

CARE

**Promoting Opportunities for Women's
Economic Empowerment Project**

Endline Analysis of Effects of Linkage



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Executive Summary

This report contains an endline analysis of CARE's POWER/PROFIR (Promoting Opportunities for Women's Economic Empowerment) project on the financial health of village savings and loans groups in Cote d'Ivoire and Rwanda. The project is collaboration between CARE Canada, Access Africa, and MasterCard Foundation. CARE International is one of the world's leading organizations in the promotion of Village Savings and Loan Associations (VSLAs) in Africa, reaching more than 3.5 million people in 26 countries.

CARE's POWER Africa project aims to determine the relative benefit of formal financial linkages for savings groups, households and individuals, and banks in Burundi, Ethiopia, Côte d'Ivoire, and Rwanda. However, this report only focuses on the two latter countries. For Rwanda, CARE's POWER project is called PROFIR (Promoting Financial Inclusion in Rwanda).

POWER Africa /PROFIR is based on the VSLA approach as a means to provide access to valuable financial services and build a pathway towards formal financial inclusion for poor households in rural areas. VSLAs builds the financial skills and assets of participating households by providing access to a safe, convenient place to save and small timely loans. VSLA also provides the necessary opportunities and knowledge for members to use formal financial service providers.

The key measures of the effects of linkage that are assess in this study are (1) Standardized return on savings (ROS), (2) Standardized return on assets (ROA), (3) Savings per member, (4) bank balances, (5) bank account usage, and (6) Adoption of individual bank accounts. These indicators measure the outcomes of the project along key dimensions of POWER Africa/PROFIR's objectives of building financial capacity for all clients and decreasing gender gaps in access to and control of financial skills, assets, and services. We also look at how group characteristics like the proportion of women members, attendance, access to credit, and proximity to financial service providers interact with linkage status to affect groups' outcomes.

Information on these indicators comes from partner service providers' administrative data for groups both linked and unlinked to formal financial service providers. We use propensity score matching to match linked groups with similar unlinked groups to better isolate the effect of linkage.

We find that returns on savings, return on assets, and savings per member has steadily increased over the duration of the project for linked and unlinked group in both countries. Furthermore, groups with more than 70% women and an attendance rate above 85% tend to outperform groups who fall short of these thresholds. Access to credit does not substantially affect performance along these measures.

Linked groups are achieving higher returns than unlinked groups and these returns are increasing at a faster pace. By the endline of the project, in Rwanda, a typical linked group will earn approximately \$25.15 USD more per member than a typical unlinked group. In Cote

d'Ivoire, a typical linked group will earn \$12.65 USD more per member than a comparable unlinked group.

In general, when looking at the economic outcomes, the groups in Rwanda are highly influenced by group characteristics and contextual factors while groups in Cote d'Ivoire are much less variable based on group characteristics.

Savings per member has steadily increased over the course of the project In Rwanda, linked groups have increased their saving per member by \$5 USD per member. This is an increase of 38%. The unlinked groups in Rwanda have also had an increase of \$6 USD per person. Since these unlinked groups have a lower initial level, this is an increase of 70% - basically double the increase of the linked groups. In Côte d'Ivoire linked groups increased their savings per member by \$2 USD and unlinked groups increased by \$2.4 USD.

The overall average bank balances of the groups in both countries are steadily rising over the course of linkage. The value of the project portfolio is consistently growing. However, this is not necessarily true for typical individual groups. There is quite a bit of fluctuation in terms of the typical bank account balances over the course of the project.

The bank balance amount is most strongly predicted by group gender composition and the group level of within-group savings.

Whether or not a bank account becomes dormant is a key indicator of long-term potential impacts of linking a group. Dormancy rates in both countries are predicted by the gender composition of the group, the distance to the bank, and the attendance rate of the group. Dormancy rates are not linked to the general level of savings of the group or the age of the group.

This seems to indicate that groups with many women are more likely to keep their accounts in good standing but that this effect is diminished for groups who are farther away from their banks.

For active accounts, the patterns and frequency of account usage is of interest to both the CARE project team as well as the financial service providers. Our findings show that account usage is driven by the age of the group, the gender composition of the group and the overall savings level of the group.

Finally, we look at the potential impacts of mobile money, we find important trends. Groups with more access to mobile money tend to have more savings – both within the savings group itself and within the bank account. Access to mobile money has an especially strong impact on groups who are quite distance, usually over 20 kilometers from their bank and have a high proportion of women.

Introduction

The POWER project - Promoting Opportunities for Women's Economic Empowerment – is a multi-country financial inclusions project designed to promote opportunities for women's economic empowerment in rural Africa. The project is collaboration between CARE Canada, Access Africa, and the MasterCard Foundation.

Three of the countries in the four-country project – Rwanda, Côte d'Ivoire, and Burundi are currently including linkage of VSLAs to formal financial institutions in their project activities. The country teams in Rwanda and Cote d'Ivoire are partnered with formal financial institutions, mobile network operators, and SACCOs. Groups from Rwanda are linked with formal financial institutions including Vision Fund Rwanda, Umutanguha Finance, Wisigara Finance, Inkunga Finance, and Urwego Bank, and Duterimbere. The Côte d'Ivoire project is partnered with MTN, a mobile network operator for money transfer, PAMF (Aga Khan Foundation Microfinance), and ADVANS, a formal financial institution. The Burundi linkages began later than the first two countries and is not included in this assessment.

This report addresses the quantitative analysis of questions around linkage and its impacts on savings groups. The analysis is based on a combination of different data sources, primarily the quarterly MIS data collected between 2014 and 2017 and data provided by the financial service providers within the same time period.

Methods

Data

This analysis is based on two primary datasets – the Group Standardized Management Information System dataset (MIS) and account data supplied by the partner financial service providers. The report is based on MIS data from 3729 groups in Rwanda and 2394 groups in Cote d'Ivoire. The financial service provider data includes 1525 groups in Rwanda and 156 groups in Cote d'Ivoire.

Group MIS data (Standardized Management Information System). This data is at the group level and is a standard series of 24 items. These include primarily economic indicators including total amount of savings, total amount of loans, count of loans, and a few administrative indicators such as count of members, percentage of group members who are women. This data is collected across all CARE savings groups as well as across savings groups from many other organizations. MIS data is collected from both groups which are linked with banks and those that are not. This large, standardized, and diverse database allows many types of analyses.

Financial service provider data; This data is supplied to CARE as part of the bank partnership. The data provides the account balance of each group's account as well information on the group's history of savings and credit with the financial services provider. This data is provided to CARE on a periodic basis.

Statistical Models

The data being generated within the POWER/Profit project is observational data – which means that it has been collected naturally from the groups and formal financial services rather than developed as part of a randomized trial. In order to understand the true effects of the project using this type of data, specific statistical methods need to be used. We are using two methods in combination: Matching and reweighting of data.

Since the MIS database contains information about groups, their linkage status, and their financial status, this data is a valuable source of non- experimental comparison groups. It allows us to track the trajectory of a large number of groups over time in order to establish a potentially causal trajectory.

We can also use the data to match unlinked groups with similar linked groups and weight the data in order to estimate the effect of linkages.

We are able to use propensity score matching with this data to help isolate and estimate the impact of linkages. Propensity score matching has several advantages in this particular research situation. Firstly, it greatly reduces the problems with dimensionality and the likelihood that inter-group characteristics are highly correlated. Secondly, the rate of economic growth of savings groups is not linear and propensity score matching helps us to avoid the assumptions of linearity in most traditional regression.

For this model, the variables that were used in the initial propensity score model were:

- Age of group
- Gender composition of group
- Type of trainer for group
- Cash at start
- Group distance to bank
- Group distance to agent
- Number of outstanding loans
- Number of cycles

The variables used as indicators are plausible predictors of economic growth of savings groups. Because we want to induce balance on variables that are prognostic of savings group behavior, we included these variables in our initial propensity score model. An initial propensity score model was estimated using the 8 variables. To estimate the propensity score, a logistic regression model was used in which treatment status was regressed on the baseline characteristics listed above. We tested several different matching methods including nearest neighbor, optimal matching and sub classification matching. We settled on nearest neighbor

matching because it resulted in the lowest mean differences between groups. The baseline variables were statistically related to the log-odds of receipt of treatment in the initial specification of the propensity score model. The variables used as baseline indicators are plausible predictors of economic growth of savings groups.

We compared the means and prevalences of continuous and categorical baseline covariates between treatment groups in the matched sample. The standardized difference was used to quantify differences in means or prevalences between treatment groups. Furthermore, we compared balance between treatment groups in all pairwise interactions of continuous covariates. The variance of continuous variables was compared between treatment groups in the matched sample. Finally, cumulative density plots and quantile-quantile plots were used to compare the distribution of continuous baseline covariates between treatment groups.

Linked and unlinked groups were then matched on the propensity score. In the data available, there were more unlinked groups than there were linked groups. For technical reasons, when matching, a pool of controls that is at least as large as the number of treated units is ideal, so this is a good situation for the analysis. We weighted the entire dataset by the inverse probability of treatment weights derived from the propensity score.

Three outcome variables were then used in the models: Profit/Loss; Return on Savings; Return on Assets. The difference in these rates was estimated directly by estimating the differences between linked and unlinked groups in the propensity score matched sample. For the models we used linear mixed-effects models and semi-parametric spline models. Confidence intervals were constructed using the Agresti method for matched samples.

Description of core variables

Profit/Loss (Net Loans – Net Savings) – Measures whether groups are net borrowers or net savers.

Standardized Return on Savings ((Profit/Loss)/(Total Savings)) - Measures the yield the group is achieving on savings, adjusted for the age of the group and the seasonality of the data collection. Please see the Appendix A for details on these calculations.

Standardized Return on Assets ((Profit/Loss)/(Total Assets)) - Measures the income the group is recouping on assets, adjusted for the age of the group and the seasonality of the data collection. Please see the Appendix A for details on these calculations.

Percentage of Women. Groups are divided into three subsets. High proportion of women = More than 85%; Moderate proportion of women = Between 70% and 85%; Low proportion of women = Less than 70% women.

Proximity to Bank. Groups are divided into four subsets along the dimension of proximity to a bank. The groups are less than 3km away, 3-5 km away, 6-10 km away, and 11+ km away.

Group Attendance. Groups are divided into cohorts based on average group attendance rates. The cohorts are groups with less than 75% average attendance rates, 76-85% attendance rates, and above 85% attendance rates.

RESULTS

Introduction

Over the entire course of the project, we have MIS data from 12,919 groups in Rwanda and 6679 groups in Côte d'Ivoire. Overall, in Rwanda 2608 savings groups were linked by endline. In Côte d'Ivoire, 182 groups were linked.

The percentage of women in savings groups is divided into three categories and are displayed for all groups and only linked groups.

Table 1: Gender composition of all groups

Percent Women	CVI	Rwanda
Less than 70% women	25%	20%
Between 70% and 85% women	13%	53%
More than 85% women	63%	27%

Table 2: Gender composition of linked groups

Percent Women	CVI	Rwanda
Less than 70% women	30%	15%
Between 70% and 85% women	31%	58%
More than 85% women	39%	28%

Attendance rates for groups were calculated by dividing the attending members by the currently registered members. Groups are divided into cohorts based on average group attendance rates. The cohorts are groups with less than 75% average attendance rates, 76-85% attendance rates, and above 85% attendance rates.

Table 3: Attendance rates of all groups

Attendance Rates	CVI	Rwanda
Low	3%	14%
Moderate	6%	42%
High	91%	44%

Table 4: Attendance rates of linked groups

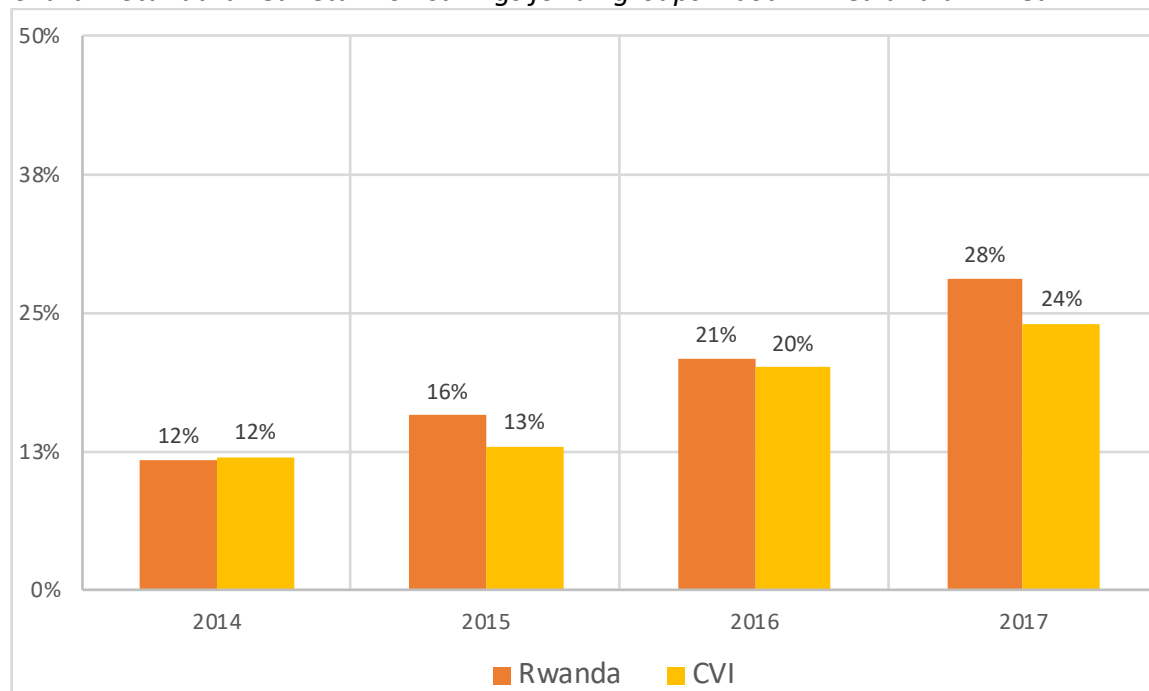
Attendance Rates	CVI	Rwanda
Low	1%	10%
Moderate	5%	51%
High	94%	39%

Return on Savings

Return on Savings (ROS) is one of the foundational economic metrics of savings groups. This metric measures the yield the group is achieving on its savings. In most common situations, this return is generated by the interest from the loans the group provides to its members. The calculation is based on the group's profits divided by its total savings during the cycle. These calculations have been standardized based on the group's age.

We look at Return on Savings (ROS) for all the groups together in Chart 1. Here we find that all groups in both countries had a gradual and steady increase in ROS over time.

Chart 1: Standardized return on savings for all groups – both linked and unlinked



Next we compare the ROS for groups within each country based on whether or not the group is linked to an external bank account. Within both countries, the linked groups have higher returns than the unlinked groups. This has been steady across the lifecycle of the project.

In Rwanda, a typical linked group will earn approximately \$25.15 USD more per member than a typical unlinked group. In Cote d'Ivoire, a typical linked group will earn \$12.65 USD more per member than a comparable unlinked group.

Chart 2: Standardized return on savings for Rwanda – comparing linked and unlinked

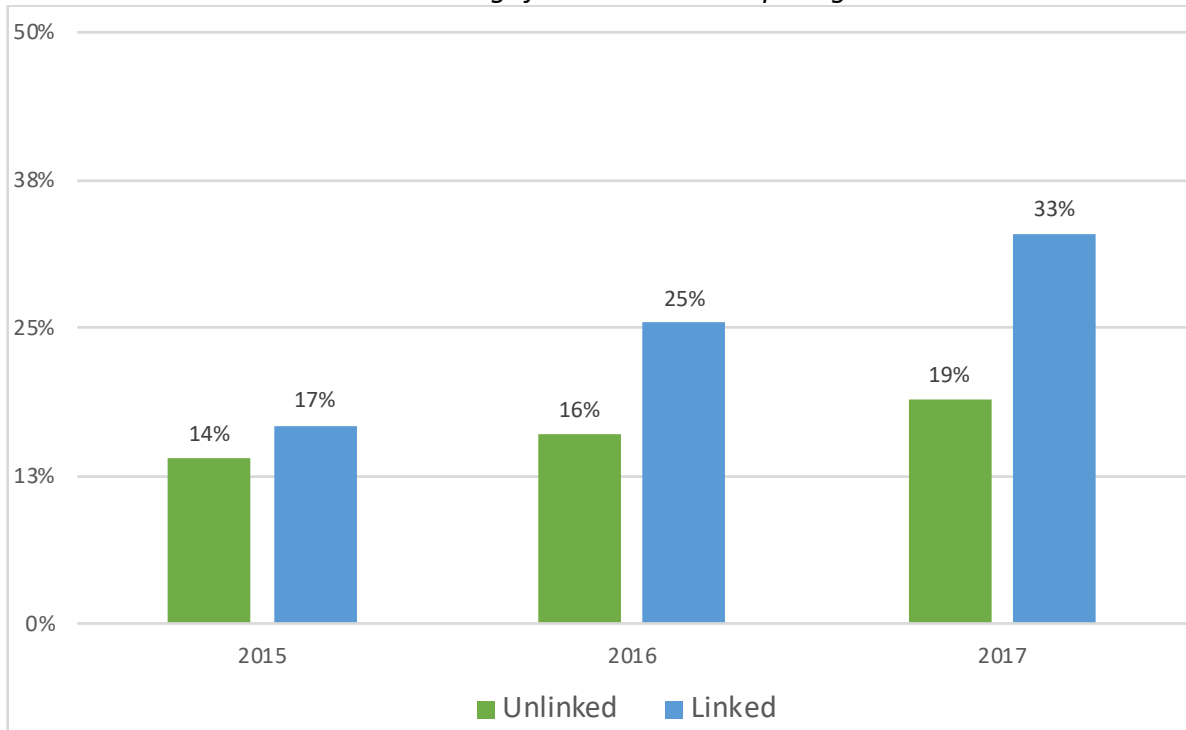
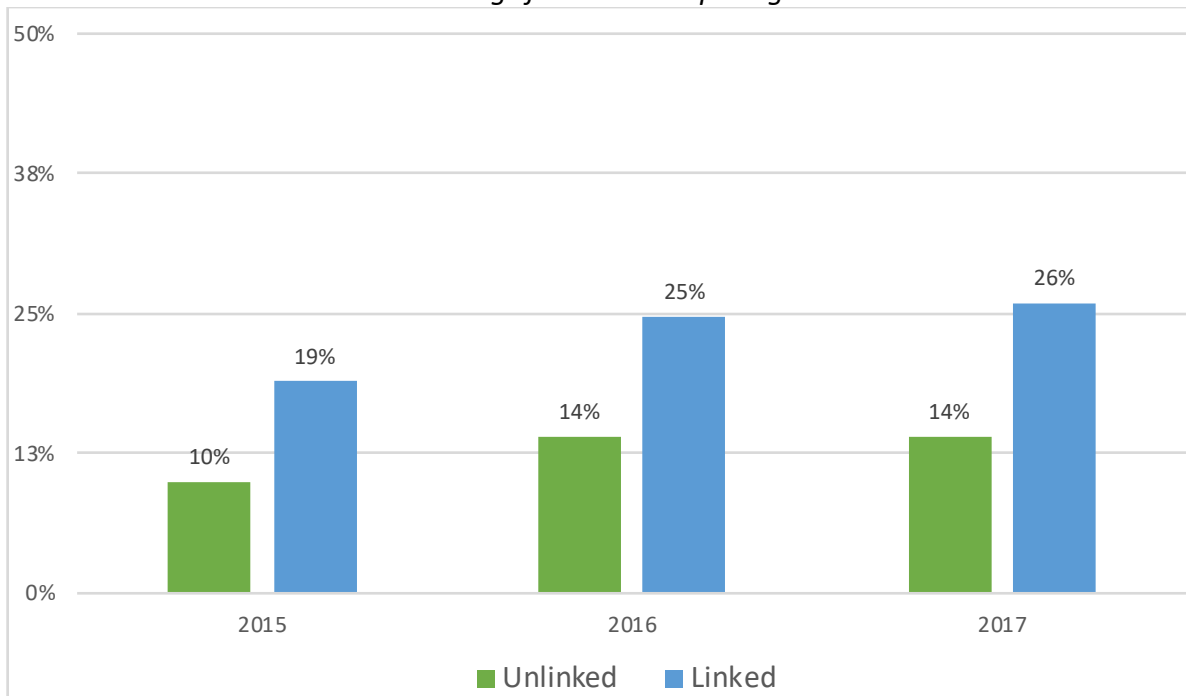


Chart 3: Standardized return on savings for CVI – comparing linked and unlinked

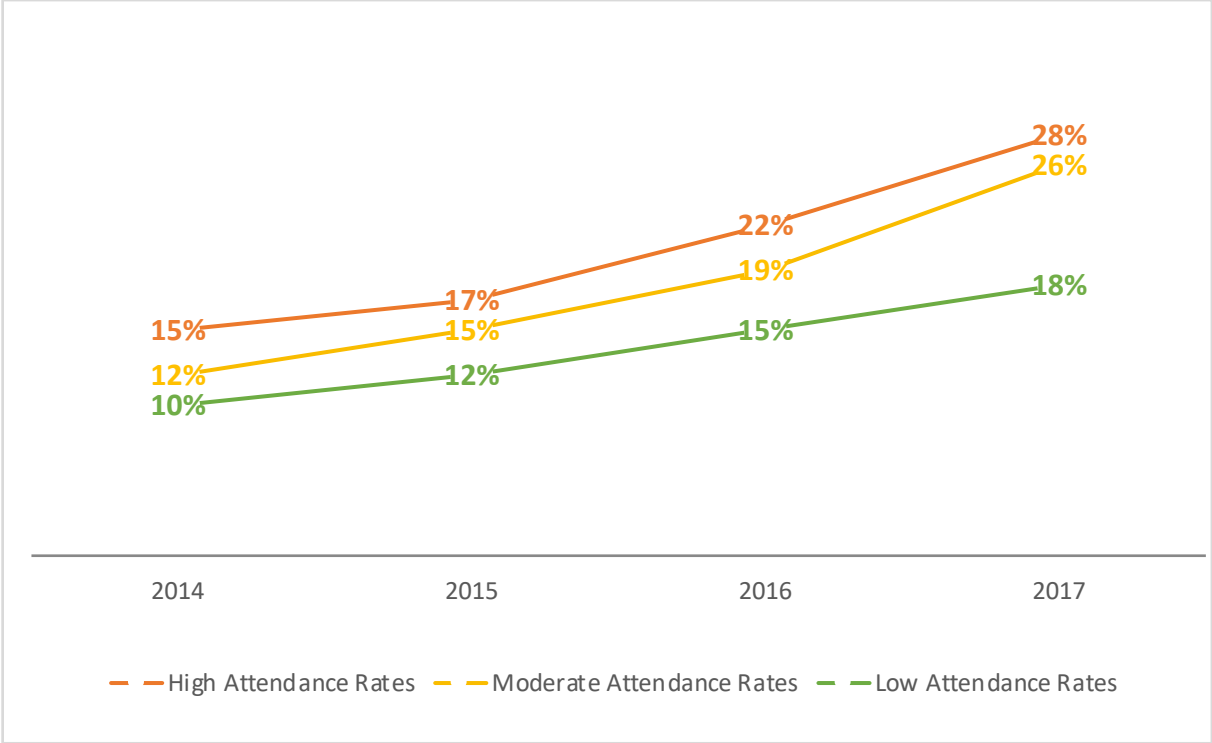


When looking at the characteristics that further drive performance in savings groups, we see that group characteristics like the percent of women members, attendance, and financial literacy can make big differences in certain cases. For instance, among savings groups in Rwanda, groups with a high proportion of women have a return on savings that is 173% higher than groups with a low a proportion of women. For Cote d'Ivoire, the influence of women's participation is not quite as strong.

A group's Return on Savings is also sometimes affected by the group's attendance rate. The impact of attendance rate is statistically significant in Rwanda but not in Côte d'Ivoire.

Chart 4 illustrates that the Rwanda groups with high attendance rates, of 98% and over, produce higher rates of ROS. From the data we can see that both groups with moderate attendance rates (between 85% and 97%) and high attendance rates (98% and over) are doing well. Groups with low attendance rates do much less well. These results have been standardized to account for the changing ages of the groups.

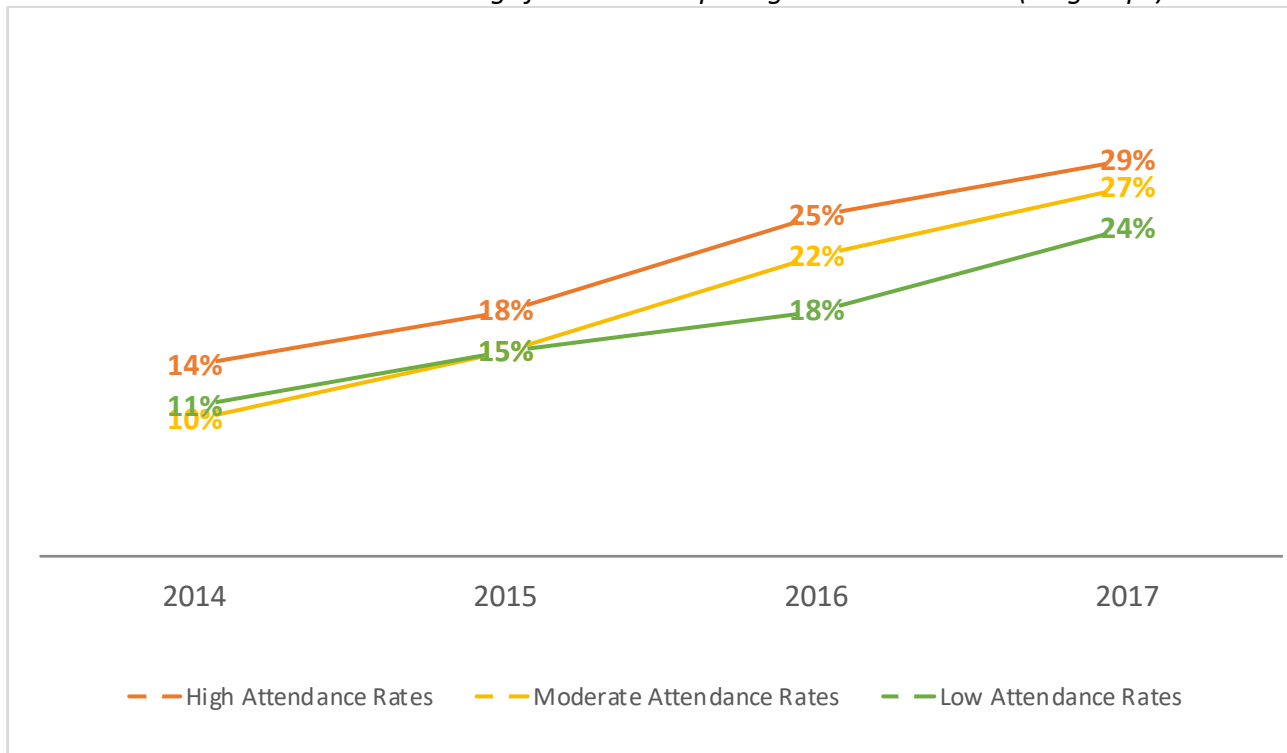
Chart 4: Standardized return on savings for Rwanda – comparing attendance rates (all groups)



High attendance rates = 98% and over; Moderate attendance rates = Between 85 and 97% average attendance rates; Low attendance rates = Less than 85% on average.

From Chart 5 we can see that although these same patterns are present for savings groups in Côte d'Ivoire, the differences between the groups at end line are not large. These differences are not statistically significant.

Chart 5: Standardized return on savings for CVI – comparing attendance rates (all groups)

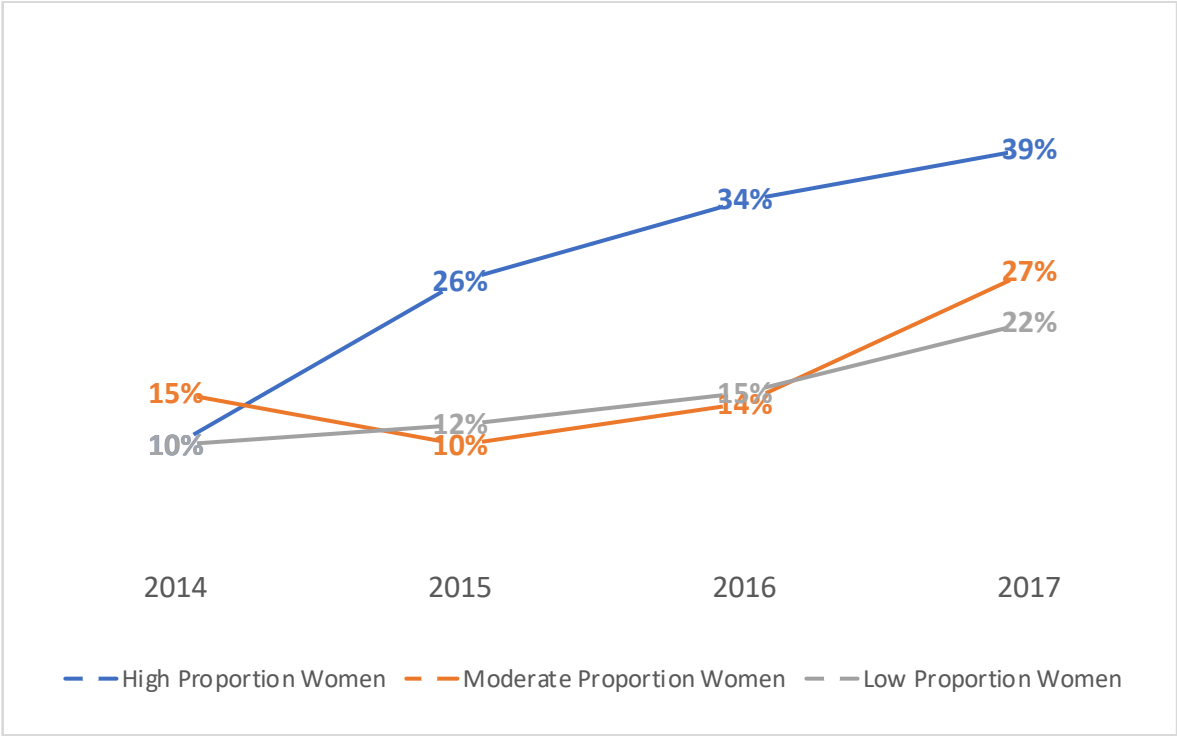


High attendance rates = 98% and over; Moderate attendance rates = Between 85 and 97% average attendance rates; Low attendance rates = Less than 85% on average.

One of the strongest predictors of a group's ROS trajectories is the group's gender composition. Across time and countries, savings groups with higher percentages of women are getting better economic performance from their investments. Among Rwanda savings groups, those with over 85% women have a return on savings rate that is a full 12% higher than groups with between 70% and 85% women and a rate that is 17% higher than groups with less than 70% women.

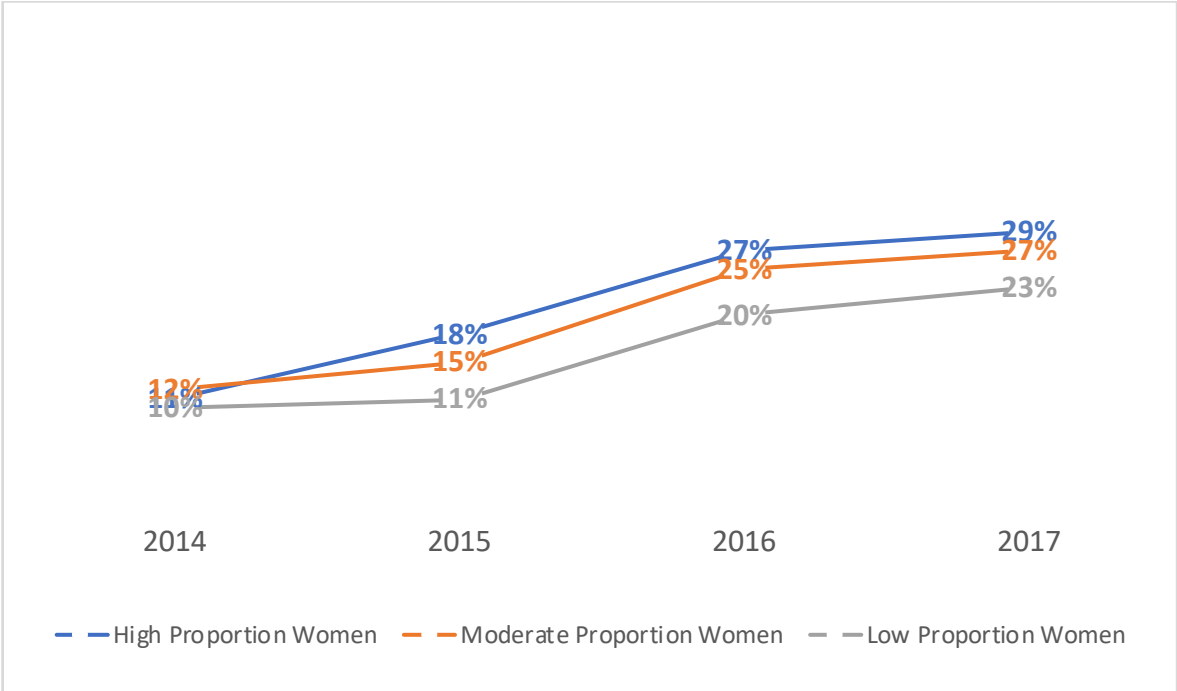
In chart 6 we see that in Rwanda, groups with more than 85% women are by far earning the highest return on savings. In chart 7 we see that the general trends are similar in Côte d'Ivoire groups, but less extreme. Groups with over 85% women have a return on savings rate that is 2% higher than groups with a moderate proportion of women and 6% higher than groups with a low proportion of women.

Chart 6: Standardized return on savings for Rwanda – comparing gender composition (all groups)



High proportion of women = More than 85%; Moderate proportion of women = Between 70% and 85%; Low proportion of women = Less than 70% women.

Chart 7: Standardized return on savings for CVI – comparing gender composition (all groups)



High proportion of women = More than 85%; Moderate proportion of women = Between 70% and 85%; Low proportion of women = Less than 70% women.

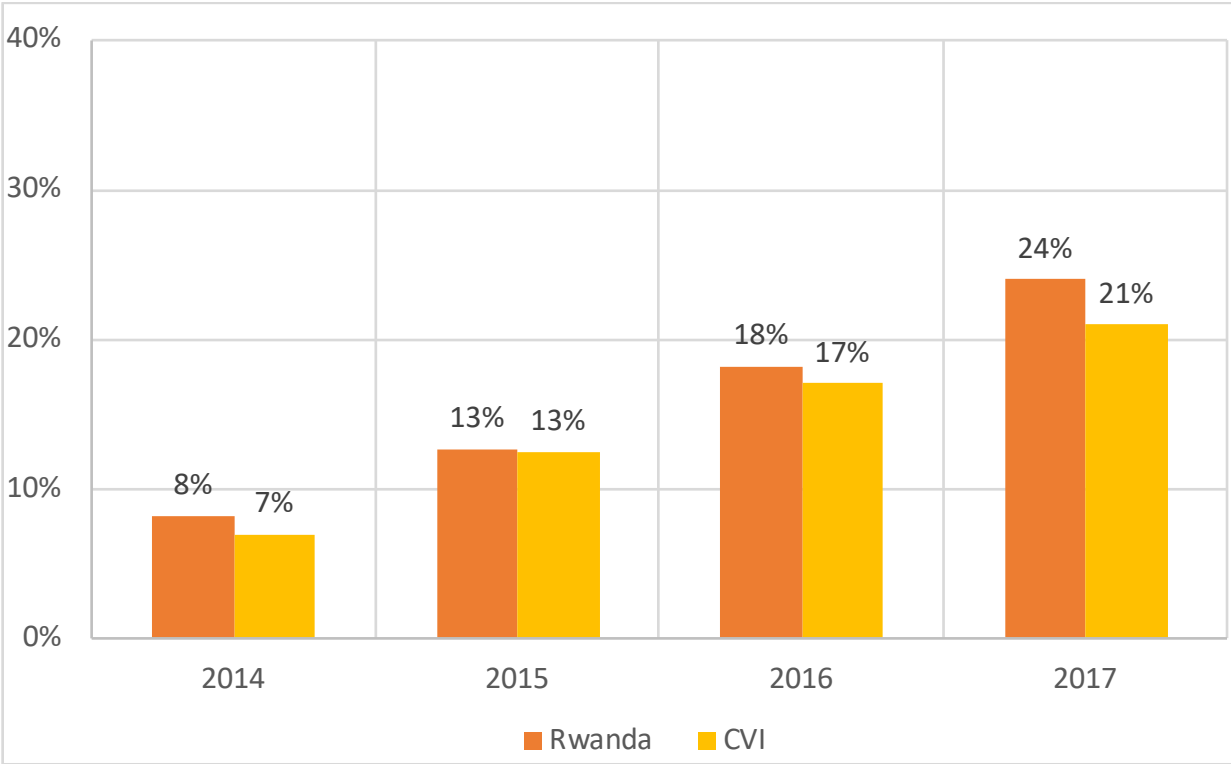
We tested for interaction effects between attendance rates and gender composition of groups, but no such effect exists. Attendance rates do not have significant fluctuations within the groups of different gender compositions.

Return on Assets

Return on Assets (ROA) is a metric designed to measure the yield the group is achieving on its use of the group’s assets. This indicates the amount of increase in total assets the groups has relative to the group’s investments. The calculation is a standardized version of the groups profits divided by their total accumulated assets. The calculations for return on savings is made using the MIS data from all the groups in the project, both linked and unlinked. The return on assets calculations have been calculated by standardizing the rate according to the age and typical savings level of the group.

The average return on assets for POWER/PROFIR savings groups have had a positively increasing trajectory over the years. The groups in both countries have performed quite similarly. In Rwanda, the 2014 ROA was 8% while in Cote d'Ivoire is was 7%. There have been statistically significant increases over time with the ROA rates at the end of the project at 24% for Rwanda and 21% for Côte d'Ivoire.

Chart 8: Standardized return on assets (all groups)



ROA by linkage

Overall in Rwanda, linked groups are earning a return on assets that is 8 percentage points higher than unlinked groups. This is based on the average return on assets. The is a difference of approximately \$28.63 USD per group member, calculated using a typical group.

Chart 9: Standardized return on assets – Rwanda – by linkage status

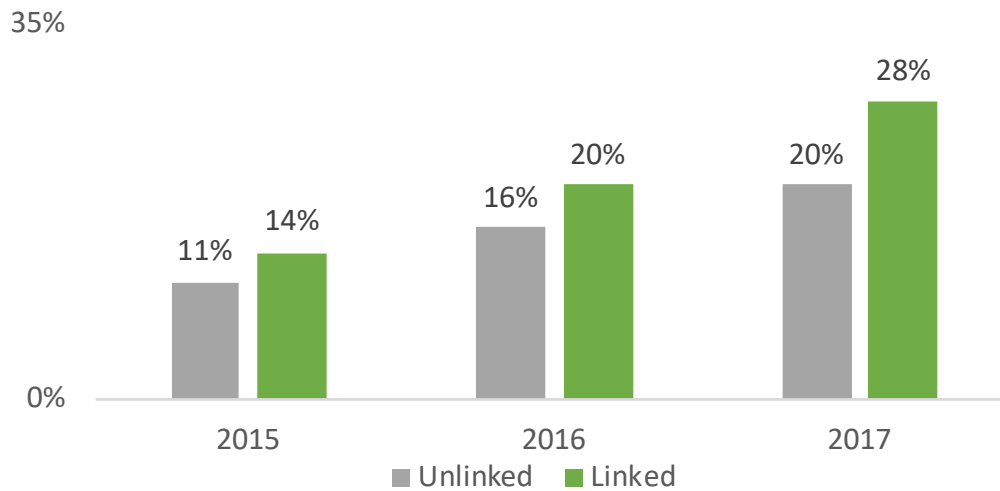
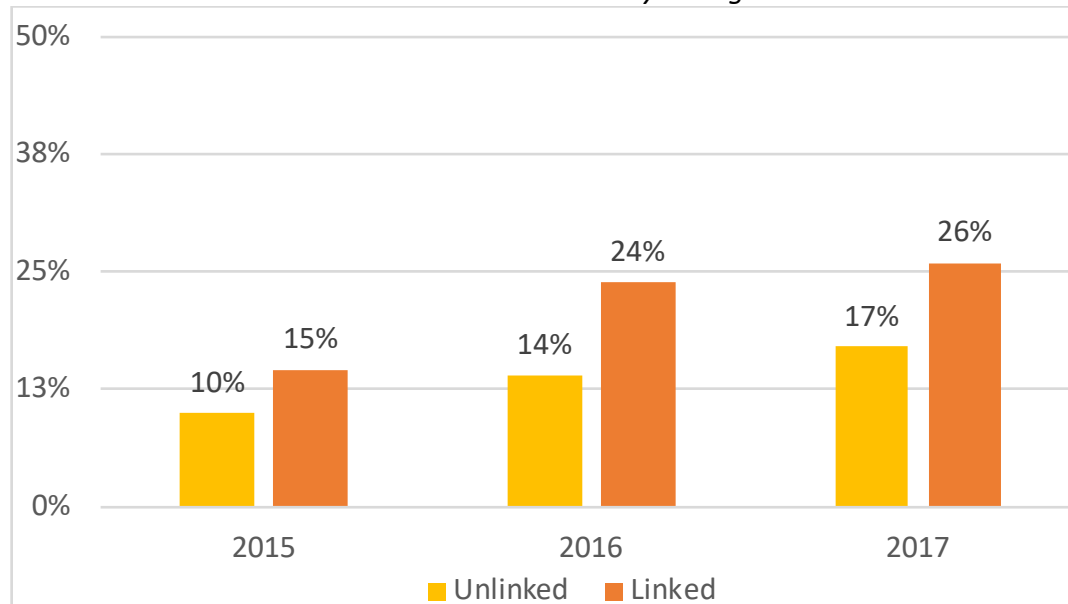


Chart 10 illustrates the differences between linked and unlinked groups in Cote d'Ivoire. For these groups, at endline, a linked group is earning 9 percentage points higher return on assets than an unlinked group. This works out to approximately \$8.40 USD per group member more for a typical unlinked group.

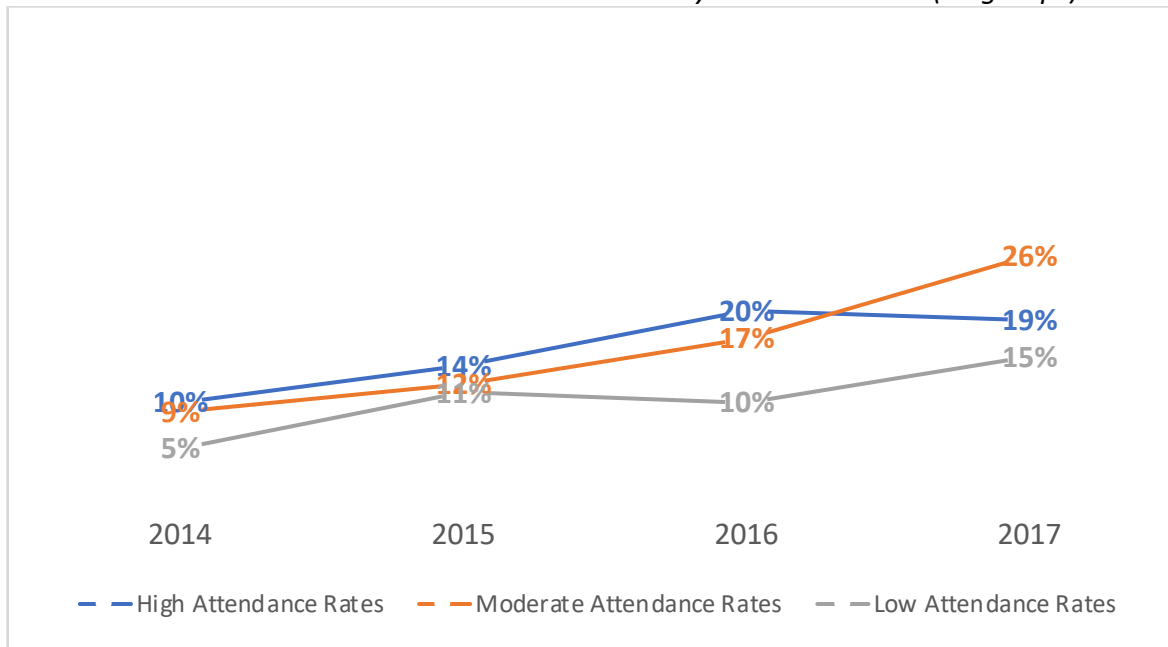
Chart 10: Standardized return on assets – CVI – by linkage status



ROA by attendance

Attendance rates have a strong impact of Return on Assets among the PROFIR groups but a much less direct impact among the groups from Côte d'Ivoire. We can see that among groups in Rwanda, it is actually those with moderate and high attendance rates who have the highest rate of return. Interestingly, in the past year the moderate attendance groups have improved the most. These groups have a ROA at endline of 26%, a full 7 percentage points higher than those groups with high attendance rates and 11 percentage points higher than those groups with low attendance rates. This trend has been consistent since the project started although the fast growth among moderate attendance groups has largely been seen in the final few months of the project.

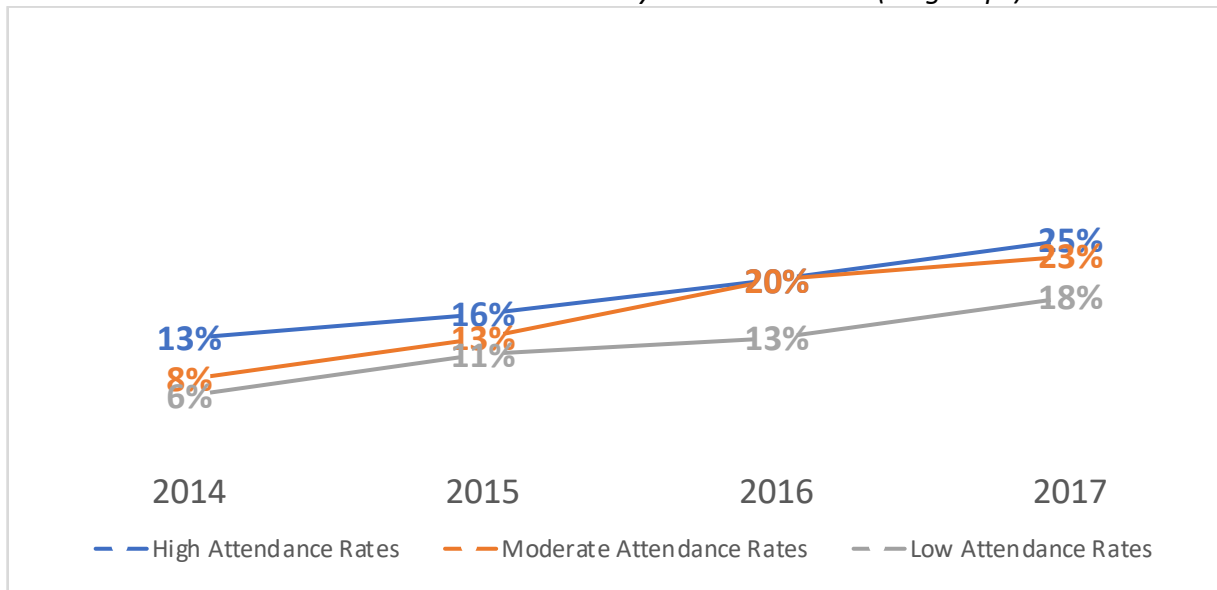
Chart 11: Standardized return on assets – Rwanda– by attendance rate (all groups)



*High attendance rates = 98% and over; Moderate attendance rates = Between 85 and 97% average attendance rates;
Low attendance rates = Less than 85% on average.*

Chart 12 shows us the ROA trajectory for groups in Cote d'Ivoire. For these groups, both those with high attendance and those with moderate attendance have had almost identical trajectories. They have ended the project with a ROA at 25% for high attendance groups and 23% for moderate attendance groups. There are no statistical difference between these two sets of groups. However, those groups with low attendance do have a statistically significant lower ROA, ending up at 18%.

Chart 12: Standardized return on assets – CVI – by attendance rate (all groups)

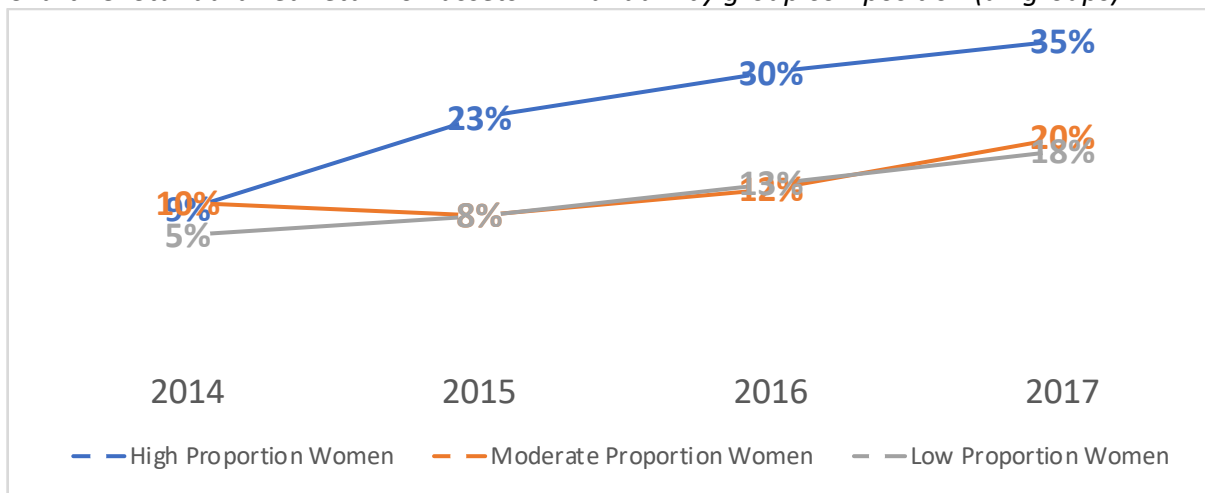


High attendance rates = 98% and over; Moderate attendance rates = Between 85 and 97% average attendance rates; Low attendance rates = Less than 85% on average.

ROA by Percent Women

The trends here are almost identical to the trends in Return on Savings, with gender composition being a very strong driver of return on assets for groups in Rwanda. The groups with high proportion on female members performing much better than other groups. Groups with over 85% women achieved a full 15 percentage points higher rate of return than all other groups. This trend holds true for the entire course of the project. The groups started off at similar levels of ROA and the groups with over 85% women quickly started earning higher returns and maintained that advantage throughout the course of the project.

Chart 13: Standardized return on assets – Rwanda – by group composition (all groups)

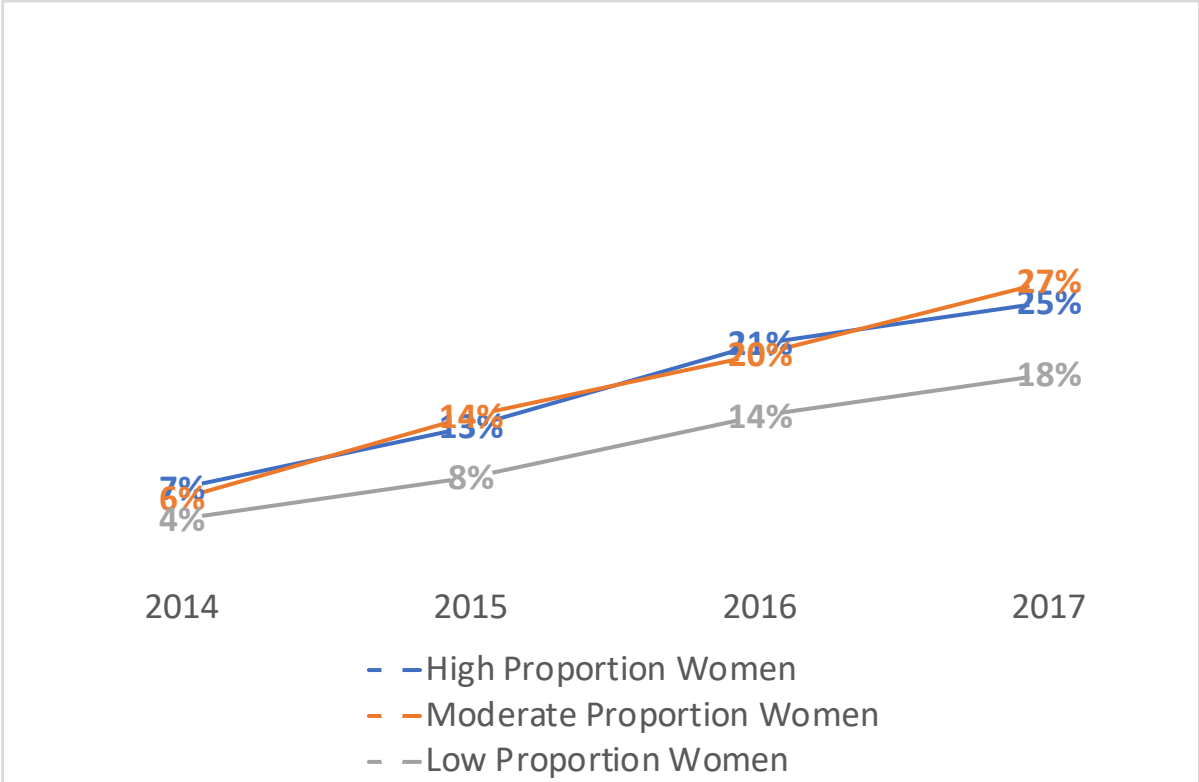


High proportion of women = More than 85%; Moderate proportion of women = Between 70% and 85%; Low proportion of women = Less than 70% women.

For groups in Cote d'Ivoire, the differences between the different groups is much smaller. It is still true that groups with higher proportions of women are performing better but the cut-off for proportions that have the biggest impact are different here than in Rwanda.

Both groups with a high proportion of women (over 85%) and groups with a moderate proportion of women (between 70% and 85%) perform similarly well. These groups have ended the project with a ROA rate of 27% and 25%, respectively. This is about 8% above the return rate for groups with low proportions of women (less than 70%).

Chart 14: Standardized return on assets – CVI – by group composition (all groups)

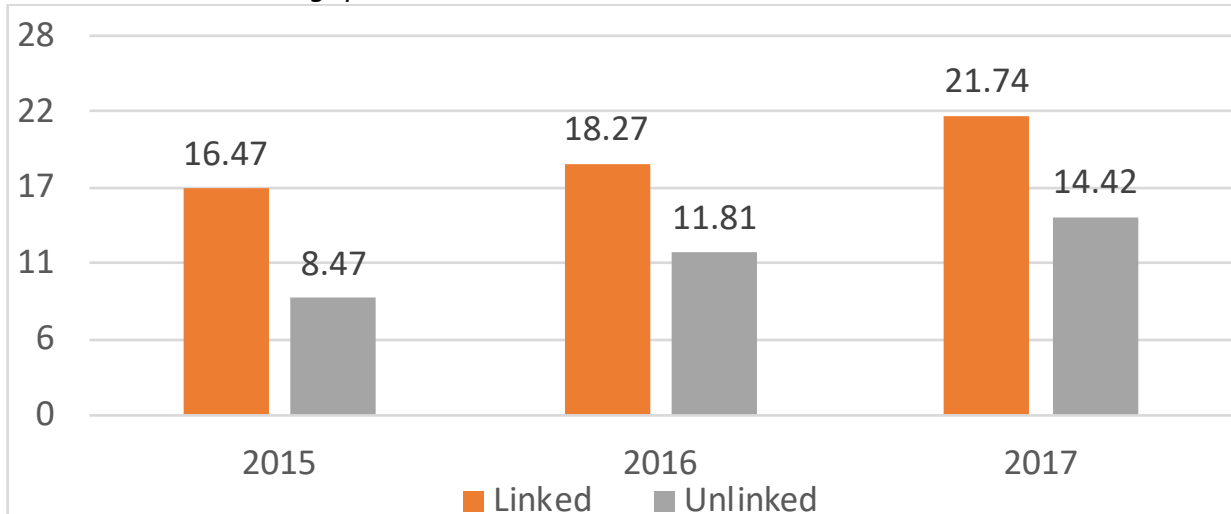


High proportion of women = More than 85%; Moderate proportion of women = Between 70% and 85%; Low proportion of women = Less than 70% women.

Savings Per Member

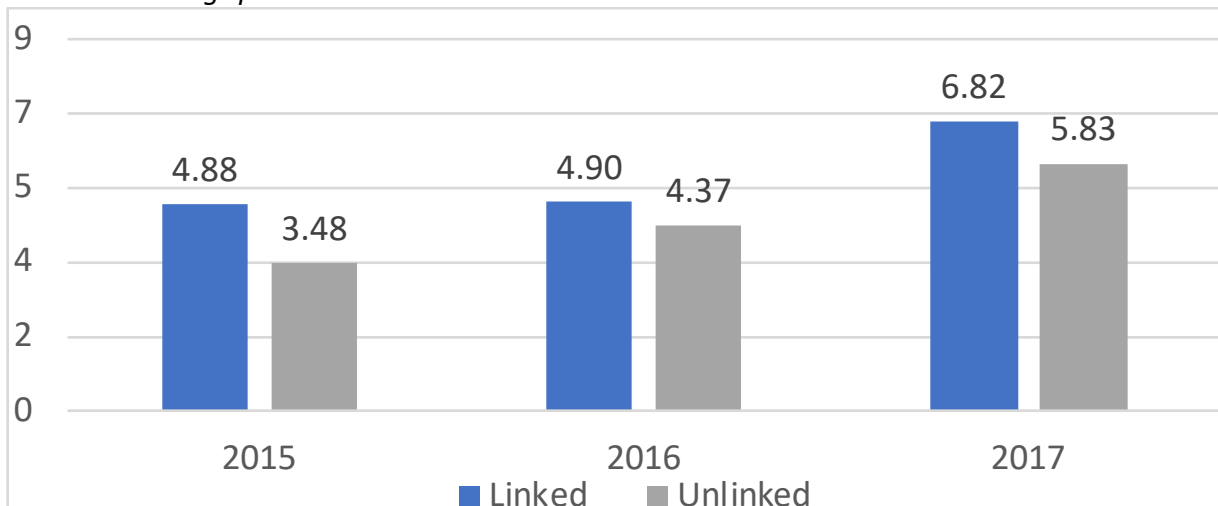
The total savings per member per cycle is increasing year over year for a typical group. In Rwanda, linked groups have increased their saving per member by \$5 USD per member. This is an increase of 38%. The unlinked groups in Rwanda have also had an increase of \$6 USD per person. Since these unlinked groups have a lower initial level, this is an increase of 70% - basically double the increase of the linked groups.

Chart 15: Median Savings per member USD - Rwanda



We find very similar trends in CIV in Chart 17. Linked groups increased their savings per member by \$2 USD and unlinked groups increased by \$2.4 USD. This is a 40% increase for linked and 67% increase for unlinked.

Chart 16: Savings per member USD - CIV



Bank Balances

The level of bank balances is a key indicator in assessing the linkage work of the POWER/PROFIR project. It is not enough simply to provide groups with access to a formal bank account. We need to know if they are using it.

In CIV the average bank balance at endline was \$192 USD and the median was \$38 USD among the 182 linked accounts. In Rwanda the average is \$328 USD and the median is \$115 USD among linked accounts 2608.

We can look at the typical bank balances over time for the Cote d'Ivoire and Rwandan groups. It helps us to see that the average bank balance for the project as a whole has been rising steadily over time. This is an indication that the overall portfolio for the project is growing. However, chart 18 demonstrates that this steady growth, while true for the project overall, is not true for every individual group. The average account balance varies quite a lot over time.

Chart 17: Average and Median Rwanda bank balance

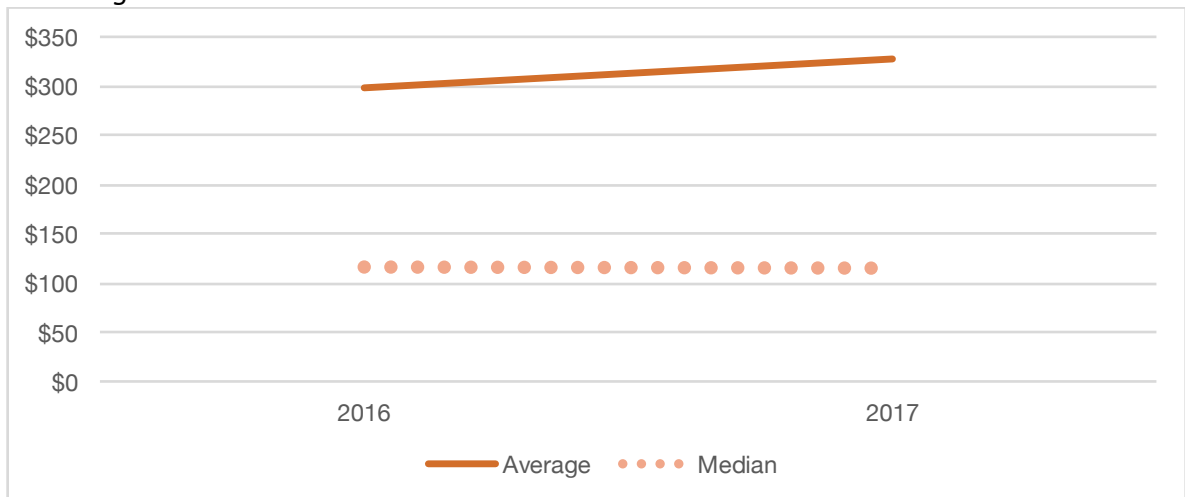
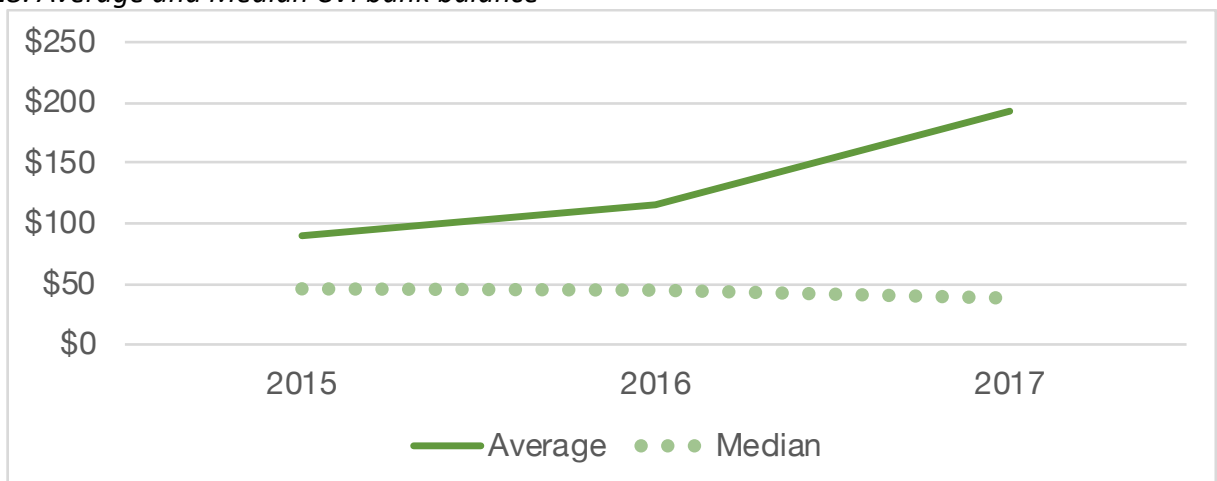


Chart 18: Average and Median CVI bank balance



Bank balances by account usage

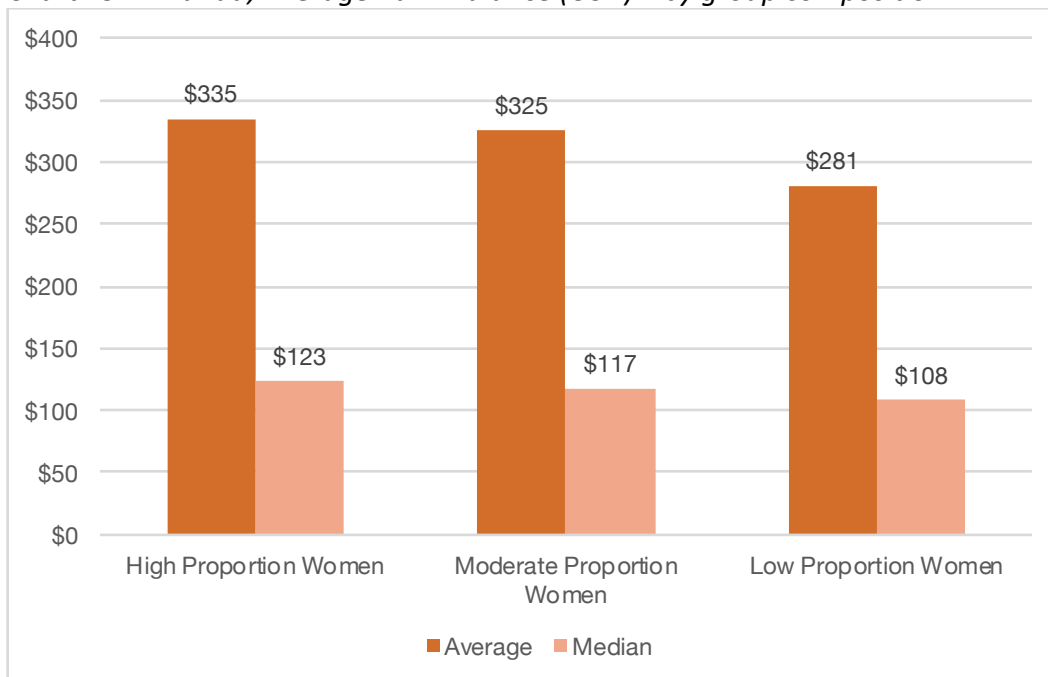
Within the linked savings groups from Cote d'Ivoire, there is a relationship between frequency of account usage and bank balance. We divided the groups into those that used their accounts for deposits and withdrawals, an average amount, less than average amount, and more than average amount. The more frequently the account was used, the higher the bank balance usually is. For accounts that are used below average, which are mostly accounts used only one, the average bank balance is less than \$50. For accounts that are used an average amount, the typical bank balance is \$117 USD. For high use accounts, the average bank balance is \$206 USD.

Bank balances by gender

Over the course of the project, the typical bank account balances have been influenced by the gender composition of the group. Groups in both countries see groups with more women having higher balances. The impact of group gender composition is related to a larger difference in bank balance for groups in CIV than in Rwanda.

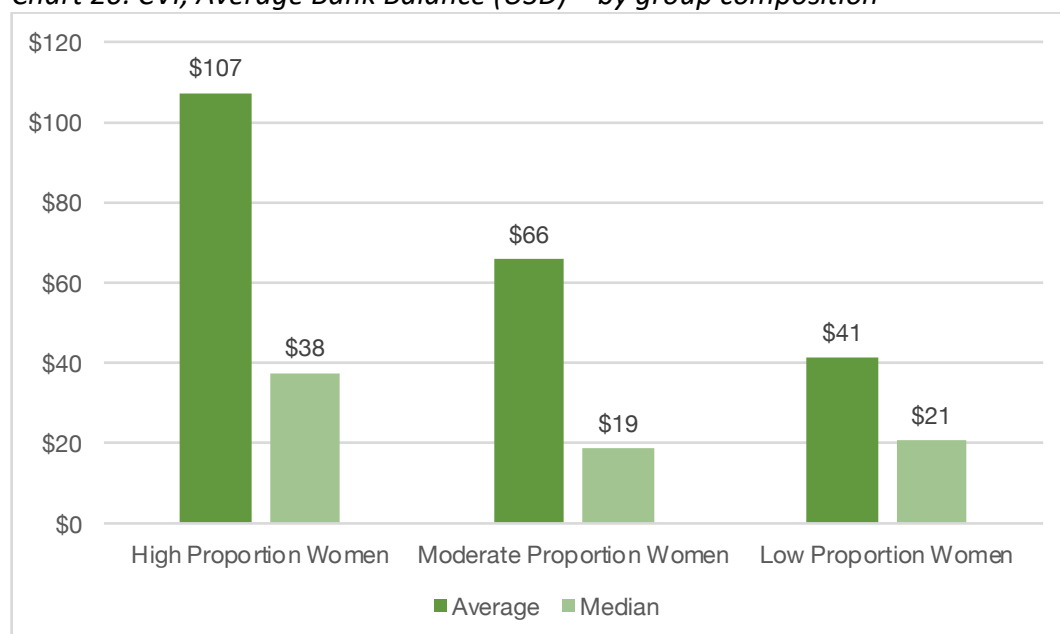
In Rwanda, there is a 48% difference between groups with a high proportion of women and groups with a low proportion of women. In CIV, this difference is as high as a 231% difference between high proportion groups and low proportion groups.

Chart 19 : Rwanda, Average Bank Balance (USD) – by group composition



High proportion of women = More than 85%; Moderate proportion of women = Between 70% and 85%; Low proportion of women = Less than 70% women.

Chart 20: CVI, Average Bank Balance (USD) – by group composition



High proportion of women = More than 85%; Moderate proportion of women = Between 70% and 85%; Low proportion of women = Less than 70% women.

We conducted analysis to uncover the determinants of the level of bank balance a group maintains. In Rwanda, the factors that predict bank balance is the gender composition of the group. The age of the group, the distance from the group to the bank, and the general wealth of the group do not significantly predict bank account balance. Among groups in Rwanda, they have, on average, half a US dollar for every additional percent women in their group gender composition.

In CIV, the significant predictors of bank balance level are group wealth, as measured by overall savings level of the group and group gender composition. The age of the group and the distance from the group to the bank do not significantly predict bank account balance. In these groups, they have, on average, a quarter of a US dollar in their bank account for every additional percent women in their group gender composition.

Dormancy Rates

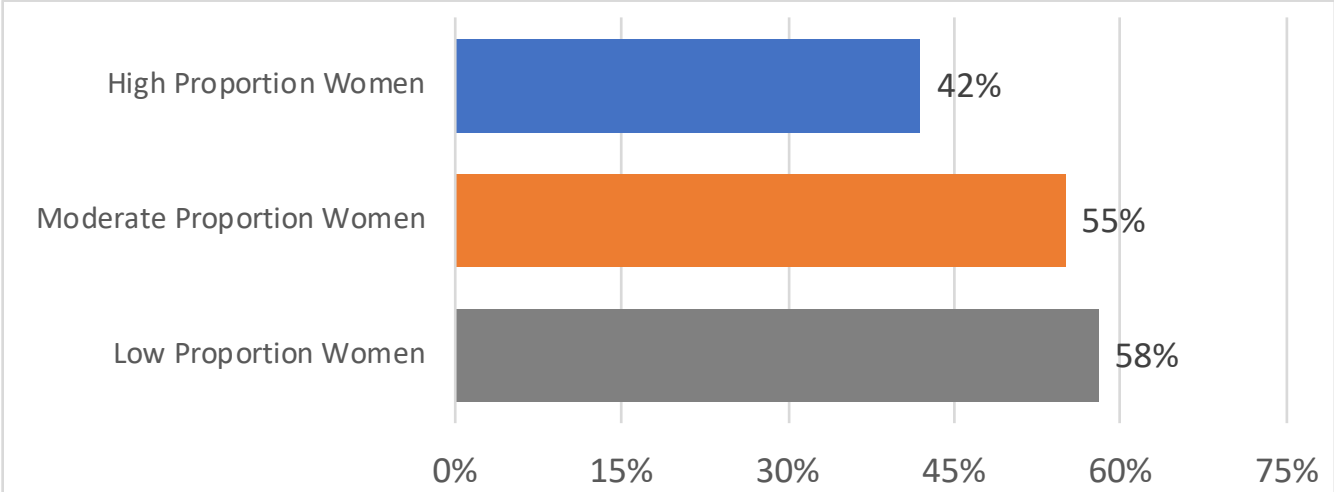
The active use of the formal bank accounts is monitored by using the financial service provider data. If a group's account is not used for over six months the account is considered to be dormant. A group with a dormant account is not actively making deposits or withdrawals from their account.

Dormancy rates in both countries are predicted by the gender composition of the group, the distance to the bank, and the attendance rate of the group. Dormancy rates are not linked to the general wealth of the group or the age of the group.

Overall, there is a very large difference in dormancy rates between the two countries. The average endline dormancy rate for groups in Cote d'Ivoire is approximately 5%. The average endline dormancy rate for groups in Rwanda is approximately 49%. Care should be taken when comparing these two figures as the frequency and quality of data from financial service providers varies a great deal both within and between countries.

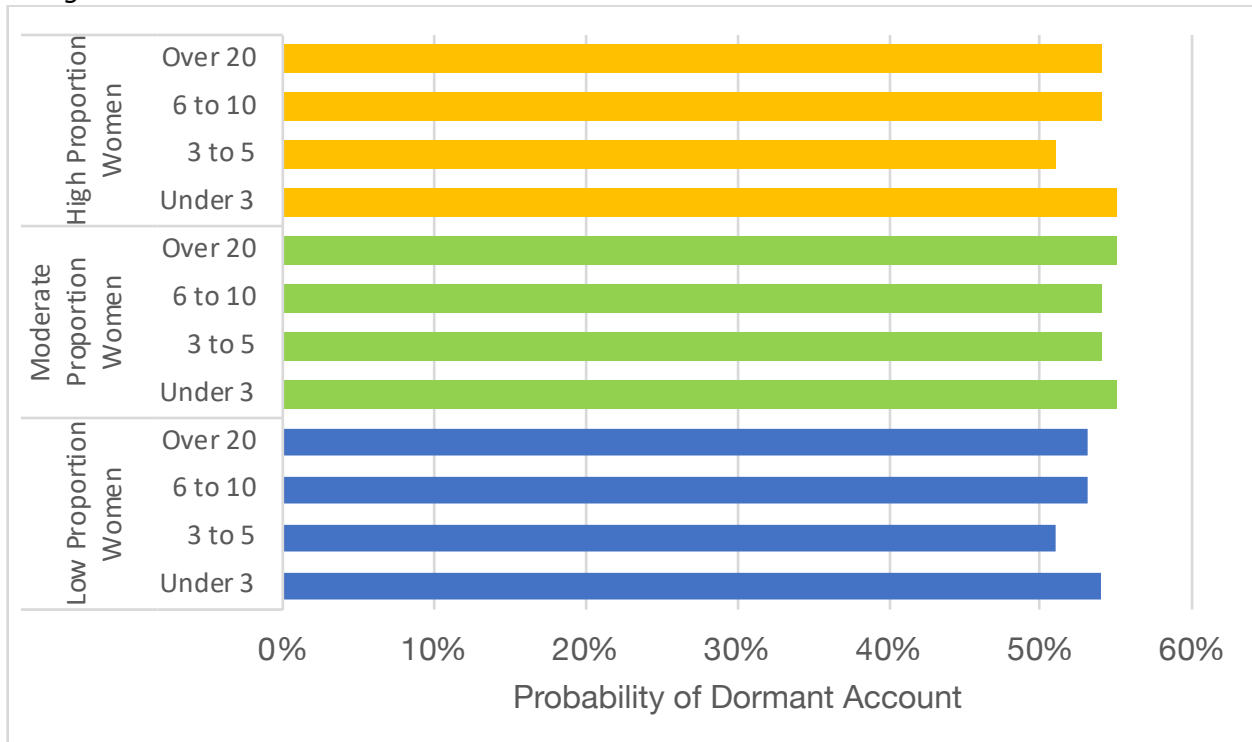
In Rwanda, the gender proportion and proximity to the financial service provider are the two strongest predictors of whether or not a group has a dormant account. These two factors have independent influences impacting dormancy rates. However, there is a strong interaction effect which is the most significant. What this means is that how proximity to the financial services provider effects the dormancy rate is different for different groups based on their gender. For example, groups that are very close to their banks have a much higher dormancy rate if they have less women. But groups that are very far from their banks, over 20km, have an equal dormancy rate for both high proportion and low proportion women groups. This seems to indicate that groups with many women are more likely to keep their accounts in good standing but that this effect is diminished for groups who are farther away from their banks.

Chart 21: Rwanda, probability of having dormancy account by gender



High proportion of women = More than 85%; Moderate proportion of women = Between 70% and 85%; Low proportion of women = Less than 70% women.

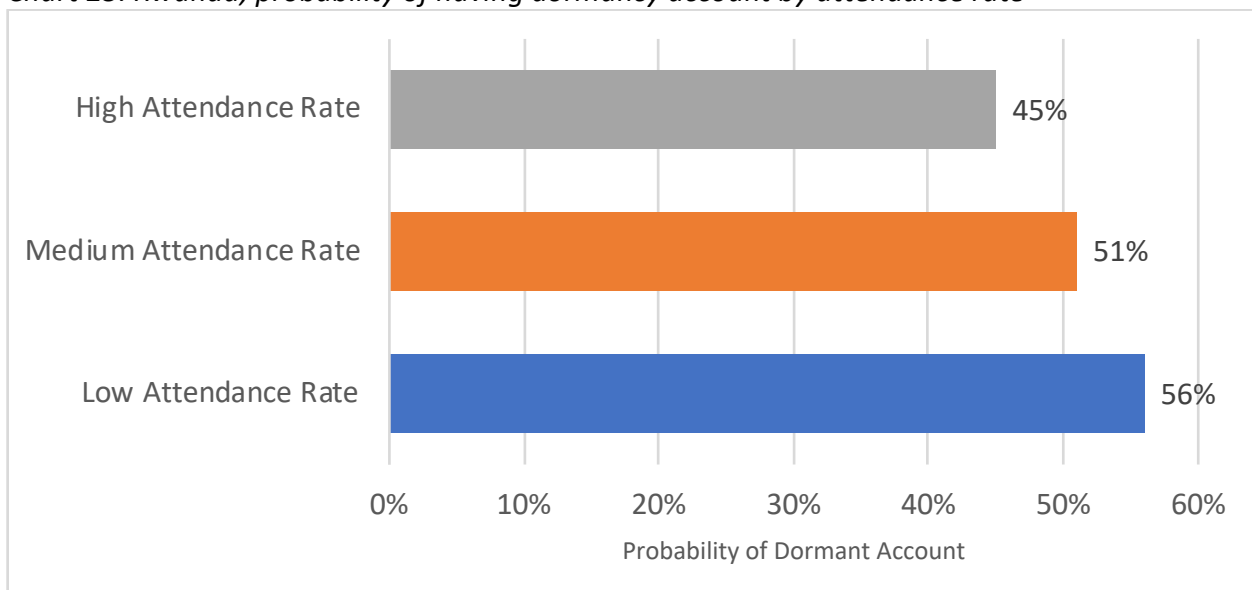
Chart 22: Rwanda, probability of having dormancy account by proximity to bank (in kilometers) and gender



High proportion of women = More than 85%; Moderate proportion of women = Between 70% and 85%; Low proportion of women = Less than 70% women.

In Rwanda, groups with high attendance rates are the least likely to have dormant accounts. The difference between a high attendance rate group and a low attendance rate group is 11 percentage points. This is very important and is statistically significant.

Chart 23: Rwanda, probability of having dormancy account by attendance rate

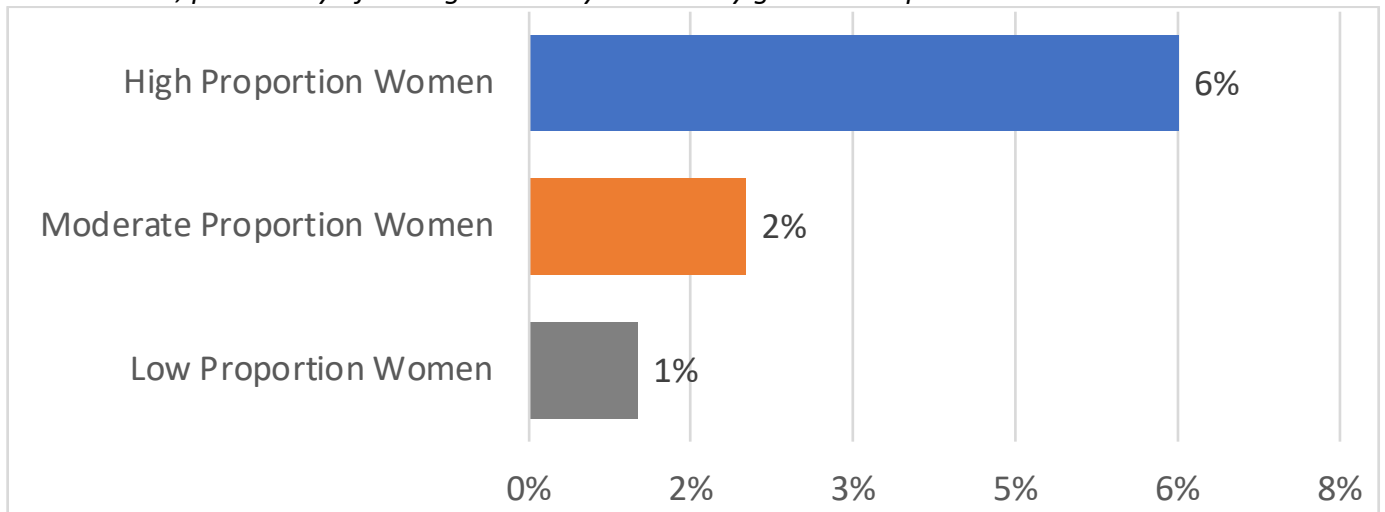


High attendance rates = 98% and over; Moderate attendance rates = Between 85 and 97% average attendance rates;
Low attendance rates = Less than 85% on average.

In Cote d'Ivoire, since the dormancy rates are so low, it is very challenging to find any predictors that will have significant differences. The only significant predictors of dormancy we found for these groups are group gender composition and attendance rate of the group.

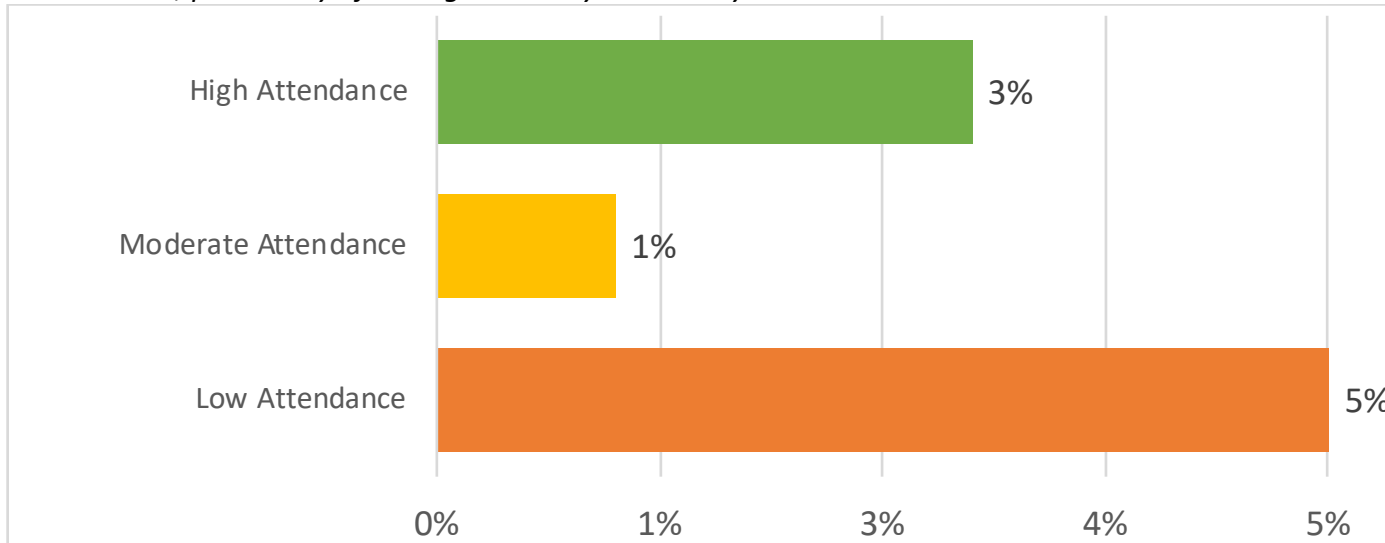
Groups with higher attendance rates have lower chances of having a dormant account. Although, the only significant difference is between groups with high attendance rates and groups with low attendance rates. Groups in Cote d'Ivoire with moderate attendance rates have the lowest probability of a dormant account, at only 1%.

Chart 24: CVI, probability of having dormancy account by gender composition



High proportion of women = More than 85%; Moderate proportion of women = Between 70% and 85%;
Low proportion of women = Less than 70% women.

Chart 25: CVI, probability of having dormancy account by attendance rate



High attendance rates = 98% and over; Moderate attendance rates = Between 85 and 97% average attendance rates;
Low attendance rates = Less than 85% on average.

Account Usage

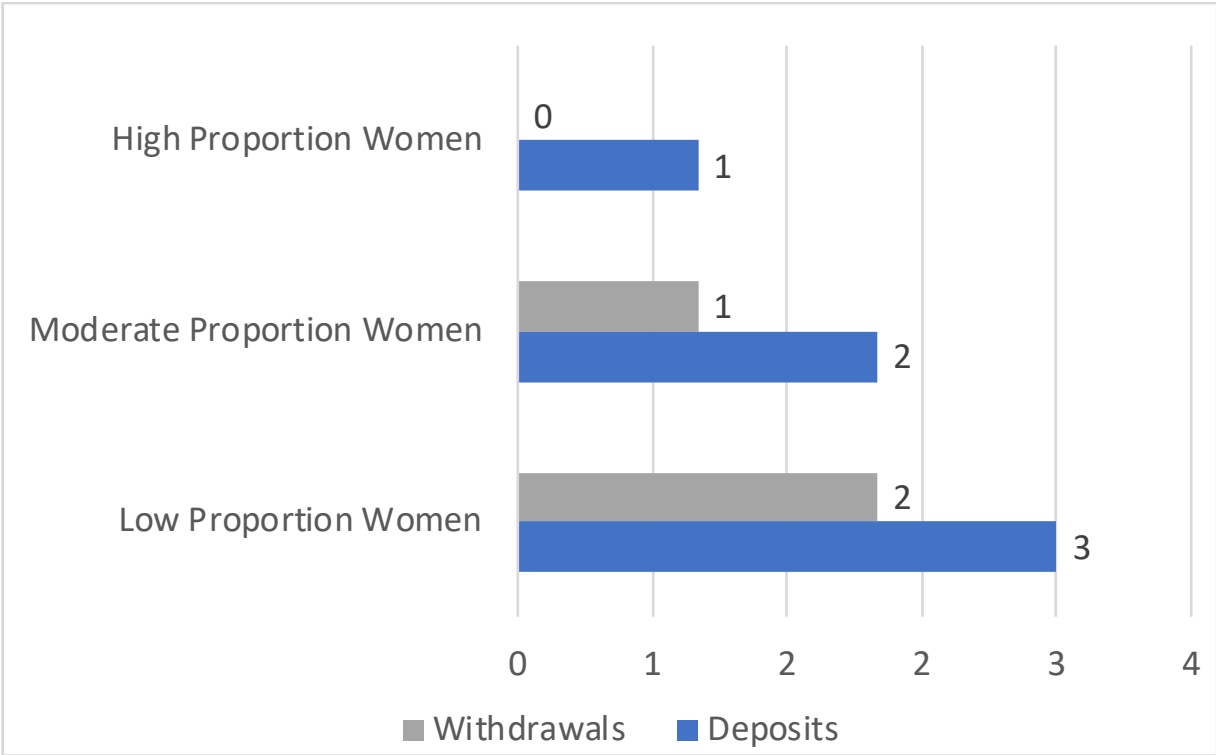
The financial service providers in Cote d'Ivoire have provided data on the number of times each group makes deposits and withdrawals from their formal account. This gives us the opportunity to explore potential drivers of bank account usage. Overall, the frequency of account usage is quite low. Most groups use their accounts at most 1 time a month. However, there are select groups that use their accounts multiple times per month.

Our analysis of the data has uncovered three drivers of account usage – group age, group gender composition and group economic status.

Older groups use their accounts slightly more – however the relationship is not linear. First time groups use their account zero or one time a month. By the time groups have reached their second cycle, they are using their account regularly 1 or occasionally 2 times per month. By the groups' third cycle and beyond, they either stop using their account at all or they use the account regularly, 1 to 4 times per month.

The gender composition of the group impacts the frequency of account use. However, in this case it is the reverse of the trend we usually see. Groups with the lowest proportions of women use their accounts the most frequently.

Chart 26: CVI – Account usage by group gender composition



*High proportion of women = More than 85%; Moderate proportion of women = Between 70% and 85%;
Low proportion of women = Less than 70% women.*

The final factor that significantly predict account usage is group savings level. Groups with higher levels of total savings – in both the savings group box and the bank account have more frequent account use. 1 additional deposit is associated with about \$188 USD more in savings. Interestingly, bank withdraw count is also associated with more overall savings.

Loans & Access to Credit

Savings Group Loans

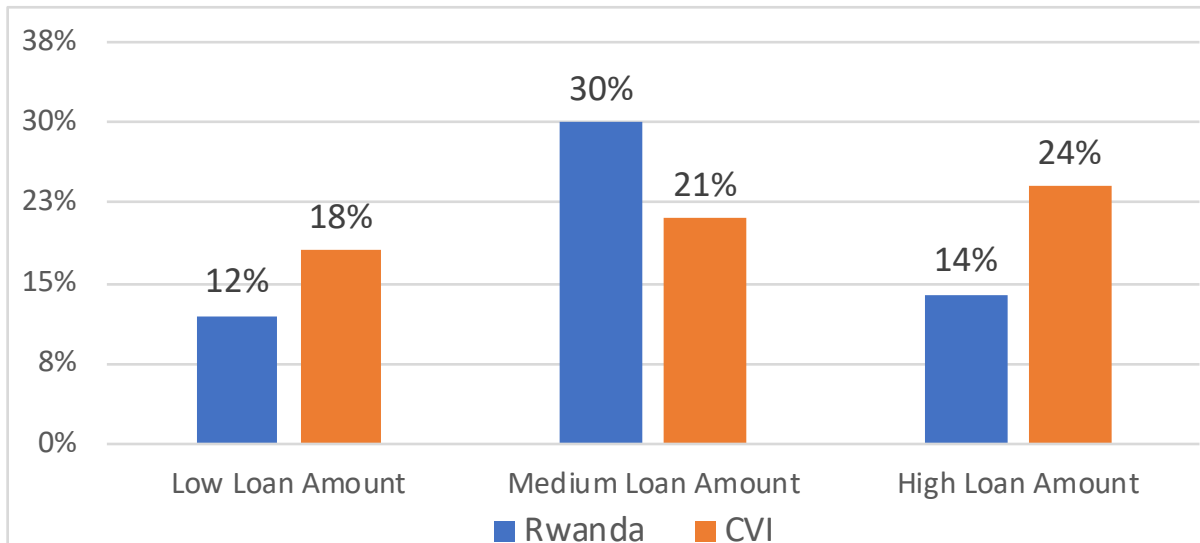
In Rwanda, the average loan size per savings group is \$751 USD for linked groups and \$692 USD for unlinked groups. The median loan size per savings group is \$573 USD for linked groups and \$546 USD for unlinked groups. Groups with higher women members tend to have slightly lower average loan amounts but the effect is very small.

In Cote d'Ivoire the average loan amount per savings group is \$146 USD for linked and \$99 USD for unlinked. The median loan size per savings group is \$28 USD for linked groups and \$47 USD for unlinked groups. In a similar pattern to the one found in Rwanda, groups with higher women members tend to have slightly lower average loan amounts but the effect is very small.

The loan amount per member does have a statistically significant relationship with the Return on Savings and Return on Investment of the group. In Rwanda, groups with moderate loan amounts are earning the highest ROS and ROA. The groups with moderate loan sizes are performing approximately 18 percentage points better than groups with either low or high loan amounts within their group.

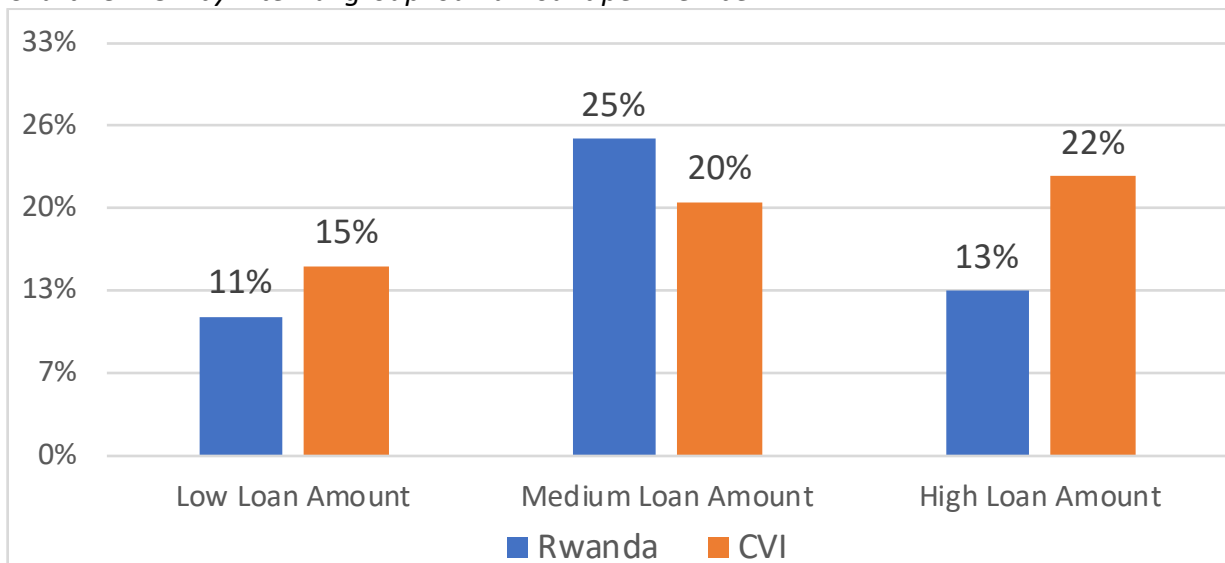
In Cote d'Ivoire, it is the groups with the highest loan amounts per member that are performing the best of ROS and ROA, but the difference between groups in CVI is much smaller. The groups with the highest loan rates are only earning two to five percentage points ahead of groups with moderate to low loan amounts.

Chart 27: ROS by internal group loan amount per member



Loan amount categories defined by quartiles, with medium being the second and third quartile

Chart 28: ROA by internal group loan amount per member



Loan amount categories defined by quartiles, with medium being the second and third quartile

There are no significant or consistent trends of differences between linked and unlinked groups that moderate the relationship between loan amounts on returns.

Table 5: Group internal loan amount by linkage

	Total Average	Unlinked Average	Linked Average
Rwanda			
Low loan amount	12%	11%	12%
Medium loan amount	30%	35%	29%
High loan amount	14%	12%	15%
CVI			
Low loan amount	18%	20%	17%
Medium loan amount	21%	18%	22%
High loan amount	24%	23%	25%

Loan Utilization Rate

The typical group in Rwanda has a loan utilization rate of 69% at endline. This rate is higher the lower the proportion of women in the group. In Cote d'Ivoire, the typical group has a loan utilization rate of 29% at endline. The groups in this country who have moderate proportions of women members are significantly more likely to have higher loan utilization rates than all other groups.

Table 6: Loan utilization rate by gender composition

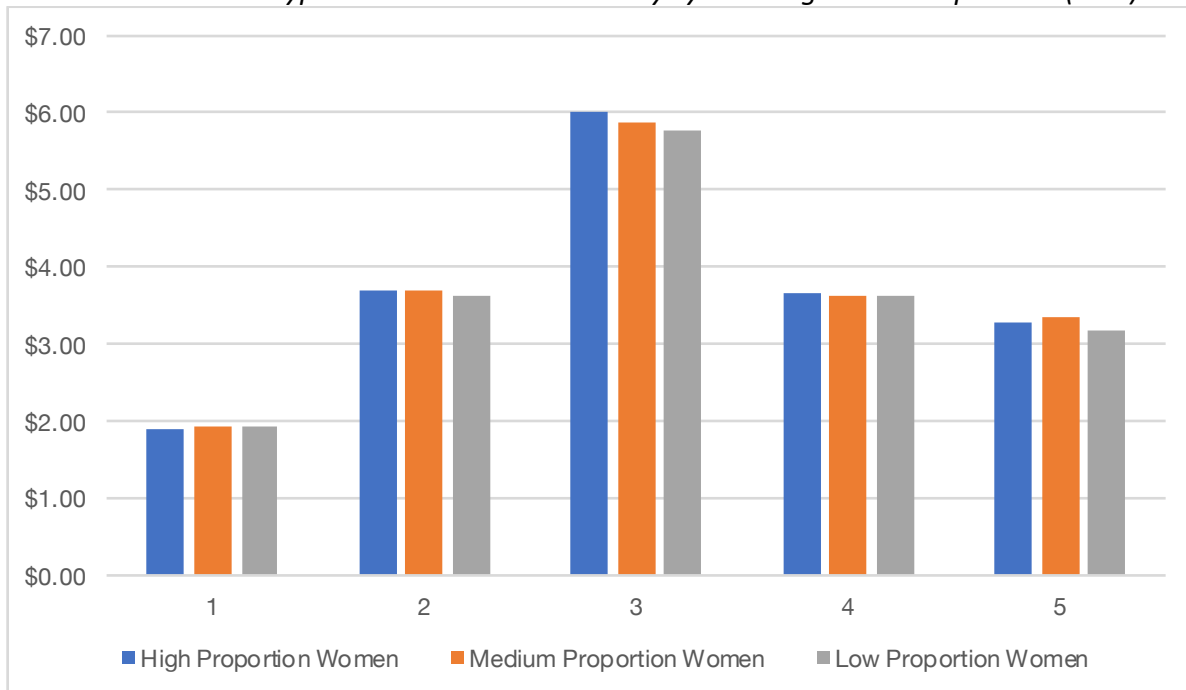
Loan utilization rate	Low Proportion of Women	Moderate Proportion of Women	High Proportion of Women
Rwanda	70%	68%	66%
CVI	22%	42%	33%

High proportion of women = More than 85%; Moderate proportion of women = Between 70% and 85%; Low proportion of women = Less than 70% women.

Loans from financial service providers

In Rwanda, the amount of loans given to a group by the financial service provider is statistically linked to the cycle of the group and the gender composition of the group. Group loans tend to start off conservatively in cycle 1 and then increase in size through cycle 3. At which point, the typical loan becomes smaller. Groups with the highest proportion of women receive slightly more in loans in cycles 2, 3, and 4. Interestingly, these same groups start of cycle 1 with slightly lower sized loans. In cycle 1, this difference is not statistically significant.

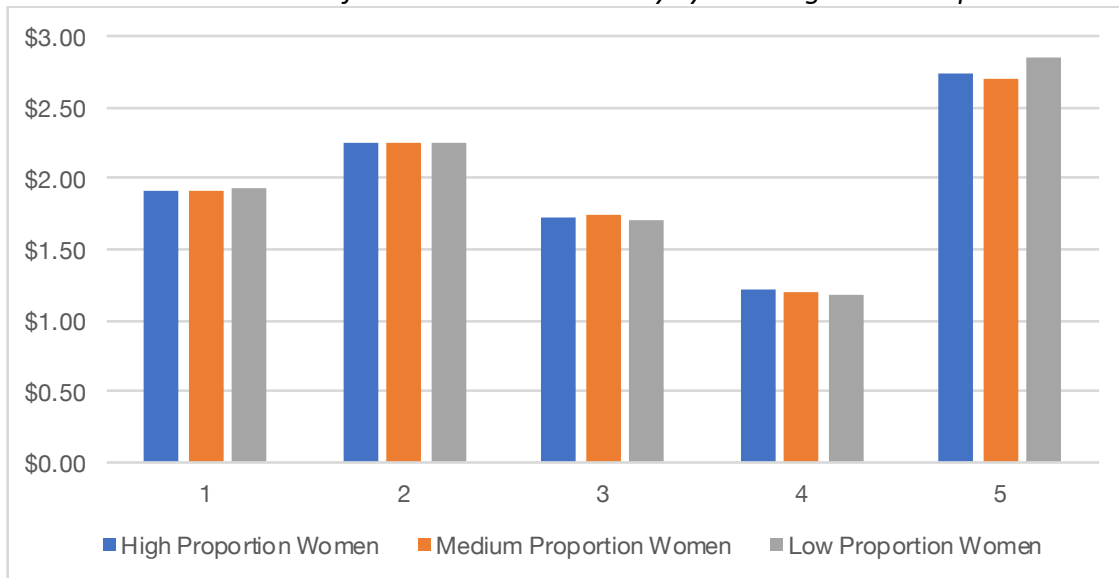
Chart 29: Rwanda – Typical cumulative FSP loan by cycle and gender composition (USD)



High proportion of women = More than 85%; Moderate proportion of women = Between 70% and 85%;
Low proportion of women = Less than 70% women.

When we look only at the size of the most recent loan, the gender composition effect is gone. There are no statistically significant effects of group gender composition in the most recent size of the financial service provider loan.

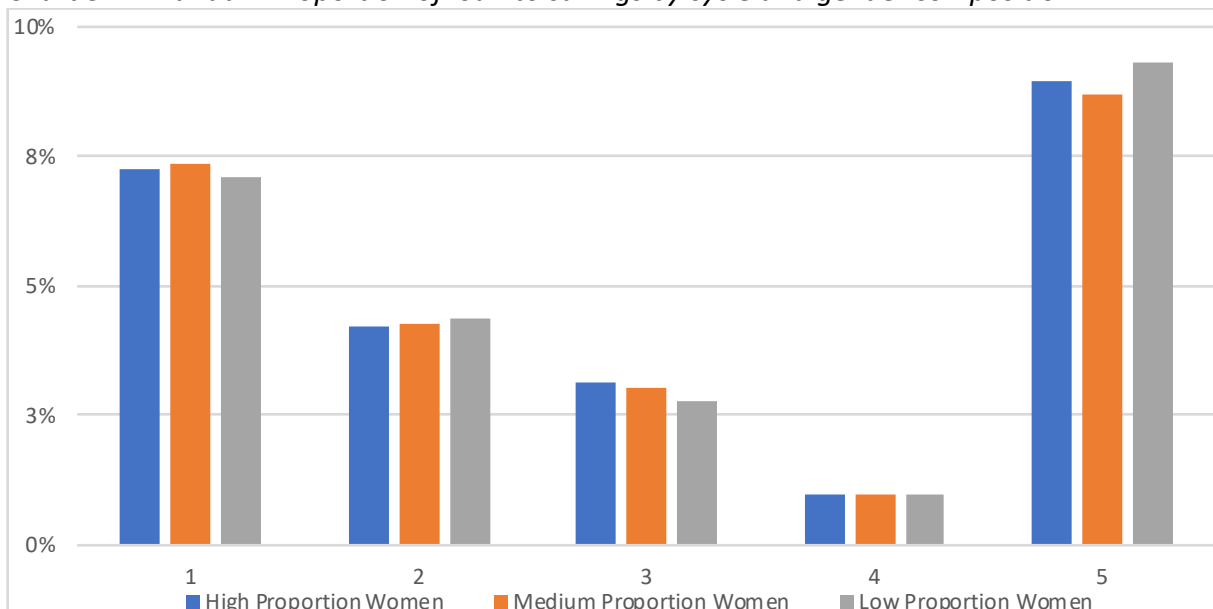
Chart 30: Rwanda – Size of most recent FSP loan by cycle and gender composition



High proportion of women = More than 85%; Moderate proportion of women = Between 70% and 85%; Low proportion of women = Less than 70% women.

We see this as well when we explore the ratio of financial service provider account balance with the size of the financial service provider loan. There is no effect of gender composition. There is a large effect of loan cycle of the group. It seems that the groups start off with a loan that is relatively large relative to their savings. Possibly because of the backing of the new program. Then the relative sizes decrease with passing cycles. However, groups who successfully make it to their fifth loan cycle and beyond start receiving much larger relative loans.

Chart 31: Rwanda – Proportion of loan to savings by cycle and gender composition



*High proportion of women = More than 85%; Moderate proportion of women = Between 70% and 85%;
Low proportion of women = Less than 70% women.*

Formal loans and bank account balance

Linked groups who have access for bank credit tend to have higher average bank account balances than those who do not. Linked groups with access to credit have an average bank account balance that is \$52 USD than groups who do not have credit.

Outstanding loan amounts

In Rwanda, the typical outstanding savings group loan at endline is within a range of 30 to 50 thousand local currency. Unlinked groups have lower levels of outstanding loans by approximately 30%. These differences remain when groups are standardized by age and gender composition.

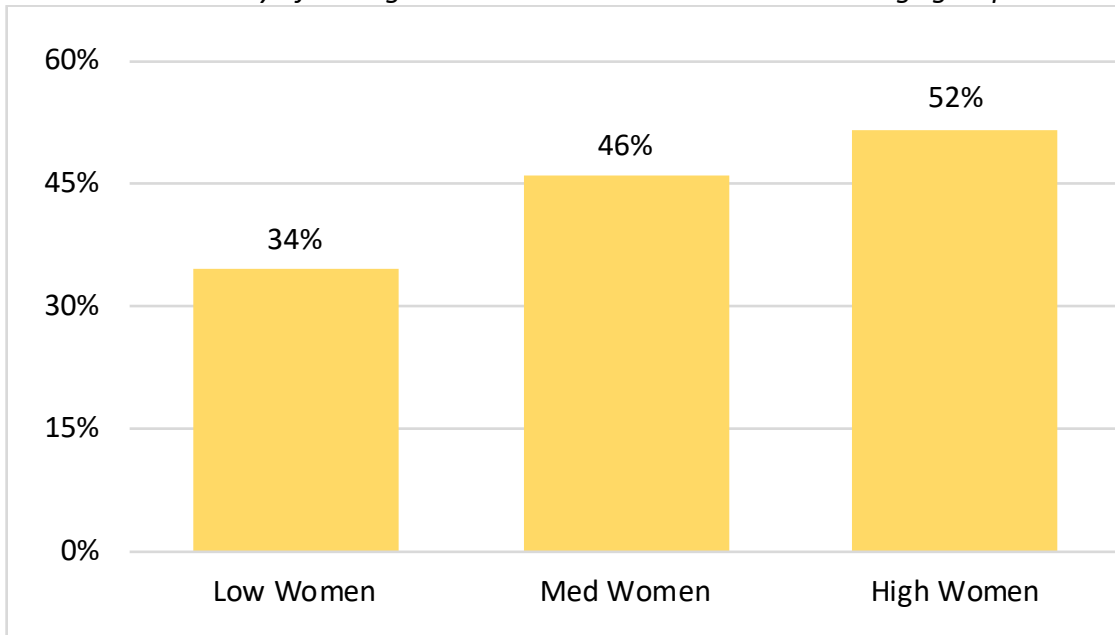
Among the linked groups in Rwanda, the range of outstanding loans to financial service providers is between 620 and 640k. The amount of outstanding financial services provider loan does not vary by group composition, proximity to bank or savings level of group.

Individual Bank Accounts

We have MIS data from the Rwanda savings groups that allows us to explore how group linkage might be influencing individual linkage to financial service providers. At endline, about 51% of members of linked savings groups have some type of account with an external financial services provider. The strongest group characteristic that predicts individual account ownership is the group gender composition. As we have seen with many of the trends we looked at, the more women in the group, the more likely any of the members have individual external accounts.

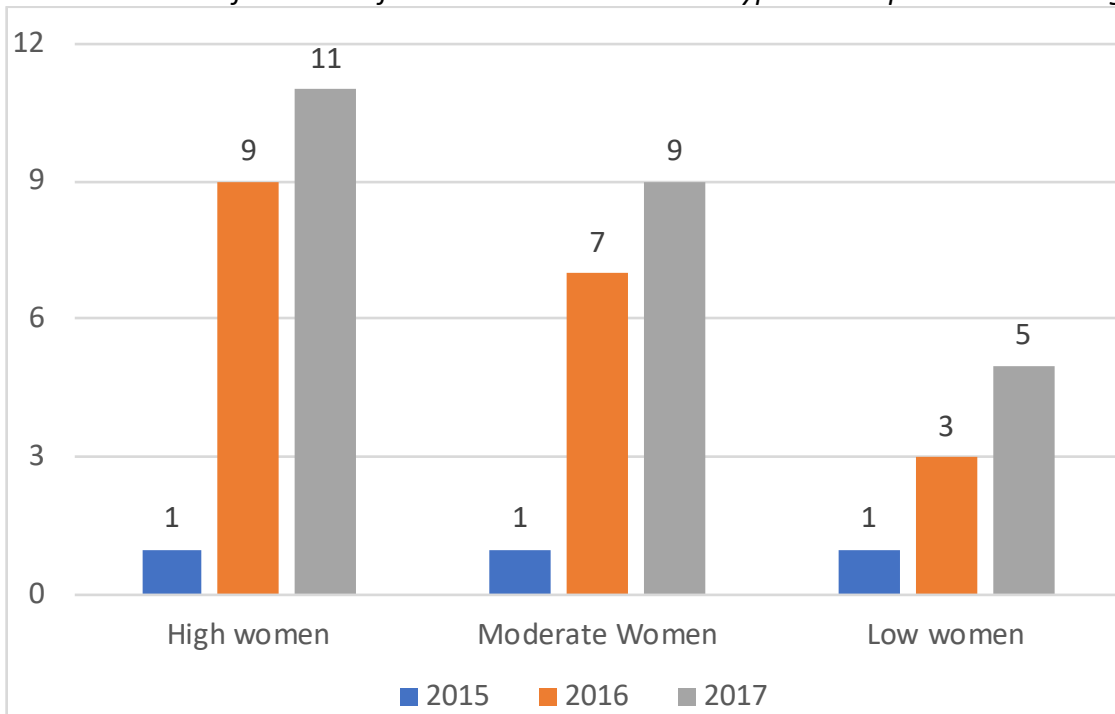
When looking at the success of linkage work via adoption and usage of individual bank accounts we see a large uptick in the number of linked group members opening a bank account. In 2014, only 19% of members in Rwanda and 3% of members in Cote d'Ivoire had a formal account. By 2017, this had grown to 42% for Rwanda and 19% for Cote d'Ivoire. A majority of the bank accounts are opened by women.

Chart 32: Probability of having an individual account – Rwanda savings groups



High proportion of women = More than 85%; Moderate proportion of women = Between 70% and 85%;
 Low proportion of women = Less than 70% women.

Chart 33: Count of Number of Women with Accounts in Typical Group– Rwanda savings groups



High proportion of women = More than 85%; Moderate proportion of women = Between 70% and 85%;
 Low proportion of women = Less than 70% women.

Mobile Money

There has been a gradual evolution of the use of mobile money within the savings groups. Within Rwanda, which is the only country in which we have enough reliable data, the rate of mobile money use has grown steadily over the course of the project.

Table 7: Mobile money usage distribution

Year	Percent Groups Using MM for group transactions	Percent of groups with members using MM	Percent of Groups with members with MM accounts
2015	4.8%	50%	45%
2016	7.7%	70%	66%
2017	8.0%	79%	77%

The Rwanda MIS data also includes information on the level of group access to mobile money. Groups with more mobile money users have more savings. For typical groups, they have approximately 12k local Rwanda currency in savings within their savings group for every additional mobile money user the group has. The use of mobile money also is related to the bank balance. For typical groups, they have approximately 3k local Rwanda currency in bank balance within their savings group for every additional mobile money user the group has.

Mobile money access has a strong relationship with total group savings when looked at by proximity to financial service provider. Groups who are farther than 20km away from a financial service provider have much higher levels of total savings for each additional mobile money user they have within their group. The addition of mobile money to a group that is quite far from a financial services provider can increase that group's savings by 19k in local Rwanda currency.

Chart 34: Increased amount total savings (USD) for increased mobile money by proximity to bank



This effect is even stronger for distant groups when looked at by group gender composition. For groups that are over 20 km from a financial services provider, the group gender composition effect is quite strong. For these distant groups with a low proportion of women, access to mobile money only increases the average total savings by 1k in local currency. For these same proximate groups with moderate amounts of women, the total savings increases by 15k in local currency with increased access to mobile money. Most dramatically, for distant groups with high proportion of women, access to mobile money increases the average total savings by 60k in local currency.

However, access to mobile money seems to have no effect on the Return on Savings or Return on Assets of the group.

Access to mobile money also seems to have no relationship with the dormancy of the account. The dormancy rates are nearly identical for groups who use mobile money and those who do not.

Conclusion

The savings and loans groups taking part in the POWER/PROFIR project have experienced many positive developments during their participation. Returns and savings per member increased regardless of whether the group was linked to a formal financial institution. This consistent progress represents successful maturation of the groups.

Nonetheless, linked groups far outperformed unlinked groups in most metrics. In Rwanda, linked groups are earning a return on savings that is 57% higher than unlinked groups. In Cote d'Ivoire, linked groups are earning a ROS that is 85% higher than unlinked groups. Return on assets follows a similar trajectory.

When looking at the characteristics that further drive performance in linked groups, we see that group characteristics like the percent of women members, attendance, and financial literacy can make big differences in certain cases. For instance, among linked groups in Rwanda, groups with a high proportion of women have a return on savings that is 173% higher than groups with a low a proportion of women. For Cote d'Ivoire, the influence of women's participation is not quite as strong.

A similar trend is evident for attendance, linked groups with above 85% attendance in Rwanda had a return on assets that was double that of linked groups with less than 85% attendance. In Cote d'Ivoire, the return on assets does not vary widely by attendance among linked groups.

When looking at the success of linkage work via the usage of the linked bank accounts, we find that older groups use their accounts slightly more – however the relationship is not linear. First time groups use their account zero or one time a month. By the time groups have reached their second cycle, they are using their account regularly 1 or occasionally 2 times per month. By the groups' third cycle and beyond, they either go one way or the other. They either stop using their account at all or they use the account regularly, 1 to 4 times per month.

The gender composition of the group impacts the frequency of account use. However, in this case it is the reverse of the trend we usually see. Groups with the lowest proportions of women use their accounts the most frequently.

We have data that allows us to explore how group linkage might be influencing individual linkage to financial service providers. At endline, about 51% of members of linked savings groups have some type of account with an external financial services provider. The strongest group characteristic that predicts individual account ownership is the group gender composition. As we have seen with many of the trends we looked at, the more women in the group, the more likely any of the members have individual external accounts.

These results show that POWER/PROFIR groups are making progress towards the goal of both financial inclusion and decreased gender gaps in access to and use of financial services. Furthermore, groups are able to leverage their link to formal financial institutions to increase their returns and savings.

Appendix A

The indicators Return on Savings and Return on Assets measure the increased yield groups gain from using their savings and assets during the course of their cycles. These calculations are based on the amount of savings a group has, the amount of loans a group has, and the amount of other debts and assets, such as property, that a group has. These amounts, and their relative value to each other, change from month to month within an individual group's cycle. At the beginning of the cycle, there are sometimes less savings and more loans and often near the end of the cycle there are more savings and less loans.

To calculate a Return on Savings and Return on Assets that can be compared across groups, we need to know what the group's savings amount, loan amount, and other debts and assets amounts are at comparable points in time. If all the groups of interest have submitted their data at the same point in their cycle – at share-out, for example, then it is possible to simply do the calculations of Profit/Loss, Return on Savings and Return on Assets directly to get comparable results. However, if the groups of interest have submitted their data at different points in their cycle this is not possible. One group may look like it is achieving very high Return on Savings simply because their data was submitted at a very early or very late point in their group cycle. If we want to calculate comparable metrics from groups whose data has been collected at different points in their cycle, we need to use an estimation algorithm that can take the data from the group, incorporate what we know about trends in relative savings and assets from many groups over time, and use these to calculate the standardized metrics.

The model to calculate these standardized metrics was developed by analyzing the trends of many groups over time. Data from over 11,000 savings groups was used to track the trends of how typical groups trends in savings, assets, debts and property rise and fall with each month of their cycle. These trends were then controlled for key group characteristics such as number of members, property at start, share-out, and gross amount of savings pre-cycle. These models were build using semi-parametric mixed-effects models. These are models that can incorporate curved trends, as financial trends usually are. As well, these models take into account the fact that groups data is being collected over time and groups exist within geographic clusters so that the error terms are not independent. This means that the model takes care of the fact that groups who are in similar parts of the country are more like each other than they are like groups from distant districts.

Once several versions of this model had been built, the Tibshurani method of post-selection inference was used to build a model selection process to find the most stable model across a

wide variety of groups. The Tibshurani method is used to choose the best model among many choices. In these calculations, we have many choices of models due to the high number of variables combined with the high level of variation between groups. Some groups have a lot of savings with high rates of return while other groups have high savings with low rates of return, etc. Different models will fit different subgroups more accurately. We used the Tibshurani method to select the model that is optimal for the highest percentage of groups.

Once the model was chosen, the model was tested on simulated data that was based on the distributions found in the actual MIS data. The model tested to be accurate on over 87% of the cases. In the cases where the model was inaccurate, it was within 5 percentage points of the correct estimate 95% of the time. The model was also tested using a random sample of MIS data from the SAVIX database and was over 90% accurate on data from groups similar to POWER/Profir groups. This is a high level of accuracy in the given scenario of unbalanced data and a complex context. Once the model was confirmed, the POWER/Profir MIS data was used with the model to calculate the Standardized Return on Savings and Return on Investment for each group in the project as well as for the project portfolio as a whole.