

EXCHANGE RATE RISK MANAGEMENT

Problem Every remittance and prefunding goes through PIL, resulting in excessive number of transactions and thus subjecting PIL to both exchange rate losses and unnecessary bank charges. Therefore, our objective is to build a forex model to identify which remittance currencies should be converted to the required prefunding currencies to maximise the return of US Dollars.

Methodology

- Understand PIL transaction flow with agents and define the problem
- Conceptualise the idea and identify suitable optimisation methods
- Design the mathematical algorithm using Excel and Python solver
- Extract key information with data cleaning and source for forex rate
- Test and evaluate the new model against the old process

Product Implementation

Mixed Integer Nonlinear Programming

1. Set
 i - Remittance currency associated with the agent
 j - Prefund currency

2. Parameter
 x_{ij} = Exchange rate of currency pair (i, j)
 R_i = Amount required from agent i in currency i
 P_j = Amount of prefunding required in currency j

3. Decision Variables
 x_{ij} = Amount required from (i, j)
 y_{ij} = Binary variable indicating if transaction occurs between i and j

4. Objective function
 $\max \sum_{i,j} x_{ij} + c_{ij} = P_j \cdot y_{ij}$

5. Constraints
 $\sum_{i,j} x_{ij} \leq R_i \quad \forall i$
 $\sum_{i,j} x_{ij} + c_{ij} = P_j \cdot y_{ij}$
 $\sum_{i,j} y_{ij} = 1 \quad \forall i$
 $x_{ij} \geq 0 \quad \forall i, j$
 $y_{ij} \in \{0,1\} \quad \forall i, j$

Excel User Interface

Historical data - Exchange rate extracted from Bloomberg
 Live data - Exchange rate extracted from OANDA
 The rate is scaled by $\pm 0.25\%$ to account for the bid-ask spread.

Future Directions

- Includes predictive analysis of future exchange rate
- Possible Suggestions:
- Holt-Winters Model with Particle Swarm Optimisation
 - Econometric model using a list of possible factors such as GDP, income growth rate etc.
- Potential Benefits
- Ability to delay/bring forward their transaction day if they are expecting the exchange rate to be in their favour
 - Projected to increase amount of savings due to possession of stronger currency

LOAN REPAYMENT PROCESS

Problem PIL manually updates the loan instructions, resulting in outdated repayment schedules or risk of missed/erroneous payments. Hence, our aim is to automate the whole process to allow for real time visibility to verify invoices and better plan for future cash flow.

Methodology

- Understanding the Revolving Credit Facility Loan process
- Gathering user requirements for the software
- Design and implement features incrementally using Excel VBA
- Test and validate the model with treasury team

Product Implementation

View/Edit Loan Details, Extend repayment date, Manual UI, Record History, Analytics, Track changes, Close fully repaid loan, Add new loan

Future Directions To digitalise PIL entire loan portfolio and also to create a database to hold all the information together.

- Potential Benefits:
- Prevent human error for all the loans
 - Increase the team's productivity

Key Skillsets

- Project Management
- Programming
- Process Improvement
- Data Analysis and Visualisation
- Operation Research

INVOICE SUBMISSION TIMELINESS

Problem The agents often take more than 30 days to report their invoices into the Liner Management System. This affects the accounting information used for financial judgement. Thus, our goal is to perform data analysis to identify patterns or trends to allow for better understanding of the timeliness problem.

Methodology

- Understanding the procedures for recording invoices
- Perform data analysis on past records of invoices to extract useful information
- Build two dashboards using Tableau for general overview trends and specific agent ranking

Product Implementation

Raw Data, Process, Data Analysis Findings, Western African countries, Australia and US tend to perform worse relative to other agents

1 Overview Trends Dashboard 2 Agents Ranking Dashboard

This shows the overall performance trends of all agents on a monthly basis. It provides PIL the big picture of the promptness of invoice submission.

This compares the timeliness performance of invoice submission between individual agents on a monthly basis. It allows PIL to empower its agent to perform better.

Future Directions To have data collection of more parameters and to forecast the expenses of individual agents.

- Potential Benefits:
- Identify root cause for timeliness issue
 - Increased accuracy of the accruals