Safety Net Substitution and Implications for Cash Transfers: Evidence from EITC and TANF*

Augustine Denteh
Tulane University

Elliott Isaac
Tulane University
IZA

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Abstract

The mid-1990's welfare reform introduced Maintenance of Effort (MOE) spending, requiring states to spend their own funds on their Temporary Assistance for Needy Families (TANF) programs to receive federal TANF block grant funding. One category of MOE spending includes refundable tax credits, effectively linking state Earned Income Tax Credits (EITCs) to TANF and introducing an explicit tradeoff for states: if a state increases state EITC spending, it can reduce spending in other MOE categories. We use administrative data and a simulated instrument approach to estimate the degree of substitution between state spending on TANF basic assistance and its state EITC and decompose this effect into extensive and intensive margin responses. We find that a $1 increase in state EITC spending causes a $0.75 decrease in state spending on TANF basic assistance, of which 65.0% is due to caseload reductions. Since 2001, our estimates suggest that state safety net substitution explains 65.8% of the decline in TANF basic assistance spending in states with refundable state EITCs.

Keywords: Safety net, Earned Income Tax Credit, Temporary Assistance for Needy Families, Maintenance of Effort

JEL: H75, H71, I38

*Augustine Denteh: Tulane University, New Orleans, LA, USA (adenteh@tulane.edu); Elliott Isaac: Tulane University, New Orleans, LA, USA (eisaac@tulane.edu). We are thankful to William Dodds for comments, to Peter Germanis for data access, and to Katey Greer and Emma Simons for excellent research assistance. This research was supported in part using high performance computing (HPC) resources and services provided by Technology Services at Tulane University, New Orleans, LA.

1 Introduction

The United States' "safety net" is comprised of multiple disconnected spending programs and tax benefits seeking to provide different means of support for low-income families. Many of these programs provide in-kind benefits, such as health insurance through Medicaid, or restricted financial support, such as benefits from the Supplemental Nutrition Assistance Program, that can only be used to purchase specific food items. The historical exceptions were the Aid to Families with Dependent Children (AFDC) program, which was often thought of as traditional cash welfare, and the Earned Income Tax Credit (EITC), which is a tax credit available to low-income families, both of which provide general monetary support.[1] Many states have subsequently implemented state EITCs where benefits are often explicitly linked via a fixed rate to the federal EITC an individual receives.

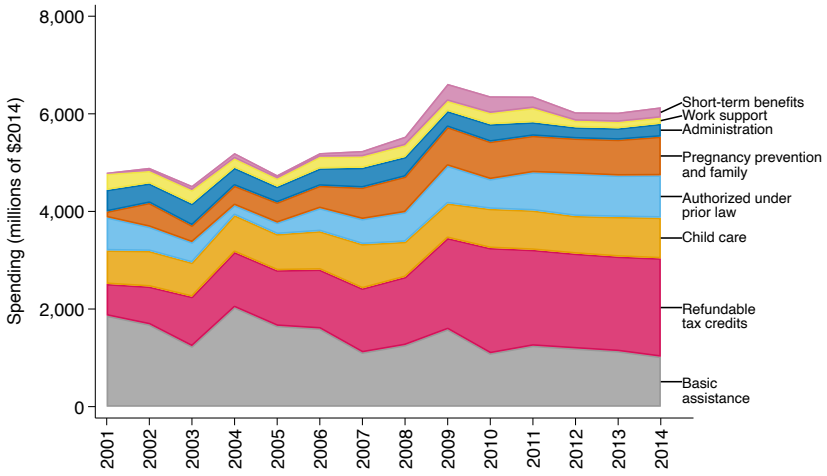
Both AFDC and the federal EITC faced dramatic transformations in the mid-1990s, when Congress greatly expanded the federal EITC and transitioned AFDC into Temporary Assistance for Needy Families (TANF), leading to increased spending on the federal EITC and (due to the explicit link between the two) state EITCs as well as decreased TANF spending and caseloads (Ziliak et al. 2000; Blank 2002; Grogger 2003). One meaningful change between AFDC and TANF was the introduction of required Maintenance of Effort (MOE) spending, which required states to devote their own budget funds toward various spending categories in order to receive federal TANF block grant funding. Notably, one category of MOE includes refundable tax credits, effectively linking state EITCs to TANF and introducing an explicit tradeoff for states: if a state increases state EITC spending then it can reduce spending in other MOE categories, including basic assistance which comprises the traditional cash welfare support from TANF.

The degree to which states substitute spending between state EITCs and TANF basic assistance has implications for the overall size of the safety net. If there is no substitution, then increased spending on a state EITC will increase the size of the safety net, whereas perfect one-to-one substitution will leave the size of the safety net unchanged. Figure 1 displays trends in MOE

1. Other programs, such as unemployment insurance or worker's compensation programs, also provide general monetary support, but only families experiencing specific situations are eligible.

spending in various categories over time for states with refundable state EITCs. Between 2001 and 2014, Figure 1 shows that the decrease in MOE spending on basic assistance was essentially replaced by MOE spending on refundable tax credits. Although the combined MOE spending on basic assistance and refundable tax credits increased by only $524 million, the spending on refundable tax credits alone increased by $1.37 billion. This pattern suggests that states with refundable state EITCs may, to at least some degree, substitute spending on basic assistance for spending on refundable tax credits.[2]

Figure 1: MOE Spending Over Time in States with Refundable State EITCs



Notes: The data come from state spending reports submitted to the Department of Health and Human Services as part of their TANF reporting requirements. The sample is a balanced panel covering 2001-2014 comprised of states that had a refundable state EITC program in place throughout the sample period, which is the sample we use for estimation below.

This type of substitution also has implications for the characteristics of recipients, and the effectiveness of safety net support. To the extent that TANF recipients are different than EITC recipients, substituting spending toward a state EITC will change the overall population of safety net recipients. Past researchers have also found that the EITC is somewhat protective for specific workers during economic downturns (but not for single parents with children) whereas TANF cyclicality is more mixed, meaning that shifting funds between a state EITC and TANF basic assistance can affect how well supported recipients are during recessions (Bitler, Hoynes, and Kuka

2. Another way of interpreting Figure 1 is that the fraction of states' combined spending on basic assistance and refundable tax credits that is due to refundable tax credits was roughly $\frac{1}{4}$ in 2001 and $\frac{2}{3}$ by 2014.

2017b; Bitler, Hoynes, and Iselin 2020; Jones and Ziliak 2022).

In this paper, we estimate the degree of substitution between state spending on TANF basic assistance and state spending on its state EITC program. In doing so, we make three significant contributions to the literature. First, prior research has estimated the tradeoffs in program receipt at the individual level, which may be due to changes in eligibility for particular programs, but little is known about whether or how states trade off funding for different safety net programs that may target different populations (Grogger 2003; Hoynes and Patel 2018; Parolin and Luigjes 2019; Bastian and Jones 2021). To the best of our knowledge, this is the first paper to estimate how states substitute spending across safety net programs administered via the tax system or via a spending program.

Second, prior research examining changes in TANF administration has generally focused on either the extensive margin only (i.e., caseloads) (Blank 2001) or a combination of the extensive margin and the intensive margin (i.e., benefit levels), such as spending per recipient (Hoynes and Schanzenbach 2018; Bitler, Hoynes, and Iselin 2020). We extend this work by presenting a simple model that decomposes the change in TANF spending into its extensive and intensive margin components. The proposed model motivates two regression specifications that allow us to separately identify and estimate the extensive and intensive margin effects of state EITC spending on state TANF spending.

Third, previous studies have examined various reasons for the decline in TANF cash assistance since welfare reform, including rising employment rates of single mothers, declining benefit levels, and stricter state participation requirements (Haskins 2016; Parolin 2021). We contribute to this strand of literature by introducing a new potential source of the decline in TANF cash assistance: states' substitution between TANF basic assistance and state EITC spending.

We use administrative and survey data from several sources to construct a balanced panel of states from 2001-2014 that had a refundable state EITC during the entire sample period. Our annual measures of MOE spending, which is our main dependent variable, and TANF caseloads come from state spending reports submitted to the Department of Health and Human Services

as part of their TANF reporting requirements. We link these data to state unemployment rates, state poverty rates, and the TANF guarantee for a family of three obtained from the University of Kentucky Center for Poverty Research (**ukcpr_2023**). Finally, we use the American Community Survey (ACS) and the NBER TAXSIM simulator to calculate the aggregate amount of state EITC payments in each year, which is our main independent variable.

State EITC spending may be endogenous due to individual responses to labor supply incentives from the EITC documented in the literature (Eissa and Liebman 1996; Meyer and Rosenbaum 2001; Eissa and Hoynes 2004; Moulton, Graddy-Reed, and Lanahan 2016; Bastian 2020). For example, if the federal EITC increases labor force participation, then state EITC spending may increase due to changes in labor supply even if policy parameters remain unchanged. In addition, because the federal EITC is more generous for families with more children, general trends in fertility will also influence changes in total state EITC payments. If changes in labor supply or fertility are also correlated with TANF receipt, then estimates of the effect of state EITC spending on MOE spending would be biased. To overcome this obstacle, we leverage the fact that many state EITC benefits are defined as a fixed percentage of the federal EITC a taxpayer claims. This implies that we can construct a simulated instrument based on changes in *federal* EITC benefits, holding population characteristics constant, which, in turn, affect how much state taxpayers receive from their state EITC. As described in further detail below, we again use the ACS and the NBER TAXSIM simulator to construct a measurement of the change in a state's total state EITC spending that is due only to changes in the federal EITC parameters from year $t-1$ to year t and use it as an instrument for the observed change in state EITC spending in year t.

Using the simulated mechanical change in a state's total state EITC spending as an instrument for the observed change addresses the concern that some of the change in a state's EITC spending is due to endogenous movement from TANF receipt to EITC receipt following changes in labor supply, as documented by Bastian and Jones (2021). Specifically, if increases in state EITC spending are only due to mechanical increases following federal EITC expansions then we would expect the first stage coefficient to be 1. On the other hand, if part of the change in state EITC spending is also

due to endogenous movement following labor supply changes, then we would expect the first stage coefficient to be greater than 1. Our results show that the first stage coefficients are greater than 1, reinforcing the endogeneity of state EITC spending. As such, using the simulated instrument allows us to identify state responses to plausibly exogenous increases in state EITC spending by isolating the mechanical change in state EITC spending due to federal EITC variation.

Our preliminary results suggest that a $1 increase in state EITC spending causes a $1.18 increase in total MOE spending. However, this total effect masks the meaningful substitution that we examine in this paper. We find that a $1 in state EITC spending decreases spending on TANF basic assistance by $0.75, suggesting that total MOE spending on state EITCs and TANF basic assistance will increase by only $0.25 for every $1 increase in state EITC spending due to states' safety net spending substitution. This estimate is in line with the raw data in Figure 1, which suggests an increase of $0.38 per $1.[3] In other words, our estimates suggest that state substitution between TANF basic assistance and its state EITC can explain $\frac{0.25}{0.38}$ =65.8% of the decline in basic assistance spending in states that have a refundable EITC. Decomposing our effects into extensive and intensive margin responses, we estimate that extensive margin responses account for 65.0% of the substitution we find while intensive margin responses account for 35.0%, which is consistent with Parolin (2021).

2 Conceptual Framework and Empirical Strategy

2.1 Conceptual Framework

Let total state spending on transfers via TANF basic assistance and the state EITC be given by $N = S_R + T$, where N is total spending, S_R is reported spending on the refundable portion of the state EITC, and T is total MOE basic assistance spending.[4] T can also be written as $T = Bc$ to differentiate the intensive and extensive margin, where B is the state's average MOE basic assistance spending per case and c is the number of TANF cases in the state. Because state EITCs

3. Figure 1 shows a $1.37 billion increase in MOE spending on refundable tax credits between 2001-2014 but only a $524 million increase in combined spending on basic assistance and refundable tax credits over the same period, suggesting an increase of $\frac{0.524}{1.37}$ =$0.38 per $1.

4. This simple framework abstracts away from other state cash or near-cash assistance and non-cash expenditures shown in Figure 1.

are often linked to the federal EITC, S_R can also be expressed as $S_R = \theta r F(z)$, where θ is the fraction of total spending on the state EITC program that is refundable, r is the state EITC rate, and $F(z)$ is the amount of federal EITC claimed by the state's taxpayers as a function of the federal EITC policy parameters, z.

We are interested in how total state spending on TANF and state EITC transfers change when federal EITC parameters change, which can be written as:

$$\frac{dN}{dz} = \underbrace{\frac{dS_R}{dz}}_{\substack{\text{Mechanical} \\ \text{response}}} + \underbrace{\frac{dB}{dz}c + \frac{dc}{dz}B}_{\substack{= \frac{dT}{dz} \\ \text{Behavioral} \\ \text{response}}} \tag{1}$$

The behavioral response is divided into an intensive margin response ($\frac{dB}{dz}c$) and an extensive margin response ($\frac{dc}{dz}B$). The intensive margin term of $\frac{dT}{dz}$ can be written as $\frac{dT}{dz}\big|_c = \frac{dB}{dz}c$ (since $\frac{dc}{dz} = 0$ in this case), while the extensive margin term can be written as $\frac{dT}{dz}\big|_B = \frac{dc}{dz}B$ (since $\frac{dB}{dz} = 0$ in this case).

2.2 Empirical Strategy

The above model suggests that we can estimate the intensive and extensive margin behavioral responses using the following first-difference regression:

$$\Delta\text{MOE Basic Assistance}_{st} = \alpha_1 \Delta\text{State EITC}_{st} + \alpha_2 \Delta \text{W}_{st} + \alpha_3 \Delta X_{st} + \Delta u_{st}, \tag{2}$$

where Δ indicates a change from year $t-1$ to t, MOE Basic Assistance is reported MOE spending on basic assistance in state s, State EITC is spending on the state EITC, and X is a vector of additional controls including the change in the state unemployment rate, the change in the state poverty rate, state-specific linear time trends, and year fixed effects.[5] The change in the state unemployment rate and the change in the state poverty rate control for the relationship between

5. The underlying unobserved effects panel data model in Equation 2 is given by

$$\text{MOE Basic Assistance}_{st} = \alpha_1 \text{State EITC}_{st} + \alpha_2 \text{W}_{st} + \alpha_3 X_{st} + S_i + u_{st},$$

where S_i is a state-specific (time-invariant) effect.

the business cycle and safety net spending, which Bitler, Hoynes, and Kuka (2017a) and Bitler, Hoynes, and Iselin (2020) study in more detail. State-specific linear time trends control for the general decrease in state MOE spending on basic assistance over time that is clear in Figure 1, so that the coefficient estimates do not reflect a spurious correlation between state EITC spending and MOE spending on basic assistance over time.

The vector W_{st} is either the TANF Guarantee (i.e., the maximum TANF benefit for a family of three in state s), which is our measure of B, or the TANF Caseloads (i.e., the total number of families receiving TANF in state s), which is our measure of c. We are interested in estimating the parameter α_1 which reflects either the extensive margin response or the intensive margin response, depending on the choice of W_{st}. On the one hand, based on our model and Equation 1, α_1 reflects the extensive margin behavioral response, $\frac{dT}{dS_R}\Big|_B = \frac{\frac{dT}{dz}\big|_B}{\frac{dS_R}{dz}} = \frac{\frac{dc}{dz}B}{dS_R}$, when W_{st} is set to the TANF Guarantee. On the other hand, α_1 reflects the intensive margin behavioral response, $\alpha_1 = \frac{dT}{dS_R}\Big|_c = \frac{\frac{dT}{dz}\big|_c}{\frac{dS_R}{dz}} = \frac{\frac{dB}{dz}c}{dS_R}$, when TANF Caseloads are included as W_{st}.

Estimating Equation 2 by pooled ordinary least squares (OLS) produces the first-difference (FD) estimator, which is unbiased under the strict exogeneity assumption, $E(u_{st}|\Gamma_{st}, S_i) = 0$, where Γ_{st} contains all time-varying variables in Equation 2 and S_i is the state-specific (time-invariant) effect. Millimet and Bellemare (2023) note that the FD estimator removes the most possible unobserved heterogeneity because its strict exogeneity assumption focuses only on two consecutive time periods. As such, if the endogeneity of state EITC spending is only due to its correlation with unobserved state characteristics, then the FD estimator suffices to obtain unbiased estimates of α_1.

However, state EITC spending may be endogenous due to individual responses to labor supply incentives from the EITC documented in the literature (Eissa and Liebman 1996; Meyer and Rosenbaum 2001; Eissa and Hoynes 2004; Moulton, Graddy-Reed, and Lanahan 2016; Bastian 2020). For example, if the federal EITC increases labor force participation, then state EITC spending may increase due to changes in labor supply even if policy parameters remain unchanged. In addition, because the federal EITC is more generous for families with more children, general trends in fertility will also influence changes in total state EITC payments. If changes in labor

supply or fertility are also correlated with TANF receipt, then the FD estimates of α_1 would be biased.

As such, we pursue instrumental variables estimation to produce credible estimates of our first-difference regression model. The definition of S_R implies that we can construct a simulated instrument reflecting changes in *federal* EITC benefits, holding population characteristics constant, which, in turn, affect how much state taxpayers receive from their state EITC. Our simulated instrument is the mechanical change in state EITC spending that is due only to changes in the federal EITC parameters or the state EITC rate from year $t-1$ to year t, which is constructed as follows.

First, we define tax units in the ACS and use the NBER TAXSIM simulator to calculate each tax unit's federal EITC amount in calendar year $t-1$ using the population observed in year $t-1$. We then recalculate this value for year t using the same population and inputs, which simulates what the tax unit would be expected to receive in federal EITC in the next calendar year (year t) holding characteristics and labor supply constant. Second, we calculate each state's total state EITC spending in years $t-1$ and t, defined as the federal EITC amount computed above multiplied by the state's EITC rates, r_{t-1} and r_t, respectively. Finally, we collapse the ACS into state-year cells and calculate the aggregate value of the mechanical change in state EITC payments in each calendar year as Mechanical ΔState EITC$_{st} = r_t \cdot$ Fed EITC$_{st}^{t-1} - r_{t-1} \cdot$ Fed EITC$_{st-1}^{t-1}$, where Fed EITC$_{sy}^{x}$ is the total federal EITC claimed in year y using the population observed in year x. Because we use the tax units observed in year $t-1$ as inputs in calculating the federal EITC amounts in both calendar years $t-1$ and t and construct the state EITC amount by multiplying the federal EITC amount by the state rate, any difference in this measure of the mechanical change in total state EITC payments between years is due to only changes in either federal EITC parameters, state EITC rates, or both. In other words, our simulated instrument leverages the fact that federal EITCs are explicitly linked through the state EITC rate, to isolate changes in a state's total state EITC payments that are caused by changes in federal EITC parameters.

Using the simulated instrument, the first-stage regression takes the following form:

$$\Delta\text{State EITC}_{st} = \rho_1 \text{Mechanical } \Delta\text{State EITC}_{st} + \rho_2 \Delta W_{st} + \Delta\rho_3 X_{st} + \Delta v_{st}, \tag{3}$$

where Mechanical ΔState EITC$_{st}$ is our simulated instrument, ΔW_{st} is the relevant additional control variable from Equation 2 depending on the specification (i.e., TANF Guarantee or TANF Caseload), and all other variables are as defined in Equation 2. The first-difference instrumental variables (FDIV) estimator of α_1 is then obtained from a second-stage regression that plugs in the fitted values from Equation 3, $\Delta\widehat{\text{State EITC}}_{st}$, into Equation 2.

The FDIV estimator consistently estimates α_1 under three standard identification assumptions. First, the instrument must be uncorrelated with the error term in Equation 2. This is the so-called exclusion restriction and implies that our simulated instrument should only influence state MOE Basic Assistance through its effect on state EITC spending. Our simulated instrument plausibly satisfies the exclusion restriction because changes in federal EITC parameters arguably should not directly influence states' MOE basic assistance spending. Second, the instrument must be independent or exogenous to state decision-making. This assumption is likely satisfied by construction because our simulated instrument is the mechanical change in state EITC spending resulting from the link between state and federal EITC amounts. One potential source of violation is when states change their EITC rates in response to changes in federal EITC parameters. However, we believe this concern is minimal because state EITC rates change infrequently over our sample period and are not likely to change contemporaneously with federal EITC policy parameters. Finally, the instrument must be strongly correlated with the endogenous variable. While the first two assumptions are untestable, we show that our simulated instrument strongly predicts the observed change in state EITC expenditures.

As such, using the simulated mechanical change in a state's total state EITC spending as an instrument for the observed change addresses the concern that some of the change in a state's EITC spending is due to endogenous movement from TANF receipt to EITC receipt following changes in labor supply, as documented by Bastian and Jones (2021). Specifically, if increases in state EITC

spending are only due to mechanical increases following federal EITC expansions then we would expect the first stage coefficient to be 1. On the other hand, if part of the change in state EITC spending is also due to endogenous movement following labor supply changes, then we would expect the first stage coefficient to be greater than 1. Table 2 shows that our first stage coefficients are greater than 1 and statistically significant. The first stage result suggests that the simulated instrument isolates the change in state EITC spending that is due to mechanical increases and allows for identification of state responses to plausibly exogenous increases in state EITC spending due to federal EITC variation.

3 Data

We use data from several sources to construct a balanced panel of states from 2001-2014 that had a refundable state EITC during the entire sample period, resulting in 154 state-year pairs.[6] Limiting the sample to states that always had a refundable state EITC during this period allows us to more cleanly identify any potential substitution by avoiding the possibility that unobservable characteristics cause states to both implement a new state EITC during this period and reduce TANF spending.[7]

Our yearly measure of MOE spending, which is our main dependent variable, and TANF caseloads come from state spending reports submitted to the Department of Health and Human Services as part of their TANF reporting requirements. We link these data to state unemployment rates, state poverty rates, and the TANF guarantee for a family of three from the University of Kentucky Center for Poverty Research (**ukcpr_2023**).

Our main (endogenous) independent variable is the observed change in state EITC spending, which is constructed as follows. We first define tax units in the ACS and use the NBER TAXSIM

6. We begin our analysis in 2000 due to some minor data irregularities in the TANF data in earlier years. We lose observations from the year 2000 because we estimate first-difference regressions, resulting in a balanced panel beginning in 2001.

7. In alternative specifications we expand the sample to an unbalanced panel of states that has a refundable state EITC at any point between 2001 and 2014 to explore the robustness of our results and find qualitatively similar results. In addition, since we are interested in the degree of substitution between state MOE spending on basic assistance and state EITC payments, we exclude states that do not have any state EITC, states that only had non-refundable state EITCs (i.e., Delaware, Maine, Ohio, and Virginia), and states with refundable EITCs that were not linked to the federal EITC (i.e., Minnesota). Importantly, our key independent variable (state EITC spending) and our simulated instrument are either not defined for these states or their state EITC spending would not count as MOE spending on refundable tax credits under TANF.

simulator to calculate each tax unit's state EITC amount in calendar year t (reflecting returns filed for tax year $t-1$). We then collapse the ACS into state-year cells to obtain the aggregate amount of state EITC payments in each year and compute ΔState EITC$_{st}$ = State EITC$_{st}$ − State EITC$_{st-1}$ using the aggregate values. As described in detail above, our simulated instrument is the mechanical change in state EITC spending that is due only to changes in the federal EITC parameters or the state EITC rate from year $t-1$ to year t.

Table 1 displays summary statistics of our primary sample in column 1 and equivalent statistics for an unbalanced panel in column 2 for comparison. In our balanced panel, on average, there is a yearly increase in total MOE spending around $9.6 million, but this includes an average yearly decrease of $18.3 million in MOE spending on basic assistance and an almost offsetting average yearly increase of $19.1 million in MOE spending on refundable tax credits, driven in part by an average yearly increase of $12.3 million in spending on state EITCs. This pattern is also apparent in column 2, which expands the sample to include state that implemented a state EITC during the sample period. These patterns from our raw data are suggestive of a causal substitution response that we investigate in this paper.

4 Results

We first present estimates of our baseline first-difference IV model in Equation 2 for total MOE spending, MOE spending on refundable tax credits, and MOE spending on basic assistance without differentiating between extensive and intensive margin effects. These estimates reveal the unconditional magnitude of state safety net spending substitution. We then separately estimate and identify the extensive and intensive margin responses for MOE spending on basic assistance. Finally, we explore the robustness of our estimates.

4.1 Main Results

Table 2 displays preliminary estimates of the total effect of a $1 increase in state EITC spending on various MOE categories. Columns 1-3 present total effects that do not condition on TANF caseloads

Table 1: Summary Statistics

	Balanced panel	Unbalanced panel
Panel A: Dependent variables		
Δ Total MOE spending (millions)	9.60	5.40
	(186.65)	(162.27)
Δ Spending on basic assistance (millions)	-18.30	-16.37
	(163.69)	(142.40)
Δ Spending on refundable tax credits (millions)	19.06	15.21
	(77.27)	(70.48)
Panel B: Independent variables		
Δ EITC spending (millions)	12.33	10.65
	(25.16)	(30.54)
Unemployment rate	6.41	6.69
	(1.79)	(2.07)
Poverty level	12.13	12.78
	(2.53)	(2.98)
Monthly TANF guarantee for family of 3	628.54	563.75
	(144.33)	(174.47)
Number of TANF families per state	70,943.89	59,002.21
	(65,429.76)	(60,372.28)
Panel C: Instrumental variable		
Mechanical Δ EITC spending (millions)	18.93	15.97
	(25.66)	(31.81)
Observations	154	233

Notes: Statistics reported are means with standard deviations in parentheses. The sample in column 1 is a balanced panel covering 2001-2014 comprised of states that had a refundable state EITC program in place throughout the sample period. Column 2 expands the sample to an unbalanced panel that includes state-year observations for states that introduced a state EITC between 2001-2014. All statistics are weighted by state population.

or the TANF guarantee, and therefore do not separate the extensive and intensive margins, while columns 4-5 present preliminary estimates of Equation 2 based on our conceptual framework.

Table 2 shows that we obtain a strong first stage coefficient that is greater than 1, indicating that some of the variation in a state's observed changed in state EITC spending is due to endogenous individual movement from TANF receipt to EITC receipt. Column 1 shows that a $1 increase in state EITC spending causes a $1.18 increase in total MOE spending. However, columns 2-5 show that this total effect masks the meaningful substitution that we examine in this paper.

Table 2: Effect of State EITC Spending on MOE Spending

			MOE spending on basic assistance		
	Total MOE spending (1)	MOE spending on refundable tax credits (2)	Unconditional (3)	Extensive margin (4)	Intensive margin (5)
Δ State EITC spending	1.18***	1.76***	-0.75***	-1.34***	-0.72***
	(0.0005)	(0.0001)	(0.0005)	(0.0004)	(0.0006)
Δ Yearly TANF guarantee for family of 3				307,804.35***	
				(30.54)	
Δ TANF caseloads					4,131.58***
					(1.26)
Δ Unemployment rate	-382,489.67***	-155,634.05***	-78,313.09***	21,027.75***	-50,268.87***
	(166.79)	(73.68)	(108.47)	(109.65)	(101.85)
Δ Poverty rate	85,398.98***	117,209.67***	-7,146.28***	-9,522.02***	5,264.72***
	(54.29)	(20.50)	(49.30)	(38.85)	(48.98)
State linear time trends	✓	✓	✓	✓	✓
1^{st} stage coefficient	1.08***	1.08***	1.08***	1.08***	1.08***
	(0.00004)	(0.00004)	(0.00004)	(0.00004)	(0.00004)
Observations	154	154	154	154	154

Notes: *, **, and *** indicate statistical significance at the 10%, 5%, and 1% level, respectively. Robust standard errors are in parentheses. The sample is a balanced panel covering 2001-2014 comprised of states that had a refundable state EITC program in place throughout the sample period. All specifications are weighted by state population and include year fixed effects.

First, as a validation check, we find that a $1 increase in state EITC spending increases MOE spending on refundable tax credits by $1.76, which confirms the link between state EITCs and MOE spending on refundable tax credits that we describe above. This coefficient may be greater

than 1 if states have additional refundable tax credits that would count in this category and that are correlated with state EITC receipt. Column 3 displays the safety net substitution that we examine in this paper. We find that a $1 increase in state EITC spending decreases spending on TANF basic assistance by $0.75, suggesting that the combined MOE spending on state EITCs and TANF basic assistance will increase by only $0.25 for every $1 increase in state EITC spending due to states' safety net spending substitution. This estimate is in line with the raw data in Figure 1, which shows a $1.37 billion increase in MOE spending on refundable tax credits between 2001-2014 but only a $524 million increase in combined spending on basic assistance and refundable tax credits over the same period, suggesting an increase of $\frac{0.524}{1.37}$ =$0.38 per $1. In other words, our estimates suggest that states substituting spending across safety net programs can explain $\frac{0.25}{0.38}$ =65.8% of the decline in basic assistance spending in states that have a refundable EITC.

Columns 4-5 present preliminary estimates of Equation 2 that separate the effect of a $1 increase in state EITC spending on MOE spending on basic assistance into the extensive and intensive margins. Our current estimates show that a $1 increase in state EITC spending causes decreases in MOE spending on basic assistance of $1.34 along the extensive margin and $0.72 along the intensive margin. These estimates need not add up to the unconditional effect in column 3 because they come from separate regressions with alternative covariates, but they do suggest that extensive margin responses account for $\frac{1.34}{(1.34+0.72)}$ =65.0% of the the substitution suggested by column 3 while intensive margin responses account for 35.0%, which is consistent with Parolin (2021). The coefficients on the change in the TANF Guarantee and the change in TANF Caseloads are both positive, indicating that increases in benefit generosity or caseloads increase MOE spending on basic assistance, as expected. In column 4 our coefficient suggests that a $1 increase in the yearly TANF guarantee for a family of three increases MOE spending on basic assistance by $307,804, which is slightly smaller than the average total TANF caseloads in these states in a given year.[8] In column 5 our coefficient suggests that one additional TANF caseload increases MOE spending on basic assistance by $4,132 (approximately $344 per month), which is 54.8% of the average TANF

8. The average number of TANF families in a given year in our sample is 418,091. If all TANF families received the increased benefits then we would expect that a $1 in the yearly TANF guarantee for a family of three leads to an increase of $418,091 in MOE spending on basic assistance. In practice, this coefficient may be smaller than that value because some families may not receive a full $1 increase in benefits.

guarantee for a family of three in Table 1.[9]

Our results corroborate estimates from Grogger (2003), who finds that increases in the federal EITC cause decreases in AFDC use on the extensive margin, and Bastian and Jones (2021), who find that increases in the federal EITC cause both extensive and intensive decreases in AFDC/TANF benefits received. Bastian and Jones (2021) also find that their estimate is smaller in the pre-welfare reform years, suggesting that TANF's linking of state EITCs to MOE spending may have accelerated the reduction in spending on basic assistance.[10] However, we build upon their work in two key ways. First, Grogger (2003) and Bastian and Jones (2021) use self-reported AFDC/TANF benefits, which has become increasingly under-reported in survey data, suggesting that their estimates may be considered a lower bound (Meyer, Mok, and Sullivan 2015b, 2015a). In contrast, we use state administrative data on aggregate spending, which we argue is a better measure when considering the effects on state budgets that we focus on in this paper. Second, the self-reported AFDC/TANF benefits measure that Bastian and Jones (2021) use includes benefits paid by federal funds and state funds, which cannot as clearly illuminate how state spending may shift across programs. We leverage the link between the federal EITC and state EITCs and the link between state EITCs and MOE spending to identify safety net substitution across state EITCs and MOE spending on basic assistance.

4.2 Robustness

We perform two additional analyses to demonstrate the robustness of our findings. First, we expand our baseline sample to include states that introduced a refundable state EITC at any point during our sample period. Up to this point, we have limited our analysis to states that have a refundable state EITC throughout our entire sample period to avoid conflating safety net substitution with potential changes in TANF spending due to unobserved factors correlated with a state's introduction of a refundable state EITC. Panel A of Table 3 presents the results of this exercise. Column 1 shows

9. If all TANF families received the average monthly guarantee of $629 reported in Table 1 then we would expect that one additional TANF caseload increases MOE spending on basic assistance by $629×12=$7,548. In practice, this coefficient may be smaller than that value because some families receive fewer benefits.

10. Bastian and Jones (2021) estimate that a $1 increase in the maximum federal EITC decreases AFDC/TANF receipt by $0.259 using their full sample from 1990-2017, but estimate a smaller effect of $0.221 when limiting their sample to 1990-1997 (before welfare reform).

that a $1 increase in state EITC spending decreases TANF basic assistance spending by $0.72 along the extensive margin and $0.65 on the intensive margin. The results are qualitatively similar to our main findings but smaller in magnitude, especially on the extensive margin, and imply that 52.6% of the the substitution suggested by Table 2, column 3 is due to the extensive margin (instead of 65.0% in our main specification).

Table 3: Alternative Specifications and Samples

Panel A: Expanding to an Unbalanced Panel		
	MOE spending on basic assistance	
	Extensive margin (1)	Intensive margin (2)
Δ State EITC spending	-0.72***	-0.65***
	(0.0002)	(0.0002)
State linear time trends	✓	✓
1^{st} stage coefficient	1.00***	1.00***
	(0.00002)	(0.00002)
Observations	233	233
Panel B: Using Additional State EITC Policy Variation		
	MOE spending on basic assistance	
	Extensive margin (1)	Intensive margin (2)
Δ State EITC spending	-1.28***	-0.82***
	(0.0003)	(0.0004)
State linear time trends	✓	✓
1^{st} stage coefficient	1.14***	1.15***
	(0.00003)	(0.00002)
Observations	154	154

Notes: *, **, and *** indicate statistical significance at the 10%, 5%, and 1% level, respectively. Robust standard errors are in parentheses. Panel A expands the sample to include states that implemented a refundable state EITC program during the sample period and adds those years in which the state EITC program was active. Panel B uses an alternative simulated instrument that leverages any state EITC policy change for identification instead of using only federal EITC policy changes and the state EITC rate. All specifications are weighted by state population and control for the change in the state unemployment rate, the change in the state poverty rate, state-specific linear time trends, and year fixed effects. Column 2 conditions on the change in the yearly TANF guarantee for a family of 3, whereas column 3 conditions on the change in TANF caseloads.

In our second exercise, we construct an alternative simulated instrument using any federal or

state EITC policy changes instead of the variation induced by only federal EITC policy changes. Panel B displays the results using the alternative instrument and our baseline sample of states that always had a refundable EITC throughout our sample period. The alternative instrument is also strongly correlated with observed changes in state EITC, with a statistically significant first stage coefficient estimate of $1.14. The second stage estimates suggest that a $1 increase in state EITC decreases spending on TANF basic assistance by $1.28 and $0.82 along the extensive and intensive margins, respectively, implying that 61.0% of the the substitution suggested by Table 2, column 3 is due to the extensive margin (instead of 65.0% in our main specification). Overall, our main findings on the safety net substitution between MOE TANF basic assistance and state EITC spending are robust to alternative sample construction and econometric specifications.

5 Conclusion

Welfare reform in the mid 1990s dramatically altered the United States' safety net, placing greater emphasis on the EITC and weakening TANF, leading to increased spending on the federal and state EITCs and decreased TANF spending and caseloads (Ziliak et al. 2000; Blank 2002; Grogger 2003). One meaningful change between AFDC and TANF was the introduction of required MOE spending, which required states to devote their own budget funds toward various spending categories in order to receive federal TANF block grant funding. Noteably, one category of MOE includes refundable tax credits, effectively linking state EITCs to TANF and introducing an explicit tradeoff for states: if a state increases state EITC spending then it can reduce spending in other MOE categories, including basic assistance which comprises the traditional cash welfare support from TANF.

In this paper, we use administrative data and a simulated instrument approach to estimate the degree of substitution between state spending on TANF basic assistance and its state EITC and decompose this effect into extensive and intensive margin responses. In doing so, we introduce a new potential source of the decline in TANF cash assistance: states' substitution between TANF basic assistance and state EITC spending. To the best of our knowledge, this is the first paper to estimate how states substitute spending across safety net programs administered via the tax system

or via a spending program.

We estimate that a $1 increase in state EITC spending causes a $0.75 decrease in state spending on TANF basic assistance, of which 65.0% is due to caseload reductions, corroborating estimates from Grogger (2003) and Bastian and Jones (2021). Our results are robust to expanding our sample to an unbalanced panel of states and to leveraging additional state-level policy variation for identification. Our estimates suggest that state safety net substitution can explain 65.8% of the decline in TANF basic assistance spending since 2001 in states that have refundable state EITCs.

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