The Impact of USAID Investment on Sustainable Poverty Reduction among Rwandan Smallholder Coffee Producers: A Synthesis of Findings

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Introduction

This document synthesizes two studies that assesses the impact of the USAID supported PEARL/SPREAD coffee interventions in support of the Government of Rwanda policy to transform all Rwandan coffee into high-quality, high-value products and thereby increase the incomes of and reduce poverty among smallholders. USAID/Rwanda began supporting the development of the coffee value chain in 2000 through the Partnership for Enhancing Agriculture in Rwanda through Linkages (PEARL I, 2000-2003 and PEARL II, 2003-2005) projects, and continued this support under the Sustaining Partnerships to Enhance Rural Enterprise and Agribusiness Development (SPREAD, 2006-2011) project. These projects emphasize a value-chain approach to promote the development of high-value markets with the potential to increase the incomes and well-being of farmers and others involved in the value chain, with a strong emphasis on the coffee value chain.

The studies' objectives were:

- To determine if the USAID-supported interventions in the coffee value chain have increased incomes and reduced poverty among smallholder coffee growers.
- To ascertain whether it is possible to determine if there is a 'tipping point' in the coffee value chain, beyond which sustainable improvements are led by the private sector and donors can begin to exit from the sector, and if so to ascertain whether the Rwandan coffee sector has reached this tipping point.

The two studies were jointly designed to focus on different aspects of the Rwanda coffee sector using different methods. One study used value chain methods to focus on the sustainability of ongoing improvements in the coffee value chain led by the private sector, determining the impacts of and private-sector responses to the intervention at each level of the value chain, while also informing poverty reduction issues. The other study focused on quantifying income changes and poverty reduction attributable to the USAID interventions using statistical and econometric analyses, while also informing the sustainability question. The studies were conducted during the Fall of 2010 and the Spring of 2011 by faculty of the National University of Rwanda with technical assistance from faculty at Michigan State University and the University of Florida.

The current document synthesizes evidence and findings from these two studies and draws conclusions about the relative success of prior investment and the potential success of continued investment. The document proceeds with brief descriptions of the USAID-supported projects, and the study methods. A results section presents evidence from the two original studies. The final section draws conclusions about investment impact and self-sustainability.

The PEARL and SPREAD Projects

The key innovation in PEARL I was the institution of a fully washed coffee (FWC) value chain. In order to qualify as FWC, coffee must be washed in a coffee washing station (CWS). PEARL I provided assistance to coffee cooperatives in cooperative formation, business plan development, credit negotiations, agronomy, CWS construction, coffee processing, Fair Trade certification, cupping and marketing. Starting in February 2001, the PEARL project started a pilot growers' association based in the Maraba District of Butare Province with the objective of

producing specialty coffee. The Maraba cooperative pilot project was a success in that it penetrated the high-priced competitive American specialty coffee market and gained significant recognition in the U.K. and the world through the sale of Maraba coffee in over 350 Sainsbury supermarkets. Introduction of the FWC value chain enabled Rwanda to participate in the high-quality coffee market, and thereby earn quality-based premiums for smallholder producers.

Following on the success of the Maraba cooperative, PEARL II emphasized the establishment of producer cooperatives and CWS. The number of CWS increased from 2 in 2000 to 54 in 2005 to 187 in 2010, located mostly along roads in the higher-production coffee areas (Figure 1). Consequently, the FWC value chain has grown from exporting 32 mt of coffee in 2002 to 5800 mt in 2010, representing 29% of Rwandan coffee exports.

Following the success of the PEARL projects, SPREAD continued to invest in the FWC coffee chain. Emphasis switched from the establishment of cooperatives and CWSs to developing a comprehensive CWS support and quality control system. SPREAD also helped the cooperatives establish their own export business, the Rwanda Smallholder Specialty Coffee Company (RWASHOSCCO), which directly links smallholder cooperatives to international buyers. SPREAD introduced the Golden Cup coffee competition to Rwanda in 2007, the country's first coffee contest, replicating the standards, protocols, and progression of a Cup of Excellence (CoE) competition and demonstrating that Rwanda had both the coffee quality and information system to hold a CoE competition. Working with coffee-sector stakeholders and CoE executives, in 2008 SPREAD managed to bring a CoE competition to Rwanda. This was the first coffee quality competition ever held in Africa. After a successful initial competition, the second CoE competition was held in 2010, ending in an internet auction on October 14. Out of the 154 lots that entered the competition, 22 lots were rated 84 or higher and auctioned on the internet; the highest-rated lot earned a bid of $ 23.61/lb, and total revenue generated from the internet auction was $432,926.91 (OCIR Café website).

Methods

The studies were carried out in the areas defined by nine CWSs, and included their linkages throughout the value chain. The nine study areas were selected so that five CWSs were cooperatively owned and four had private owners, representing both washing stations set up by PEARL/SPREAD and those constructed by for-profit firms, and each of Rwanda's four rural regions were represented.

The value chain study included a literature review and discussions with key informants. The study mobilized in total 86 coffee growers, comprising 60 men and 26 women, who discussed coffee revenues and poverty reduction; 3 inputs suppliers who discussed the sale and distribution of inputs in Rwanda; 5 private CWS owners and 4 managers and 18 Directors of coffee cooperatives who discussed coffee markets and coffee quality stability; 2 representatives of US coffee importers and 4 coffee exporters and owners of dry mills who described contracts and coffee shipments; 5 bank agents who talked about loan access; and 3 staff of the Rwanda Coffee Authority and 3 staff of SPREAD project who described challenges and opportunities in the Rwandan coffee value chain. Data including wholesale and retail prices, various quality ratings, and buyer information were collected from 11 international coffee buyers by phone and email.

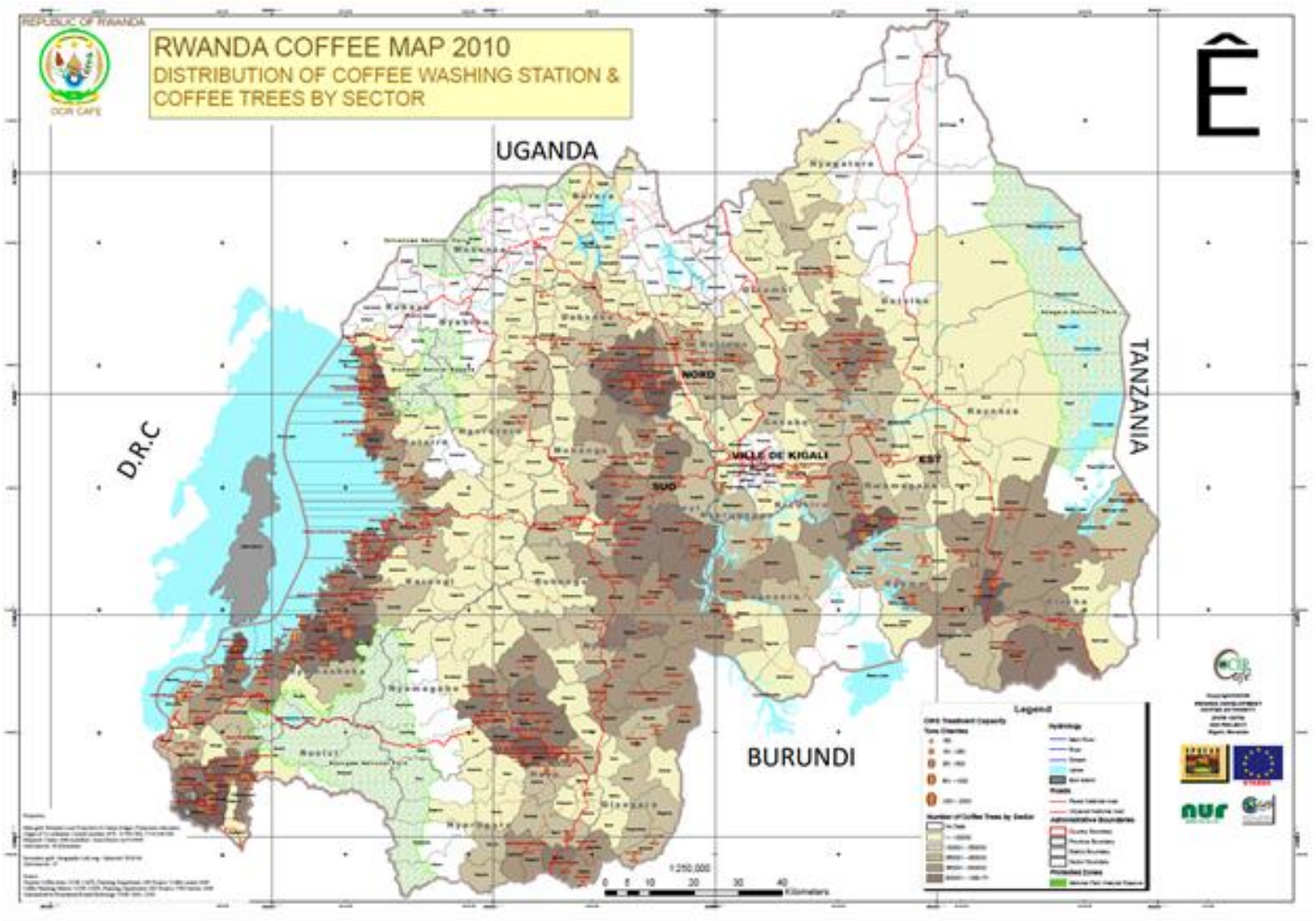

Figure 1. Locations of Coffee Washing Stations and Distribution of Coffee Trees.

Source: OCIR-Café

The poverty analysis study used quasi-experimental methods applied to the nine sample areas used in the value chain analysis. Data sources included household data from the National Statistics Institute of Rwanda (NSIR) 2000 and 2005 national surveys, and primary data collection in the nine study areas to obtain comparable 2010 data. The primary data collection used specific questions on household demographics and expenditures taken from the 2005 and 2010 (data not yet available) NSIR economic and income sections of the national surveys, and were approved by the National Ethics Committee (IRB).

Because the NSIR sample boundaries differ from the CWS member areas, the nine CWS-based sample areas were subdivided into 17 statistical areas. Statistical and econometric analyses applied to these 17 areas focused on the difference-in-difference approach, examining changes in income and poverty status over time among smallholders linked to CWSs (the treatment group) compared to changes in income and poverty status over time among smallholders not linked to CWSs (the comparison group).

Results

Qualitative Results on the Self-Sustainability of the FWC Value Chain

The question of sustainability arose because of increases in the number of cooperatively and privately owned CWSs from 2005 to 2010 despite minimal direct support for CWS creation by SPREAD. Indeed, the emergence of the FWC value chain has had enormous impact on the lives of participating smallholders. However, investigation into CWS creation and other nodes of the FWC value chain revealed that sustainability has not yet been reached.

At the input supply node, the key sustainability issue is the lack of agricultural chemical supply, including fertilizers and pesticides, and a lack of both credit to purchase these inputs and smallholder repayment of credit when it has been available in the past. Chemical inputs are the key to increasing physical productivity of coffee smallholders, and most importantly to continued improvement in the quality of smallholder coffee beans. Credit to expand coffee farms is often available through the financial/banking industry for smallholders willing and able to use physical capital (land or trees) as collateral, although land ownership rights are not fully established. Smallholder investment in coffee trees was sustainable as long as the EU was subsidizing distribution of seedlings; evolution of this program to a *de facto* public-private partnership requires nurturing to become self-sustaining. CWS creation where infrastructure exists is likely sustainable; lack of local transport and water infrastructure constrains CWS creation in remote areas and thus limits self-sustaining increases in CWS coverage areas. I.e., in terms of both number and processing capacity, CWSs tend to be located near principal or secondary roads (Figure 1) and in localities with larger numbers of coffee trees. There is a bi-directional causality between CWS location and number of coffee trees. However, many CWSs were built in anticipation of yield increases and currently are operating at less than full capacity. Farmer cooperatives are new, usually created for the purpose of constructing a CWS, typically have inexperienced management, and have little managerial capacity to expand into providing additional support to smallholders in needed areas such as input distribution, smallholder credit, soliciting research, and limited ability to conduct extension or marketing. Increased utilization of existing CWS capacity in accessible areas is a key to sustainability of the current value chain.

The implication is that despite enormous progress to date, continued growth is needed before the FWC value chain becomes self-sustaining. Indicators of continued growth include increased physical productivity, increased production of premium coffees, high capacity utilization in existing CWS through increased yields, and improved access by smallholder in remote areas to CWS, and growth in the number of international buyers. Continued investment is needed, particularly in developing institutions related to input distribution and research, strengthening cooperatives, and in improving transport and water infrastructure in remote areas.

Table 1. Current Sustainability Status in the Rwanda Fully Washed Coffee Value Chain

Value Chain Node	Sustainability Tipping Point	Current Status/Issues
Input Supply	Sustainable supply of fertilizers and pesticides	OCIR-café experimenting with supply schemes, unsuccessfully to date; lack of private-sector suppliers, credit, farmer repayment of credit
Smallholders	Investment in coffee trees	EU distribution program turned over to Government, small farm sizes limit growth potential
Washing Stations	Private-sector and cooperative investment and construction	Good where transport and water infrastructure exists
Famer Cooperatives (CWS owners)	Self-sustaining finance; ability to accept loans; ability to facilitate input distribution to farmers.	The Rwanda Smallholders Coffee Cooperative Organization (RWASHOSCCO) is emerging as a super-structure and support organization for cooperatives
Buyers/Exporters	Sustained relationships with buyers; consistent and dependable supply of quality coffees in container-size lots; efficient transport.	Emerging relationships, coffee quality improving. Nurturing of both relationships and quality necessary for sustainability through institutions such as RWASHOSCCO. Continued innovation needed to meet emerging organic, shade-grown, and other specialty market criteria. Cooperatives produce small lots of premium coffee; landlocked status requires regional approach to improved transport infrastructure
Production and Value Chain Research	Limited amount conducted by SPREAD; public-private partnership needed	Inchoate private- and public-sector coffee and value chain research institutions, with the exception of cupping laboratories.
Source: Synthesized from Bihogo et al., 2011.		

A Key Quantitative Result Related to Sustainability

One quantitative result provided key information related to sustainability. The price premium received by Rwanda coffee relative to international C coffee prices was negative in the 1990s, indicating substandard quality; was essentially 0 in 2002, indicating commodity-quality coffee; and increased to 68% in 2009, indicating that Rwanda coffee was earning a quality premium.

Qualitative Results on Income Increases and Poverty Reduction

As part of the discussions in the value chain study, key informants were asked to construct a subjective ranking of smallholder poverty status and livelihood situation, and to relate this status to the number of coffee trees owned specifically for smallholders involved in coffee production. The informants described five different income categories, ranging from 'deprived' to 'rich' (Table 2). Associated with each category were various livelihood measures, such as ability to build a house, send children to school, or access health insurance. Also associated with each category were numbers of coffee trees owned and estimated revenues from coffee production. In this classification, farmers owning 500 or fewer coffee trees were 'deprived', 'poor', or 'less poor'; farmers with 501 or more coffee trees were able to escape the subjective classifications of impoverished and invest in their children or in physical assets.

Table 2. Coffee Farm Size and Subjective Livelihood Status of Farm Owner

Farm Category	Estimated revenues/ Year (RWF)	Properties that may be acquired by the coffee farmer	Poverty Status
<= 100 coffee trees	< =49,000	❖ He/She can buy a rabbit or a chicken ❖ He/She can buy a goat ❖ He/She can afford a health insurance ❖ He/She cannot send a child to high school ❖ He/She cannot buy a cow ❖ He/She cannot build a house	Deprived
101-300 Coffee trees	49,001-126,000	❖ Coffee trees can be given as a collateral in the bank ❖ He/She can buy a cow under a bank loan ❖ He/She can buy a bicycle ❖ He/She can send one child to high school	Poor
301-500 Coffee trees	126,001-224,000	❖ Coffee trees can be given as a collateral in the bank ❖ He/She can buy a cow under a bank loan ❖ He/She can buy a bicycle ❖ He/She can send two children to school	Less poor
501-800 Coffee trees	224,001-448,000	❖ He/She can apply for a loan ❖ He/She can buy a cow ❖ He/She can buy another piece of land ❖ He/She can build a decent house	Less rich
1000+ Coffee trees (½ to ¾ ha)	>448,000 (> $ 750)	❖ He/She can apply for a loan ❖ He/She can buy a cow, another piece of land, a motorcycle or a car. ❖ He/She can send children to school ❖ He/She can build a nice house ❖ He/She can invest in other projects	Rich

Source: Bihogo et al., 2011 [1], based on 2010 Rwanda coffee prices.

With continued increases in international and Rwandan coffee prices in 2011, even more smallholders are expected to escape poverty and generate the ability for further investment in productive assets.

The importance of increasing the number of coffee trees owned was seen in a case study of 11 coffee farmers (key informants) who were asked for specific information about their coffee tree holdings in 2000 and 2010 (Table 3). Ten of the 11 smallholders increased the number of coffee trees they owned, and 9 of 11 reported sufficient accumulation of trees to improve their subjective poverty status per Table 2. Two of the 11 escaped poverty by moving into the 'less rich' category.

Table 3. Number of Coffee Trees Owned and Poverty Status, 2000 and 2010, Case Study of 11 Smallholders

2000		2010	
Number of Trees	Subjective Poverty Status	Number of Trees	Subjective Poverty Status
0	Deprived	101	Poor
400	Less Poor	600	Less Rich
0	Deprived	150	Poor
300	Poor	500	Less Poor
300	Poor	600	Less Rich
200	Poor	320	Less Poor
250	Poor	350	Less Poor
200	Poor	200	Poor
100	Deprived	400	Less Poor
100	Deprived	200	Poor
200	Poor	300	Poor

Source: Bihogo et al., 2011 [1]

An important consideration is land constraints that affect smallholder ability to increase their ownership of trees. Rwanda is the most densely populated country in sub-Saharan Africa, with average farm sizes of 1/2 ha [2]. This is barely enough to grow 1000 coffee trees; the need for subsistence production reduces the amount available for coffee. Therefore it will be important to increase the physical productivity of existing coffee trees and land while continuing to improve coffee quality.

Quantitative Results on Income and Poverty

Income

The basic difference-in-difference comparison is illustrated using income data for the Remera district (in 2000 part of the Kigali district) (Table 4). In 2000 the Remera treatment group smallholders had a mean income of 204,889 RWF; in 2010 their mean income was 1,487.523 RWF. This results in a difference over time in income of 1,282,634 RWF (approximately $2,500 at current exchange rates). However, not all of this income increase is attributable to the USAID programs, since other forces were increasing incomes throughout Rwanda. To control for these other forces, a comparison group of smallholders in Remera who did participate in the FWC value chain was created. In 2000 the Remera comparison-group smallholders had a mean income of 101,100 RWF (the differences between groups in 2000 will be addressed in the poverty section); in 2010 their mean income was 317,929 RWF. This results in a comparison group difference over time in income of 216,829 RWF. The comparison group increase in income over time is an estimate of what the increase in the treatment group income would have been, in the absence of the program. The program impact is thus the difference over time in the treatment income less the difference over time in the comparison group income, or the DiD calculation of 1,065,805 RWF. In other words, the USAID supported programs increased average smallholder incomes in Remera by an average of 1,065,805 RWF or $1,776 at current exchange rates.

Table 4. Income Difference-in-Difference Calculations, Remera District

		Treatment Group Income	Comparison Group Income	
2000		204,889 RWF	101,100 RWF	
2010		1,487.523 RWF	317,929 RWF	
		Difference over time (2010-2000) 1,282,634 RWF	**Difference over time (2010-2000)** 216,829 RWF	
		Difference in Difference 1,065,805 RWF (~ $1,776 at current exchange rates)		
N=91 Source: Moss et al. , 2011				

DiD calculations for all study districts gave a range of DiD income changes from -1.4% in Gasaka to 211.3% in Kageyo (Table 2). That is, in Gasaka the incomes of participating smallholders (the treatment group) increased by 1.4% less than did the incomes of non-participating smallholders (the comparison group); in Kageyo the mean treatment group income increased more than 3 times as much as the mean comparison group income. The negative change in Gasaka was explained by the introduction of a mining activity in the area, which greatly increased the opportunity for remunerative employment as unskilled labor in the mine. Excluding Gasaka, all income differentials were positive. Of the 17 areas, 14 showed FWC-participating smallholder mean incomes increases 1/3 higher or more relative to non-participant income increases; five of the areas showed participants' mean incomes at least twice the mean incomes of non-participants. A Wilcoxon signed rank test provided a statistical test of the hypothesis that the DiD income changes are randomly distributed (i.e. no difference between treatment and control). The test results ($Z=3,702$, $p<0.001$) rejected the hypothesis, leading to the conclusion that there were statistically significant differences in income growth rates between the treatment and comparison groups over the 2000 to 2010 period.

The pace of income growth increased over the sample time frame. For the entire sample (all localities), from 2000 to 2005 treatment group incomes grew 27% faster than comparison group incomes; from 2000 to 2010 treatment group incomes grew 82% faster than comparison group incomes.

Table 5. Income Differentials, FWC Participants v Non-Particpants, in the 17 Study Areas

Statistical Area	Number of Respondents	Income DiD, (Treatment v. Comparison, 2000 v 2010) RWF	Percent Difference
COKO	46	11,081	3.8%
CYANIKA	50	129,940	41.9%
GASAKA	44	-57,854	-1.4%
GASHONGA	45	468,251	61.8%
KAGEYO	49	2,315,193	211.3%
KAMEGERI	40	459,873	166.8%
KARAMA	18	716,924	100.1%
KIBUMBWE	47	297,334	83.9%
KILIMBI	84	1,144,252	148.4%
MARABA	38	329,281	62.0%
MUHONDO	42	170,772	36.4%
MUHURA	51	5,664	1.4%
NZAHAHA	48	284,748	68.9%
REMERA	91	1,169,594	154.3%
RULI	46	186,459	35.4%
RUSHASHI	53	194,529	38.4%
SIMBI	16	337,946	67.7%

Source: Moss et al., 2011[3] .

Poverty

A simple comparison of 2010 poverty rates among the treatment and control revealed a poverty rate of 82% in the comparison group and 65% in the treatment group (Figure 2). Since the two groups started with the same poverty rates in 2000, this 17% difference is in fact equal to the DiD estimate of the effects of SPREAD on poverty.

Before drawing quantitative conclusions about the impact of the USAID-supported programs on poverty reduction, and because smallholder participation in the FWC is not random, it is important to control for the possibility of non-random differences between treatment and comparison groups that may affect poverty rates. Even though poverty rates in the sample treatment and comparison groups were the same for both treatment and control groups, there may be other differences between groups such as

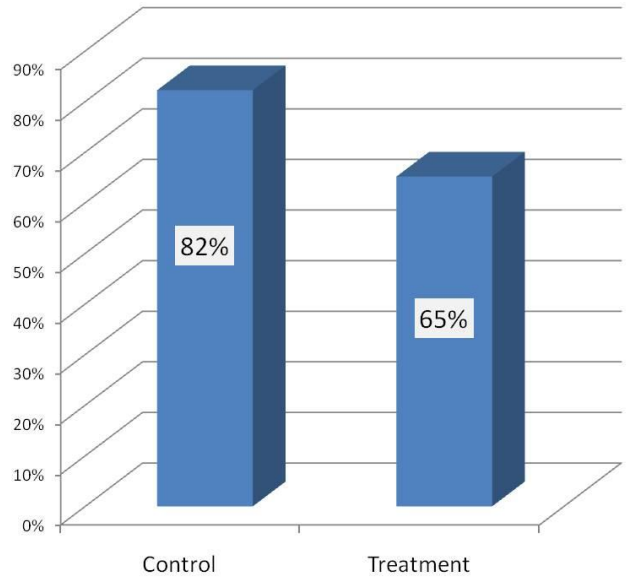

Figure 2. 2010 Headcount Poverty Rates, Comparison and Treatment Groups

the initial income difference in the Remera subgroups that potentially affect the emergence from poverty. It is important to control for these potential effects so as not to attribute these effects to the USAID programs. Econometric analysis was applied to the household income data to control for group-specific factors that potentially influence income growth, including gender, education, household size and access to health and transportation service. Logistic regression was applied to analyze the change in poverty rate over the period 2005 to 2010 as a function of treatment and other group-specific factors; the period 2000 to 2010 was not analyzed due to limited availability of group-specific data in 2000. Because logistic regression coefficients are non-linearly related to the dependent variable, impact factors showing the marginal effect of a change in the explanatory variable on the poverty rate are also presented (Table 6). The coefficient on the 'treatment' variable was an econometric estimate of the DiD measure of poverty reduction. Between 2005 and 2010 the treatment effect was to reduce poverty by 14.3 percentage points. The effect was statistically significant at the 1% level.

The DiD measures of poverty reduction of 17 points from 2000 to 2010 and 14.3 points 2005 to 2010 represented the empirical quantified impacts of the USAID-supported programs on poverty reduction. The more rapid pace of poverty reduction from 2005 to 2010 was consistent with the empirical analysis of the income change, and with descriptions of coffee sector growth such as [1].

The increased impact of the programs on income and poverty in the second five years is typical and expected. To accomplish movement in macro-level indicators of complex phenomena such as poverty or hunger requires a strong and sustained commitment to effective programming. Even effective programs involve a certain amount of start-up time before their outcomes are widely achieved, and

additional time is required before outcomes translate into measurable change in incomes and poverty. The Rwanda coffee sector is a perfect example: CWSs take time to plan, finance, and construct; smallholders take time to change their behavior in response to the CWS; and coffee trees take time to grow and mature; and given the extremely impoverished initial status of most smallholders, emergence from poverty takes time. The limited reduction in poverty during the 2005-2010 period is thus expected; in this context the strong reduction in poverty during the 2005-2010 period is even more notable.

Program Efficiency

Program efficiency was measured by the cost per household climbing out of poverty. Two similar calculations are cited for comparative purposes: Thirtle, Lin and Piese have estimated that agricultural research and development helps African smallholders emerge from poverty at a cost of about $144/person; agricultural R&D has been the most economically successful investment available in the past [4]. Oehmke et al. calculated the cost efficiency of a highly successful USAID/Kenya dairy program to be $172/household/year over a six year period [5].

The USAID program efficiency calculation was based on the PEARL/SPREAD program costs, even though there were other programs affecting the FWC value chain, such as the EU support for distribution of seedlings through OCIR-café. In other words, the results are indicative of USAID project efficiency conditional on the existing programs.

Based on a population of 394,000 smallholders, 29% of whom participate in the FWC value chain [6], just over 114 thousand smallholder coffee farmers were beneficiaries of the development of the FWC value chain. Based on the econometric estimate of a 14.3 percentage point reduction in poverty among the sample FWC smallholders that is attributable to the PEARL/SPREAD programs (Table 6), 16,339 smallholders were able to climb out of poverty due to participation in the FWC value chain.

The cost of the PEARL/SPREAD projects was approximately $10 million over the ten-year period 2000 to 2010 [7]. Dividing by the estimated number of smallholders climbing out of poverty gives an efficiency ratio of $612/household (total over the ten-year project period). On a 'per household' basis, the efficiency of the Rwanda projects is broadly comparable to the efficiency of successful investments in agricultural R&D; it is about 40% more efficient than in the Kenya dairy sector.

Interpretations and Conclusions

The general interpretation of the analytical results is that the development process among Rwanda smallholders matches the pattern of increased asset productivity followed by accumulation of the productive assets. The establishment of CWSs and the FWC value chain increased the value-productivity of the coffee trees and land. The Rwanda coffee smallholder households that emerged from poverty did so through the accumulation of higher-productivity land and coffee trees that could be used for high-quality coffee production, although some human capital accumulation was also required to improve coffee quality. It is important to note that physical productivity remained at low levels during the sample period; economic productivity increased because of the higher quality and hence higher value of the output.

Table 6. Difference-in-Difference Analysis of USAID Impact on Smallholder Poverty

Coefficient	Parameter (absolute t-stat.)	Marginal Impact on Poverty Rate (% points)
Constant	-0.65743*	
	(0.45120)	
Treatment (USAID impact)	-0.88410***	-14.3
	(0.18418)	
Household Size	-0.14984***	1.7
	(0.03398)	
Sex of HHD	-0.60858**	-9.3
	(0.26431)	
Distance to Market	-0.00116**	0.0
	(0.00050)	
Distance to School	0.00913***	0.2
	(0.00136)	
Distance to Health Center	-0.00421***	0.0
	(0.00075)	
Reads	0.34343	-9.9
	(0.37532)	
Education-completed primary school	0.38563*	-2.2
	(0.27526)	
Education-completed technical school	1.09290	-18.3
	(1.07696)	
Education-completed secondary school	0.83535	-8.5
	(1.55136)	

*, **, and *** denote significance at the 10, 5 and 1% levels, respectively.

Source: Moss et al 2001.

The evidence presented leads to the conclusion that the USAID programs have had a significant and cost-effective impact on smallholder income increases and poverty reduction. Moreover, the impact of the FWC on smallholder poverty is accelerating. An important caveat is that the EU subsidization of seedlings is likely a critical complementary investment, without which the poverty reduction would be occurring at a much slower rate. Nonetheless, it would be unsurprising if poverty reduction was even more rapid in the next five years, given continued successful investment in the sector.

An important lesson learned is that increased asset productivity is not determined solely by the physical productivity of the asset. In the case of Rwanda, improvements in coffee quality coupled with rising international coffee prices and an existing international quality premium sufficed to raise the revenues generated per coffee tree, i.e. they raised the economic (or value) productivity of coffee trees that are

the key asset in coffee production. However, increased physical productivity is necessary for continued and self-sustaining poverty reduction.

There are three key issues and conclusions related to sustainability and future investment. The first issue is whether the FWC value chain as it currently stands is self-sustaining. The conclusion is probably not, for a variety of reasons including private sector involvement that is conditional on meeting expectations of continued improvement in quality and quantity, land constraints that make it increasingly difficult to increase production through increases in the number of trees, etc. The second issue is whether there are supporting institutions in Rwanda sufficient to nurture self-sustainability in the FWC value chain, such as research and input distribution to overcome low yields. The answer is clearly no, not yet: further work is needed to develop the existing FWC value chain and supporting investments. The third issue centers on scalability: with existing structures, can the FWC value chain be extended throughout most or all of Rwanda? The answer is not completely. Both emergent cooperatives and the private sector have shown the ability to invest in CWSs, but these CWSs tend to be located near primary or secondary roads, and near local water sources, and in districts that have large numbers of coffee trees (for proximity to roads see Figure 1); local water source information from key informants). Improvements in transport infrastructure and water access will be important to increasing the scalability of the FWC value chain.

Finally, the evidence supports the proposition that further investment in the Rwanda FWC value chain under Feed the Future or other funding mechanisms has strong potential for continued, cost-effective, poverty reduction. Corroborative evidence includes qualitative evidence about the potential for expanding the FWC value chain to a greater number of farmers; qualitative and quantitative evidence about the potential for continued income increases among poor smallholders currently participating in the FWC value chain, especially through improved input supply and increased physical productivity; and statistical evidence of the successful poverty reduction under SPREAD and an increasing pace of poverty reduction in the past five years relative to the 2000-2005 period and relative to non-participant poverty rates.

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