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Analysis of Microfinance Institutions in the Philippines: 2010-2018

What is Microfinance

Microfinance, also known as microcredit, microlending, and microloans, is the process of lending small amounts of money at low interest rates to new businesses in developing parts of the world. This is in hopes of spurring the country's economic growth. It is commonly believed that the system started in Bangladesh in 1976. An economics professor loaned a group of women $27 to finance their own small business. As a result, they were able to launch and sustain their business along with paying back their professor.

General Facts about our selected country: Philippines

The Philippines, officially the Republic of the Philippines, is located in Southeast Asia. The capital city is Manila. The total population of the country is 101 million people with a GDP per capita of $2,899. This GDP is ranked 148th in the world. The unemployment rate of the country averages 7.1%. About 95% of adults are considered to be literate. The life expectancy for someone in the Philippines is 68 years.

About our dataset

Our dataset focuses on the year 2010. The information in this data set provided the most data points. WE encountered the issue of not finding large enough data that is recent due to the fact that the information is self reported. Some of the different types of microfinance institutions found in our data include banks, rural banks, non-government organizations, and credit unions. The information we decided to focus includes, assets,

operating expense, personnel, financial revenue, return on assets, percent of female borrowers, and average outstanding balance.

Regression Analysis on our Dataset: Operational Self Sufficiency

On our dataset we ran a regression analysis on the operational self sufficiency variable (OSS). OSS is an indicator of how successful an MFI is. As seen below, OSS is the operating revenues divided by the sum of financial expenses, operating expenses, and impairment expenses.

$$\text{OSS} = \frac{\text{Operating Revenues}}{\text{Financial Expenses} + \text{Operating Expenses} + \text{Impairment Expense}}$$

Once the regression analysis was completed, we were able to identify the average outstanding balances and return on assets variables as the best indicators of determining OSS success with 0.0002 and 0.004 p-values respectively. This means that if these two variables are doing well, it is likely that the operational self sufficiency is also. The opposite is also true.

The equation below represents how these variables work with one another

$$OSS = .9888 + (3.1232*ROA) + (0.0002*AOB)$$

Regression Analysis on our Dataset: Portfolio at Risk

In addition to running regression analysis on OSS, we ran a regression analysis on the portfolio at risk variable (PAR). PAR indicates the likelihood of defaulting on the and not paying on time. In the context of microfinance institutions, the higher the PAR value the more likely their borrowers are not going to pay them back.

Once the regression analysis was completed, we identified that none of the variables were statistically significant at the 95% confidence level. This means that none of the p-values were below 0.05. With this in mind, none of the variables successfully predict the PAR value.

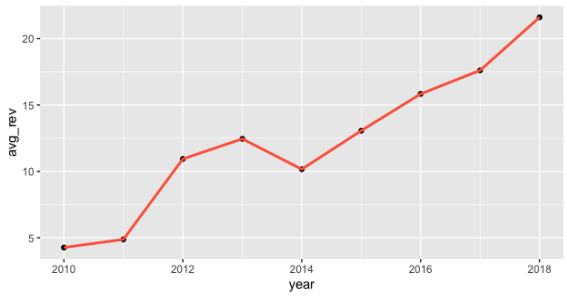
Time Series Analysis on the Forecasted Average Revenue

A time series analysis is a predictive form of analysis over a certain period of time. It is used to quantify the impact of certain events, such as seasonality, on the future outcomes of the variable being studied.

In our study we took the data from 2010 to 2018 to forecast the average revenue of the following year, 2019. As indicated in the chart below, it was forecasted in 2019 that MFIs in the Philippines would make 21.599 million on average.

	year	avg_rev
2010	2010	4.266368
2011	2011	4.878008
2012	2012	10.932224
2013	2013	12.447214
2014	2014	10.159400
2015	2015	13.059967
2016	2016	15.829725
2017	2017	17.604051
2018	2018	21.599232

Showing 1 to 9 of 9 entries, 2 total columns



Simple Moving Average on the Forecasted Average Revenue

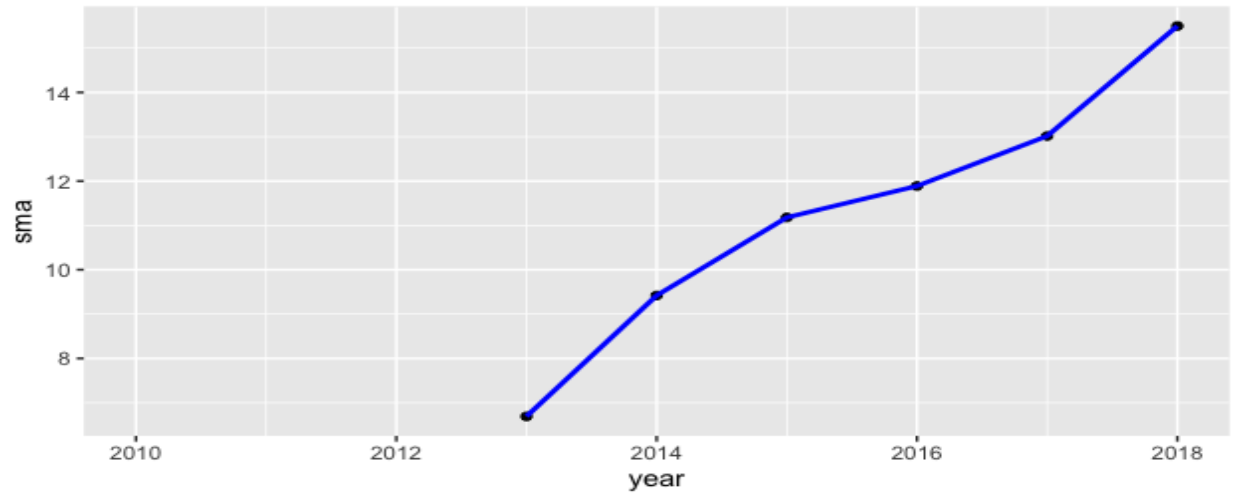
A simple moving average is calculated by taking the average of the set time periods (in our case 3 and 4 years) and calculating the average throughout the time period until reaching the end.

In the chart below, you can see the averages for 3 years and 4 years respectively. The simple moving average of 3 proves better because it is higher than the 4 year moving average.

```
> mean(frev$sqerror4,na.rm = TRUE)
[1] 22.23908
> mean(frev$sqerror, na.rm = TRUE)
[1] 18.50121
>
```

Using the simple moving average from our 4 year time period, we calculate that in 2019 the MFIs in the Philippines will make 18.344 million in revenue. This calculation can be seen in the charts below.

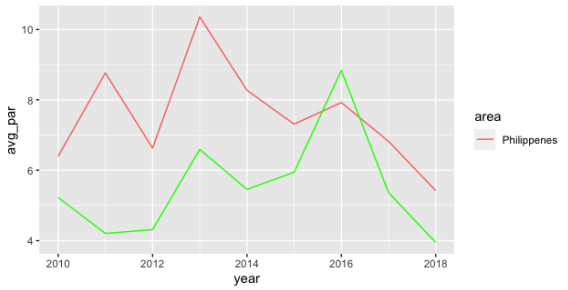
```
> print(sma_frev[9])
[1] 18.34434
>
```



The simple moving average for the PAR values from 2010-2018 can be seen in the charts below.

	year	avg_par
2010	2010	6.397381
2011	2011	8.762667
2012	2012	6.630714
2013	2013	10.355000
2014	2014	8.271379
2015	2015	7.309091
2016	2016	7.923043
2017	2017	6.821000
2018	2018	5.419000

Showing 1 to 9 of 9 entries, 2 total columns



Conclusions

Our regression analysis determined the relationship between our variables and indicated that return on assets and average outstanding balance can help determine the operational self sufficiency. In contrast, none of our variables were significant enough at the 95% confidence level to help indicate whether a portfolio was at risk. In our time series analysis, we found that our financial revenue tended to increase while our portfolio at risk value was constant.

The forecasted revenue for microfinance institutions in the Philippines for 2019 was 18 million which was a 7% increase from the previous year. With this information, it is safe to assume that microfinance institutions up until 2019 were performing well.

References

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Hayes, A. (2023) Simple moving average (SMA): What it is and the formula, Investopedia. Investopedia. Available at: https://www.investopedia.com/terms/s/sma.asp (Accessed: February 24, 2023).

Kagan, J. (2023) Microfinance definition: Benefits, history, and how it works, Investopedia. Investopedia. Available at: https://www.investopedia.com/terms/m/microfinance.asp (Accessed: February 24, 2023).

Mix market (no date) DataBank. Available at: https://databank.worldbank.org/source/mix-market (Accessed: February 24, 2023).

Appendix

```
Solve for regression
# Clear the environment
rm(list = ls())

# Set the working directory
setwd("~/Desktop")

# Read Excel file in R
library(readxl)
dataP <- read_excel("Book1.xlsx")
summary(dataP)

# multiple regression
dataP_model <- lm( OperationalSelfSufficiency ~  Assets + PercentOfemaleBorrowers +
ReturnOnAssets + FinancialRevenue + OperatingExpense + Personnel +
AverageOutstandingBalance, data = dataP)
dataP_model$coefficients # coefficients

summary(dataP_model)
summary(dataP_model)$r.squared # R2
summary(dataP_model)$adj.r.squared # R2

library(rsq)
rsq(dataP_model, adj = FALSE) # R2
rsq(dataP_model, adj = TRUE) # adjusted RR2

summary(dataP_model)


# multiple regression
dataP_model1 <- lm( OperationalSelfSufficiency ~  ReturnOnAssets +
AverageOutstandingBalance, data = dataP)
dataP_model1$coefficients # coefficients

summary(dataP_model1)
summary(dataP_model1)$r.squared # R2
summary(dataP_model1)$adj.r.squared # R2

#### PAR regression analysis ####

# multiple regression
dataP_model2 <- lm( PAR ~  Assets + PercentOfemaleBorrowers + ReturnOnAssets +
FinancialRevenue + OperatingExpense + Personnel + AverageOutstandingBalance, data = dataP)
dataP_model2$coefficients # coefficients

summary(dataP_model2)
summary(dataP_model2)$r.squared # R2
summary(dataP_model2)$adj.r.squared # R2
```

```
library(rsq)
rsq(dataP_model2, adj = FALSE) # R2
rsq(dataP_model2, adj = TRUE) # adjusted RR2


summary(dataP_model2)

# multiple regression
dataP_model3 <- lm( PAR ~  OperatingExpense , data = dataP)
dataP_model3$coefficients # coefficients

summary(dataP_model3)
summary(dataP_model3)$r.squared # R2
summary(dataP_model3)$adj.r.squared # R2

library(rsq)
rsq(dataP_model3, adj = FALSE) # R2
rsq(dataP_model3, adj = TRUE) # adjusted RR2

summary(dataP_model3)
```

Excel Calculations

par.cvs

MFI_frev.cvs

Fembor.cvs

all_par.csv