Project 1 – FIN 654 - Spring 1: 2018

Purpose, Process, Product

These practice sets will repeat various `R` features in this chapter. Specifically we will practice defining vectors, matrices (arrays), and data frames and their use in present value, growth, future value calculations, We will build on this basic practice with the computation of ordinary lease squares coefficients. We will leave plots using `ggplot2` to the next practice set. We will summarize our findings in debrief documented with an `R markdown` file and output.

Assignment

Submit into **Coursework > Assignments and Grading > Project 1 > Submission** an `R` script file with filename **lastname-firstname__Project1.R**. If you have difficulties submitting a `.R` file, then submit a `.txt` file.

1. List in the comments (use `#` in front of a string to make a comment) the 'R' skills needed to complete this project.
2. Explain each of the functions (e.g., `rep()`) used to compute results.
3. Discuss how well did the results begin to answer the business questions posed at the beginning of each part of the project?

`R` script set up

1. Open a new `R` script file and save it with file name `lastname-firstname_Project1` to your working directory. The `R` file extension will automatically be appended to the file name. Create a new folder called `data` in this working directory and deposit the `.csv` file for practice set #2 below to this directory.
2. Type in the the following script.

   ```
   # Practice set 1: present value
   (INSERT code here)
   # Practice set 2: regression
   (Insert code here)
   ```

3. Click the "save" icon.

Part 1

Problem

We work for a mutual fund that is legally required to fair value the stock of unlisted companies it owns. Your fund is about to purchase shares of InUrCorner, a U.S. based company, that provides internet-of-things legal services.

- We sampled several companies with business plans similar to InUrCorner and find that the average weighted average cost of capital is 18%.
- InUrCorner sales is $80 million and projected to growth at 50% per year for the next 3 years and 15% per year thereafter.

- Cost of services provided as a percent of sales is currently 75% and projected to be flat for the foreseeable future.
- Depreciation is also constant at 5% of net fixed assets (gross fixed asset minus accumulated depreciation), as are taxes (all-in) at 35% of taxable profits.
- Discussions with InUrCorner management indicate that the company will need an increase in working capital at the rate of 15% each year and an increase in fixed assets at the rate of 10% of sales each year. Currently working capital is $10, net fixed assets is $90, and accumulated depreciation is $15.

Questions

1. Let's project `sales`, `cost`, increments to net fixed assets `NFA`, increments to working capital `WC`, `depreciation`, `tax`, and free cash flow `FCF` for the next 4 years. We will use a table to report the projection.

Let's use this code to build and display a table.

```
# Form table of results
table.names <- c("Sales", "Cost", "Working Capital (incr.)",
    "Net Fixed Assets (incr.)", "Free                                 Cash Flow")
# Assign projection labels
table.year <- year  # Assign projection years
table.data <- rbind(sales, cost, WC.incr,
    NFA.incr, FCF)  # Layer projections
rownames(table.data) <- table.names  # Replace rows with projection labels
colnames(table.data) <- table.year  # Replace columns with projection years
knitr::kable(table.data)  # Display a readable table
```

2. Modify the assumptions by +/- 10% and report the results.

Part 2

Problem

We work for a healthcare insurer and our management is interested in understanding the relationship between input admission and outpatient rates as drivers of expenses, payroll, and employment. We gathered a sample of 200 hospitals in a test market in this data set.

```
x.data <- read.csv("data/hospitals.csv")
```

Questions

1. Build a table that explores this data set variable by variable and relationships among variables.
2. Investigate the influence of admission and outpatient rates on expenses and payroll. First, form these arrays.

Next, compute the regression coefficients.

Finally, compute the regression statistics.

3. Use this code to investigate further the relationship among predicted expenses and the drivers, admissions and outpatients.

```r
require(reshape2)
require(ggplot2)
actual <- y
predicted <- X %*% beta.hat
residual <- actual - predicted
results <- data.frame(actual = actual,
    predicted = predicted, residual = residual)
# Insert comment here
min_xy <- min(min(results$actual), min(results$predicted))
max_xy <- max(max(results$actual), max(results$predicted))
# Insert comment here
plot.melt <- melt(results, id.vars = "predicted")
# Insert comment here plot.data <-
# rbind(plot.melt,
# data.frame(predicted = c(min_xy,
# max_xy), variable = c('actual',
# 'actual'), value = c(max_xy,
# min_xy))) Insert comment here p <-
# ggplot(plot, aes(x = predicted, y =
# value)) + geom_point(size = 2.5) +
# theme_bw() p <- p +
# facet_wrap(~variable, scales =
# 'free') p
```