2018 government shutdown and SNAP benefits' timing: Can food stamps recipients smooth consumption?

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Abstract

We test the ability of households to smooth consumption in the face of unexpected transitory income shocks. In response to the 2018-19 government shutdown the federal government instructed all states to pay February SNAP benefits on or before January 20th. This created a short-term windfall (two payments very close to each other) followed by a longer than normal gap during which no SNAP disbursements were received. We exploit this exogenous variation as well as preexisting state-level differences in disbursement schedules which drove some states to temporarily alter the timing of the 2019 March and April SNAP disbursements. We find SNAP eligible households reduce expenditures when SNAP disbursements are accelerated within the month. No such response is observed in households that are just above the SNAP eligibility criteria.

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1 Introduction

The permanent income hypothesis posits that transitory income changes should not affect consumption. A large literature however, shows that income fluctuations have important effects on households' current consumption (e.g., Jappelli and Pistaferri 2010). Previous studies have traditionally focused on the impact of expected temporary income shocks (Angelucci et al. 2021; Parker 1999; Shapiro and Slemrod 1995; Souleles 1999; Stephens Jr 2003, 2006; Wilcox 1989).

This paper investigates households' ability to smooth consumption (via expenditures) using a unique natural experiment that generates an *unexpected* temporary income shock for households eligible for the Supplemental Nutrition Assistance Program (SNAP). We consider the federal government shutdown which began on December 22, 2018. Its protracted length put SNAP recipients at risk to miss SNAP payments for the first time in history (McCausland 2019; Luhby 2019).[1] To avoid this event, on January 8, 2019, the USDA announced an emergency plan: in addition to the normal January disbursement, recipients would receive the February disbursement on or before January 20 (US Department of Agriculture 2019). This mandate moved 5.1 billion dollars worth of February SNAP benefits into January, as shown in Figure A1.[2] The government shutdown ended on January 25, six days before the first SNAP disbursements would have been missed and states were free to return to their normal schedules for the March SNAP benefit.

Our analysis takes advantage of two exogenous sources of variation stemming from this natural experiment. First, we consider the sudden federally mandated change in the benefit schedule which compares household spending in February 2019, when all SNAP eligible households received their benefits unexpectedly earlier, to spending in months

[1] In the 21 days shutdown of 1995-6, the Department of Agriculture (therefore the food stamp program) was not affected. In the 16 days shutdown of 2013, a mini-appropriations bill protected funding for SNAP benefits.

[2] Specifically, Congress' expired *December 21 Continuing Resolution* allowed programs like SNAP to be funded for 30 days. This created a loophole: as long as February SNAP benefits were paid before January 21, SNAP benefits could be fully funded through February.

with unaltered benefit schedules. Second, we take advantage of state-level variation and compare household expenditures in the set of states that temporarily advanced the timing of March and April benefits to a group of control states where the March and April benefit schedules were unaltered. Specifically we exploit state level variation in the timing of SNAP disbursements. All states have set disbursement schedules with some states giving SNAP benefits entirely within the first half of the month while in other states some households receive benefits in the latter half of the month. Given these pre-existing disbursement schedules and the federal mandate to provide February SNAP benefits on or before January 20th many SNAP recipients would have had a gap of at least 50 days between SNAP disbursements unless their state took action.

Using the Nielsen Homescan panel, which provides rich daily consumption data for a sample of SNAP eligible households, we find evidence inconsistent with consumption smoothing. Specifically, retail expenditures in February 2019 are about 5.7% lower than months with unaltered distribution schedules. Evidence suggests that the decrease in expenditures is concentrated in the latter part of the month when budget constraints are more severe. No such response is observed in households that are just above the SNAP eligibility criteria nor if we assume the shutdown occurred a year earlier. The state level variation triggered by preexisting differences in SNAP disbursement schedules reinforces our finding that a temporary change in the timing of the SNAP benefits influences the timing of consumption. Receiving SNAP benefits one day earlier than usual decreases spending at the end of month by 1.4%. Our findings are inconsistent with standard models of inter-temporal choice.

The existing literature suggest that SNAP eligible households exhaust their benefits well before the end of the cycle and are not able to smooth consumption (Wilde and Ranney 2000; Shapiro 2005; Wilde and Andrews 2000; Hastings and Washington 2010). Average daily food expenditures of SNAP households at the end of the benefit cycle are only 57% of the expenditures the day of and the day after benefit disbursement (Tiehen et al. 2017).

Although households may be stocking up on food early in the cycle, studies have found that this cannot fully account for the differences in benefit cycle expenditure, citing poor diet and lower calorie intake towards the end of the cycle (Shapiro 2005; Todd 2015). Our study, differently from the existing literature, analyzes SNAP eligible households' behavior when hit by an *unexpected* and exogenous change in SNAP disbursement.

Our study relates to the literature examining the impact of expected income shocks on household expenditures (e.g., Stephens Jr 2006, Gelman et al. 2014, and Carvalho et al. 2016). It is most closely related to (Shapiro 2005) who considers SNAP eligible households. We are also closely connected to the literature that document end of cycle SNAP effects. These papers use variation in states' SNAP schedule and show that SNAP eligible household have more food insecurity, lower test scores, and higher rates of crime just prior to receiving SNAP benefits (Gregory and Smith 2019, Cotti et al. 2018, Carr and Packham 2019). This evidence is consistent with SNAP recipients' inability to smooth consumption. Our results reinforce this finding.

2 SNAP Benefits and Data

The U.S. Supplemental Nutrition Assistance Program, or SNAP (formerly food stamps), provides food assistance to needy households. The program is federally funded through the USDA and administered at the state level. Monthly benefits are disbursed by states at pre-determined times according to the state's idiosyncratic scheduling criteria. The USDA estimates that in 2018, 43.9 million Americans were eligible to receive SNAP (Cunnyngham 2021). While generous, SNAP benefits are nevertheless generally insufficient to cover a household's food expenses (Center on Budget and Policy Priorities 2021). On average, in 2018 and 2019, SNAP households received about $251 and $258 per month, respectively (US Department of Agriculture 2021). Eligibility for benefits is determined by federal guidelines and is mostly a function of household income and household size. SNAP

benefits are an important part of household income: for a 3 member family, with one full time worker earning $10 per hour, SNAP boosts income by around 22% (Center on Budget and Policy Priorities 2019). SNAP program participation has been consistently shown to lower food insecurity and to improved household welfare.

Our primary data source is the 2018 and 2019 Nielsen Homescan Consumer Panel dataset. Nielsen panelists agree to scan the bar codes of all products purchased for personal, in-home use, following each trip to a retail establishment. Hence, the data contain a unique shopping trip identification code, household ID, purchase date, total purchase amount, and payment method for each trip.[3] In total we observe over twenty one million shopping trips in the two year period 2018 and 2019. This allows us to construct various spending measures for the households in the 46 states considered in our sample.[4]

Nielsen maintains a database of approximately 1.4 million individually identifiable products in ten product categories: dry grocery, frozen foods, dairy, deli, packaged meat, fresh produce, nonfood grocery, alcohol, general merchandise, and health and beauty aids. Therefore Nielsen captures all SNAP eligible product purchases. In addition, the data contains information about the panelist demographics: sex, age, race, household income (reported with a two-year lag), household size, age and presence of children, occupation, employment status, and location. We limit the analysis to households with annual income below $70,000. We use the trip-level expenditure data to construct various spending measures and focus on all retail spending that occurs during the 2018 and 2019 calendar year.

The Nielsen data is commonly used to study household behavior as it contains detailed information about every retail purchase across a large, national sample (Aguiar and Hurst

[3]The payment method does not identify SNAP EBT cards.

[4]The Nielsen data does not include households in Alaska or Hawaii. We also exclude from our sample households in Washington DC, Indiana, and Ohio because their response to the advance February 2019 disbursement contaminates the natural experiment. In order to minimize the impact of the extended gap between "February" and March disbursements, DC delivered March benefits on February 26 while Indiana and Ohio gave half of the March benefit on February 22 and the remaining half on the normal schedule (FreshEBT 2019).

2007; Broda et al. 2009). Nevertheless, there are some limitations. First, non-retail expenditures (e.g., rent payments or utilities) are not captured in the data. Second, as the scanning task is not trivial, the Nielsen data is skewed toward older households and households with at least one non-worker (Einav et al. 2008; Lusk and Brooks 2011).

The Nielsen demographics provide enough detail to impute a measure of SNAP eligibility in a method similar to Castellari et al. (2016). For each year of the sample we overlay Nielsen's income bin and household size data onto the USDA's gross income limits for household sizes to generate three mutually exclusive categories: SNAP ineligible, SNAP eligible and SNAP ambiguous. These categories only capture household eligibility, not participation, therefore our estimates must be considered Intent-To-Treat. "SNAP ineligible" households are above the gross income limits given their household size. "SNAP eligible" households are below the gross income limits given their household size.[5] Finally, there are households we cannot classify because Nielsen only provides income in bins. Consider the income bin $20,000-$24,999. In 2018, the annual gross income limit for a family of size 2 was $21,408. Thus, households near the bottom of Nielsen's bin were eligible while those at the top were ineligible. We exclude these "SNAP ambiguous" households from the analysis.[6] In our 2019 data, 8.6% of households are SNAP eligible while 4.5% are SNAP ambiguous. Previous studies using the Nielsen dataset report annual SNAP eligibility rates of 13% (Goldin et al. 2016).

Summary statistics for households by SNAP eligibility can be found in Appendix Table

[5]Some households that we categorize as eligible will be ineligible for benefits due to other details of the SNAP eligibility formula. In addition to being below the gross income limits, household's net income must fall below a threshold. Households are allowed to deduct 20% of earnings, childcare expenses, child support, medical expenses and some housing costs from their income to determine net income. There is also an asset threshold and rules that deny benefits to unauthorized immigrants in some states. These extra rules will lead us to falsely classify some (small number of) households as eligible who are actually ineligible and will attenuate our findings.

[6]Conditional on receiving benefits SNAP ambiguous households should receive smaller benefits than SNAP eligible households because they have higher household incomes and SNAP benefits are progressive. Estimates from the USDA's administrative dataset on a representative sample of SNAP recipient households suggest that the median monthly benefit for household we categorize as eligible is $192, while median monthly benefits for households we classify as SNAP ambiguous is $30. If we add the SNAP ambiguous households to the analysis and classify them as eligible we find effects that are attenuated. This is consistent with the households being ineligible or eligible for smaller benefits (see Appendix Tables A4 and A5).

A1. As expected, SNAP eligible households have lower monthly expenditures compared to ineligible households. Eligible households spent an average of $506.7 per month during 2018 in retail establishments. SNAP households in our sample are more likely to reside in the southern part of the US. Only about 28% of SNAP eligible household heads have obtained a college degree and 97.4% of households in the sample have annual incomes that fall below $35,000. 21.9% of eligible households are non-white and 7.9% of them are of Hispanic origin. Over half of SNAP households in the sample have two or more persons living under the same roof.

3 Impact of federal disbursement schedules changes on expenditures

3.1 Identification and estimation

We first exploit the federal mandate that all SNAP eligible households would receive the February disbursement on or before January 20 (see Appendix Figure A1). We argue that the early SNAP disbursement was an unexpected change to the timing of benefits. No affected households were aware of the upcoming double payment before the USDA announcement on January 8, 2019. A non-trivial proportion of SNAP recipients received no advance warning of the double payment (Rosenbaum 2019; Kline and Allyn 2019). For example, the Pennsylvania Department of Human Services did not begin mailing letters explaining the double payment to SNAP recipients until January 18, two days after the state's early disbursement on January 16 (Lubrano 2019). Google Trends key words provides additional evidence that early disbursement was a surprise to SNAP recipients. Appendix Table A2 shows that searches for food stamp, Supplemental Nutrition Assistance Program, and related terms quintupled during the week of January 14 - 21, 2019 when SNAP households received their early February disbursement. Moreover, no other

government transfer programs were impacted by the shutdown.[7] Therefore it is unlikely that there were disruptions to transfer programs that confound our results.

The altered benefit timing is visualized in Figure 1. Before the 2018-19 shutdown, any household receiving SNAP benefits was always paid on a set day of the month according to each state's rule (see Appendix Table A3). Panel A shows the normal SNAP benefits distribution schedule (e.g. 2018) with the month of February denoted by green hash lines. Each black bar starts on the first disbursement date and end on the last possible disbursement date within a month. Panel B shows the distribution schedule for early 2019. Red bars indicate the benefits that would have normally been distributed in February but were instead distributed early due to the shutdown. For instance, in a typical February, Colorado distributes benefits between the 1st and the 10th of the month according to the last digit of the head of household's social security number. However, in February 2019 SNAP benefits were distributed to all households on the 17th of *January*. As the box with green hash lines shows, no SNAP recipient household in the US received benefits during the month of February 2019.[8]

We investigate whether the early February 2019 benefit caused eligible households to decrease their expenditures compared to other months with unaltered distribution schedules. Specifically, we estimate the following OLS regression:

$$Y_{it} = \alpha_0 + \alpha_1 NoBenefit_{it} + \alpha_2 February + \alpha_3 2019 + \alpha_4 X_{it} + \epsilon_{it} \quad (1)$$

where Y_{it} is a measure of total spending on food and non-food items tracked by Nielsen

[7]Federally funded social welfare programs such as Social Security, Medicare, and Medicaid, were unaffected because the shutdown only affected funds subject to annual appropriation by Congress. Programs under Titles II, XVI, and XVIII of the Social Security Act were therefore unaffected. Furthermore, Veterans Administration (VA) disability payments, Survivor Benefits Plan payments, and retiree payments are funded outside of annual appropriations and were therefore unaffected. Even the employees of the Social Security Administration and the Veterans Administration were protected during this shutdown due to a full year funding agreement reached in September of 2018. H.R. 430, funding for Temporary Assistance for Needy Families (TANF) cleared the Senate on January 22 2019. The USDA announced that the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) was fully funded through February before the shutdown.

[8]The only exception would be the handful of households who were newly eligible in February 2019.

for SNAP eligible household i during time period t. The dummy variable $February$, takes the value 1 if the calendar month is February. 2019 is a dummy that takes the value 1 if expenditure occurs in 2019. Thus, it allows spending to change as overall economic conditions change between the two years in our sample. Our variable of interest is $NoBenefit$, which is the interaction variable between the February dummy and the dummy for 2019. A negative α_1 would indicate that households had lower spending in February 2019, when the SNAP benefits were distributed unexpectedly early in January 2019 vis-à-vis months with unaltered schedules. Finally, X_i includes month fixed effects and the following household controls: household income bins, household size, presence of children, type of residence, marital status, race, Hispanic origin, employment, education, and age of head of household and state fixed effects. We focus on the years 2018 and 2019 and exclude observations for the months of January, March, and April because disbursement timing was also altered during these months in 2019 due to the shutdown.[9]

We estimate equation 1 separately for four different time periods: the entire month, the first two weeks of the month, the last two weeks of the month, or the final week of the month.[10] If households are unable to smooth consumption, the effect of receiving benefits early should be more pronounced in the latter part of February. Early in the month there may still be unused funds from the double January disbursement, but account balances are likely to be depleted by the end of February.

3.2 Results

We first present results for expenditures over the entire month. Column (1) of Table 1 shows the estimation results from equation (1) controlling for calendar month fixed effects only. It reports the average impact of unexpectedly receiving the 2019 February

[9]We use the March and April variation in Section 4.

[10]In order to maintain a consistent number of days in each month, we follow previous literature and define entire month expenditure as expenditure that occurs during the first 28 days of each calendar month. Thus, expenditures that occur between the 21st and 28th day of the month (regardless of which month) will be included in the final week of the month. Nonetheless, we alternatively run the analysis without dropping expenditures past the 28th of the month and results are robust.

SNAP check early, in January, on eligible households' expenditures during the month of February 2019. We find that SNAP eligible households reduce their total expenditure during the month of February 2019 by $29.52 vis-à-vis months with unaltered schedules. This effect is statistically and economically significant. In relative terms, receiving the February 2019 check in January causes SNAP eligible households to reduce total monthly expenditure by 5.71% from a baseline of $516.75 in February 2018. In column (2) we add various household level demographic and socio-economic controls. There is virtually no change in the size of our coefficient of interest which suggests that changes in household characteristics over time are not biasing our findings.

Columns (3), (4) and (5) of Table 1 consider the impact of expenditures over various periods within the month. The early February SNAP disbursement arrived for all households in January 16th-20th, if households cannot smooth consumption we expect the effects to be substantially more pronounced in the latter part of February when budget constraints are tighter. Indeed, we find evidence in favor of larger impacts concentrated towards the end of the month. Results in column (3) suggest that receiving the February check in mid January causes SNAP eligible households to reduce their spending by only $8.41 during the first two weeks of February but the effect is not statistically significant. That corresponds to a 3.24% decrease relative to average expenditure. Columns (4) and (5) show that as the month proceeds the relative effect of receiving benefits early becomes stronger. Eligible households decrease their expenditure during the last two weeks of the month by $21.11 or -8.20% from a baseline expenditure. The corresponding estimates for the last week of the month are -$12.76 and -9.59%.

Our estimates are likely lower bounds of the impact of altered benefit timing for SNAP recipient households. According to the latest USDA report, only 82% of nationally eligible households received benefits in 2018 (Cunnyngham 2021). Additionally, the Nielsen data is not rich enough to perfectly define SNAP eligibility and our sample is likely to include households that are ineligible due to immigration status, changes in income, or failure of

the asset test. Thus, estimated effects for those households who are actually participating in the SNAP program would be larger. Overall, our results in Table 1 suggest that SNAP eligible households do not smooth their consumption when encountering unexpected, earlier than usual benefit disbursement, and the effect is more pronounced towards the end of the month.

We conduct two robustness checks to support the validity of this natural experiment. It is possible the changes in consumption we observe are attributable to uncertainty surrounding the shutdown and/or changes in other federal transfer programs. To guard against this we first estimate equation 1 for SNAP ineligible households: those with annual income above the SNAP eligible threshold but below $ 70,000.[11] The results of this exercise are shown in column (1) of Table 2 and are reassuring. We find no impact on SNAP ineligible households: the estimated effect is small and statistically insignificant. SNAP ineligible households reduce their total February 2019 expenditure by only 0.58%. This suggests that the reduction in February spending that we observed in the SNAP eligible sample is due to changes in the SNAP program and not confounds. Furthermore, to test the validity of our estimation strategy we perform an additional robustness check using a placebo treatment variable. We re-estimate equation 1, using data from the 2017 and 2018 panel waves and assuming that the early SNAP disbursement occurred in 2018 instead of 2019. Results shown in column (2) of Table 2 suggest that the "fake" early disbursement had no effect on total February 2018 expenditures. If anything, SNAP eligible households appear to have increased their February 2018 spending by $6.18 but the effect is not statistically significant.

[11]Results are robust to varying this income threshold and performing the tests using expenditures from households with incomes below $60,000 or below $80,000.

4 Impact of disbursement schedules changes at the state level on expenditures

4.1 Identification and Estimation

We now exploit state level changes to the March and April disbursement schedules. The SNAP benefit disbursement schedule is set at the state level with variation along two pertinent margins: the number of days in the disbursement window and the calendar date when disbursements end. As shown in Panel A of Figure 1 and in Appendix Table A3, many states have wide disbursement windows with some households receiving SNAP benefits in the latter half of the month. Due to this preexisting variation in disbursement timing, the average number of days between a household's early February 2019 disbursement and their originally scheduled March 2019 disbursement varies across states. For example, some Illinois SNAP recipients normally receive their benefits on the 20th day of each month. Given that the February benefit was disbursed earlier, on January 20th 2019, without corrective action these recipients would have gone 60 days between the "February" and March disbursement. Hence, to minimize the gap between checks, on February 13th 2019, Illinois announced that all March payments would be sent on the first of the month.[12].

15 states did not move their March SNAP disbursement.[13] Among the unchanged states all SNAP recipients receive their benefits before the 10th day of the month under the normal schedule, with the exception of Missouri. A total of 29 states accelerated their March payments to reduce the number of days between SNAP disbursements. Figure 2 illustrates the impact that preexisting disbursement schedules had on a state's decision

[12]By February 15th all states that adjusted March disbursement had made announcements (Evich 2019)

[13]We classify Washington as unchanged. Although Washington slightly modifies its March disbursement schedule, it moves the average disbursement one day in the opposite direction. Results are robust to excluding Washington from the analysis.

to accelerate March disbursements: Panel A shows the normal last disbursement date for the 15 states that did not advance their March SNAP benefits; Panel B shows the normal last disbursement date for the 29 states that advanced their March SNAP benefits. Only two states finish disbursements by the first week of the month while the remaining 27 distribute well into the month.[14] Thus, it seems whether or not the March check was altered is largely a function of preexisting features of the disbursement schedule. The states in Panel B have significantly later normal disbursement schedules.

Additionally, some states that accelerated their March payments would have had a longer than usual gap until their April SNAP disbursement. Thus in March, seven states also accelerated their April payments. As shown by the darker bars in Panel B of Figure 2 the states that moved April payments are all those where the normal SNAP disbursement window falls in the later half of the month. By May of 2019 all states returned to their normal disbursement schedule.

Appendix Table A2 shows summary statistics for states that altered at least one SNAP disbursement and those that did not. The average household in states with altered disbursement schedules received their March SNAP benefit on average 6 days earlier than usual. The states which accelerated payments are more likely to be southern and are ethnically slightly less white than the states who did not not accelerated payments. Importantly, household education levels and incomes are very similar across states that altered their SNAP disburse schedule and those states where the schedule was unchanged.

We exploit the fact that some states had early March and April disbursements to see if unanticipated temporary changes in the timing of the SNAP benefits matters for consumption. Figure 1 shows the states that accelerated the March payments in bold. The shaded bands indicate the last seven calendar days of March and April in 2018 and 2019.[15]

[14]We exclude Ohio, Indiana, and DC from the sample because they distributed a portion of the March 2019 SNAP benefits in February. We also exclude Florida and Georgia because they split the March payments into two installments. The Nielsen data does not contain Alaska and Hawaii.

[15]We examine the last seven days of the month in order to focus on a time period in 2018 and 2019 in which no household receives a SNAP disbursement (in our sample the latest distributions occur in Alabama, Delaware, and Maryland on the 23rd of the month). See the blacks bars in Figure 1.

In the states which did not alter SNAP disbursements, the number of days between a disbursement and the beginning of the shaded time window is unaltered. In the states which advanced SNAP payments, households received their benefits earlier than usual, extending the number of days between a SNAP disbursement and the shaded time window.

If the permanent income hypothesis holds, this temporary change in the timing of SNAP disbursements should not impact households' expenditures at the end of the month. To test this we estimate the following regression using retail expenditures data from March and April of 2018 and 2019:

$$Y_{ismy} = \alpha_0 + \alpha_1 Altered_{smy} + \alpha_2 A_y + \alpha_3 B_m + \alpha_4 C_s + X_{imsy} + \epsilon_{imsy} \tag{2}$$

where Y_{imsy} is total expenditures the last seven days of the month for household i in state s at month m and year y. Our variable of interest, $Altered_{smy}$, is an indicator equal to one if the state distributed SNAP benefits earlier than its normal disbursement schedule in a given month and year. A_y is a dummy for the year 2019, B_m is a dummy for the month of March and C_s is a vector of indicators capturing state fixed effects. X_{imsy} are the same predetermined socio-economic characteristics used as controls in equation (1). α_1 estimates the effect, in dollars, of the accelerated SNAP disbursement on expenditures the last seven calendar days of the month.

4.2 Results

Table 3 reports the results of our estimates for equation (2). Column 1 shows the results from a parsimonious model without household demographics. In normal years, SNAP eligible households spend an average of $134 in retail establishments in the final week of the month. Residents of states that advanced the SNAP payments have expenditures in the final week of the month that are $10.50 lower than baseline. Thus, households that

receive a SNAP payment unexpectedly earlier than usual decrease expenditure in the last week of the month by 7.85%. As shown in column 2, estimates with the compliment of household controls are similar. This suggests that differences in the composition of residents across treated and control states are not driving our results. SNAP eligible households in states that advanced SNAP payment have end of the month expenditures that are 7.47% lower than normal. These results compliment our previous results, suggesting that SNAP eligible households do not smooth consumption following accelerated benefit disbursements.

As an alternative specification we replace the indicator variable $Altered_{smy}$ in equation (2) with a continuous treatment measure $Days\ Since\ Disbursement_{msy}$. For each state month we compute the expected number of days between the end of the month and the receipt of the last SNAP benefit. In some states, such as New Jersey, the expected SNAP disbursement occurred only two days early whereas in other states like North Carolina the average SNAP recipient received their March benefit 10 days early. If households cannot smooth consumption, end of month spending should be lower in North Carolina than in New Jersey. The results of the exercise, which are shown in Column 3 of Table 3, suggest that moving the SNAP benefit one day earlier than normal lowers end of the month retail expenditures by \$1.89. Given that the average households received benefits 6 days earlier than usual the results from the continuous treatment measure align closely with dichotomous measure and suggest little heterogeneity across states in the ability of households to consumption smooth.

We conduct the same two robustness checks to support the validity of this natural experiment. It is possible the changes in expenditures we observe are attributable to other state-level changes that impact low-income households. To guard against this we estimate equation (2) for SNAP ineligible households: those with annual income above the SNAP eligible threshold but below \$ 70,000. The results of this exercise can be seen in Panel A of Table 4. As expected, the impacted of living in a state that advanced SNAP benefits

on ineligible households is near zero (a decrease of spending of $1.67) and statistically insignificant.[16] This robustness check supports our conclusion that the reduction of expenditures in the last seven days of the month is due to the SNAP disbursement changes rather than confounds. Panel B reports the results of equation (2) under the placebo assumption of that the shutdown occurred in 2017 and all disbursement schedule adjustments were made in 2017. Thus we re-estimate equation (2), using data from 2017 and 2018 assuming that the early SNAP disbursement occurred in 2018 instead of 2019. Results shown suggest that the "fake" early disbursement had no effect on end of the month expenditures. If anything, SNAP eligible households in treated states appear to have increased their end of month spending by $3 but the effect is not statistically significant.

5 Conclusion

Exploiting exogenous variation stemming from the 2018-19 federal shutdown, we study SNAP eligible households' ability to smooth consumption when hit by an *unexpected* temporary income shock. Consistent with the previous literature, we do not find support for the permanent income hypothesis for our sample. Our estimates suggest that households likely treated the early February benefit as a "bonus" check and were not able to make it last through February. Total expenditures in February 2019, and particularly expenditures concentrated in the latter part of the month, were lower compared to expenditures during months with normal schedules. In addition, we exploit the fact that some states advanced SNAP payments to reduce the length of time between SNAP disbursements. We show household expenditures at the end of the month are lower in states which temporarily advanced SNAP disbursements.

Robustness checks show that there is no change in consumption for households near eligibility during the same periods. Our findings are consistent with the literature doc-

[16] In results not shown we estimate the continuous treatment version of equation 2 for the sample of SNAP ineligible households and again see no difference in expenditures.

umenting month cyclicality in food consumption among SNAP eligible households and highlight yet again that timing and frequency of benefit disbursements are critical.

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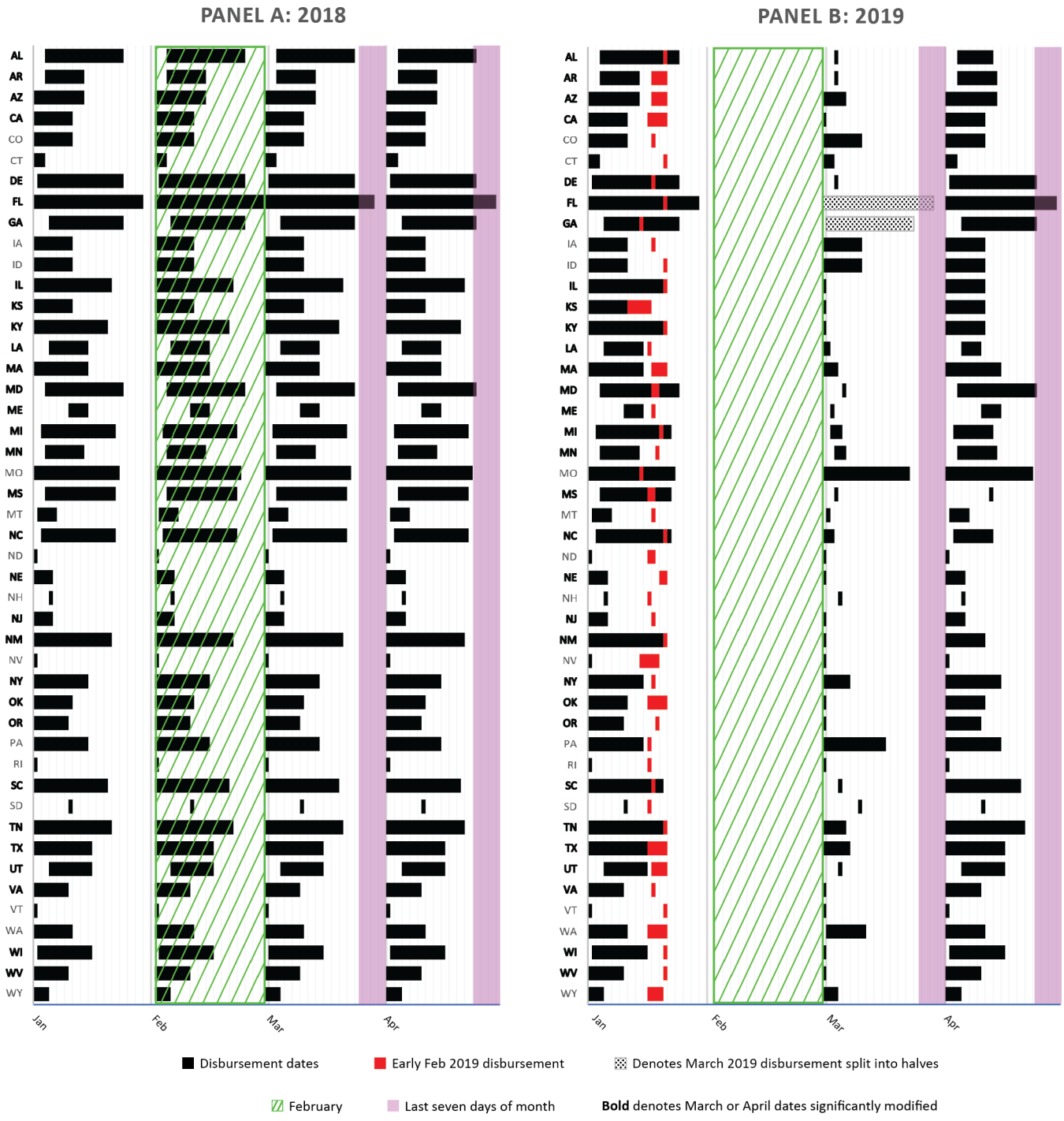
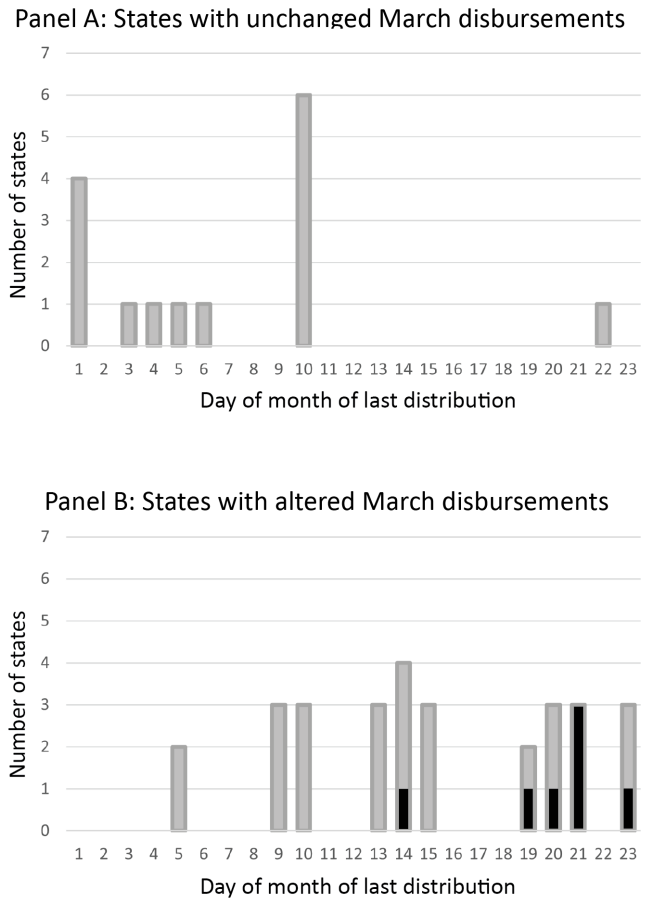
FIGURE 1: SNAP disbursement timing by state and year



Source: See Data Appendix A3.

FIGURE 2: Last day of standard disbursement schedule



Black bar denotes altered April disbursement.

Unchanged March disbursement states: CO, CT, IA, ID, MO, MT, ND, NH, NV, PA, RI, SD, VT, WA, and WY.

Altered March disbursement states: AL, AR, AZ, CA, DE, IL, KS, KY, LA, MA, MD, ME, MI, MN, MS, NC, NE, NJ, NM, NY, OK, OR, SC, TN, TX, UT, VA, WI, and WV.

Altered April disbursement states: AL, IL, KY, LA, MI, MS, and NC.

TABLE 1: Impacts of early February disbursement on household expenditure

	Household expenditure				
	Monthly		First two weeks	Last two weeks	Last week
	(1)	(2)	(3)	(4)	(5)
No benefit	-29.52***	-29.52***	-8.41	-21.11***	-12.76***
	(10.36)	(9.95)	(5.87)	(5.73)	(3.50)
February	-22.44***	-22.44***	-20.39***	-2.05	14.36***
	(8.58)	(8.24)	(4.86)	(4.75)	(2.90)
2019	19.19***	22.25***	13.77***	8.49***	5.31***
	(3.45)	(3.33)	(1.96)	(1.92)	(1.17)
Household controls	No	Yes	Yes	Yes	Yes
February 2018 expenditure	516.75	516.75	259.29	257.46	133.04
Relative effect (% change)	-5.71	-5.71	-3.24	-8.20	-9.59
Observations	89,568	89,568	89,568	89,568	89,568

Notes: The dependent variable in columns (1) and (2) is total expenditure during the first 28 days of a calendar month. In column (3) the dependent variable is expenditure during the first two weeks of a calendar month, in column (4) expenditure during the last two weeks and in column (5) expenditure during the last week of a calendar month. No benefit is the interaction term between the February dummy and the indicator for 2019. Relative effect is calculated by dividing the coefficient on No benefit by average expenditure during that period in February 2018. Month fixed effects are included in all columns. Household controls include household income, size, presence of children, type of residence, marital status, race, Hispanic origin, employment, education, and age of head of household and state fixed effects. *, **, *** mean statistical significance at the 90, 95, and 99 percent level.

TABLE 2: Robustness checks on early February disbursement

Panel A: SNAP ineligible households	
No benefit	-3.22
	(4.20)
February	-78.77***
	(3.49)
2019	0.24
	(1.40)
Feb 2018 monthly expenditure	$559.00
Relative effect (% change)	-0.58
Observations	453,969
Panel B: Placebo shutdown	
No benefit	6.18
	(9.11)
February	-26.51***
	(7.53)
2018	3.80
	(3.05)
Feb 2017 monthly expenditure	$506.28
Relative effect (% change)	1.22
Observations	93,168

Notes: Panel A shows results from the estimation of equation (1) for SNAP ineligible households. Panel B shows equation (1) estimated for SNAP eligible households assuming a placebo shutdown occurred in January 2018 and affected payments in February 2018 as opposed to February 2019. The outcome variable is monthly expenditure during the first 28 days of a calendar month. We account for calendar month fixed effects in both panels. All regressions include the following household controls: income, size, presence of children, type of residence, marital status, race, Hispanic origin, employment, education, age of head of household, and state fixed effects. *, **, *** mean statistical significance at the 90, 95, and 99 percent level.

TABLE 3: Impacts of altered March and April disbursement timing on household expenditure in the last seven days of the month

	(1)	(2)	(3)
Altered schedule	-10.52**	-10.01**	–
	(4.89)	(4.95)	
Days since disbursement	–	–	-1.89**
			(0.75)
2019	5.08	5.60	5.64
	(3.41)	(3.51)	(3.20)
Household controls	No	Yes	Yes
March 2018 weekly expenditure	$133.98	$133.98	$133.98
Relative effect (% change)	-7.85	-7.47	-1.41
Observations	17,660	17,660	17,660

Notes: The dependent variable is total expenditure during the last seven days of the month. *Altered schedule* is an indicator variable equal to 1 if the observation is in a state, month, and year in which SNAP benefits were distributed earlier than the normal disbursement schedule. *Days between disbursements* is the expected number of days between SNAP disbursements in 2019. March 2018 weekly expenditure is the average expenditure during the last week of March 2018. Relative effect is calculated by dividing the coefficient of the interaction term by average expenditure during the last week of March 2018. Household controls include household income, size, presence of children, type of residence, marital status, race, Hispanic origin, employment, education, and age of head of household. State and Month fixed effects are also included. Households in FL, IN, OH, and GA are excluded because their March distributions were made in two payments. *, **, *** denote statistical significance at the 90, 95, and 99 percent level. Standard errors clustered by state in parentheses.

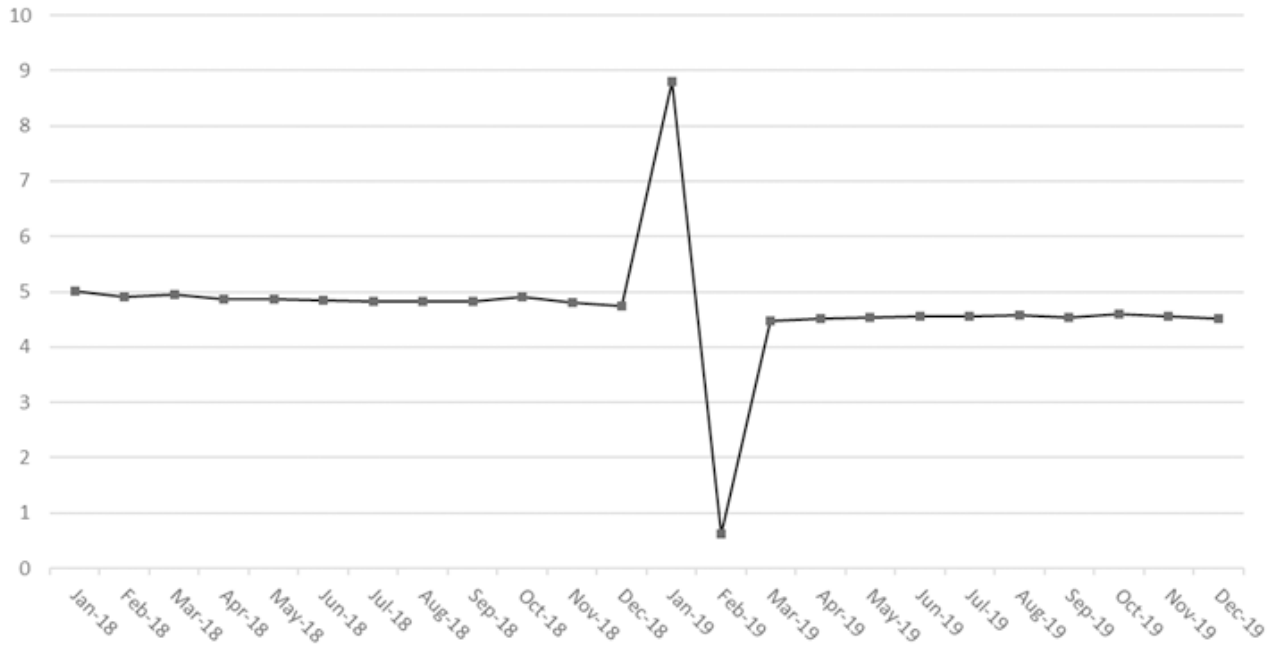
TABLE 4: Robustness checks on altered March and April disbursement timing on household expenditure in the last seven days of the month

Panel A: SNAP ineligible households	
Altered Schedule	-1.67
	(2.48)
2019	-4.51**
	(1.99)
March 2018 expenditure	$151.38
Relative effect (% change)	-1.10
Observations	89,062
Panel B: Placebo shutdown	
Altered Schedule	2.97
	(4.42)
2018	7.59**
	(2.84)
March 2017 expenditure	$118.80
Relative effect (% change)	2.50
Observations	18,414

Notes: The dependent variable is total expenditure during the last seven days of the month. Panel A shows estimates of the effects for SNAP ineligible households. Panel B shows diff-in-diff regression estimates for SNAP eligible households using data from 2017 and 2018, assuming a placebo shutdown occurred in January 2018 and affected payments in February 2018 as opposed to February 2019. *Altered schedule* is an indicator variable equal to 1 if the observation is in a state, month, and year in which SNAP benefits were distributed earlier than the normal disbursement schedule. *Days between disbursements* is the expected number of days between SNAP disbursements in 2019. March 2018 weekly expenditure is the average expenditure during the last week of March 2018. Relative effect is calculated by dividing the coefficient of the interaction term by average expenditure during the last week of March 2018. Household controls include household income, size, presence of children, type of residence, marital status, race, Hispanic origin, employment, education, and age of head of household. State and Month fixed effects are also included. Households in FL, IN, OH, and GA are excluded because their March distributions were made in two payments. *, **, *** denote statistical significance at the 90, 95, and 99 percent level. Standard errors clustered by state in parentheses.

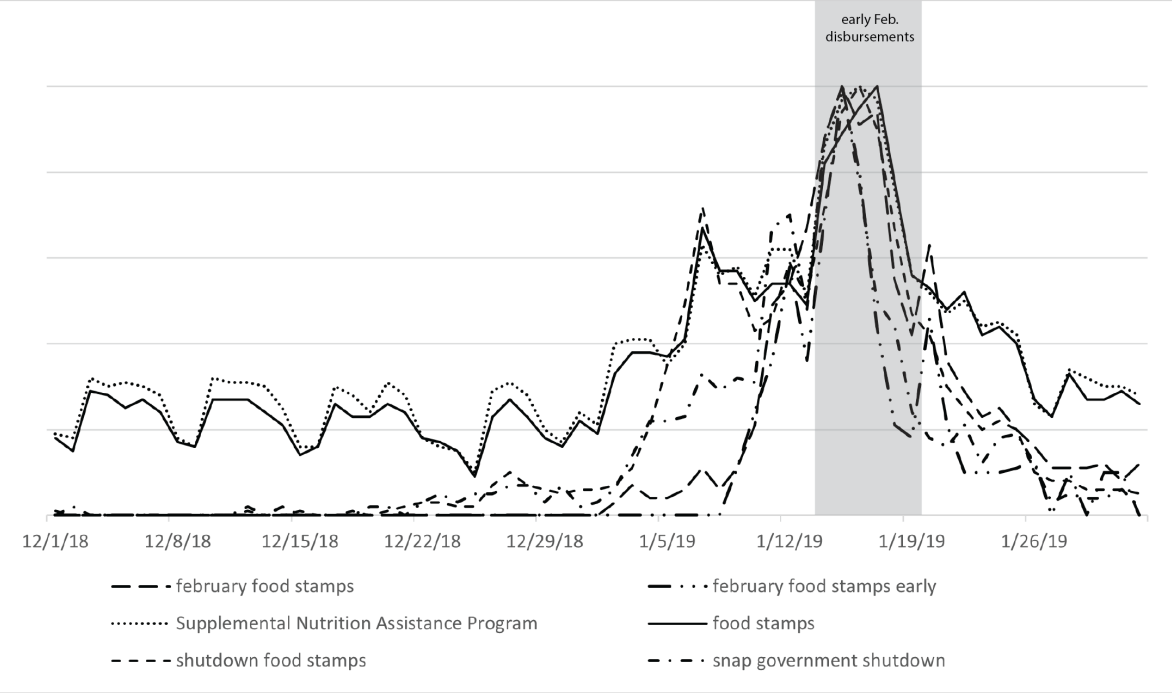
Appendix A

FIGURE A1: Total monthly SNAP benefits disbursed in 2018 and 2019 (billions of dollars)



Note: February disbursements are non-zero for two reasons: first, there were a small number of new applicants admitted to the program who received their first disbursements in February of 2019 according to the standard schedule, and second, SNAP beneficiaries in DC, IN, and OH received part or all of their March disbursements in February. Source: USDA Food and Nutrition Service.SNAP Data Tables (9 July 2021). https://www.fns.usda.gov/pd/supplemental-nutrition-assistance-program-snap

FIGURE A2: US Google search relative volume on keywords



Source: Google Trends.

TABLE A1: Household descriptive statistics

	Eligible	Ineligible
Demographics:		
Married	40.3 (49.1)	54.7 (49.8)
White	78.2 (41.3)	80.9 (39.2)
Hispanic Origin	7.9 (27.0)	6.6 (24.8)
Household size: 1 member	37.5 (48.4)	33.7 (47.3)
Household size: 2 members	22.7 (41.9)	41.1 (49.2)
Household size: 3 members	14.5 (35.2)	12.0 (32.5)
Household size: 4+ members	25.3 (43.4)	13.1 (33.8)
Female head of household is employed	35.1 (47.7)	53.5 (49.9)
Male head of household is employed	48.1 (49.9)	61.3 (48.7)
Head of household has HS degree or less	38.6 (48.7)	28.1 (44.9)
Head of household has some college	33.4 (47.2)	31.9 (46.6)
Head of household has college degree or more	27.9 (44.9)	39.9 (48.9)
At least a child under 18 present at home	29.6 (45.6)	17.6 (38.1)
Head of household age <35	10.7 (30.9)	9.3 (29.1)
Head of household age 35-49	25.7 (43.7)	21.1 (40.8)
Head of household age 50-54	11.5 (31.9)	9.5 (29.3)
Head of household age 55-64	27.5 (44.7)	27.5 (44.7)
Head of household age 65+	24.6 (43.1)	32.5 (46.8)
Income and spending:		
Annual income <10,000	27.8 (44.8)	–
Annual income 10,000-14,999	34.2 (47.4)	–
Annual income 15,000-24,999	25.0 (43.3)	4.8 (21.5)
Annual income 25,000-34,999	10.4 (30.5)	19.3 (39.4)
Annual income 35,000-44,999	2.2 (14.7)	22.1 (41.5)
Annual income >45,000	0.4 (5.9)	53.7 (49.9)
Monthly Spending	$506.7 (456.9)	$571.5 (453.0)
Region:		
Northeast	15.9 (36.6)	17.5 (37.9)
Midwest	19.8 (39.9)	20.9 (40.6)
South	43.7 (49.6)	41.6 (49.3)
West	20.5 (40.4)	20.0 (40.0)
No. households in 2018	5,063	25,364

Notes: Column (1) shows descriptive statistics in percentage points for SNAP eligible households. Column (2) shows descriptive statistics in percentage points for SNAP ineligible households (with annual income below $ 70,000). Data from 2018 Nielsen Consumer Panel. Standard Deviation in Parenthesis.

TABLE A2: SNAP eligible households by March 2019 disbursement schedule

	Altered disbursement schedule	Unchanged disbursement schedule
State characteristics:		
March 2019 deviation, days	-5.9 (2.3)	0.1 (0.3)
Normal disbursement spread	14.2 (4.6)	10.0 (6.1)
Normal Last disbursement day	15.1 (4.9)	10.3 (5.8)
Number of states	29	15
Demographics:		
Married	39.1 (48.8)	36.3 (48.1)
White	74.7 (43.5)	85.7 (35.1)
Hispanic origin	8.8 (28.3)	4.9 (21.7)
Household size: 1 member	38.4 (48.7)	42.7 (49.5)
Household size: 2 members	24.0 (42.7)	21.0 (40.8)
Household size: 3 members	12.7 (33.3)	13.7 (34.4)
Household size: 4+ members	24.9 (43.3)	22.6 (41.9)
Female head of household is employed	35.1 (47.7)	32.2 (49.9)
Head of household has HS degree or less	38.0 (48.6)	42.1 (49.4)
Head of household has some college	33.8 (47.3)	30.0 (45.9)
Head of household has college degree or more	28.2 (45.0)	27.9 (44.9)
At least a child under 18 present at home	27.6 (44.7)	28.3 (45.1)
Head of household age < 35	10.1 (30.2)	8.8 (28.4)
Head of household age 35-49	26.6 (44.2)	25.9 (43.8)
Head of household age 50-54	9.9 (30.0)	10.1 (30.1)
Head of household age 55-64	27.6 (44.7)	25.8 (43.8)
Head of household age 65+	24.8 (43.2)	28.3 (45.1)
Income and spending:		
Annual income <10,000	29.8 (45.7)	28.1 (45.0)
Annual income 10,000-14,999	33.4 (47.2)	37.6 (48.5)
Annual income 15,000-24,999	25.3 (43.5)	24.50 (42.7)
Annual income 25,000-34,999	9.6 (29.5)	8.2 (27.4)
Annual income 35,000-44,999	1.6 (12.4)	1.9 (13.7)
Annual income >45,000	0.3 (5.4)	0.2 (4.7)
Monthly spending	$601.98 (622.7)	$618.75 (595.2)
Region:		
Northeast	13.8 (34.5)	40.9 (49.2)
Midwest	20.5 (40.4)	25.8 (43.8)
South	46.1 (49.9)	0 (0)
West	19.6 (39.7)	33.4 (47.2)
No. households	3,441	893

Notes: Altered disbursement schedule signifies states for which SNAP benefits were distributed earlier than the normal disbursement schedule in March of 2019. Normal disbursement spread is the number of days over which SNAP distributions occur in the given state during normal years. Standard Deviation in Parenthesis.

TABLE A3: Disbursement timing and sources

State	Normal Dates[a]	Feb 2019 Dates[c]	March 2019 Dates[c]
AL	1	Jan 20	4
AR	4-13	Jan 17-20	4
AZ	1-13	Jan 17-20	1-6
CA	1-10	Jan 16-20	1
CO	1-10	Jan 17	unchanged
CT	1-3	Jan 20	unchanged
DE	2-23	Jan 17	4
FL	1-28	Jan 20	split into two
GA	5-23	Jan 14	split into two
IA	1-10	Jan 17	unchanged
ID	1-10	Jan 20	unchanged
IL	1-20	Jan 20	1
KS	1-10	Jan 16	1
KY	1-19	Jan 14-20	1
LA	5-14	Jan 16	1-2
MA	1-14	Jan 17-20	1-4
MD	4-23	Jan 17-18	6
ME	10-14	Jan 17	3
MI	3-21	Jan 19	3-5
MN	4-13	Jan 18	4-6
MO	1-22	Jan 14	unchanged
MS	4-21	Jan 16-17	4
MT	2-6	Jan 17	2
NC	3-21	Jan 20	1-3
ND	1	Jan 16-17	unchanged
NE	1-5	Jan 19-20	1
NH	5	Jan 16	unchanged
NJ	1-5	Jan 17	1
NM	1-20	Jan 20	1
NV	1	Jan 14-18	unchanged
NY	1-14	Jan 17	1-7
OK	1-10	Jan 16-20	1
OR	1-9	Jan 18	1
PA	1-10	Jan 16	unchanged
RI	1	Jan 16	unchanged

SC	1-19	Jan 17	5
SD	10	Jan 16	unchanged
TN	1-20	Jan 20	1-6
TX	1-15	Jan 15-20	1-7
UT	5-15	Jan 17-20	5-7
VA	1-9	Jan 17	1
VT	1	Jan 20	unchanged
WA	1-10	Jan 16-20	2-11
WI	2-15	Jan 20	1
WV	1-9	Jan 20	1
WY	1-4	Jan 16-19	unchanged

[a] All standard disbursement schedules obtained from United States Department of Agriculture, "Supplemental Nutrition Assistance Program (SNAP) Monthly Issuance Schedule for All States and Territories." fns-prod.azureedge.net/sites/default/files/snap/Monthly-Issuance-Schedule-All-States.pdf.

The normal Pennsylvania disbursement schedule is based on the number of business days elapsed, not on calendar days. Business days are reported here although calendar days are reported for all other states.

[b] Authors infer early February disbursement dates for 12 states (KS, KY, LA, MN, MO, MS, ND, NH, NV, RI, SD, and TX) from historical Google search volume on the terms "SNAP", "Food Stamps", and "EBT" for the state in question. A spike in search interest on these terms consistently accompanies known early disbursement dates in other states. If the upper bound is not clear in the published record, we base it on the federal stipulation that all February benefits must be paid on or before January 20th.

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MA "January 17, 2019 Update from the Department of Transitional Assistance on February SNAP Program Impact Due to Partial Federal Government Shutdown." Mass.gov, 17 Jan. 2019, estion. A spike in search interest on these terms consistently accompanies known earlydisbursement dates in other states. If the upper bound is not clear in the published record, we base it on thefederal stipulation that all February benefits must be paid on or before January 20th.38 www.mass.gov/news/january-17-2019-update-from-the-department-of-transitional-assistance-on-february-snap-program.

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TABLE A4: Impacts of early February disbursement on SNAP eligible and SNAP ambiguous household expenditure

	Household expenditure				
	Monthly		First two weeks	Last two weeks	Last week
	(1)	(2)	(3)	(4)	(5)
No Benefit	-26.08***	-26.08***	-8.19*	-17.89***	-12.94***
	(8.08)	(7.79)	(4.59)	(4.52)	(2.78)
February	-25.81***	-25.81***	-22.39***	-3.42	13.36***
	(6.70)	(6.46)	(3.81)	(3.75)	(2.31)
2019	10.73***	14.23***	9.20***	5.03***	3.82***
	(2.69)	(2.60)	(1.53)	(1.51)	(0.93)
Household controls	No	Yes	Yes	Yes	Yes
February 2018 expenditure	517.68	517.68	259.38	258.30	133.47
Relative effect	-5.04	-5.04	-3.16	-6.93	-9.69
Observations	135,756	135,756	135,756	135,756	135,756

Notes: The dependent variable in columns (1) and (2) is total expenditure during the first 28 days of a calendar month. In column (3) the dependent variable is expenditure during the first two weeks of a calendar month, in column (4) expenditure during the last two weeks and in column (5) expenditure during the last week of a calendar month. No benefit is the interaction term between the February dummy and the indicator for 2019. Relative effect is calculated by dividing the coefficient on No benefit by average expenditure during that period in February 2018. Month fixed effects are included in all columns. Household controls include household income, size, presence of children, type of residence, marital status, race, Hispanic origin, employment, education, and age of head of household and state fixed effects. *, **, *** mean statistical significance at the 90, 95, and 99 percent level.

TABLE A5: Impacts of altered March and April disbursement timing on SNAP eligible and ambiguous household expenditure in the last seven days of the month

	(1)	(2)	(3)
Altered schedule	-6.35	-6.29	–
	(3.83)	(3.95)	
Days between disbursements	–	–	-1.08**
			(0.54)
2019	-0.54	0.37	0.12
	(2.58)	(2.71)	(2.62)
Household controls	No	Yes	Yes
March 2018 weekly expenditure	$133.98	$133.98	$133.98
Relative Effect (% change)	-4.74	-4.70	-0.81
Observations	26,750	26,750	26,750

Notes: The dependent variable is total expenditure during the last week of the month. *Longer wait* is an indicator variable equal to 1 if the time between disbursements for the average SNAP recipient was more than two days greater in 2019 than 2018. Δ *days between disbursements* is the expected number of days between SNAP disbursements in 2019. March 2018 daily expenditure is the average daily expenditure during the last week of March 2018. Relative effect is calculated by dividing the coefficient of the interaction term by average expenditure during the last week of March 2018. Household controls include household income, size, presence of children, type of residence, marital status, race, Hispanic origin, employment, education, and age of head of household. State and Month fixed effects are also included. Households in FL, IN, OH, and GA are excluded because their March distributions were made in two payments. *, **, *** denote statistical significance at the 90, 95, and 99 percent level. Standard errors clustered by state in parentheses.