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MBA 614
Section 1

Final Project Report

Executive Summary

Description of Business

At one of my previous employers, I worked extensively with a company that had a significant number of foreign receivables from sales to foreign customers. These foreign receivables exposed the company to foreign exchange risk and created foreign exchange gains and losses that had to be tracked for the company's income statement. This company lacked the resources for a sophisticated accounting system and manually tracked the foreign exchange gain and loss related to these foreign receivables in a separate spreadsheet. Each time the spreadsheet was updated, the user had to search the Internet to find current exchange rates for a number of currencies and recalculate the foreign exchange gain or loss based on the new exchange rates. This process was very repetitive and time consuming and was prone to human error.

Overview of System

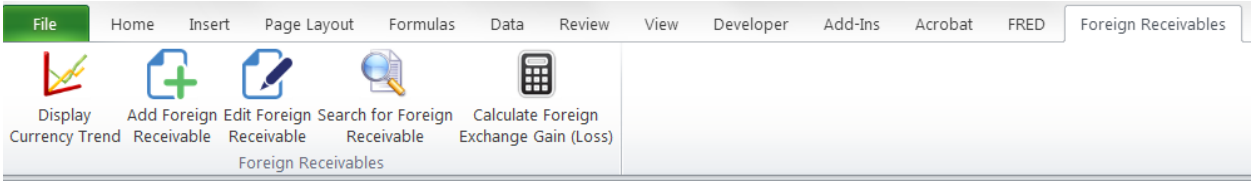
In order to eliminate the need to manually search for exchange rates and remove the error involved in the process of updating the foreign receivables spreadsheet, I designed a system to (1) view currency trends for a user-specified period of time; (2) add, edit, and search foreign receivable records; and (3) automatically retrieve current exchange rates and calculate total foreign exchange gain or loss based on the most current exchange rates.

Implementation

Ribbon Control

In order to implement the above solution, I first modified the ribbon to create a "Foreign Receivables" group of Ribbon Controls that performed the following activities: (1) Display Currency Trend; (2) Add Foreign Receivable; (3) Edit Foreign Receivable; (4) Search for Foreign Receivable; and (5) Calculate Foreign Exchange Gain (Loss) (see **Figure 1**).

Figure 1: Modified Ribbon Control



Each of the above Ribbon Controls initializes a User Form or calls a sub procedure. Below is a detailed description of what is performed by each Ribbon Control.

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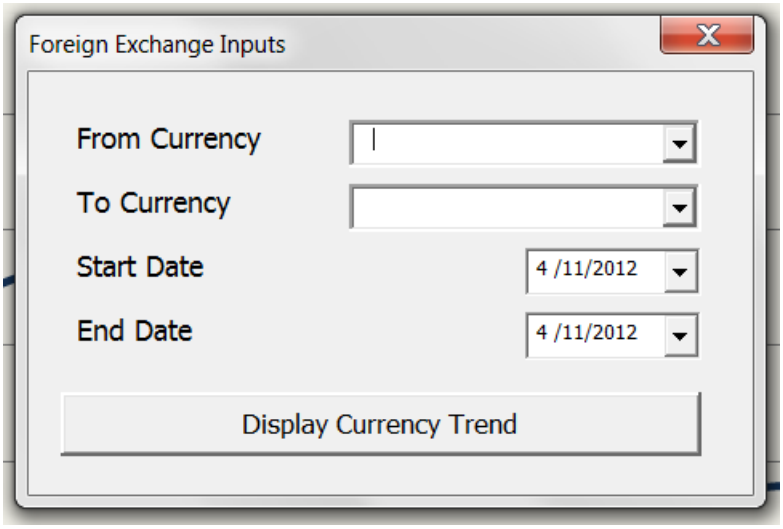
Display Currency Trend

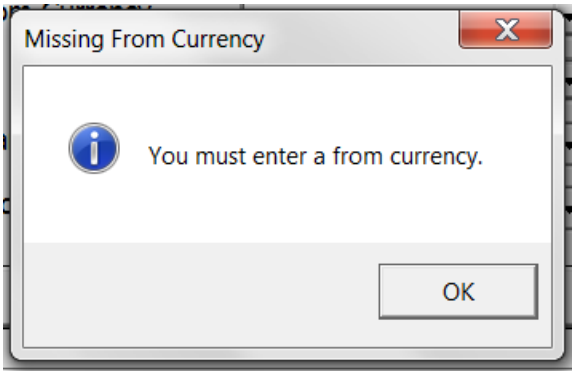
The Display Currency Trend Ribbon Control initializes the frmForex User Form (see **Figure 2**) and activates the "Trend Chart" worksheet.

Figure 2: frmForex User Form



The form allows the user to select one of 24 currencies tracked by the United States Federal Reserve from a Combo Box (uses For Next Loop to add currencies listed on "Currencies" worksheet) and select a start date and end date using the Date Picker control. An If statement with a corresponding Message Box and Exit Sub command forces the user to select a from currency and to currency before continuing (see **Figure 3**).

Figure 3: Input Error Message Box

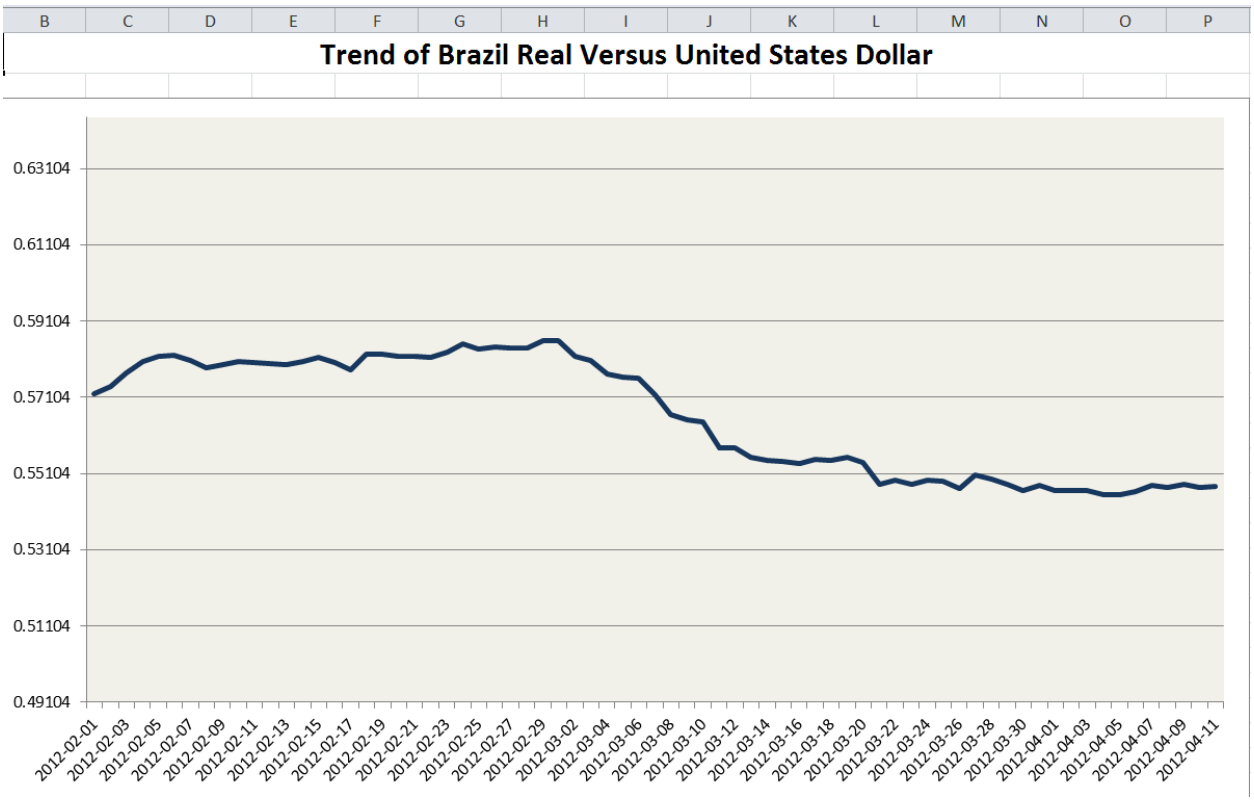


Once the appropriate inputs have been entered, a Web Query is performed to automatically collect foreign exchange rates for the user-selected currency pair and time period. The website www.oanda.com allows for the download of historical foreign exchange rates. The URL string required to accomplish this task has the following form (variables highlighted in yellow):

"http://www.oanda.com/currency/historical-rates/download?quote_currency=" & fromCurrency & "&end_date=" & Year(endDate) & "-" & Month(endDate) & "-" & Day(endDate) & "&start_date=" & Year(startDate) & "-" & Month(startDate) & "-" & Day(startDate) & "&period=daily&display=absolute&rate=0&data_range=c&price=bid&view=table&base_currency_0=" & toCurrency & "&base_currency_1=&base_currency_2=&base_currency_3=&base_currency_4=&download=csv"

By changing the variables, a URL string can be created that downloads a csv file containing the historical exchange rates for a specified currency pair and time period. The data from the csv file is copied to the worksheet named "Trend Data" using Text-to-Columns. Using this data, a chart is created on a worksheet named "Trend Chart" that displays the currency trend for the specified time period. Appropriate formatting is then applied and a dynamic chart title is created (see **Figure 4**).

Figure 4: Currency Trend Chart



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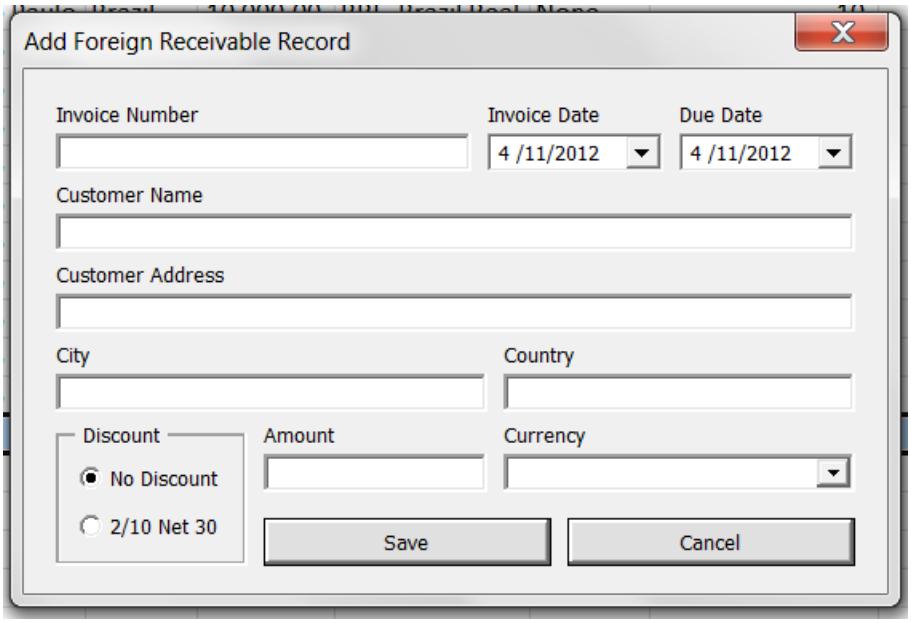
Add Foreign Receivable

The Add Foreign Receivable Ribbon Control initializes the frmAdd User Form (see **Figure 5**) and activates the "Foreign Receivables" worksheet.

Figure 5: frmAdd User Form

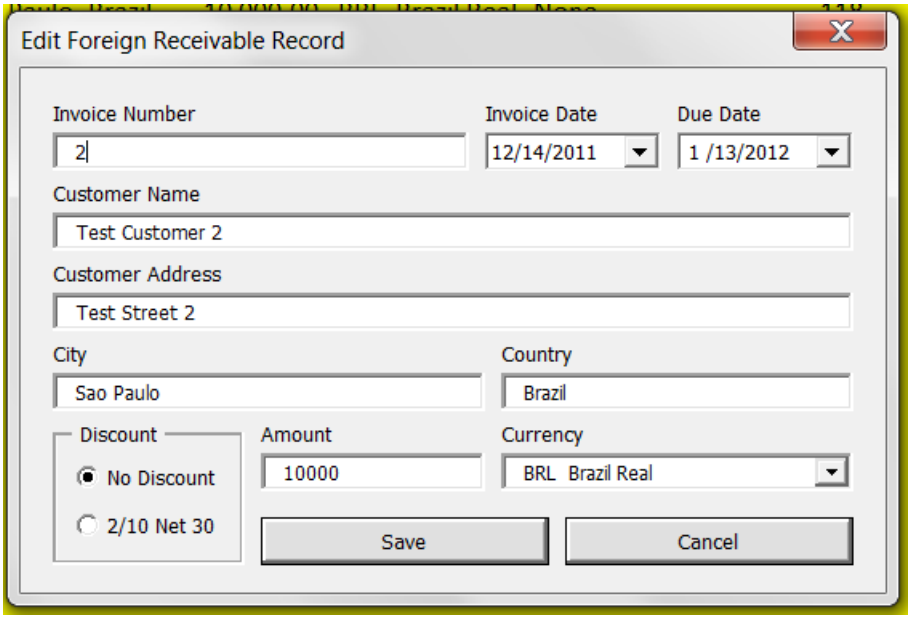


Using appropriate tab indexes, the user can enter Invoice Number, Invoice Date (selected using Date Picker Control), Due Date (selected using Date Picker Control), Customer Name, Customer Address, City, Country, Discount, Amount, and Currency (selected from Combo Box). An If statement with a corresponding Message Box and Exit Sub command forces the user to select at least an Invoice Number, Amount, and Currency before continuing. Clicking on the "Save" command button copies the user-entered information to the corresponding fields in the next available row in the "Foreign Receivables" worksheet, appropriate formatting is applied, and the columns are autofitted to display the information. Clicking on the "Cancel" command button unloads the user form.

Edit Foreign Receivable

The Edit Foreign Receivable Ribbon Control initializes the frmEdit User Form (see **Figure 6**) and activates the "Foreign Receivables" worksheet. When the User Form is initialized, it is populated with the information in the row of the active cell and the entire row is highlighted.

Figure 6: frmEdit User Form

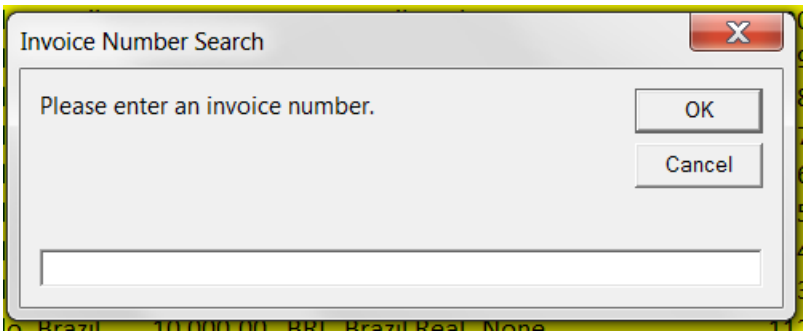


If no information is in the "Foreign Receivables" worksheet, a message box is displayed that notifies the user that there are no records to edit. An If statement with a corresponding Message Box and Exit Sub command forces the user to select at least an Invoice Number, Amount, and Currency before continuing. Clicking on the "Save" command button copies the user-entered information to the corresponding fields in the next available row in the "Foreign Receivables" worksheet, appropriate formatting is applied, and the columns are autofitted to display the information. Clicking on the "Cancel" command button unloads the user form.

Search for Foreign Receivable

The Search Foreign Receivable Ribbon Control calls the invoiceSearch sub procedure and activates the "Foreign Receivables" worksheet. This sub procedure requests input from the user using an Input Box to perform a search based on invoice number (see **Figure 7**).

Figure 7: Invoice Number Search Input Box

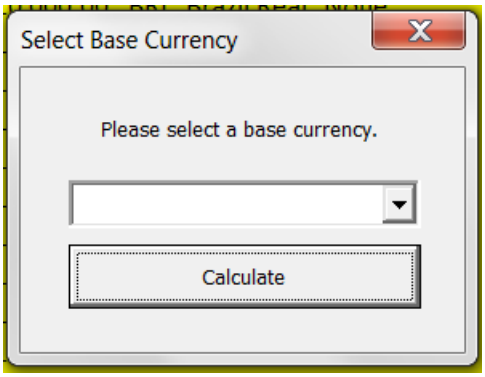


The user must enter an invoice number before continuing. Using an index variable and a For Next Loop, a search is performed on all rows starting with row 3 and ending with the CurrentRegion.Rows.Count in the "Foreign Receivables" worksheet. If a matching invoice number is found, the entire row is selected; otherwise, a message box is displayed indicating no records were found.

Calculate Foreign Exchange Gain (Loss)

The Calculate Foreign Exchange Gain (Loss) Ribbon Control initializes the frmCalculate User Form (see **Figure 8**) and activates the "Foreign Receivables" worksheet. The frmCalculate User Form allows the user to select a base currency from which to base the foreign exchange gain or loss calculations. The user must enter an invoice number before continuing.

Figure 8: frmCalculate User Form

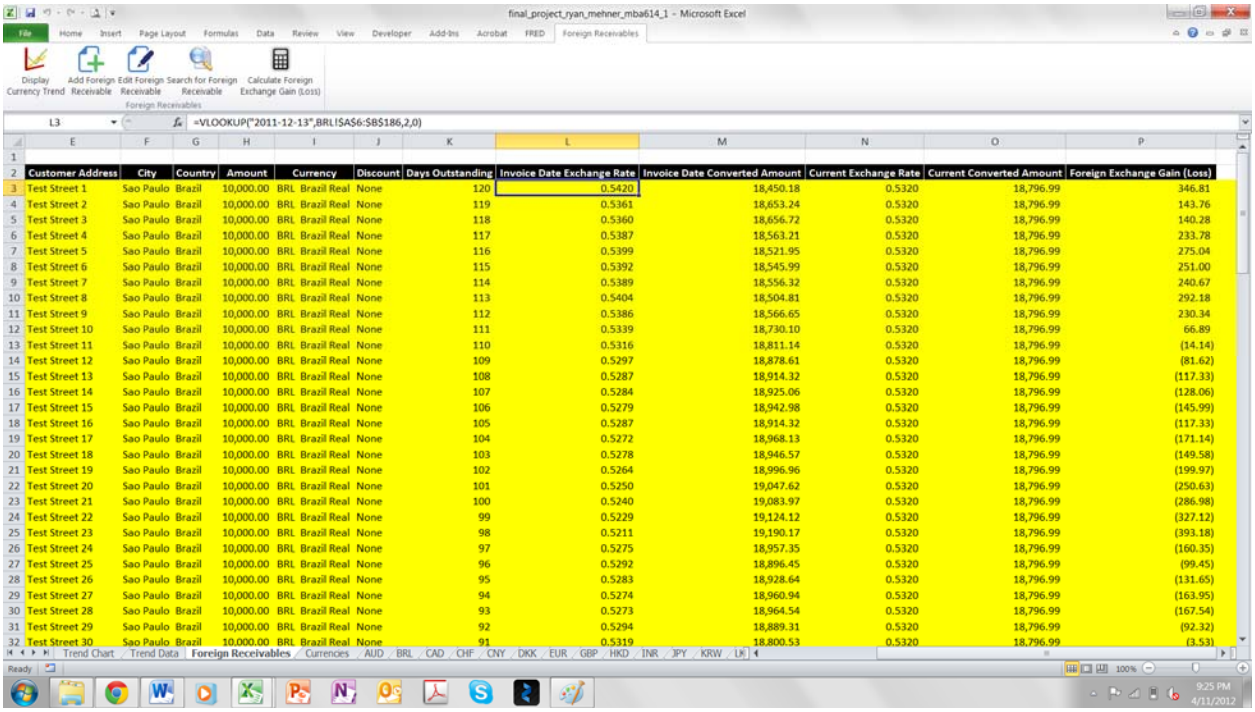


When the "Calculate" command button is clicked, the base currency is copied to cell B2 of the "Foreign Receivables" Worksheet. Using this base currency as the to currency in the URL string described in the Display Currency Trend section above, a For Next Loop loops through all of the currencies in the "Currencies" Worksheet and obtains exchange rates for the last 180 days for all of the currencies and places the data in corresponding worksheets. The first exchange rate listed (cell A6) in each worksheet is the most recent exchange rate. Next, a loop is used to go through each record on the "Foreign Receivables" Worksheet and add the following formulas to each row in the corresponding columns:

```
Sheets("Foreign Receivables").Cells(i, 11).Formula = "=TODAY()-B" & i
    checkDate = Format(Sheets("Foreign Receivables").Cells(i, 2).Value, "yyyy-mm-dd")
    Sheets("Foreign Receivables").Cells(i, 12).Formula = "=VLOOKUP(" & Chr(34) & checkDate
& Chr(34) & "," & fromCurrency & "!$A$6:$B$186,2,0)"
    Sheets("Foreign Receivables").Cells(i, 13).Formula = "=H" & i & "/L" & i
    Sheets("Foreign Receivables").Cells(i, 14).Formula = "=" & fromCurrency & "!$B$6"
    Sheets("Foreign Receivables").Cells(i, 15).Formula = "=H" & i & "/N" & i
    Sheets("Foreign Receivables").Cells(i, 16).Formula = "=O" & i & "-M" & i
```

These formulas calculate the Days Outstanding, Invoice Date Exchange Rate, Invoice Date Converted Amount, Current Exchange Rate, Current Converted Amount, and Foreign Exchange Gain (Loss). For any record with Days Outstanding greater than 60, the entire row is highlighted in yellow (see **Figure 9**).

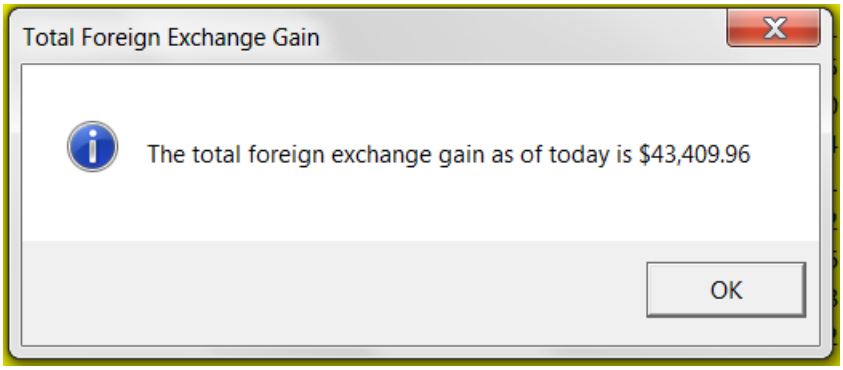
Figure 9: Foreign Receivables Worksheet Calculations and Formatting



Customer Address	City	Country	Amount	Currency	Discount	Days Outstanding	Invoice Date Exchange Rate	Invoice Date Converted Amount	Current Exchange Rate	Current Converted Amount	Foreign Exchange Gain (Loss)
Test Street 1	Sao Paulo	Brazil	10,000.00	BRL Brazil Real	None	120	0.5420	18,450.18	0.5320	18,796.99	346.81
Test Street 2	Sao Paulo	Brazil	10,000.00	BRL Brazil Real	None	119	0.5361	18,653.24	0.5320	18,796.99	143.76
Test Street 3	Sao Paulo	Brazil	10,000.00	BRL Brazil Real	None	118	0.5360	18,656.72	0.5320	18,796.99	140.28
Test Street 4	Sao Paulo	Brazil	10,000.00	BRL Brazil Real	None	117	0.5387	18,563.21	0.5320	18,796.99	233.78
Test Street 5	Sao Paulo	Brazil	10,000.00	BRL Brazil Real	None	116	0.5399	18,521.95	0.5320	18,796.99	275.04
Test Street 6	Sao Paulo	Brazil	10,000.00	BRL Brazil Real	None	115	0.5392	18,545.99	0.5320	18,796.99	251.00
Test Street 7	Sao Paulo	Brazil	10,000.00	BRL Brazil Real	None	114	0.5389	18,556.32	0.5320	18,796.99	240.67
Test Street 8	Sao Paulo	Brazil	10,000.00	BRL Brazil Real	None	113	0.5404	18,504.81	0.5320	18,796.99	292.18
Test Street 9	Sao Paulo	Brazil	10,000.00	BRL Brazil Real	None	112	0.5386	18,566.65	0.5320	18,796.99	230.34
Test Street 10	Sao Paulo	Brazil	10,000.00	BRL Brazil Real	None	111	0.5339	18,730.10	0.5320	18,796.99	66.89
Test Street 11	Sao Paulo	Brazil	10,000.00	BRL Brazil Real	None	110	0.5316	18,811.14	0.5320	18,796.99	(14.14)
Test Street 12	Sao Paulo	Brazil	10,000.00	BRL Brazil Real	None	109	0.5297	18,878.61	0.5320	18,796.99	(81.62)
Test Street 13	Sao Paulo	Brazil	10,000.00	BRL Brazil Real	None	108	0.5287	18,914.32	0.5320	18,796.99	(117.33)
Test Street 14	Sao Paulo	Brazil	10,000.00	BRL Brazil Real	None	107	0.5284	18,925.06	0.5320	18,796.99	(128.06)
Test Street 15	Sao Paulo	Brazil	10,000.00	BRL Brazil Real	None	106	0.5279	18,942.98	0.5320	18,796.99	(145.99)
Test Street 16	Sao Paulo	Brazil	10,000.00	BRL Brazil Real	None	105	0.5287	18,914.32	0.5320	18,796.99	(117.33)
Test Street 17	Sao Paulo	Brazil	10,000.00	BRL Brazil Real	None	104	0.5272	18,968.13	0.5320	18,796.99	(171.14)
Test Street 18	Sao Paulo	Brazil	10,000.00	BRL Brazil Real	None	103	0.5278	18,946.57	0.5320	18,796.99	(149.58)
Test Street 19	Sao Paulo	Brazil	10,000.00	BRL Brazil Real	None	102	0.5264	18,996.96	0.5320	18,796.99	(199.97)
Test Street 20	Sao Paulo	Brazil	10,000.00	BRL Brazil Real	None	101	0.5250	19,047.62	0.5320	18,796.99	(250.63)
Test Street 21	Sao Paulo	Brazil	10,000.00	BRL Brazil Real	None	100	0.5240	19,083.97	0.5320	18,796.99	(286.98)
Test Street 22	Sao Paulo	Brazil	10,000.00	BRL Brazil Real	None	99	0.5229	19,124.12	0.5320	18,796.99	(327.12)
Test Street 23	Sao Paulo	Brazil	10,000.00	BRL Brazil Real	None	98	0.5211	19,190.17	0.5320	18,796.99	(393.18)
Test Street 24	Sao Paulo	Brazil	10,000.00	BRL Brazil Real	None	97	0.5275	18,957.35	0.5320	18,796.99	(160.35)
Test Street 25	Sao Paulo	Brazil	10,000.00	BRL Brazil Real	None	96	0.5292	18,896.45	0.5320	18,796.99	(99.45)
Test Street 26	Sao Paulo	Brazil	10,000.00	BRL Brazil Real	None	95	0.5283	18,928.64	0.5320	18,796.99	(131.65)
Test Street 27	Sao Paulo	Brazil	10,000.00	BRL Brazil Real	None	94	0.5274	18,960.94	0.5320	18,796.99	(163.95)
Test Street 28	Sao Paulo	Brazil	10,000.00	BRL Brazil Real	None	93	0.5273	18,964.54	0.5320	18,796.99	(167.54)
Test Street 29	Sao Paulo	Brazil	10,000.00	BRL Brazil Real	None	92	0.5294	18,889.31	0.5320	18,796.99	(92.32)
Test Street 30	Sao Paulo	Brazil	10,000.00	BRL Brazil Real	None	91	0.5319	18,800.53	0.5320	18,796.99	(3.53)

Finally, the foreign exchange gain or loss is summed and the total is displayed to the user in the form of a Message Box. If the sum is greater than 0, the word “gain” is used in the Message Box; otherwise, the word “loss” is used in the Message Box (see **Figure 10**).

Figure 10: Total Foreign Exchange Gain (Loss) Message Box



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Discussion of Learning and Conceptual Difficulties Encountered

This project was challenging and definitely helped me to solidify and extend my understanding of VBA concepts and applications. I learned that general Excel functions and VBA functions are sometimes different, especially with regard to Date and Time. I also learned how to write formulas into cells, how to include the double quotation character in a string, and received excellent practice in creating and programming user forms. I further learned how to create and manipulate charts in VBA. I felt it was sometimes difficult to proactively think about how a user might cause an input error and create controls in the code to prevent such an error from occurring. VBA is constant trial and error and debugging was a frequently used tool as I worked through my solutions. I also encountered challenges when I forgot to unload User Forms. One of the main conceptual challenges I faced was understanding the URL string components and how I could use variables to change the URL to retrieve different data. It took some time to figure out, but after some diligence, I learned how to use the URL to my advantage. In addition, I encountered difficulty with the user-input invoice date format not matching with the currency data date format. After much struggle, I was able to use the Format function to change the invoice date into the same format as the currency data so my formulas would work in the "Foreign Receivables" Worksheet. I was generally able to work through the difficulties, challenging as they may be, to find a solution for what I was trying to accomplish.

Assistance

I relied heavily upon my knowledge gained throughout the semester, course resources, and the textbook in working through this final project. I asked a couple of questions to some of my classmates to get ideas for solutions, but I did not rely heavily upon them for assistance. I occasionally referred to online resources for specific questions related to certain functions and formatting issues in VBA.