

**The Poverty Stoplight:
Does Personalized Coaching in Microfinance Help Clients Overcome Poverty?**

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ABSTRACT

During the past 3 years Fundación Paraguaya, a microfinance NGO, has been developing a coaching program called the Poverty Stoplight. Its objective is to help its microfinance village bank women clients to identify and overcome poverty across 50 indicators. Against the background of the debate around minimalist versus integrated approaches to microfinance, the questions remains whether clients who undergo the Poverty Stoplight coaching program have better chances of overcoming poverty than those who only receive loans.

This study uses panel data retrieved from Fundación Paraguaya's program records in order to estimate the average treatment effect on the treated (ATT) in a difference-in-differences model. The database includes information on 472 women, 282 of which participated in the Poverty Stoplight program and 190 only received microloans but not the personalized coaching treatment. The results indicate that the Poverty Stoplight program is more successful in helping families overcome poverty than the exclusive provision of micro loans.

1. Introduction and Background

After having been celebrated as the proverbial silver bullet for the fight against poverty, microfinance has come under some critique in the past decade. Not only have some linked the tragic suicides of small farmers with their microfinance debts (for instance, Schmidt 2010) – researchers have also called into question the very efficacy of microcredits for helping borrowers overcome poverty. The debate between a Pitt and Khandker on the one side (Pitt and Khandker 1998; Pitt, Khandker, and Cartwright 2003; Pitt 2011) and Roodman and Morduch on the other side (Morduch 1998; Roodman and Morduch 2009; Roodman and Morduch 2011)—the former arguing that a microcredit program in Bangladesh has had positive effects, the latter denying that claim using the very same dataset—is probably the best known example for this ongoing debate. A final conclusion on whether or not microfinance works for the poor is thus still pending.

Against that background, proponents of micro finance have tried to shift the focus of the discussion. Microfinance programs, so the assertion, are very different in their nature, and the actual program design is what matters for the success or failure of a program. More specifically, microfinance institutions (MFIs) can broadly be classified into those taking a “minimalist” and those taking an “integrated” approach (Ledgerwood 1998, 65). Minimalist MFIs are founded on the idea that what holds people back is a lack of access to capital; once credit constraints are removed, poor individuals can work their way out of poverty. Hence, minimalist MFIs only provide financial intermediation. Integrated MFIs, by contrast, offer both financial intermediation and other services. The basic idea of this approach is that poor individuals typically suffer from a range of different deprivations at the same time, and that these deprivations reinforce each other. Micro lenders will only be able to effectively use loans to overcome poverty, so the theory, if they also receive support in other areas, such as social intermediation (the build-up of human and social capital), enterprise development services, or social services (such as health care, education, or literacy trainings). There is in fact some empirical evidence that the provision of additional services increases the success of microfinance programs, but, again, there is also some contradictory evidence (McKenzie and Woodruff 2014).

Hence, the debate whether integrated MFIs add value compared to minimalist MFIs is still ongoing.

Three years ago, the microfinance NGO Fundación Paraguaya (FP) has decided to move beyond its former minimalist approach and to opt for the provision of integrated microfinance services instead. In accordance with this shift FP has been developing a personalized and customized coaching and mentoring program in Paraguay called the Poverty Stoplight. Its objective is to help its microfinance village bank women clients to identify and overcome poverty across 50 indicators. The Poverty Stoplight, which uses a visual survey with photographs shown on a tablet, is both a way to easily measure poverty and to help families design and implement a poverty elimination plan. According to the NGO's records 18,000 of its 55,000 client families have overcome income-poverty since this program was launched.

The reason behind Fundación Paraguaya's effort to go beyond financial inclusion and to aim for poverty *elimination*—not just poverty *reduction*—is twofold. On the one hand, despite economic growth over the past two decades, poverty levels in Paraguay have only very recently started to decrease. As social tension continues due to the fact that 23.8% of the population live in poverty and 10.1% live in extreme poverty (DGEEC 2014), government, business, and civil society are looking for new ways to address this seemingly intractable problem. On the other hand, Fundación Paraguaya realized that many of its microfinance clients remained under the poverty line despite constant access to credit during many years. For many years, Fundación Paraguaya had tracked only inputs (i.e. amount of loans disbursed, amount of training hours) and outputs (i.e. number of poor women reached, number of village banks created, loan portfolio, loan size). It did not measure outcomes (the effect of its microfinance program on its clients) nor impact (whether or not its microfinance program was responsible for its clients' improved standard of living).

Fundación Paraguaya thus realized that poverty is not only about insufficient income but also about deprivations across multiple dimensions. There are profound structural and systemic causes that are intertwined with individual behavior and culture, as depicted in the conceptual framework in Figure 1. In order to overcome multidimensional poverty families need to become aware and take stock of their situation. At the same time, government services and economic opportunities must be available. The Fundación set out to design an approach that facilitates this by providing a metric and a tool for families to quantify their level of poverty and identify customized strategies to address specific deprivations.

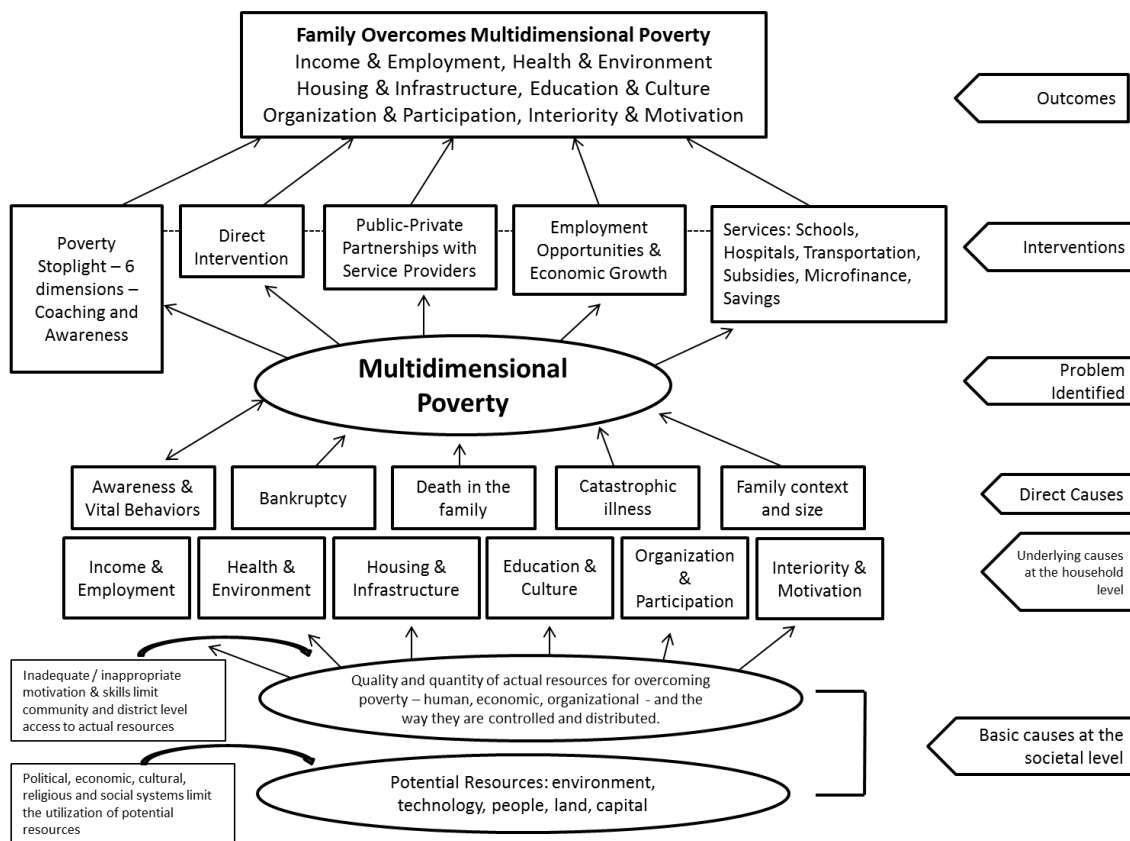


Figure 1 Conceptual Framework: Multidimensional Poverty and the Poverty Stoplight Approach

In order to move to this more holistic approach, FP defined what non-poverty means across six dimensions (income & employment, health & environment, housing & infrastructure, education & culture, organization & participation, and interiority & motivation). Working with its clients in rural villages and urban slums, these dimensions were operationalized into 50 indicators, each with three simple

and concrete definitions: what it means in the local context to be extremely poor (red), poor (yellow) and non-poor (green). The categories are visualized through pictures, so that the heads of household who undergo the survey can self-diagnose their level of poverty by selecting the picture that best represents their situation. For example, having to bring water from the (contaminated) river is considered *extremely poor*, bringing water from a well away from the house is *poor*, and having at least one water faucet in the house is considered *non-poor*. The colors red, yellow and green are used to illustrate the family's "heat map".

In addition, in working with local "positive deviants" the NGO developed a menu of interventions to address each specific indicator, ranging from direct activities (such as focused lending and business plan coaching) to indirect activities (such as assisting poor women to learn how to demand services from government agencies). This allows FP staff to work together with the women clients to develop a personalized plan for each participating family.

Both for Fundación Paraguaya itself and for the larger microfinance and development community it is relevant to ask whether this new integrated approach to eliminating poverty is better than the former minimalist strategy. The only impact evaluation carried out until now is a study by the US-based microfinance consulting group EA Consultants in partnership with Triple Jump, a microfinance fund that lends resources to Fundación Paraguaya (Budzyrna and Magnoni 2013). The paper compared average poverty levels of two cohorts of clients who underwent the Poverty Stoplight program and showed that poverty reduction was statistically significant for those clients who had been in the program for more than one year. However, the study did not control for any other factors that may have been responsible for increases in income; therefore the statistical power of the results is relatively low. This paper builds upon the study by Budzyrna and Magnoni and attempts to build a more robust evaluation of the Poverty Stoplight program by using regression analysis techniques. The results of this exercise will constitute an interesting contribution to the literature on the effectiveness of microfinance programs.

2. Dataset

Three Fundación Paraguaya datasets were merged for the purposes of this research study. The first is the treatment database of clients who underwent the Poverty Stoplight program. These clients participated in a baseline visual survey at the beginning of the program (in 2012 and 2013) and in a second visual survey about one to two years later. A total of 1,033 women had taken the Stoplight survey twice as of February 2014. From this group, only those who were still clients of the Fundación were selected for the study, because only those were accessible for additional data collection; this made the sample shrink to 589 clients. Lastly, initially non-income-poor clients were excluded from the database, so that the final sample size is 282 clients. The dataset contains information on current and past loans, 50 poverty indicators, and additional household income information for each client.

The second database was constructed ex-post for the purpose of this study and contains data on the comparison group, that is, on 190 income-poor clients of similar characteristics (that is, clients from similar regional offices and loan officers) who had two non-visual survey questionnaires but had not undergone the Poverty Stoplight program. These 190 clients represent all the existing initially poor clients for which before and after measurements are available. The database contains data on clients' current and past loans, demographic information on the clients' households, and 12 poverty indicators.

The third source of data are additional surveys conducted in February 2014 with all clients of the treatment and comparison groups. These surveys were administered by the loan officers with the purpose of collecting additional demographic and household data for this evaluation study.

In a nutshell, the total sample is a balanced panel containing information on 472 clients at two points in time. Non-probability, convenience sampling was utilized with information that was readily available.

The poverty indicators

The explicit goal of the Poverty Stoplight coaching program is to reduce multidimensional poverty, yet no single variable can capture this concept. Therefore, this study uses a set of poverty measures in order to evaluate the success of the program. These measures are:

- Poverty gap. This continuous variable was constructed by subtracting the official per capita poverty line (in USD) from per capita family income (in USD). Hence, negative values indicate family per capita income below the poverty line and positive values indicating per capita family income above the poverty line.
- Twelve indicators of poverty. These twelve indicators are dichotomous variables indicating whether ($x=1$) or not ($x=0$) an individual is poor in a specified way. The twelve indicators are: income poverty; having access to potable water; having access to nearby health post; vaccination status of children; having an appropriate latrine; having ownership of a refrigerator and electrical appliances; having a ventilated kitchen equipped with an elevated stove; having separate bedrooms for adults and children; having access to cellphones; having all of the family's children attend school through the 12th grade; forming part of a self-help group; and being registered to vote. These indicators were selected because they were the only common poverty variables for both the treatment and the control group. They were derived from the Poverty Stoplight's three-level ranking system of red meaning extremely poor, yellow meaning poor, and green meaning non-poor. Because the database contained very few extremely poor clients, yellow and red were combined to represent "poor".
- Poverty Index. A simple unweighted index was created from the above twelve poverty indicators by adding up the number of indicators in which an individual is poor. Hence, the maximum index value of 12 ($=12*1$) denotes an extreme situation where an individual is poor in every single one of the

twelve indicators, and the minimum index value of 0 (=12*0) denotes an entirely non-poor individual.

Table 1 provides an overview of all poverty indicators in both survey rounds, including number of observations, means, standard deviation, minimum and maximum values. Note that all indicators marked with an asterisk (*) are dichotomous variables; hence, the mean value of these indicators can be interpreted as the percentage of poor clients. As can easily be seen, this value is very low for most of the indicators. It should also be noted that the poverty index has a mean of 2.42 (with a standard deviation of 2.05) out of a theoretical maximum value of 12, which denotes that the sample is comprised of more non-poor than poor individuals. Figure 2 and Figure 3 summarize the 12 individual poverty indicators for treatment and comparison group at the baseline, that is, before the treatment. Again, one can easily see that in most indicators, more individuals were non-poor than poor. One can also see that the comparison group was slightly poorer across the individual indicators (differences are marked with asterisks).

Table 1 Descriptive Statistics: Poverty Indicators

Variable	N.	Mean	St.D.	Min	Max
Poverty Gap	944	12.44	71.62	-107.32	522.36
Poverty Index	829	2.42	2.05	0	11
* Income above Poverty Line	944	.73	.45	0	1
* Potable Water Access	916	.04	.20	0	1
* Health Post Nearby	913	.10	.31	0	1
* Vaccines	922	.03	.17	0	1
* Sanitary Latrine	913	.13	.34	0	1
* Refrigerator	912	.06	.24	0	1
* Elevated Stove-Ventilated Kitchen	915	.10	.30	0	1
* Separate bedrooms adults/children	900	.16	.36	0	1
* Cellphones	940	.73	.44	0	1
* Children in school until 12 th grade	852	.10	.30	0	1
* Belongs to Self Help Group	909	.21	.41	0	1
* Registered to vote	909	.08	.28	0	1

Note: for the 12 individual indicators, 1 means poor and 0 means non-poor

Figure 2 Treatment Group: Ex-ante poverty levels. Asterisks denote variables in which treatment and comparison group differ (* p<0.05, ** p<0.01, *** p<0.001)

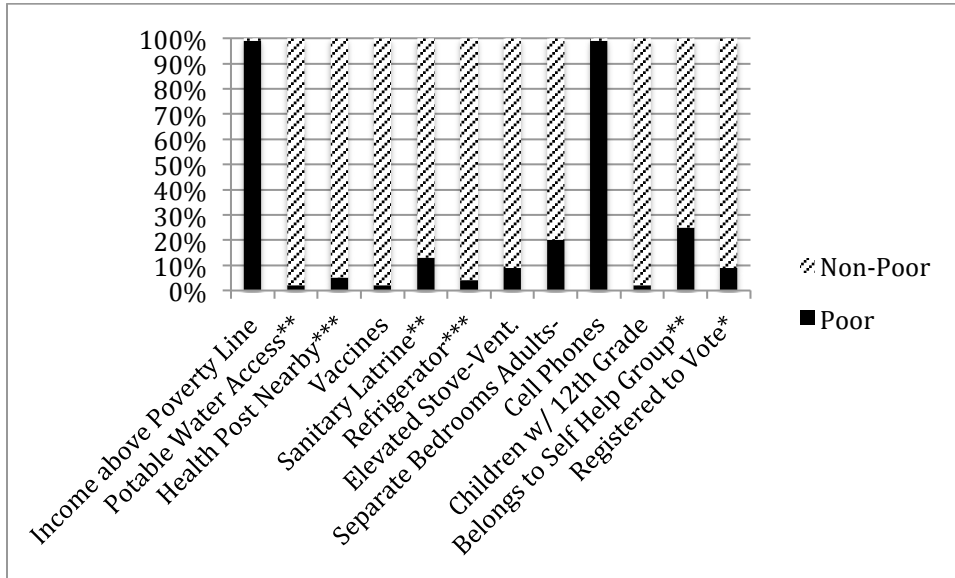
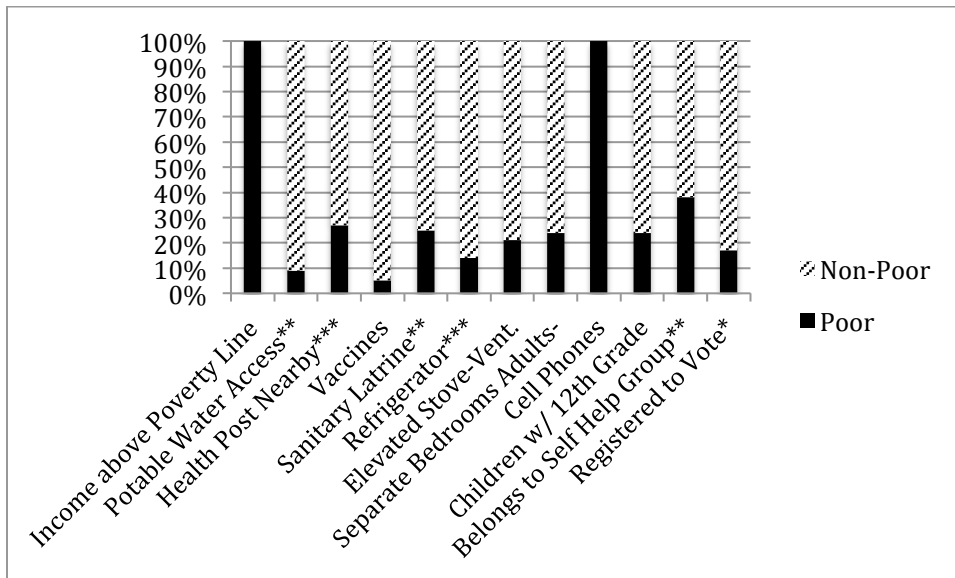


Figure 3 Comparison Group: Ex-ante poverty levels. Asterisks denote variables in which treatment and comparison group differ (* p<0.05, ** p<0.01, *** p<0.001)



Control Variables

As was depicted in the conceptual framework above, there are many factors that potentially contribute to a person’s poverty status apart from participation in the Poverty Stoplight coaching program. The database contains information on many of these factors, including the following: zone of residence (urban or rural); years of

microcredit relationship; number of loans received; cumulative loan size received; use of the loan (working capital or other use); number of family members; educational attainment; housing ownership type (owned with title, without title, by a family member, or other); main income source (employment, production and agriculture, sales businesses); marital status; and hours of work per week. An overview on descriptive statistics for all independent variables can be found in the annex.

3. Methodology

The paper analyzes whether clients who underwent the Poverty Stoplight coaching program had a higher probability of overcoming multidimensional poverty than clients who only received microfinance loans, but not the additional treatment. The analysis uses an econometric difference-in-differences (DiD) model, meaning that the treatment group of clients who underwent the integrated program is compared at two points in time (before and after the treatment) to a comparison group of clients who only received loans. The model is specified as follows:

$$\text{Poverty}_{it} = \beta_0 + \beta_1 \text{Stoppart}_{it} + \beta_2 \text{Stoppart}_{it} * \text{After}_{it} + \beta_3 \text{After}_{it} + \beta_k C_{kit} + u_{it}$$

where β_2 is the main outcome of interest, which is the average treatment effect on the treated (ATT); the dependent variable is a poverty measure for individual i at time t ; *Stoppart* denotes participation in the Poverty Stoplight personalized coaching program; *After* takes on the value 0 for the ex-ante baseline visual survey and the value 1 for the ex-post survey round; and C_{kit} is a matrix of control variables. Fourteen separate models are estimated, each one using a different poverty measure as the outcome variable: Models 1 and 2 analyze the effect of the program on poverty gap and the above-outlined poverty index, respectively; the remaining twelve models use the twelve dichotomous poverty indicators as outcome measures. The first two models are estimated using OLS, and the models of the twelve individual poverty indicators are estimated using probit.

The theory behind this DiD approach is as follows: when simply comparing the poverty level of a group of individuals before and after they received a specific treatment, one can never be sure that a change in the poverty level is actually caused by the treatment. However, one can also compute the change in the poverty level of another group of individuals who are very similar to the first group except that they did not receive the treatment of interest. If one finds that the changes in the poverty levels differ between the two groups, then one has some good reason to believe that the treatment had an effect. This difference in the differences is oftentimes referred to as the average treatment effect on the treated (ATT). An underlying assumption of this approach is that in the absence of the treatment, both groups would improve their standard of living in the same way over time. This assumption is typically reasonable if individuals are randomly assigned to either one of the groups. As explained above, this was not the case for the dataset used for this evaluation. Therefore, it is important to question whether or not the treatment and comparison groups can be assumed to be of similar characteristics. One way to approach this is to compare the two groups in all available common variables. To be sure, unobserved differences cannot be detected through this strategy.

Data presented in Table 2 shows that the two groups are not completely comparable before the treatment (*ex-ante*): they were statistically different in 9 out of the 20 independent variables. Individuals from the comparison group got less loans of a smaller cumulative size, are more likely to live in rural areas in houses of family members, are more likely to earn their income through employment and to be single, and work fewer hours per week. They are also significantly poorer in 8 of the 12 individual poverty indicators and in the overall poverty index. Not that these observable differences do not, *per se*, pose a problem for the difference-in-differences design, as they can be accounted for mathematically. However, the existence of these observable differences suggests that there most likely also exist important *unobservable* differences between the two groups. If these unobservable differences are systematically related to poverty outcomes, then the estimation results will be biased. Therefore, the results of this study need to be interpreted with caution.

Table 2 Ex Ante Comparison of Treatment and Comparison Group.

Variable	Treatment group		Comparison Group		Difference (t test)	
	Mean	StDev	Mean	StDev	Amount	PValue
Independent variables						
Rural**	0.37	0.48	0.53	0.50	0.16	0.001
Years of Credit Relationship	0.57	0.90	0.71	1.10	0.14	0.132
Number of Loans***	3.29	2.86	2.34	2.45	-0.95	0.000
Cumulative Loan Size***	567.69	642.35	362.30	507.47	-205.40	0.000
Loans for Working Capital	0.93	0.25	0.90	0.29	-0.03	0.303
Family Members	4.55	1.54	4.64	1.91	0.10	0.096
Fam.Mem.Generating Income	2.13	0.81	2.00	0.95	-0.13	0.109
No Education	0.12	0.33	0.14	0.35	0.02	0.436
Primary Education	0.23	0.42	0.17	0.38	-0.06	0.114
Some Secondary Education	0.20	0.40	0.20	0.40	0.00	0.994
Secondary/Higher Education	0.45	0.50	0.48	0.50	0.04	0.451
House has Title	0.42	0.49	0.40	0.49	-0.01	0.766
House without Title	0.39	0.49	0.31	0.46	-0.08	0.064
House of Family Members **	0.13	0.33	0.23	0.42	0.11	0.003
Main Activity: Sales*	0.64	0.48	0.52	0.50	-0.11	0.013
Main Activity: Production	0.23	0.42	0.17	0.38	-0.06	0.094
Main Activity: Employed ***	0.13	0.34	0.31	0.46	0.18	0.000
Marital Status: Single**	0.26	0.44	0.37	0.48	0.12	0.007
Marital Status: Married**	0.74	0.44	0.63	0.48	-0.12	0.007
Hours Worked per Week*	44.66	18.78	41.04	16.45	-3.62	0.046
Dependent Variables						
Poverty Gap	-26.91	26.51	-29.66	22.39	-2.76	0.240
Poverty Index***	2.88	1.32	4.03	2.18	0.17	0.000
Income above Poverty Line	0.99	0.08	1.00	0.00	0.01	0.246
Potable Water Access**	0.02	0.16	0.09	0.29	0.06	0.002
Health Post Nearby***	0.05	0.22	0.27	0.44	0.22	0.000
Vaccines	0.02	0.15	0.05	0.22	0.03	0.093
Sanitary Latrine**	0.13	0.33	0.25	0.43	0.12	0.001
Refrigerator***	0.04	0.20	0.14	0.35	0.10	0.000
Elevated Stove-Vent. Kitchen**	0.09	0.29	0.21	0.41	0.11	0.001
Separate Bedrooms Adults-Child	0.20	0.40	0.24	0.43	0.04	0.308
Cell Phones	0.99	0.08	1.00	0.00	0.01	0.246
Children w/ 12 th Grade Educ***	0.02	0.15	0.24	0.43	0.21	0.000
Belongs to Self Help Group**	0.25	0.43	0.38	0.49	0.13	0.003
Registered to Vote*	0.09	0.29	0.17	0.38	0.08	0.013

Variables in which the two groups differ are marked as follows: * p<0.05, ** p<0.01, *** p<0.001

4. Results

It is interesting to first take a look at the before and after poverty levels of the treatment and comparison group, without taking other factors into account. As can be seen in Figure 4, the mean poverty gap was very similar for the two groups before the program started: Families in the treatment group had a mean poverty gap of USD -26.91, while families in the comparison group were slightly poorer with a mean poverty gap of USD -29.66. Both groups managed to overcome poverty, yet the treatment group was considerably more successful: Their mean per capita family income was USD 67.48 above the poverty line, while the comparison group was on average only USD 31.27 above the poverty line. A similar story can be told about the simple multidimensional poverty index (Figure 5). Treatment and comparison group differed more clearly in this measure in their ex-ante poverty level, the former having a poverty score of 2.88 out of 12, the latter being poorer with a score of 4.03 out of 12. Again, both groups were less poor in the second round of data collection, and again, the treatment group seems to have been considerably more successful than the comparison group: After the treatment, the poverty index value for the former dropped to 0.76, the one of the latter only to 2.86. Prima facie the treatment thus seems to have had an impact.



Figure 4 Comparison of poverty gaps, not controlling for other factors

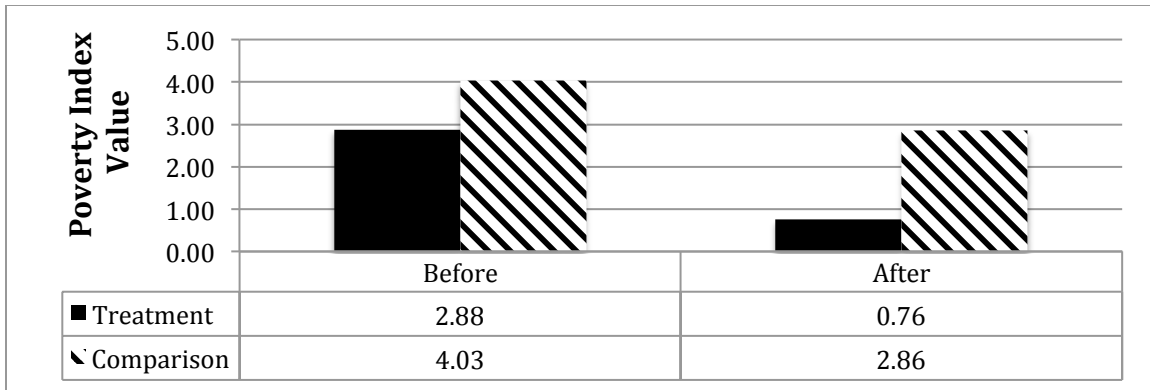


Figure 5 Comparison of poverty index values, not controlling for other factors

In order to gain more confidence about the causal effect of the Poverty Stoplight program on these higher success rates, other factors need to be controlled for. For that purpose, the difference-in-differences model presented in the previous section was estimated. Table 3 contains the OLS estimation results for the two poverty outcome measures *poverty gap* and *poverty index*. Both of these models provide support for the research hypothesis. The average treatment effect on the treated, *After*Participation*, is statistically significant with the expected sign in both models¹. The ATT estimator for model 1 is 22.92 (significant at the 0.01 level), indicating that Poverty Stoplight program participation contributed to a decrease in the poverty gap of almost USD 23. The ATT estimator for model 2 is -0.74 (also significant at the 0.01 level), suggesting that participating in the program lead to a decrease of 0.74 points in the multidimensional poverty index. Hence, those microfinance clients who participated in the Poverty Stoplight coaching program were more successful in overcoming poverty than those microfinance clients who only received microloans but not the whole treatment. Note that these effects were *in addition* to on overall decrease in poverty levels in both treatment and comparison group: the coefficient on *after* shows a drop in poverty levels at the highest statistical significance level for the entire sample.

¹ As was explained earlier, negative values in the poverty gap variable indicate family per capita income below the poverty line and positive values indicate income above the poverty line. Hence, a positive estimation coefficient denotes a decrease in poverty.

Table 3 OLS Estimation Results.

Dependent variables	Model 1: Poverty Gap		Model 2: Poverty Index	
	Coefficient	P Value	Coefficient	P Value
Poverty Stoplight Participant	-0.04	-0.995	-1.17***	0.00
After*Participation (ATT)	22.92**	-0.004	-0.74**	-0.004
After	57.45***	0.00	-1.06***	0.00
Rural	12.21**	-0.002	-0.01	-0.934
Years of Credit Relationship	-1.63	-0.438	-0.06	-0.333
Number of Loans	-0.35	-0.791	-0.03	-0.487
Cumulative Loan Size	0.01**	-0.003	0.00	-0.183
Loans for Working Capital	9.73	-0.232	0.39	-0.135
Family Members	-11.88***	0.00	0.11*	-0.016
Fam. Members Generating Income	13.91***	0.00	-0.02	-0.786
Primary Education	2.03	-0.77	0.03	-0.884
Some Secondary Education	-0.51	-0.941	0.02	-0.944
Secondary/Higher Education	-3.05	-0.626	-0.13	-0.526
House has Title	3.52	-0.709	0.53	-0.097
House without Title	-2.73	-0.773	1.00**	-0.002
House of Family Members	4.15	-0.68	0.47	-0.171
Main Activity: Sales	-5.19	-0.344	0.03	-0.883
Main Activity: Production	-5.18	-0.432	0.18	-0.394
Hours worked per week	0.41***	0.00	0.00	-0.202
Marital Status: Married	4.16	-0.331	0.16	-0.248
Intercept	-36.33*	-0.018	2.44***	0.00
N	793		690	
r ²	0.451		0.41	
F	31.64		23.26	

Key: *p<0.05, **p<0.01, ***p<0.001

Figure 6 and Figure 7, which are derived from the estimation results presented in Table 3, depict the differences between treatment and comparison groups across time for the Poverty Gap and the Poverty Index, respectively. Even after controlling for a range of variables the Poverty Stoplight program appears to have a positive effect, which can be shown in two ways. First, the difference between before and after poverty levels is larger for the treatment group, which suggests that the treatment is successful. This is true for both models. Second, controlling for other factors, both groups had practically identical poverty gaps before the treatment but were very large different afterwards. On the other hand, even though both the

treatment and the comparison groups were not so similar in terms of their Poverty Index values before the treatment, the difference increased after the treatment².

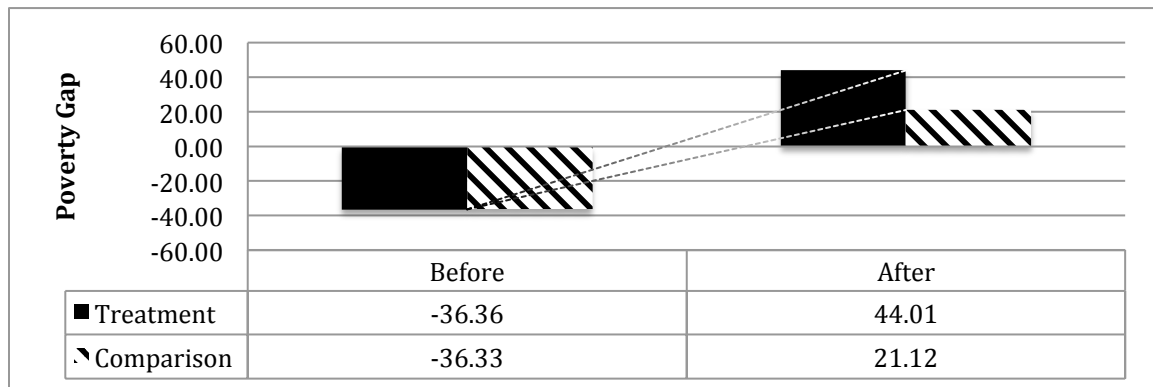


Figure 6 Differences in Poverty Gaps, controlling for other factors

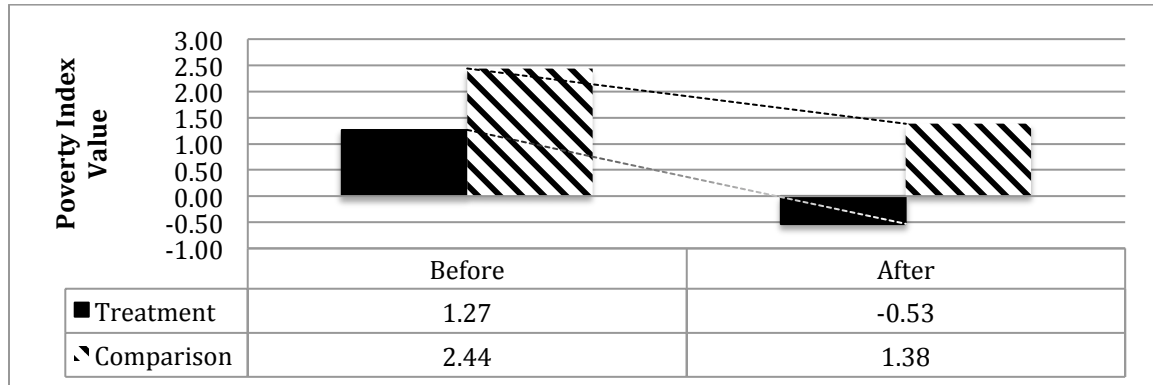


Figure 7 Differences in Poverty Index values, controlling for other factors²

Only very few of the control variables are found to have a significant effect in models 1 and 2. For example, contrary to the conceptual model, education and house property title do not seem to impact a person's poverty status. Not surprisingly, however, results show that larger families tend to be poorer per capita and that those families who have more income generating members and work longer hours per week are less likely to be income poor.

² Note that the negative value for the predicted average poverty index value in the treatment group is the result of many observations begin clustered around the lower end of the index.

Table 4 Probit Estimation Results I: Margins

	Income Above Poverty Line	Potable Water Access	Health Post Nearby	Vaccines	Sanitary Latrines	Refrige- rator
Poverty Stoplight Participant	-0.492 0.978	-0.058** 0.003	-0.187*** 0.000	-0.058** 0.006	-0.069* 0.021	-0.086*** 0.000
Interaction After Partiicp.	0.411 0.981	0.004 0.891	-0.015 0.734	0.004 0.876	-0.090 0.074	-0.038 0.374
After	-0.853 0.961	0.001 0.968	-0.054* 0.040	0.013 0.436	-0.026 0.429	-0.029 0.251
Rural	0.067** 0.001	0.007 0.624	-0.043 0.050	-0.039* 0.013	-0.013 0.576	-0.006 0.769
Yrs Credit Relationship	0.020 0.224	-0.008 0.435	0.002 0.835	-0.000 0.994	-0.004 0.766	-0.002 0.852
Number of Loans	-0.012 0.134	-0.004 0.648	-0.011 0.126	-0.007 0.155	-0.023* 0.012	-0.018* 0.025
Cummulative Loan Size	-0.000 0.056	-0.000 0.673	0.000 0.063	0.000 0.346	0.000 0.138	0.000* 0.019
Loans for Working Capital	-0.084 0.058	0.000 0.994	0.065 0.234	. .
Family Members	0.061*** 0.000	0.006 0.161	-0.003 0.671	0.009* 0.046	-0.003 0.676	-0.002 0.696
Fam.Mem. Gen.Income	-0.036* 0.011	-0.003 0.714	0.012 0.377	-0.008 0.380	0.038* 0.012	0.004 0.744
Primary Education	0.011 0.778	-0.011 0.635	-0.102** 0.003	-0.004 0.880	-0.027 0.509	-0.041 0.224
Some Sec Education	0.038 0.320	-0.009 0.697	-0.076* 0.019	0.001 0.979	-0.011 0.776	-0.028 0.371
Secondary/Higher Educ	0.002 0.945	0.007 0.734	-0.083** 0.004	0.010 0.660	-0.041 0.256	-0.022 0.425
House has Title	0.044 0.367	-0.005 0.877	0.068 0.304	-0.029 0.290	-0.002 0.976	0.026 0.598
House Without Title	0.033 0.502	0.029 0.373	0.121 0.067	-0.005 0.865	0.090 0.144	0.018 0.714
House of Family Members	0.081 0.125	-0.052 0.205	-0.002 0.979	-0.046 0.152	0.067 0.295	-0.002 0.969
Main Activity: Sales	0.010 0.754	-0.013 0.464	0.030 0.341	0.016 0.392	-0.041 0.185	0.018 0.517
Main Activity: Production	0.037 0.315	0.011 0.606	0.069 0.060	0.004 0.862	-0.026 0.494	0.035 0.288
Hours worked per Week	-0.001* 0.011	0.001 0.159	0.002** 0.009	0.001* 0.027	0.000 0.595	0.000 0.376
Marital Status: Married	0.017 0.484	0.008 0.572	0.069** 0.004	0.017 0.258	-0.007 0.779	0.060** 0.008
N	793	773	725	734	770	724

Key: *p<0.05, **p<0.01, ***p<0.001, p values underneath.

Table 5 Probit Estimation Results II: Margins

	Elevated Stove/ Vent. Kitchen	Separate Bedroom Adults/ Children	Cell phones	Children w/12 th Grade Educ.	Belongs to Self-Help Group	Register ed to Vote
Poverty Stoplight Participant	-0.106*** 0.000	-0.087* 0.012	-0.492 0.977	-0.142*** 0.000	-0.126*** 0.000	-0.071** 0.006
Interaction After Particip.	-0.062 0.187	-0.147** 0.006	0.407 0.981	-0.026 0.543	-0.202*** 0.001	-0.076 0.096
After	-0.042 0.132	-0.033 0.396	-0.849 0.961	-0.029 0.237	-0.067 0.086	-0.048 0.103
Rural	-0.054* 0.013	-0.065* 0.015	0.069*** 0.001	0.020 0.333	-0.023 0.410	-0.021 0.303
Yrs Credit Relationship	-0.026 0.139	-0.057* 0.013	0.018 0.270	0.001 0.869	-0.022 0.295	-0.029 0.098
Number of Loans	-0.019* 0.033	0.010 0.335	-0.011 0.157	0.002 0.702	-0.000 0.979	0.007 0.435
Cummulative Loan Size	0.000*** 0.001	0.000 0.987	-0.000 0.065	-0.000 0.677	-0.000 0.627	-0.000 0.776
Loans for Working Capital	0.126 0.074	0.114 0.097	-0.082 0.063	-0.019 0.650	0.099 0.128	0.048 0.336
Family Members	-0.009 0.191	-0.004 0.630	0.061*** 0.000	-0.018* 0.011	0.005 0.590	0.001 0.902
Fam.Mem. Gen. Income	0.039** 0.004	0.017 0.304	-0.037** 0.010	0.019 0.133	-0.004 0.815	-0.019 0.191
Primary Education	-0.014 0.672	0.088 0.064	0.016 0.682	0.008 0.814	-0.015 0.752	0.021 0.547
Some Secondarr Educ.	-0.043 0.202	0.043 0.375	0.037 0.325	0.021 0.544	0.019 0.675	-0.029 0.434
Secondary/Higher Educ.	-0.077* 0.014	0.058 0.182	0.003 0.941	0.027 0.392	-0.033 0.440	0.005 0.887
House has Title	-0.018 0.705	-0.006 0.931	0.044 0.366	0.535 0.981	0.044 0.540	0.073 0.276
House Without Title	0.008 0.871	0.110 0.095	0.036 0.465	0.573 0.980	0.122 0.092	0.099 0.142
House of Family Members	-0.019 0.706	-0.069 0.336	0.081 0.124	0.513 0.982	0.006 0.936	0.035 0.617
Main Activity: Sales	-0.040 0.141	-0.016 0.648	0.011 0.710	0.036 0.203	0.006 0.870	0.062* 0.049
Main Activity: Production	-0.008 0.806	-0.008 0.851	0.037 0.313	0.052 0.120	0.068 0.136	0.040 0.281
Hours worked per Week	0.001 0.177	0.002* 0.017	-0.002** 0.009	0.000 0.646	0.003*** 0.000	-0.000 0.785
Marital Status:Married	0.050* 0.035	-0.014 0.627	0.019 0.432	-0.038 0.061	0.018 0.544	0.034 0.132
N	772	757	790	712	766	766

Key: *p<0.05, **p<0.01, ***p<0.001, p values underneath.

Table 4 and Table 5 contain the estimation results for the models using the remaining twelve outcome variables. As mentioned earlier, these variables are all defined as dichotomous (poor and non-poor). Because of this, these models were calculated using probit techniques. The results are presented as marginal effects, that is, as the changes in the probability of being poor given the respective independent variable. Generally speaking, these models provide very little support for the research hypothesis. Out of the twelve models, only two generate statistically significant difference-in-differences estimators. However, this observation does not necessarily mean that the Poverty Stoplight did not have a positive effect because each individual indicator is in itself very narrowly defined. As discussed, when these indicators were combined into the Poverty Index (model 2), a positive effect was found.

Conclusions & Outlook

This paper analyzed the impact of Fundación Paraguaya's recently developed Poverty Stoplight program to eliminate multidimensional poverty. Data of 472 women clients of Fundación Paraguaya's village bank microfinance program was used to compare whether those women who underwent a personalized coaching program were more likely to overcome poverty.

Both the treatment and the comparison groups' quality of life improved over time, yet a difference-in-differences model found that the treatment group achieved statistically higher gains than the comparison group. These results reinforce the conclusions of an earlier external evaluation that found a positive program effect but did not, for lack of data, control for other factors. In addition, these results support the idea that microfinance programs that provide more than just loans have a stronger impact than minimalist microfinance programs.

However, this study design has some potential validity threats. First and foremost, selection bias may play an important role, as program participants were not selected randomly. In fact, the descriptive statistics presented suggest that the treatment and comparison group cannot be assumed to be perfectly similar. Loan

officers played an important role in selecting women to participate in the Stoplight program, and they may have tended to select those who were close to the poverty line or otherwise more likely to overcome poverty. These women may thus have represented “low-hanging fruit”. If that is the case, the treatment effect may be overestimated.

Second, there are some concerns relating to the accuracy of the data: most of it was self-reported by clients and loan officers, which leaves room for over- or underreporting. Furthermore, not all data were collected at the same time and in the same way as various data sources were merged for this study. For instance, the data collected in February 2014 on family status and demographic information relied on retroactive self-reporting; clients may have forgotten or may misrepresent their previous conditions

Finally, there are no controls for interfering events or secular trends such as growing government conditional cash programs, new economic opportunities that may be occurring in parts of the country due to the country’s current economic boom, or clients having extraordinary access to more microfinance opportunities. If for some reason these interfering events or secular trends affected treatment and comparison groups differently, then the Difference-in-Differences estimator would be biased. Depending on the nature of these interferences, the effect of the Stoplight Program may be either over- or underestimated and may found to be responsible for an improvement in living conditions when in fact it is not.

More research is necessary in order to address all these issues. In particular, a controlled study that allows for random assignment to treatment and control group would greatly improve the statistical power of an impact evaluation. However, until better data becomes available, the results presented in this study can be seen as an indication that Fundación Paraguaya’s Poverty Stoplight is a promising tool for improving the outcomes of microfinance institutions.

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APPENDIX

Table 6 Summary Statistics of Independent Variables

Variable	Obs	Mean	Std. Dev.	Min	Max
Poverty Stoplight Participant	944	.5974576	.49067	0	1
Interaction after Participation	944	.2987288	.4579433	0	1
After	944	.5	.500265	0	1
Rural	944	.4396186	.4966038	0	1
Years of Credit Relationship	939	1.037274	1.31406	0	20
Number of Loans	939	4.172524	3.468415	0	25
Cummulative Loan Size	941	803.2034	975.4582	0	6177.78
Loans for Working Capital	924	.9220779	.2681941	0	1
Family Members	944	4.522246	1.645564	1	14
Fam.Mem.Generating Income	942	2.20913	.905645	0	7
Primary Education	920	.2021739	.4018397	0	1
Some Seondary Education	920	.2097826	.4073748	0	1
Secondary/Higher Education	920	.4619565	.4988218	0	1
House has Title	925	.4151351	.4930119	0	1
House without Title	925	.3567568	.4793013	0	1
House of Family Members	925	.1708108	.3765472	0	1
Main Activity: Sales	929	.6124865	.4874449	0	1
Main Activity: Production	929	.2034446	.4027772	0	1
Hours worked per week	839	43.76996	18.1044	0	112
Marital Status: Married	929	.7050592	.4562618	0	1

Table 7 Poverty Stoplight: 6 dimension and 50 indicators

INCOME & EMPLOYMENT	EDUCATION & CULTURE
Income above Poverty Line	Spanish Literacy
Other Sources of Income	Children educated through 12 th grade
Access to credit	Knowledge to generate income
Savings	Ability to Plan & Budget
More than one source of income	Communication & Social capital
Documentation: Personal ID	School supplies and books
	Access to Information (Radio & TV)
HEALTH & ENVIRONMENT	Entertainment & Leisure
Potable Water	Values cultural traditions
Hear Care Center close to home	Respects other cultures
Nutritious Diet	Human Rights awareness
Personal Hygiene & sexual health	
Ophthalmologist & Dentist	ORGANIZATION & PARTICIPATION
Vaccination	Belongs to a self-help group
Garbage Disposal	Ability to influence the public sector
Unpolluted environment	Ability to solve problems/conflicts
Insurance (Death-Burial)	Registered to vote
HOUSING & INFRASTRUCTURE	SELF-AWARENESS & MOTIVATION
Safe roofs, doors, windows	Self-awareness & self-esteem
Sanitary Latrines & Sewer	Awareness of needs: personal goals
Electricity	Moral consciousness
Refrigerator & Home Appliances	Awareness of emotional needs
Separate Bedrooms for Adults/Children	Aesthetic self-expression
Elevated Stove & Ventilated Kitchen	Psychosexual awareness
Tables, Chairs, Basic Comfort	Entrepreneurial spirit
Access to all-weather roads	Autonomy to make decisions
Regular means of transportation	
Police Station & Physical Safety	
Telephone or cell phone	
Sufficient & adequate clothing	