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Heterogeneous Effects of Child Development Accounts on Savings for Children's Education

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Abstract

In this study, we use data from SEED for Oklahoma Kids (N = 2,677), a statewide policy experiment testing Child Development Accounts (CDAs), to examine effects on individual savings for children's postsecondary education. Built on the account structure of the Oklahoma 529 College Savings Plan, the experiment automatically opened state-owned 529 accounts for children in the treatment group with a $1,000 initial deposit, and encouraged their caregivers to open and save in participant-owned 529 accounts. Using quantile regressions and statistical match, the study focuses on the effects of CDAs on the shape of the savings distribution among participants who hold a participant-owned account for their children. Results suggest that the intervention has heterogeneous effects, affecting individual saving performance of about 8% of treatment participants. Treatment participants we expect would hold their own participant-owned accounts without the intervention have about $400 more in savings than their counterparts in the control group. Treatment participants who are motivated by the intervention to hold a participant-owned account have mean deposits of nearly $900. All those who are motivated by the intervention to save have mean deposits of $1,826. A high proportion of treatment group participants motivated by the CDA intervention to have participant-owned accounts have socioeconomically disadvantaged characteristics; the CDA intervention reduces inequality in savings for children's education. While the CDA intervention affects some treatment participants' individual savings, total assets accumulated in both state-owned and participant-owned accounts can play an important role in financing postsecondary education. When appropriately designed, CDAs can promote asset building among all children, and holding assets is a promising policy tool to improve college preparedness and help finance postsecondary education.

Keywords: *529 plans, asset building, Child Development Accounts, college savings, postsecondary education*

Introduction

This study examines the effect of Child Development Accounts (CDAs) on parents' savings for children's postsecondary education. We use data from SEED for Oklahoma Kids (SEED OK), a statewide policy experiment that offered CDAs to treatment participants. Built on the existing account structure of the Oklahoma 529 College Savings Plan (OK 529 plan), the SEED OK intervention automatically opened state-owned 529 accounts with a $1,000 initial deposit for children in the treatment group and also encouraged their parents (or other caregivers) to open and save in participant-owned 529 accounts.

CDAs provide structured opportunities (e.g., financial access, information, and incentives) to encourage lifelong asset building and to promote child development (Goldberg, 2005; Sherraden, 1991). CDAs are promising policy tools for promoting asset building in early life and preparing families for children's postsecondary education (Nam, Kim, Clancy, Zager, & Sherraden, 2013). Given increasing policy concern about rising college costs and student loan debt, it is important to understand the effects of CDAs on college savings. For example, the Consumer Financial Protection Bureau reports that the total amount of student loan debt was approaching $1.2 trillion in 2013, and

more than seven million borrowers were in default (Chopra, 2013). Studies also show that postsecondary education is one of the top saving priorities for families with children, and over 60% saved for that purpose in 2009 (Sallie Mae, 2009). With institutional support and financial incentives from CDA programs, families may accumulate more assets for children than they would by saving in basic savings accounts. Previous research demonstrates that, in addition to providing financial benefits, the asset-holding process created by CDAs may improve parenting expectations and practices, as well as child development outcomes (Huang, Sherraden, Kim, & Clancy, 2014; Huang, Sherraden, & Purnell, 2014; Kim, Sherraden, Huang, & Clancy, 2013), and are associated with children's long-term educational achievement (Elliott & Beverly, 2011).

Limited empirical evidence shows the effects of CDA holding on participant savings. One study (Nam et al., 2013) using SEED OK data up to 2009 finds that CDAs significantly increased the rate of participant-owned account holding from 1% in the control group to 16% in the treatment group. Across the full treatment group, mean individual savings was $47 in participant-owned accounts. While modest, this was significantly higher than that in the control group. Among treatment participants holding participant-owned accounts, mean savings was about $300 (Nam et al., 2013). These results suggest that the CDA intervention has varying effects for those with participant-owned accounts and those without, and may change the shape of the savings distribution especially at the top percentiles. Therefore, this study uses SEED OK data through 2013 to examine the effects of CDAs on the (a) shape of the savings distribution and (b) amount of individual savings among those with participant-owned accounts.

The SEED OK Experiment

The SEED OK experiment is a statewide randomized experiment asking (among other questions) whether CDAs encourage parents to begin accumulating assets for their child's postsecondary education from birth. The experiment drew a probability sample of 7,328 children from all infants born in Oklahoma during two 3-month periods (April–June and August–October in 2007). Among caregivers of these infants—most of whom are mothers, the term we will use hereafter—2,704 agreed to participate in the experiment and completed a baseline survey between fall 2007 and spring 2008, resulting in a response rate of 37%. The low participation rate may have been caused by mothers' reluctance to provide the child's Social Security number, a requirement for opening an OK 529 account (Nam et al., 2013). After the survey, SEED OK researchers randomly assigned 1,358 mothers to the treatment group and 1,346 to the control group (Marks, Rhodes, & Scheffler, 2008).

The state of Oklahoma provides tax credits for 529 plan contributions up to $10,000 per year per person or $20,000 for married couples filing jointly. Investment earnings in 529 accounts used for eligible educational costs are not subject to federal or state taxes. While the OK 529 plan and associated tax benefits are available to anyone, SEED OK included information about the OK 529 plan and additional financial incentives for treatment mothers (Figure 1).

The first incentive was a $1,000 initial deposit into a state-owned account held for the beneficiary child. The state treasurer's office automatically opened state-owned accounts for all but one (whose mother opted out) member of the treatment group. Second, treatment mothers also were encouraged to open and make deposits into their participant-owned accounts. The OK 529 plan requires a $100 minimum initial contribution to open such an account. To remove any financial barriers to account opening, the SEED OK intervention included a contribution of the required
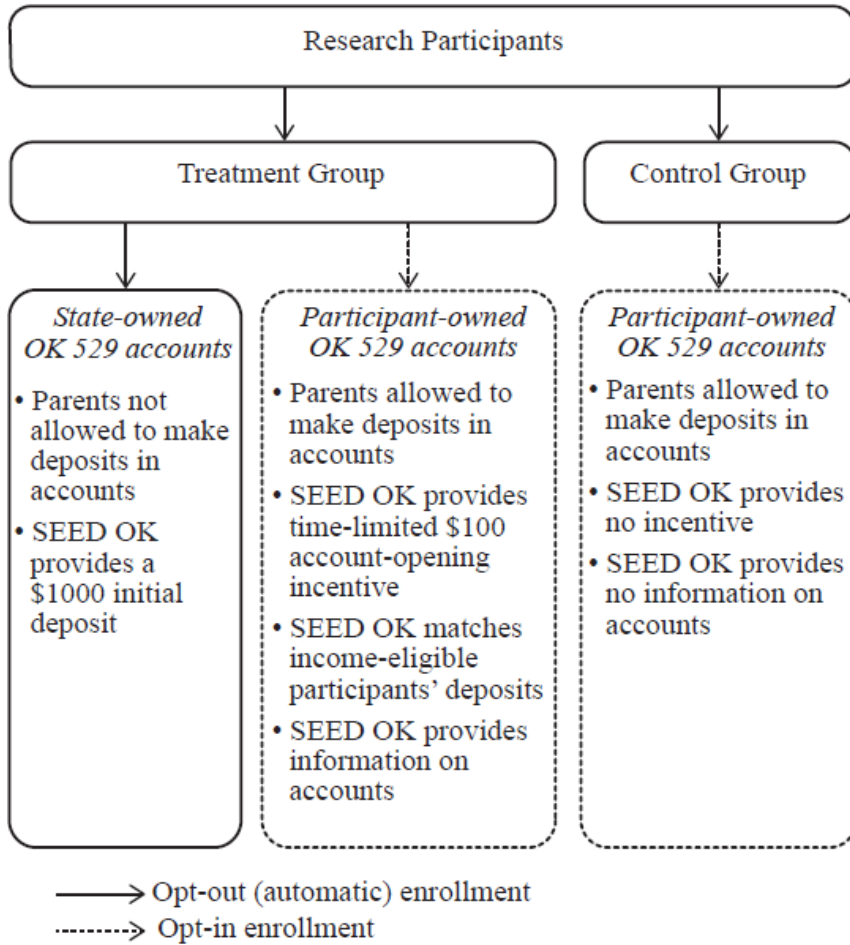
Figure 1. SEED OK financial incentives by treatment status. Adapted from Huang, Nam, and Sherraden (2013, p. 6). Copyright 2012 by the American Council on Consumer Interests. *Note:* OK 529 accounts = Oklahoma 529 College Savings accounts; SEED OK = SEED for Oklahoma Kids.

$100 initial deposit to treatment mothers who opened participant-owned accounts by April 15, 2009. The third incentive was a savings match. From 2008–2011, SEED OK included matches to deposits into participant-owned accounts made by low- and moderate-income treatment mothers. Households with an annual adjusted gross income (AGI) below $29,000 were offered a 1:1 match— in which every dollar deposited was matched with one dollar—up to $250 per calendar year. Households with an AGI between $29,001 and $43,499 were eligible for a 0.5:1 match—in which every dollar deposited was matched with 50 cents—up to $125. The $29,000 cutoff corresponded with the median AGI for Oklahoma in 2006, and the $43,500 cutoff corresponded to 150% of the median.

The office of Oklahoma's State Treasurer mailed various forms of correspondence (e.g., letters, postcards, and brochures) to treatment mothers on behalf of the SEED OK study. Communication materials were designed primarily to explain the features of the state-owned account, encourage treatment group mothers to open participant-owned accounts, and prompt them to begin saving for their child's postsecondary education. The OK 529 plan mailed OK 529 account statements each

calendar quarter to treatment mothers. These statements showed any deposits and reported the market value of the account. The SEED OK study occasionally mailed small gifts (e.g., books or music CDs) to treatment children. Information was provided almost exclusively by mail due to the experimental nature of the study, and study participants may not have received or read the materials (Beverly, Clancy, & Sherraden, 2014; Gray, Clancy, Sherraden, Wagner, Miller-Cribbs, 2012).

Mothers in the control group have received no information from SEED OK researchers about the OK 529 plan. The treasurer's office did not automatically open a state-owned account for their children, and they received no financial incentives. However, like all others outside the experiment, they are free to open their own participant-owned accounts in the state's OK 529 plan.

Effects of the SEED OK Experiment

While CDAs have been implemented or demonstrated a number of countries, the SEED OK experiment has the most rigorous research design to evaluate CDA effects. Research on SEED OK suggests that the CDA intervention has positive effects on parenting and child development (Beverly et al., 2014). Kim et al. (2013) assess changes in SEED OK mothers' expectations for their children's future postsecondary education and find that the proportion of mothers whose expectations declined over 3 years is smaller in the treatment group than in the control group. Another study (Huang, Sherraden, & Purnell, 2014) suggests that the CDA intervention in SEED OK has significant effects on reducing maternal depressive symptoms, and the effects are larger for subsamples with disadvantaged characteristics. Huang et al. (2014) find that, at age 4, treatment group children from low-income or low-education families show significantly higher levels of social-emotional development than their counterparts in the control group.

Overall, research on the SEED OK experiment has provided evidence of positive effects on diverse measures of asset holding. In addition to a higher rate of account holding and a greater amount of savings in participant-owned accounts among treatment mothers, 99.9% of the treatment group mothers (all but one, who opted out for religious reasons) hold a state-owned account automatically opened for their child (Nam et al., 2013). The total assets accumulated—including savings, SEED OK financial incentives, and investment returns—are substantively and significantly higher for the treatment group.

Several studies examine the heterogeneous effects of the SEED OK CDA intervention on asset accumulation by demographic and socioeconomic characteristics. For example, Huang, Nam, and Sherraden (2013) find that mothers' financial knowledge is positively associated with participant-owned account holding and observe a significant interaction effect between financial knowledge and treatment group status. Relative to the control group mothers with low levels of financial knowledge, treatment-group mothers with any level of financial knowledge have significantly higher account holding rates.

Beverly, Kim, Sherraden, Nam, Clancy (2012) examine the effects of SEED OK on savings outcomes by various demographic groups (e.g., income, race and ethnicity, parents' education level, banked status, homeownership, public assistance, and primary language spoken). The study finds that treatment group children from advantaged families are more likely to hold participant-owned accounts and have higher savings amounts than similar control group children. However, variations by demographic characteristics are lower in the treatment group than in the control group. In other

words, the universal and progressive SEED OK intervention has greater positive effects among disadvantaged families.

Wikoff, Huang, Kim, and Sherraden (2013) ask whether SEED OK has a greater effect on participant-owned account holding among families experiencing material hardship than on their counterparts who are not. Results demonstrate a negative association between material hardship experience and account holding in general, but this association is different by treatment status. Compared to control group mothers, treatment group mothers are more likely to hold participant-owned 529 accounts at all levels of material hardship. This finding demonstrates that CDAs can lessen adverse effects of material hardship and encourage families experiencing it to make a financial plan for their children's future postsecondary education.

These studies show that both treatment and control families with socioeconomically disadvantaged characteristics (e.g., low incomes, material hardship, or low levels of financial knowledge) are less likely to hold and save in participant-owned accounts. Reasons for not holding accounts include lack of surplus income, lack of information, misunderstanding the accounts and incentives, and the length of time until their children are college age (Gray et al., 2012). Another possible reason is the regressive nature of tax benefits in the OK 529 College Savings Plan. Given the regressive nature of the Oklahoma 529 College Savings Plan (and all College Savings Plans as they were originally designed), the disparity in asset holding and asset accumulation by socioeconomic status exists even within the treatment group.

However, the studies also show that universal and progressive incentives in the CDA intervention reduce the asset-holding gap between advantaged and disadvantaged families within the treatment group. In other words, SEED OK reduces—though does not completely remove—the socioeconomic disparity in asset accumulation. This point is of great importance because findings can be easily misunderstood. For example, it is empirically incorrect to conclude that CDAs increase inequality based on the still-existing disparity within the treatment group. The greater effects on asset accumulation among disadvantaged groups also are consistent with greater nonfinancial positive outcomes, which exhibit the same pattern (e.g., Huang et al., 2014; Huang, Sherraden, & Purnell, 2014).

While the studies discussed above assess whether asset-accumulation effects of SEED OK vary by demographic and socioeconomic characteristics, the present study examines heterogeneous effects of CDAs very specifically. We focus on how these effects are reflected in the shape of savings distribution, and the amount of savings deposited by the mothers.

Methods

Data and Sample

This study uses survey and account data from SEED OK, including a baseline telephone survey conducted on all study mothers between 2007 and 2008 and quarterly account data up to 2013 obtained from the manager of the OK 529 plan. Baseline survey data contain detailed demographic and socioeconomic information about SEED OK mothers, and quarterly account data provide accurate information (i.e., account-holding status, account balance, deposits, and withdrawals) for all

OK 529 accounts—including state-owned and participant-owned—opened for children in the SEED OK experiment.

Of the 2,704 study participants, 2,677 are included in the final analysis sample. First, SEED OK participants who did not live in Oklahoma at the time of the baseline survey (*n* = 22) are excluded because nonresidents may be less likely to hold a participant-owned account given different tax benefits of the 529 plans in Oklahoma and their resident states. The final sample also excludes participants who are not mothers (i.e., fathers, grandparents, and siblings; *n* = 5).

Measures

The dependent variable is individual savings amount deposited by mothers into participant-owned accounts, which we created using account data from January 1, 2008, to December 31, 2013. This measure indicates mothers' net financial investment for children's future education and does not include investment earnings or SEED OK incentives (i.e., the $100 account-opening incentive, $1,000 seed deposit, and savings matches). Since the study is mainly interested in money saved in participant-owned accounts, we refer to mothers who hold these accounts as participant-owned account holders. Mothers who do not hold accounts and those who hold accounts but do not make any contributions have a value of 0 for the dependent variable. The independent variable is an indicator of SEED OK treatment status. Mothers in the treatment group are coded as 1, and those in the control group are coded as 0.

Other variables include children's, mothers', and households' characteristics. First, children's characteristics include age measured in months and gender (1 = male and 0 = female). Mothers' characteristics include race (White, Black, American Indian, and other), age (<20, 20–29, and ≥30), education (below high school, high school, some postsecondary education, and 4-year postsecondary education or above), marital status (1 = married and 0 = not married), and employment status (1 = employed, 0 = unemployed).

Control measures of household characteristics include household size, number of children, homeownership status (1 = homeowners and 0 = otherwise), welfare program participation (1 = yes and 0 = no), household income-to-needs ratio, receipt of the Earned Income Tax Credit (EITC; 1 = yes and 0 = no), and location. The variable of household size is top-coded at 7 because only a small proportion of households have more members. Number of children in the household is categorized into four groups (one child, two children, three or more children, or missing). Almost 40 mothers do not report this information in the baseline survey. Households have a value of 1 on the measure of welfare program participation if they received income from Temporary Assistance for Needy Families (TANF), Supplemental Nutrition Assistance Program (SNAP), Supplemental Security Income (SSI), or Social Security Disability Insurance (SSDI) in the previous 12 months. They have a value of 0 if they did not receive any benefits from these programs. Household income-to-needs ratio is the between a household's pretax income and the 2007 federal poverty thresholds adjusted for household size (Annual Update of the HHS Poverty Guidelines, 2007). Households are categorized into four groups by their income-to-needs ratio (below 2, between 2 and 4, above 4, and missing). Household location is indicated by the first three digits of the zip code.

The study also controls for several indicators of asset ownership and financial management. Assets include checking accounts (1 = yes and 0 = no), savings bonds (1 = yes and 0 = no), credit cards (1

= yes and 0 = no), and home equity loans (1 = yes and 0 = no). Financial management is indicated by whether mothers set financial goals (1 = often true, 2 = sometimes true, and 3 = rarely true) and whether friends and relatives expect mothers to help out when they have extra money (1 = often true, 2 = sometimes true, and 3 = rarely true).

Statistical analysis

Quantile regression and the shape of savings distribution

First, we report descriptive statistics by treatment status to examine whether randomization has successfully created two comparable groups. We then run quantile regressions to evaluate the CDA intervention's effect on the shape of the savings distribution. Quantile regression models the relationship between independent variables and specific percentiles of the savings distribution (Hao & Naiman, 2007; Koenker & Hallock, 2001). We chose quantile regression because only a small proportion of treatment mothers and an even smaller proportion of mothers in the control group opened and made deposits into participant-owned accounts, and the savings distribution is highly skewed. The skewed distribution implies that the relationship between the SEED OK experiment and participant-owned savings varies at different percentile points on the savings distribution. The model specification can be summarized as follows:

$$Q_\theta(Y_i) = \beta_{\theta,0} + \beta_{\theta,1} \cdot T_i + \epsilon^\theta_i,$$

where $Q_\theta(Y_i)$ indicates the θth percentile of the savings in participant-owned accounts; T_i denotes whether a study mother *i* belongs to the treatment group or not; and ϵ_i is random error. In this equation, the coefficient of $\beta_{\theta,0}$ is the estimated θth percentile of the savings for the control group, and the coefficient of treatment status ($\beta_{\theta,1}$) estimates a difference in the θth percentile of the savings between treatment and control groups. The quantile regression is weighted to adjust the oversampling of minority groups and the discrepancies between mothers and nonmothers (Marks et al., 2008). To improve model convergence, we did not include control variables in the quantile regression. Since the CDA intervention was assigned randomly, we assume that (a) the inclusion of control variables does not change the results and (b) the treatment and control groups have comparable demographic and socioeconomic characteristics. For the purpose of improving model convergence, Marks, Engelhardt, Rhodes, and Wallace (2014) use propensity score weighting to include a proxy of demographic characteristics in quantile regression and do not find that control variables change the estimated effects of the CDA intervention.

Statistical match and mean savings

Quantile regression identifies (a) the percentage of mothers whose saving performance has been affected by SEED OK and (b) the treatment–control difference in the percentiles of the savings distribution. We use statistical match to evaluate the effect of the SEED OK intervention on the amount of savings among participant-owned account holders. A statistical match is useful because the mean difference in savings amounts between treatment group participant-owned account holders and their control group counterparts is not a valid measure of the CDA's effect. Holding a participant-owned account and making deposits into it are self-selected actions, rather than the randomly assigned results of the SEED OK intervention. Therefore, the treatment–control mean difference in savings amounts among participant-owned account holders is confounded with other

determinants (e.g., income, education, and saving motivation) that affect holding of and saving into the account. Some of these determinants may not be observed in the study. Because they opened and held participant-owned accounts without additional SEED OK incentives, control group participant-owned account holders are more motivated to save for children. They also are more likely to have resources to save than most treatment group participant-owned account holders, who have been encouraged by SEED OK incentives to open and hold the account.

Therefore, to assess the effect of SEED OK on savings amounts among participant-owned account holders, we contrasted savings amounts of control group members with those of treatment group members who we expect might have held an account even without the presence of SEED OK. We then consider the savings amounts of the rest of treatment group participant-owned account holders to be the net effect of the CDA intervention on those motivated by the intervention because their counterparts in the control group do not hold or save in participant-owned accounts. In other words, the treatment group can be categorized into three subgroups: (1) those without participant-owned accounts who are not motivated by the current design of the intervention to hold and save in an account; (2) those who we would expect to hold accounts even without SEED OK; and (3) those who would not hold accounts without the intervention.

Statistical match can separate subgroups 2 and 3. We identify a set of variables on which all participant-owned account holders in the control group share the same responses and find treatment group mothers who have the same responses for statistical match. For example, if all control group participant-owned account holders have a 4-year postsecondary education degree or above, we assume that treatment group mothers who are likely to hold an account without the intervention should be selected from those with the same level of education. If the statistical match successfully separates two subgroups of treatment group account holders, we hypothesize that the number of control group participant-owned account holders ($n = 12$) should be very similar to the number of their matched treatment group account holders. After statistical match, we can compare average savings amounts in participant-owned accounts to evaluate SEED OK effects. We did not use propensity score match because only 12 control group mothers hold participant-owned accounts, and many demographic variables can perfectly predict account-holding status in a binary model because the sample size is small.

Results

Sample characteristics

Table 1 reports descriptive statistics of all variables by treatment status. Less than 15% of SEED OK mothers are younger than 20 years old. The majority of SEED OK mothers are White (about 78%); about 40% have at least some college education; and nearly 60% are married. At the time of the baseline survey, less than half (about 45%) were employed. The mean household size is four, and two thirds of households have fewer than two children. Less than half of mothers own their homes, and more than 40% of households received at least one public assistance benefit in the 12 months prior to the baseline survey assessment. Nearly 70% of households have an income-to-needs ratio of less than 2. Treatment and control groups do not have statistical differences in these observed demographic characteristics, which indicates successful randomization before implementation of SEED OK.

Table 1. Demographic and Socioeconomic Characteristics of the Sample (N = 2,677)

| | Weighted percentage or mean | |
| | Treatment group | Control group |
Variables	(n = 1,343)	(n = 1,334)
Child's characteristics		
Age (mean)	78.35	78.33
Gender (male)	53.44	52.75
Mother's characteristics		
Age		
<20	13.81	13.99
20–29	61.80	61.45
≥30	24.39	24.56
Race		
White	78.05	77.44
African American	9.06	9.25
American Indian	11.61	11.86
Asian	1.28	1.45
Education		
Below high school	22.34	22.35
High school	37.89	37.93
Some postsecondary education	18.19	18.73
4-year postsecondary education or above	21.58	20.99
Marital status (married)	59.19	60.65
Employment status (employed)	44.69	46.53
Household characteristics		
Household size (mean)	4.20	4.13
Number of children		
1	33.73	37.10
2	33.45	33.01
3 or more	31.14	28.95
Missing	1.67	0.94
Homeownership (yes)	42.05	41.66
Welfare participation (yes)	40.48	41.55
Income-to-needs ratio		
<200%	65.84	66.50
200–400%	17.86	17.94
>400%	12.45	12.97
Missing	3.85	2.59
EITC income	27.55	25.73
Asset ownership and financial management		
Checking account (yes)	74.39	73.34
Savings bond (yes)	8.46	9.34
Credit card (yes)	39.82	42.89
Home equity loan (yes)	5.85	4.72
Set financial goals		
Often true	47.54	49.98
Sometimes true	38.33	36.09
Rarely true	14.13	13.93
Help friends and relatives		
Often true	12.36	12.44
Sometimes true	24.93	25.93
Rarely true	62.71	61.64

Table 2 reports participant-owned account-holding status and savings amounts in participant-owned accounts. In total, 201 (17%) mothers in the treatment group and 12 (1%) mothers in the control group hold participant-owned accounts. Eight percent of treatment group mothers have deposited savings into their participant-owned accounts. The mean duration of account holding is 21 quarters. The nonweighted average savings amount is $158 for all mothers in the treatment group (including zero for those without participant-owned accounts) and $26 in the control group. The treatment–control difference in participant-owned savings is statistically significant at the .001 level. Because about 92% of treatment group mothers and more than 99% of control group mothers do not have savings in participant-owned accounts, the median savings amount for both groups is $0. Among those holding participant-owned accounts, the nonweighted mean savings amount is $1,053 for the treatment group and $2,863 for the control group. A direct comparison of these two means shows that the mean savings amount among control group account holders is statistically higher than that among treatment group account holders ($p < .01$). As we discussed above, this is not a valid measure of the CDA intervention's effect on savings amounts among participant-owned account holders. Thirty-seven treatment group savers have received savings matches from SEED OK, and the mean savings amount among this group is $927.

Results of quantile regressions

Table 3 reports results of quantile regressions estimating different percentiles of savings amounts in participant-owned accounts. For comparison, we list results of the linear regression in the first column. On average, control-group mothers saved $32 in participant-owned accounts while treatment-group mothers saved $153 ($p < .001$) by the end of 2013. Consistent with descriptive results reported in Table 1, results of quantile regressions suggest that the savings distribution is highly skewed and the CDA intervention affects only a proportion of treatment group mothers' saving performance. As indicated by the coefficients for the constant, the savings amount among control group mothers is $0 at the 25th, 50th, and 75th percentiles. The coefficients for treatment mothers suggest that treatment group mothers do not have different savings amounts at these three quartiles. However, starting from the 95th percentile, the coefficient for the treatment status variable is positively and statistically significant. At the 95th percentile, treatment group mothers save $390 more than control group mothers ($p < .05$). The treatment–control difference increases to $1,600 at the 97th percentile ($p < .001$) and $3,640 at the 99th percentile ($p < .001$). Thus, SEED OK changes the shape of the savings distribution and affects saving performance mainly among treatment group mothers in the top percentiles (8%). Another way to look at this is that SEED OK markedly affects savings amounts but only among a modest portion of treatment mothers.

Figure 2 is a graphic representation of results in Table 3. The dashed line is the coefficient for the treatment status in the ordinary least squares (OLS) regression and shows the effect of the CDA intervention averaged to all treatment group mothers across all percentiles. The solid line represents coefficients for the treatment status variable in quantile regressions and shows that the effect of the CDA intervention is heterogeneous, affecting less than 10% of treatment group mothers. Figure 2 also demonstrates that treatment group participant-owned savings amounts are equal to or higher than savings amounts in control group accounts at all percentile points.

Table 2. Participant-Owned Account Holding Status and Savings (N = 2,677)

Variables	Weighted percentage or mean		Nonweighted percentage or mean	
	Treatment group (*n* = 1,343)	Control group (*n* = 1,334)	Treatment group (*n* = 1,343)	Control group (*n* = 1,334)
Holding a participant-owned account**				
Frequency	201	12	201	12
Percentage	16.84	1.02	14.97	0.90
Mean quarters of account holding	21.03	21.00	21.38	19.25
Amount of savings in participant-owned accounts				
Mean**	152.93	32.18	157.67	25.75
Median	0.00	0.00	0.00	0.00
% of mothers with >$0 savings	8.51	0.86	7.52	0.82
Maximum	28,800.00	9,750.00	28,800.00	9,750.00
Mean among mothers with participant-owned accounts*	908.11	3,163.34	1,053.46	2,862.50
Mean among mothers who received a savings match (*n* = 37)	927.54		926.70	

*p < .01; **p < .001.

Table 3. Results of Quantile Regressions: Amount of Savings by Treatment Status (*N* = 2,677)

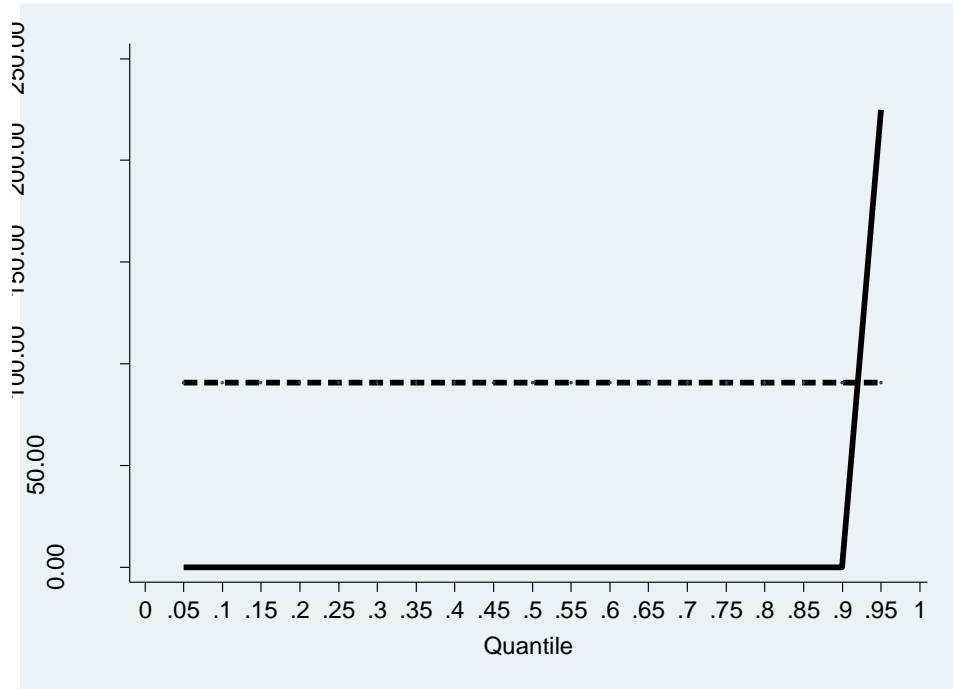|	Mean	25%	50%	75%	95%	96%	97%	98%	99%
Constant	32.18	0	0	0	0	0	0	0	0
Treatment group	120.75***	0	0	0	390*	702.58**	1,600***	1,750***	3,640**

*p < .05; **p < .01; ***p < .001.

Figure 2. Coefficients of quantile regressions.

Statistical match and mean savings among participant-owned account holders

The first column of Table 4 shows that control group mothers with participant-owned accounts (*n* = 12) share many characteristics. For example, only White and American Indian control group mothers hold participant-owned accounts, and participant-owned account holders in the control group are all older than 20 years of age and have 4-year college degrees. Their households have incomes above 200% of the poverty threshold and were not receiving EITC income at the baseline. Account holders in the control group also have basic financial access (e.g., checking accounts and credit cards) and often set financial goals for their families.

Among 2,677 study participants, we identified 86 mothers—40 from the treatment group and 46 from the control group (including the 12 participants-owned account holders)—who share the characteristics listed in the first column of Table 4. Fourteen of the 40 mothers from the treatment group hold participant-owned accounts for their children. Matched with account holders in the control group, these 14 treatment group mothers are considered those who would hold accounts without the CDA intervention. As shown in the first column of Table 5, the mean savings amount is $2,863 for the 12 control group account holders and $3,258 for the 14 matched treatment group account holders. While treatment group account holders have a greater mean savings amounts, there is no statistical difference between the two means (*p* = .84). This comparison also shows that additional SEED OK incentives do not crowd out the amount of savings in participant-owned accounts for this subgroup within the treatment group.

Table 4. Demographic and Socioeconomic Characteristics by the Statistical Match Status

	Frequency (%)		
Variables	Control group account holders (*n* = 12)	Treatment group account holders not matched (*n* = 187)	Treatment group mothers without accounts (*n* = 1,142)
Mother's demographic characteristics			
Race/ethnicity			
Caucasian	9 (75)	133 (71)	698 (61)
American Indian	3 (25)	25 (13)	230 (20)
Age (older than 20)	12 (100)	179 (96)	950 (83)
Education (4-year postsecondary education and above)	12 (100)	95 (50)	173 (14)
Household characteristics			
Household size (3 or 4)	12 (100)	122 (65)	671 (59)
Number of children (1 or 2)	12 (100)	131 (70)	746 (64)
Income-to-needs ratio (above 200%)	12 (100)	109 (58)	303 (27)
Households with EITC income (No)	12 (100)	127 (77)	770 (71)
Asset ownership and financial management			
Checking account (Yes)	12 (100)	170 (91)	747 (66)
Savings bonds (No)	12 (100)	158 (86)	1,049 (94)
Credit card (Yes)	12 (100)	128 (69)	371 (33)
Home equity loans (No)	12 (100)	162 (89)	1,066 (96)
Set financial goals (often true)	12 (100)	102 (55)	513 (45)
Friends/relatives expect me to help out (rarely true)	12 (100)	129 (69)	666 (58)

Note: The table does not report demographic and socioeconomic characteristics of matched treatment group account holders because they are the same as those reported in the first column for control group account holders. Treatment group account holders not matched with control group account holders are affected substantially by the SEED OK CDA intervention, and treatment group mothers without accounts are those not affected.

Table 5. Mean Savings in Participant-Owned Accounts by Statistical Match Status

	n	Mean savings	Mean difference[a]	P value[b]
Main statistical match				
Control group account holders	12	2,863		
Matched treatment group account holders	14	3,258	395	.84
Treatment group account holders not matched	187	888		
Supplemental analysis 1				
Control group account holders	12	2,863		
Matched treatment group account holders	33	3,198	335	.87
Treatment group account holders not matched	168	632		
Supplemental analysis 2				
Control group account holders	12	2,863		
Matched treatment group account holders	16	2,989	126	.95
Treatment group account holders not matched	185	886		

[a] This column reports the difference in mean savings in participant-owned accounts between control group account holders and matched treatment group account holders.

[b] This column reports the *p* value of t tests comparing the savings in participant-owned accounts between control group account holders and matched treatment group account holders.

After removing the 14 treatment group account holders, the remaining treatment group account holders ($n = 187$) compose the subgroup encouraged by the CDA intervention to open and hold an account. The mean savings for this subgroup is $888, which we consider the *net effect* of SEED OK because their counterparts in the control group do not hold or save in participant-owned accounts. We find that 91 of these 187 account holders made contributions to participant-owned accounts, and the mean savings amount is $1,826.

While the variables in Table 4 seem to be reasonable predictors of mothers' participant-owned account holding, the process of statistical matching cannot be perfect. Therefore, we ran supplemental tests by reducing the number of variables used for matching, which reduces restrictions on matching (and provides a less perfect fit and more conservative results). First, removing several variables—including EITC income, economic support of friends and relatives, ownership of savings bonds, and home equity borrowing—generates 33 account holders in the treatment group matched with those in the control group. In the second supplemental test, we removed the zip code variable, which generated 16 treatment group account holders. Results for these two supplemental tests are reported in the second and third columns of Table 5 and are consistent with those discussed above.

Who is affected by SEED OK to save?

Statistical match helps identify those encouraged to save by the CDA intervention. The second and third columns of Table 4 report characteristics of matched variables for treatment group mothers motivated by the intervention to hold accounts ($n = 187$) and those who are not ($n = 1,142$). Overall, the groups in the second and third columns are more socioeconomically disadvantaged than control group account holders and less likely to have a college education, have household income above 200% of the poverty line, own savings accounts and credit cards, or set financial goals. These findings are consistent with previous research predicting parents' saving performance for children's education

(Huang, Beverly, Clancy, Lassar, & Sherraden, 2013; Nam et al., 2013). It is important to note that, while control group account holders all have a college education degree and incomes above 200% of the poverty threshold, the percentages of treatment group mothers affected by the intervention on these two variables (the second column of Table 4) are much lower: 50% and 58%, respectively. In other words, a high proportion of treatment group mothers motivated by the universal and progressive features of the CDA intervention to have participant-owned accounts have socioeconomically disadvantaged characteristics. The CDA intervention reduces inequality in savings for children's education.

Discussion

Results summary

Previous SEED OK research estimates the treatment–control difference in mean assets and savings using the intention-to-treat approach (Nam et al., 2013). The experiment achieves universal participation through automatic opening of state-owned accounts for children in the treatment group. The average asset amount—which includes savings, SEED OK incentives, and investment returns—is greater than $1,000. To provide a supplemental understanding of CDA effects on personal savings for children's education, this study examines how the intervention affects the shape of the savings distribution and amount of savings among participant-owned account holders.

Results suggest that SEED OK affects saving performance for a proportion of treatment group mothers. When we focus on only the treatment group mothers affected by the intervention, the estimated effect on savings is greater than previous estimates based on the intention-to-treat approach. The treatment–control difference increases from $390 at the 95th percentile to $3,640 at the 99th percentile, while the treatment–control difference in mean savings is $121. For treatment group mothers who would have held a participant-owned account without the intervention ($n = 14$), the offer of additional financial incentives does not crowd out their contributions. If we take into consideration duration of account holding, the annual mean savings is about $180 for treatment group mothers motivated by the SEED OK experiment to hold participant-owned accounts ($n = 187$) and about $350 for those motivated by the experiment to save in the accounts ($n = 91$). More than one third of treatment savers are eligible for savings matches, and their nonweighted average savings ($927) is only slightly less than that of all treatment mothers with a participant-owned account ($1,053).

Effect size for account holders

How should we interpret the size of these effects? The CDA intervention has changed 8% of treatment group mothers'—including a significant portion of those in socioeconomically disadvantaged families—financial planning and saving performance for children's postsecondary education. The effect on participant-owned savings among these 8% of treatment mothers is not negligible. Control group mothers opened participant-owned accounts at a rate of less than 1%. Moreover, the mean savings amount among treatment group mothers motivated by the intervention to save ($n = 91$; $1,826) is about 65% of that among control group mothers with participant-owned accounts ($2,823). Without the SEED OK intervention, the amount of these mothers' savings for their children in participant-owned accounts would have been $0 instead of $1,826.

We can put this amount of savings in a broader context of challenges in saving. For example, in 2010, the average net worth of the poorest 40% of U.S. households declined to -$10,600 (Wolff, 2012). Nearly half of Americans cannot come up with $2,000 for an unexpected need within a month (Lusardi, Schneider, & Tufano, 2011). The percentage of parents with children younger than age 18 who saved for postsecondary education declined from 60% in 2010 to 50% in 2013 (Sallie Mae, 2013). Overall, to save and accumulate assets was much harder for many American families during the economic downturn. Yet even in this environment, SEED OK treatment participants substantially increased their savings in the CDA.

Is the increased savings amount enough to matter? The average 2013–2014 in-state tuition for 4-year colleges in Oklahoma is $6,583 (College Board, 2013), not including costs for room and board. Assuming a 5% annual increase, the college planning calculator developed by Sallie Mae (College cost calculator, n.d.) estimates that in-state tuition for a 4-year postsecondary education in Oklahoma will be $48,528 in 2025. If treatment group mothers who are motivated by the intervention to hold participant-owned accounts ($n = 187$) maintain the same saving pattern until their children are 18 years old, and the savings have a 5% rate of return, the average amount balance will be about $4,400, approximately 9% of the total tuition cost. If treatment group mothers motivated by the SEED OK CDA intervention to save ($n = 91$) maintain the same saving pattern, the average amount balance will be nearly $7,500, or 15% of the total tuition cost. If we include the SEED OK initial $1,000 deposit and account-opening $100 deposit, the predicted percentages of total tuition cost are 13% and 23%, respectively.

Since most savings are invested in age-based funds, the return rate may be even higher than 5%, according to historical fund performance data (Historical investment performance, n.d.). Also, college tuition rates are higher than actual average college costs. As shown in reports from Sallie Mae (2013), parents on average paid for 9% of children's postsecondary tuition from savings in 2012, and parents of children younger than age 18 expect to use savings to finance a similar percentage of children's postsecondary education. Projected savings amounts ($4,400 and $7,500) also are comparable to estimated financial aid (i.e., $5,040) for a typical child in the sample at age 18 (Marks et al., 2014). Overall, these data indicate that savings and asset accumulation created by the CDA intervention among participant-owned account holders are substantively meaningful in helping finance children's postsecondary education and are consistent with parents' saving expectations.

Accumulated savings in CDAs may play an even more important role in financing postsecondary education if these mothers increase the amount of savings over time, and in general, parents are more likely to save for education when children get older and closer to college age. A report from Sallie Mae (2013) suggests that the amount of parental savings for children ages 13–17 is about three times the amount of that for children ages 0–6.

How to expand effects of CDAs

It is important to note that the majority of treatment group mothers (92%) have not as yet made contributions in participant-owned accounts. Parents' financial decisions about whether to save for their children's education are affected not only by the CDA intervention but also by demographic and socioeconomic characteristics and other institutional conditions. The studies mentioned above (i.e., Lusardi, Schneider, and Tufano [2011] and Wolff [2012]) demonstrate the great challenge of saving and accumulating assets. Families with young children tend to make financial investments

based on a hierarchy of needs (Xiao & Noring, 1994) and may make financial planning for children's futures less of a priority than more immediate needs.

Results of this study and previous SEED OK research suggest that asset-building programs matter. The CDA intervention affects saving performance in some households, and the amounts of participant-owned savings and assets are meaningful to children's postsecondary education. A critical question is the extent to which CDA programs counteract asset-accumulation constraints and enable more people to accumulate savings and assets for their children. For example, how do we reduce the area between the dashed line and the solid line in Figure 2 and increase the level of the dashed line? The design of specific program features may provide the answer. For example, state-owned SEED OK accounts are automatically opened for treatment group mothers by the state treasurer's office, and almost all (99.9%) treatment group mothers still hold the accounts several years later, a substantial experimental impact (Nam et al., 2013).

Regarding practical policy application, the SEED OK experiment demonstrates that automatic account opening is a highly successful strategy for inclusion of a full population. Moreover, this research has influenced state officials in Nevada to launch Nevada College Kick Start—which automatically opened and seeded with $50 college savings accounts for about 3,400 kindergarten students in 13 rural communities—as a pilot program in 2013. Statewide expansion of the program announced in 2014 includes nearly 35,000 public school kindergarten students. In March 2014, influenced directly by SEED OK results, the State of Maine announced that all newborns will receive an automatically opened CDA seeded with $500 (Beverly at al., 2014).

Additional research on automatic account opening and other asset-building features provides important insight into how to design more inclusive asset-building programs (e.g., Choi, Laibson, Madrian, & Metrick, 2004). An emerging institutional theory of saving identifies constructs—access, information, incentives, expectations, facilitation—that shape saving actions and performance and can be used to guide future CDA development (Beverly et al., 2008; Sherraden, Schreiner, & Beverly, 2003). In this institutional view, saving may have little to do with individual behaviors—e.g., automatic enrollment and saving in a 401(k)—yet may still have positive long-term results.

Overall, the SEED OK effect on savings amounts is limited at this stage to a small proportion of treatment group mothers, but this does not mean that the intervention has no effect on asset holding and child development for the rest of the treatment group. Personal saving is only one way to accumulate assets. Almost all treatment group mothers received $1,000 in state-owned accounts for children's future education. This asset holding has generated positive effects on parental educational expectations and child development and may continue to have positive effects in the long term. As shown in previous research, the effects of SEED OK on maternal depressive symptoms and children's social-emotional development are not related to saving performance in participant-owned accounts (Huang et al., 2014; Huang, Sherraden, & Purnell, 2014). In other words, the holding of an account with assets is what matters, regardless of the source.

Limitations

This study has some limitations. First, SEED OK does not provide detailed data on households' savings for children's postsecondary education other than that in OK 529 accounts. Accordingly, this study cannot examine the relationship between CDA and other children's savings. Control

group members may be more likely than their treatment counterparts to save in other accounts. If so, this study may overestimate the treatment effects of the SEED OK CDA intervention. Second, the study uses account data collected for the first 6 years of the intervention, reporting short-term—but not long-term—effects of expanded financial access. Considering that parents can save for their children's education over 18 years, 6 years may be too short a period to evaluate the full effect of the SEED OK CDA intervention. Future research on long-term effects is warranted. Third, the sample includes only children born in Oklahoma and does not represent children in other states or the United States as a whole. In addition, SEED OK researchers drew a probability sample of 7,328 infants. Only 37% participated in the experiment, which may raise the issue of external validity. Although study participants looked much the same as nonparticipants on most observed variables, it is possible that important differences remain unobserved.

Policy and research implications

This research has several policy and research implications. First, results show that savings in participant-owned accounts can play an important role in financing children's postsecondary education for treatment group mothers affected by the intervention. Since an extremely small group of mothers in the control group save in participant-owned accounts, the intervention increases the number of savers by about nine times. Thus, CDAs can be a promising policy tool for helping families become financially prepared for children's postsecondary education and begin accumulating assets for children in early childhood. Second, future CDA programs should identify and test features that promote accumulation of more assets for children's education. With appropriate program design, CDAs have the potential to expand program effects to a greater population, especially among mothers with socioeconomic disadvantages.

By removing treatment group mothers who would have held participant-owned accounts without the SEED OK CDA intervention, the study identifies a group of mothers whose saving performance for children are directly affected by it. This could inform future evaluations of the effects of the CDA intervention on other aspects of individual well-being, which could contribute to theoretical specification going forward.

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