Income Analysis of Microloan Borrowers

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Abstract

A panel study design consisting of borrower surveys collected over seven years was used to assess change in family and business incomes of clients in a Dominican Republic microfinance-plus program. The findings demonstrate borrower's experienced significant positive change in incomes. Those who exited early were most likely to be the wealthiest clients initially. Those who stayed in the program were more likely to be the poorest when they began the program. Despite this initial difference in distribution, incomes increased significantly for program participants. These outcomes demonstrate significant inter-variability in participant response to a microfinance-plus program.

Introduction

Microfinance for the poor has become a worldwide phenomenon, yet its impact on the poor remains in question. Muhammad Yunus promoted microenterprise in Bangladesh during the 1970's through microfinance, and his efforts inspired many such initiatives around the world. Today perhaps as many as 10,000 institutions offer microfinance services to the poor. In 2013 the International Finance Corporation estimated US $60-100 billion was circulated to the developing world through microfinance (IFC, 2013). The Global Financial Development report for 2014 (World Bank, 2013) confirmed the worldwide demand for financial inclusion and declared the objective of achieving universal financial access by 2020 for poverty alleviation. The G20 has also recognized financial inclusion as one of the main pillars of the global development agenda and offered the Global Partnership for Financial Inclusion (GPFI) for promoting financial inclusion in non-G20 countries. Clearly, significant resources are being directed toward the expansion of microfinance.

Despite the massive infusion of resources into microfinance, many believe there is a paucity of evidence as to its effectiveness as a poverty alleviation strategy (Duvendack, Palmer-Jones, Copestake, Hooper, Loke, & Rao, 2011). The growth of microfinance and its mixed reviews has naturally ignited academic research and provoked controversies. While some researchers have claimed microcredit programs alleviate and reduce poverty (Gruses, 2009, Santos & Carrion, 2009, Shetty, 2010, Bosch et al., 2012, Ambrish, 2014); others doubt the evidence to date as a demonstration of a positive impact of microcredit on poverty eradication and job creation (Roodman & Morduch, 2009; Armendáriz & Morduch, 2011; Duvendack et al., 2011; Banerjee, Duflo, Glennerster, & Kinnan, 2015).

There are also questions about how impact should be assessed (Hulme, 2000; Shaffer, 2011; Banerjee, Duflo, Glennerster, & Kinnan, 2015), and even the ultimate goal of microfinance (Reed, 2011). There is ample evidence that microfinance can aid income smoothing (Pitt & Khandker, 1998; Collins, 2009; Islam & Maitra, 2011) A growing body of evidence is beginning to show participation in microfinance-plus programs can improve health outcomes (Dohn, Chávez, Dohn, Saturria, & Pimentel, 2004; Leatherman, Metcalfe, Geissler, & Dunford,2011), although the evidence here is also mixed (Banerjee, Duflo, Glennerster, &Kinnan, 2015).

In an effort to prove the effectiveness of microfinance, some researchers have advocated for stronger research design, including randomized control trials and cleaner quasi-experimental designs (Roodman& Morduch, 2009; Banerjee, Duflo, Glennerster, & Kinnan, 2015), yet few studies have met this rigor. Beyond proving microfinance reduces poverty, research is also necessary to assist with improving program performance through a deeper understanding of its impact, particularly through longitudinal studies (Roodman & Morduch, 2009; Duvendack, et al., 2011). There has been some success with assessments through self-reporting by Microfinance Institutions (MFIs). The Microfinance Summit Campaign has sought to capture the activity of MFIs and the Comitéd' Echanges de Réflexion et d'Information sur les Systèmesd' Epargne-crédit (CERIS) has sought to assess the social performance of MFIs (Mosley & Rock, 2004; CERIS, 2011; Reed, 2012). Progress Out of Poverty has developed country-specific instruments to assess poverty, which are now being used by approximately 500 organizations (Progress Out of Poverty, 2016). This type of internal self-assessment is critical for aid organizations to understand their impact, yet only a small percentage of organizations employ these types or tools, or at least, report their activities. The purpose of this research was to assess the impact of participation in a multiyear, microcredit program. The study sought to answer the question: *What is the influence of microcredit program participation longevity on changes to borrowers' income?* While research on microloan impact is abundant, longitudinal studies in this field, in particular those comparing the medium-term effects of 5 to 7 years, are far fewer. This research fills this gap by using a relatively large database and an empirical approach.

Research Method

Study Context

The data source for this study was Esperanza International Inc. (EII), an NGO with ten active branch offices providing financial services since 1995 to the poor in the Dominican Republic. By the end of 2011 EII had dispersed 113,553 loans, creating more than 50,000 businesses. As of December 2011, there were 9,952 active clients. The loan repayment rate was 97.55%, and the program retained 29% of its clients overall. Clients who successfully repay their loans are eligible for further loans; many clients have taken multiple loans over a seven-year period, providing a means to assess changes over time in income and other assets relating to quality-of-life. Loan products are taken for various purposes, such as business development, housing improvement, and education.

Study Design

This study used a panel design of secondary data obtained from pre-loan surveys. The surveys were a required portion of the loan package, insuring that 100% of loan recipients complete a pre-loan survey with each loan. The surveys were completed by the loan officer during an oral interview with the borrower in their home. Clients completed this survey during each application for a loan. As clients successfully completed a loan and requested a subsequent loan, the second pre-loan survey became the post measure. Borrowers must have completed two pre-loan surveys to be included in the study, with the first survey serving as the individual's baseline and the final loan survey providing a means to determine a longitudinal change (See Figure 1).

Cohort Treatment

Cohort	Treatment
C0	X_1
C1	$\mathbf{X_1}T_1 \rightarrow \mathbf{X_2}$
C2	$\mathbf{X_1}T_1 \rightarrow X_2T_2 \rightarrow \mathbf{X_3}$
C3	$\mathbf{X_1}T_1 \rightarrow X_2T_2 \rightarrow X_3T_3 \rightarrow \mathbf{X_4}$
C4	$\mathbf{X_1}T_1 \rightarrow X_2T_2 \rightarrow X_3T_3 \rightarrow X_4T_4 \rightarrow \mathbf{X_5}$
C5	$\mathbf{X_1}T_1 \rightarrow X_2T_2 \rightarrow X_3T_3 \rightarrow X_4T_4 \rightarrow X_5T_5 \rightarrow \mathbf{X_6}$
C6	$\mathbf{X_1}T_1 \rightarrow X_2T_2 \rightarrow X_3T_3 \rightarrow X_4T_4 \rightarrow X_5T_5 \rightarrow X_6T_6 \rightarrow \mathbf{X_7}$

X =pre-loan condition survey; T=loan(treatment); Bold type denotes comparison surveys

Figure1. Design of First and Final Survey Selection by Cohort

Borrowers were separated into multiple cohorts based on the number of loans they received. For example, members of cohort C1 successfully repaid their first loan (T_1) and applied for a second loan; this cohort was evaluated by comparisons of pre-loan surveys X_1 and X_2. Other cohorts were similarly analyzed so that cohort C6, whose members had completed six loans (T_6), was evaluated by comparison of pre-loan surveys X_1 and X_7. Each client belonged to only one cohort; individual surveys were not represented in more than one cohort. Individual clients were identified by a unique numerical identifier; personal information was not readily accessible.

Instrumentation

The pre-loan survey contains 32 questions (See Appendix A). It was designed by EII administrators, program managers and loan officers for the purpose of determining the impact of their programs on clients. The content of the survey has remained unchanged over the duration of its use. Each loan application addresses issues such as income, housing, household demographics, food, security, finances, health care, education, social, and spiritual involvement. The participatory design approach resulted in an instrument consistent in content with other published impact assessment instruments (Bebbington, 1999; Progress out of Poverty, 2011). Inter-rater reliability was addressed through standardized application procedures and training of loan officers who administer these surveys.

Study Variables

This study focused on changes to income. Income was defined as total monthly family income (from all household sources) and total monthly business income. Both concepts were operationalized through client self–report during loan survey interviews conducted by the EII loan officer. Each income variable was reported as ordinal level scales.

Data Analysis Plan

The data were reviewed for completeness and assessed to determine the characteristics of the database. Completeness was determined by examining the data for missing or out-of-range values. Complete surveys were matched by the client identification number to discern clients with multiple loans. Clients who completed only one survey (cohort C0) were eliminated. The remaining clients with matched surveys were grouped into seven cohorts (cohorts C1-C7). Cohort C7 had only 32 surveys and was eliminated from further study due to the limited statistical power possible with this small group. Variables, (Family Income and Business Income) were examined for outliers using z-score frequencies (Field, 2009; 2010). Surveys with z-scores > 3.29 were deleted. Cronbach's alpha was used to assess the percent variation in the responses. Descriptive statistics were used to characterize the data. Number, frequencies, means, standard deviation, skewness and kurtosis were analyzed. All analyses were performed in SPSS (2010). Changes in income (family, business) from the first to the final survey were analyzed using Wilcoxon ranked sums analysis for non-parametric, ordinal data. These variables demonstrated a normal distribution, so a one-tailed, paired t-test was conducted for each cohort. Chi-square analysis was used to determine the association between initial and final, family and business incomes, and cohort membership. Effect levels were calculated using odds ratios.

Findings

Data Characteristics

The Esperanza survey database had 59,930 surveys reported from April 7, 2005 through December 31, 2011 . Incomplete and out of range data representing 4.9% (n=2,909) of surveys were eliminated. Cohort C0 surveys (n=19,1382) were eliminated, resulting in 37,639 matched surveys representing cohorts C1-C6. The dependent variables for these surveys were examined for outliers; surveys with z-scores >3.29 were deleted (n=144, 0.4%). This resulted in a data set of 37,495 matched surveys representing 12,902 clients, distributed by cohort as: (C1, N=6,854; C2, N=2,986; C3, N=1,460; C4, N =898; C5, N=429; C6, N=275). These cohorts represented both former and current (active) clients. Income variables (family income, business income) were each ranked in four, ascending categories. The distribution of family income was predominately weighted toward the upper income category but were evenly distributed in the lower categories (RD < \$2,500 = 18.3%; RD \$2,501-4,500 = 17.8%; RD \$4,501-6,500 = 17.4%; RD>\$6,500 = 46.5%. Business income distribution was concentrated in the lower categories (RD< \$5,000 = 47.4%; RD \$5,001-10,000 = 24.8%; RD \$10,001- 15,000 = 15.9%; RD> \$25,000 = 11.9%).

### Changes to Income

Wilcoxon signed rank analysis indicated an overall increase in income. Family income increased significantly ($p < .001$) for all cohorts except C1 ($p > .05$). All cohorts had effect sizes ranging from small ($r = .10$) in C1 to medium-large ($r = .43$) in C6. There was a significant, positive change in business income across all cohorts ($p < .001$). Effect size (Pearson's r) had an upward trend, increasing from medium ($r = .296$) in C1, to large ($r = .62$) inC6 (See Figure II). Therefore, it can be seen that borrowers in the microfinance program had significant increases to their income. Furthermore, the longer one participated in the program the greater the change in family and business incomes.
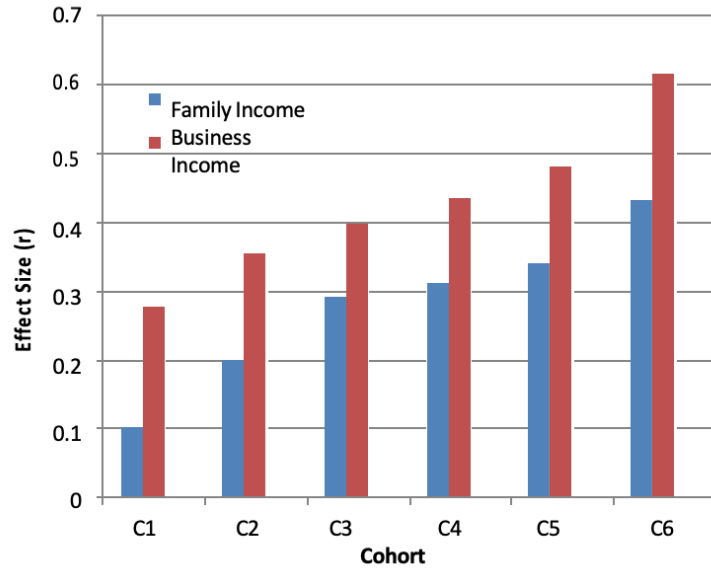
Figure II. Effect Size of Changes in Income Variables, from First to Final Survey, by Cohort (Note: Pearson's r: .1=small; .3=medium; .5=large)

Change in Family Income by Cohort

Change in family income was investigated by comparing initial and final incomes of each cohort. There was a dramatic difference in the size of the initial family income across cohorts ($X^2(15) = 264.96$, p< .001). Those in the upper income category (category 4, RD >$6,500) initially represented 52.4% in cohort C1. However, the frequency of borrowers in the upper income category steadily declined in the upper cohorts (C4-C6) representing only 7.6% of the initial composition of cohort C6. Based on an odds ratio calculation, borrowers in the highest income category at onset were 13.62 times more likely to be in cohort C1 than cohort C6. In contrast, those with the lowest income (Category 1, RD <$2,500) initially represented only 15.3% of cohort C1, but represented 53.5% in cohort C6. Based on odds ratio, borrowers in the lowest income category at onset were 6.38 times more likely to be in cohort C6 than cohort C1 (See Figure 3). These results indicate clients in the highest income categories at onset are likely to leave the program early, while those who stay in the program were most likely to have been in the lowest income categories at onset.
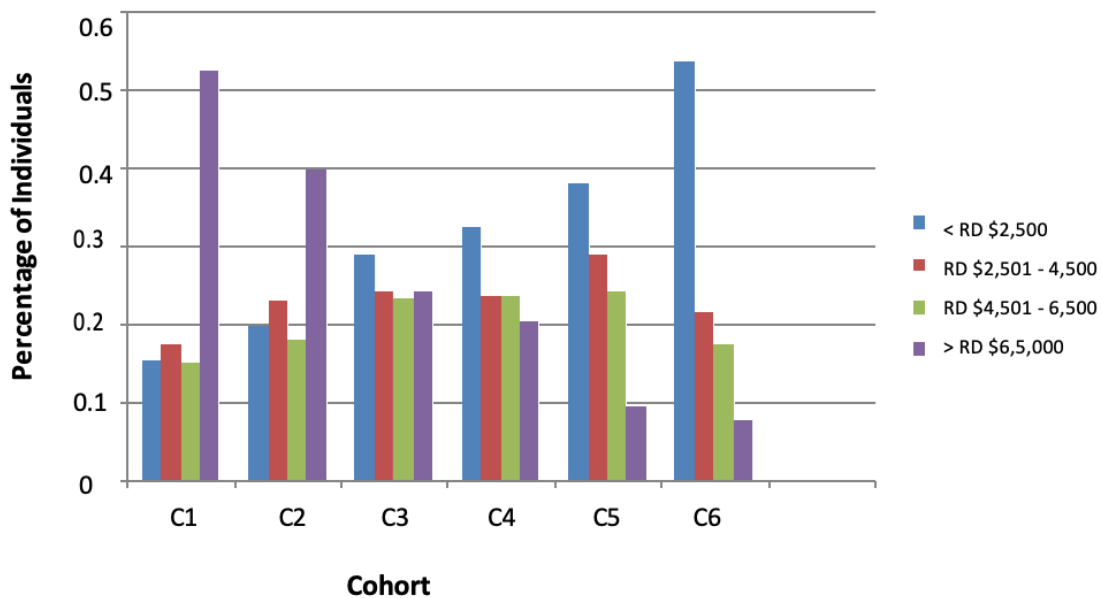
Figure III. Percent Distribution of Initial Family Income Categories by Cohort

Increases in income were revealed in the reports of final income for all cohorts (See Figure 4). Each cohort was dominated by clients in the upper income categories. The change in distribution from lower income categories to upper income categories is particularly apparent in cohorts C3 through C6. Chi-square analysis indicated a significant association between final family income and cohort membership (X^2 (15) = 45.32, p < .001). The shift in frequencies from Category 1 to Category 4 was pronounced and statistically significant between initial and final loan applications.
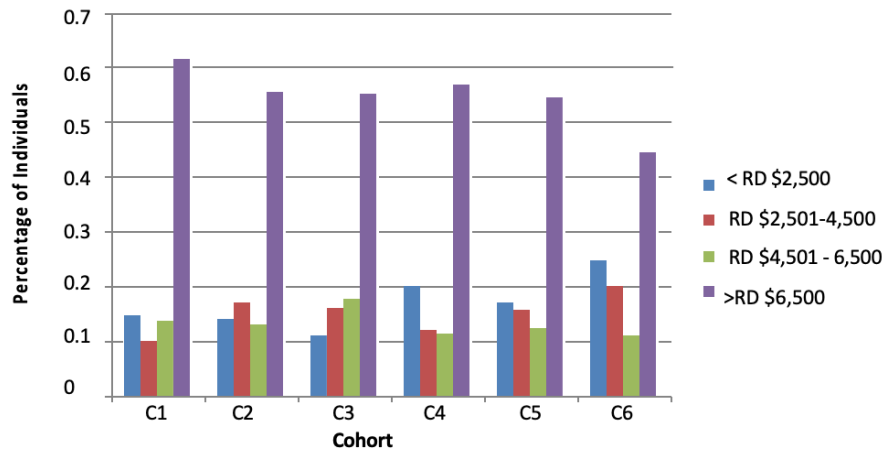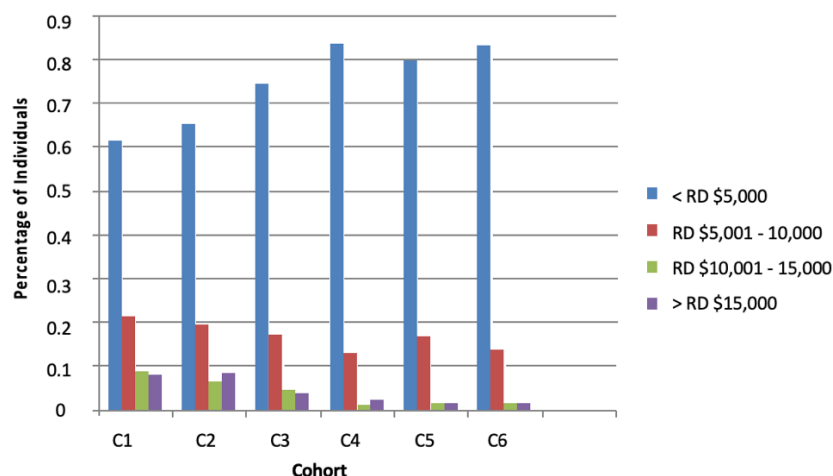

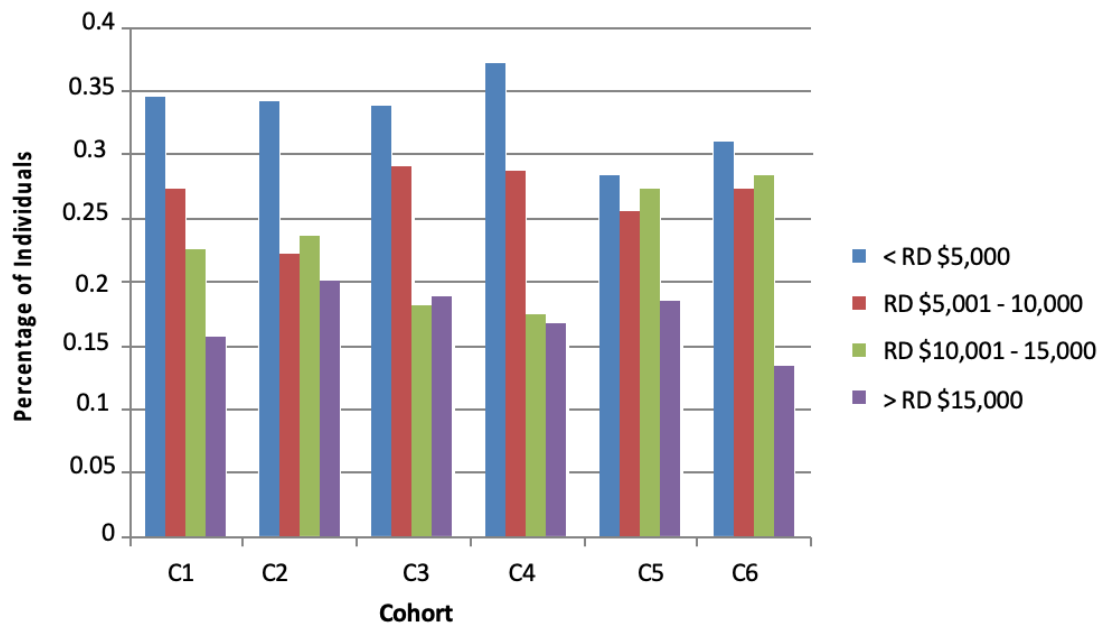**Figure IV. Percent Distribution of Final Family Income Categories by Cohort**

In the initial measures, income Category 1 dominated cohorts C4, C5, and C6 (See Figure 4). In the final measures, income Category 4 dominated all cohorts. Calculation by odds ratio indicated the percent distribution of Family Income in Category 1 was only 0.41 times more likely to be represented in Cohort C6 than Category 4 (See Figure 4), representing a substantial and significant rise in family income. Increases in final income were demonstrated in each cohort. The change in distribution from lower income categories to upper income categories is particularly apparent in cohorts C3 through C6.

Change in Business Income

There were significant changes between initial and final business income for each cohort. Chi-square analysis indicated a significant association between initial business income and cohort membership (X^2 (15) = 89.93, p< .001). Initially, all cohorts were dominated by borrowers reporting business income in the lowest category (Category 1, RD<$5,000) with frequencies ranging from 61.4% in cohort C1 to 83.6% in cohort C6 (See Figure 5). Based on a calculation of the odds ratio, those in the lowest business income category at onset were 0.31 times more likely to be in cohort C1 than cohort C6. Business Incomes were more uniform through the cohorts in the final measures; Chi-square analysis indicated a marginally significant difference between cohorts (X^2 (15) = 24.10, p > .05). Although Category 1 still dominated each cohort, there was a marked increase in all other income categories resulting in a nearly 50% reduction in business income below RD <$5,000 compared to the initial income (See Figure 6). Cohorts C6 and C7 demonstrate a nearly even distribution among the top three income categories at the final application.

Figure V. Percent Distribution of Initial Business Income Categories by Cohort

Figure VI. Percent Distribution of Final Business Income Categories by Cohort

Discussion

The processing and analysis of the above data provided instructive insights on the impact of microloans on borrowers' income, as well as the differences in the distribution of income between cohorts. The ranked sum comparisons of income from the first to final measures indicate Business Income and Family Income increased overall, with changes of the greatest magnitude occurring for those who were in the program longest. These changes are consistent with out-comes of similar research evaluating microfinance (Al-Mamun, Malarvizhi, Hossain, & Tan, 2012; Islam, 2011; Swain, Van Sanh, & VanTuan, 2008). The results of this study suggest financial need may be an explanation for the composition of the cohorts. Examination of the initial composition of each cohort demonstrated a dramatic relationship between cohort membership and income. Low frequency borrowers (C1-C3) were likely to be wealthier at entry to the program than high frequency borrowers (C4-C6). Even though high frequency borrowers tended to have less income at onset, their incomes ultimately increased toward a distribution similar to final assessment of the lower cohorts. This study occurred during the great recession, which could have increased participation of the 'upper' poor, who had been negatively influenced by financial shocks from the recession. The needs of these clients, who may have been experiencing transitory poverty, may have been very different than the needs of those clients struggling with chronic poverty. Initial income has been identified as a key-determinant of impact of a microloan on a borrower's avails. Those who may be considered the "upper" poor are likely to receive the greatest benefit from microfinance (Hulme & Mosley, 1996; Mosley & Rock, 2004; Shaw, 2004). The ultimate goal of these programs would be the financial independence of their clients. If clients leave because this goal is achieved, the program is a success. However, this level of success may not be possible for all borrowers. Rather, being able to smooth income through access to credit, and to have access to other services, may be reason for long-term participation, and constitute a level of success for some clients. Appropriate measures of success are still needed (Reed, 2011). The longevity of participation by those with lower income at the onset of the program may indicate program success in targeting, recruiting and retaining these clients.

Study Limitations

There are several limitations to this study, first being the inability to understand client dropout. Esperanza's 30% client retention appears low, but its true meaning is not understood. Dropout rates range widely, from 3.5 % (Khandker 2005), to 25-60% (Wright, 2001). The results of the initial cohort composition suggest the possibility that low frequency borrowers may not have the same financial needs as high-frequency borrowers. Program exit information is not collected, but EII administrators report that a majority of clients eventually request loan amounts in excess of EII policy. Initial income has been identified as a key-determinant of impact. Second, although instrument administration and completeness of data were adequate, data collection procedures and client responses pose a limitation. The veracity of client responses is perhaps the greatest potential limitation. Low reliability of self-reported data is not uncommon in surveys and may have increased error in observed values, which could lead to an overestimation of effect size (Cohen, 1988; Alwin, 2007).

Scaling of survey items has limitations. This was especially true with the categories of Business Income, which had an initial category RD<$5,000, in contrast to Family Income, with the first category beginning with RD <$1,500 and the last category representing incomes above RD $6,500. These categories resulted in 47.4% of all Business Income responses in the lowest category, and 46.5% of all Family income responses in the highest category. Had incomes been more broadly distributed between the income categories, greater change in income would likely have been discovered.

A number of biases may exist. Social acquiescence, or the Hawthorne effect, is a widely-described phenomenon in the social sciences. Clients may be motivated to provide a response they believe will help them acquire the loan, as the survey is part of the loan approval process. Longitudinal learning is a potential issue, as borrowers in the program may learn which responses to report. Interviewer effects (use of different loan officers for survey data collection) area potential limitation as well, due to differences in personality and manner of executing the surveys. Finally, a selection bias may exist. Assets and vulnerabilities vary within households, creating different levels of poverty. The chronic poverty of the very poorest is often due to an inability to work (Shaffer, 2008). In contrast, the transitory poor may experience poverty due to circumstances that will have a short-to-medium term impact. The nature, scale and duration of poverty circumstances may be an important factor in evaluating program effectiveness (Shaffer, 2008).

Conclusions

The landmark research by Roodman & Murdoch (2009) sent a ripple of concern regarding the effectiveness of microfinance and the design of impact studies. While they called for more rigorous experimental designs, they also recognized the importance of program evaluation research, particularly those studies involving longitudinal data over a longer period of time. With most impact assessments spanning 12–18months (Roodman & Morduch, 2009), the seven years of data analyzed herein offers a much longer view on the progress of clients. This research demonstrated an overall increase in borrower income with the greatest magnitude of change with borrowers who stayed in the program longer. There is a gradual change developing in the perceived role of microfinance. The traditional microenterprise approach emphasizing productivity is evolving toward a more comprehensive approach where microfinance becomes a means of financial inclusion and a tool to help manage a household's finances and improve well-being (Schicks, 2010). It is often delivered with an explicit social mission, whether it is poverty reduction, empowerment of women or the promotion of community capacity. This shift in perspective has led some to suggest that financial inclusion through microfinance is a sufficient goal, even if it doesn't clearly reduce poverty (Reed, 2011). Measuring one's emergence from poverty may require a much longer view than is typical of most research studies.

Likewise, changes in income alone are insufficient to characterize transitions from poverty. The advantages of an asset based approach to conceptualizing poverty is widely accepted (Bebbington, 1999; Chambers, et al., 1992; Hulme & Shepherd, 2003; Moser & Stein, 2011), yet there is still debate about how best to operationalize an asset-vulnerability framework (Moser & Anis, 2008). The asset-based concept of poverty described by Hulme (2003) reveals variations in poverty; the poor are not homogenous. As income and capitals fluctuate, households move through a poverty matrix, fluctuating in response to various shocks and opportunities. Using an asset-based approach to monitor the income and capital of a household may help to distinguish the near poor, the transitory poor, and the chronic poor, so they can be offered optimal services. The data herein suggest that to best determine the influence of MF, assessment should be done within the context of these dynamics of poverty. What is the progress of the chronic poor? What is the progress of the transitory poor? There are many useful questions to be asked by MFIs to help serve their clients better, which are unanswerable without proper program evaluation studies. Microfinance Institutions can learn a great deal about the effectiveness of their programs through assessment research, even with its potential limitations. Without means of proper assessment, adequate program performance and broader assessments such as cost benefit analysis of services are stymied.

Appendix A: Survey Detail

1. Have you received training in business? (0-no;1-yes)
2. Have you received vocational skill development training? (0-no; 1-yes)
3. Children's education (0-none;1-informal; 2- public school;3- private school)
4. Children less than1year old have had all vaccinations (0-no; 1-yes; 2-NAif2, eliminate)
5. Where do you seek help when someone in your family is sick? (0-nowhere; 1-folkore community healer; 2-community health promoter; 3-public hospital; 4-private clinic)
6. How long has it been since your last PAP or PSA? (0-Don't know; 1-1-2yrs; 2-<1yr;)
7. Do you have a business? (0-no;1-yes)
8. How many paid employees do you have? 0-0;1-1-2;3-3-4;4-5 or more; 5-NA
9. Do you participate in solving problems in your community? (0-never; 1-at times; 2-often; 3-always)
10. Do you belong to a church? 0-no;1-at times; 2-yes; 3-no church to attend, eliminate)

11. Do you read the Bible? (0-no;1-at times, 2-yes)
12. Which church (religion) do you belong to? (0-don't belong; 1-belong) (Catholic/Protestant/Other collapsed to 1)
13. Do you pray? (0-no; 1-at times; 2-regularly)
14. How do you see your situation in the future? (0-worse; 1-equal; 2-better)
15. Do you pay for electricity? (0-no;1-yes)
16. Do you pay for water? (0-no;1-yes)
17. Do you pay for telephone? (0-no;1-yes)
18. Do you own your home? (0-no;1-yes, no title;2-yes, with title)
19. Of what materials is your home constructed? (0-Inferior; 1-Wood/Zinc; 2-block/Zinc; 3-block/cement) other?
20. What material is the floor made of? (0-earthen; 1-mixed; 2-cement/other)
21. Do you have electricity? (0-no;1-yes)
22. Do you have water service? (0-no; 1-yes)
23. Do you have telephone service? (0-no; 1-yes)
24. How many meals / day for your family? (1-1; 2-2;3-3)
25. How much money does the entire household bring in each month? (1-RD $2,500or less; 2-RD$2,501– 4,500;3-RD $4,501–6,5004-RD>$6,500)
26. How much Business Income is brought in each month? (1-RD $5,000or less; 2-RD$5,001–10,000;3-RD $10,001–15,0004-RD>$15,000)
27. What is the principal source of income for the family? (0-noregular income; 1-regular income from salary or Business)
28. Do you have savings? (0-no; 1-yes)
29. How do you protect your savings? (0-none;1-home or w/friend; 2-cooperative; 3-commercial bank or BDE)
30. What is the amount of your savings? (0- RD $500 or less; 1-RD $1,001 –2,000; 2-RD$2,001 –4,00;3->RD $4,000)
31. Do you have debt (0-yes, 1-no)
32. With whom do you have debts? (0-moneylender, family, other; 1-development org; 2-Development Org; 3-no debt)

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