Credit Risk Analysis for AgriFinance
A Consulting Report for TechnoServe-Uganda

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A Consulting Report for TechnoServe-Uganda

The Fletcher School of Law and Diplomacy

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Submitted in partial fulfillment of the degree of
Master of Arts in Law and Diplomacy for Manisha Basnet and Yuan-Ting Meng
and Master of International Business for Charlene Hasib
at the Fletcher School of Law and Diplomacy, Tufts University

Under the Supervision of Dr. Julie Schaffner

Acknowledgements

First and foremost, we would like to thank our advisor, Professor Julie Schaffner, whose guidance and advice have been invaluable in preparing this report. Our sincere gratitude is also reserved for Mr. Tim McLellan for connecting us with the TechnoServe-Uganda staff and enabling this consulting project.

Special thanks are due to the Institute for Global Leadership, The Hitachi Center, and the Institute for Business in the Global Context at Tufts University for funding our research trip to Uganda. Our visit would not have been fruitful without the kindness of the TechnoServe farmers who took the time to speak with us and all the people along the way who shared advice and guidance while our research team was in Kampala and Gulu. We would especially like to thank Michael Rothe, Robert Ocaya, and Lara Chattwal of GIZ Uganda; Herbert Kirumda and Samuel Arop of TechnoServe-Uganda; and Mr. Rao, Manager of Crane Bank in Gulu, Uganda. We would also like to acknowledge the contribution of George Olak, at TechnoServe, who assisted in our fieldwork and provided invaluable insights on the local agricultural context.
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I. Introduction

The purpose of this report is to help Crane Bank develop a structured credit evaluation system to lend funds more effectively to smallholder farmers that are members of TechnoServe’s cooperative in Northern Uganda. According to Crane Bank, almost half of the farmers who were given loans defaulted in the first year that the pilot program was implemented because of poor weather and misuse of loan funds. We hope to provide insights that may help mitigate the risk of such widespread default in the long-term.

The lending project is funded primarily by Edun – a fabric company dedicated to fair traded sourcing of raw materials – and RaboBank, a Dutch financial institution. Along with providing subsidized loan funds to Crane Bank, sponsors dictate some of the loan terms that borrowers must accept to receive funds, including a minimum of 1-acre cotton production per farmer. At present, farmer data is collected by TechnoServe and then passed on to Crane Bank for evaluation. Crane Bank’s field officers periodically visit farmers’ plots to verify land ownership and appropriate usage of funds.

Crane Bank’s initial agri-loan pilot program began in the first half of 2013 with loan disbursements to approximately 12,000 member farmers. The program proved difficult to implement given that farmer risk evaluations were done primarily by TechnoServe utilizing mostly demographic data about farmers and their past production yields. This indirect method of credit evaluation by the bank resulted in confusions among borrowers regarding the services associated with loans; farmers had believed that crop insurance was built into the interest rate whereas only life insurance was included. There were also misalignments between farmers’ self-perceived needs and loan restrictions; farmers received loans specifically for crop cultivation, but told our research team that they had occasionally used it to meet other expenses and generally wanted more flexibility regarding usage of fund.

Given the complexity of the current lending program’s evaluation process, and the multiple sponsors and stakeholders involved, streamlining the evaluation process for applicants could significantly improve lending processes and outcomes. This paper aims to help project leaders better understand the credit environment and provide data and recommendations that may help in developing a more systematic approach to lending.

This report is organized into the following sections: Part A: Outline of the characteristics and goals of TechnoServe’s Conservation Cotton Initiative project in Northern Uganda and the lending partnership with Crane Bank, and provides an overview of the farmer cooperative members; Part B: Overview of research survey methodology and results; Part C: Research and analysis based on credit scoring and proven risk mitigation techniques in agricultural contexts; Part D: Recommendations on risk mitigation approaches for TechnoServe.
PART A

This section provides an overview of TechnoServe’s initiatives in Northern Uganda, and the farming characteristics of its cooperative members.
II. TechnoServe Conservation Cotton Initiative

TechnoServe implemented the Conservation Cotton Initiative (CCI) program with an aim to improve the livelihoods of 12,000 cotton farmers in Northern Uganda. The project aims to help farmers increase income from cotton production by providing training on farming, organizing community groups, and broadening farmers’ access to financial services and markets. The project was implemented as a three-year pilot program (2011-2014) and continues to serve farmers in Gulu, Amuru and Nwoya districts of Northern Uganda through loans from Crane Bank.

In order to improve credit access for the farmers, CCI has entered into a partnership with Crane Bank to provide loans to local cotton farmers. The project has also established 90 informal Village Savings and Loans Associations (VSLAs) and trained members to operate these community groups effectively. There are currently 2,700 farmer members in the VSLA, constituting 56% of the 160 farmer groups. The social program also performs Functional Adult Literacy (FAL) training, whereby it provides members with literacy on accurate record keeping, information on market value chain assessment, and health and wellness education — all of which are conducive to improving agricultural productivity.

Additionally, in order to increase productivity and to improve product marketability, CCIU helps organize cooperative groups, called the Producer Business Groups (PBG), in order to enhance smallholder cotton farmer product marketing and help members’ effectively use credit. Member farmers are also organized into Business Service Provider groups (BSP), and receive training to improve the commercial viability of farming. Members of the BSP are also eligible to apply for loans from Crane Bank.

CCI Farmer Production and Sales

CCI programs have 9,534 member farmers spanning across 17 sub-counties in Gulu, Amuru and Nwoya districts in Northern Uganda (as of October, 2013). Women farmers constitute 31.6% of the entire member-base and men represent 68.3%.

<table>
<thead>
<tr>
<th>CCIU Farmer Population location (Total: 6423 farmers)</th>
<th>17 Sub-counties (N: nwoya; A; amuru; G: gulu)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ALERO (N) 403</td>
<td>AWACH (G) 206</td>
</tr>
<tr>
<td>BOBI (G) 468</td>
<td>KOCH GOMA (N) 208</td>
</tr>
<tr>
<td>KOCH ONGAKO (G) 20</td>
<td>KORO (G) 193</td>
</tr>
<tr>
<td>LAKWANA (G) 1211</td>
<td>LALOGI (G) 1091</td>
</tr>
<tr>
<td>LA LOGI (A) 1028</td>
<td>UNYAMA (G) 230</td>
</tr>
<tr>
<td>MEDE (O) 2</td>
<td>ODEK (O) 1158</td>
</tr>
<tr>
<td>ONGAKO (G) 101</td>
<td>PABBO (A) 15</td>
</tr>
<tr>
<td>PA CHO (G) 45</td>
<td>PALARO (O) 611</td>
</tr>
<tr>
<td>PATIKO (C) 132</td>
<td>UNYAMA (G) 230</td>
</tr>
</tbody>
</table>

In the second production season of 2013, 6,423 farmers harvested various combinations of four crops: cotton, maize, beans and groundnuts. Of the participating farmers, 76.5% planted beans and 61.9% planted maize. Groundnut production was undertaken by 61.5% of members. Farmers who opted to produce cotton constituted 47.3% of the population.

**Program location - Gulu District**

Gulu is situated 295 km north of the capital city of Kampala. It is the marketing center of the main agricultural region in northern Uganda, the homeland of the Acholi ethnic group. Based on the 2014 Census, the population count within this region was 443,733. Agriculture remains a major economic activity in this region and over 80% of the population still relies on subsistence farming. Major crops grown are millet, sorghum, maize, upland rice, cassava, sweet potatoes, pigeon peas, sesame, groundnuts, sunflower, soya beans, bananas, cotton and tobacco. Coffee, rice and groundnuts are newer cash crops; traditionally, the region was known for cotton and tobacco production.

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4 Ibid.
Crop Production and Sales

The production and sales data are recorded for 2013 production season two and 2013 sales season one. A predominant part of the entire farmer body (6,423) surveyed for this season harvested one acre or less of each of the four-crop types. Income per kilogram is the highest for bean, followed by groundnut and then maize.

Cotton
3,041 farmers in total planted cotton, with up to 73.6% of the farmers reserving 1 acre of agricultural land for this crop; 11.2% planted 2 acres of cotton; and 10.5% planted 0.5 acre.

Maize
A total of 3,977 farmers took up maize production and as much as 63.4% of them utilized 1 acre of land for this purpose; 24% planted 0.5 acre; 7.6% reserved 2 acres for maize production. Sales prices in 2013 Season 1 range from UGX 50 to UGX 2,500 per kg, the smallest amongst the three years of crop sales data available. Most farmers sold at the price of UGX 600, with price range between UGX 600 and UGX 699 taking 46.2% of the entire pricing spectrum, and followed by 39.2% sold between UGX 500 and UGX 599. Farmers who plant maize receive the lowest price per kilogram compared to producers of other crops.

Bean
Bean production was the most popular among the four crops, with 4,916 out of 6,423 farmers choosing to cultivate this product. Of those who cultivated beans, 67.4% planted one acre and 17.9% cultivated 0.5 acre of land. The price range for bean varies the most among the four crops, with the lowest at UGX 100 per kilogram and the highest at UGX 7,000 per kg. Of participating farmers, 1,561 sold yields at UGX 1,000, constituting 55.7% of the total. Another 33.5% of bean farmers received UGX 1,001 - 1,900 and 8.6% earned between UGX 2,000-UGX 2,500.

Groundnut
Most farmers (60.9%) planted groundnut on one acre of their land; and 24.5% used half acre. Production ranged from 1 kg to 500+ kg. The majority produced less than 200 kg. Among the 3,955 groundnut farmers, 476 of them did not have sales records. Prices spectrum covers UGX 79 to UGX 5,000 per kilogram, while 2,810 farmers were earned
between UGX 1,000 and UGX 2,000. Within this range, 33.7% received the price at UGX 1,500; 19.4% received UGX 1,800 and 11% at UGX 1,100.

We observed that the amount a farmer chose to sell often depended on harvest output. When production was low, a greater proportion of the harvest was reserved to meet household consumption needs.

A previous section outlined the crops planted, the land acre deployed, quantity yielded, and pricing in the first season of 2013. We note that farmers with similar sizes of land and in the same climate zone and cultural communities demonstrate variance in yields, which could be derived from insufficient access to funds needed for output enhancing investments.

**A. TechnoServe – Crane Bank Loan Program Partnership**

Crane Bank (CB) receives low interest funds from Rabobank, which is based in The Netherlands, and Edun, a fashion house that aims to source production inputs sustainably from the African continent. Notably, Edun is co-owned by Bono, lead singer of U2, and Irish activist, Ali Hewson.

CB lends funds that it borrows from Rabobank and Edun at a subsidized interest rate to farmers. In taking out loans, farmers agree to terms restricting funds to investments for agricultural purposes only. In addition, farmers are required to cultivate a minimum of 1 acre of cotton in accordance with the loan terms set by Rabobank and Edun.

Farmers receive loans at 9% interest rate for 6 month loans and at 18% interest for 12 month periods. To penalize non-payment and late payment, farmers are charged 36% per annum on their loan balance starting the day after default. An average loan size is provided to farmers with a land size of 50 to 100 acre. Interest rates for farmers in the area for alternative sources of loans usually cost between 22 - 23%. As of the time of the writing of this report, default rates for the project stands at 50%.

**Loan Process**

Crane bank makes its funding decisions based on loan applications submitted by TechnoServe on farmers’ behalves. TechnoServe creates very basic farmer business profiles, which outline what and how much a farmer produced in the last season. Farmers also fill out CB’s bank loan application form with help from TechnoServe; this form specifies the farmer’s loan request in terms of amount and duration. CB also sends bank
officers to the field to verify the land area cultivated by an applicant through the use of Geographic Information System (GIS) mapping and interviews with neighbors. A loan committee uses the information to decide whether to approve the loan or to reject it.

For CB to verify an application, the cost of document processing per farmer can take up to UGX 80,000, inclusive of advertising fees, GPS mapping, and transactional and educational expenses. The cost of loan processing, therefore, represents a significant portion of amounts borrowed.

To ensure that loans are used exclusively for farming, CB initially distributed funds in three installments corresponding with key times associated with farming. Currently it distributes funds in two installments that are in accordance with the farming season: before planting season so that inputs and preparatory measures can be taken; and secondly before the harvest season. The distribution timing was altered in response to farmers’ requests for larger sum payouts.

In taking out a loan, farmers agree to mortgage some land as collateral with their family’s agreement; to declare number and names of wives/husbands and children, certified by the community; provide ID card of both borrower and guarantors; and possess a financial ID card and security check issued by the national government.

Loan Behavior

Farmer performance is very dependent on weather and the risks derived thereof. Not all farmers grow cotton every year because of their vulnerability to fluctuations in cotton price. Cotton prices have fluctuated from UGX 1,800 in 2011 to UGX 1,008 in 2013. Crop diversification among farmers is therefore rapidly and widely adopted to avoid loss of income. Such behavior though generally positive is not without challenges, including the increasing need of land, labor and greater amount of financing. Many farmers do not cultivate the entirety of their agricultural land because of resource shortages. Repayment among all borrowers, local leaders and PBG chairpersons are not without default record; women and youth generally require more assistance than men.

As mentioned in the previous section, TechnoServe at present disburses loan payments in accordance with key points in the crop production cycle to ensure that loans are used for agricultural purposes only. Farmers claim that the strict timelines and parsing of loans into installments makes it hard for them to make timely investments and from making non-farming purchases that they deem necessary. Farmers told our researchers that if they

Note that in Northern Uganda, land is tribally held and farmers simply are granted permission to utilize a tract of land. Thus, farmers “own” the land but do not possess land deeds or security of ownership.
had received money all at once, they would have been able to plan on a long-term basis, buy in bulk, and make more nuanced and timely planting and harvesting decisions (note: with farming, timing is very important). Farmers also admitted to utilizing at least some portion of loan funds for non-sanctioned purposes, including consumption and payment of existing loan fees. However, CB believes that this installment loan system is important to prevent moral hazard issues whereby farmers use monies for non-sanctioned and non-welfare enhancing purposes.

**Loan Program Limitation**

This section will explore some of the limitations of the agri-lending program in brief - we will explore some of these issues in greater detail in PART D.

We believe that not all participating farmers fully understood what the loan pilot program entailed. Some farmers had believed that the program covered crop insurance, but TechnoServe program staff told us that this was not the case. This reflects the need for enhanced communication to ensure both farmers and bank officials are on the same page. Misunderstandings may undermine the effectiveness of the program and reduce trust between farmers and project officials.

Currently, repayment is roughly at 50%, according to a CB official. The prominent reason for default was adverse weather. The absence of insurance may compromise the effectiveness of the loan program, since farmers are vulnerable to weather conditions.

Currently, CB’s capacity to collect farmer data for first time borrowers is low. CB and other partner-banks may need to increase staffing to develop adequate understanding of agriculture, agribusiness and smallholder livelihood cycles to inform program design.

One of the donors for this project, Edun, mandated cotton cultivation as a requirement for those who accept loans. Farmers who produce cotton, furthermore, might be able to sell their output to Edun, which is a fashion house with a social mission geared towards ethical sourcing for clothing manufacture. However, the low profitability of cotton as compared to other crops in the region puts farmers at a disadvantage.
PART B

This section summarizes the methodology and research outputs of our survey interviews of 44 TechnoServe member farmers who have borrowed funds from Crane Bank.
III. Research Methodology

A. Farmer Survey Collection in Gulu

In order to develop an understanding of cooperative farmers’ capital constraints and to determine possible factors for consideration in credit risk evaluation, our researches conducted in-person interviews and home visits. Data was collected over a two-day period through survey-based interviews with cotton farmers in the Gulu district. Researchers collected basic demographic information, education level, financial and communication patterns, and behavioral insights. All 44 farmers surveyed belong to a VSLA and possess certain similarities in terms of training and credit access since they are all affiliated with TechnoServe’s CCIU program.

The survey was conducted in both English and Acholi, the regional language. Surveyors partnered with local translators and were accompanied by a TechnoServe staff member who was responsible for programs in the targeted areas. Prior to the survey, the VSLA chairman convened member farmers and shared the purpose and process of the interviews, and informed farmers of their right to suspend and withdraw from surveys at any time during the process.

Demographic Data

The average age of the forty-four farmers surveyed was 50.8 years old, with an age range from 20 to 82. Over the surveyed farmers, 66% were men and 34% were women. A typical household size in the area was between six to ten people: 73% of our survey sample falls under this category. Farming is not only the predominantly economic activity, but also remains a way of life: 66% of persons surveyed have been farming for more than 30 years. However, most do not cultivate more than five acre of land.

Education Level

Most of our survey farmers (57%) had attained some level of primary-level education. However, not everyone completed the whole primary education available. About 14% received high school education and 11% attended junior high school. Only 7% of farmers surveyed did not receive any formal education. It should be noted that despite the fact that education is free in Uganda and almost all of our surveyed farmers received a certain level of education, the poor quality of education provided could mean that years of schooling may not be indicative of a certain level of functional literacy and numeracy.
**Financial & Communication Pattern and Behavior**

Physical access to financial institutes is a major barrier due to the distance from the village to the nearest CB branch. Of farmers surveyed, 41% take one to two hours to reach the branch; 34% require more than two hours. Around 66% of farmers interviewed travel by boda-boda (motorbike) as the prevalent method of transportation; followed by 25% on foot; and 16% who rely on buses and taxis; the remainder commuted by bicycle. Farmers told researchers that travel costs (on average) amounted to UGX 20,000.

Of the farmers interviewed, 93% save with VSLA; 45% reported to save through banks; 25% save at home and 9% save by investing in livestock. None of the farmers currently save with an MFI.

Most farmers interviewed borrow funds from formal banks and the VSLA. For our farmers, two major regular payments are children’s school fees and mobile phone service, with both near 100%. Correspondingly, 85% said they possess mobile phone and 14% had easy access to one when needed. Depending on location, fees for pumping water is another regular expense.

We also asked if farmer intended to take out additional loans in the future, and 90% affirmed while 7% said they would assess the situation before making a decision. Farmers reported using loans for five major purposes: purchasing farm tools and inputs (70%); paying for children’s education (67%); paying for health expenses (27%); and livestock and land investments (27%). Other miscellaneous uses include: working capital, leasing land; and consumption. Farmers do not consider taking loans for ceremonial purposes.

At the end of the survey, we asked farmers whether they were aware of anyone who had ever defaulted. We consciously avoided asking whether they themselves were defaulters in order to safeguard against farmers lying in order to avoid social stigma or the fear of potential repercussions. A few of our respondents shared that the reasons for default were adverse weather (resulting in poor harvests) and lack of financial management skills. Another reason that came up was misspending on alcohol consumption.

**B. Survey and Research Limitations**

The survey was conducted within a short-span of time—consisting of only two days. This allowed for interview of a small sample size, consisting of 44 farmers in 3 villages, of the
total cooperative member-base. There were also issues of self-selection since farmers had the option to choose whether or not to participate in surveys.

In addition, the lack of field testing of surveys may have resulted in operational inefficiencies in terms of the relevancy of questions asked and time allocated for interviews to be conducted by researchers. For instance, we asked farmers about the value of their land and the amount they might sell their houses. We learned upon speaking with farmers that local customs and the nature of land ownership (which we will describe more fully in later sections) do not allow for such transactions. The concept of land ownership and sale, therefore, were not present and we found that farmers were offering us widely divergent estimates for home and land valuations that were unreliable.

We wish to provide a caveat that our results may only be applicable for participants of the CCI program. All the farmer groups we interviewed work with TechnoServe and undergo standard training and resources as cooperative members. The high level of heterogeneity among farmers surveyed is therefore inherent and can be reflected upon our results. For instance, the age range in our respondent group tends to be higher; everyone has experience-taking loan with financial institutes and, in this case, with CB.
PART C

This section provides an introduction to credit scoring and an overview of the credit market and approaches to credit risk analysis
III. Financial Inclusion

A. Smallholding Agriculture in Uganda

In Uganda, the agricultural sector’s contribution to GDP has remained steady at around 37% of national output. The sector employs up to 75% of Ugandans and, therefore, is a major area of focus for development initiatives by the government and non-profit organizations. Uganda enjoys warm climate, ample and fertile land and regular rainfall - presenting some of the best conditions for crop cultivation in East Africa. Moreover, agriculture provides nearly all of the country’s foreign exchange earnings, with coffee constituting 19% of total exports.

IFAD adeptly summarizes agriculture in Northern Uganda:

“The agricultural pattern throughout the area is quite homogeneous, with cotton as the main cash crop, and maize, millet, groundnuts, cassava, beans, sorghum and banana as food crops. There is a large cattle population in the region, over one million head, or more than one third of the national herd.”

Most farmers are defined as smallholders, thus cultivate relatively small tracts of land and grow crops for both consumption and commercial purposes. In recognition of the importance of the importance of smallholder farming, the national government and the country’s central bank, The Bank of Uganda, have introduced numerous policies since 2005 to extend credit access to the sector.

B. Access to Finance for Smallholder Agriculture

Agricultural lending provides opportunities for smallholder farmers to improve production outcomes and improve their families’ health and economic outcomes. Khandker and Koolwal (2014) find that although not many households in Uganda report borrowing specifically for agriculture, access to institutionalized credit (especially microcredit) nonetheless leads to investments in agricultural initiatives and substantially

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7 Ibid
improves production outcomes. Studies also indicate that self-financing is not an adequate vehicle for growth given the limited savings that smallholder farmers typically generate after meeting expenses. In fact, Anka (1992) notes that “without credit, agriculture productivity multiplication is impossible”.

Access to credit may allow farmers to increase the scale and efficiency of their production. In Gulu, for example, many smallholder farmers in the TechnoServe cooperative do not cultivate the entirety of their farmland and significant portions remain fallow because of lack of resources and manpower. The ability to purchase or lease farming equipment could help such farmers make better use of their land. Apart from raising living standards and disposable income in the community, funds could be reinvested into productive enterprises. With access to affordable credit, some farmers might over time increase their scale of operations by purchasing or leasing neighbors’ farmlands and further improve upon their socioeconomic status.

Smallholder farmers continue to find it difficult to gain access to formalized lending channels. Access to credit is especially limited in rural areas with poor infrastructure, since such conditions present significant barriers in terms of travel time and access to lending institutions. The lack of commercial appeal and high operational complexity of lending to rural communities means that market solutions are rarely feasible. Instead, local communities must rely on MFIs where they exist. Micro-lenders provide credit as part of a social mission to improve socioeconomic indicators in impoverished communities. Thus MFI model presents a significant challenge in terms of achieving financial sustainability. However, MFIs can improve their likelihood of success by implementing methodologies that are highly efficient and thereby lowering lending costs.

C. Microcredit in Uganda

Microfinance institutions (MFIs) in Uganda have attempted to fill the gap in credit availability to smallholder farmers to some extent. Currently, these micro-loans provide credit access to approximately USD 620 million in loans to almost 540,000 borrowers, which is equivalent to about 3.8% of Uganda’s total population.

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9 Ibid
12 Ibid
Many MFIs operating in Uganda tend to utilize proprietary credit risk scoring models that comprise of the factors discussed in the previous section. Among the methodologies used, we note that composite scores based on behavioral data, psychological tests, judgmental analysis, and demographic and transactional information are used.

Credit data is generally collected directly from the farmer by loan officers, or collected from farmers’ suppliers and service providers (including mobile phone operators and input sellers). In addition to credit risk scoring, micro-lenders such as Root Capital, Accenture, and BRAC-Uganda provide ancillary financial services to help farmers, including financial literacy training to improve relationships with farmers and to help them develop skills and resources that may aid in repayment.

Despite the growth of microcredit over the last several decades, individual lending organizations have struggled to achieve sustainable business models. Tarinyeba-Kiryabwire (2010) notes that a large part of this struggle has been characterized by the paradoxical necessity of charging high interest premium to the poor to compensate for their higher risk but consequently running into adverse selection problems (quality of borrowers decrease as interests increase) that make it difficult for lenders to meet the social mission of providing affordable credit. Even where MFIs have access to subsidized funds through donor channels, they have struggled to pass these on to poor borrowers because of high operational costs fuelled by poor management and lack of adequate infrastructure.

D. Uganda’s Development of a Credit Bureau

In 2011, the Bank of Uganda partnered with a South African private company named CompuScore to develop a credit bureau for the first time in the country’s history. The bureau has led to documentation and development of cogent credit histories for 890,702 individuals and 18,870 commercial firms. The program has been heralded as a success in terms of increasing access to financial services—with ease of credit access increasing since financial institutions can now better evaluate credit risk for those who were before assessable. The existence of a credit bureau also showcases a greater level of institutional and financial sector sophistication and, therefore, contributes to improving Uganda’s

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14 Ibid.
ranking in The World Bank’s Doing Business Report\textsuperscript{15} -- moving from a ranking of 158 in 2008 to 131 in 2014.\textsuperscript{16}

Creation of a formal financial bureau has been an important achievement, but coverage still only extends to 4.9\% of the adult population.\textsuperscript{17} Furthermore, the current credit system lacks transparency, with no laws providing access to credit scores to consumers and with score access being limited.\textsuperscript{18} The CompuScore model is not helpful in terms of increasing credit access for smallholder farmers with no existing ties to the formal financial sector and limited documented credit histories.

However, the creation of the credit bureau indicates a turn towards more institutionalized financial operations and, therefore, may alleviate country-level risk and attract greater investments. Furthermore, the TechnoServe cooperative members possess biometric financial identity cards as part of the national credit bureau program and, therefore, as their formal borrowing history as Crane Bank’s clients increase, they may have more flexibility in terms of gaining loans from other financial institutions.

\textbf{E. Credit Scoring}

A credit score is a numerical representation of an individual’s credit worthiness as determined by analysis of data inputs from credit history records as well as transactional and demographic information. The most widely acceptable and subjective form of credit score is a verifiable and field tested model based on empirical evidence. For such a statistical credit scoring model, the relationships between risk (as a probability) and client characteristics are statistically determined and then weighted by the scoring institution based on their perceived importance of the metric and the statistical relationship between default likelihood and the input (p-value) (Schreiner, June 2002). The result of this weighted mathematical formula is a credit score that indicates the probability-based ranking of creditworthiness; i.e. that an applicant will make timely and full repayments on loans.

\textsuperscript{15} https://www.compuscan.co.za/compuscan-celebrates-5-years-uganda/
\textsuperscript{16} http://www.doingbusiness.org/rankings
\textsuperscript{17} http://www.doingbusiness.org/data/exploreeconomies/uganda/getting-credit
\textsuperscript{18} ibid
The FICO Score: An Exemplar of a Statistical Credit Score

We will use the FICO score, which is the predominant consumer credit score used by financial institutions in the United States, to make lending decisions, as an exemplar of how a statistics-based credit score might work.

The FICO model uses less than 100 variables that are chosen because of their predictive power of repayment risk; the factors are weighted either higher or lower vis-a-vis other factors based on the statistical strength of the measurement. The weights assigned to predictive factors are such that they add up to 100%. For the FICO score, the input categories and their respective weights are as follows: Payment History (35%) + Amounts Owed (30%) + Length of Credit History (15%) + Types of Credit in Use (10%) + New Credit (10%).

While we will refrain from going into granular detail about the FICO score, it is important to note some of the strengths and weaknesses of this statistical credit scoring model. The FICO score is based on a standard set of highly vetted inputs that allows for apples-to-apples comparison of prospective borrowers. Inputs are collected systematically by credit reporting agencies, which update consumer data within 30 days of new information being available. Applicant’s have a right to view their credit score data and financial institutions must provide reason if they are rejected for a loan application. The system is dependent on strong institutional reporting standards and the availability of credit reporting agencies for coverage. It allows for standardization and efficiency in the lending process and, because of consumer protection laws, ensures fairness. Fairness in credit decisions is considered necessary because scoring systems may have strong welfare and social mobility repercussions. Among other things, loans are often used to fund expand businesses, support education goals, and pay for health care needs. Furthermore credit scoring in the United States is standardized to an extent that financial institutions are able to gauge the riskiness of a credit applicant based on the score without any direct personal contact.

The strict standards embodied by the FICO score is difficult to fully implement even in the United States which has a highly developed financial sector. It is unusable for individuals who have thin files (two or fewer trade lines) or lack credit histories altogether. Thus, a fully statistical model may not be possible in rural Uganda where there are significant resource constraints and limitations on data availability.

BancaMia – Exemplar of Credit Scoring for Microfinance

BancaMia is a for-profit bank in Colombia that issues unsecured loans to micro and small enterprises introduced a credit scoring system that significantly improved productivity in the loan approval process and improved allocation of credit without affecting average loan amounts and default rates.

Prior to the introduction of credit scores, BancaMia made credit approval decisions using information about the prospective borrowers, collected by its loan officers. A credit committee would approve and reject applications that incorporated the collected information. In some difficult cases, the credit committee would either postpone their decision until further information was collected or refer the application for further review to upper-level managers. This loan approval process very much fell under the discretion of the committee and was very expensive due to the high number of referrals and rounds of information collection. BancaMia developed its own credit scoring software “to improve identification of the best and worst clients, decentralize the loan approval process, and reduce the labor costs involved in the loan application evaluation.”

The credit score is calculated using historical information in the credit applications to predict the repayment performance of prospective borrowers. Bancamia used verifiable client information - both quantitative (age, gender) and qualitative information of the applicants to generate data.

The use of credit score increased the probability of the review committee reaching a decision by 4.6 percentage points. The computer-generated credit scores reduced uncertainty about borrowers’ creditworthiness, thus allowing banks to provide appropriately sized loans to risky and riskier borrowers. Hence, while the average loan size issues remained unchanged, the bank was able to match its lending to borrower characteristics. Loan outcomes, such as the average size of loans issued or default rates among borrowers were not affected as a result of credit score. Since bank’s productivity improved significantly, Techno Serve should adopt the credit score method, to potentially reduce the cost of administering loans for the bank, thereby granting credit more responsibly and sustainably.

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F. Score Calculation Models for Micro-lenders

The USAID Credit Scoring Handbook (“the handbook”) breaks down credit scoring models for micro-lending into 3 types:\textsuperscript{21}

- Statistical: empirically derived from data on past loans;
- Judgmental: structured from expert judgment and institutional experience; and
- Hybrid: some cross of statistical and judgmental techniques.

\textbf{FIGURE 2: MODEL SELECTION DRIVERS}


According to the handbook, the biggest determinant of an organization’s scoring approach is “quality and quantity of historical data available” and secondly the flexibility and direction of future operations. As data quality and quantity increases, the organization can move from judgmental to more statistically oriented analytical methods. Therefore, alongside collecting systematic data and records, the lender will initially rely more on loan officer judgments, available transaction and demographic data, and qualitative interviews of prospective borrowers’ acquaintances. As a transactional history develops, the organization can move towards a hybrid model. Regressions will thereafter need to be run to determine directionality and p-values connecting the event of loan

default to the risk factors collected. USAID summarizes the benefits of starting out with a judgmental model.\textsuperscript{22}

For a judgmental model, no advanced statistical knowledge or software is necessary in the discovery phase. Instead, a panel of credit decision makers should discuss which factors guide their current decisions. One technique is to rank the risk factors used in the credit review process according to their perceived importance in determining a client’s creditworthiness. Consultants may provide advice during this process, but the bank and the MFI’s staff should contribute actively since they generally have an intuitive in depth knowledge of their client base.

Micro-lenders in rural agricultural contexts tend to utilize a blended model that consists of judgmental analysis by program officers of an individual’s credit-worthiness alongside demographic and credit history data where feasible.

Part D

This section contains our recommended next steps for TechnoServe and Crane Bank with respect to its lending project in Northern Uganda. We also offer potential tools and considerations that may facilitate the move to a systematic risk evaluation approach.
IV. Recommendations and Next Steps

A. Credit Scoring Approach

In general, we believe that a systematic credit scoring approach has potential benefits that could improve lending to smallholder farmers. Credit scoring systems help to streamline the lending process and improve loan officer efficiency by putting in place a standard set of data points of interest. Operationalizing a standard credit scoring system helps reduce human bias in the lending decision and allows the bank to adjust credit terms and interest premia based on risk classification. Those with superior credit scores could, for example, be subject to less follow-ups from bank officials and have access to higher credit limits.

Having a consistent credit scoring system - over several years - might allow an MFI to better estimate what proportion and characteristics correlate with likelihoods of certain payment behaviors, such as tardiness or non-payment, and allow the institution to better estimate potential write-offs. Credit scores can also reduce time spent on collections since effective scores enable better lending decisions, which consequently reduce the need for collections officers to make repeat visits for collections and helps them prioritize visits to those who are at higher risk of defaulting.

In rural contexts and with limited resources, we believe that a hybrid model is perhaps the most feasible. We recommend that TechnoServe and Crane Bank begin the work of collecting and maintaining databases on farmers and train staff accordingly. Understanding local contexts and holding a long term programmatic outlook are arguably essential in determining which factors and credit risk evaluation approaches would best optimize lending processes and outcomes.

We recommend that TechnoServe and Crane Bank develop credit risk analysis metrics that are based on qualitative and judgmental assessments, but with the aim to gradually work in more statistical analysis as an individual’s credit history record develops. Moving to a fully empirical model will depend on the quality and quantity of data and record keeping facilities available.

We also recommend that TechnoServe continuously monitor its risk exposure and ensure that this remains at an acceptable level. For example, if a portfolio consists of a specific village, the organization should evaluate its Portfolio at Risk (PaR) on a monthly basis. This is calculated by dividing the outstanding balance of all loans with arrears over 30

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days (or other relevant time frame), plus all refinanced (restructured) loans, by the outstanding gross portfolio as of a certain date.24

i. Empirically Verified Predictive Factors

This section will outline potential factors that TechnoServe and Crane Bank may consider as potentially useful when collecting data to generate a credit risk model. These inputs have been found to be empirically predictive of borrower credit risk in a variety of other rural agricultural contexts. However, we note that contextual analysis is of great importance in determining which data points are included. Considerations in determining data will include pragmatic issues of data availability and verifiability. In addition, based on the literature, we believe that there is a steep learning curve for small MFI projects. As a result, learning will likely occur as the project’s time investment in Northern Uganda increases. Therefore, we hope that TechnoServe and Crane Bank will consider the recommended data points below simply as a starting point in thinking about which factors to utilize.

*Predictive Data Table*25 26 27 28 29

<table>
<thead>
<tr>
<th>Predictive Data</th>
<th>Explanation from Literature</th>
</tr>
</thead>
<tbody>
<tr>
<td>Years of Schooling</td>
<td>Schooling is generally associated with more patience, but the correlation between education and risk attitude is less clear</td>
</tr>
<tr>
<td>Number of Crops Grown</td>
<td>Households in the unimodal zone villages are on average more risk-averse, more loss-averse and less patient than the farmers from other zones</td>
</tr>
<tr>
<td>Farming Expertise</td>
<td>The greater a farmer's technical knowledge of farming, the better the likelihood of output and lower the risk of default</td>
</tr>
<tr>
<td>Existing Indebtedness</td>
<td>Higher levels of existing debt may constrain ability to pay for additional loans and generally makes an applicant riskier</td>
</tr>
<tr>
<td>Mobile Top-up History</td>
<td>Delinquencies on mobile-phone bills were 60 percent more predictive of eventual small-loan defaults than were delinquencies on loans from other banks</td>
</tr>
</tbody>
</table>

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### Payment of School Fees
Regular and timely payment indicates responsibility on part of applicant.

### Payment of Utilities
Regular and timely payment indicates responsibility on part of applicant.

### Loan Use: Investment vs Working Capital
Loans for working capital may be riskier than those for investment. In addition, investments in machinery may be used as collateral for future loans.

### Reputational Factors
Default risk decreases as length of farmer's relationship with bank increases.

### Age
Delinquency Probability Typically Increases with Age.

### Contractual Terms and Cash-flows between Borrowers and Suppliers
Contractual terms and resulting cash flows between small businesses and their key suppliers was extraordinarily predictive. With a Gini coefficient of 35, this factor compared favorably with the best variables offered by developed-market credit bureaus.

### "Psychometrics" or tests of Trustworthiness
Psychological questionnaires based on the concept that those who are less trusting are more likely to themselves be untrustworthy. Utilized by Harvard EFL - technology and capacity constraint.

### Voice Biometric Test to Weed Out Gaming of Questionnaire
Utilized by Harvard EFL. Technology Dependent - may not be feasible in terms of cost and technical expertise required.

### Land Size (Food Crop Land Size/Total Land Size)
Subsistence farmers are riskier than commercial farmers. As area of farmland used for food crop decreases, risk of default also decreases.

### Expected Net Income (based on historical data)
As Net Income ratios (Net Income/Debt) increases the risk of default decreases.

### Cropping Intensity(fraction of cultivated area that is harvested)
As cropping intensity increases, risk of default decreases.

### Personal Guarantees
Guarantors reduce adverse selection and moral hazard but they are unlikely to honor their liability if they also asset losses. Therefore, personal guarantees are effective in reducing drought risk if guarantors are less exposed to drought than borrowers.

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**ii. Challenges to Credit Scoring**

*Resource Intensive:* Credit scoring is a more technical approach than simply relying on loan officers’ judgements. This process carries significant cost and may require more technical expertise than an MFI has in place. Because statistical scores (and even quasi-statistical scores comprising of judgmental factors) are often reliant on trends in credit history along with meticulous record keeping, so there is a time lag before they can be
implemented. In order to develop a workable credit risk model, an MFI must be willing to invest both time and money into a project.

**Susceptible to Fraud:** Credit risk models must be safeguarded from possible gaming or cheating by loan applicants. The strength of a credit score is reliant on the predictive strength of inputs used. Analysts must therefore ensure the credibility of inputs utilized and safeguard against possible manipulations and outright fraud when inputs are not independently verifiable. For example, questions measuring a potential applicant’s integrity might be gamed, especially as applicants determine the underlying logic behind evaluation metrics.

**Errors in Risk Analysis:** Statistics based Credit scoring inherently carries some standard error that implementers must be comfortable with. This margin of error is likely to be even greater in a rural context given data reliability issues and the learning curve involved. The incorporation of judgmental analysis increases the potential for error even more. This margin of error might mean that Crane Bank rejects some portion of farmers mistakenly as too high in terms of credit risk even though they are not, in fact, risky applicants. Generally, the higher the requirements and standards for creditworthiness (potentially in the form of a high cutoff threshold for scores), the more people will erroneously be rejected as too risky.  

The degree of risk Crane Bank is willing to take on and the balance between its social mission – to improve livelihoods through financial inclusion versus the financial sustainability of the project – will need to be weighed in determining acceptable cut-off margins.

### iii. Lack of Documentation

Unlike formal economies, smallholder farmers in the Gulu region transact in the informal economy and therefore have little bill trail, rental payments and energy utility payments, from which to capture data to draw analytics. To drive financial inclusion nontraditional data need to be gathered from diverse sources together to generate meaningful insights of low-income borrowers especially first-time users. This is because first time smallholder farmers from Gulu:

- Do not have a record of past borrowing behavior
- Debt capacity is difficult to measure as they engage in cash transaction, have no formal savings or registered assets
- Dependent on farming for income that is inconsistent by nature

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iv. Data Access

The datasets that are needed could be owned by entities (telecommunication companies or educational institutions) that may have little incentive to share the data. These entities may also lack trust in third parties owing to legitimate data security concerns.

B. Systemic Risk Factors

TechnoServe’s choice of operational location depends on non-commercial factors, including the economic need of local inhabitants and preferences of donors. Because of these reasons, systemic risk analysis is not a primary focus of this report. We provide a brief overview in this section because we feel that understanding of systemic risk might become important in the future as the organization seeks to expand its lending base.

Systemic risk scores evaluate the lender’s target market and may comprise considerations of country-level risk as well as more localized risk exposures. Research by Munro and Yuki (2014) demonstrate that risk levels can vary tremendously even within Uganda. The country consists of numerous climate zones which define the variety and types of crops and vegetables that can be productively cultivated. Considerations of systemic risk are generally precursors to entering a market to gauge whether the payoffs are palatable to investors’ given risk appetites.

While there are numerous risk factors that could be considered in evaluating systemic risk, we include a few such considerations:

Weather: Higher risk aversion in uni-modal villages may stem from over-dependence on fewer crops and greater risk of low-rainfall, which makes farmers reluctant to implement business changes since they may perceive farming as a zero-sum game – at least, in comparison to farmers in multi-modal villages.

Moreover, lenders themselves may be more concerned about covariate risk in villages that are over-dependent on a single crop. A pest infestation specific to root vegetables, for example, may destroy all harvests of affected species; for multi-modal villages, which may also grow other crop varieties, the risks are smaller.

Commodity Price Volatility: Based on conversations with TechnoServe cooperative members, we find that smallholder farmers lack negotiating powers and are price-takers in the marketplace. Agricultural outputs are commodity goods and this means that farmers are vulnerable to price declines of primary crops. Diversification, once again,
may provide some protection against such market risk since price effects are generally crop-specific and may not be have positive covariance with other crops cultivated.

**Distance to Town and Road Conditions:** Based on research by Yuku and Munro (2024), these two metrics are related and have empirically been proven to impact the viability of a microlending project. As distance to town increases and road conditions decrease, the mobility of a community becomes consequently constrained. This limits their access to markets and support institutions and increases the likelihood of default.

**Number of Crops Grown Locally:** Diversified agricultural outputs are generally considered better than areas that are more limited in their output. Yuki and Munro (2014) distinguish between uni-modal villages - which have scarcer and more erratic rainfall - from multi-modal villages which have more diversified farming. Their research concludes that the uni-modal villages are generally riskier because farmers tend to be “risk-averse, more loss-averse and less patient” - all of which are detrimental to productive use of loan sums.

**Number of Schools in the Locality:** According to Yuki and Munro (2014), the number of schools in a community is positively correlated with credit-worthiness. This is likely the number of schools may serve as a proxy for educational attainment. This number may also indicate the extent of reinvestment and growth in a community.

**C. Additional Risk Mitigation Techniques**

In addition to credit scoring, there are a number of efforts that MFIs including Crane Bank and TechnoServe can take to mitigate default risk. These potential approaches are outlined below:

**Portfolio Diversification**

Smallholder farmers sometimes find it difficult to borrow because of a generalized perception among commercial financiers that agricultural lending is inherently riskier than lending in other sectors. Klaus (2014) finds that this view is false; consumer level credit risk is not greater for smallholder farmers than equivalent borrowers in other industries.\(^ {31}\)\(^ {32}\) He does acknowledge that agri-farming is particularly and acutely

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32 Maurer, Klaus. “Where is the risk? Is agricultural banking really more difficult than other sectors?.” *Finance for Food.* Springer Berlin Heidelberg, 2014. 139-165.
impacted by changes in exogenous factors. When a pest infestation or adverse weather event occurs, most farmers within a locality suffer widespread damages that might negate the entirety of their profit for that planting season; and, worse - such an event might put farmers in a debt trap as interest accrues amidst financial hardships. For lenders, this could mean wholesale default from borrowers.

MFIs could be forced to shut down under such conditions if their asset-base is not sufficiently diversified to mitigate against shock events. Research, however, supports that such portfolio risk can be mitigated through diversification within a particular portfolio area or by expanding lending to other “agro-climatic regions” and populations. Please note that we consider each village/locality to constitute an individual portfolio. Credit scoring might aid in this diversification process by allowing institutions to estimate risk for a “portfolio”, thereby allowing institutions to selectively combine portfolios that have an overall low covariance. For TechnoServe and Crane Bank, this might mean, for example, a blended borrower portfolio that includes farmers that grow root vegetables and cotton (such as in Gulu) alongside lending to another farming community that specializes in drought resistant crops and is located in a separate climatic zone. Diversification has been a longstanding approach in the financial industry to reducing investment risk.

Repayment Incentives

Although the TechnoServe and Crane Bank lending project requires that farmers post collateral, the project organizers have told our team that they do not plan to collect land or other collateral even in the event of loan default. This is understandable given that such confiscations might take away the main form of livelihood and otherwise cause unusual hardships on locals. To complicate matters further, land ownership in Uganda is retained by the tribal clan and individual members are simply given the rights to work and live on tracts; grazing areas and water resources are owned jointly by community members. Thus, there is no absolute security of land tenure and MFIs, as a result, cannot confiscate land in the event of default as a matter of law.

However, without confiscations or similar means of penalizing defaulter and enforcing loan contracts, the MFI opens itself to a potentially financially untenable situation in which farmers treat loans as “free” money. Moreover, cooperative farmers generally have few assets apart from the land they cultivate, but the land itself does not technically belong to the farmer.

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In order to avoid this problem, strong relationship building and mechanisms to provide incentives for timely payment (perhaps through extensions of credit lines) are crucial. Continuation of loan access has been found to be an adequate incentive to induce loan repayment in some contexts. Empirical studies have found that lenders and trading counterparties have successfully used reputational factors and built on community ties, trust, and moral norms as an effective mechanism to incentivize repayment of loans. These relationship factors have been proven successful and allows for effective (if imperfect) operation even in areas with subpar law enforcement, high levels of corruption, and institutional shortcomings.

Crane Bank might attempt to capture the potential benefits of interpersonal accountability building in a number of ways, including: (i) increasing transparency of loan payment information; and (ii) developing a stronger and more direct relationship with the borrower community. Because reputational factors have been proven useful to ensure repayment, greater transparency about loan payment could result in social sanctions in terms of reputational loss when an individual defaults on repayment. It is generally acceptable among lenders that as a relationship with a borrower increases (in terms of time), the risk of credit default decreases. Crane Bank might consider opening a branch office with consistent working hours at least once a week in the local community in order to develop stronger interpersonal relationships between farmers and bank representatives. Relatedly, studies also demonstrate that creditworthiness increases as the distance to the bank decreases. Such a center would allow farmers to ask questions in order to clarify loan terms. This might be useful since, during our conversations with farmers, we found that some had mistakenly thought that crop insurance was built into the interest rate premia. Following harvest failure, however, farmers learned that the additional 1.5% in interest was for life insurance and did not, in fact, provide a safety net for poor agricultural production. We found that farmers were frustrated and disappointed with the misunderstanding. Easier and direct access to bank channels may help ease such miscommunications and create an interpersonal bond that might increase the probability of repayment.

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Agricultural Insurance

Another challenge that TechnoServe - as well as other micro-lenders - faces is the difficulty of lending to farmers in the absence of crop insurance. This is particularly true in Uganda, which is vulnerable to occasional drought and a lack of irrigation facilities and technical understanding of such issues by smallholder farmers. Furthermore, the bulk of agricultural crops grown in Uganda are “rain-fed” and the March-May rainy season is of prime importance to farmers in Northern Uganda, and this rainy season has seen shrinkage in recent years; this makes TechnoServe cooperative members vulnerable to climate change.

Crop insurance typically is purchased by farmers in order to provide a safety net in the event of certain exogenous shocks, including inclement weather and market events that may destroy value of harvests. Such insurance could help farmers smooth out consumption and protect against financial shocks. However, the events that would cause crop insurance tend to affect many, if not all, farmers in a locality and cause huge amounts of damage all at once. Covered shock events require large cash injections from insurance companies that may not have sufficient liquidity to provide characterized adequate recompense for damages incurred. This is in contrast to auto-insurance, which is by statistically predictable and steady stream of pay-outs for a particular pool of borrowers. Agricultural insurance, therefore, is not feasible in Uganda unless reinsurance arrangements that allow the primary coverage provider to hedge against risk by selling part of their payout liability to another insurance firm can be organized.

In Uganda, which is prone to droughts, agricultural insurance is arguably a necessity to ensure sustainable lending. For some smallholder farmers, harvest failure might become a life or death matter, especially without recourse to crop insurance or other safeguards. Binding and inflexible loan terms might increase feelings of hopelessness among borrowers in such situations. This worst-case scenario has been played out in India recently, where farmer-suicides in indebted communities has become commonplace. To prevent similar issues in Uganda, MFIs should consider ways to improve credit risk assessments and to develop contingencies to prevent undue burdens on borrowers in the aftermath of a shock event.

However, insurance providers are not very active in Northern Uganda for commercial reasons. TechnoServe tells us, “Crop insurance is not provided, because insurance service

http://www.swissre.com/reinsurance/insurers/agriculture/

providers do not see much value/return on investment, especially for smallholder farmers. We even struggled to get animal insurance for ox-plough entrepreneurs.”

Cash Flow Analysis

In addition to developing credit scores, the IFC recommends that a microlender gain significant insight into the cash flow of the borrower-household to ensure that payment deadlines match with household’s cash flows. If a household’s annual income is considered on an annual basis, there might be problems with repayment when there are mismatches in timing of income inflow and due dates. Farmers tend to have uneven income streams; they tend to be cash poor during the production season and receive the bulk of their income from sales after harvest. An example of such an approach includes Financiera Confianza’s AgroMix product, which allows for irregular loan payments based on the borrowing household’s earnings patterns--and flexibility in lending terms seems to be a common trend in agri lending.

TechnoServe at present disburses loan payments in accordance with key points in the crop production cycle to ensure that loans are used for agricultural purposes only. However, farmers told our researchers that such limitations restricted their ability to make timely purchases of farming inputs. We also found that farmers admitted to utilizing at least some portion of loan funds for non-sanctioned purposes, including consumption and payment for loan fees.

42 Ibid.
V. Conclusion

As we have noted throughout this document, credit scoring is a resource intensive endeavor that requires long-term commitment by lenders that often operate in resource constrained areas with low institutional development and scarcity of formal documentation. In such an environment, it is often contingent on the lending institution to create databases of predictive inputs from scratch and engage in partnerships with third parties that may have verifiable and useful information. For TechnoServe and Crane Bank, this may involve partnering with local schools and mobile operators to collect data on bill payment.

While credit scoring can result in significant improvements in efficiency and engender better repayment outcomes, it is perhaps best paired with other risk mitigation strategies. The issue of collateral is one that abounds in Northern Uganda where land deeds are not held by farmers who simply farm and live off land owned by tribal leaders. In this context, we believe that relationship building and developing workable incentives may yield better repayment outcomes.

We believe that credit scoring may help the lending project become more cost effective in the long-term, so more sustainable, which may help attract donors seeking to invest in projects that have been proven to be effective. This approach is also timely since the development sector as a whole has shifted to more empirically verifiable and systematic approaches to program design.

Moreover, we believe that credit scoring may reduce default rates in the long term as Crane Bank learns to better identify and rule out riskier individuals. Through better lending, investments by the community may grow, and with such growth, the collateral (farming equipment and machinery) owned by the community may grow as well. Longer-term investments in the community (a necessary factor for credit scoring in this context) may also allow for greater relationship building and the growth of mutual trust and cooperation, which, again, will lubricate lending decisions. Thus, we believe that investing time and resources into enhancing credit availability and risk analysis now may make lending to this community an easier and more worthwhile endeavor in the future.


VI. Appendixes

Appendix 1 - Abbreviations

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
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<tbody>
<tr>
<td>BOU</td>
<td>Bank of Uganda</td>
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<tr>
<td>CB</td>
<td>Crane Bank</td>
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<td>CCIU</td>
<td>Conservation Cotton Initiative</td>
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<tr>
<td>FAL</td>
<td>Functional Adult Literacy</td>
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<tr>
<td>GDP</td>
<td>Gross Domestic Product</td>
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<tr>
<td>GIS</td>
<td>Geographic Information System</td>
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<tr>
<td>GIZ</td>
<td>Deutsche Gesellschaft für Internationale Zusammenarbeit</td>
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<tr>
<td>IFAD</td>
<td>The International Fund for Agricultural Development</td>
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<tr>
<td>IFC</td>
<td>International Finance Corporation</td>
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<tr>
<td>MFI</td>
<td>Microfinance Institutions</td>
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<tr>
<td>NGO</td>
<td>Non-Governmental Organizations</td>
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<tr>
<td>PBC</td>
<td>Producer Business Groups</td>
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<td>UGX</td>
<td>Uganda Shilling</td>
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<tr>
<td>USAID</td>
<td>United States Agency for International Development</td>
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<tr>
<td>USD</td>
<td>United States Dollar</td>
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<tr>
<td>VSLA</td>
<td>Village Savings and Loans Associations</td>
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</table>

Appendix 2 - Glossary of Key Terms

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
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<tbody>
<tr>
<td>Agricultural cooperative</td>
<td>A farmers' co-op, is a cooperative where farmers pool their resources in certain areas of activity</td>
</tr>
<tr>
<td>Collection officers</td>
<td>A person form a particular institution that has been assigned to handle collecting on a debt that has not been paid by the person who owns that account</td>
</tr>
<tr>
<td>Cooperative farmer</td>
<td>Farmer member belonging to a cooperative group</td>
</tr>
<tr>
<td>Credit Score</td>
<td>A number assigned to a person that indicates to lenders their capacity to repay a loan.</td>
</tr>
<tr>
<td>Crop Insurance</td>
<td>Crop insurance is purchased by agricultural producers, including farmers, ranchers, and others to protect themselves against either the loss of their crops due to natural disasters, such as hail, drought, and floods, or the loss of revenue due to declines in the prices of agricultural commodities.</td>
</tr>
<tr>
<td>Defaulting</td>
<td>Fail to fulfill an obligation, especially to repay a loan</td>
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<tr>
<td>Exogenous Factors</td>
<td>Any factor that are outside the economics model.</td>
</tr>
<tr>
<td>Term</td>
<td>Definition</td>
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<td>-------------------------------------------</td>
<td>---------------------------------------------------------------------------------------------------------------------------------------------</td>
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<tr>
<td>Financial Literacy</td>
<td>The capacity to have familiarity with and understanding of financial market products, especially rewards and risks in order to make informed choices.</td>
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<tr>
<td>Geographic Information System</td>
<td>A computer system that allows you to map, model, query, and analyze large quantities of data within a single database according to their location.</td>
</tr>
<tr>
<td>Hybrid Scoring Model</td>
<td>A credit scoring model that is some cross of statistical and judgmental techniques.</td>
</tr>
<tr>
<td>Informal Financial Institutions</td>
<td>Lending groups that are collectively owned and managed by members. They operate at the community or village level and are able to function with greater flexibility in rural areas than commercial banks. A method of approving or denying credit based on the lender's judgment rather than on a particular credit-scoring model.</td>
</tr>
<tr>
<td>Judgmental analysis</td>
<td>A credit scoring model that is structured from expert judgment and institutional experience.</td>
</tr>
<tr>
<td>Lease</td>
<td>A contract by which one party conveys land, property, services, etc., to another for a specified time, usually in return for a periodic payment.</td>
</tr>
<tr>
<td>Micro-lending</td>
<td>The extension of very small loans (microloans) to the unemployed, to poor entrepreneurs and to others living in poverty that are not considered bankable.</td>
</tr>
<tr>
<td>Portfolio</td>
<td>A collection of investments all owned by the same individual or organization.</td>
</tr>
<tr>
<td>Portfolio at Risk</td>
<td>Refers to loans that are late in their repayments; it is the universal measure for quality of a loan portfolio.</td>
</tr>
<tr>
<td>Risk Mitigation</td>
<td>Taking steps to reduce adverse effects</td>
</tr>
<tr>
<td>Risk-Averse</td>
<td>A risk averse investor is an investor who prefers lower returns with known risks rather than higher returns with unknown risks.</td>
</tr>
<tr>
<td>Smallholding farmers</td>
<td>The term ‘smallholder’ refers to the farmer's limited resource endowments relative to other farmers in the sector. In favorable areas with high population densities they often cultivate less than one ha of land, whereas they may cultivate 10 ha or more in semi-arid areas, or manage 10 head of livestock. Their characteristics differ by country and farming system zone.</td>
</tr>
<tr>
<td>Statistical Scoring Model</td>
<td>A credit scoring model that is empirically derived from data on past loans</td>
</tr>
</tbody>
</table>
Appendix 3 - Glossary of Key Players

<table>
<thead>
<tr>
<th>Term</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accenture</td>
<td>Accenture provides management consulting, technology and outsourcing services</td>
</tr>
<tr>
<td>Bank of Uganda</td>
<td>It is the Central Bank of the Republic of Uganda.</td>
</tr>
<tr>
<td>BRAC-Uganda</td>
<td>It is an MFI in Uganda. BRAC works with people whose lives are dominated by extreme poverty, illiteracy, disease and other handicaps.</td>
</tr>
<tr>
<td>CompuScore</td>
<td>Uganda's first credit bureau-based scorecard</td>
</tr>
<tr>
<td>Crane Bank</td>
<td>Crane Bank is a commercial bank in Uganda. It is one of the commercial banks licensed by the Bank of Uganda, the national banking regulator.</td>
</tr>
<tr>
<td>Credit Bureau</td>
<td>A company that collects information relating to the credit ratings of individuals and makes it available to credit card companies, financial institutions, etc.</td>
</tr>
<tr>
<td>Edun</td>
<td>A fashion brand founded by Ali Hewson and Bono in 2005 to promote trade in Africa by sourcing production throughout the continent.</td>
</tr>
<tr>
<td>FICO score</td>
<td>A person's credit score calculated with software from Fair Isaac Corporation (FICO)</td>
</tr>
<tr>
<td>Financiera Confianza</td>
<td>A microfinance institution based in Peru</td>
</tr>
<tr>
<td>Micro Lenders</td>
<td>The practice of granting small loans to those in need</td>
</tr>
<tr>
<td>Microfinance</td>
<td>Microfinance is the supply of loans, savings, and other basic financial services to the poor.</td>
</tr>
<tr>
<td>Microfinance Institutions</td>
<td>A microfinance institution (MFI) is an organization that provides microfinance services. MFIs range from small non-profit organizations to large commercial banks.</td>
</tr>
<tr>
<td>Rabobank</td>
<td>A Dutch multinational banking and financial services company headquartered in Utrecht, the Netherlands.</td>
</tr>
<tr>
<td>Root Capital</td>
<td>A non-profit social investment fund operating in poor rural areas of Africa and Latin America</td>
</tr>
<tr>
<td>TechnoServe</td>
<td>TechnoServe is an international nonprofit that promotes business solutions to poverty in the developing world by linking people to information, capital and markets.</td>
</tr>
<tr>
<td>Village saving and lending association</td>
<td>A group of people who save together and take small loans from those savings</td>
</tr>
</tbody>
</table>

Systemic Risk

The risk of collapse of an entire financial system or entire market, as opposed to risk associated with any one individual entity, group or component of a system, that can be contained therein without harming the entire system.
Appendix 4 – Bibliography


http://www.doingbusiness.org/data/exploreeconomies/uganda/getting-credit


Maurer, Klaus. "Where is the risk? Is agricultural banking really more difficult than other sectors?." Finance for Food. Springer Berlin Heidelberg, 2014. 139-165.


