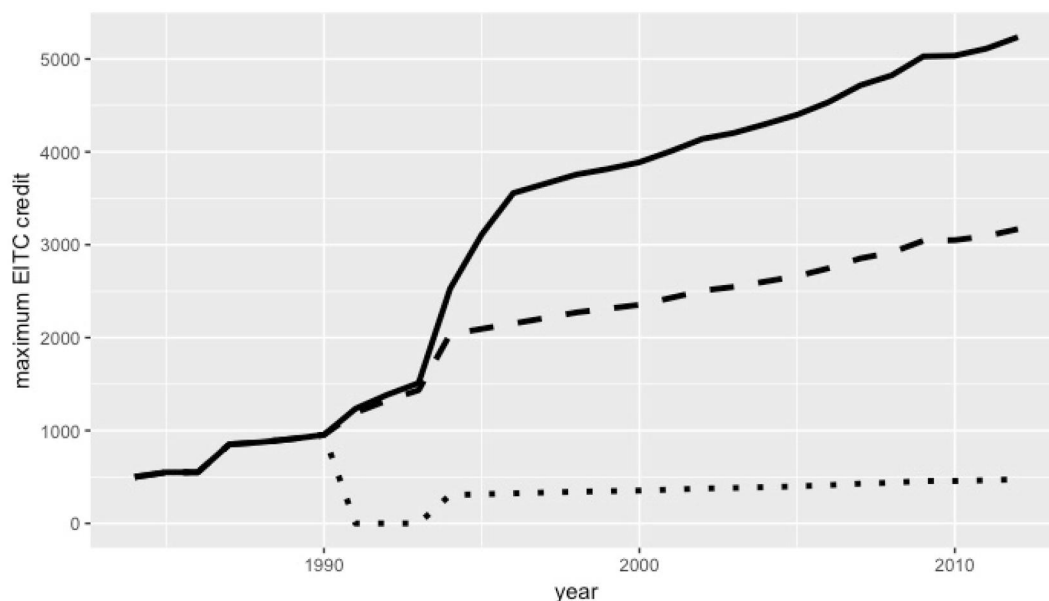
FIGURE 1 Program benefits over time. The solid line shows the maximum Earned Income Tax Credit (EITC) benefit for households with two dependent children by year. The dashed line shows the maximum EITC benefit for households with one child, and the dotted line shows the maximum benefit with no dependent children. Maximum EITC credit is in dollars for that specific year, not adjusted dollars. *Source*: Brookings Institution Earned Income Tax Credit Parameters, 1975–2017

differences are dependent on the amount of credit, and whether, for types of consumption that generally are thought to improve well-being, there are diminishing consumption returns with increases in EITC. The implications from this finding could be to better understand whether increases in the benefits beyond a certain level of earnings may be less likely to increase well-being.

The paper is organized as follows. Section 2 gives a background on the Earned Income Tax Credit. Section 3 describes our data and models. Section 4 presents the results of our analysis; the final section compares our results to those of other work and considers the implications of our findings.

2 | THE EARNED INCOME TAX CREDIT AND ITS EFFECTS

The EITC is one of the largest systematic, regularly occurring income disbursement mechanisms in the United States. While begun in 1975 as a small Federal program, the EITC was expanded in 1986, with further expansions in 1990 and 1993 (Figure 1). In 2016, the IRS reported that 27 million household benefited from the EITC, with total benefits of 67 billion dollars (IRS, 2017). The maximum credit is quite large relative to qualifying income, up to $6269 in 2016 for households with three or more children, $5572 with two children and $3373 for one child households. For households in the maximum qualifying range with two children, the refund can be up to 40% of yearly earnings received as a refund. The maximum credit is substantially lower for households with no children, only $510, with no credits if household earnings exceed $15,010. While much of the benefit comes from the federal EITC, for tax year 2020 twenty-three states along with the District of Columbia have state specific EITCs which are directly refundable, while an additional six states have a non-refundable EITC. The value of these state EITCs averages around 20% of the federal credit.

The bulk of the literature on the impacts of the EITC examines the effects on employment and household earnings. In most cases, this has been through examining changes in an outcome in correlation with temporal or spatial increases in the credit, in addition to the different amounts of credit received based on the number of dependents. Not surprisingly, the greatest impact of expansions of the EITC has been on increasing employment among households in the earnings levels targeted, but this has variation depending on where a household was on the qualification schedule. The greatest impacts were for households with earnings on the phase-in part, which most typically were female-headed single parent households, and on households who were not previously in the labor force (Dickert et al., 1995; Eissa & Hoynes, 2006).

Two studies have found beneficial impacts of tax refunds from the EITC on children's test scores. Dahl and Lochner (2008) showed that EITC earnings were associated with increase test score performance among children. In addition,

using tax data linked to test scores, Chetty et al. (2011) used the non-linearity of qualification for the EITC to identify that $1000 in additional tax credit was associated with between a 6% and 9% of a standard deviation increase in test scores.

There are also impacts on both short and longer-term health and well-being. Work has shown beneficial impacts on birth weight (Hoynes et al., 2012; Markowitz et al., 2017; Strully et al., 2010), and on maternal health and health related behaviors more broadly (Evans & Garthwaite, 2010; Hamad & Rehkopf, 2015). Other work shows that EITC receipt increases subjective well-being, including a decrease in depressive symptoms, an increase in happiness, and an increase in self-esteem (Boyd-Swan et al., 2016).

While most studies have examined impacts over 1 year or longer, several prior studies have used the seasonal nature of the EITC disbursement to examine associations with short-term changes in behavior and consumption. These findings include showing higher consumption of durable goods in February when most of the EITC disbursement occurred (Barrow & McGranahan, 2000). Using data from 1997 to 2006, qualifying for any amount of EITC refund was associated with spending more on all categories of expenditure except tobacco, food, and gasoline (Goodman-Bacon & McGrana-han, 2008). Other work showed no change in junk food, sugar sweetened beverages and fast food, but demonstrated an increase in healthier types of food purchases (McGranahan & Schanzenbach, 2013). Surprisingly, changing the threshold point for how much EITC earnings were qualified for didn't change findings. In addition to consumption, a number of health related behaviors and biological factors changed over the short-term in correlation with months when the EITC credit was most likely to be received (Rehkopf et al., 2014). Beneficial changes in behavior of EITC qualifying individuals included being less likely to smoke, more likely to want to lose weight, and having less food insecurity.

3 | DATA AND MODEL

3.1 | Data

3.1.1 | Consumer expenditure data

We used data from the CE Survey from 1986 through 2012. We analyzed data from the Interview Survey that focuses on major and recurring expenses collecting data on expenditures over the previous 3 months. Households are interviewed over four quarters, and we use the quarterly interviews.

3.1.2 | Imputing income and EITC

We used imputed income to address known issues in the underreporting of earnings. Over 10% of wage earners in the CE failed to report the dollar amount earned. Without correcting for this failure, we could potentially misclassify their EITC status. We use the imputed earnings data from Fisher et al. (2015), which includes tax credits as estimated by TAXSIM (Feenberg & Coutts, 1993).[1] Fisher et al. (2015) impute any component of income that a household indicated they received but failed to report a dollar value. The resulting income was then run through TAXSIM to estimate taxes and tax credits. Our analysis therefore uses qualified EITC benefits rather than the actual EITC received. Further, half of EITC recipients with qualifying children used refund anticipation loans or refund anticipation checks from paid tax preparers, which lowers the dollar amount received (Theodos et al., 2010). While we use the dollars qualified for due to data availability, it has advantages for inference. It avoids the potential for bias if analyzing only those who received, since it is plausible that those who claim may be differential with respect to individuals' consumption as compared to those who are eligible but do not claim. While this measurement error may result in attenuated findings, it is most likely that this bias would be toward the null. In addition, there is certainly measurement error in the imputed EITC benefits. This measurement error also leads to attenuated findings.

3.1.3 | Expenditure variables

Our primary expenditure categories of analysis include the following. First, we used a summary measure of non-durables (Heathcote et al., 2010). We then looked overall at food and subcategories of food at home, food away from home and alcohol. We examined transportation expenditure overall, as well as subcategories of gas and public transportation, auto

maintenance, other transportation, automobiles (all), new automobiles, used automobiles, and other automobiles. Among housing expenditures, we examined home maintenance and home furnishings. Consumption of apparel was examined overall and divided by age based in data availability: ages 0–1, ages 2–17 and ages 18+. Among personal items we examined expenditures for personal care, reading, entertainment, education, cash contributions, medical out-of-pocket, and tobacco. The estimates of consumption for categories of apparel, furniture and furnishings, alcohol, tobacco, and food away from home require more cautious interpretation because of known under reporting within those categories (Bee et al., 2014). Since consumption in these categories are under reported, we likely underestimate any potential effects of EITC quali-fication on consumption of these items. We include these items in our analysis, however, because they represent key categories for understanding the potential health benefits of specific types of consumption, and because positive findings are likely to be real given the direction of bias that would be impacted by underreporting.

3.2 | Models

Our primary approach for identification is the difference-in-differences (DD) model based on qualification for EITC and the month when an individual was surveyed. Based on prior work and data from the IRS on EITC fund disbursement (Figure 2), we treat February through April as treatment months, and May through January as control months. The DD is calculated as:

$$y_{its} = \beta_0 + \beta_1 \text{EITC}_i + \beta_2 \text{Treatment}_t + \beta_3 \text{EITC}_i * \text{Treatment}_t + \gamma X_i + \theta_t + \varphi_s + \varepsilon_{its}, \qquad (1)$$

where y_{its} is spending by household i in month t residing in state s. EITC_i is whether the household is eligible for the EITC, and Treatment_t is whether the expenditures are from February, March, or April. We are interested in the co-efficient on the interaction of EITC eligibility and the treatment months. The vector X_i includes control for age of the household head, number of adults in the household, number of kids in the household, marital status, whether the head of household has been divorced, level of education of the head of household (as less than high school, high school, some college or college degree), race (as black, white or other), along with indicator variables for month and year.

We also fit other model specifications to examine the robustness of our primary findings. First, we added an individual fixed effect model to our primary model. While this reduces our overall sample size, this model allows us to control for unmeasured non-time varying endogenous variables. Secondly, we use a triple difference model based on the number of
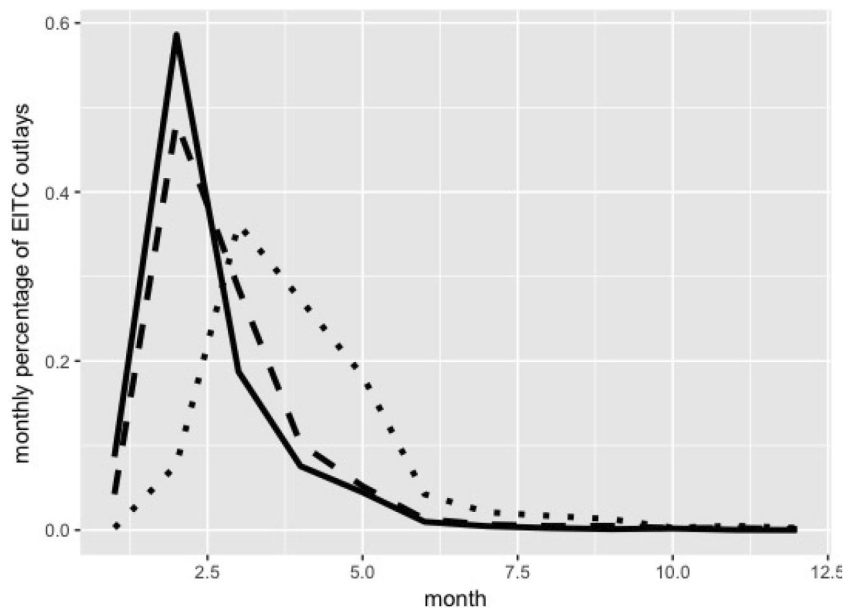

FIGURE 2 Density plot of refund month over time. The solid line represents the average monthly percent of tax credits distributed by month of the year, averaged over 2010–2012. The dashed line is for 1998–2000, and the dotted line is for 1984–1986. *Source*: *Monthly Treasury Statement of Receipt and Outlays of the United States Government*, 1984–1986, 1998–2000, and 2010–2012

dependents in the household, since households with two or more qualifying dependents receive a larger credit with the same amount of earnings. An additional triple difference model uses the pre/post 1993 EITC expansion, since benefits were expanded from 1993 to 1996 (Figure 1; Evans & Garthwaite, 2010). A third specification stratifies our results by the amount of credit, under the assumption that within the range of credit provided by the EITC refund, there will be greater impacts on consumption with a greater refund. Identifying off these alternative specifications assumes that there are no diminishing returns to the size of the credit. If above a certain threshold of credit there are not proportionally greater levels of consumption, then these approaches would not be expected to identify a greater impact of the EITC.

One concern about using the size of the credit is that self-employed individuals can choose their EITC benefit (Saez, 2010). When we restrict the sample to those who are not self-employed, the results are similar when using the amount of the EITC credit.

An additional specification examines the potential importance of liquidity constraints by running separate models for those with less than $400 in liquid savings and those with at least $400 in liquid savings. We use this threshold as recent research identified 52% of US households indicated that they would have to sell something or borrow money to cover a $400 emergency expense (Board of Governors, 2014). EITC recipients are likely to be liquidity constrained. A 2-week delay in the issuance of EITC benefits in 2017 led to a significant shift in the timing of expenditures at retail stores and restaurants (Aladangady et al., 2018).

We fit an additional model that addresses the concern about the comparison group. Households with higher than median income may have very different spending patterns and may not be an ideal comparison group for EITC recipients (Hardy et al., 2018). Thus, we present our primary specification restricting the sample to households with income below $75,000.

A further specification that has been used previously in the literature is using educational attainment (high school education equivalent or less) as an indicator of whether an individual is likely to receive the EITC (Evans & Garthwaite, 2010; Strully et al., 2010). The advantage is that this indicator is much less likely to be endogenous to EITC received since its attainment is most likely to occur many years prior to EITC receipt. The disadvantage of this is that education is only weakly correlated with receiving EITC (Pearson correlation of 0.09), so this is limited for detecting consumption associations with EITC disbursement.

3.2.1 | Other types of seasonality that could bias results

Based on the DD approach we use, our results could be biased if there are seasonal differences that differentially influence consumption among those that qualify for the EITC as compared to those that don't qualify for EITC. Part of this concern is mitigated by the fact that the EITC impacts are not divided into high and low income but are among low-wage workers. That is, individuals in the comparison group who do not qualify for the EITC comprise both lower and higher income individuals as compared to EITC qualified individuals. However, it is possible that these middle range individuals have different seasonal exposures not related to the EITC.

One of the primary concerns for any omitted variable for seasonal variation is weather related patterns that may impact consumption differentially. We assess whether this influences our findings by examining whether our results are consistent across census regions, where the more extreme seasonal weather patterns in the Northeast and Midwest that would likely have greater impacts. Another type of seasonality that may bias our findings is seasonal differences related to employment in particular sectors with low-wage workers, for example, holiday season employment or agricultural employment. We would not expect holiday season employment to bias our findings as increased employment in October through December would likely be smoothed out as these months form only a part of the comparison group. In terms of agricultural employment, as with the seasonality of weather patterns, this would likely differ by census region, so we can indirectly evaluate this influence by the examination of how our findings differ by census region. While differential responses to other seasonal influences is a potential threat to inference from our models, we can in addition account for this potential for bias by assessing the triple difference models based on year and number of dependents.

3.2.2 | Relevance of non-EITC tax refunds for identification

Souleles (1999) finds that recipients of tax refunds generally spend about 64% of the refund in the first 3 months. Our estimates, however, intend to capture the effect of the EITC refund over and above spending of the tax refunds in

general, since for low wage earners all the refund is due to EITC credits. Individuals with incomes that are too high to qualify for the EITC yet who receive a tax refund would be in our comparison group, yet may still have increased consumption during the months when the refund is generally assumed to occur. There are two factors that mitigate this limitation of our analysis. First, this will bias our results toward the null, if individuals in our comparison group are consuming more during the same months. However, a second possibility is that higher income recipients tend to file their taxes later and thus receive their refund later than February through April. We perform sensitivity analysis of our primary models without including April as a control month and find similar results.

4 | RESULTS

Table 1 shows summary statistics for the EITC eligible population and those who do not qualify for the EITC. As expected based on eligibility criteria, EITC-eligibles are on average younger, have more children, are more likely to be black and have lower levels of education.

Table 2 shows the unadjusted values of our primary difference-in-difference model in the first seven columns (a–g). Level of spending is shown for relevant strata for these models, with February through April spending (a), May through

TABLE 1 Summary statistics of population by Earned Income Tax Credit (EITC) qualification

	EITC recipients	Non-recipients
Before-tax income (median)	$44,301	$77,420
EITC benefit (median)	$1666	–
Age (median)	42	53
Number of adults	2.3	1.9
Number of children	1.4	0.6
Marital status		
Married	60.3%	61.3%
Divorced, widowed, separated	20.9%	25.4%
Never married	18.8%	13.3%
Race		
White	77.0%	85.6%
Black	17.2%	9.8%
Other	5.8%	4.6%
Education		
Less than high school	24.2%	16.7%
High school	33.7%	27.8%
Some college	28.6%	25.9%
College-plus	13.5%	29.6%
Census region		
Northeast	16.2%	20.6%
South	23.1%	25.3%
Midwest	36.7%	31.5%
West	23.9%	22.7%
n	16,284	94,795

Note: Table uses the last interview such that households only appear once.

Source: Author's calculations using Consumer Expenditure Survey, 1986–2012.

TABLE 2 Simple difference-in-differences by spending category

Dependent variable	EITC recipients			Non-recipients				Regression coefficients	
	(a) Feb–Apr	(b) May–Jan	(c) = (a)–(b) First Diff	(d) Feb–Apr	(e) May–Jan	(f) = (d)–(e) First Diff	(g) = (c)–(f) Diff-in-Diff	Coef.	SE
Food	1900	1886	14	1957	1977	−20	34	38.4	(11.3)
Food at home	1429	1431	−2	1301	1311	−10	8	15.4	(8.1)
Food away from home	408	390	18	552	558	−6	24	21.8	(6.6)
Alcohol	64	66	−2	105	109	−4	2	1.2	(1.8)
Transportation	2143	2126	17	2344	2438	−106	123	113.6	(51.5)
Gas and public transport	608	612	−3	625	654	−29	26	26.4	(6.4)
Auto maintenance	187	191	−4	215	230	−15	11	10.0	(5.0)
Other transportation	447	448	−1	532	530	−8	7	1.9	(6.0)
Automobiles all	901	875	26	973	1025	−53	79	75.3	(49.3)
New automobiles	276	310	−34	519	567	−48	14	10.5	(35.2)
Used automobiles	617	551	66	435	442	−7	73	71.6	(34.3)
Other automobiles	7	14	−7	18	16	2	−9	−6.7	(4.0)
Housing	1548	1531	17	1916	1950	−34	51	55.1	(15.8)
Utilities	1124	1091	33	1247	1190	57	−24	−20.4	(7.1)
Home maintenance	171	181	−10	300	342	−42	32	30.9	(8.8)
Home furnishings	253	260	−7	369	417	−48	41	44.5	(8.9)
Apparel	312	403	−91	386	486	−100	9	16.7	(6.7)
Apparel 18+ year olds	231	287	−56	330	406	−76	20	21.8	(6.3)
Apparel 2–17 year olds	50	83	−33	36	59	−23	−10	−6.0	(1.5)
Apparel 0–1 year olds	32	33	−1	19	21	−2	1	0.9	(0.9)
Personal care	217	192	25	327	293	34	−10	−9.1	(8.5)
Reading	29	29	0	57	59	−2	2	1.3	(0.7)
Entertainment	407	485	−78	642	698	−56	−22	−11.9	(12.8)
Education	168	212	−44	175	215	−40	−4	−1.1	(10.5)
Cash contributions	162	171	−9	300	327	−27	18	12.0	(10.7)
Medical out-of-pocket	513	499	14	806	790	16	−2	−3.1	(9.5)
Tobacco	127	124	3	93	94	−1	4	4.4	(2.6)
Strictly non-durables	3977	3907	70	4250	4209	41	29	39.7	(20.4)
Non-durables	4830	4839	−9	5499	5544	−45	36	54.6	(26.2)

Note: The table shows the simple difference-in-differences results, not controlling for any observables. The first difference is between average spending between February to April and average spending between May–January, within EITC recipients (column a – column b) and non-recipients (column d – column e). The second difference is then across EITC recipients and non-recipients (column c – column f). The last two columns show our basic diff-in-diff results using Equation (1).

Source: Author's calculations using Consumer Expenditure Survey, 1986–2012.

January spending (b) and the difference (c) for EITC recipients and also these same strata for Non-recipients (d–f). The final column (g) shows the difference-in-differences, unadjusted for any other covariates. These models suggest increased consumption in several categories, notably food, transportation overall, automobiles, housing, apparel for 18+, and non-durables. The far-right columns of Table 2 present the regression results from the primary difference-in-differences model as comparison.

To ease comparison across models for specific consumption categories, we present the results for a given consumption category in a figure, presenting estimates and standard errors in table form in the Appendix. Figure 3 presents the results for total food consumption. The gray bar presents the point estimate, and the black represents the 95% confidence interval. For our main difference-in-difference model, food consumption increases by $38, and the 95% confidence interval does not include $0. The impact is around $60 when we restrict to households with at least $500 in estimated EITC benefits. Appendix Table A1 shows that this increase in food spending is about evenly split between food at home and food away from home. The differences are generally consistent with overlapping confidence intervals on the estimates across all four census regions. Households that receive smaller EITC benefits appear to spend more on food than those with higher benefits, with a $70 increase for those receiving an EITC less than $1500. The results hold when we restrict the comparison group to those with income less than $75,000. These results confirm earlier findings and suggest that the EITC in effect acts as a supplement to SNAP, at least for the food at home results. The increased consumption of food away from home may have mixed implications for health. Food purchased outside the home tends to be less healthy (Kant & Graubard, 2004). Conversely, the ability to purchase food away from home is a way to address scarce time resources of food preparation (Jabs & Devine, 2006) that could help to mitigate the negative impacts of poverty on cognition (Mani et al., 2013).

Transportation spending also increases with EITC receipt (Figure 4), with an increase ranging from $180 to $200 in our main specifications that limit to those who received at least $500 in benefits. We also see a statistically significant increase in transportation spending in our triple-difference model using the difference in benefits by the number of children. Contrary to food, it is those households with the largest EITC benefits that increase transportation spending, increasing by $256. There is also a sizable increase in transportation spending for those with at least $400 in liquid assets, with a $467 increase in spending, but the confidence intervals include the null and overlap substantially.
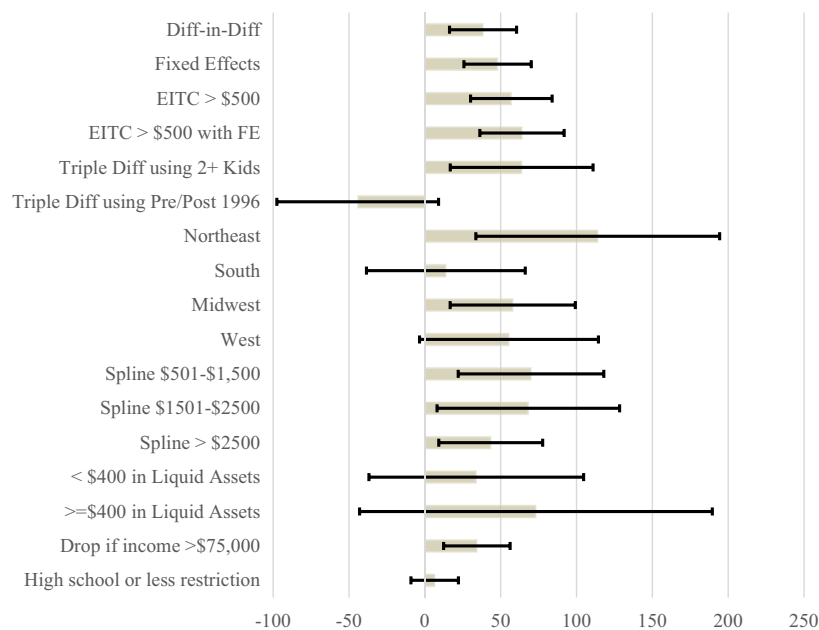

FIGURE 3 Food results by model. The Diff-in-Diff results use the simple difference-in-differences model from Equation (1). The results show the coefficient on the interaction of Earned Income Tax Credit (EITC) receipt with the months EITC benefits are typically received (February–April). The Fixed Effects results add a household fixed effect to the Diff-in-Diff results. The EITC > $500 model restricts the definition of EITC receipt to those were expected to receive at least $500 in EITC benefits. The Triple Diff using 2+ Kids adds a third interaction term to identify the causal impact of EITC receipt, whether the household had two or more children. This triple diff model is estimated off the extra benefits received by those with two or more children. The Trip Diff using Pre/Post 1996 adds an alternative third interaction term, using the increase in the generosity of the EITC benefits in 1996. The region results (Northeast, South, Midwest, and West) present the coefficients by region of the United States, looking for differences in spending that may be generated by differences in weather. The spline results examine differences in spending by the amount of EITC benefits expected to be received. Lastly, the <$400 in Liquid Assets examines differences by the amount of money the household has in checking and savings accounts. Corresponding coefficient estimates are reported in Appendix Tables. *Source*: Author's calculations using Consumer Expenditure Survey, 1986–2012
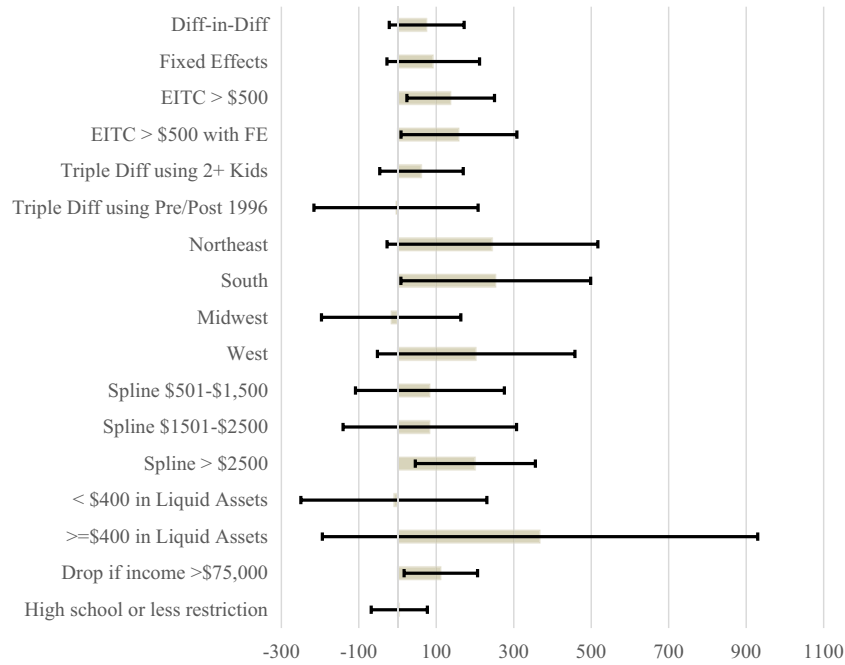
FIGURE 4 Transportation results by model. The Diff-in-Diff results use the simple difference-in-differences model from Equation (1). The results show the coefficient on the interaction of Earned Income Tax Credit (EITC) receipt with the months EITC benefits are typically received (February–April). The Fixed Effects results add a household fixed effect to the Diff-in-Diff results. The EITC > $500 model restricts the definition of EITC receipt to those were expected to receive at least $500 in EITC benefits. The Triple Diff using 2+ Kids adds a third interaction term to identify the causal impact of EITC receipt, whether the household had two or more children. This triple diff model is estimated off the extra benefits received by those with two or more children. The Trip Diff using Pre/Post 1996 adds an alternative third interaction term, using the increase in the generosity of the EITC benefits in 1996. The region results (Northeast, South, Midwest, and West) present the coefficients by region of the United States, looking for differences in spending that may be generated by differences in weather. The spline results examine differences in spending by the amount of EITC benefits expected to be received. Lastly, the <$400 in Liquid Assets examines differences by the amount of money the household has in checking and savings accounts. Corresponding coefficient estimates are reported in Appendix Tables. *Source*: Author's calculations using Consumer Expenditure Survey, 1986–2012

Most of the increase in transportation appears to come from the purchase of automobiles (Figure 5). Increased spending on durable goods such as automobiles matches findings on the response to tax rebates (Souleles, 1999) and tax cuts (Parker et al., 2013). Adams et al. (2009) also find that automobile sales increase around tax season for sub-prime borrowers and that this is generated by down payment constraints. Those receiving the largest EITC benefit are the group that increases auto spending (Figure 5).

We find consistent evidence for other durables as well, namely apparel and housing (Figures 6 and 7), with a $41 increase in spending on apparel and a $107 increase in housing for those with the largest EITC benefits. The increase in apparel spending appears to just be for apparel for adults, and the increase for housing comes from home maintenance and home furnishings (Table A4). The results present a consistent story that those with the highest EITC benefits spend those benefits on durables. These households could be down payment constrained, never have the cash on-hand to make a large purchase or use the EITC benefits as a way of forced savings. The use of high school education as a less endogenous proxy of EITC receipt also supports an impact of the EITC on both apparel and housing consumption.

Those with EITC benefits in the mid-range, from $1501 to $2500, increase spending on non-durables (Figure 8). Within these broader categories, those with lower benefits also increase spending on gasoline and public transportation (Table A4). Thus, it seems that those with lower benefits focus their spending on non-durables, while those with the largest benefits also increase non-durables, especially food, but also increase purchases of durables.

The one model that fails to find any positive and significant effect of EITC is the triple-difference model using the 1993 EITC expansion. For many spending categories, the coefficient is negative but not statistically different from zero. In most cases, the findings from these models do have overlapping confidence intervals with our primary models, even though the point estimates include the null within 95% confidence intervals. Thus while not supportive of our primary
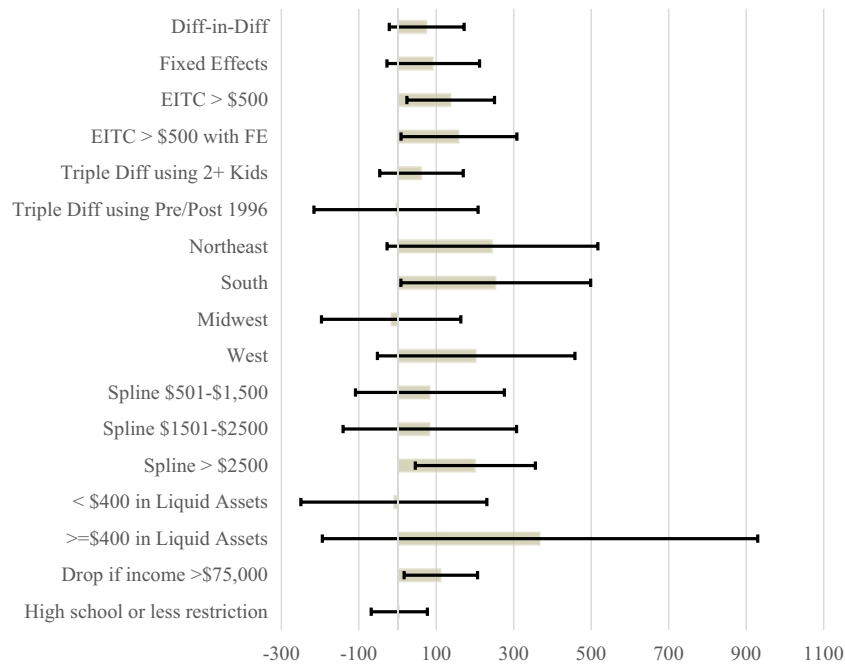
FIGURE 5 All automobile spending results by model. The Diff-in-Diff results use the simple difference-in-differences model from Equation (1). The results show the coefficient on the interaction of Earned Income Tax Credit (EITC) receipt with the months EITC benefits are typically received (February–April). The Fixed Effects results add a household fixed effect to the Diff-in-Diff results. The EITC > $500 model restricts the definition of EITC receipt to those were expected to receive at least $500 in EITC benefits. The Triple Diff using 2 + Kids adds a third interaction term to identify the causal impact of EITC receipt, whether the household had two or more children. This triple diff model is estimated off the extra benefits received by those with two or more children. The Trip Diff using Pre/Post 1996 adds an alternative third interaction term, using the increase in the generosity of the EITC benefits in 1996. The region results (Northeast, South, Midwest, and West) present the coefficients by region of the United States, looking for differences in spending that may be generated by differences in weather. The spline results examine differences in spending by the amount of EITC benefits expected to be received. Lastly, the <$400 in Liquid Assets examines differences by the amount of money the household has in checking and savings accounts. Corresponding coefficient estimates are reported in Appendix Tables. *Source*: Author's calculations using Consumer Expenditure Survey, 1986–2012

conclusions, they are not evidence against them. The less precise estimates of these models may be due to the staggered expansion of the EITC benefits beginning in 1993, where there were increases each year up to 1996 (Figure 1). In addition, the expansion from 1993 to 1996 was directed primarily only at households with two or more children, and our models are based on the entire EITC population post 1996. Consistent with our primary findings, we also generally see less negative coefficients for outcomes that are impacted by higher levels of EITC benefits, for example, for transportation as compared to food. In addition, our identification strategy relies on the timing of EITC receipt in February through April. The timing of tax refunds is more dispersed prior to 1996 (Figure 2), potentially impacting our ability to detect an effect based on the pre- and post-1996 comparison in these models.

4.1 | Child Tax Credit

Lastly, we provide preliminary evidence on the effect of the Child Tax Credit on spending. Introduced for tax year 1997, the Child Tax Credit allows a credit for each qualifying child. TAXSIM estimates the Child Tax Credit for each household. We include the Child Tax Credit in an analogous manner as the EITC in Equation (1). Food spending increases by $32, and the increase is statistically significant (Figure 9). No other expenditure categories exhibit a statistically significant increase in spending related to the Child Tax Credit. Further research can expand on our findings by exploiting the various changes in the credit schedule.
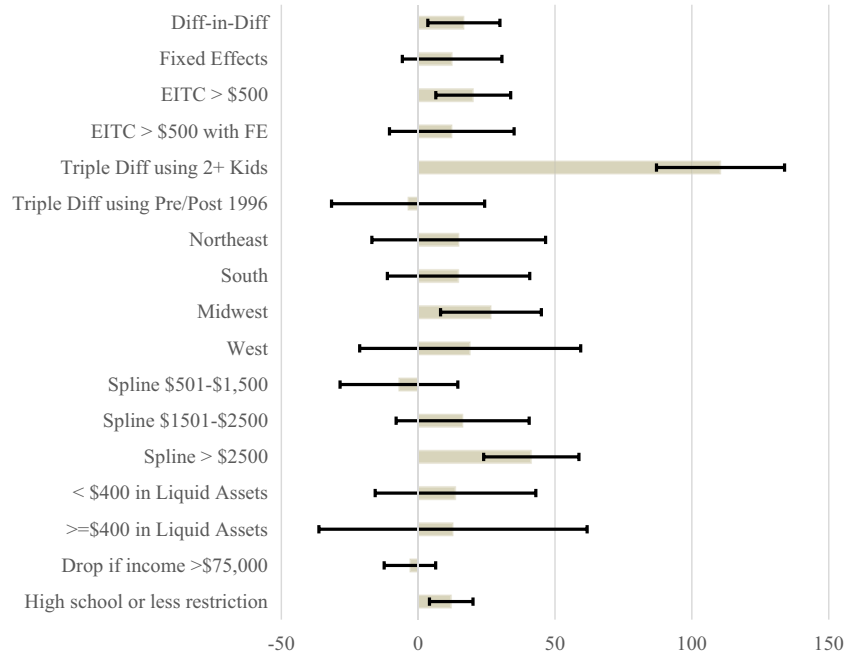
FIGURE 6 Apparel results by model. The Diff-in-Diff results use the simple difference-in-differences model from Equation (1). The results show the coefficient on the interaction of Earned Income Tax Credit (EITC) receipt with the months EITC benefits are typically received (February–April). The Fixed Effects results add a household fixed effect to the Diff-in-Diff results. The EITC > $500 model restricts the definition of EITC receipt to those were expected to receive at least $500 in EITC benefits. The Triple Diff using 2+ Kids adds a third interaction term to identify the causal impact of EITC receipt, whether the household had two or more children. This triple diff model is estimated off the extra benefits received by those with two or more children. The Trip Diff using Pre/Post 1996 adds an alternative third interaction term, using the increase in the generosity of the EITC benefits in 1996. The region results (Northeast, South, Midwest, and West) present the coefficients by region of the United States, looking for differences in spending that may be generated by differences in weather. The spline results examine differences in spending by the amount of EITC benefits expected to be received. Lastly, the <$400 in Liquid Assets examines differences by the amount of money the household has in checking and savings accounts. Corresponding coefficient estimates are reported in Appendix Tables. *Source*: Author's calculations using Consumer Expenditure Survey, 1986–2012

5 | DISCUSSION

Using detailed categories of consumption and calculation of exact levels of EITC benefits that households qualified for, we provide new detail and insights into responses to EITC refunds. Our strongest findings that are supported by multiple model specifications are that there is increased spending on food, non-durables, automobiles, home maintenance, home furnishings, apparel for ages 18 and older, and less spending for apparel for ages 2–17. We find that those with lower EITC benefits spend on non-durables and in particular food, suggesting that the EITC acts as a supplement to SNAP. Those with higher EITC benefits spend on durables, particularly automobiles. There are, however, differences in spending depending on the amount of liquid assets, with much of the spending in these categories among households with at least $400 in liquid assets.

Our findings are consistent with prior work showing increased spending overall on durable goods (Barrow & McGranahan, 2000). Our findings are also consistent with more specific categories of durable goods consumption investigated in prior work which showed increased spending on vehicles and transportation (Goodman-Bacon & McGranahan, 2008). In building on their findings, our results show that this spending was greater among individuals with larger levels of EITC receipt and among those EITC recipients who had more than $400 in liquid assets, although this is not unequivocal as there are large confidence intervals on the liquid asset estimates. Our findings are also generally consistent with the health promoting effects of the impact of increased income on reducing food insecurity (Weaver & Fasel, 2018), funds for home repairs to improve housing conditions (Swope & Hernández, 2019), and the increase access to health promoting resources through functional transportation, which is of particular importance in rural areas (Wolfe et al., 2020).
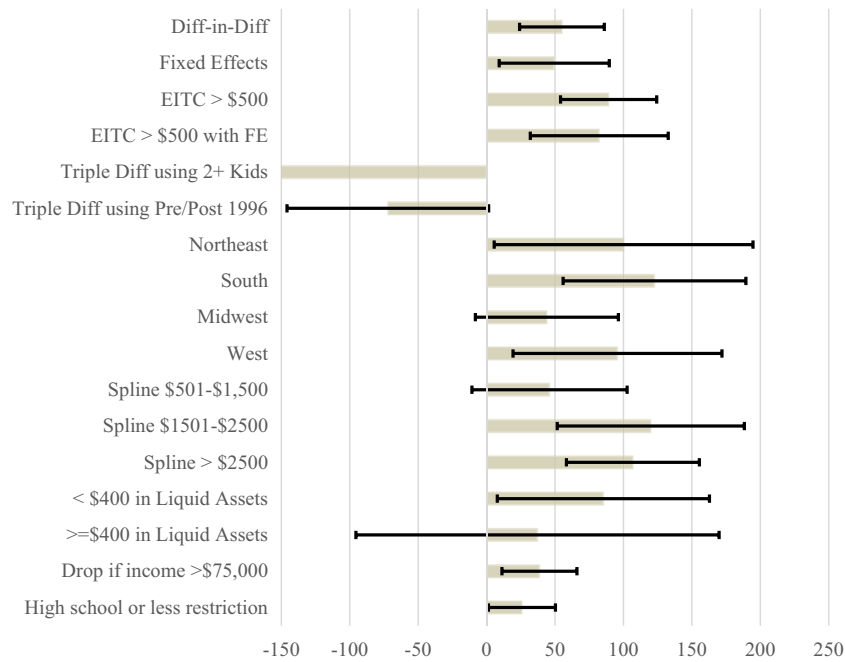
FIGURE 7 Housing results by model. The Diff-in-Diff results use the simple difference-in-differences model from Equation (1). The results show the coefficient on the interaction of Earned Income Tax Credit (EITC) receipt with the months EITC benefits are typically received (February–April). The Fixed Effects results add a household fixed effect to the Diff-in-Diff results. The EITC > $500 model restricts the definition of EITC receipt to those were expected to receive at least $500 in EITC benefits. The Triple Diff using 2+ Kids adds a third interaction term to identify the causal impact of EITC receipt, whether the household had two or more children. This triple diff model is estimated off the extra benefits received by those with two or more children. The Trip Diff using Pre/Post 1996 adds an alternative third interaction term, using the increase in the generosity of the EITC benefits in 1996. The region results (Northeast, South, Midwest, and West) present the coefficients by region of the United States, looking for differences in spending that may be generated by differences in weather. The spline results examine differences in spending by the amount of EITC benefits expected to be received. Lastly, the <$400 in Liquid Assets examines differences by the amount of money the household has in checking and savings accounts. Corresponding coefficient estimates are reported in Appendix Tables. *Source*: Author's calculations using Consumer Expenditure Survey, 1986–2012

Our work can also be compared to results from a qualitative analysis of 115 low-income EITC recipients in the Boston area, where four themes emerged: "relief from financial stress, enhanced consumption, the possibility of upward mobility, and an overarching theme of social inclusion" (Sykes et al., 2015). The closest comparison to this population is our threshold of more than $1000 of EITC qualifiers, as this avoids inclusion of higher income earners that may have received a small amount of EITC credit. An important aspect of this qualitative work on EITC recipient spending was in spending on children, for the "Small splurges for a Dora the Explorer bedspread or a Bob the Builder lamp added considerably to their feelings of adequacy as parents" (Sykes et al., 2015). Our quantitative analysis did not confirm this, showing no difference in spending on children's clothing, but did confirm findings on increases in spending on furnishings. Another finding from the qualitative work was finding "modest spending on treats can also stand as a symbol that one is not living totally on the edge" (Sykes et al., 2015). We show consumption patterns that are based not only on what would be considered needs, but consistent with this prior finding, patterns that fulfill social meeting and inclusion (Sykes et al., 2015). For example, spending on "wants" such as going out to eat and clothing.

Our findings on alcohol and tobacco show no changes in spending during the EITC disbursement months, which runs counter to other work showing increases in alcohol and drug use associated with a "check effect" (Catalano et al., 2000). A potential explanation for these differences is that prior work has been primarily among males without dependents, and spending patterns may differ substantially among EITC recipients, which are more typically female headed households with dependents. An alternative explanation is that individuals spend money differently depending on the form it is received, and paychecks may be spent in different ways than money that is seen as part of the federal and state tax system. In addition, the greater amounts of money from EITC as compared to a typical paycheck may result in different types of spending. Our findings here do not enable us to distinguish between these explanations.
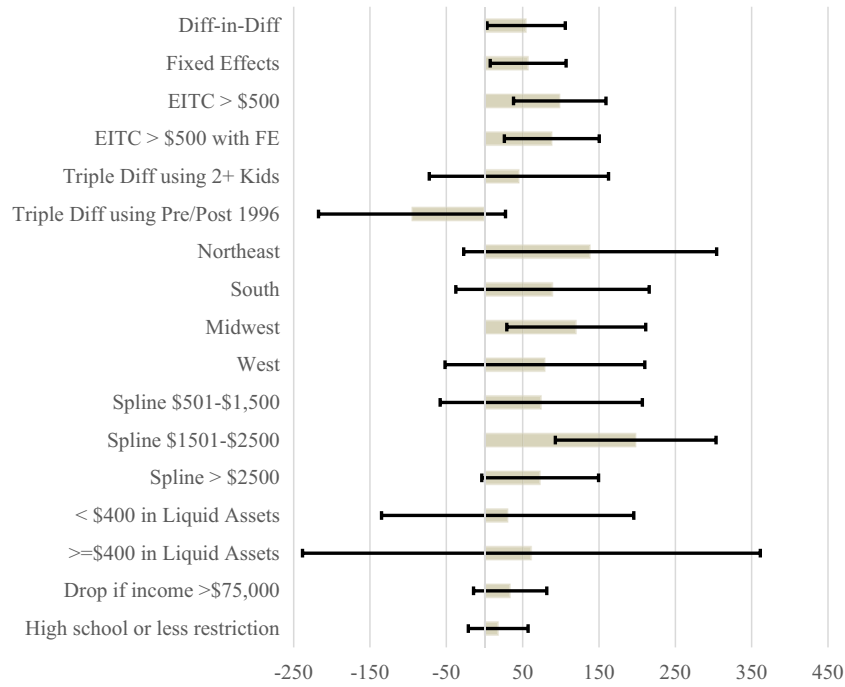
FIGURE 8 Non-durable spending by model. The Diff-in-Diff results use the simple difference-in-differences model from Equation (1). The results show the coefficient on the interaction of Earned Income Tax Credit (EITC) receipt with the months EITC benefits are typically received (February–April). The Fixed Effects results add a household fixed effect to the Diff-in-Diff results. The EITC > $500 model restricts the definition of EITC receipt to those were expected to receive at least $500 in EITC benefits. The Triple Diff using 2+ Kids adds a third interaction term to identify the causal impact of EITC receipt, whether the household had two or more children. This triple diff model is estimated off the extra benefits received by those with two or more children. The Trip Diff using Pre/Post 1996 adds an alternative third interaction term, using the increase in the generosity of the EITC benefits in 1996. The region results (Northeast, South, Midwest, and West) present the coefficients by region of the United States, looking for differences in spending that may be generated by differences in weather. The spline results examine differences in spending by the amount of EITC benefits expected to be received. Lastly, the <$400 in Liquid Assets examines differences by the amount of money the household has in checking and savings accounts. Corresponding coefficient estimates are reported in Appendix Tables. *Source*: Author's calculations using Consumer Expenditure Survey, 1986–2012

Some of our findings of decreased spending require additional work to fully understand. For example, there were consistent findings across our primary difference-in-differences models showing decreased spending on utilities and household operations and apparel for 2–17-year-olds. These apparel results may be explained by strong seasonal trends in spending associated with the school year that are not counteracted by additional spending with the EITC. In results not presented but available, we found the utility results driven by differences in utilities related to electricity and natural gas, not by water, telephone, or household operations, and it is homeowners that lower utilities expenditures, not renters. It could be that the low-income homeowners are more sensitive to the increased cost of winter utilities, while renters may in many cases not be directly responsible for their utilities.

There are several limitations to our data and approach that should be kept in mind. Most importantly, we are not able to estimate a causal relationship with EITC income receipt and consumption, and we interpret our multiple model specifications as a whole to assess the plausibility of an underlying relationship, rather than focusing on a single causal parameter estimate. The models least subject to endogeneity, the triple difference models and the education restriction, are the least well powered to show a statistically significant association, but provide additional support for our primary findings in terms of directions of association.

An additional limitation is that the EITC eligibility is measured with noise as we do not know the exact timing of when an individual received their refund, or whether they even applied for a refund. This has substantial advantages over a model specification where we do know the timing of the refund and whether an individual received it, as these differences are likely to be endogenous. That is, those who do file or file early are likely to be different with respect to their consumption. The primary implication is that due to this error we are most likely to have underestimated coefficients of consumption. Nevertheless, since uptake is currently around 80%, this is not likely to be a substantial
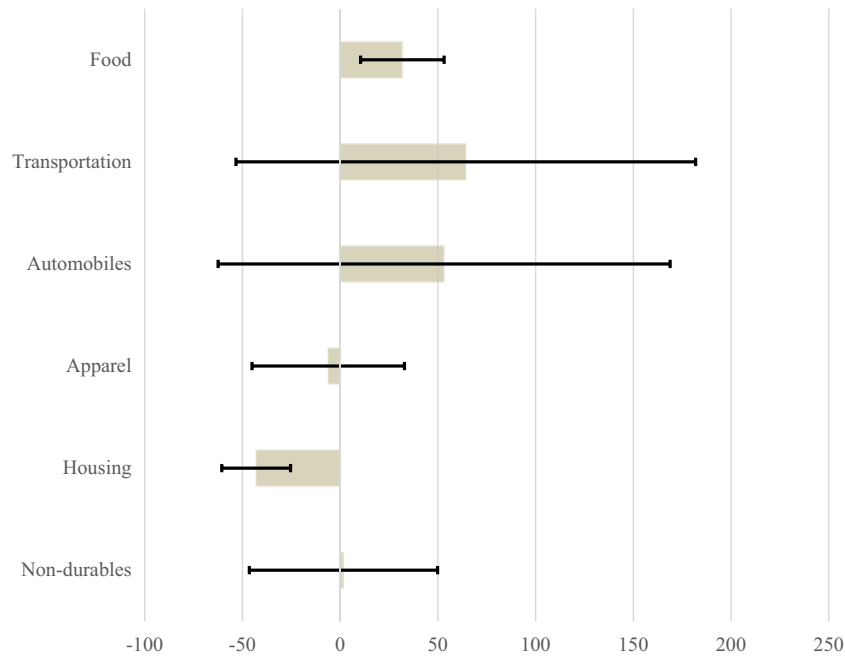
FIGURE 9 Child Tax Credit results using difference-in-difference model with fixed effects. The results use the simple difference-in-differences model from Equation (1) with a household fixed effect. The results show the coefficient on the interaction of CTC receipt with the months CTC benefits are typically received (February–April). *Source*: Author's calculations using Consumer Expenditure Survey, 1986–2012

underestimation. A further limitation is that because non-EITC recipients also receive other tax refunds, we are differencing against other refunds. The IRS reports that approximately one-third of filers receive a refund, and that the average refund is $3120, although this figure includes individuals receiving an EITC refund. The average amount of refund is fairly consistent across tax brackets. We would expect, then, given the empirical data on credit constraints, as well as the fact that relatively speaking the EITC is a much larger refund as compared to earnings for higher income households, refunds for higher income households would be less likely to be spent immediately on consumption.

We noted earlier that our primary models could be explained by differential seasonal patterns of consumption by households that were and were not eligible for the EITC, for reasons other than EITC receipt. Two alternative model specifications support our primary inference. First, there are generally consistent patterns based on region, and climate related seasonality impacts on consumption are likely to differ by region. Secondly, we find consistent results in our triple difference models based on 2+ children. Finally, EITC recipients are not a homogenous category by income distribution, as there are folks who are not receiving EITC because they are either below or above the income qualification levels. Thus, any non-EITC related seasonality in consumption would have to be differential with respect to very low and moderate to high earning households together as compared to low to moderate earning households.

Finally, our findings have implications for the implementation of the EITC. First, those types of consumption are variable depending on the amount of assets that individuals have at the time of receiving the EITC. Spending may differ depending on how this may change over time. Secondly, that generosity of the EITC is likely to have important impacts on what types of spending occur. Future work should consider more closely aligning the generosity of EITC with the desired objectives of the program as they relate to the types of consumption induced.

DATA AVAILABILITY STATEMENT
The data that support the findings of this study are available on request from the corresponding author.

ENDNOTE

[1] The imputed earnings and tax credit data are only available through 2012.

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