

BASIS ASSETS AND MARKET ACCESS INNOVATION LAB



INVESTING IN SMALL FARM PRODUCTIVITY: THE NICARAGUA MCC COMPACT

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A JOINT EFFORT TO IMPROVE LIVES

IN 2007, THE NICARAGUAN GOVERNMENT and the Millennium Challenge Corporation (MCC) launched a rural business development (RBD) program designed to boost small farm income. The program was implemented in Leon and Chinandega, the country's rural 'breadbasket', due to the growth potential of its fertile land and its connection to international markets. The RBD program was designed to support land-owning farmers in developing and implementing a business plan for a high potential activity. The analysis reported here shows that on average the program resulted in income increases in the targeted activities, and in substantial increases in capital investment. At the same time, further analysis reveals quite substantial heterogeneity in program impact. That is, for approximately 25 percent of farmers, impacts have been significantly larger than average effects, but for another 25 percent, there were no observable impacts.

Business plans specified the type of activity that a farmer would develop, and the kinds of RBD services that would be provided during the 24 months of intensive treatment and training. Business services included expert technical assistance, marketing support, and materials and equipment, all aimed to improve farm productivity and, consequently, households' economic well-being. In some cases, the plan required investment in new installations that were co-funded by the RBD program. The intervention targeted four business groups: livestock and fishing, agricultural businesses, non-agricultural businesses and forestry. As of July 2011, 9,104 rural entrepreneurs had participated in the program. This evaluation covers sesame, bean, vegetable, cassava and livestock farmers, which together represented just over half of all program beneficiaries. Yet a few questions remain: how well did these RBD services work, and for whom? Did this program constitute a worthwhile investment for MCC, the Nicaraguan government, and for the farmers themselves?

LEARNING FROM THE SMALL FARM PROGRAM

Our primary evaluation strategy was built around a randomized pro-

KEY POINTS

Roughly three-quarters of participants appear to have benefited, while the remaining 25 percent of participants benefited little, if at all, from RBD.

In general, the program is much more effective for high-performing households.

Women farmers invest more of their incremental income boosting household living standards and less on investment than do men.

gram rollout due to capacity constraints that did not allow all eligible farmers to be brought into the project immediately. The roll-out provided RBD services to a randomly selected early treatment group between September 2007 and September 2009. A late treatment group (also randomly selected) received services from March 2009 to March 2011. Due to the randomization, the late treatment group should function as a valid control group for the early group, on average identical to the early group in every way except for early receipt of RBD services.

It is important to note that the impact of RBD services is likely to have a temporal dynamic. Unlike aspirin or other fever reducers that immediately impact their users, the RBD intervention presented beneficiaries with new opportunities and information as well as a capital infusion, often in the form of in-kind goods. In this way, business services act not unlike an investment in a financial account that accrues interest: the earlier one has the opportunity to participate in the project, the more of a head start in growth for that person's income, which allows income to accumulate ever faster over time. In this context, it is not unreasonable to expect that measurable living standards may dip initially as (credit-constrained) beneficiaries divert resources to the program and then subsequently rise as farmers learn to utilize new opportunities and as their own investment matures.

In order to investigate the evolution of the likely delay in return on investment, we needed to be able to look at impacts in a continuous fashion. Because the treatment in our case was staggered, the temporal sequence in which households entered the program was de facto randomized. Unlike most impact evaluations, which rely exclusively on a binary comparison of those who received the program vs. those who did not, we were able to collect longitudinal data and estimate the continuous treatment effect, examining the impact of spending more months in treatment, mapping out the duration response functions of each outcome variable. Doing so is especially important for programs that are intended to spur learning and co-investment, meaning that their impacts are likely to evolve over time.

MORE MONEY FOR FARMERS?

Figure 1 shows the different stages of anticipated impacts, and our research design examined each step along this causal chain. The full analysis reveals that the program had its desired direct-outcome effects, as treated farmers indeed used more improved technologies and received better output prices (see the [full report](#) for details). One step further along the causal chain reveals that incomes in the targeted activities were substantially boosted by the program, perhaps by as much as 30% (\$2,000) after several years in the program.

FIGURE 1: Flowchart of Hypothesized Outcomes

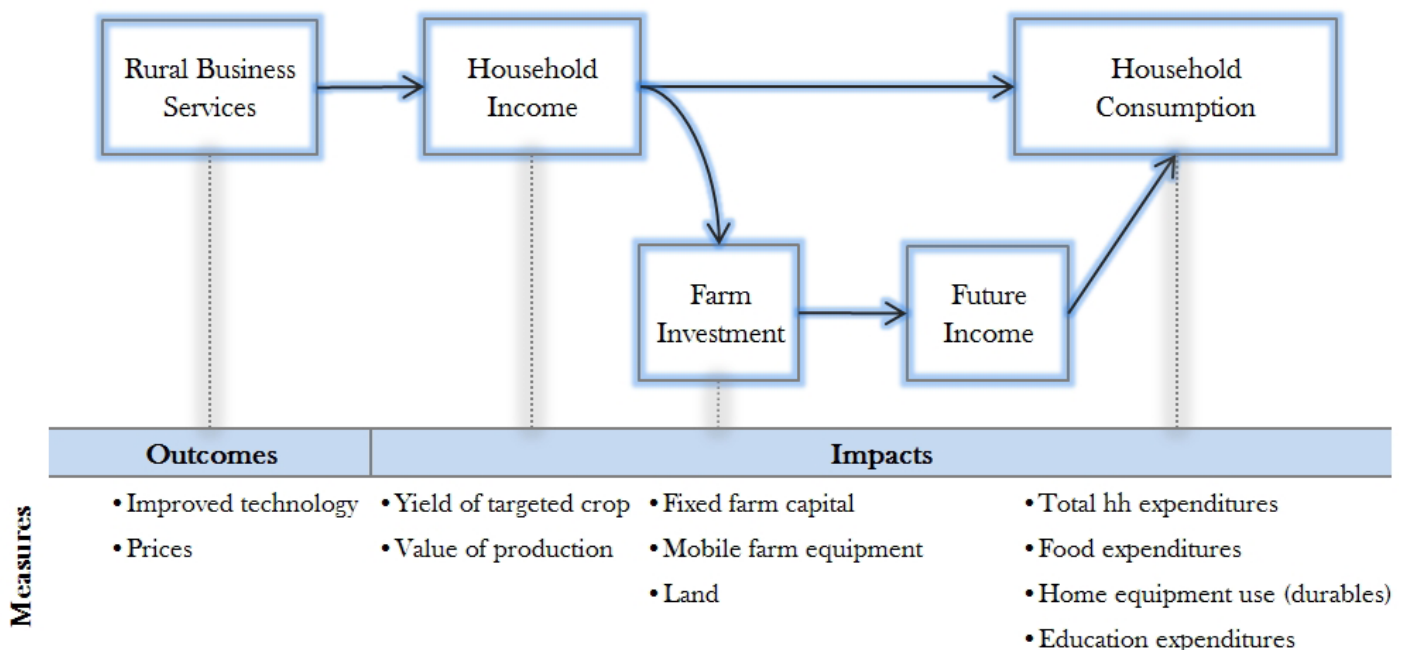


Figure 2 shows the estimates of continuous impacts for per capita household consumption, farm income and total capital. The vertical axis displays impacts in 2007 PPP-adjusted US dollars, and the horizontal axis shows the number of months since treatment began. Following the dotted line (farm income), we can see that program impacts on farm income rise quite steeply over the first 15-20 months of program enrollment, peaking at over \$2,000 of additional farm income. Impacts then appear to flatten out, or even decline slightly, once farmers are no longer directly participating in the program (remember that farmers are actively enrolled for 24 months).

Given the income increase, farmers then likely had to choose how to allocate this new income. They could either invest it back into the farm, or consume it directly. We estimate that the program boosted investment in agricultural capital, and these impacts are everywhere significantly greater than zero. Somewhat surprisingly, the estimated average increase in per-capita consumption (a proxy for household living standards) is zero, or even negative over some ranges, and is nowhere statistically significant. There is modest evidence that this apparent division of income between increased investment and increased consumption is shaped by the intra-household distribution of bargaining power and preferences as it appears that women farmers spend

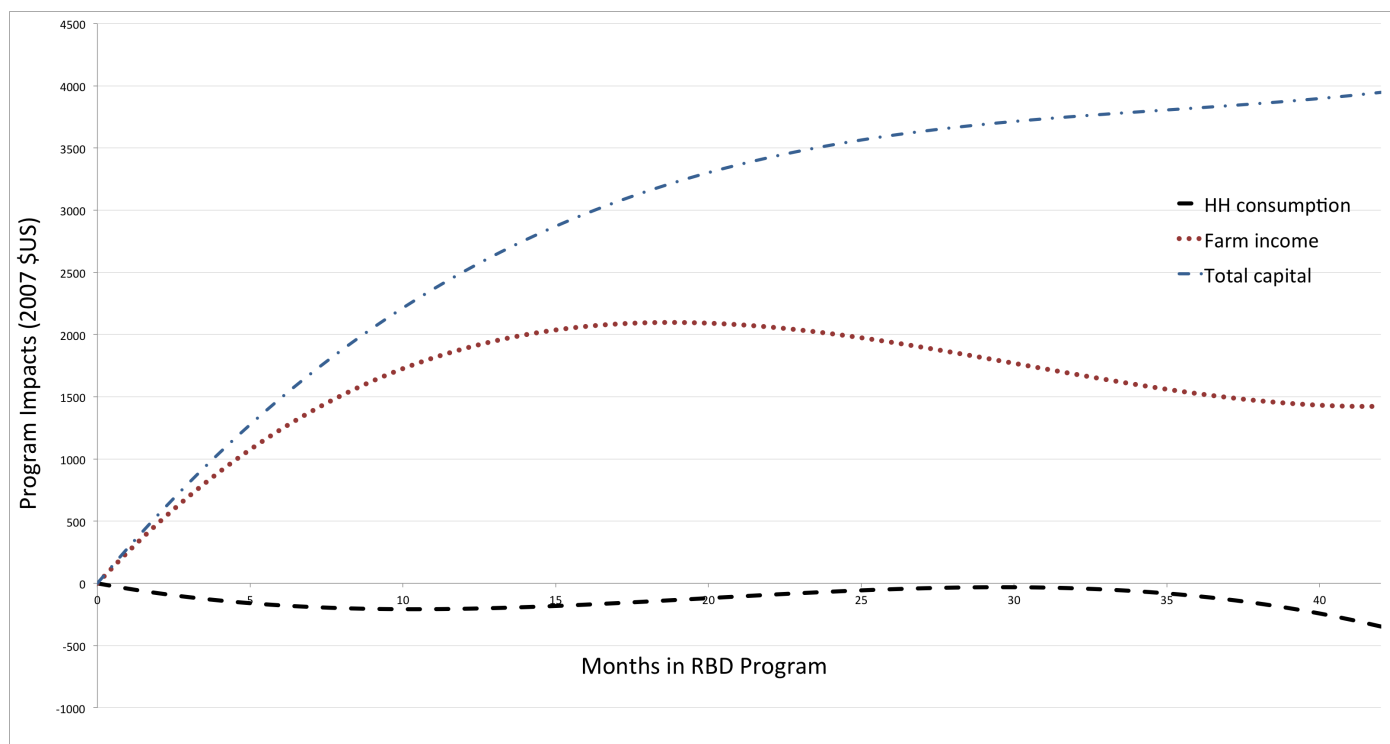
more of their incremental income boosting household living standards and less on investment than do men.

While the impacts on income in targeted activities are substantial, the spillover of this increased income into improved living standards thus appears to be modest, at least over the time frame of the evaluation. Evidence that stocks of agricultural capital increased significantly with the program is consistent with this sluggish consumption response and would seem to indicate that households face binding credit constraints and an inability to borrow in order to finance investments and smooth consumption over time.

WHO BENEFITS MOST FROM BUSINESS SERVICES?

Having examined the average impacts of the program, we now turn to the question of whether those average impacts reflect the experiences of all the beneficiaries. In other words, did the program improve the business prospects of the whole small farm population, or did it work better for a subset of producers who were better able to access capital or, perhaps, those who had better business acumen than their baseline observable characteristics (such as education) would predict? While the failure of a program to work uniformly well for all participants is in no way a condemnation of the program, it is clearly important to understand for whom and for how many families the program actually works to boost

FIGURE 2: Estimated Impacts Over Time



living standards and combat poverty. To explore this issue, we employed econometric techniques to determine the extent to which estimated average impacts are indicative of the full range of impacts experienced by program participants.

This heterogeneity analysis reveals quite striking differences in impacts across people. In general, we find that the program is much more effective for the high per-

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forming households. Indeed, the upper quantile (“high-performing”) households exhibit a 50% larger impact on their income in targeted activities. The program effects on mobile capital peak at just under \$300 for the lowest 25th percentile, around \$1,200 at the median and around \$2,000 for the 75th percentile. Towards the end of the program, however, the amount of investment in mobile capital dips substantially for the 75th percentile, dropping down to or below baseline levels. The impacts on fixed capital show investment impacts of less than \$500 for the 25th percentile and the median households, but substantial increases (\$1,200) after 20 months since program enrollment for the 75th percentile. Graphs illustrating all these results can be found in Section 5 of the [full report](#).

WERE PUBLIC FUNDS WELL SPENT?

We estimate that the average direct costs of the RBD program were \$3,194 per beneficiary. When impacts evolve, there are multiple ways to define the internal rate of return (IRR) of a program. Using the assumption that returns estimated to occur in the medium term persist in the future (a favorable assumption), we calculate an average internal rate of 18% based on the estimated im-

pacts on income.

The rates of returns for expenditure impacts are much more modest-ranging since the impacts are at best estimated to be zero. These low impacts on consumption remain something of a puzzle, as it is unclear whether it is simply a short-term phenomenon as households invested their immediate gains in productive assets, or whether it reflects impacts on total income (not just income in targeted activities) that are rather more modest than the estimates used to construct the IRRs.

IMPLICATIONS FOR FUTURE SMALL FARM PRODUCTIVITY PROGRAMS

The RBD program was an ambitious effort to target the small farm sector, integrating them into higher valued and more productive agricultural activities. With appro-



appropriate caution given to the findings on household living standards, it is fair to say that the program succeeded for many, but not all targeted households. In rough numbers, two-thirds of eligible farm families chose to participate. Of those that chose to participate, roughly three-quarters appear to have benefited, while 25 percent of participants benefited little, if at all from RBD services. The existence

of these two minority groups (those that did not participate, and those that did, but did not succeed) serves as a useful reminder that maybe not all small farms can upgrade and succeed. If the goal is to eliminate rural poverty, then this limitation needs to be kept in mind as other interventions may be needed to improve prospects for this sub-population. It may be that next generation RBD programs can reduce the size of this minority.

While the analysis was unable to identify which families failed to succeed and why, it is likely that some failures were due to the risk inherent in agriculture, but it does not appear as though less well-off farmers at baseline did worse. Efforts to incorporate insurance into small farm development strategies may have a key role to play

in allowing a greater percentage of the small farm population to succeed over a longer term.

Another explanation for the lack of success of some program participants may be because the RBD program did not include a direct credit market intervention. The overall MCC program in Ni-

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caragua operated in part on the theory that improved property registration would indirectly improve smallholder access to capital by increasing their collateral and creditworthiness. Whether or not that strategy would have worked remains an open question, as the property registration component of the program was eliminated in early 2009. (This reduced compact funding from \$175 million to \$113.5 million. While this action cut off the property regularization part of the program, the RBD Program was not affected as a result of this partial project termination.) What is clear is that the pattern of increasing income, but sluggish changes in living standards (and perhaps a small initial drop in household living standards), may signal the existence of capital constraints as income increases are soaked up to self-finance future fixed and working capital investments.

Looking forward, this evaluation suggests at least two outstanding questions about the Nicaraguan program itself. First, will the realized gains sustain themselves over time? Second, will household living standards eventually catch up with the estimated income gains? In principle at least, both questions could be addressed with an

additional round of data and further reliance on the continuous treatment estimates used in this study.

Finally, an important conclusion from this evaluation is that there are positive returns to programs that invest in small-farm productivity, and that programs like this one are worth considering as part of a broader development strategy.

FURTHER READING

Carter, M.R., P.E. Toledo and E.Tjernstrom. 2012. "The impact of rural business services on the economic well-being of small farmers in Nicaragua – Final Evaluation Report" URL: <http://www.mcc.gov/documents/reports/report-102012-evaluation-nic-rural-business-development.pdf>

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Carter, M.R., P.E. Toledo and E.Tjernstrom. 2012. "Investing in Small-Farm Productivity: Impact Dynamics and Heterogeneity in Nicaragua". Working paper

Carter, M.R., P.E. Toledo and E.Tjernstrom. 2012. "Lessons from the design and implementation of a field experiment to evaluate a rural business program in Nicaragua" Working paper

Additional documents can be found at www.data.mcc.gov.



B A S I S

The BASIS AMA Innovation Lab is a virtual institute hosted at the University of California Davis comprised of researchers from around the globe that aims to improve the agricultural competitiveness and quality of life of the rural poor in the developing world through policy-relevant research that is dedicated to improving access to resources and enhancing the operation of markets.



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