Working for Your Bread: The Labor Supply Effects of SNAP

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The Supplemental Nutrition Assistance Program (SNAP) is the only universal component of the US safety net. In 2019, the government spent over 60 billion dollars to provide nutrition benefits to more than 36 million Americans. Economic theory predicts that the structure of the eligibility and benefit formulas—which reduce benefits as earned income increases—will reduce labor supply (Hoynes and Schanzenbach, 2015). However, despite being the largest means-tested federal program, the literature relating SNAP to labor supply is extremely sparse (particularly in the modern era) and we have hardly any evidence about the intensive margin (Moffitt, 2004; Hoynes and Schanzenbach, 2012, 2015; East, 2018). SNAP program formulas are designed to reduce labor supply distortions with benefits that gradually fade out as earned income increases, but whether these intensive-margin distortions occur in practice is an empirical question that has important policy implications for the SNAP program and for work requirements in the safety net more broadly.

In this article, we assess how the modern program rules of SNAP influence labor supply decisions. We test whether a kink in the benefit reduction rate creates labor supply distortions along the intensive margin.

Why might nutrition programs distort labor supply along the intensive margin? One possibility is if recipients adjust their work hours in ways that place them on salient kink points of the benefit formula. In a progressive system, where tax rates on benefits are higher as income increases, neoclassical economics predicts that individuals will bunch at income levels right before tax rates on income increase and avoid places where there is a decline in tax rates. We may not expect sharp bunching though as workers may experience labor market frictions (Kostøl and Myhre, 2020) and likely have little say over the costs they face, such as housing expenses. Despite these frictions, theory suggests there should be excess mass below kinks. Moreover, there is qualitative evidence that SNAP recipients are aware of how earnings impact benefit levels.

> "Recently, I was offered a job for $2 more, and then, I had to account for the travel... [I]f I take this job with me spending basically as much money as I'm making, *my SNAP benefits are going to be lowered as well.* So it basically would've been me working backwards." [emphasis added] (Caspi et al., 2020)

Such labor distortions have yet to be studied in the literature mainly due to data limitations. Until now, researchers have largely used annual self-reported measures of income and labor supply, usually for relatively small samples of self-reported program recipients and often lacking information on earnings and disregard information needed to accurately measure the net monthly income used in determining SNAP benefit levels and eligibility if families are not adjunctively eligible (eligible due to participation in other programs such as TANF or SSI). To overcome these challenges, we use novel administrative SNAP data for two states that include detailed in-

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formation about monthly income and disregards needed to calculate eligibility.

We test for intensive margin labor supply distortions by exploring whether we observe an excess density (mass) of SNAP cases at a kink in program benefits using well-known bunching estimators utilized in other contexts (for a review see Kleven, 2016; Bertanha, McCallum and Seegert, 2019).

Our work contributes to the growing empirical public finance literature revitalized by Saez (2010) that explores the response of individuals to kinks and notches in the budget set by using administrative data. Much of this work has focused on taxes, and papers on means tested programs have focused on tax credits requiring work (see review by Kleven, 2016). Thus, while eligibility formulas for many means-tested safety net programs have a host of kinks and notches where people either lose eligibility for programs or benefit reduction rates increase, no work that we know of has found evidence of this systematic behavior for safety net programs.

Across both states, we find little evidence of labor supply distortions where benefits are initially taxed. The one exception is that we observe an excess mass for single-unit cases with self-employment income in Colorado. However, the magnitude of the bunching is small in relation to total state caseloads. Thus, we conclude that labor supply distortions from the increase in the benefit tax rate is not a first-order concern.

I. Benefit Formula

SNAP benefits are a function of net income, i.e., the gross income of an assistance unit less a complicated set of income disregards. A household's gross income includes all earnings from work, as well as some other sources such as disability payments and child support. Net income is then calculated by subtracting the following deductions: the standard deduction, earnings deduction of 20% of any earnings, as well as deductions for dependent care, child support, medical, and shelter costs. See Section A.A1 for details on the benefit formula. Note that if disregards surpass household income, net income will be negative.

Maximum benefit levels for a given case size are set by the US Department of Agriculture's Thrifty Food Plan, which updates each year. SNAP benefits are calculated as the maximum benefit level minus 30 percent of net income. The idea is that net income reflects the remaining cash that a family has in hand after accounting for all other necessary non-food expenditures. SNAP rules require recipients to be responsible for 30 percent of their food, hence the 30 percent tax rate on each dollar of net income.

The prevalence and the impact on net income of each disregard in our population vary dramatically across disregard types (see Table A1). Colorado included information on all types of deductions, while Oregon only included information on medical and shelter deductions. Fortunately for measuring net income in Oregon, outside of the standard and earned income deductions, shelter is the only other broadly used disregard. In Colorado, SNAP cases respectively use the child care, child support, and medical deduction 4, 2, and 5 percent of the time. On the other hand, 74 percent of cases in both Colorado and Oregon use a shelter deduction with an average value of roughly \$400.

We focus our analysis on SNAP recipients who are engaged in the labor market by focusing on cases with at least one dollar of earned income that do not include elderly or disabled recipients. Columns 2 and 4 of Table A1 show the same descriptive information for this earner sample. As expected, earners have more earned income, have less unearned income, are more likely to utilize the child care and shelter deductions, and receive more SNAP benefits.

Table A1 shows that the shelter deduction has a large impact on net income for a majority of SNAP cases. Figure 1 helps to visualize the impact that shelter deductions can have on net income for fictitious families of three with no unearned income and either \$0 or \$600 of shelter costs. The left panel traces out net income across earned income levels. The right panel plots SNAP benefits against earned income and high-

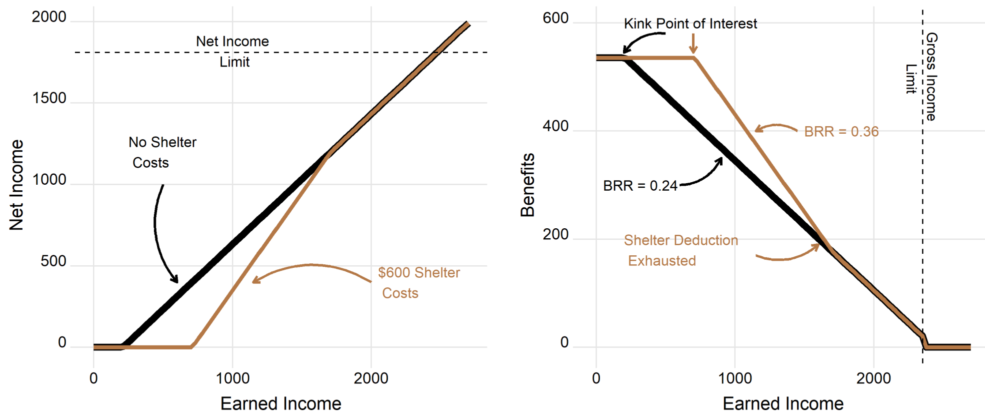

Figure 1. : Benefit Formula by Shelter Cost Amounts.

Note: The figure displays net income and benefits for a three-person family with either no shelter expenditures or $600 of shelter expenditures with no unearned income and no additional deductions. The leftmost panel plots earned income against net income and the rightmost panel plots benefit levels.

lights the kink point of interest.

There are two takeaways from this figure. First, shelter deductions allow for relatively large amounts of earned income while still maintaining maximum SNAP benefit levels. For example, the case with $600 in shelter costs is able to earn almost $800 per month and still receive full benefits. If most households only used the standard deduction, there would be very limited scope for adjusting labor supply to target the kink point. Second, there is a range of earned income for which the benefit reduction rate (BRR) is steeper for cases with shelter deductions than not. Due to the 20% earnings disregard, every dollar of earned income reduces benefits by 24 cents. However, for cases with shelter deductions, an additional dollar also increases net income by reducing the shelter deduction. As a result, the BRR for these cases is actually 36 cents for every dollar and, consequently, bunching may vary by shelter deduction usage.

II. Data

The key obstacle to documenting possible labor supply distortions induced by SNAP rules is having sufficiently detailed and accurate data to avoid measurement error (e.g., Haider and Loughran, 2008).

Studying SNAP is particularly challenging because income eligibility is often determined at the monthly level, which is not collected in most surveys and because other factors (e.g., dependent care and excess shelter cost disregards)—which are rarely measured and are likely subject to greater measurement error than income—impact eligibility. To overcome this obstacle, we utilize new administrative records containing every SNAP recipient for two states: Colorado from 2012-2013 and Oregon from 2008-2016. Importantly, for these states we observe gross and net income—after removing SNAP earnings disregards and other adjustments—allowing us to precisely place recipients along program formulas.

III. Bunching Estimator

We test for an excess mass of SNAP cases right below the zero net income kink point in the SNAP eligibility formula by augmenting the empirical model of Chetty et al. (2011). Specifically, we estimate

$$C_j = \sum_{i=0}^{7} \beta_i \cdot (Z_j)^i + \sum_{i=-200}^{200} \gamma_i \cdot 1\left[Z_j = i\right] + \epsilon_j$$

where C_j is the number of cases in net income bin j and Z_j is the net income bin for the SNAP unit in $50 intervals. We include dummy variables for each bin within $200 on either side of the kink point (this is where we anticipate the bunching to occur). This procedure approximates the shape of the counterfactual bunching region by interpolating the shape of the surrounding areas with a seventh-degree polynomial.[1] See Figure A1 for an example. The actual bunching amount is calculated by summing the $\hat{\gamma}_i$ terms. Similar to Chetty et al. (2011), we calculate standard errors with a parametric bootstrap procedure that: draws 5,000 samples of ϵ_j (from above) with replacement to create new count data, fits the model on the new counts, and estimates the bunching. We define our standard error as the standard deviation of this vector of bunching estimates.

IV. Results

In Figure 2 (a), we plot the density of gross income (earned plus unearned income) in \$50 bins by state. Gross and net income profiles differ substantially between states. In Oregon, there is a large mass of SNAP cases earning less than \$150 per month, roughly 683,000 cases. Conversely, the density for Colorado increases relatively smoothly with gross income. Panel (b) plots densities across net income bins. In the aggregate, neither state shows evidence of bunching at zero net income. The large mass of low earners is visible in the Oregon net income distribution, but does not center around the kink. Thus, while we estimate a statistically significant excess mass (see Table A2), we do not interpret this as bunching induced by the kink point.

SNAP units with fewer recipients, particularly single-person units, may have fewer labor market frictions and may exhibit different bunching behavior as a result. We explore this possible heterogeneity in the remaining panels (c and d), which display net income distributions by the number of people in the SNAP unit. In Colorado, there appears to be an excess mass around the kink point for single-person cases (n.s.). Aside from the large mass for earners below \$150, Oregon shows little evidence of excess mass at zero net income across case sizes.

[1]We selected a seventh-order polynomial to match the previous literature.

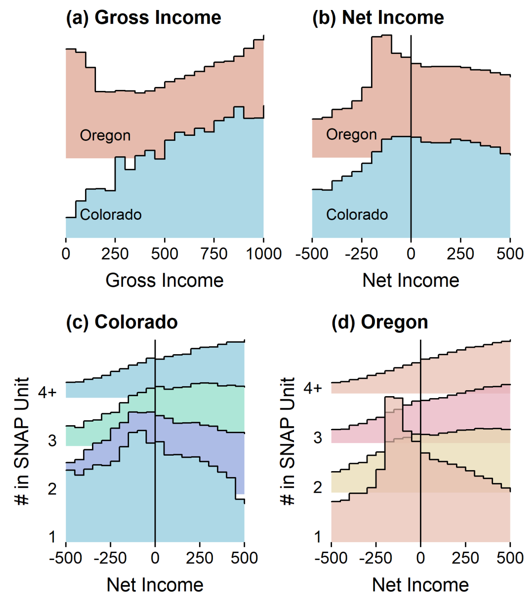

Figure 2.: Density of Cases by Gross and Net Income Near Net Income = 0.

Note: Panels (a) and (b) plot SNAP case density for gross and net income. Panels (c) and (d) display densities of cases by net income (x-axis) and by the number of people in the SNAP unit.

The Colorado data uniquely feature information on self-employment income. This is important because bunching behavior in other settings is typically strongest amongst self employed individuals (e.g., Saez, 2010; Chetty et al., 2011). Panels (a) and (b) of Figure 3 show case-size-specific densities for cases without and with some self-employment income. The distributions appear relatively similar for cases with two or more recipients. However, cases with one recipient and some self-employment income exhibit bunching at the zero net income kink that is not visible in the cases without self-employment income. We estimate a statistically significant excess density of 0.002, or 3,470 cases in the \$400 dollars surrounding the kink (see Table A2 and Figure A1.) However, even though we can detect bunching for this group, the effect size is economically quite small. For context, the excess mass represents less than 0.3 percent of cases in the Colorado earner sample.

Finally, because benefit reduction rates vary by shelter deduction use, in panels (c) and (d) we test for bunching heterogeneity by shelter-deduction levels. We only estimate a statistically significant excess mass for Colorado for cases without shelter deductions (see Table A2). Taken together, the distributions show little heterogeneity in bunching along this dimension.

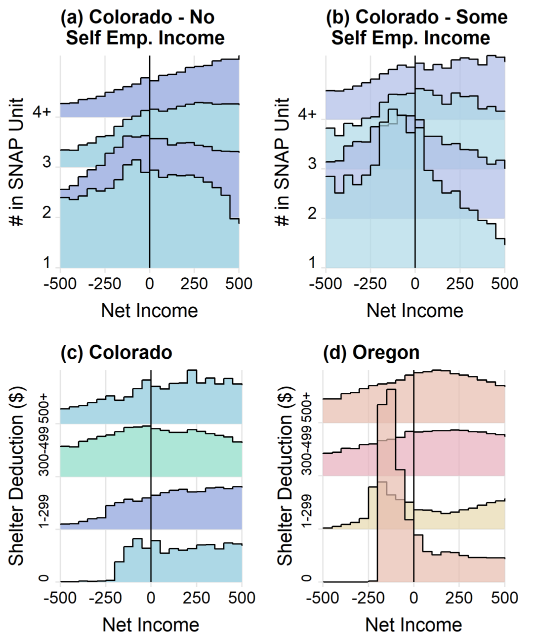

Figure 3.: Density by Self-Employment Income and Shelter Deduction

Note: Panels (a) and (b) plot density across the number in the SNAP unit for Colorado cases without and with self-employment income. Panels (c) and (d) plot the net income density by levels of shelter deduction.

V. Conclusion

We explore whether SNAP recipients bunch where benefits are initially taxed. We find evidence of slight bunching among single-unit self-employed Colorado cases, but no overall evidence of large labor supply responses. Work requirements such as those faced by able bodied adults without dependents are a possible policy response, but during the years of the data, Colorado had statewide waivers from these limits. We find little evidence of bunching in Oregon or across other types of Colorado caseloads. Together, these results suggest that intensive margin labor supply distortions due to changes in the benefit reduction rate are not a first order concern.

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Online Appendix

A1. Benefit Formula Details

Net income is calculated by subtracting the following deductions: the *standard deduction* meant to allow for routine unavoidable costs (in 2020, the standard deduction for a household with 1-3 members was $167), the *earnings deduction* of 20% of any earnings, the *dependent care deduction* for expenses on child or dependent care required for the recipient to work, the *child support deduction* for child support payments, the *medical expense deduction* for medical expenses exceeding $35 a month for elderly or disabled members, and finally an *excess shelter deduction*. The excess shelter deduction is the amount of housing costs that surpass net income after applying all other disregards. This amount has an upper-limit determined by the federal government.

Shelter deductions are a function of countable income and shelter expenditures, which can include housing payments, rent, and utility payments. The countable income for a case is calculated by combining unearned income with earned income (after applying the 20% disregard) and all deductions besides the shelter deduction (i.e., $CntInc = UnErnInc + 0.8ErnInc - OtrDed$). The shelter deduction is then calculated as any excess shelter costs above half of the countable income up to some cap ($SheltDed = min\left[Cap, ShelCosts - \frac{CntInc}{2}\right]$). Next, net income is simply countable income after the shelter deduction is applied ($NI = CntInc - SheltDed$). Finally, benefits are calulated as follows: $Benefits = max\left[MaxBenefit - 0.3 * NI, MinBenefit\right]$.

There is also a gross income limit of 130% of the Federal Poverty Guideline, which is rarely binding, and does not apply in some states using rules called Broad-Based Categorical Eligibility. During the years of the data, Oregon used Broad Based Categorical Eligibility to raise the gross income test to 185% of the federal poverty line, while Colorado eliminated an asset test (not discussed here) and left the gross income test at 130%.

A2. Tables

Table A1—: Net Income Formula and Descriptive Statistics

	Colorado (2012-2013)		Oregon (2009-2019)	
Sample	Full (1)	Earner (2)	Full (3)	Earner (4)
Earned Income	329.3 (681.0)	954.8 (500.1)	344.2 (695.9)	1,033.0 (566.8)
Unearned Income	378.2 (465.1)	75.6 (195.7)	401.5 (500.9)	52.6 (162.9)
WTR Child Care Ded.	0.04 (0.19)	0.09 (0.29)		
Child Care Ded. (> 0)	264.7 (492.8)	244.5 (190.4)		
WTR Child Support Ded.	0.02 (0.14)	0.02 (0.14)		
Child Support Ded. (> 0)	281.6 (317.8)	277.4 (175.2)		
WTR Medical Ded.	0.05 (0.21)	0	0.09 (0.28)	0
Medical Ded. (> 0)	347.5 (4,743.0)	0		
WTR Shelter Ded.	0.74 (0.44)	0.86 (0.34)	0.74 (0.44)	0.89 (0.31)
Shelter Ded. (> 0)	405.1 (261.8)	386.1 (136.6)	425.6 (186.9)	412.0 (120.7)
Benefit Amount	288.0 (205.6)	356.6 (195.5)	226.8 (165.6)	267.1 (184.5)
ABAWD	0.13 (0.33)	0.13 (0.34)	0.30 (0.46)	0.37 (0.48)
Elderly/Disabled	0.35 (0.48)	0	0.34 (0.48)	0
N	5,665,000	1,331,000	49,270,000	10,180,000

Note: The table provides means and standard deviations (in parentheses) of different inputs to the SNAP benefits formula. Columns 1 and 3 are for the full sample of SNAP recipients, while columns 2 and 4 limit observations to the "earner sample," i.e., cases with at least one dollar of earned income and that have no elderly or disabled members. Row headers with (> 0) signify that the average amount conditions on having a non-zero value for the given disregard.

Table A2—: Bunching Estimates (Net Income = 0)

	Colorado		Oregon	
	Density	Frequency	Density	Frequency
Full Earner Sample	0.000*	-221.9*	0.001***	410,200***
	(0.000)	(4,696)	(0.000)	(28,110)
# in SNAP Unit				
1	-0.000	-371.1	0.002***	398,500***
	(0.000)	(3,775)	(0.000)	(26,740)
2	0.000**	3,984**	0.000**	12,570**
	(0.000)	(2,063)	(0.000)	(5,350)
3	0.000*	3,295*	0.000	4,739
	(0.000)	(2,030)	(0.000)	(3,718)
4+	-0.000	-363.7	-0.000	-5,523
	(0.000)	(1,272)	(0.000)	(4,076)
Amount of Shelter Deduction				
$0	0.002***	14,360***	0.002	111,800
	(0.000)	(3,222)	(0.003)	(150,200)
$1-299	0.000	2,469	-0.001	-61,130
	(0.000)	(2,595)	(0.000)	(36,630)
$300-499	-0.000	-9,652	-0.000	-1,651
	(0.000)	(4,248)	(0.000)	(20,060)
$500+	-0.001	-666.1	-0.000	-14,560
	(0.000)	(266.8)	(0.000)	(8,464)
	Colorado			
	No Self Emp. Income		Some Self Emp. Income	
	Density	Frequency	Density	Frequency
# in SNAP Unit				
1	-0.000	-4,625	0.002***	3,470***
	(0.000)	(3,517)	(0.000)	(475.9)
2	0.000*	2,367*	0.000*	613.3*
	(0.000)	(1,764)	(0.000)	(468.8)
3	0.000*	2,686*	0.000	249.3
	(0.000)	(1,619)	(0.000)	(477.7)
4+	0.000	138.6	-0.000	-221.9
	(0.000)	(1,171)	(0.000)	(429.9)

Note: Bunching estimates and standard errors (in parethneses) are calculated using the method explained in Section III. *, **, and *** denote statistical significant respectively at $p < 0.10$, $p < 0.05$, and $p < 0.01$.

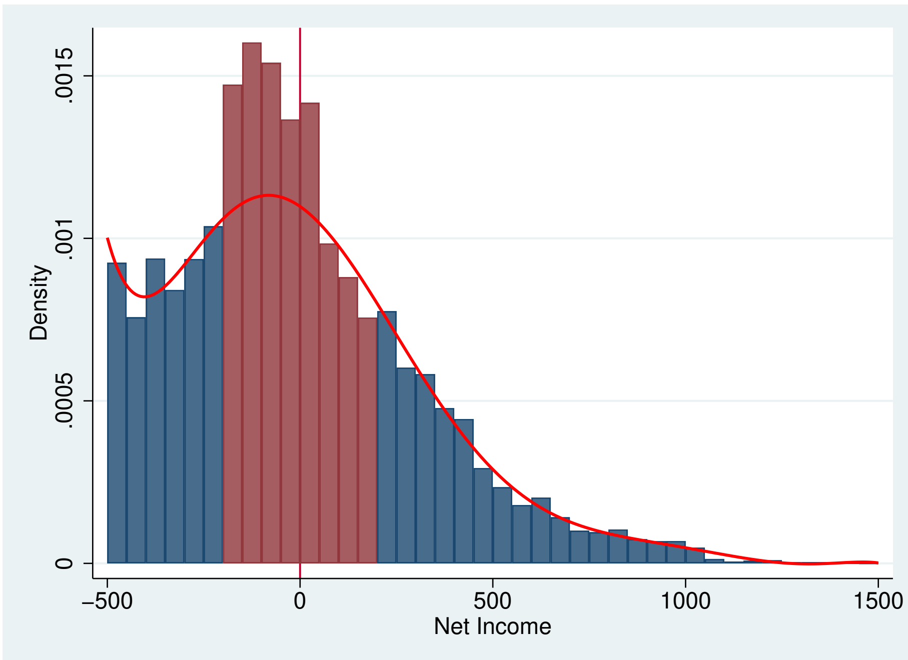

Figure A1. : Example of Bunching Calculation — Colorado Single-Unit Cases with Self-Employment Income

Note: Bunching is estimated by fitting a seventh degree polynomial to the count data and including bin fixed effects for each bin within $200 of either side of the net income equals zero kink (in red). Bunching is calculated by summing together the bin fixed effects. This figure is the density of Colorado single-unit cases with some self-employment income.