Employed in a SNAP? The Impact of Work Requirements on Program Participation and Labor Supply

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Abstract

A new wave of policy debates is taking place around work requirements in federal assistance programs, including food stamps (SNAP) and Medicaid. While opponents argue that work requirements screen out the most vulnerable beneficiaries, proponents contend that work requirements improve self-sufficiency by encouraging work. This paper uses linked administrative data from Virginia's SNAP and Unemployment Insurance (UI) programs to estimate the effects of work requirements on SNAP participation, beneficiary composition, and labor supply. Using discontinuities in age that determine whether a beneficiary is subject to work requirements, we find that the policy reduces overall SNAP participation by 58 percent and reduces retention among pre-existing SNAP beneficiaries by 42 percent. We find evidence that the policy disproportionately screens out beneficiaries with greater economic vulnerability and longer durations on SNAP. We fail to detect substantial impacts of work requirements on average employment or earnings. However, we find that a portion of the wage distribution shifts to the right in the vicinity of the minimum work requirements threshold. Our findings suggest that work requirements screen out a large number of economically vulnerable SNAP beneficiaries in exchange for an earnings increase among a limited subset of individuals.

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1 Introduction

For decades, policymakers have sought to provide benefits to low-resource households in times of need without substantially reducing work incentives among able-bodied adults. One common strategy is to require that beneficiaries sustain formal employment or participate in community service in order to receive benefits. Some form of "work requirement" exists in many means-tested programs, including Temporary Assistance for Needy Families (TANF), the Supplemental Nutrition Assistance Program (SNAP), and Medicaid. Work requirements are once again taking center stage in current policy debates. Opponents argue that work requirements will reduce benefits for the most vulnerable recipients in times of need, while proponents contend that expansions of work requirements will improve labor force attachment and promote self-sufficiency.[1] This paper uses administrative data and a transparent identification strategy to evaluate the impact of work requirements on program and labor force participation in the context of SNAP.

Attempts to understand the impacts of modern work requirements have been limited by three factors. First, commonly used survey data sources severely and non-randomly under-report participation in means-tested programs (Meyer et al. 2014, Meyer and Mittag 2019). Second, credible quasi-experiments are difficult to find, since work requirements policies often remain stable over many years. Third, the precise population affected by work requirements may be difficult to identify in the data: a study focused on current participants would miss a non-random set of individuals who were unable to join or stay in the program *due to* work requirements, while a study focused on a broader low-income population would include individuals who would not participate with or without work requirements. Focusing on too broad a population may increase estimation noise and model dependence.

This paper uses administrative panel data and multiple sources of variation to overcome these challenges. First, we use administrative data from Virginia's SNAP program to measure participation and characterize participants. We link these data to wage records from Virginia's Unemployment Insurance (UI) program, allowing us to accurately measure program participation and UI-covered earnings without relying on survey data. Second, we exploit credible quasi-experiments based on the administrative details of Virginia's SNAP program. These include the 2013 reinstatement of work requirements for able-bodied adults without dependents (ABAWDs), which had been

[1] For example, see the American Enterprise Institute's "Poverty and Social Policy Debate Series: Federal Work Requirements" (available at: `aei.org/spotlight/federal-work-requirements-debate/`) and Lola Fadulu's "Why States Want Americans to Work for Medicaid" *The Atlantic*, April 2019 (available at: `theatlantic.com/health/archive/2019/04/medicaid-work-requirements-seema-verma-cms/587026/`)

suspended during the Great Recession. We leverage the fact that work requirements only apply to participants under the age of 50 to construct regression discontinuity (RD) estimators of the effects of work requirements on program participation and labor market outcomes. Third, the administrative data allow us to focus the latter parts of the analysis on participants enrolled in SNAP just before work requirements were reinstated in Virginia. This population allows us to study screening using *ex ante* observed covariates, mitigates possible concerns of non-random selection into SNAP due to policy changes, and allows us to focus on a sample whose work behavior is most likely to be impacted by new SNAP policies.

Our results suggest that work requirements dramatically reduce SNAP participation among childless adults. In Virginia, the introduction of work requirements reduced participation among ABAWDs near the age cutoff by 58 percent after two years. Time patterns of participation, RD estimates, and placebo checks all corroborate this conclusion. Moreover, we provide suggestive evidence that the estimated magnitude of the participation reduction is generalizable to ages further from the policy cutoff. To provide a more precise counterfactual, we then focus our estimates on the stock of beneficiaries who were on SNAP just before work requirements took effect. Our RD estimates suggest that the introduction of work requirements reduced the rate of two-year retention by 42 percent (24 percentage points) among this group. Work requirements induced a disproportionate degree of exit among chronic SNAP users, black beneficiaries, and (in some specifications) homeless beneficiaries. To further inform policy design, we disentangle the effect of the work requirements themselves from an additional verification burden associated with work requirements. In particular, we estimate that the additional recertification used to verify work magnifies the policy's disenrollment impacts by 30 percent.

We then study the impact of work requirements on labor force participation and earnings, again focusing on the stock of beneficiaries on SNAP just before work requirements were reinstated. We do not detect a statistically significant increase in employment due to the reinstatement of work requirements: RD estimates statistically rule out average increases in employment greater than 6.5 percentage points. There is, however, evidence of a response for a subset of individuals. In particular, we find a rightward shift in wage earnings of a few hundred dollars per month in the 75th to 85th percentiles of the unconditional earnings distribution, which corresponds to earnings near the work requirements threshold. Taken together, our findings suggest that the primary effect of work requirements is to screen out a large number of long-term SNAP beneficiaries in exchange for a meaningful earnings increase among a limited subset of individuals.

The paper builds upon a body of research studying work requirements and screening

in means-tested programs. It is closely related to the theory developed by Besley and Coate (1992), which formalizes the trade-off between providing safety net benefits and avoiding work disincentives. Empiricists have built upon this theoretical contribution along three tracks. One body of literature documents the work disincentives inherent in means-tested and social insurance programs, providing evidence that income effects explain much of the causal relationship between government assistance and work (Autor and Duggan 2007, Fetter and Lockwood 2018). A handful of papers explore this relationship specifically in the setting of food stamps (Fraker and Moffitt 1988, Keane and Moffitt 1998, Hagstrom 1996, and Hoynes and Schanzenbach 2012). A second body of literature studies the heterogeneous impacts of administrative hurdles on potential beneficiaries in a variety of programs (Nichols and Zeckhauser 1982, Deshpande and Li 2019, Finkelstein and Notowidigdo 2019, Gray 2019).

The third track studies whether work requirements ameliorate possible distortions by promoting labor force participation and earnings. In the context of traditional welfare programs, a number of studies find that work requirements increase employment and exits from welfare but decrease total income among low-income households (Fang and Keane 2004; Grogger and Karoly 2005; Greenberg et al. 2009; Chan 2013; Card and Hyslop 2005; Chan and Moffitt 2018). A smaller set of papers investigate SNAP work requirements using survey data (Harris 2019; Stacy et al. 2018; Cuffey et al. 2015). These papers corroborate our results in finding small average impacts of work requirements on labor force participation, but they typically find much smaller reductions in participation than we do. This muted response could be explained by well-known measurement errors in survey questions regarding SNAP participation, and by the difficulty of limiting possible confounders by defining the subset of participants who are likely to be impacted by SNAP policy changes.[2] A separate strand of time series results suggests that the implementation of ARRA work requirements coincides with substantial reductions in food stamp participation according to administrative data sources, although these studies often use less granular data sources than we have and are potentially threatened by legislative endogeneity (Wilde et al. 2000; Ziliak et al. 2003; Ganong and Liebman 2018). We see these papers are corroborating our main findings, but offering less detail than we obtain through administrative data and an RD design.

The paper proceeds as follows. Section 2 discusses work requirements in SNAP, the policy variation available, and the administrative data we use. Section 3 documents

[2]One exception, Ribar et al. (2010), uses household-level administrative data from South Carolina to identify effects from variations in work requirements over counties and time. In contrast, our analysis is at the individual level, consistent with how work requirements are applied within ABAWD households, and utilizes an RD design.

participation survival curves and trends over time, and presents our main regression discontinuity estimates of participation reductions. Section 4 focuses on the population of existing beneficiaries to construct estimates of the effect of work requirements on program retention, assess screening impacts, and study the role of additional verification requirements. Section 5 presents regression discontinuity evidence regarding labor market outcomes, including analyses of heterogeneous impacts along the earnings distribution. Section 6 concludes.

2 Setting and Data

2.1 The SNAP Program

The Supplemental Nutrition Assistance Program (SNAP), previously called the Food Stamp Program, is among the largest poverty alleviation programs in the United States. In 2015, the program provided over $69 billion in benefits to over 45 million individuals, representing 14 percent of the U.S. population (Ganong and Liebman 2018). The program has been widely studied: researchers have documented the program's impacts on food insecurity (Mabli and Ohls 2014), poverty (Short 2015), test scores (Gassman-Pines and Bellows 2018), criminal recidivism (Tuttle 2019), as well as health and economic outcomes (Almond et al. 2011, Hoynes et al. 2016, Gregory and Deb 2015).

While the SNAP program primarily uses federal funds and is regulated by the United States Department of Agriculture (USDA), it is administered by each state individually. The core aspects of the SNAP program are the same across all U.S. states. Each month, households in the program get money loaded onto an Electronic Benefits Transfer (EBT) card, which they can use to buy most food items at authorized grocery or convenience stores. A household's monthly benefit amount is based on a maximum monthly benefit amount that is set by the federal government for each year and increases with household size. To compute benefit amounts, households first calculate a set of possible deductions (e.g., medical costs, dependent care deduction). Benefits are reduced from their maximum amount by 30 cents for each additional dollar in excess of these deductions.[3] With some exceptions, households are generally deemed ineligible for benefits if their gross income (before deductions) exceeds 130 percent of the Federal Poverty Line (FPL) or if their net income (after deductions) exceeds 100 percent of the FPL. Some states also use a household asset test. To keep track of income and deductions, participants in most states are required to submit periodic

[3]There is a 20 percent earned income deduction. This implies that SNAP benefits effectively decline by 24 cents for each additional dollar of *earned* income.

"recertifications", typically at 6- or 12-month intervals. These periodic verifications require substantial paperwork, including documentation of deductions and earnings (e.g., medical bills or pay stubs), and the majority of attrition from the SNAP program happens at these deadlines (Hastings and Shapiro 2018, Gray 2019, Homonoff and Somerville 2019).

In addition to income limits and periodic recertifications, SNAP imposes two distinct types of work requirements. First, the "general" work requirement dictates that participants aged 16–59, with some exceptions, must complete work registration, accept suitable employment if it is offered, not voluntarily quit a job or reduce hours below 30 hours per week, be willing to report information to the state agency to enable determination of employment status, and comply with an employment and training or workfare program if offered. Second, the "ABAWD" or "time limit" work requirement applies only to able-bodied adults without dependents (ABAWDs). ABAWDs are defined as adults aged 18–49 who do *not* report a child in the household and do *not* meet a limited set of exemptions (e.g., a confirmed disability).[4] These individuals must be employed, participate in qualifying job training programs, or do approved community service for at least 80 hours each month. ABAWDs who do not meet these requirements may receive benefits for a maximum of three months within a three-year period. Unless otherwise specified, we use the phrase "work requirements" to refer to these ABAWD work requirements and *not* general work registration requirements.

Some ABAWDs may be exempt from these additional work requirements through one of three channels. First, counties with distressed labor markets according to specific USDA criteria are permitted to waive ABAWD work requirements (Appendix B). Second, states are permitted to exempt up to 15 percent of ABAWDs from work requirements at their discretion, and can save or spend those waivers across different years to a limited extent. Third, the American Recovery and Reinvestment Act (ARRA) of 2009 exempted *all* counties in all states from ABAWD work requirements as part of the Great Recession stimulus package.[5] Individual states began to reinstate work requirements over the subsequent few years. Virginia reinstated ABAWD work requirements statewide on October 1, 2013. A small subset of economically distressed counties were later re-exempted.

[4]See USDA Food and Nutrition Service, "SNAP Work Requirements" May 2019, for more information: `www.fns.usda.gov/snap/work-requirements`.

[5]A few states, including Texas, kept work requirements in place despite the exemption option provided by ARRA: `www.cbpp.org/research/food-assistance/states-have-requested-waivers-from-snaps-time-limit-in-high-unemployment`. Virginia used the ARRA exemptions as written by USDA.

2.2 Policy Variation in Virginia

The paper relies on variation in SNAP work requirement policies to identify the effects of work requirements. Our main identification strategy takes advantage of program eligibility requirements that change sharply based on age. ABAWD work requirements apply to childless non-exempt adults aged 18–49. In contrast, participants aged 50 or older are not subject to the same time limits on benefits, irrespective of work status. The sharp policy difference between childless adults in their late forties and similar childless adults in their early fifties allows us to use a regression discontinuity (RD) design. Furthermore, we are unaware of other rules within SNAP, TANF, or Medicaid that change discontinuously at age 50 that can confound this identification strategy.[6] Eligibility requirements for Supplemental Security Income (SSI) and Social Security Disability Income (SSDI) do loosen at age 50 due to the occupational grids used to determine disability status (Chen and van der Klaauw 2008, Deshpande et al. 2019). In light of this, we check for confounding effects at the age 50 discontinuity by examining data from time periods when work requirements were not in effect (i.e., the ARRA period).

For supporting evidence, we take advantage of cross-sectional and time series variation in counties that received waivers exempting ABAWDs from the work requirements.[7] Virginia implemented a statewide exemption of the ABAWD work requirements in 2009 as part of the ARRA stimulus package. Virginia then reinstated ABAWD work requirements statewide on October 1, 2013. Starting in May 2014, however, 23 of Virginia's 133 counties were granted county-wide exemptions from work requirements on the basis of high unemployment rates. The paper focuses chiefly on the 110 counties in which work requirements remained on after October 2013. Data from the 23 counties reinstating exemptions are used in supporting analyses.

When Virginia implemented the work requirements policy in October 2013, non-compliant ABAWDs were not immediately removed from SNAP. In Virginia, SNAP participants whose participation spell began prior to the reinstatement of work requirements generally had 12-month recertification periods. Importantly, compliance with work requirements was not evaluated until their *next* scheduled recertification after the reinstatement of work requirements. Within this group, those who were not in compliance at this next recertification were given a 6-month period before their subsequent recertification, at which point they would be removed from the program if they were not meeting work requirements. For example, an ABAWD who entered in September 2013

[6] Moreover, childless adults were not eligible for TANF or Medicaid in Virginia during our sample period.

[7] In addition to Virginia's 95 counties, the state classifies 38 independent cities as county-equivalents for Census purposes. For brevity, our description refers to both "true" counties and these 38 cities as counties.

might not make contact with the SNAP office again until they were notified of upcoming recertification requirements in August 2014. If the participant remained otherwise eligible but was not working, she could be certified for another 6 months. In this case, she would not be removed from SNAP until March 2015.[8] In contrast, newly entering ABAWDs were given 4 to 6 month recertification periods (depending on their month of entry). A 4-month recertification is the standard dictated by USDA policy.[9] Virginia was able to initially and temporarily implement a 6-month recertification policy by using the 15 percent exemptions discussed in Section 2.1 (see Appendix B for more details).[10] In order to accurately capture the impact of work requirements while accounting for this gradual roll-out, our main RD estimates focus on participation and employment two years after the official reinstatement of work requirements.

2.3 Administrative Data on SNAP Participation and Earnings

We use annual administrative records from the the Virginia Department of Social Services (DSS) between 2007 and 2015. The files include data on demographics, disability and employment status, receipt of unearned income, and the first and last calendar months of every SNAP participation spell. Demographics include age in months, gender, education, race, zip code of residence, and county of the participant's SNAP program office.[11] In addition to age, two additional variables report information relevant for determining ABAWD status. The first measures the status of general work registration and reasons for any exemption using 21 categorical values. The second measures disability status, also using 21 categorical values, including which disability programs the SNAP participant is enrolled in. Our main specifications consider individuals who have no known exemptions or disabilities and have no children in their SNAP household. These individuals would typically be considered ABAWDs if they are under age 50, and non-ABAWDs if they are over age 50.[12]

[8] Virginia state officials have confirmed that participants were not informed of their work requirements nor their next recertification period in advance of recertification.

[9] These four months are composed of the 3 allotted months of benefits without meeting work requirements within a 3-year window as well as an initial partial month of benefits that does not count towards the 3 allotted months.

[10] The USDA explicitly encouraged states to apply the 15 percent waivers to ABAWDs in order to extend their eligibility periods immediately following the expiry of statewide work requirements exemptions: `https://fns-prod.azureedge.net/sites/default/files/snap/FY-2015-ABAWD-Exemptions-Memo-Adjusted-for-Carryover.pdf`.

[11] Not all city-counties have a physical SNAP office located within their borders, but all ordinary counties do. SNAP applicants who apply for SNAP through the wrong program office are still subject to the rules of the county of their residence and their applications are typically either transferred or denied.

[12] To validate this definition in our data, we compare our count of ABAWDs with official counts using external data provided by Virgina DSS that includes a detailed set of codes for ABAWD status and

We match these administrative records from DSS to employment records collected by the Virginia Employment Commission as part of the state's Unemployment Insurance (UI) program. These records contain a panel of quarterly earnings from 2005 to 2017. Using the UI records, we define quarterly employment as an indicator for appearing in the wage data that quarter.[13] In analyzing earnings outcomes, we deflate quarterly earnings to 2018Q1 USD using the all-items CPI.

The ability to link SNAP administrative records with administrative earnings histories provides major advantages relative to survey data such as the Current Population Survey (CPS) or the American Communities Survey (ACS). First, we observe the universe of SNAP participants and UI-covered earnings in Virginia. Survey data have been shown to undercount SNAP participants by up to 40 percent (Meyer and Mittag 2019) and to measure income with systematic errors (Bee and Mitchell 2017). Our estimates are therefore less likely to find a false negative due to attenuation bias, side-stepping a common criticism of existing research on work requirements (Rachidi et al. 2019). Second, we have a large sample with detailed geographic information, including geographic areas that are typically censored in survey data due to small cell sizes. These features are crucial for precision in our RD estimates. Finally, we are able to link within-person administrative records spanning more than a decade. We leverage this long panel to construct measures of labor force attachment and to assess impacts across alternative time horizons.

Despite these advantages, the data also have some limitations. First, the SNAP administrative data do not report benefit amounts. Second, UI wage records do not include all workers, and in particular miss self-employed workers, federal employees, and independent contractors.[14] This fact does not threaten the validity of our estimates unless the *composition* of employment changes due to work requirements. For example, our method could under-estimate the impact of work requirements on labor force participation if the policy primarily impacts the transition from non-employment to self-employment. Our results include robustness checks that help to account for sources of employment that are not covered by UI (Appendix Figure 7).

Table 1 describes the characteristics of Virginia SNAP participants in September 2013 (the last month before the reinstatement of work requirements). We report descriptive statistics separately for adults whom we classify as ABAWDs and adults whom we do not

exemptions. The number of ABAWDs in our data is 96.5 percent of the official count, providing confidence that we are accurately measuring ABAWDs among SNAP participants.

[13]Our results are robust to alternative definitions of employment that we have tested, such as an indicator for earning above the full-time minimum wage.

[14]Self-employed workers comprise about 10 percent of the U.S. workforce. See, for example, Steven Hipple and Laurel Hammond (2016) "Self Employment in the United States."

classify as ABAWDs due to either their age, having a dependent, or satisfying a specific exemption.[15] In this month, there are 89,507 unique ABAWDs, which represents 9.1 percent of the total beneficiary population. The mean age of ABAWDs is 32.8 years, about ten years younger than other adults. A smaller share of ABAWDs are female (40 percent of ABAWDs vs. 67 percent of other adults), married (7 percent vs. 21 percent), report unearned income to DSS (7 percent vs. 41 percent), or have ever reported a disability in the past (10 percent vs. 35 percent). According to UI records, ABAWDs have slightly lower levels of employment and lower annual wage earnings than other adults on SNAP. Finally, ABAWDs are more likely to be homeless (14 percent vs. 2 percent).

[15] We present descriptive statistics of all SNAP households over the entire period of our data in Appendix A.

Table 1: Descriptive Statistics of SNAP Enrollees in September 2013

	ABAWDs		Non-ABAWD Adults	
	Mean	SD	Mean	SD
Age	32.8	9.7	43.1	17.1
Female	0.40	0.49	0.67	0.47
Married	0.07	0.25	0.21	0.41
Household Size	1.3	0.7	2.6	1.6
Homeless	0.14	0.34	0.02	0.14
White	0.42	0.49	0.46	0.50
Black	0.46	0.50	0.42	0.49
Some College+	0.10	0.30	0.12	0.33
Has Earned Income (DSS)	0.17	0.37	0.26	0.44
Has Unearned Income (DSS)	0.07	0.26	0.41	0.49
Avg. Annual Earnings (UI)	3,504	5,769	4,642	8,027
Fraction of Months Employed (UI)	0.32	0.34	0.31	0.39
Ever reported...				
Any Disability	0.10	0.30	0.35	0.48
Exempt from Work Registration	0.39	0.49	0.77	0.42
Exempt Due to Dependent	0.11	0.31	0.32	0.47
Medicaid Recipient	0.44	0.50	0.78	0.41
TANF Recipient	0.12	0.32	0.24	0.43
SNAP E&T Participant	0.16	0.37	0.06	0.25
Moved County	0.33	0.47	0.31	0.46
N	89,507		473,977	

Note: Table reports descriptive statistics of SNAP enrollees from September 2013. The top panel shows demographic data from DSS records, with the exception of the bottom two rows showing earnings and employment from UI records. Some College+ refers to educational attainment of some college or higher (college graduate or advanced degree). The bottom panel reports the fraction of people enrolled in September 2013 who had the designated indicator at any point since the start of the sample period (January 2007).

3 Effects on Program Participation

This section estimates the effect of work requirements on total SNAP participation. First, Section 3.1 documents trends of lower retention and falling total SNAP participation in the wake of work requirements. Section 3.2 then implements RDs, our primary identification strategy, to estimate the effect of work requirements on participation. Section 3.3 shows that slowdowns in the flow of new entrants account for a small minority of the total participation drop. Hence, reduced participation is driven primarily by exit among existing participants and shorter spells among new entrants.

3.1 Falling Participation

We begin by showing the acceleration of exit from SNAP when participants are confronted with work requirements. The survival plot in Figure 1a shows the fraction of able-bodied adults who continue to be on SNAP for up to thirteen months after the start of their participation spell. The plot subsets to ABAWDs younger than 50, and adults 50 and older who would meet the criteria for ABAWD if not for their age.[16] We also restrict attention to SNAP participants who first enter after the reinstatement of statewide work requirements between October 2013 and April 2014. For the first six months after entry, none of these participants is required to work in order to continue to receive SNAP benefits. Each month, a small fraction of participants leave SNAP for other reasons (e.g., income rising above the threshold) in equal proportions across the under-50 (dashed line with circles) and 50-and-above (solid line with triangles) groups.

After six months, those under 50 years old must demonstrate that they meet work requirements or be removed from program rolls.[17] While participation survival declines in both groups after six months, the decline among those under 50 is much larger than the the corresponding decline for those 50 or older.[18] By month seven, the surviving fraction of ABAWDs is more than 30 percentage points (over 40 percent) smaller than the surviving fraction of able-bodied adults aged 50 and older. Since the sample consists of SNAP participants who enter the program at different times over the course of several months, the sharp decline we observe among ABAWDs after six months is not explained by a

[16]The under-50 group excludes 49-year olds because they will pass the age-50 cutoff within the year.

[17]In addition, at the six-month mark, both groups have some sort of reporting requirement. Those that are 50 or older would typically recertify after 12 months but have a lighter reporting requirement midway through their certification period. Those that are under 50 are required to recertify after 6 months.

[18]The sharper drop between the months we label as 6 and 7 than between the months we label as 5 and 6 is attributable to imperfect measurement. Because we only observe the month of initial entry, rather than the precise date, some of the participants in the plot do not actually face binding work requirements until the month we label as month 7.

common calendar-time shock.

The sharp drop tracks subsequent policy changes. Figure 1b repeats the survival plot for later program entrants, those newly entering between July 2014 and December 2014, where the under-50 group was required to meet work requirements after only four months rather than after six months.[19] The figure shows a remarkably similar pattern to Figure 1a, with nearly identical survival curves for the under-50 and 50-and-above groups during the first four months, and then a sharp divergence after the under-50 group must meet work requirements. As a placebo test, Appendix Figure A.1 produces corresponding survival curves for the subset of counties that received exemptions from ABAWD work requirements in May 2014. Participation differs little by age when work requirements are not in effect. Taken together, these survival curves strongly suggest that work requirements reduced retention substantially among new ABAWDs.

Next, we document the magnitude of total participation declines following the reintroduction of work requirements. Figure 2a shows the total monthly participation counts before and after the reinstatement of work requirements (dashed red vertical line), comparing beneficiaries slightly younger than 50 (dashed line) to those 50 and slightly older (solid line). Across age groups, the participation increase that followed the Great Recession began to flatten and decline after 2012. After the reinstatement of work requirements, participation fell sharply among the under-50 group. Participation declines in the 50-and-above group, likely due to the gradual economic recovery, were much slower.

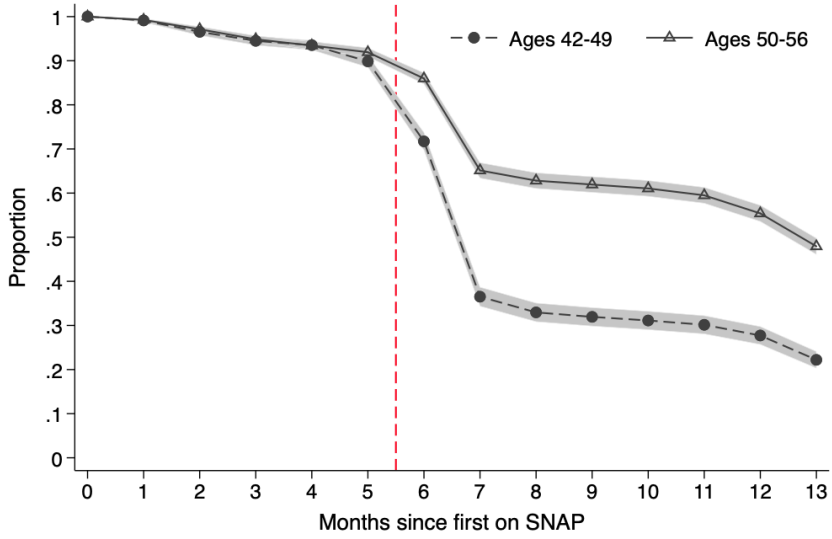
While our main RD identification strategy estimates local average treatment effects for 50-year-old SNAP participants, Figure 2b suggests that the effects we document may be generalizable to a broad range of ages. The figure plots participation counts for 5-year age bins, as a percentage of the corresponding age bin's count in September 2013 (just prior to the reinstatement of work requirements). While the groups aged 50 and above experience slow and heterogeneous declines in participation, all age ranges from 20 to 49 experience nearly identical relative declines in participation. Although the RDs in subsequent sections only estimate participation declines around age 50, the patterns in Figure 2b suggest that the impact of work requirements does not vary dramatically across the age distribution.

3.2 Estimates of Total Participation Impact

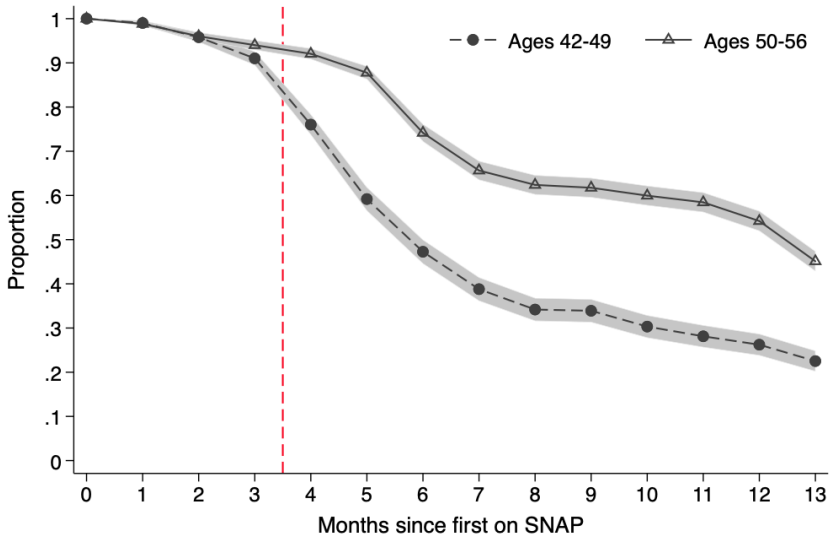
Section 3.1 shows that SNAP participation dropped differentially among participants subject to work requirements when work requirements were reinstated. However, potential underlying differences between the under-50 and 50-and-above groups in the figure make it

[19]The change from six to four months was a result of Virginia discontinuing use of its 15 exemptions, described in Section 2, in October 2014.

Figure 1: SNAP Participation Survival by Work Requirements Status



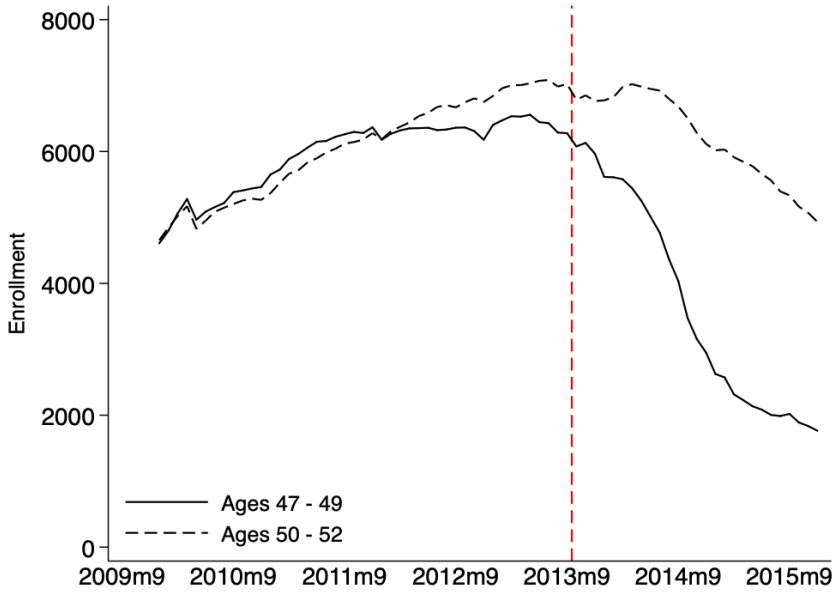
(a) Participants With Six-Month Recertification Periods



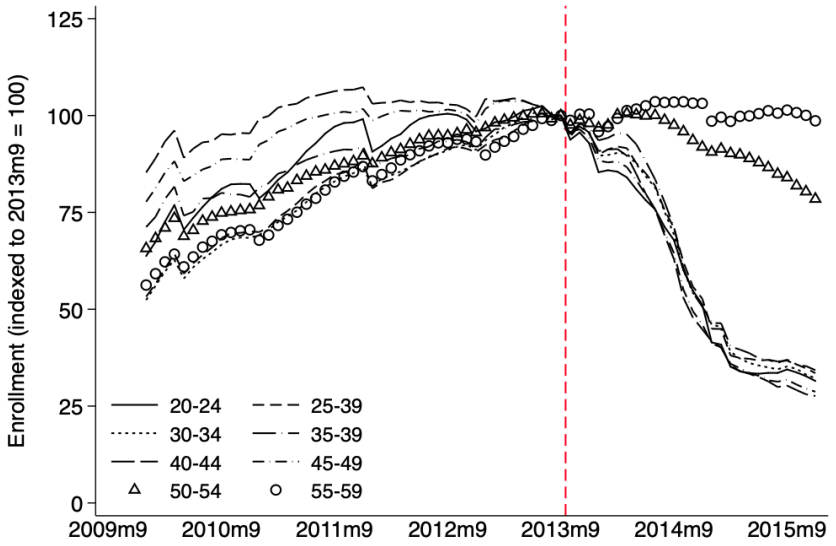
(b) Participants With Four-Month Recertification Periods

Notes: Figure plots participation survival for ABAWDs aged 42–49 and able-bodied adults without dependents or disabilities aged 50–56 in counties with active work requirements, and who have not had a SNAP spell earlier in our sample period. Work requirements apply to ABAWDs (dashed line), who are required to start meeting them six months (top panel) or four months (bottom panel) after initial entry (dashed red vertical line) in order to continue to receive SNAP benefits. The top panel plots participation survival for participants whose SNAP spells begin between October 2013 and April 2014, prior to the change from six months to four months. The bottom panel plots it for those whose SNAP spells begin between July 2014 and December 2014, after the change to four months is fully in effect.

Figure 2: Total Participation and New SNAP Entry Around Work Requirements



(a) Total Participation Counts (Raw)



(b) Total Participation Counts (Normalized), By Age Group

Notes: Plots of monthly total participation counts in Virginia, for adults in the specified age ranges who would meet the definition for ABAWD if age were ignored. The dashed red vertical line corresponds to the end of the statewide ARRA exemptions from work requirements in September 2013. Top panel plots raw counts for age groups immediately surrounding age 50. Bottom panel plots counts for a wider range of age groups, normalized to within-group participation in September 2013.

difficult to draw conclusions about the portion of the differential drop, if any, that is *caused* by work requirements. To obtain a credible point estimate for the causal impact of work requirements on total participation, we exploit the sharp discontinuity in ABAWD classification at age 50 using a regression discontinuity framework.

We first estimate the impact of work requirements on total participation counts for the entire state of Virginia. Our preferred RD specification is a local linear model, with age (the running variable) centered around 50:[20]

$$Y_a = \alpha + \beta \cdot U50_a + \gamma \cdot (age_a - 50) + \delta \cdot U50_a \cdot (age_a - 50) + \varepsilon_a \tag{1}$$

where Y_a is the count of participants aged a, incremented in months. The variable $U50_a$ is an indicator for whether age a is strictly below 50, and therefore marks the age range where work requirements apply. The coefficient of interest is β, which measures the jump in the regression function at the discontinuity.[21]

The primary specification estimates the model for participation counts 24 months after the reinstatement of work requirements. This allows enough time to capture the entirety of the gradual roll-out of work requirements (described in Section 2.2). In evaluating outcomes at 24 months, we exclude a donut of SNAP participants who are older than 48 and younger than 50 as of September 2013. These participants cross the eligibility cutoff during the two-year period, and therefore do not retain their initial below-50 status throughout the study period. In order to avoid ad hoc bandwidth selection for the RDs, we follow the systematic procedure of Calonico et al. (2014) to select (potentially asymmetric) optimal bandwidths. Appendix Figure A.7 suggests that our conclusions remain similar over a wide range of bandwidth choices.

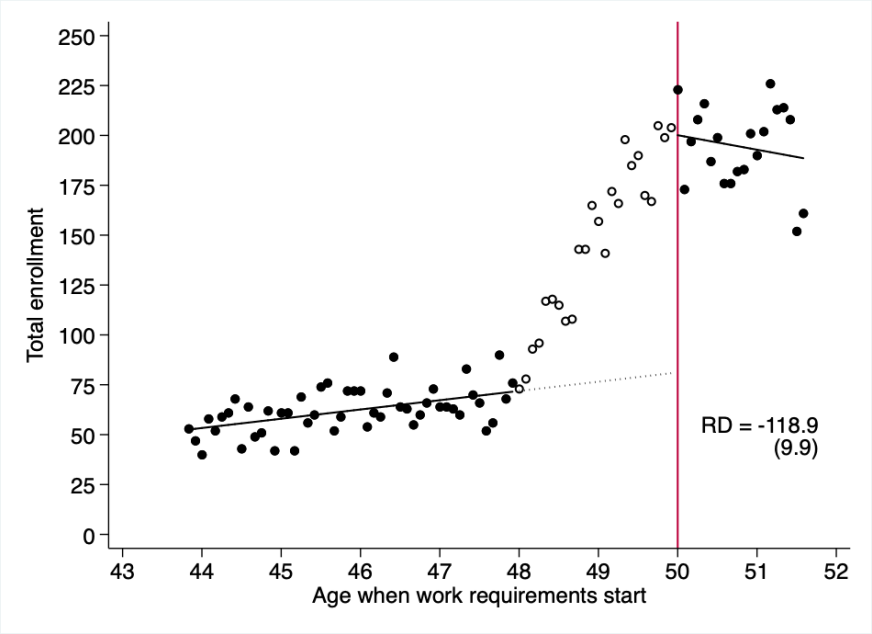
Figure 3 displays the results of the total participation RD. The regression is estimated using granular one-month age bins. The sharp positive increase in participation at age 50 suggests that, two years after reinstatement, work requirements reduce total ABAWD participation by 58 percent. This drop is calculated as the reduction within each monthly age bin (119 participants), compared to the number of participants at age 50 (205 participants).

Appendix Figure A.2 provides further evidence that the participation reduction is caused by work requirements. The figure shows the total participation RDs estimated at earlier periods: 12 months before the reinstatement of work requirements, the month that work requirements were reinstated, and 12 months after the reinstatement of work

[20]We follow Gelman and Imbens (2017) in using low-order polynomial specifications. Appendix A checks robustness to alternative specifications.

[21]Participation counts include only the 110 counties in which work requirements remain on after their reinstatement; the 23 counties that later regain exemptions are excluded.

Figure 3: RD Estimate of Total SNAP Participation, 24 Months After Work Requirements



Notes: Figure displays the RD results for total SNAP participation 24 months after work requirements were reinstated in Virginia. The scatter plot shows total participant counts by age in quarters, and the lines show a linear regression fit on both sides of the eligibility threshold. Standard errors clustered by monthly age in parentheses. The sample consists of the subset of counties for which work requirements remain on after October 2013.

requirements. In each RD, we define the excluded donut to correspond to those participants whose exposure to work requirements changes between the estimation period and the post-ARRA reintroduction of work requirements.[22] The periods before and at the reinstatement serve as placebo checks: participation on either side of the age 50 threshold is nearly identical, suggesting that the jump in Figure 3 is *not* attributable to discontinuities at age 50 that are present when work requirements are absent. The period 12 months after the reinstatement of work requirements shows a similar pattern to Figure 3, but the participation drop below age 50 is smaller, consistent with the gradual roll-out of the policy. To verify robustness, Appendix Figure A.3 plots the RD estimates for a wide array of time horizons using linear and quadratic specifications.

3.3 Retention vs. Deterrence

Sections 3.1 and 3.2 provide compelling evidence of a causal effect of work requirements on total SNAP participation. This section conceptually clarifies how this decline may occur through three distinct channels:

1. Deterrence of potential new enrollees.
2. Decreased retention among new enrollees.
3. Decreased retention among existing participants.

We perform a series of rough exercises to approximate the relative magnitude of each channel in explaining the overall participation decline. Note that Figure 3 estimates a missing mass of 119 beneficiaries per monthly age bin just below age 50.

Two different exercises suggest that the first channel—deterrence of potential new enrollees—appears to explain only a small fraction of the total enrollment decline. First, Figure 4 plots monthly new entrant counts. There is no clear trend break in the flow of new entrants following the reintroduction of statewide work requirements. Instead, the flow of new entrants under 50 decreases at a steady rate starting in 2011. Alternatively, we estimate (noisy) RDs of total new enrollment in each month from October 2013 through September 2015, and sum the corresponding enrollment drops together. Appendix Figure A.4 shows these coefficients. The coefficients sum to –20, suggesting that new enrollment deterrence can only explain 17 percent (20/119) of the total enrollment decline.

The second channel—decreased retention among new enrollees—is difficult to estimate credibly given the possible selection of unobservably different beneficiaries into the program

[22]The earlier periods do not require a donut; the period 12 months after the reinstatement of work requirements requires a one-year age donut.

Figure 4: New SNAP Entry Around Work Requirements

Notes: Plot of monthly counts of new entrants in Virginia, for adults in the specified age ranges who would meet the definition for ABAWD if age were ignored. Points represent month-deseasonalized, mean-preserving new entrant counts. The dashed red vertical line corresponds to the end of the statewide ARRA exemptions from work requirements in September 2013.

over time. As a very rough approximation, we estimate the loss in retention among new enrollees by estimating separate RDs around age 50 for each subsequent monthly cohort of new entrants after September 2013.[23] Point estimates are shown in Figure A.5. Multiplying each coefficient by the number of new 50-year-old enrollees in each month yields a sum of –21, suggesting a modest role for new beneficiary retention of around 18 percent (21/119).

Finally, we multiply the number of 50 year olds on the program in September 2013 (214) by the retention effect calculated later in the paper (–0.241) and conclude that 52 participating individuals per monthly age bin left due to work requirements. This suggests that retention among new enrollees can explain 44 percent (52/119) of the total enrollment decline.

These exercises are very imperfect but are nonetheless useful. Namely, they provide evidence that deterrence is *not* the primary driver of enrollment declines. Instead, retention of existing beneficiaries appears to be the most important channel in total enrollment declines.

[23]We adjust the donut in each RD to exclude those under 50 who turn 50 before September 2015.

4 Effects on Participant Exit

This section estimates the effect of introducing work requirements on the retention of existing beneficiaries. The regressions are estimated on our "stock" population of childless adults who were participating in SNAP as of September 2013, just before the reinstatement of work requirements. The stock population has three attractive features. First, it allows us to study the heterogeneity of work requirements using individuals' ex ante characteristics (which come from SNAP data). Second, it defines the sample prior to the reinstatement of work requirements, thereby avoiding selection arising from nonrandom deterrence of entry into SNAP. Third, it allows us to estimate the effects of work requirements on labor market outcomes for a population that is likely to be impacted by SNAP policy changes. We only include individuals from the large majority of counties in which work requirements remained in force for two or more years, which covers 70.7 percent of the full stock sample. This sample definition allows us to measure outcomes for all participants after the same elapsed time since the reinstatement of work requirements. This is our main sample for the remainder of the paper.

As before, our preferred RD specification is a local linear model, with age (the running variable) centered around 50:[24]

$$1(Enrolled)_i = \alpha + \beta \cdot U50_i + \gamma \cdot (age_i - 50) + \delta \cdot U50_i \cdot (age_i - 50) + \eta \cdot X_i + \varepsilon_i \qquad (2)$$

$1(Enrolled)_i$ is our outcome of interest for individual i in a predetermined future month. The vector X_i includes a handful of individual-level controls to increase precision; point estimates are very similar with or without controls.[25] The coefficient of interest is β, which measures the jump in the regression function at the discontinuity. We begin by running these regressions on our stock sample of SNAP participants who were enrolled as of September 2013, when the statewide exemption was still in effect, and examine outcomes after the October 2013 reinstatement of work requirements.

Our main specifications measure participation two years after work requirements resume (September 2015). This allows enough time to capture the entirety of the gradual roll-out of work requirements (described in Section 2.2), although Appendix Figure A.6

[24]We follow Gelman and Imbens (2017) in using low-order polynomial specifications. Appendix A checks robustness to alternative specifications.

[25]The baseline specification includes indicators for female, married, homelessness, any earned income, any unearned income, and some college according to DSS records. It also includes categorical variables for race and linear controls for case size from the SNAP records, pre-period wage earnings, and the fraction of months with employment in the pre-period from the UI records. The pre-period in this case includes all data back to the beginning of our sample window (January 2007). Other controls are taken as snapshots in September 2013.

shows stable results over a wide set of durations. In evaluating outcomes at 24 months, we exclude a donut of SNAP participants who switch from being subject to work requirements as of September 2013 to not being subject to work requirements by September 2015, as in Section 3.2. Standard errors are clustered by monthly age (the discrete running variable). Again, our main results use bandwidths determined by the method in Calonico et al. (2014), although Appendix Figure A.7 demonstrates robustness across bandwidths from 2 to 10 years.

4.1 Identification Assumptions

The identification assumptions for these RD regressions of participant exit are analogous to the assumptions required for the labor market outcomes RD regressions in Section 5. We therefore discuss both together here. The key identification assumption of the RD is that the potential outcomes are smooth at the age 50 cutoff in the absence of the treatment.

We perform a battery of checks to validate the research design. First, we test for balance in covariates at the discontinuity by replacing $1(Enrolled)_i$ with each of our demographic controls. Table 2 shows there are rarely differences across the threshold using either a linear or quadratic specification: the magnitudes of the differences are generally small and only 1 of 17 is statistically significant. Second, we verify that the density of the age distribution is smooth at the discontinuity. Appendix Figure A.8 shows there is no visual evidence of sorting around the cutoff. We fail to reject the null hypothesis of continuity in the density at age 50 based on the manipulation tests in Frandsen (2017), which adapts the standard density tests for a discrete running variable (McCrary 2008, Cattaneo et al. 2018). Finally, we re-estimate the RDs using as a placebo the ARRA time period when work requirements were not in effect for any group (Figure 5b). These checks support the identifying assumptions required for the validity of the research design.

4.2 Estimates of Participant Exit

Figure 5a displays our main RD results. The sharp positive increase in participation at age 50 suggests that work requirements reduce ABAWD participation by a statistically significant 24 percentage points. This represents a 42 percent decline from the mean among participants aged 50.[26] As further evidence that this decline is a result of work requirements, Figure 5b replicates the specification using data from the statewide ARRA exemption period between 2011 and 2013, when all participants were exempt from work requirements. This placebo regression uses an analogous "stock" sample of participants enrolled in September 2011 and

[26]Recall that some participation attrition naturally occurs over time, as shown in Figure 1a.

Table 2: Covariate Balance in RD

	Discontinuity	S.E.	Control Mean	% diff	N
Female	0.020	0.026	0.457	4.5	8,123
White	-0.009	0.025	0.409	-2.1	7,902
Black	-0.004	0.026	0.519	-0.8	7,409
Married	0.035	0.014	0.075	46.7	9,385
Household Size	-0.006	0.029	1.284	-0.5	7,554
Household Head	-0.006	0.009	0.941	-0.7	7,308
Homeless	-0.007	0.018	0.147	-4.8	8,350
High School	0.018	0.024	0.541	3.3	9,000
Some College or Higher	-0.015	0.015	0.098	-15.4	9,541
Has Earned Income	-0.011	0.012	0.186	-6.0	8,131
Has Unearned Income	0.013	0.012	0.087	15.2	10,332
Earned or Unearned Income	-0.004	0.014	0.266	-1.4	9,570
Fraction of Months Employed (7yr avg)	0.008	0.011	0.311	2.6	7,369
Avg. Annual Earnings (7yr avg)	298.432	194.442	4466.207	6.7	9,800
Fraction of Months Employed (3yr avg)	-0.001	0.013	0.288	-0.5	6,480
Avg. Annual Earnings (3yr avg)	298.790	221.707	3635.817	8.2	8,908
Unemployment Rate	0.041	0.064	7.394	0.6	8,738

Notes: Table presents balance tests of covariates at SNAP enrollment using our "stock" sample. Each row corresponds to a different regression with that characteristic as the dependent variable. The discontinuity measures the jump in the regression function at age 50. Standard errors are clustered by monthly age (the running variable). The Control Mean denotes the mean of that characteristic immediately to the right of age 50. Each regression uses MSE-optimal bandwidths calculated separately for each side of the cutoff and for each outcome, and a uniform kernel to weight observations. Sample sizes vary depending on the bandwidth used.

measures outcomes in September 2013. There is no statistically or economically significant difference in participation across the age 50 cutoff during this placebo period.

Our results are robust to a wide variety of specifications. As discussed above, Appendix Figure A.6 traces out the RD results for participation where outcomes are measured at alternative time periods, ranging from 1 to 27 months following the reinstatement of work requirements. The effect begins to appear in the seventh month after work requirements resume, which is the first month that we should expect SNAP participants to be disenrolled if they are not meeting the requirements. The participation drop reaches 24 percentage points within roughly 18 months and then remains at that level, consistent with the disenrollment schedule described in Section 2.2.

These results are consistent for different choices of the age bandwidth around age 50. For each outcome, Appendix Figure A.7 plots the baseline RD estimate from a bandwidth of 2 years up to 10 years, with the same bandwidth used on both sides of the cutoff. As in the main models, these regressions exclude SNAP participants over 48 and younger than 50. The estimated drop in participation demonstrates little sensitivity over this range of symmetric bandwidths.

4.3 Screening Using Work Requirements

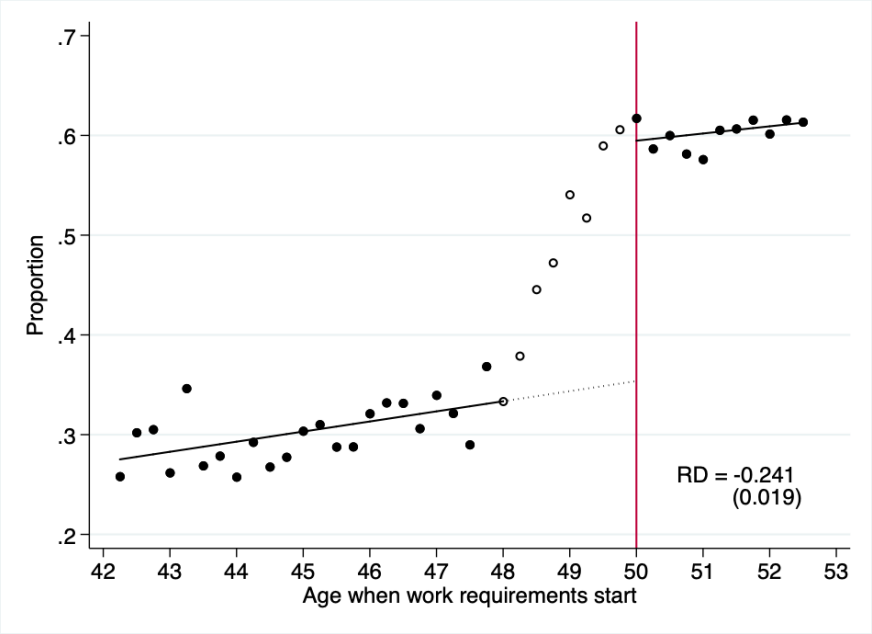
Section 4.2 documents that work requirements lead to substantial exit from SNAP. This section examines *who* exits from SNAP as a result of work requirements. We estimate screening impacts using two alternative measures. The first assesses the differential sensitivity of exit to work requirements as a function of participants' observable characteristics. The second asks which characteristics are disproportionately represented among exiters.

First, we assess the differential sensitivity of individuals to work requirements based on a binary attribute x. To do so, we fully interact the standard RD specification with an indicator for each characteristic x:

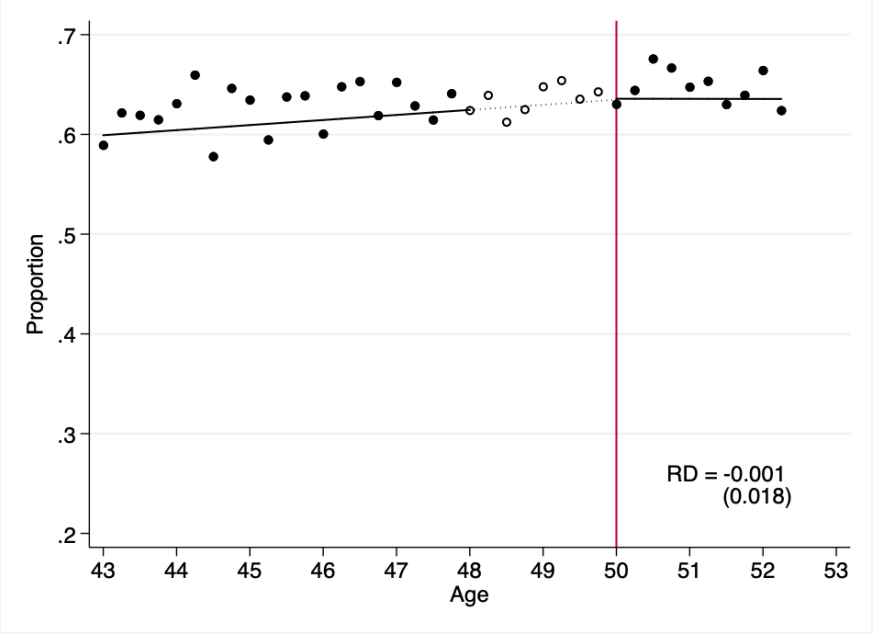
$$\begin{aligned} 1(Enrolled)_i = \alpha_1 + \alpha_2 x_i + \beta_1 U50_i + \beta_2 U50_i \cdot x_i + \gamma_1(age_i - 50) + \gamma_2(age_i - 50) \cdot x_i \\ + \delta_1(age_i - 50) \cdot U50_i + \delta_2(age_i - 50) \cdot U50 \cdot x_i + \varepsilon_i \end{aligned} \tag{3}$$

where $1(Enrolled)_i$ represents participation in SNAP two years after the expiry of ARRA statewide work requirements exemptions. This specification is estimated on our stock population, with a separate regression for each characteristic x. Table 3 reports β_2, which captures the differential discontinuity for the group with $x = 1$ in percentage points. To

Figure 5: RD Estimates of SNAP Retention, 24 Months After Work Requirements



(a) Participation During Work Requirements



(b) Placebo Test: Participation During ARRA Exemptions

Notes: Panel (a) visually displays the RD results for SNAP participation after 24 months of work requirements. The scatter plot shows covariate-adjusted means by age in quarters, and the lines show a linear regression fit in months on both sides of the eligibility threshold. Standard errors clustered by monthly age in parentheses. The sample consists of work-registered individuals on SNAP in September 2013 and in the subset of counties for which work requirements remain on after October 2013. As a placebo test, Panel (b) replicates the analysis among those enrolled in September 2011 and measures enrollment in September 2013, over which period no work requirements were in effect.

account for the fact that some groups have higher baseline retention rates, columns 2 and 3 report the size of the discontinuity as a fraction of retention at age 50 for the group with $x = 0$ and $x = 1$, respectively. Using the delta method, we test whether these two relative discontinuities are statistically different, and report the p-value in column 4.

For our second measure of screening, Table 4 reports RD regressions on the proportion of cases with characteristics x among the set of all cases that exit SNAP between September 2013 and September 2015:

$$x_i = \alpha_1 + \theta_1 U50_i + \gamma_1(age_i - 50) + \gamma_2(age_i - 50) \cdot U50_i + \varepsilon_i \tag{4}$$

In this regression, the coefficient of interest is θ_1, which represents the change in composition of exiting cases across the age 50 cutoff. Appendix Table A.2 runs a similar regression, but uses the sample who exited within 18 months of the introduction of work requirements instead of 24 months.

While the statistical significance of different factors depends on the specification, these regressions agree on a broad story. Table 3 shows higher sensitivity to work requirements among cases classified as homeless, without earned income, and not disabled. Tables 4 and A.2 show that work requirements induce disproportionate exits among chronic SNAP users (Tables 4 and A.2), black households (Table 4), and homeless cases (Table A.2). Overall, the results suggest that work requirements disproportionately impact beneficiaries with characteristics suggesting greater economic vulnerability.

4.4 Channels Driving Exit

Work requirements may drive program exit through at least two distinct channels. First, SNAP participants may exit as a result of failure or unwillingness to work or perform other qualifying activities. Second, participants may exit due to additional reporting requirements. For example, as described in Section 2.2, the additional cost of assembling documents, such as pay stubs, that verify that work requirements are being met at each recertification may prove substantial. The program exit documented in Figure 5a has different policy implications depending on which mechanism is the primary driver. For example, if participants' verification costs are negatively correlated with their utility of receiving SNAP, then imposing high verification costs may advance the policy goal of allocating benefits to those who value them most.

The following results suggest that practical verification costs are meaningful, but are not the primary driver of the impact we measure. In Figure 6, we take advantage of a

Table 3: Screening RD, 24 Months After Work Requirements

	β_2	β_1/α_1	$\frac{(\beta_1+\beta_2)}{(\alpha_1+\alpha_2)}$	p-value of difference
Female	0.043	-0.456	-0.360	0.117
	(0.044)			
Married	-0.002	-0.404	-0.458	0.608
	(0.070)			
Homeless	-0.090	-0.390	-0.516	0.065
	(0.050)			
White	0.021	-0.415	-0.400	0.750
	(0.031)			
Black	-0.073	-0.381	-0.440	0.328
	(0.040)			
Some College+	-0.024	-0.401	-0.484	0.318
	(0.057)			
Has Earned Income	0.106	-0.433	-0.288	0.017
	(0.037)			
Has Unearned Income	0.115	-0.426	-0.236	0.054
	(0.065)			
Ever Before UI Recipient	0.091	-0.433	-0.313	0.095
	(0.050)			
Ever Before Disability	0.153	-0.511	-0.166	0.000
	(0.053)			
Above Median Unemp. Rate	-0.025	-0.409	-0.411	0.971
	(0.047)			
Above Median Previous Time on SNAP	-0.078	-0.426	-0.409	0.732
	(0.033)			
Above Median Previous SNAP Spell	-0.145	-0.342	-0.438	0.110
	(0.035)			

Notes: Table presents RD estimates of Equation 3. Each row presents results from a separate regression corresponding to the characteristic listed. $N = 15{,}558$. Separate MSE-optimal bandwidths calculated on each side of the donut. The column β_2 presents the differential jump at age 50 for people with the characteristic relative to those without. Standard errors clustered by monthly age in parentheses. The second column reports the retention of people without the characteristic, calculated as β_1/α_1. The third column reports retention for those with the characteristic, calculated as $(\beta_1+\beta_2)/(\alpha+\alpha_2)$. The p-value from the test that columns 2 and 3 are equal is reported in the last column, calculated using the delta method.

Table 4: Screening RD by Subgroup, 24 Months After Work Requirements

	Discontinuity	SE	Control Mean	% Diff
Female	-0.003	0.027	0.433	-0.8
Married	0.005	0.014	0.106	4.6
Homeless	0.017	0.017	0.139	12.2
White	-0.023	0.027	0.428	-5.3
Black	0.065	0.031	0.377	17.2
Some College+	-0.027	0.017	0.130	-21.2
Has Earned Income	-0.019	0.017	0.185	-10.4
Has Unearned Income	-0.015	0.015	0.095	-15.8
Earned or Unearned Income	-0.025	0.023	0.267	-9.5
Ever Before UI Recipient	-0.047	0.028	0.242	-19.4
Ever Before Disability	0.020	0.015	0.072	27.8
Above Median Unemp. Rate	0.046	0.027	0.369	12.5
Above Median Previous Time on SNAP	0.112	0.023	0.411	27.3
Above Median Previous SNAP Spell	0.095	0.023	0.447	21.2

Notes: Table presents RD estimates of Equation 4. Each row presents results from a separate regression corresponding to the characteristic listed. The first column presents the estimate on the indicator for under 50. Standard errors clustered by monthly age in parentheses are presented in the second column. The third column presents the percentage of 50-year olds who exited SNAP by September 2015 and have the characteristic listed as of September 2013. The last column presents the discontinuity as a percentage of the control mean. The unemployment rate is measured as the county average of the two year period between October 2013 and September 2015.

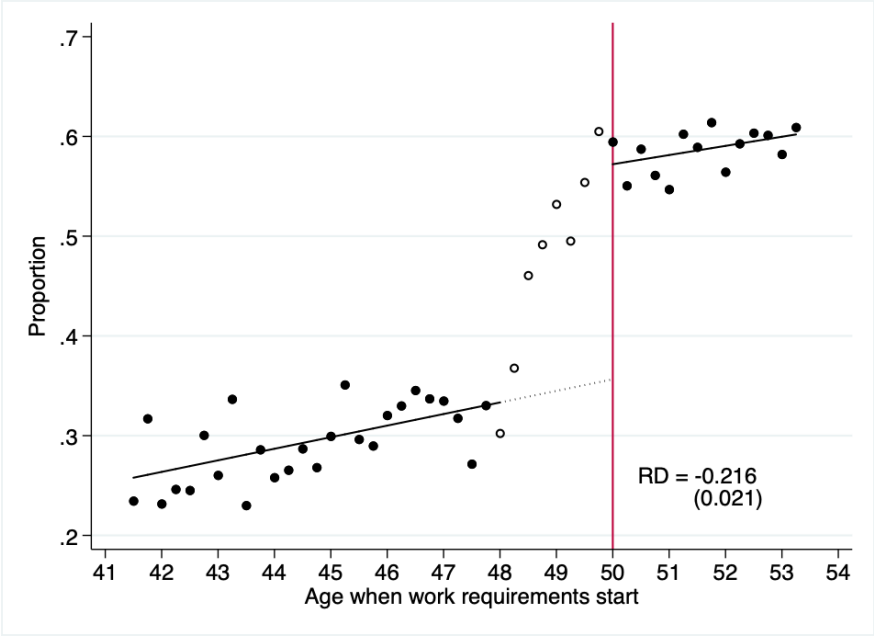
unique source of policy variation to isolate the impact of an additional recertification associated with the work requirements policy: the number of recertifications that participants face varies depending on the first month of their enrollment spell. Participants under 50 whose enrollment spells began between April and September must complete two recertifications in the 24 months between September 2013 and September 2015. The 50-and-older participants who are not subject to work requirements also must complete two recertifications over this period. On the other hand, participants under 50 whose enrollment spells began between October and March must complete *three* recertifications in the 24 months following September 2013. This variation in recertification requirements by month applies irrespective of the year in which the enrollment spell begins.[27]

The difference in the RD estimate between those who face two recertifications (Figure 6a) and those who face three recertifications (Figure 6b) can therefore be used to approximate the marginal impact of an additional recertification. This approximation is valid as long as there are no substantive changes in economic conditions or other drivers of exit occurring contemporaneously with the switches between the two- and three-recertification regimes. The results indicate that the effect of an extra recertification (6.8 percentage points) is equivalent to an additional 31.4 percent (6.8/21.6) of the counterfactual effect of the work requirements.[28] This verification channel plays a non-negligible but secondary role in program exit.

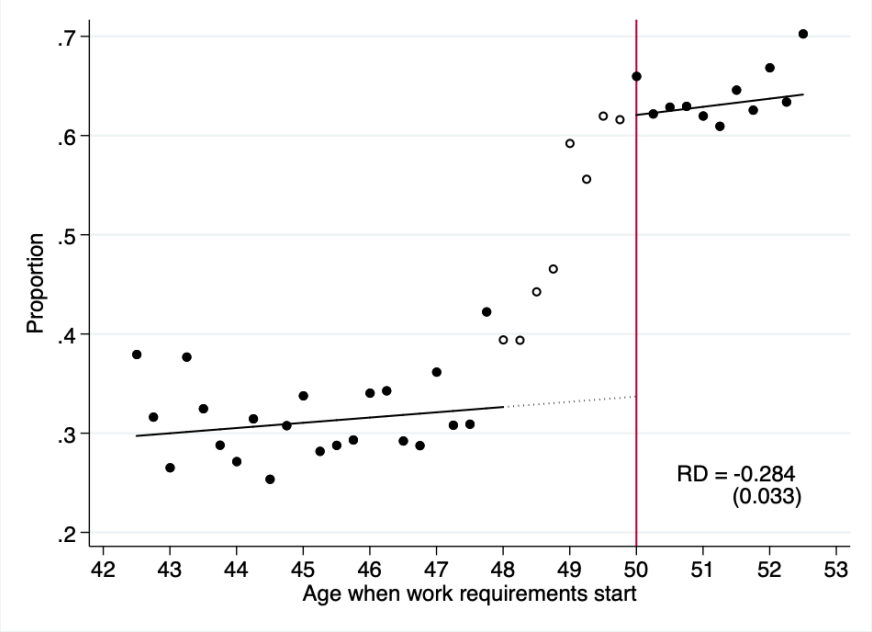
[27]To better understand this variation, consider two 47-year-old non-working beneficiaries with recertifications due in March and April, respectively. The March recertifier must submit paperwork in March 2014, September 2014 (due to the 6-month grace period), and September 2015. The April recertifiers must submit paperwork in April 2014, October 2014, and October 2015. By the time we assess retention in September 2015, the March recertifier must have submitted three rounds of paperwork, while the April recertifier must have submitted two. Note that we exclude May recertifiers, who actually have three recertifications due to the switch from a 6-month to a 4-month grace period (see Section 2.2).

[28]Equivalently, 23.9 percent of the RD estimate among those with an additional recertification is attributable to the additional recertification rather than to the work requirements themselves (6.8/28.4).

Figure 6: RD Estimates of SNAP Retention by Number of Recertifications, 8 Quarters After Work Requirements



(a) Baseline Number of Recertifications (Two)



(b) Additional Recertification (Total of Three)

Notes: Figure plots RD results for SNAP participation after 24 months of work requirements, separately estimated based on the number of recertifications faced by the participant in the 24 months after work requirements. Panel (a) estimates the effect for enrollment cohorts in which ABAWDs under 50 face the same number of recertifications (two) as the 50-and-older group. Panel (b) estimates the effect for enrollment cohorts in which ABAWDs have an additional recertification (for a total of three). Standard errors clustered by monthly age in parentheses. The sample consists of work-registered individuals on SNAP in September 2013 and in the subset of counties for which work requirements remain on after October 2013, with enrollment spells beginning in either April and June-September (Panel (a)) or October-March (Panel (b)).

5 Effects on Labor Market Outcomes

This section estimates the effect of work requirements on individual-level labor market outcomes using the stock population and regression specification described in Section 4. We first present estimates of the effects on employment, wage earnings, and other labor market outcomes. We then conduct robustness checks for both the employment and wage earnings estimates. Finally, we estimate RDs on quantiles of the earnings distribution to examine heterogeneity in the labor market impacts of work requirements.

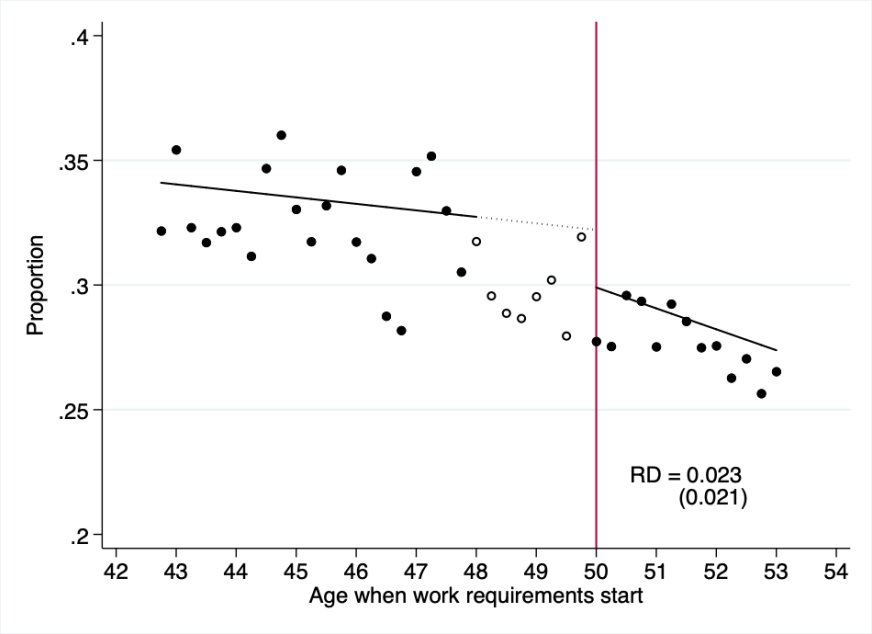
5.1 Estimates of Labor Market Effects

Section 3.2 documents the large participation drops due to work requirements. In contrast, our estimates of the average effects on employment and wage earnings are not statistically different from zero. Figure 7 shows the RD results for with an indicator for employment on the left-hand side, defined as having any UI-covered earnings 8 quarters after work requirements were reinstated. We detect no statistically significant impact of work requirements on employment on average, although we are unable to reject employment increases of up to 6.5 percentage points. To test robustness, Appendix Figure A.9 defines the dependent variable as the union of having a wage in the UI data or reporting a wage to the SNAP agency. This allows us to capture possible effects on self-employment, under the assumption that work requirements only induce additional self-employment if the affected individuals remain on SNAP. We still fail to detect a statistically significant impact on employment.

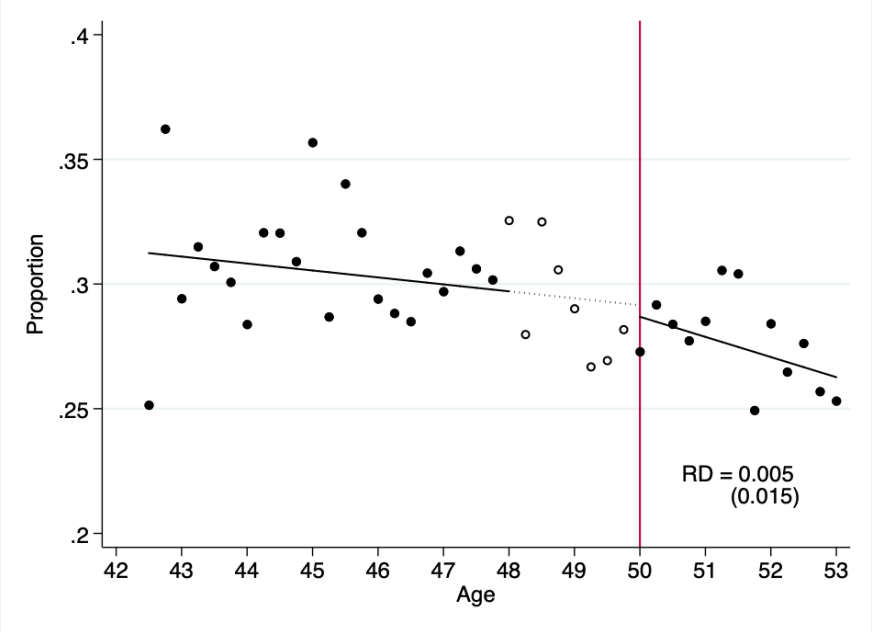
A potential explanation for this null result is that many SNAP participants have very low labor force attachment, making employment responses unlikely and diluting the average estimate. We further investigate this null result in Appendix Table A.3, which shows our primary specification using individuals with greater or lesser labor force attachment. To measure labor force attachment, we run a leave-one-out probit estimator for each observation, regressing an indicator for UI-covered employment in 2013Q3 on a large set of demographic covariates. Work requirements do not clearly increase UI-covered employment even for individuals with moderate or strong pre-existing attachment to the labor force.

We then assess whether UI-covered earnings change at the age 50 cutoff. Figure 8a shows no statistically significant impact on average earnings. However, the estimate is somewhat imprecise, and we are unable to statistically rule out increases of up to $65 per month. Appendix Figure A.10a shows qualitatively similar results for log earnings (conditional on employment).

Figure 7: RD Estimates of Employment, 8 Quarters After Work Requirements



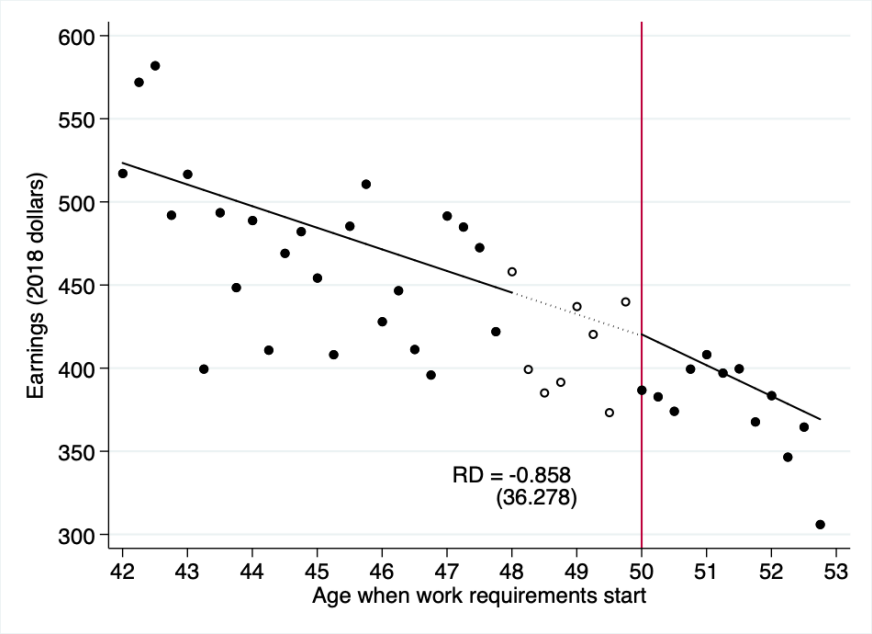
(a) Employment During Work Requirements



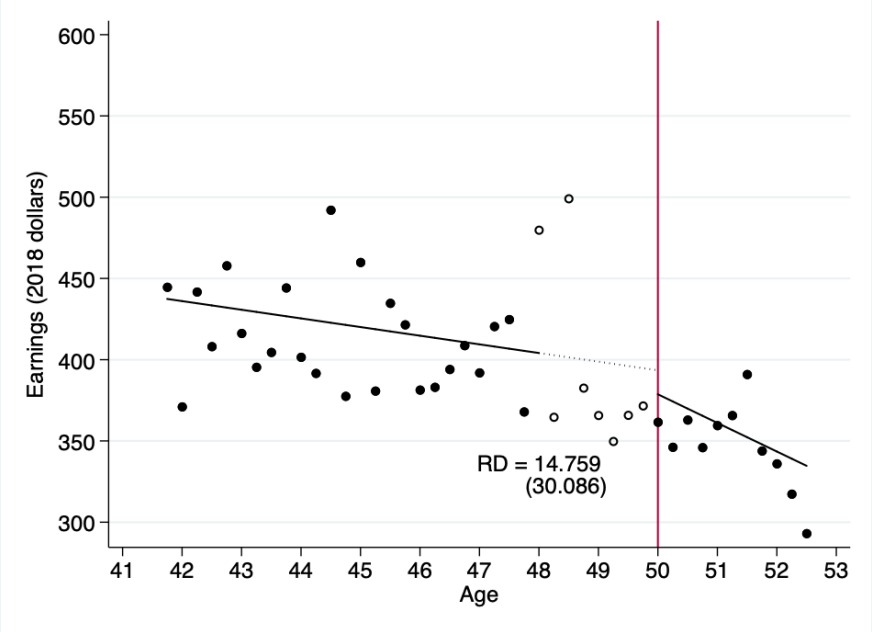
(b) Placebo Test: Employment During ARRA Exemptions

Notes: Panel (a) visually displays the RD results for employment after 24 months of work requirements. The scatter plot shows covariate-adjusted means by age in quarters, and the lines show a linear regression fit in months on both sides of the eligibility threshold. Standard errors clustered by monthly age in parentheses. The sample consists of work-registered individuals on SNAP in September 2013 and in the subset of counties where work requirements remain on after October 2013. Panel (b) replicates the same analysis among those enrolled in September 2011, when the ARRA exemption that suspended work requirements was in effect for an additional two years.

Figure 8: RD Estimates of Earnings, 8 Quarters After Work Requirements



(a) Earnings During Work Requirements



(b) Placebo Test: Earnings During ARRA Exemptions

Notes: Panel (a) visually displays the RD results for earnings (including zeros) after 24 months of work requirements. Earnings are top-coded at the 99th percentile within yearly age bins for each calendar month. The scatter plot shows covariate-adjusted means by age in quarters, and the lines show a linear regression fit in months on both sides of the eligibility threshold. The sample consists of work-registered individuals on SNAP in September 2013 and in the subset of counties where work requirements remain on after October 2013. Panel (b) replicates the same analysis among those participating in September 2011, when the ARRA exemption that suspended work requirements was in effect for an additional two years.

As a notable aside, Appendix Figure A.11 defines the dependent variable as an indicator for whether the participant remained on SNAP with a known exemption (other than an age-based exemption). This captures the extent to which ABAWDs were able to claim new exemptions (e.g., disability) or alter their household structure (e.g., by claiming new dependents) in response to work requirements. There does appear to be some impact: approximately 6 percent of the stock sample is able to stay on the program by claiming a new exemption. However, this magnitude is small relative to the 25 percent of the stock sample who lost benefits as a result of work requirements.

Table 5 collects these point estimates and standard errors from these specifications. Below the coefficient estimates, we report the mean of each corresponding outcome variable at age 50 (immediately to the right of the RD threshold). For the two outcomes where we find statistically significant effects in our main stock sample, the estimate from the placebo period is a precisely estimated zero. Overall, the findings suggest that work requirements do not increase labor force attachment by a meaningful amount on average. The upper bound of our 95 percent confidence interval on employment is 4.4 percentage points. For wage outcomes, point estimates suggest a small or zero impact but are less precise. Appendix Table A.5 reproduces this table for models without covariates, and shows that point estimates are very similar.

A number of robustness checks in Appendix A also fail to find strong evidence of employment effects. Appendix Figure A.7 shows robustness to alternative bandwidth choices for employment and earnings, using a symmetric bandwidth on both sides of the cutoff. Appendix Figure A.12 presents estimates for other durations ranging from 1 to 27 months after work requirements. We also obtain similar estimates if we use triangular kernels instead of a uniform kernel to weight observations (Appendix Table A.4). We reproduce Table 5 without covariates in Table A.5. The estimates on employment and earnings are slightly higher and, in the case of earnings, marginally significant. Appendix Figure A.13 plots these estimates over time to examine robustness to the choice of duration. While there are signs of an upward trend in both employment and earnings, none of the estimates are statistically significant and they remain within the confidence intervals for models with controls. Collectively, these results reinforce that our findings are consistent with zero or moderate average impacts on employment or earnings.

5.2 Heterogeneity of Labor Market Effects

The RD regressions in Section 5.1 fail to detect an impact of work requirements on labor market outcomes on average. In this section, we examine the heterogeneity of the effect

Table 5: RD Estimates of Key Outcomes, 8 Quarters After Work Requirements

	Main Stock (September 2013)	Placebo Stock (ARRA Period)
Panel A. SNAP Participation		
Discontinuity	-0.241	-0.001
	(0.019)	(0.018)
Control Mean	0.596	0.633
N	15,466	13,246
Panel B. Employment		
Discontinuity	0.023	0.005
	(0.021)	(0.015)
Control Mean	0.294	0.285
N	15,955	15,143
Panel C. Employed or Earned Income		
Discontinuity	0.008	-0.008
	(0.017)	(0.014)
Control Mean	0.341	0.338
N	17,930	16,934
Panel D. Earnings		
Discontinuity	-0.9	14.8
	(36.3)	(30.1)
Control Mean	413.2	381.9
N	16,207	15,657
Panel E. Log Earnings		
Discontinuity	0.022	0.121
	(0.077)	(0.073)
Control Mean	6.867	6.787
N	4,652	5,641
Panel F. Exemption (Other than Age)		
Discontinuity	0.059	-0.028
	(0.012)	(0.010)
Control Mean	0.097	0.118
N	15,525	18,034

Notes: Table shows regressions coefficients from local linear RD specifications with a uniform kernel, corresponding to RD figures in the text. Standard errors clustered by monthly age (the running variable) are reported in parentheses. Control mean is the predicted mean of the corresponding outcome variable immediately to the right of the age 50 threshold (the intercept with the cutoff). Employment and wages are measured from UI records. Log wages estimated on those with positive earnings. Earnings include those with zero UI earnings, and are winsorized at the 99 percent level by yearly age within each calendar month. The variables Earned Income and Exemption status are reported on DSS records.

of work requirements on earnings. It may simultaneously be true that work requirements induce no change in earnings among the majority of participants who are far from the threshold—either because they are so far below it that meeting it would be too difficult or costly or because they would be above it even in the absence of work requirements—and induce a substantial change in earnings among individuals near the cutoff. In such a case, the average effect of work requirements may be statistically indistinguishable from zero despite the existence of a subgroup of participants for whom the effect is positive.

To examine the heterogeneity of the effects, we estimate separate RD regressions for quantiles of the monthly wage earnings distribution:

$$Earnings_{qa} = \alpha_q + \beta_q \cdot U50_a + \gamma_q \cdot (age_a - 50) + \delta_q \cdot U50_a \cdot (age_a - 50) + \varepsilon_{qa} \qquad (5)$$

where q represents quantiles of monthly earnings (computed as average monthly earnings over the course of one quarter), a represents age, and the quantiles are computed separately within one-year age bins. We estimate the regression at each percentile. The qth regression effectively computes the sharp difference between that percentile of monthly earnings among participants just below age 50 to the corresponding percentile of monthly earnings among participants aged 50. By estimating the effect at each percentile of the distribution, we trace out the potentially heterogeneous effect along that distribution.

Interpretation of the estimates from these regressions is largely analogous to standard quantile regression, although our method allows us to include a two-year donut. The estimates describe changes in the distribution of earnings as a result of work requirements. As is the case with standard quantile regression, however, the estimates do not allow inference about the identity of the individuals whose behavior shifted as a result of work requirements. In other words, it is not possible to say what the counterfactual earnings would be among the people who are at a given quantile in the observed work requirements regime. They should instead be interpreted as estimates of the difference in earnings between the qth quantile of the distribution of 50-year-olds' earnings under work requirements and the qth quantile of the distribution of 50-year-olds' earnings in the absence of work requirements. The identity of the participants at the qth quantile of each distribution generally will not remain fixed under counterfactual work requirements regimes, except under the assumption that the effect is (weakly) monotonically increasing in the original quantile. The earnings distribution among 49-year-olds stochastically dominates the distribution among 50-year-olds, which is consistent with a monotonic effect but also consistent with some rank-switching.

With this caveat in place, Figure 9 plots the main coefficients of interest β_q using

the stock population, and the shaded region shows 95 percent confidence intervals. Since the RD estimate of the effect in the lower range of the distribution is mechanically zero,[29] we only report results for the 60th percentile and above. The vertical red line is placed at the approximate quantile corresponding to the minimum earnings required to maintain eligibility, calculated as 80 times the hourly minimum wage over the period ($7.25 per hour). For each percentile, we again use MSE-optimal and potentially asymmetric bandwidths.

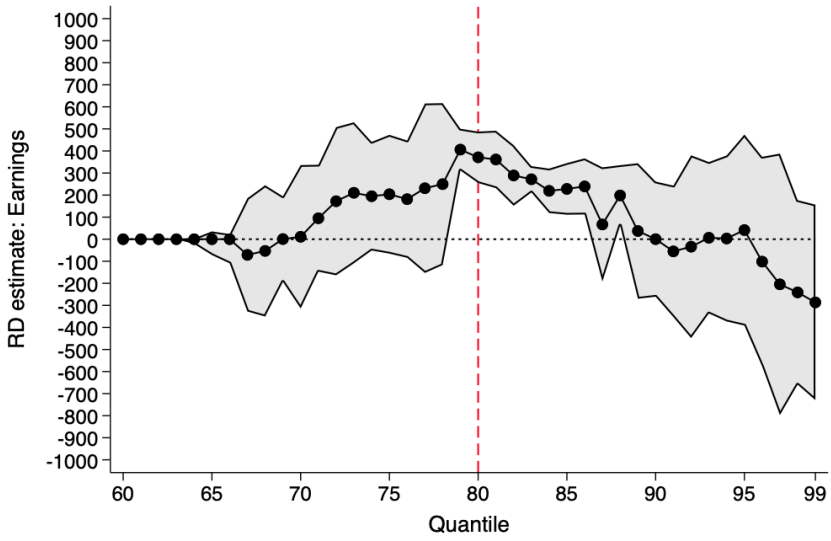
The effect of work requirements on monthly earnings is not statistically distinguishable from zero at the top and bottom ends of the earnings distribution. The bottom two-thirds of the distribution have a zero effect. The estimates for the top decile are also not distinguishable from zero. However, between the 75th and 85th percentiles of the distribution, the estimated effects of work requirements on earnings are consistently positive and statistically significant. The increases are in the range of $250 to $450 per month, which is equivalent to shifting a portion of the earnings distribution to the right by two percentiles in the vicinity of the minimum work requirement threshold. This is a substantial increase in earnings.[30] However, its policy significance is moderated by the limited range of the earnings distribution with a positive impact.

Figure 9b considers the analogous exercise for the placebo cohorts (on SNAP in September 2011, followed up September 2013). Consistent with an effect of work requirements, we see small and typically insignificant jumps in the placebo period. Appendix Figure A.14 shows qualitatively similar patterns if using the same fixed bandwidths for each percentile, although the magnitude of the earnings impacts are slightly larger.

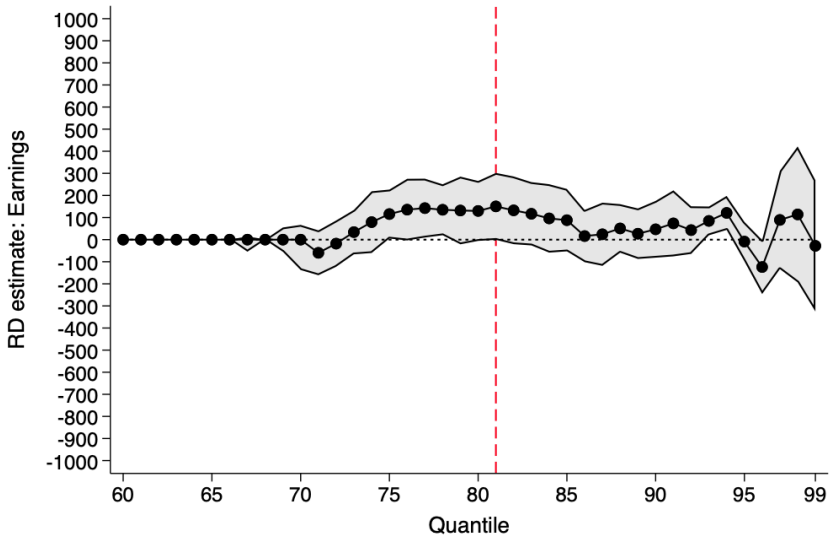
[29]The bottom two-thirds of the earnings distribution on both sides of the age 50 cutoff have zero earnings.

[30]By comparison, in 2015, when our regression outcomes are measured, the federal poverty line for a single-person household in 2015 was $11,770, or $981 per month.

Figure 9: Heterogeneity in RD Estimates of Earnings Using Centile-Specific Bandwidth, 8 Quarters After Work Requirements



(a) Quantile Regressions During ARRA Exemptions



(b) Placebo Test: Quantile Regressions During ARRA Exemptions

Notes: Figure plots coefficients from individual-level regressions of monthly earnings. Each coefficient is from a separate regression for that quantile. Age is binned by a width of 1 year, and distributions are calculated separately within each bin. For each centile, the RD bandwidth is calculated separately on each side of the donut. Estimates in (a) are from the main stock population of individuals on SNAP in September 2013. Estimates in (b) are from the placebo population of individuals on SNAP in September 2011, when the ARRA exemption that suspended work requirements was in effect for an additional two years. Whiskers denote 95 percent confidence intervals using standard errors clustered by monthly age.

6 Conclusion

As work requirements in means-tested programs come to the forefront of modern policy debates, it is critical to understand their causal impact on program participation and work. On one hand, work requirements may reduce benefits for economically vulnerable adults without a counterbalancing improvement in labor market outcomes. On the other hand, work requirements could successfully incentivize labor force participation, thereby helping to counter disincentives to work from means-tested programs.

We measure the magnitude of both phenomena by combining SNAP and UI administrative data from the state of Virginia with quasi-experimental policy variation. Our estimates suggest that SNAP work requirements dramatically reduce participation among affected adults, with point estimates suggesting a 58 percent decline in participation two years later. Focusing on the sample of beneficiaries receiving SNAP just before the reintroduction of work requirements, we estimate a drop in retention of 42 percent. These declines are largest among adults with characteristics linked to economic vulnerability. At the same time, we statistically rule out a large average increase in UI-covered employment, and fail to detect an increase in self-employment or wage earnings along a large majority of the distribution. There is evidence, however, of increased earnings in the vicinity of the eligibility threshold. In practice, work requirements appear to screen out a large number of long-term SNAP beneficiaries in exchange for an earnings increase among a limited subset of individuals.

The similarity of participation patterns at younger ages subject to work requirements suggests that our results may also generalize to SNAP beneficiaries below age 50 (Figure 2b). Caution is warranted, however, in generalizing our results to Medicaid: state Medicaid work requirements differ widely, and the value of Medicaid may differ from that of SNAP benefits heterogeneously for different beneficiaries. Nevertheless, an analogous study of work requirements in Medicaid could reveal commonalities and distinctions between work requirements across different programs. The ways in which work requirements interact across programs, as well as a more detailed picture of heterogeneous impacts of a given work requirements policy across beneficiaries, are important directions for future research.

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Online Appendices [Not for Publication]

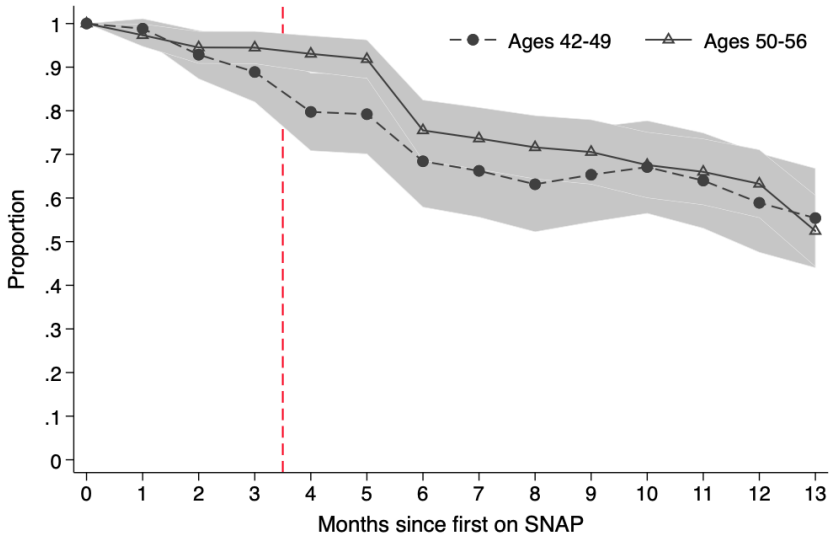
A Additional Results

Table A.1: Descriptive Statistics of SNAP Participant-Months in Full Sample (2005-2016)

	All		Non-ABAWD Adults		ABAWDs	
	Mean	SD	Mean	SD	Mean	SD
Age	24.29	32.8	41.2	16.4	32.4	9.9
Adult	0.55	0.50	1.00	0.000	1.00	0.02
Female	0.54	0.50	0.62	0.48	0.39	0.49
Married	0.13	0.33	0.27	0.44	0.08	0.27
Household Size	3.0	1.7	2.6	1.6	1.2	0.6
Household Head	0.43	0.50	0.76	0.43	0.88	0.32
Homeless	0.02	0.15	0.02	0.14	0.12	0.32
White	0.41	0.49	0.45	0.50	0.37	0.48
Black	0.36	0.48	0.34	0.47	0.37	0.48
Some College+	0.07	0.25	0.13	0.33	0.12	0.32
Has Earned Income	0.13	0.34	0.26	0.44	0.16	0.37
Has Unearned Income	0.24	0.42	0.34	0.47	0.08	0.27
Avg. Annual Wages	4,200	10,463	7,993	13,492	5,940	11,366
Fraction of Months Employed	0.22	0.36	0.39	0.41	0.37	0.38
Ever reported...						
Any Disability	0.15	0.36	0.29	0.45	0.09	0.28
Exempt from Work Registration	0.39	0.49	0.70	0.46	0.26	0.44
Exempt Due to Dependent	0.13	0.34	0.25	0.43	0.08	0.27
Medicaid Recipient	0.69	0.46	0.60	0.49	0.29	0.45
TANF Recipient	0.22	0.42	0.16	0.36	0.05	0.21
SNAP E&T Participant	0.04	0.19	0.05	0.21	0.16	0.36
Moved County	0.23	0.42	0.21	0.41	0.22	0.41
N	2,272,827		1,008,085		238,782	

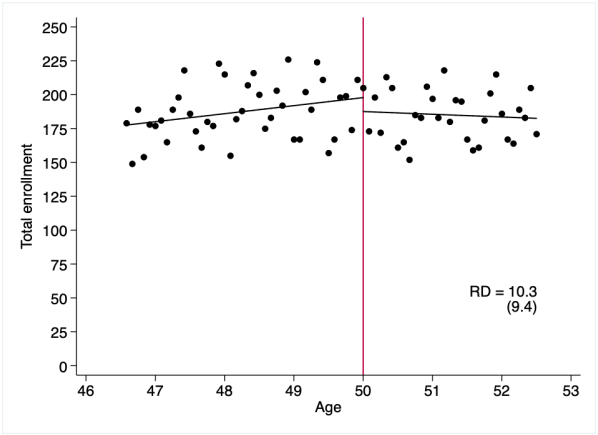
Notes: Table reports descriptive statistics of SNAP participant-months across the whole sample, rather than restricted to the stock population in the main analysis. N denotes count of participant-months. The variables Has Earned Income and Has Unearned Income are reported in DSS files. The variables Avg. Annual Wages and the Fraction of Months Employed are both calculated from UI records.

Figure A.1: SNAP Participation Survival in Counties with Work Requirement Exemptions

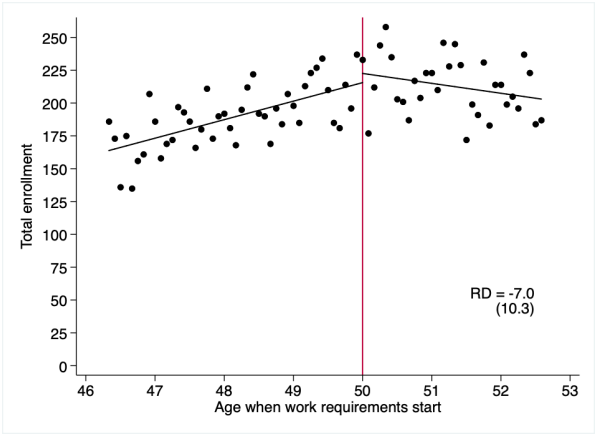


Notes: Figure plots participation survival for ABAWDs aged 42–49 and able-bodied adults without dependents or disabilities aged 50–56 in counties with exemptions for work requirements in May 2014, who have not had a SNAP spell earlier in our sample period, and who first receive benefits between July 2014 and December 2014.

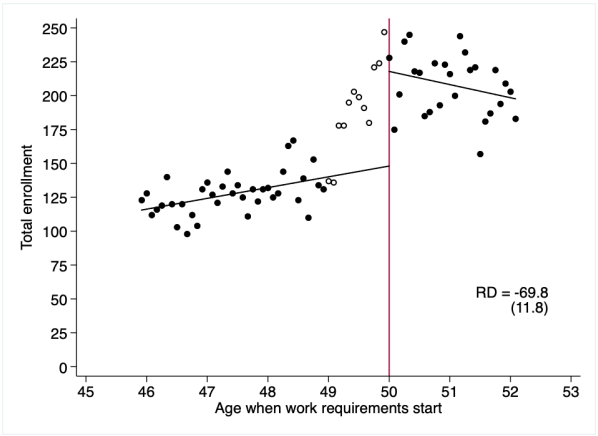
Figure A.2: RD Estimate of Total SNAP Participation



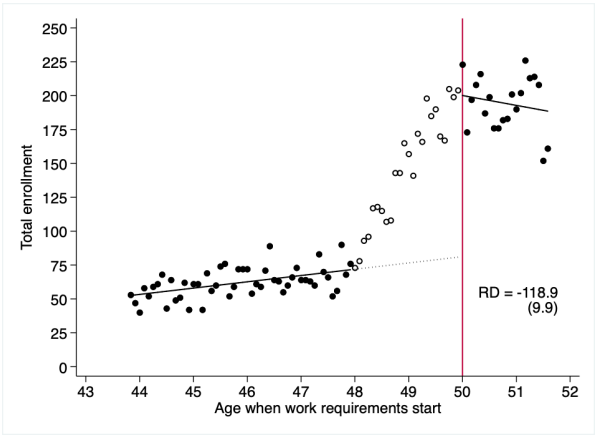
(a) 24 Months Before Work Requirements



(b) Month of Work Requirements



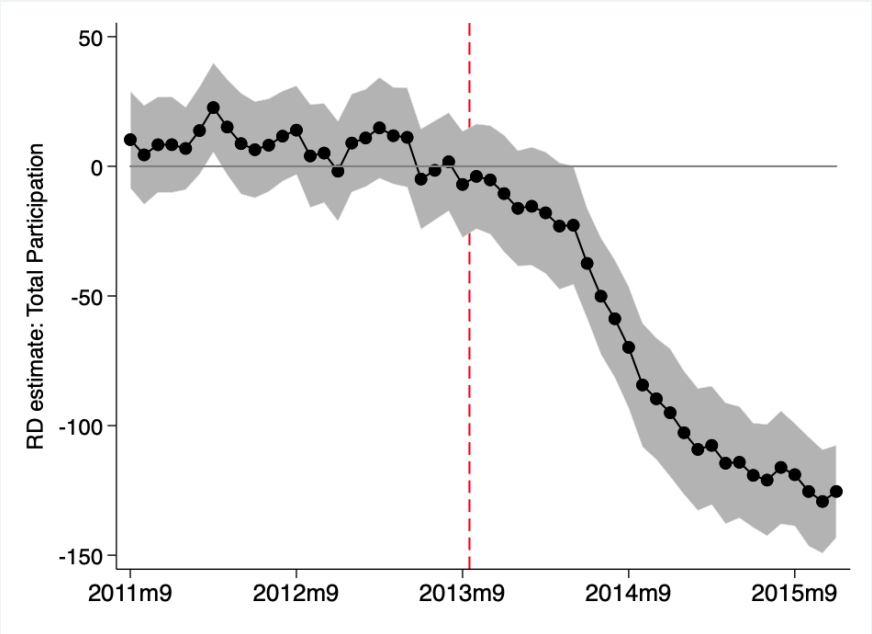
(c) 12 Months After Work Requirements



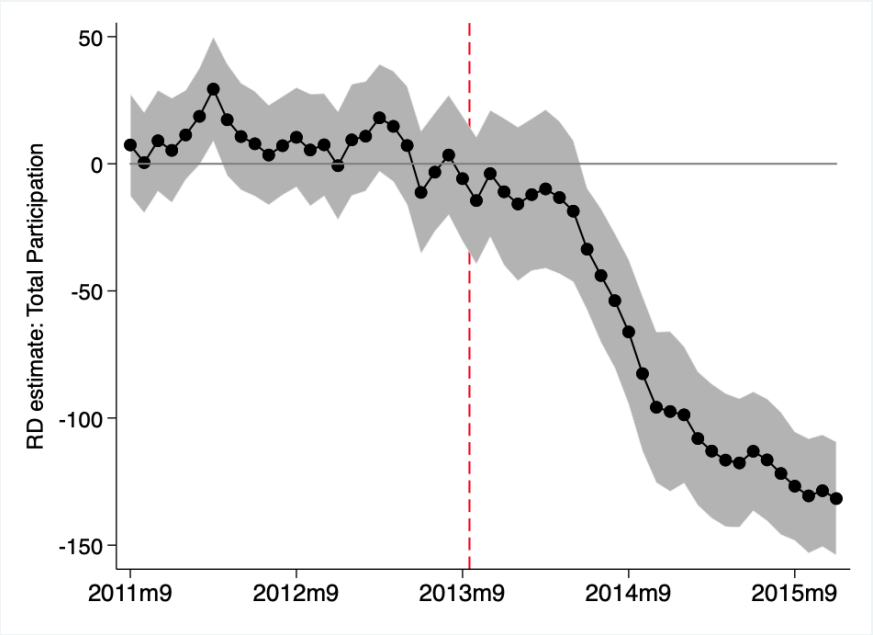
(d) 24 Months After Work Requirements

Notes: Figure visually displays the RD results for total SNAP participation 12 months before, 0 months after, 12 months after, and 24 months after work requirements. The scatter plot shows total participant counts by age in quarters, and the lines show a linear regression fit on both sides of the eligibility threshold. Standard errors are clustered by monthly age in parentheses. The sample consists of the subset of counties for which work requirements remain on after October 2013.

Figure A.3: RD Estimates of Total SNAP Participation at Other Intervals



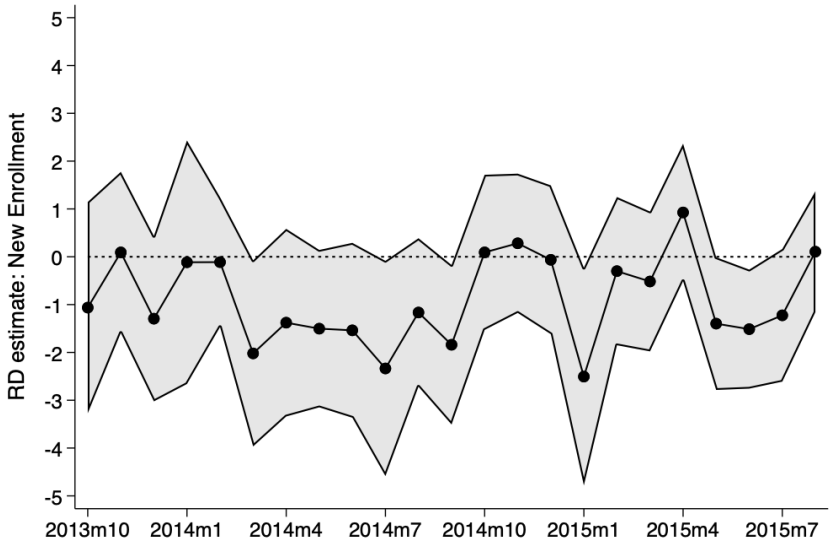
(a) Age polynomial: linear



(b) Age polynomial: quadratic

Notes: Figure shows RD coefficients for SNAP participation, repeated for other intervals in addition to the baseline interval (24 months after work requirements). In this figure, the coefficient at 2015m10 corresponds to the 24-month interval in Figure 5a. Panel A presents RD estimates using linear age polynomials and Panel B presents estimates with quadratic age polynomials for robustness. Shaded regions denote 95 percent confidence intervals that cluster standard errors on monthly age.

Figure A.4: RD Estimates of New SNAP Enrollment by Cohort



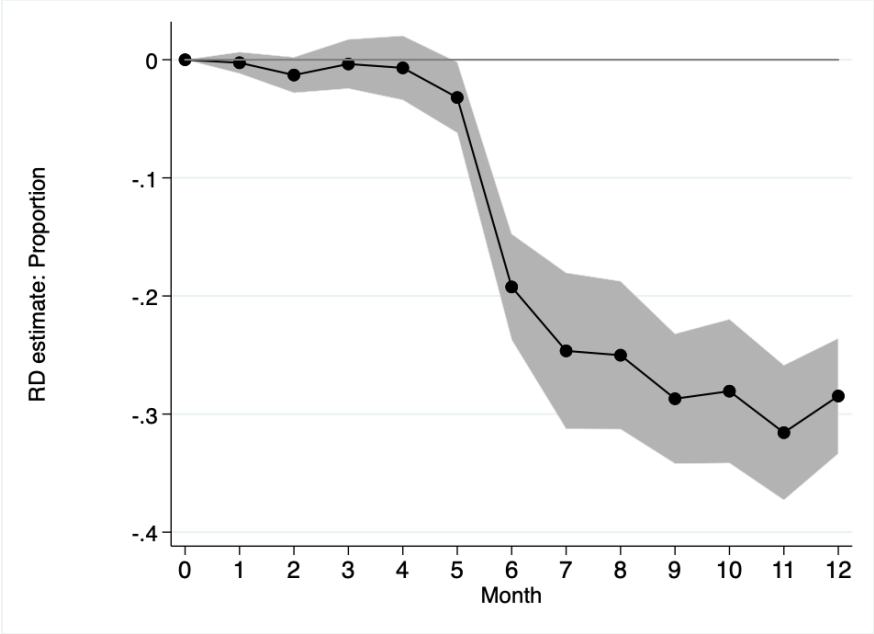
Notes: Figures show coefficients for total new enrollment RDs across successive cohorts of new SNAP entrants. Each regression uses a different MSE-optimal bandwidth, with the bandwidths calculated separately on each side of the cutoff. Shaded regions denote 95 percent confidence intervals that cluster standard errors on monthly age.

Table A.2: Screening RD by Subgroup, 18 Months After Work Requirements

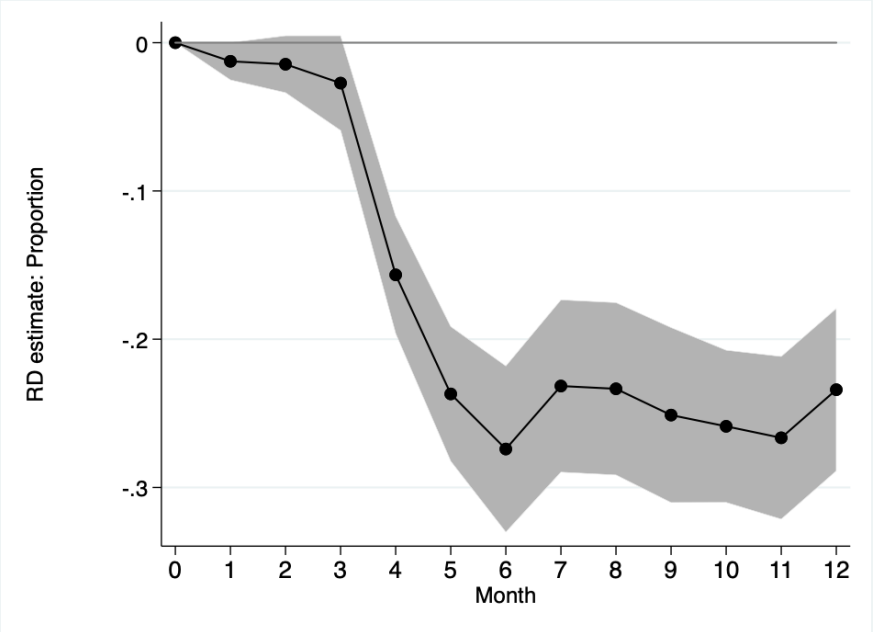
	Discontinuity	SE	Control	% Diff
Female	-0.003	0.026	0.428	-0.6
Married	0.018	0.012	0.101	18.0
Homeless	0.039	0.017	0.135	29.0
White	-0.038	0.024	0.418	-9.0
Black	0.047	0.031	0.389	12.0
Some College+	-0.028	0.017	0.128	-21.6
Has Earned Income	-0.017	0.017	0.180	-9.3
Has Unearned Income	-0.013	0.015	0.097	-13.0
Earned or Unearned Income	-0.037	0.023	0.267	-13.8
Ever Before UI Recipient	-0.032	0.029	0.241	-13.1
Ever Before Disability	0.001	0.014	0.089	1.7
Above Median Unemp. Rate	0.024	0.021	0.377	6.3
Above Median Previous Time on SNAP	0.112	0.027	0.410	27.3
Above Median Previous SNAP Spell	0.101	0.025	0.441	22.9

Notes: Table presents RD estimates of Equation 4. Each row presents results from a separate regression corresponding to the characteristic listed. The first column presents the estimate on the indicator for under 50. Standard errors clustered by monthly age in parentheses are presented in the second column. The third column presents the fitted value of the regression at age 50 (from the right), which corresponds to the predicted percentage of people who exited SNAP by September 2015 and have the characteristic listed as of September 2013. The last column presents the discontinuity as a percentage of the control mean. The unemployment rate is measured as the county average of the two year period between October 2013 and September 2015.

Figure A.5: RD Estimates of SNAP Participation in First Year Since Enrollment



(a) 6-month Initial Benefit Month Regime



(b) Less than 6-month Initial Benefit Month Regime

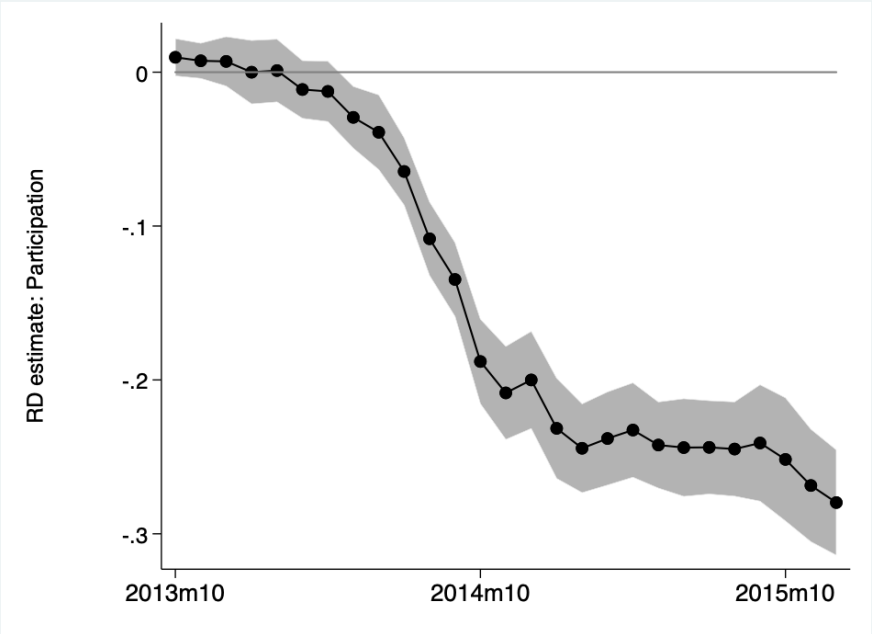
Notes: Figures show RD coefficients for SNAP enrollee cohorts that enter SNAP for the first time since the reinstatement of work requirements in October of 2013, at given points in time since their month of enrollment. Shaded areas represent 95 percent confidence intervals using standard errors clustered by monthly age. Each regression uses the MSE-optimal bandwidth with separate bandwidths calculated on either side of the cutoff.

Table A.3: RD Estimates for SNAP Participation and Employment Outcomes by Labor Force Attachment

	All	Least LFA	Middle LFA	Most LFA
Panel A. SNAP Participation				
Discontinuity	-0.244	-0.255	-0.249	-0.155
	(0.018)	(0.030)	(0.029)	(0.032)
Control Mean	0.596	0.624	0.602	0.515
N	15,558	6,305	6,679	4,640
Panel B. Employment				
Discontinuity	0.040	0.015	0.027	0.022
	(0.023)	(0.024)	(0.023)	(0.046)
Control Mean	0.298	0.172	0.291	0.546
N	17,412	7,488	6,601	4,424
Panel C. Unconditional wages				
Discontinuity	68.337	29.975	11.876	-9.892
	(49.332)	(50.165)	(76.106)	(96.911)
Control Mean	429.942	254.968	452.551	787.396
N	14,396	7,349	4,992	3,817

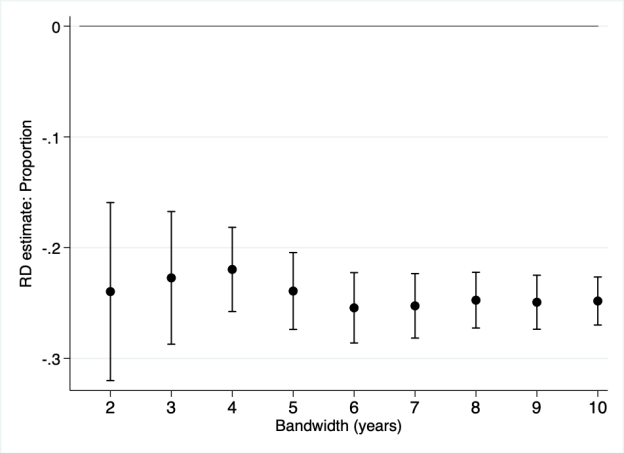
Notes: Table presents the RD coefficient estimates for SNAP participation, employment and earnings for different levels of labor force attachment. The "Least LFA" group corresponds to individuals with no reported earnings since the start of the UI data (January 2007), while the "Middle LFA" and "Most LFA" group consists of individuals with positive average wages below and above the median positive average wage, respectively. Average wages are taken from the beginning of the sample window until September 2013. Table includes the coefficient, standard error, intercept, and sample size for each specification. Control mean is the predicted mean of the corresponding outcome variable immediately to the right of the age 50 threshold (the intercept with the cutoff).

Figure A.6: RD Estimates of SNAP Participation at Other Intervals, Stock Sample

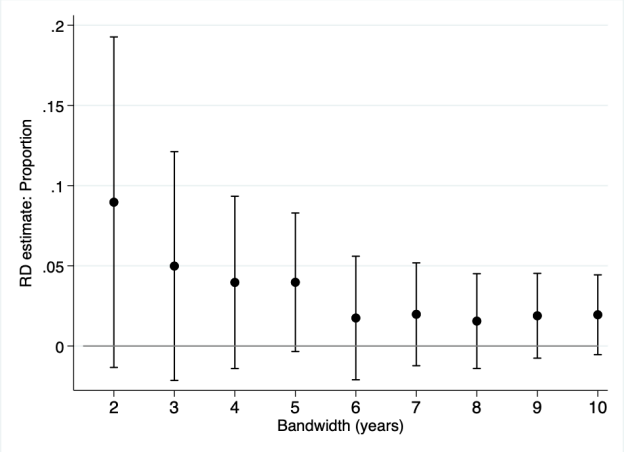


Notes: Figure shows RD coefficients for SNAP participation in the post-ARRA period among the stock population, repeated for other intervals in addition to the baseline interval (24 months after work requirements). In this figure, the coefficient at 2015m10 corresponds to the 24-month interval in Figure 7a. Shaded regions denote 95 percent confidence intervals that cluster standard errors on quarterly age.

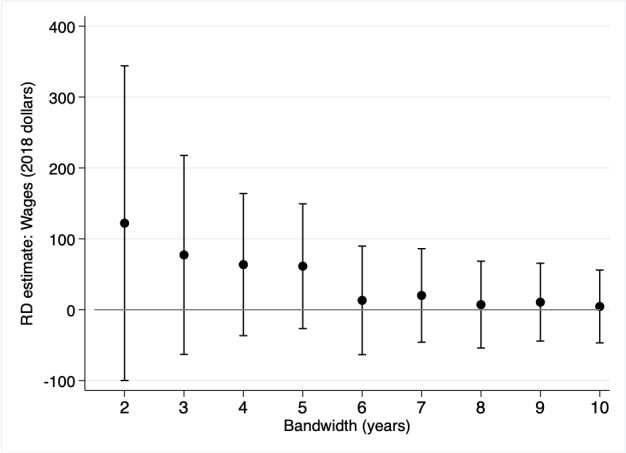
Figure A.7: Robustness to Bandwidth Selection



(a) SNAP participation



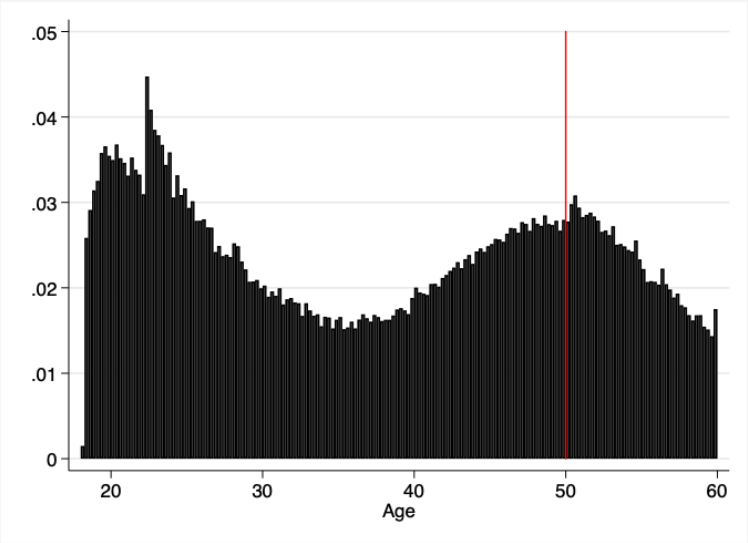
(b) Employment



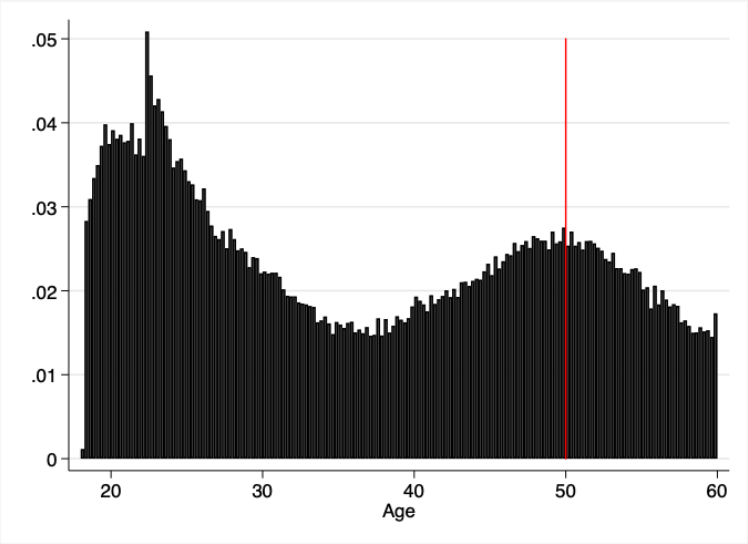
(c) Earnings

Notes: Figures plots the RD estimates 8 quarters after work requirements were reinstated using different bandwidths. The sample consists of work-registered individuals on SNAP in September 2013 and in the subset of counties where work requirements remain on after October 2013. Our baseline estimates presented in Figures 3 and 4 use a 6-year bandwidth. Unconditional wages are winsorized at the 99 percent level within monthly age.

Figure A.8: Density of Age at SNAP Enrollment



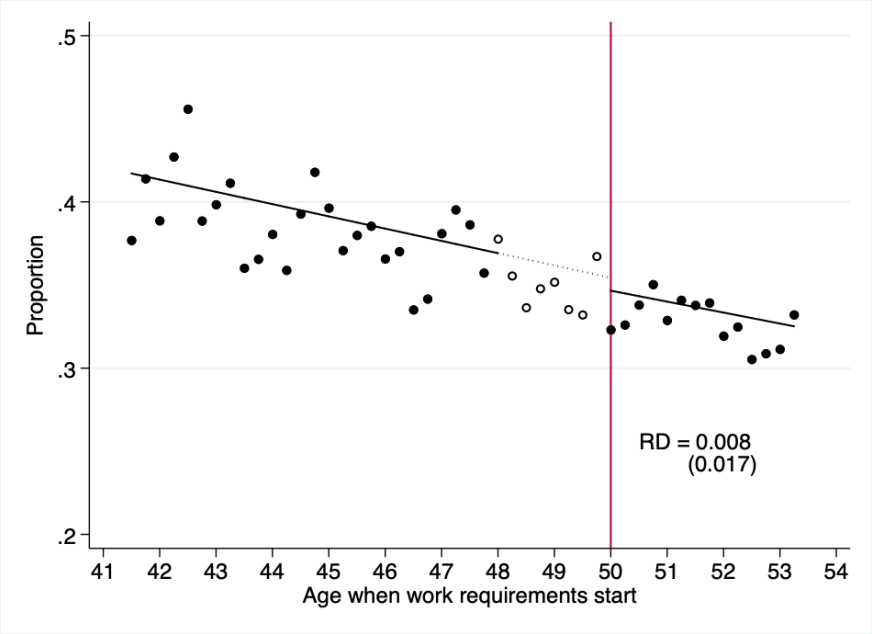
(a) WR Counties



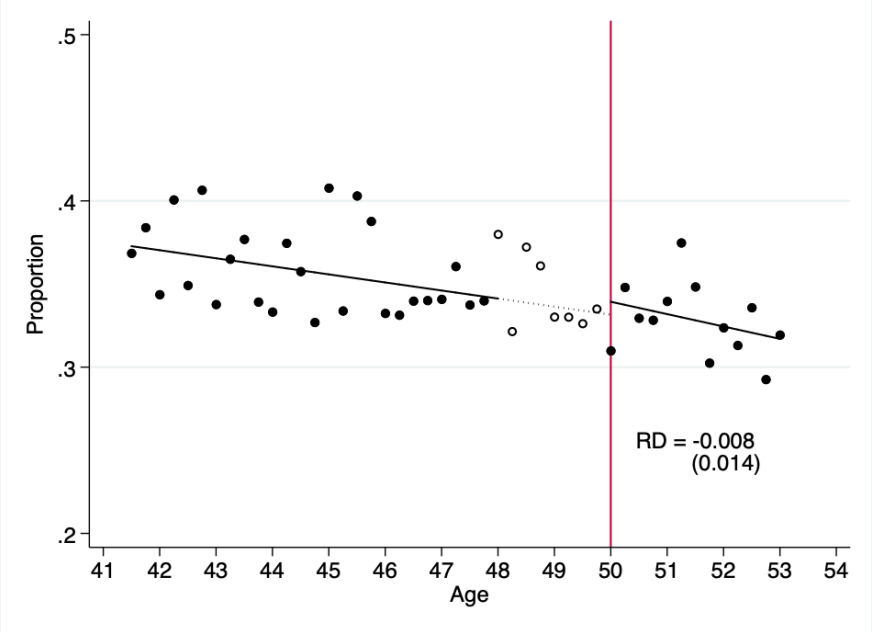
(b) No WR Counties

Notes: Figures plots the distribution of age at SNAP enrollment within quarterly bins for those in counties with work requirements and those without work requirements. In counties without work requirements, there is no visible discontinuity in the density at age 50. In counties with work requirements, participation appears to be slightly lower just to the left of 50, although the magnitude is small and formal statistical tests (Frandsen 2017) fail to reject the null that the density is smooth at this cutoff. Taken together, there is not strong evidence of selection based on age around the eligibility threshold for work requirements.

Figure A.9: RD Estimates of Employment (UI or DSS), 8 Quarters After Work Requirements



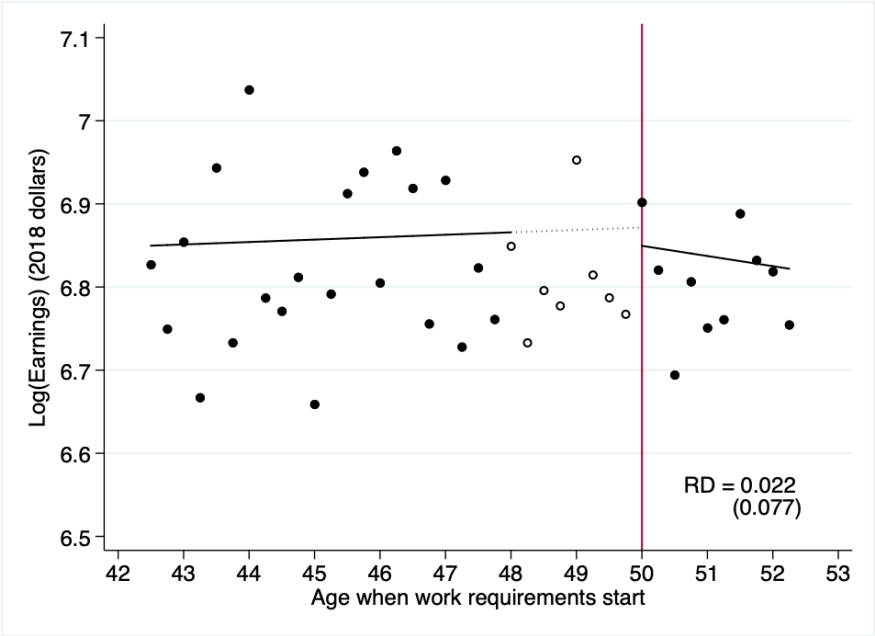
(a) Employment During Work Requirements



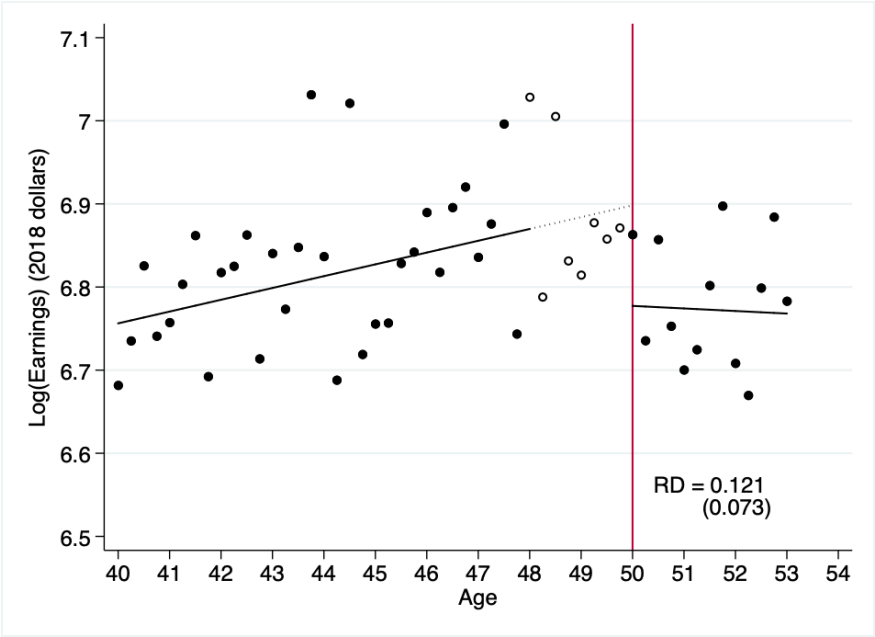
(b) Placebo Test: Employment During ARRA Exemptions

Notes: Panel (a) visually displays the RD results for employment in either the UI data or DSS reported earnings after 24 months of work requirements. The scatter plot shows covariate-adjusted means by age in quarters, and the lines show a linear regression fit in months on both sides of the eligibility threshold. Standard errors clustered by monthly age in parentheses. The sample consists of work-registered individuals on SNAP in September 2013 and in the subset of counties where work requirements remain on after October 2013. Panel (b) replicates the same analysis among those participating in September 2011, when the ARRA exemption that suspended work requirements was in effect for an additional two years.

Figure A.10: RD Estimates of Log Earnings, 8 Quarters After Work Requirements



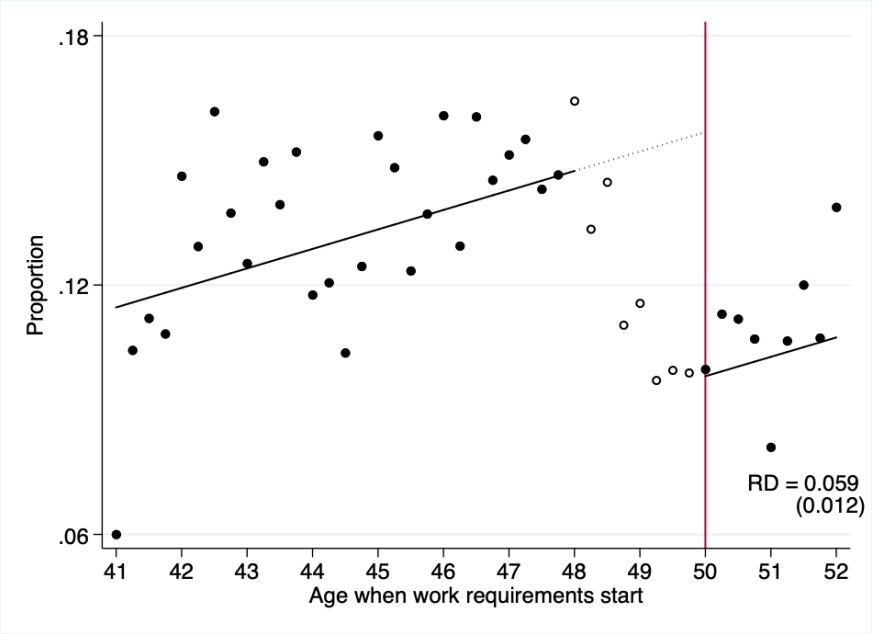
(a) Log Wages During Work Requirements



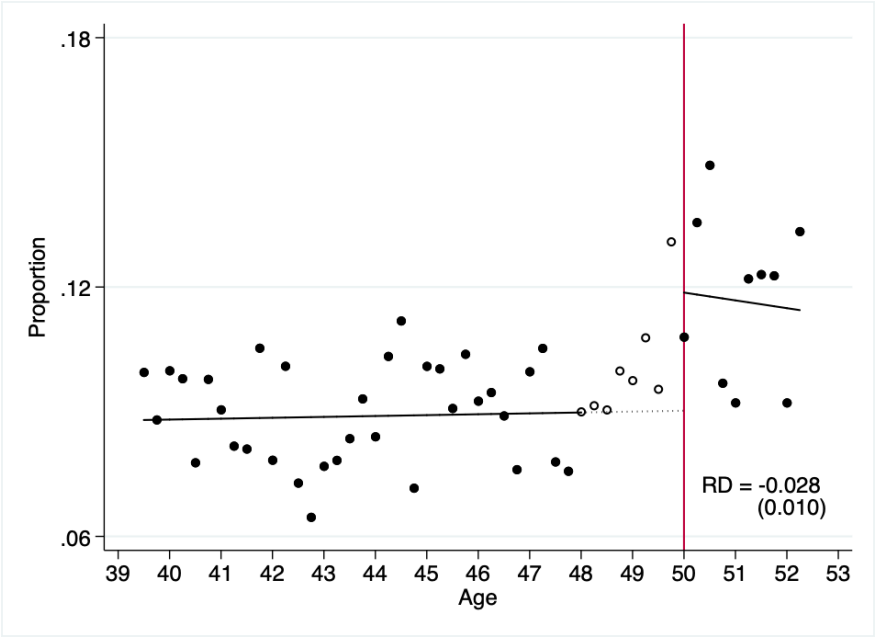
(b) Placebo Test: Log Wages During ARRA Exemptions

Notes: Panel (a) visually displays the RD results for log wages (conditional on employment) after 24 months of work requirements. The scatter plot shows covariate-adjusted means by age in quarters, and the lines show a linear regression fit in months on both sides of the eligibility threshold. Standard errors clustered by monthly age in parentheses. The sample consists of work-registered individuals on SNAP in September 2013 and in the subset of counties where work requirements remain on after October 2013. Panel (b) replicates the same analysis among those participating in September 2011, when the ARRA exemption that suspended work requirements was in effect for an additional two years.

Figure A.11: RD Estimates of Exempt Status, 8 Quarters After Work Requirements



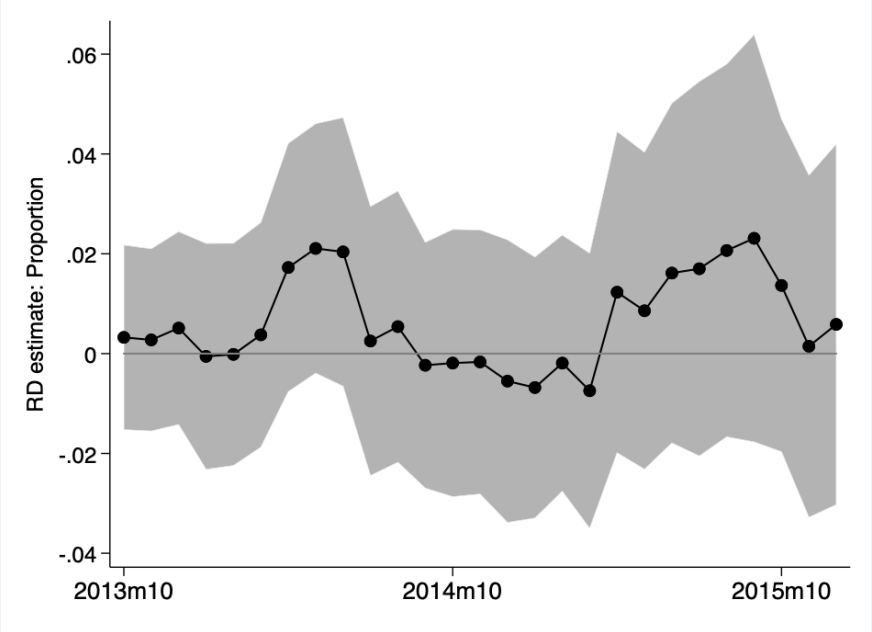
(a) Exemptions During Work Requirements



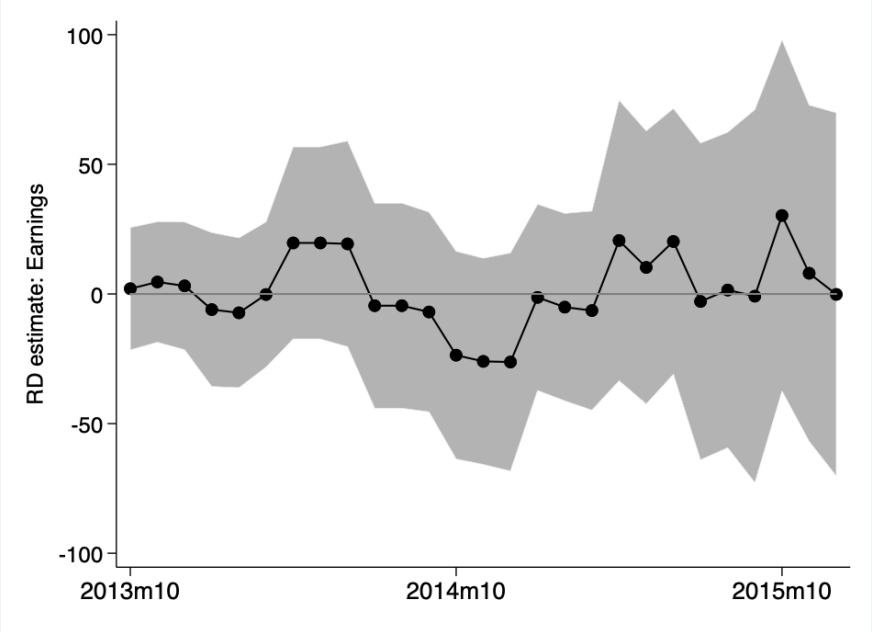
(b) Placebo Test: Exempt Status During ARRA Exemptions

Notes: Panel (a) visually displays the RD results for reported exemptions (except for age) after 24 months of work requirements. The scatter plot shows covariate-adjusted means by age in quarters, and the lines show a linear regression fit in months on both sides of the eligibility threshold. Standard errors clustered by monthly age in parentheses. The sample consists of work-registered individuals on SNAP in September 2013 and in the subset of counties where work requirements remain on after October 2013. Panel (b) replicates the same analysis among those participating in September 2011, when the ARRA exemption that suspended work requirements was in effect for an additional two years.

Figure A.12: RD Estimates of Employment and Earnings at Other Intervals



(a) Employment



(b) Earnings

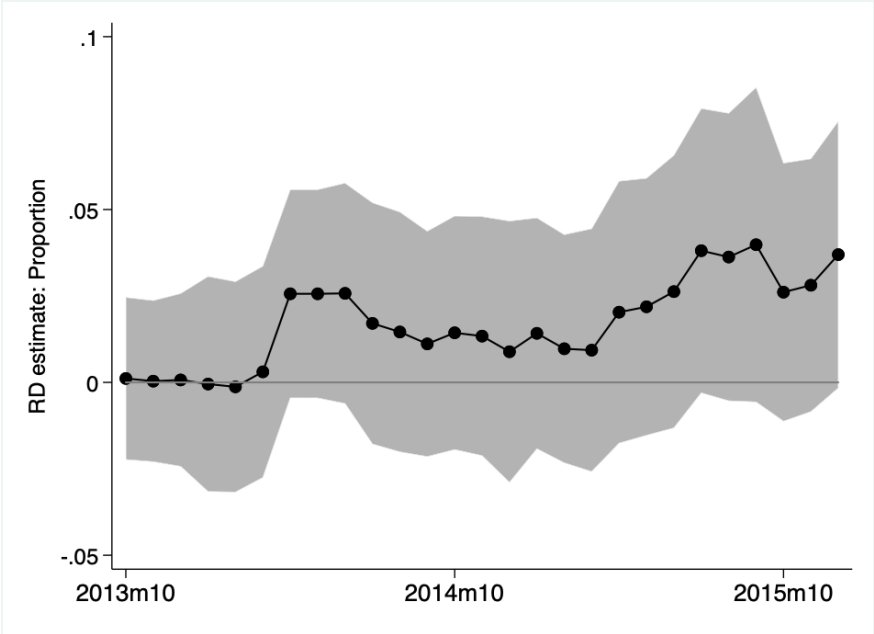
Notes: Figure shows RD coefficients for employment and earnings, repeated for other intervals in addition to the baseline interval. Each estimate calculated using a separate MSE-optimal bandwidths on each side of the donut. Shaded regions denote 95 percent confidence intervals that cluster standard errors on monthly age.

Table A.4: RD Estimates Under Alternative Models

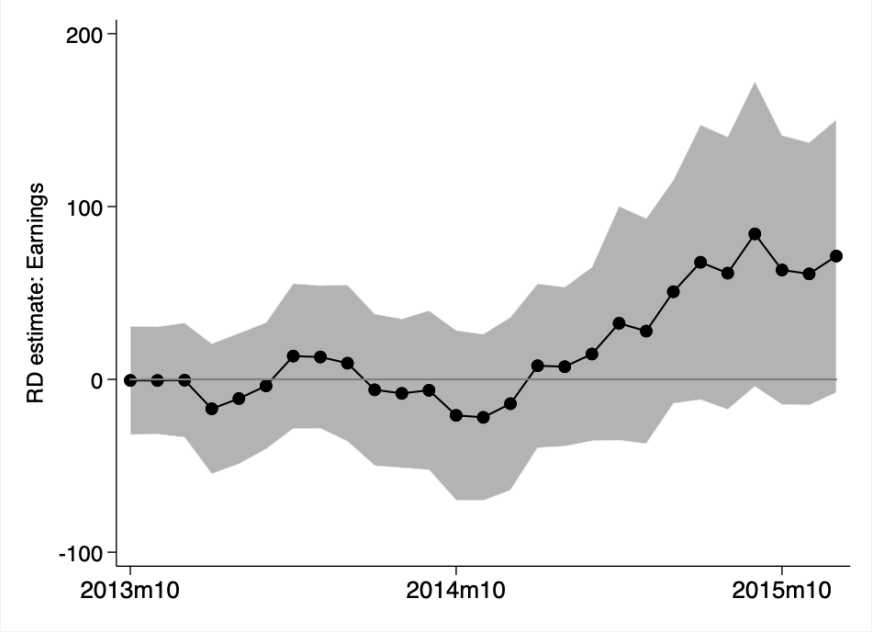
	Linear Uniform		Linear Triangular		Quadratic Uniform		Quadratic Triangular	
	Main Sept 2013	Placebo Sept 2011	Main Sept 2013	Placebo Sept 2011	Main Sept 2013	Placebo Sept 2011	Main Sept 2013	Placebo Sept 2011
Panel A. SNAP Participation								
Discontinuity	-0.241	-0.001	-0.241	0.002	-0.227	-0.008	-0.227	0.003
	0.019	0.018	0.016	0.016	0.023	0.025	0.026	0.025
Control Mean	0.596	0.633	0.597	0.631	0.598	0.628	0.597	0.626
N	15,466	13,246	20,098	18,189	22,832	21,245	26,381	22,717
Panel B. Employed								
Discontinuity	0.023	0.005	0.018	0.005	0.025	0.010	0.026	0.012
	0.021	0.015	0.021	0.013	0.038	0.024	0.031	0.021
Control Mean	0.294	0.285	0.295	0.281	0.285	0.288	0.286	0.282
N	15,955	15,143	22,593	20,946	21,598	20,686	25,548	23,479
Panel C. Earnings								
Discontinuity	-0.9	14.8	15.8	18.8	31.9	23.5	78.5	15.5
	36.3	30.1	32.2	28.5	69.6	45.0	71.6	42.7
Control Mean	413.2	381.9	413.6	370.1	407.0	383.0	403.0	380.8
N	16,207	15,659	21,591	20,714	21,618	22,276	22,915	25,923

Notes: Table shows the main RD estimates under alternative specifications for the kernel and polynomial order. Separate MSE-optimal bandwidths are calculated on each side of the donut for each regression. The first two columns show RD estimates for the stock population (enrolled September 2013) and the placebo stock population (September 2011) using Y_i 24 months later, using the controls described in the text. The third and fourth columns re-weight observations using a triangular kernel. The last four columns replicate this exercise using a quadratic fit on either side of the RD. Control mean is the predicted mean of the corresponding outcome variable immediately to the right of the age 50 threshold (the intercept with the cutoff).

Figure A.13: RD Estimates of Employment and Earnings at Other Intervals, without Controls



(a) Employment



(b) Earnings

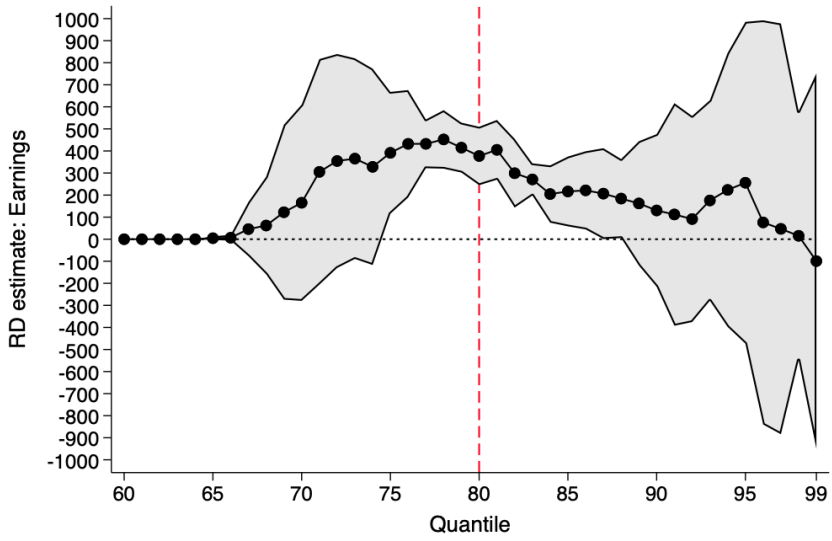
Notes: Figure shows RD coefficients for employment and earnings, repeated for other intervals in addition to the baseline interval, in models without controls. Each estimate calculated using a separate MSE-optimal bandwidths on each side of the donut. Shaded regions denote 95 percent confidence intervals that cluster standard errors on monthly age.

Table A.5: RD Estimates of Key Outcomes without Covariates, 8 Quarters After Work Requirements

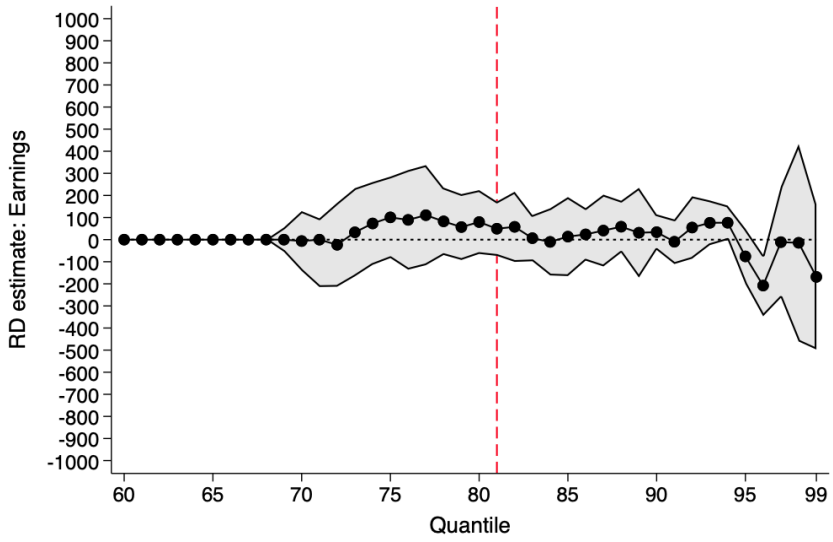
	Main Stock (September 2013)	Placebo Stock (ARRA Period)
Panel A. SNAP Participation		
Discontinuity	-0.244	0.013
	(0.018)	(0.018)
Control Mean	0.596	0.632
N	15,558	13,921
Panel B. Employment		
Discontinuity	0.040	0.001
	(0.023)	(0.015)
Control Mean	0.298	0.285
N	17,412	15,834
Panel C. Employed or Earned Income		
Discontinuity	0.032	-0.009
	(0.022)	(0.016)
Control Mean	0.345	0.338
N	17,519	15,537
Panel D. Earnings		
Discontinuity	84.2	-10.7
	(44.4)	(32.7)
Control Mean	418.5	378.0
N	14,652	14,732
Panel E. Log Earnings		
Discontinuity	0.004	0.106
	(0.072)	(0.074)
Control Mean	6.867	6.787
N	5,258	5,684
Panel F. Exemption (Other than Age)		
Discontinuity	0.061	-0.028
	(0.012)	(0.011)
Control Mean	0.097	0.121
N	16,160	17,014

Notes: Table shows regressions coefficients from local linear RD specifications with a uniform kernel, without covariates. Standard errors clustered by monthly age (the running variable) are reported in parentheses. Control mean is the predicted mean of the corresponding outcome variable immediately to the right of the age 50 threshold (the intercept with the cutoff). Employment and wages are measured from UI records. Log wages estimated on those with positive earnings. Unconditional earnings include those with zero UI earnings, and are winsorized at the 99 percent level by monthly age. The variables Earned Income and Exemption status are reported on DSS records.

Figure A.14: Heterogeneity in RD Estimates of Earnings Using Same Bandwidth, 8 Quarters After Work Requirements



(a) Quantile Regressions During ARRA Exemptions



(b) Placebo Test: Quantile Regressions During ARRA Exemptions

Notes: Figure plots coefficients from individual-level regressions of monthly earnings using the same MSE-optimal bandwidth (calculated for earnings) for each centile. Each coefficient is from a separate regression for that centile. Distributions are calculated separately within each age bin. Estimates in (a) are from the main stock population of individuals on SNAP in September 2013. Estimates in (b) are from the placebo population of individuals on SNAP in September 2011, when the ARRA exemption that suspended work requirements was in effect for an additional two years. Whiskers denote 95 percent confidence intervals.

B Institutional Details of Virginia SNAP

B.1 ABAWD Work Requirement Exemptions

Individuals are exempt from general work registration if they are younger than 16 years old, 60 years old or older, working 30 hours or more each week, receiving or applying to receive unemployment insurance, serving as a caretaker of a child under the age of 6, temporarily or permanently incapacitated, ill or disabled, regularly participating in an alcohol or substance abuse rehabilitation program, aged 16 or 17 and attending school for at least a half-time basis, aged 16 or 17 but not head of household, enrolled in a recognized school, job skills training, or institution of higher education for at least a half-time basis, already complying with another assistance program's work requirements (e.g., TANF or unemployment compensation), or a full-time caretaker of an incapacitated person. Adults are exempt from ABAWD work requirements if they are younger than 18 years old, aged 50 or older, pregnant, medically certified as unable to work, living in a household that includes a child under the age of 18, exempt from general work registration or living in a locality that is exempt from work requirements. A Localities (counties and independent cities) may also receive exemptions from the ABAWD work requirements in some circumstances. Specifically, the state office analyzes data and submits a waiver of the requirements for localities that meet qualifications established by the USDA/FNS. A locality may receive an exemption from work requirements if it has a recent 12-month average of unemployment rate above 10 percent, a recent 3-month average unemployment rate above 10 percent, a historical seasonal unemployment rate above 10 percent, a designation as a Labor Surplus Area by the Department of Labor's Employment and Training Administration, a qualification for extended unemployment benefits by the Department of Labor's Unemployment Insurance Service, a low and declining employment-to-population ratio, a lack of jobs in declining occupations or industries, or a recent 24-month average unemployment rate that is 20 percent above the national average for the same 24-month period.

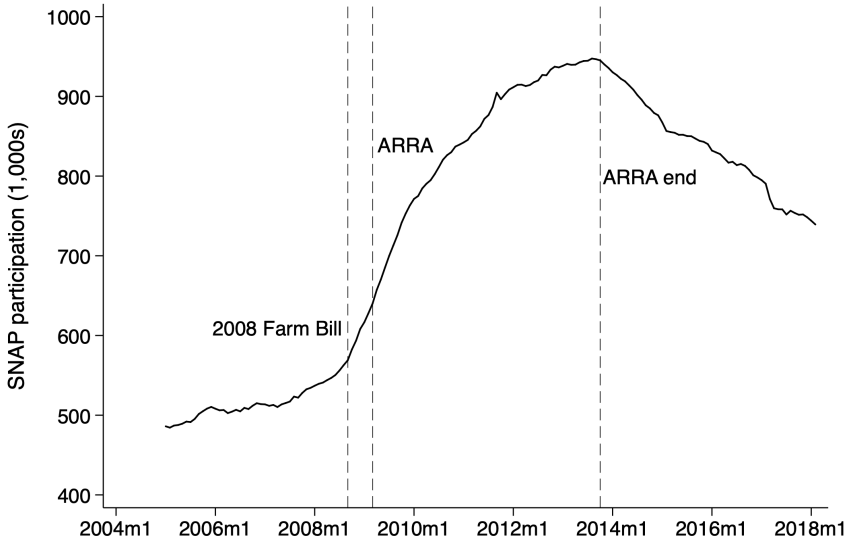
Other than these exemptions, ABAWDs who have already exhausted their allotted SNAP benefits (i.e., 3 months in a 36-month window) can maintain or regain eligibility for SNAP benefits by working at least 20 hours or more per week, participating in an employment services program operated by the Virginia Department of Social Services for 20 hours or more per week (or for at least the number of hours equal to the household's benefits amount divided by the federal minimum wage), participating in an approved work program for 20 hours or more a week, or volunteering for at least the number of hours equal to a household's benefits divided by the federal minimum wage. The state is also annually allotted (by the USDA) a reserve of monthly exemptions based on 15 percent of the number

of ABAWD enrollees who live in the state who are not exempted otherwise and do not live in exempted localities. These exemptions may be used by the state to extend the certification period.

B.2 Virginia's Reinstatement of Work Requirements

ABAWD work requirements were reinstated in Virginia on October 1, 2013 coinciding with the end of state-wide work requirement exemptions under the American Recovery and Reinvestment Act of 2009 (ARRA), which lasted from April 2009 to September 2013. As shown in Figure B.1, participation rose substantially during the ARRA period but began to fall soon afterwards. The end of ARRA also coincided with an approximately 7 percent drop in the level of SNAP benefits allotted to SNAP recipients in Virginia (Figure B.2). The identification strategy based on regression discontinuity accounts for this benefit change in estimating the causal effect of work requirements, since the benefit change occurs similarly on both sides of the age 50 cutoff.

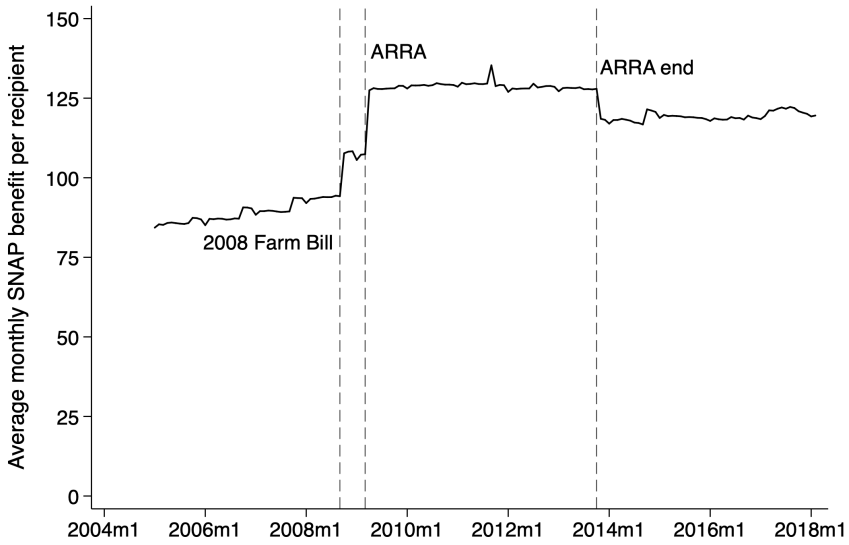
Figure B.1: Monthly SNAP Participation



Notes: Figure plots monthly SNAP participation across Virginia measured in thousands. Participation rose substantially during the ARRA period before falling in 2014.

Prior to the reinstatement of work requirements, individuals typically would receive 12-month recertification periods. Individuals who began their current benefit receipt period prior to the reinstatement of work requirements continued to receive SNAP benefits up to their recertification date, which would occur after reinstatement. At recertification, their work compliance was evaluated. If they were found to be in compliance of work requirements

Figure B.2: Monthly Benefit Amounts, per SNAP recipient

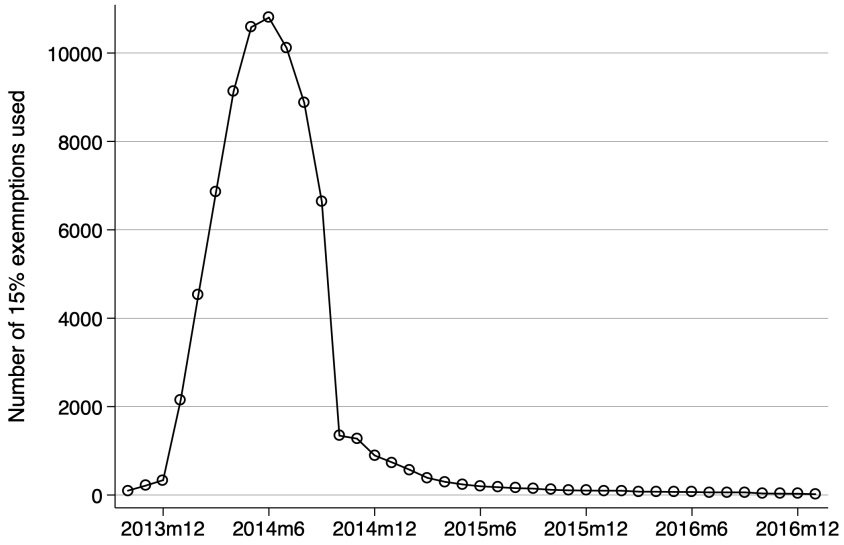


Notes: Figure plots monthly benefits per SNAP recipient across Virginia, calculated as total benefits divided by total SNAP participation. Benefits were reduced by about 7 percent at the end of ARRA.

at recertification, they were given a 12-month recertification period. If they were found not to be in compliance, they were given a 6-month recertification period. This recertification period was composed of an initial partial month of benefits, 3 months allotted for a 36-month window, and a remaining 2 months of exemptions from the reserve of 15 percent exemptions allotted to the state. If after this 6-month period they were again found not to be in compliance with work requirements, they were immediately disenrolled from the program and stopped receiving benefits. The distribution of 15 percent waiver exemptions over time is shown in Figure B.3. These waivers were heavily used throughout most of 2014 but were sparingly used after September of 2014. As a result, Figure B.4 displays a correspondingly large spike in exits of ABAWDs in October of 2014 due to exhaustion of allowable benefit months.

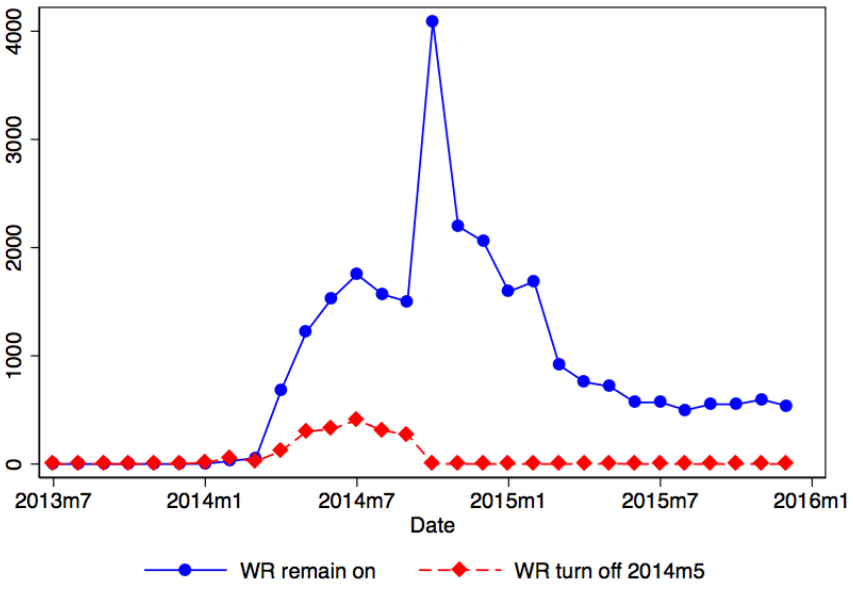
Virginia initially reinstated ABAWD work requirements for all counties in the state on October 1, 2013. However, starting in May 2014, Virginia obtained exemptions for ABAWDs living in 23 counties. Individuals who live in these counties and whose recertifications occurred after the reinstatement of work requirements but before May 2014 received 6 month recertifications. As a result, Figure B.4 shows that ABAWD exits due to exhaustion of allotted benefit months from exempt counties is almost non-existent after October 2014. Those recertifying after May 2014 in exempt counties received 12 month recertifications.

Figure B.3: Number of ABAWD 15 Percent Exemptions Used



Notes: Figure plots the count of 15 percent waiver exemptions used in Virginia each month. One unit corresponds to one ABAWD being allowed to remain on SNAP for one additional month despite not meeting work requirements. The 15 percent exemptions were primarily used to extend the benefit eligibility of ABAWDs who would otherwise have been removed from SNAP following the reintroduction of work requirements in October 2013.

Figure B.4: Count of SNAP Exits Due to Failure to Meet ABAWD Work Requirements



Notes: Figure plots the count of SNAP exits that occur as a result of exhausting allowable benefit months without fulfilling work requirements.

Finally, ABAWDs who newly enrolled between October 2013 and September 2014 were (theoretically) given 6-month recertification periods. Again, these recertification periods were composed of an initial partial month of benefits, 3 months allotted for a 36-month window, and a remaining 2 months of exemptions from the reserve of 15 percent exemptions allotted to the state. Since 15 percent exemption waivers were not used as readily after September of 2014, those who newly enrolled on or after May of 2014 did not receive a full 6 months of benefits if they did not meet work requirements. And those enrolling between July 2014 and September 2017 generally only received 4-month recertification periods. The variation in recertification periods corresponds to drops in SNAP participation among cohorts of recipients who enroll after October 2013, as depicted in Figure A.5: Figure A.5a shows that the RD point estimate among new participants with 6-month recertifications (October 2013 to April 2014 cohorts) drops substantially in the seventh month. In contrast, Figure A.5b shows that among those with 4-month recertifications (May 2014 to December 2014 cohorts), participation drops in the fifth month. In both cases the RD effects are large and largely comparable in magnitude to the effect estimated using the stock population in the main text.