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Seed Deposit, Match Cap, and Net Savings Patterns

An Assessment of Institutional Incentives in the *I Can Save* Program

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Seed Deposit, Match Cap, and Net Savings Patterns: An Assessment of Institutional Incentives in the *I Can Save* Program

Incentive structures are key to the success of asset-building programs. A review of the existing literature reveals a lack of knowledge regarding the time dimension of incentive structures embedded in the asset-building programs. It is not clear how saving performance may change even when institutional settings stay the same over time. Using cash flow data from I Can Save*, a small-scale Child Development Account demonstration project, this study closely examines how two institutional components, seed deposit and match cap, affect net savings over the four-year observation period. Results from the descriptive and multivariate analyses show that saving performance is a function of time in response to the institutional incentives, namely, seed deposit and match cap. The findings suggest that the effects of asset building programs can be time dependent, and the temporal aspect of program effects may have important implications for developing effective asset-building programs.*

Key words: *asset building, saving, child development account, institutional incentive*

Introduction

There is a growing awareness of the important role of household assets in protecting and improving human well-being (Conley, 1999; Oliver & Shapiro, 2006; Sherraden, 1991). Researchers and policymakers have made efforts to develop policy tools that encourage low-income and low-wealth people to save for lasting assets. This is perhaps best reflected by such initiatives as Individual Development Accounts (IDAs) and Child Development Accounts (CDAs), both of which are incentivized savings accounts encouraging low-income households to save for developmental purposes (such as home ownership, business start-ups, and children's future education) (Loke & Sherraden, 2008).

By 2008, there were about 1,100 IDA programs run by community-based organizations across the United States with more than 80,000 total participants. These programs have resulted in over 10,400 new homeowners, 7,400 educational purchases, and 6,300 small business start-ups (Corporation for Enterprise Development, 2008). Beginning 2005, the Child Trust Fund in the United Kingdom endows each child born on or after September 1, 2002 with an initial deposit of £250 from the government when they open a child savings account. Children in low-income families receive an additional £250. Asset-building policies have also been adopted in Singapore, Korea, Canada and other countries (Loke & Sherraden, 2008). The expansion of asset-building programs indicates their increasing significance as a policy tool for social development.

Research on asset-building policy suggests that the success of these programs depends on various features, including seed deposit, match rate and match cap, financial education, and many others.[1]

[1] See Schreiner and Sherraden (2007) for a detailed discussion of IDAs' design features.

Seed deposit refers to the initial endowment provided by the program to motivate low-income households to participate. In Saving for Education, Entrepreneurship, and Downpayment (SEED), a large-scale demonstration of CDAs in the US, the seed deposit ranged from 0 to $1,000 (Mason, Nam, Clancy, Loke, & Kim, 2009). *Match rate* is the subsidy rate, and match cap is the subsidy maximum for participants' eligible savings. *Match cap* features are widely used in pension plan design, such as 401(k) plans, as a powerful tool to set saving goals for program participants. Given a match cap, the rule of thumb for many people is to "save up to the match cap" (Choi, Laibson, Madrian & Metrick, 2004, 2005; Tversky & Kahneman, 1974; Schreiner & Sherraden, 2007). Asset-building programs also specify the hours and types of financial education required for participants. Together, these program features provide an institutional setting that encourages low-income participants to accumulate assets.

A few studies have investigated how these institutional factors affect savings outcomes across different programs (e.g., Schreiner & Sherraden, 2007; Mason, Nam, Clancy, Loke, & Kim, 2009). Yet, the time dimension of institutional factors embedded in asset-building programs has not been closely examined. Participants' saving performance may be time-varying as a response to institutional factors. For instance, a seed deposit not only provides an incentive for opening a savings account, but may also stimulate participants to save immediately after the initial endowment is placed in their accounts. This stimulating effect of a seed deposit may diminish over time. Participants' saving behavior may also change over the course of the program depending on how far their savings are from the saving goal established by the match cap. Similarly, financial education may be more beneficial in the long run because it takes time for people to truly grasp and apply financial knowledge and skills. All of this suggests that the effects of institutional factors in asset-building programs may be time dependent. A study of the temporal aspects of program effects may generate important implications for developing effective asset-building programs.

This study examines the temporal effect of institutional factors of asset-building programs on savings using the cash flow data from *I Can Save*, a small-scale CDA demonstration. Specifically, the study focuses on two institutional factors in the *I Can Save* program: seed deposit and match cap. We examine two questions: Is there a savings pattern in the months immediately following seed deposit? How does saving behavior change in response to the match cap over the course of the program?

Background

I Can Save

I Can Save is a demonstration of matched college savings for low and moderate income elementary school students in St. Louis, Missouri. Operated by a nonprofit housing agency and an elementary school, *I Can Save* engaged children and their parents in a voluntary savings program beginning when children were in kindergarten and first grade (2003-2007). The program aimed to generate a model for school-based college savings and financial education to increase children's understanding of personal finance and improve their academic engagement and expectations for higher education. The project adopted a quasi-experimental research design with an experimental group (n=73) in which each student received a savings account and financial education, and a comparison group that

did not receive such interventions.[2] This paper focuses on the children in the experimental group only, because the project did not collect savings deposit data from the comparison group.

The *I Can Save* program has several key program features. First, all students in the experimental group received a savings account with an initial seed deposit of $500 when they entered kindergarten and first grade in 2003. Second, children received a one-to-one match (match rate) for all savings deposits, up to a total of $1,500 (match cap) over four years. In addition, the program provided opportunities for children to earn small amounts of money for saving through participation in an after school *I Can Save* Club, which engaged children in activities such as games, refreshments, and monthly field trips to deposit savings in the bank. Over the four years, children and parents participated in financial education that focused on how to manage and save money and the importance of saving for college. Finally, the program provided a mechanism to connect with existing college savings policy. Upon completion of the program, children's deposits and match dollars were scheduled to be rolled over into a Missouri MO$T account, a 529 college savings account plan.[3] The 529 plan allows participants to withdraw funds for post-secondary education at any federally accredited institution of higher education. By high school graduation, savings in each account will be worth around $3,500, assuming a 5% annual rate of return, no withdrawals, and no additional deposits (Sherraden, Johnson, Elliott, Porterfield, & Rainford, 2007).

The *I Can Save* program tracked and documented information on saving by program participants over the four years. At completion of this program, the average savings each child had in the account was $1,376 (including match).

Institutional theory of saving

The design of the *I Can Save* program is based on the institutional theory of saving, which suggests that saving is shaped by program features rather than by individual characteristics or preferences (Beverly & Sherraden, 1999; Beverly, et al., 2008). These program features include access, information, incentives, facilitation, expectations, and restrictions (Beverly & Sherraden, 1999). *Access* refers to eligibility that affects saving and investment action. Regarding access, it is important to develop programs and policies that encourage asset building for low-income households. *Information*, mostly obtained through financial education, may be general or specific to a particular financial product or program. *Incentive* refers to rewards for saving that may include subsidies and rates of return. *Facilitation* refers to any assistance in saving, especially making saving "automatic." *Expectations* are implicit or explicit suggestions about desired saving, investment, or asset accumulation. Restrictions are rules that restrict access to assets. Each of these elements can shape saving behavior and investment. From the perspective of the institutional theory of saving, even low-income individuals and households can save when appropriate institutional arrangements are in place (Schreiner & Sherraden, 2007).

For the *I Can Save* program, incentives include the seed deposit ($500) and the match fund (a one-to-one match up to $1,500). Research on CDAs shows that the initial deposit has a large and significant association with asset accumulation. Specifically, a $100 increase in the initial deposit is associated with a $110 increase in accumulation (Mason, Nam, Clancy, Loke, & Kim, 2009). The match cap, an

[2] See Sherraden, Johnson, Elliott, Porterfield, & Rainford (2007) for a detailed description of *I Can Save*.
[3] The 529 savings plan provides a tax-advantaged tool for accumulating college savings. This plan allows individuals to save money in an account dedicated to the future higher education expenses of a beneficiary (Mason, Clancy, & Lo, 2008).

implicit expectation, also has a positive impact on savings outcomes. For example, participants in programs with higher match cap generally saved more (Mason, Nam, Clancy, Loke, & Kim, 2009; Schreiner & Sherraden, 2007). Another important element in *I Can Save* is financial education, which included classroom-based curricula and an after-school *I Can Save Club* held once a week. Children received one lesson from *Financial Fitness for Life*® per week in class, reinforced through after-school club activities. Parents were also encouraged to participate in workshops that cover a number of topics to increase financial knowledge (Sherraden, Johnson, Elliott, Porterfield, & Rainford, 2007). Finally, this program also set up a restriction that savings in children's accounts must be used for their post-secondary education.

A temporal view of institutional factors

A number of studies examine how institutional factors in asset-building programs affect savings outcomes (Han, 2006; Han & Sherraden, 2007; Schreiner & Sherraden, 2007). By comparing savings outcomes across programs, the effects of different institutional arrangements across programs can be assessed. For example, in one study, participants in the program with higher match rates are more likely to be savers; in addition, with an increase in match rates from 1:1 to 2:1, participants' monthly asset accumulation increased from $28 to $41.43 (Schreiner & Sherraden, 2007). Most research on asset-building programs focuses primarily on the average effects of institutional features on saving performance, assuming that such effects are time-invariant or homogenous across time.

Nonetheless, institutional factors generate effects that are likely to vary across time. For example, in a study of an IDA program, general program effects on household financial assets and other types of assets at the 18th month are different from those at the 36th month (Huang, unpublished). Financial education can improve participants' understanding of personal finance and knowledge about saving and investment, but the effect of financial education may not be seen immediately (Mandell, 2009).

Such time-varying effects may not be unique to financial education, and may be found in seed deposit and match cap as well. Seed deposits encourage people to open a savings account, a necessary first step for savings accumulation, but seed deposit may also affect the dynamics of saving behavior. The experience of receiving an initial endowment into the account may immediately stimulate saving behavior (Prabhakar, 2007). This effect may tend to attenuate with time, and may eventually vanish. Scholars, however, have not studied the possible temporal effects of the seed deposit. Match caps may also have important temporal qualities (Leckie, Hui, Tattrie, & Cao, 2009). In the context of asset-building programs, a match cap tends to set a psychological saving target or goal for program participants and stimulate them to "save more than they otherwise would have done on their own" (Schreiner & Sherraden, 2007, p. 219). Previous studies of match caps in IDAs focus on the impact of annual match cap and lifetime match cap on saving behavior (Schreiner & Sherraden, 2007). The annual match cap (the limit on the amount of matchable deposits possible in each participation-year) has an attainable goal and a fast approaching expiration date (one year), which may motivate participants to save immediately. In contrast, in the case of the lifetime match cap (the limit on the amount of matchable deposits before the time cap is reached), participants may feel that the goal is too high to achieve, or that they have plenty of time to reach the goal. Therefore, the incentive to save at present is rather low.

The psychological impact of a match cap suggests that program effects could be highly time-varying. Given a fixed match cap for a specific asset-building program (such as *I Can Save*), we hypothesize that participants will have better saving performance in the process of approaching the saving goal set by the match cap. This hypothesis, however, may oversimplify the psychological effects of the match cap because small deposits[4] by participants in early stages of the program may not give them a feeling of being able to reach the savings goal/lifetime match cap ($1,500 in the *I Can Save* program). In addition, match caps could have negative effects on savings outcomes at certain points in time. For instance, when the match cap is almost reached, participants may begin to save less compared to previous stages because there is little incentive for them to save beyond the saving goal (match cap). In this case, the reluctance to save beyond the cap suggests an opposite hypothesis: participants may have better saving performance before they are close to the savings goal. To sum up, an individual's saving behavior in the asset-building program may vary in response to his/her perception of the difference between the match cap and net savings in the program account. Due to the distinct psychological mechanisms, the effects of match cap may be nonlinear.

As discussed above, the time trend is an important dimension when evaluating the effects of institutional mechanisms in asset-building programs. Moreover, time effects cannot be fully understood without closely looking at within-individual variations (i.e., time series data of individuals). To address the gap in the literature, this study aims to understand the temporal effects of institutional mechanisms, using savings data from the *I Can Save* program. With a focus on two institutional factors, namely, the seed deposit and the match cap, it aims to shed some light on how incentive structures affect saving behavior over time.

Methods

Data

This study uses cash flow data from the *I Can Save* program recorded by the depository institution. These are probably the most accurate and complete data on saving performance of program participants because they come directly from bank records. During the 50 months of the program from November 2003 to December 2007, cash flow data generated a total of 3,371 monthly records (data points) for 73 participants. The number of records for each participant varies from 36 to 50 records, depending on when savings accounts were opened.[5] At the end of each calendar month, the depository institution produced a monthly report for each participant including monthly deposit, deposit frequency in the current month, monthly interest, current balance, year-to-date deposit, year-to-date interest, year-to-date balance, and remaining match. Monthly deposit provides a direct indicator of saving behavior of program participants, and the other variables are considered the functions of monthly deposit. This study focuses primarily on monthly deposit.

Measures

To examine saving performance, we use three variables from the cash flow data. *Monthly deposit* measures how much a participant saved in the program account each calendar month. The seed deposit provided by the program, the match fund, and the interest on savings are not counted in

[4] As shown in Table 1, the mean and median of the monthly deposit of *I Can Save* participants are $15 and $0, respectively.
[5] Most of the participants enrolled in the ICS program in the first year. However, about ten participants opened the accounts in the second year.

monthly deposit. In other words, this variable provides information on program participants' net savings. The second measure is *deposit frequency each month*. When monthly deposit frequency equals 0, monthly deposit also has a value of 0. Finally, the *total amount of remaining match* is calculated by subtracting the year-to-date savings balance from the match cap ($1,500). The total remaining match shows the "closeness of actual saving behavior to that which would take full advantage of match incentives" (Schreiner et al., 2001, p. 65). The less the remaining match, the more a participant has used her or his match eligibility and the closer the amount of net savings is to the match cap. As discussed earlier, this study focuses on the hypothesized temporal effects of match cap, which should be reflected in the relationship between participants' net savings in a reference month and the remaining match in the previous month. Therefore, we use the first-order lagged remaining match (called "remaining match" hereafter). Moreover, in order to capture the nonlinear effects of match cap on monthly net savings, we categorize the lag remaining match into three groups: records with this variable below the 20th percentile position ($968) (the low remaining match group), those higher than the 80th percentile position ($1,224) (high remaining match group), and the others in the middle group (middle remaining group). Participants in the low remaining match group are closer to match cap, and more likely to achieve saving goals.

To see how the seed deposit affects saving behavior over time, we divide the course of the *I Can Save* program into five time periods of ten consecutive months each. Each time period is indicated by a dummy variable. For instance, the first dummy variable is created with 1 indicating any record within the initial ten months, and 0 indicating records of the other four time periods. The other four dummy variables are created similarly.

Analysis plan

Descriptive statistics of the above variables are reported. For further analysis, several strategies are used to test hypotheses about the respective effects of seed deposit and match cap on monthly net saving. (1) To examine if seed deposits have any effect, we show and compare several typical individual time series of monthly deposit. In addition, we examine the time series of average monthly deposit of the full sample. (2) To examine how the match cap influences saving performance, we compare average monthly deposit in each ten percentile increment of the remaining match. (3) Finally, using monthly deposit as a dependent variable, we test both the effect of seed deposit and the effect of match cap in a multivariate model.

Several characteristics of average monthly deposit should be noted. First, about 70% of monthly records have monthly deposits equal to 0. Second, the variable cannot have a value less than 0. Third, the variable is highly skewed (skewness=17). In order to address these issues, a two-part model is implemented: the first part examines the probability of having monthly net savings greater than 0, and the second part examines the log-transformed monthly deposit conditional on having monthly net saving greater than 0. Both parts use a fixed-effect estimator to control for individual heterogeneity. The model specification is as follows:

$$\begin{aligned}
&\text{logit}(P_{it}) = \alpha^1{}_i + \lambda^1{}_2 p_{2it} + \lambda^1{}_3 p_{3it} + \lambda^1{}_4 p_{4it} + \lambda^1{}_5 p_{5it} + \beta^1{}_{t-1} M_{it-1} + \varepsilon^1{}_{it} \\
&(Y_{it} \mid P_{it} = 1) = \alpha^2{}_i + \lambda^2{}_2 p_{2it} + \lambda^2{}_3 p_{3it} + \lambda^2{}_4 p_{4it} + \lambda^2{}_5 p_{5it} + \beta^2{}_{t-1} M_{it-1} + \gamma^2 N_{it} + \varepsilon^2{}_{it} \\
&i = 1.....73, \\
&t = 1.....50
\end{aligned} \qquad (1)$$

Where P_{it} is the probability of having monthly deposit greater than 0 for individual *i* at month *t*, and Y_{it} is the log-transformed monthly deposit of individual *i* at month *t* conditional on P_{it} =1, p_2-p_5 indicate the time periods from the second ten months to the fifth ten months, M_{it-1} is a three-group categorical variable of individual *i*'s remaining match at the time of *t-1* (the lagged remaining match), and N_{it} is deposit frequency at the time of *t*. The superscriptions of 1 and 2 on regression coefficients indicate the first and second part of analyses, respectively. Deposit frequency (N_{it}) is not controlled for in the first part of analysis because of its perfect correlation with the dependent variable. The estimated parameters of λ_2-λ_5 and β_{t-1} are of primary interest. If the hypothesized effect of seed deposit exists, λ_2-λ_5 should be statistically smaller than 0, suggesting that the ten months following the installment of a seed deposit results in a significantly higher level of net savings for each participant than the remaining time periods; if the hypothesized effect of match deposit exists, it would also show on β_{t-1}.

Results and Discussion

Descriptive statistics

Table 1 summarizes descriptive statistics of the selected variables. On average, participants saved about $10 each month (SD=$50). Almost 70% of these monthly records have a monthly deposit of 0. To exclude these cases results in an increase in the mean of monthly deposit to $32 (SD=$86). The data suggests that there is more within-individual variation (SD=$60) than between-individual variation (SD=$12), indicating substantial month-to-month fluctuations in individual deposits. The average balance in an account at any month is $454 (SD=$367) (including the match). The average total amount of deposit of all program participants over the four years is $461 (SD=$578) and the median is $196. In other words, a typical child in the program saved $200 to $460. The average deposit frequency each month is 0.5; the deposit frequency for each participant during the four years of the program is 21 times. By the time the program ended, each participant had earned an average of approximately $5 of interest, and had saved a total of $1,376, including match funds.

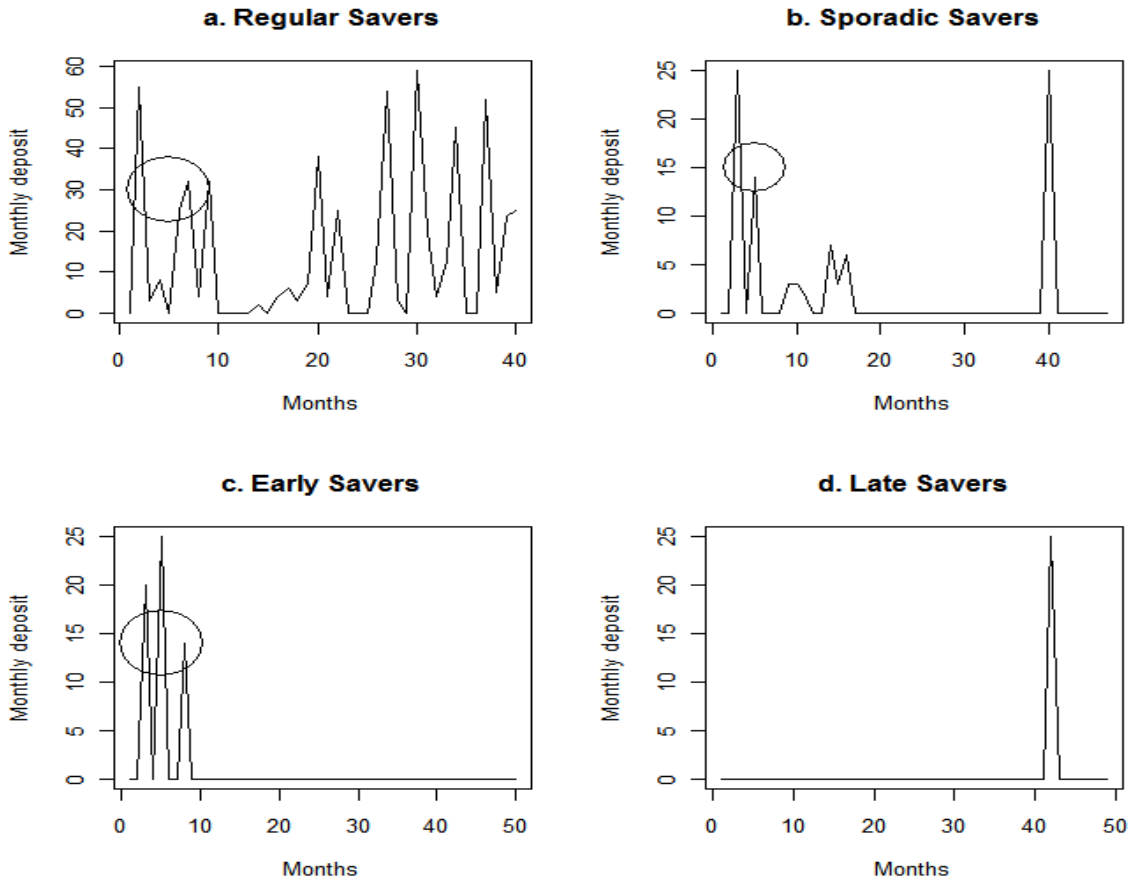
Table 1. Sample characteristics

Variables	Mean (SD)	Median
Net monthly deposit ($)	9.97 (61.37)	0.00
Total deposit ($)	460.76 (578.17)	196.00
Deposit frequency (monthly)	.46 (.80)	0.00
Deposit frequency per participant	21.28 (17.38)	15.50
Regular savers	35.80 (14.46)	34.00
Sporadic savers	11.19 (4.50)	13.00
Early savers	5.14 (3.23)	4.50
Late savers	4.67 (1.53)	5.00
Current balance ($)	454.52 (367.27)	319.95
Total interests ($)	5.30 (3.43)	3.95
Total savings ($)	1,375.72 (1,020.94)	900.70
Year-to-date remaining match ($)	1,045.81 (314.38)	1,174.87

Effect of seed deposit

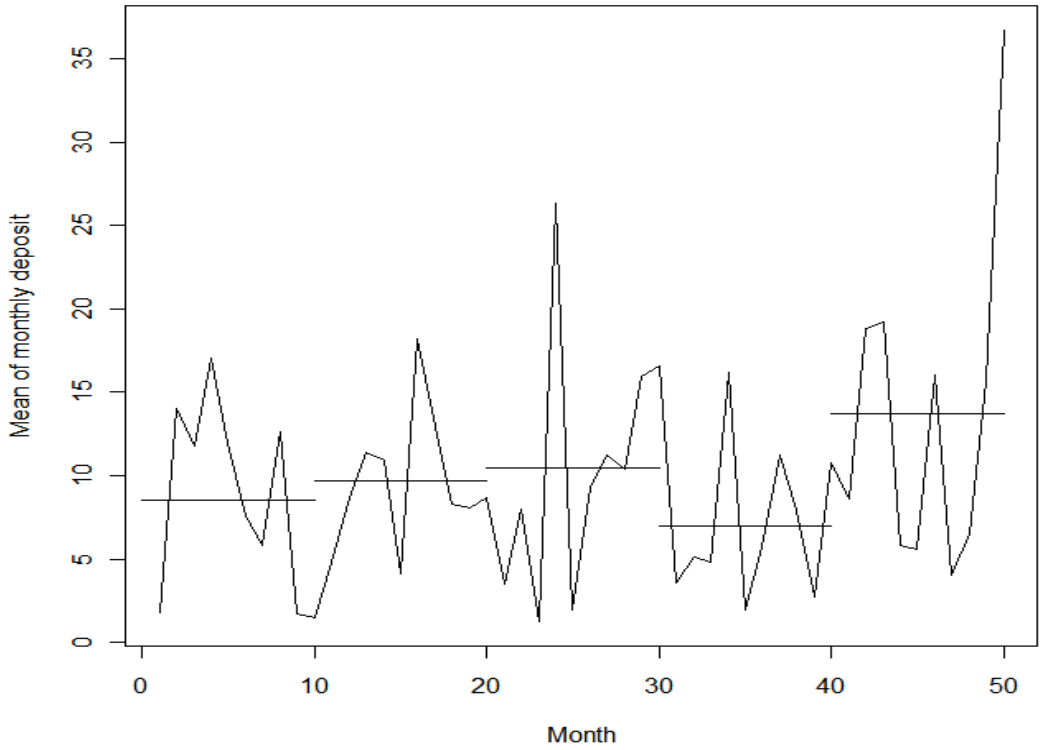
As discussed earlier, we expect the effect of a seed deposit to diminish with time. We examine 73 participants' time series of monthly deposits and identify four types of savers in the sample: "regular savers," "sporadic savers," "early savers," and "late savers." As shown in Figure 1, the effect of seed deposit on monthly savings over time is essentially reflected by the saving behavior of three types of savers. Regular savers made frequent deposits and had relatively larger amounts of deposits. We identify 35 regular savers who made an average of 36 deposits in the observation period (see Table 1). Figure 1a shows a typical time series of monthly deposit of a regular saver. The circle highlights the beginning ten months with relatively larger amounts of monthly deposit than the period that follows. There are 22 sporadic savers in the sample who averaged 11 deposits. Although they made fewer deposits than regular savers, sporadic savers had similarly high monthly deposits during the early period of the program (Figure 1b). Except for a few deposits at the beginning of the program, early savers (n=13) did not save regularly afterwards (Figure 1c), but relatively high monthly deposits are again observed in the months immediately after seed deposit. Finally, three late savers saved late in the program, and therefore, we observe no "seed deposit effect" in this small group. In sum, the effect of seed deposit on saving performance is found in regular savers, sporadic savers, and early savers.

Figure 1. Time series of four types of savers



The above analysis focuses on individual time series of monthly net saving. Between-individual variations in monthly deposit are examined to test the hypothesis regarding the "seed deposit effect." Figure 2 depicts the mean monthly deposit of all the program participants during each month (linked curve) and during each of the five consecutive ten-month periods (dash): $8.53, $9.58, $10.31, $6.91, and $13.52. In contrast to Figure 1, the effect of seed deposit in Figure 2 is less discernible. The average monthly deposit of the full sample in the early period is about the same or even lower than the other months. The first ten-month period is in fact the second lowest in mean monthly deposits, and therefore appears to refute the hypothesis of the "seed deposit effect." However, note that these mean values in fact provide between-group estimation across different participants and different saving patterns, and thus may shadow the hypothesized "seed deposit effect" on individual saving performance over time. For example, we expect regular savers are expected to save more frequently and have higher levels of monthly deposit. In fact, Figure 1 shows that regular savers save about twice as much as the other groups. In other words, by combining all participants with different saving patterns, the effect of seed deposit may be depressed by the saving pattern of regular savers alone. Therefore, this warrants a formal statistical test with appropriate estimator. In the following hypothesis testing, we adopt the fixed-effect estimator to control for individual heterogeneity.

Figure 2. Mean deposit by months



Effect of match cap

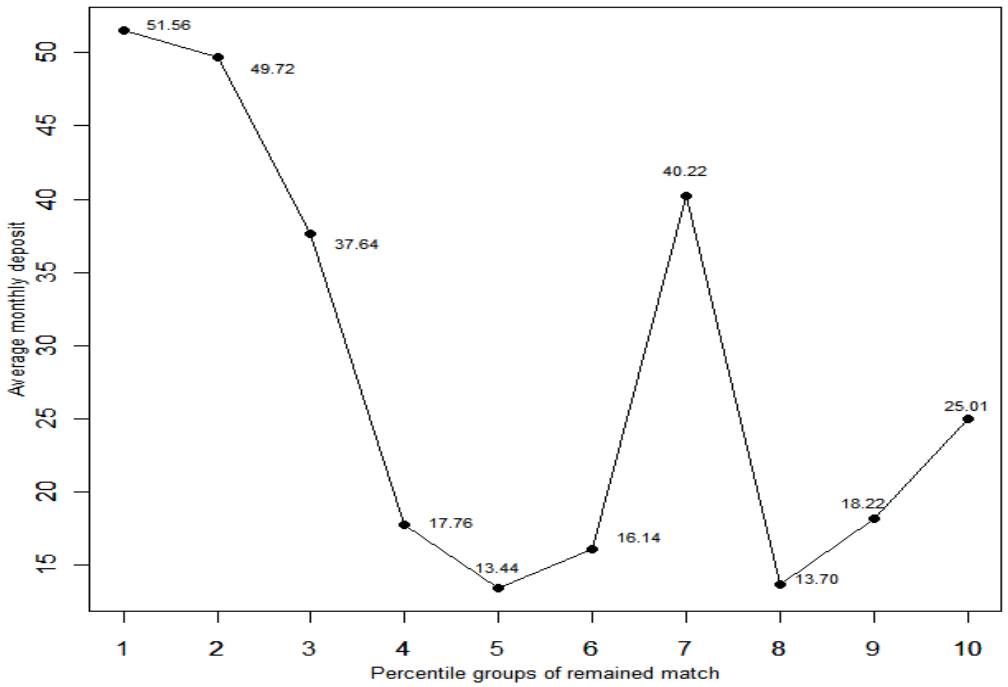
The effect of the match cap on the net saving pattern over time can be addressed from different perspectives. As discussed earlier, individuals might save more to meet match cap as their savings

grow closer to the match cap. That is, when the remaining match grows smaller, program participants may be inspired to save more. The alternative hypothesis suggests that when the remaining match is smaller, program participants may save less in order to avoid overshooting the match cap. They may save more in the early period as they try to meet match cap without having to worry about exceeding it. Also, the initial sense of novelty and interest in the program may result in less psychological cost to saving in the beginning. Each of these hypotheses may turn out to be correct in some limited sense.

Perhaps a direct indicator of the effect of match cap is the correlation between the remaining match and the monthly deposit, which turns out to be negative (r=.-14, p=.000), supporting the hypothesis that program participants save more when they are closer to match cap. Another way to look at the relationship between match cap and monthly deposit is to examine the average of monthly deposit[6] in each ten percentile increment of the remaining match. For example, the average monthly deposit is $51.56 in the top decentile savers group (the group closest to match cap) of the remaining match (ranges from 0 to $707), $49.72 for the second highest decentile savers group of the remaining match, and $25.01 for the last decentile savers group. Figure 3, which connects the mean points for these ten groups by the order of decentile positions, is partially consistent with the correlation coefficient reported above. There is a clear nonlinear relationship between the remaining match and monthly net savings. Participants' average monthly deposit is higher at the two ends, and is relatively lower in between (except for the seventh decentile savers group). The higher level of monthly net savings in the lower end supports the hypothesis that participants aspire to save more when they move closer to the goal. In other words, when the savings goal becomes tangible, participants are more willing to save and do save more. The other hypothesis that participants save more in the beginning also finds support from the relatively high mean of the monthly deposit at the other end of the graph. This provides a justification for the categorization of the remaining match in the following multivariate analysis. To some extent, Figure 3 could be misleading because it is a pooled cross-sectional analysis of the panel data. Specifically, we find that the top decentile has only 16 participants (as opposed to 73 participants in the bottom decentile) who because of their higher levels of account balance moved up to the top decentile positions on the distribution of the remaining match. As a result, the top decentile is overweighted with good savers who had relatively high average monthly deposits. Consequently, although it appears to support the hypothesized match cap effect, the estimation is biased upward compared to the within-individual estimation for this group. This suggests that an across-individual estimation has limited value in evaluating individuals' net savings that is time varying.

[6] The records with $0 monthly deposit are not included in the mean calculation.

Figure 3. Monthly deposit by percentile of lagged remaining match



Results of the two-part model

The two-part model provides a formal test of the hypothesized "seed deposit effect" and "match cap effect," and the fixed-effect estimator provides within-individual estimation to deal with the issues in the above analysis. The first column of Table 2 reports the results of the first part analysis using the full sample to model the probability of having monthly net savings greater than 0 in a given month. Except in the fourth period, participants are statistically more likely to make deposits or have net savings greater than 0 than they are in the first period. For example, the odds of having net savings in the second period is nearly three times as that in the first period. In other words, the seed deposit does not increase the probability of making a deposit in the first ten months in the program. The exception is the fourth period, in which participants saved less than the first period. However, the hypothesized "seed deposit effect" is supported by the second part of analysis (see the second column of Table 2). For participants who saved, the level of deposit in the first ten months is statistically higher than the other four periods, controlling for the other variables in the model. Program participants' net savings in the first period are about 6% higher than that in the following three periods, and 3% higher than the last period. In other words, among participants who made deposits (regardless of frequency), they saved much more in the first ten months following the seed deposit than during the other periods. This provides evidence for the "seed deposit effect."

Table 2. Results of the two-part model

Variables	Full Sample		Subsample	
	Part I	Part II	Part I	Part II
Program period				
(First period)	-	-	-	-
Second period	1.09***(0.17)	-0.64***(0.10)	1.05***(0.18)	-0.63***(0.10)
Third period	0.40*(0.20)	-0.62***(0.12)	0.36(0.20)	-0.60***(0.12)
Fourth period	-0.03(0.21)	-0.61***(0.15)	-0.11(0.22)	-0.58***(0.15)
Fifth period	0.43*(0.21)	-0.33*(0.16)	0.33(0.22)	-0.31(0.16)
Remaining match by group				
(Low)	-	-	-	-
Middle	-0.51**(0.17)	0.10(0.12)	-0.53**(0.17)	0.11(0.12)
High	-0.25(0.26)	0.40*(0.17)	-0.28(0.27)	0.43*(0.18)
Deposit frequency		0.62***(0.06)		0.63***(0.06)
Constant		2.13***(0.18)		2.10***(0.19)
Observations	3,371	1,039	3,169	1,014
Number of participants	73	73	70	70
R-squared	.	0.26	.	0.26

Standard errors in parentheses
*** p<0.001, ** p<0.01, * p<0.05

Regarding the "match cap effect," as shown in the first part of analysis (first column of Table 2), participants with low remaining match cap were more likely than those with medium or high remaining match to save in the following month. The difference, however, is statistically significant only between the low and medium groups. For those in the medium remaining match group, the odds of having net savings in the following month is only about 60% of that of the low group, suggesting that participants aspired to save when they moved closer to the match cap. The second part of analysis also generates supporting results for the match cap effect, but in a somewhat different way. Among participants who had non-zero net savings in a given month, those having high remaining match cap saved 4% and 3%, respectively, more than those with a low or medium remaining match cap. Put differently, participants' initial awareness of the match cap as a result of entering the program may have sparked their willingness to save more. Results of both parts together support the hypothesis that match cap has a nonlinear effect on the time trend of program participants' net savings: Participants with smaller remaining match were statistically more likely to make deposits than other participants, while participants with higher levels of remaining match saved greater amounts of monthly savings. In other words, the match cap has greater influence on saving behavior in the start and the end of the program. The effect of the match cap is more likely to occur when participants start saving toward the match cap and when the match cap becomes so close that with small additional savings participants can fully meet the savings goal.

Finally, the third and fourth columns retest the two-part model with the late savers (n=3) excluded from the sample (subsample). The results are nearly consistent with those from the full sample. As shown by the magnitude of the regression coefficients for this subsample, the effect of seed deposit decreases slightly and the effect of match cap increases marginally.

Conclusion

This study has several limitations. First, the information provided by the cash flow data is relatively limited. With only three variables in the model, other time-variant determinants of saving performance are left out in the error term of the model. For example, financial education is not a repeated measure in our data and therefore cannot be used for model testing although it may have an impact on saving behavior. For the same reason, household socioeconomic characteristics are omitted from the model. These omissions may cause an omitted variable problem that cannot be completely addressed by the fixed-effect estimator, and this may bias the estimates of regression coefficients. Second, the sample size of this study is small (N=73), even though each participant has 36 to 50 monthly records. Third, we cannot separate the effect of seed deposit from other factors, such as the initial excitement about program participation. The so-called "seed deposit effect" also may be complicated by other unknown factors.

Despite these limitations, the results of univariate and multivariate analyses and the graphs consistently support the hypotheses about the temporal effects of seed deposit and match cap. Regarding the effect of seed deposit, even though participants are less likely to make deposits in the early periods immediately following the seed deposit, they actually save more on average as long as they do make deposits. Similarly, speaking of the match cap, participants save more in the early periods of the program when the match cap still appears a somewhat remote savings target. Participants become more likely to save, however, when they approach the match cap in the late periods of the program. The total amount of deposits made in the late periods is not different from the middle period, but is statistically smaller than that of the initial period.

For community organizations operating asset-building programs and for policy makers wishing to design effective asset-based policies, it is important to take into account the effects of institutional factors across time. A good program design should not only consider incorporating multiple institutional factors to reflect each aspect suggested by the institutional theory of saving (i.e., access, incentive, information, facilitation, expectation, and restriction), but also should consider how to take advantage of the temporal effects of institutional factors. For instance, since participants have more motivation to save when the initial endowment is provided, the seed fund, usually a one-time event, could be divided into multiple annual seed deposits. Without increasing the cost of the program, a multiple-event mechanism of annual seed deposit might motivate participants to remain in the program longer and save more.

Moreover, our findings show that participants have better saving performance in the early and late periods of a program as a response to the match cap. This echoes previous findings that annual match cap may be an important factor in encouraging asset accumulation (Schreiner & Sherraden, 2007). The annual match cap can naturally divide the program into several cycles that elicit psychological-based cycles of saving, and possibly improve saving performance. Excess deposits in one year may count as deposits toward the match in the next year. In addition, the psychological effects of match cap may be strengthened when the remaining annual match and the expiration date explicitly appear on each participant's monthly account statement. Furthermore, in order to help participants overcome the low incentive (if any) to save in excess of the match cap, a small reward fund could be set up for those who save more than the lifetime match cap. These strategies do not necessarily increase program costs; instead, they may distribute program costs more evenly while improving individuals' saving performance across time.

The implications of the temporal effects of institutional factors are not limited to the seed deposit and the match cap discussed in the current study. Similar strategies could also be applied to other institutional factors. For instance, it could be helpful to provide financial education at the start of the program, so that participants have relatively more time to apply the knowledge and skills in personal financing when they are still in the program.

Finally, the findings of this study support the institutional theory of saving. The current study demonstrates that saving behavior changes over time, in response to two institutional factors. Further, it suggests that future research on institutional features of savings programs should consider the heterogeneity of institutional effects across time. Interactions between institutional settings and time and individual characteristics will provide insights for future program development.

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