# 6123 - Corporate Finance in Global Firms

Group Assignment

Instructions:

- This third milestone has the purpose of stimulating a discussion about the trade-off between financial return and impact discussed in sustainable finance.
- Please submit a report (e.g., main results, answers, and graphs) in PDF, and provide the auxiliary Excel spreadsheet and programming code.
- Deadline: see Canvas.

## Milestone III

Read the case 'Root Capital and the Efficient Impact Frontier' available on Canvas and open the accompanying Excel file 'Loan_portfolio.xslx'.

## Excel Tips

Your Excel file has two sheets. The first sheet, "Full Set of Possible Loans," includes 200 loans from which to choose in constructing your portfolios. These reflect real loans in Root Capital's portfolio in 2015, anonymized and simplified for this purpose. You choose a loan for a portfolio by clicking or writing "Yes" (or copying and pasting "Yes") in columns A-E of the first sheet. The second sheet, "Portfolio Dashboard," auto-calculates and displays indicators of the aggregate impact and financial performance of whichever loans you chose in the first sheet. Not every financial and impact indicator will be used; they are there for students that wish to explore further on their own.

- To sort data based on one column, click on the arrow in row 2 of that column.
- To sort data based on multiple columns go to "Data" on the control Ribbon, and click on "Sort." You can "add levels" as needed using the button on the top left of the pop up box.
- There is space to create five distinct portfolios. If you wish, you can use this space to compare multiple portfolios side by side.

Detailed definitions for each column can be found in the Simulation Glossary found at the end of this document.

## Exercise 1

Root Capital is in the process of allocating up to USD 2.5 million. Your team has already screened and pre-selected a set of 200 loans as given in the attached Excel file. Root Capital can follow various ESG strategies, from traditional investment to philanthropy. Your task as loan officers at Root Capital is to find what the optimal allocation is under each strategy and compare their return and impact. After answering each of the questions below, fill in the summary table on the last page.

Note that loans can only be granted in full, and Root Capital uses the Expected Net Loan Income as a measure of financial return (column AC), not the return as a percentage of the capital invested.

1. **Traditional Investment**: How should Root Capital allocate up to USD 2.5 million if it wants to maximize financial return?
2. **Positive Screening**: How should Root Capital allocate up to USD 2.5 million if it wants to maximize financial return, conditional on loans that reach at least 50 female farmers and employees (column W)?
3. **Integration**: Root Capital can integrate the number of female farmers and employees directly into a combined return function, which is the sum of the financial return plus USD 2 per female farmer and employee reached by the loan. How should Root Capital allocate up to USD 2.5 million?

4. **Impact Investment**: Under Impact Investment, greater importance is placed on social impact. Therefore, Root Capital can integrate each female farmer and employee by a factor of 5 into the analysis (i.e., USD 5 per female farmer and employee reached by the loan). How should Root Capital allocate up to USD 2.5 million?

5. **Philanthropy**: How should Root Capital allocate up to USD 2.5 million if it wants to maximize social impact, as measured by the number of female farmers and employees reached by the loan?

Briefly describe the method that you used to perform the optimization problems above.

## Exercise 2 - Programming Task

*Note: This part of the assignment is slightly more advanced and requires programming skills. If you are not proficient in programming, I highly recommend collaborating with your group to harness collective knowledge, engage in learning, practice, and ultimately address the task at hand.*

In this second part, you are required to identify the Efficient Impact Frontier. This frontier traces the optimal trade-off between social and financial value creation. Evidence of this trade-off must have become clear in Exercise 1.

Using programming or statistical software (e.g., R, Python, Stata, ...), generate 10 million random combinations of loans (out of the 200 possible loans) up to USD 2.5 million of total loan amount. After you randomly draw each combination, make sure the total loan amount does not exceed USD 2.5 million, and save the corresponding Total Expected Net Income and the Total Female Farmers and Employees Reached.

Plot each loan portfolio on a graph with 'Total Female Farmers and Employees Reached' on the horizontal axis and 'Total Expected Net Income' on the vertical axis. Using different colors, add the portfolios that you identified in Exercise 1 to this plot.

What can you say about the Efficient Impact Frontier?

# Glossary of Data Definitions

*Loan Additionality*

- **High Additionality**: If Root Capital didn't make this loan, the business likely could not get a loan for this purpose on similar terms from any lender. These loans create new social value for recipients in addition to being aligned with investors' values.
- **Medium Additionality**: If Root Capital didn't make this loan, the business likely could get a loan for this purpose on similar terms from a subsidized lender, but not a commercial lender. These loans are aligned with investors' values.
- **Low Additionality**: If Root Capital didn't make this loan, the business likely could get a loan for this purpose on similar terms from a commercial lender. These loans are aligned with investors' values.

*Environmental Vulnerability*

- **Climate Change Hotspot**: Region where agriculture is expected to be severely impacted by climate change, resulting in significantly (5%+) shorter growing periods; and/or high temperatures (above 30C) that will reduce crop suitability
- **Biodiversity Hotspot**: Region contains exceptional levels of biodiversity and is threatened by significant degradation
- **Soil Degradation Hotspot**: Region experiencing significant pressure on chemical and/or physical components of soil health
- **Water Scarcity Hotspot**: Region with "extremely high risk" of water scarcity

*Environmental Performance*

- **Certified**: Business has an active environmental certification, e.g. Fair Trade, Organic, Rainforest Alliance, Utz etc.
- **Planting & Maintaining Trees**: Business is planting or sustainably managing trees, promoting biodiversity conservation and carbon capture
- **Clean Tech**: Business employs clean & appropriate tech for reduced emissions and resource efficiency

*Poverty*

- **Extreme Poverty**: Farmers and/or agroprocessing employees live on less than $2.50 per day
- **High Poverty**: Farmers and/or agroprocessing employees live on $2.50 - $4 per day
- **Moderate Poverty**: Farmers and/or agroprocessing employees live on more than $4 per day

*Social Performance*

- **Food Security & Nutrition**: Business sells food into local markets to improve food security
- **Gender Inclusive**: 30%+ farmers and/or employees are women; OR business is woman-led and 20%+ farmers and/or employees are women
- **Livelihood Improvement**: Business provides services that are likely to improve farmer and employee livelihoods
  - Paying prices to farmers that are 10%+ higher than the local market price
  - Providing technical assistance to over 50% of farmers to improve yield and quality
  - Paying wages that are 20%+ above local minimum wage or paying 10%+ above minimum wage and providing benefits to employees
  - Making small loans to over 25% of farmers and/or agroprocessing employees
  - Providing public goods to over 25% of farmer communities (such as water, electricity, health care)
  - Providing income diversification opportunities to over 25% of farmers

*Financial Performance*

- **Expected Net Income (USD)**: Expected Revenue - (Operating Expenses + Cost of Debt + Cost of Risk)
  - **Expected Revenue (USD)**: Expected interest and fee payments from borrower to Root Capital
  - **Operating Expenses (USD)**: Expected Root Capital loan underwriting, servicing and monitoring expenses
  - **Cost of Debt (USD)**: Projected interest payments from Root Capital to investors for the use of this capital
  - **Cost of Risk (USD)**: Projected losses if loan defaults, multiplied by probability of default
- **(Dashboard only) Average % Probability of Default**: Average weighted probability of default for all loans in portfolio

## Summary Table

| | 1. Traditional Investment | 2. Positive Screening | 3. Integration | 4. Impact Investment | 5. Philanthropy |
|---|---|---|---|---|---|
| Total No. Loans in the Portfolio | | | | | |
| Total Loan Amount | | | | | |
| Loan Numbers in the Portfolio (column F) | | | | | |
| Total Expected Net Income | | | | | |
| Total Female Farmers and Employees Reached | | | | | |
| No. Loans with Negative Return | | | | | |