Casterbridge Case

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Overview

Casterbridge Bank provides investment banking services out of London, England. Throughout the 1980's, Casterbridge took advantage of lucrative market conditions to expand rapidly and profitably–most of which came through the hiring of new analysts. The hired analysts are typically fresh graduates from highly prestigious universities who are ready to meet the strenuous demands of investment banking. These analysts perform long, stressful hours of analysis, research, and support to MBA professional staff on client projects with a very high turnover rate, usually only lasting three years due to strain and stress of the position. Typically, client project demand peaks in the spring and fall, with less demanding break periods in the summer and winter months during which Casterbridge's clients are vacationing. Casterbridge paid little mind to new analyst hiring costs during its rapid 1980's growth, but as the investment banking market has cooled, Casterbridge has been forced to re-evaluate its internal human resources practices and supply management. Recently, Casterbridge hired William and Mary's MSBA team 11 to work in conjunction with one of their prime management employees, Susan, to evaluate how the firm might optimize its hiring process.

Problem Description

Casterbridge's main issue lies in staffing: their current hiring process does not maximize the contribution to company earnings derived from hiring new analysts. Historically, Casterbridge utilized a hiring approach developed by one of its recently promoted employees, Tom Hardy. Tom's approach averages annual client demand for analysts while considering Casterbridge's average attrition and offer rejection rates. Tom's approach uses this information to hire new analysts en masse in the spring. Currently, Casterbridge has found the seasonality of client demand and banker's work ethic means many of their analysts are idling (expensively) in the office during the summer and the winter, but that they are understaffed and overworked throughout the stressful peak fall and spring months. This variability leads to a high attrition rate and impacts the firm's potential profit. Additionally, Casterbridge's management believe Tom's model could be oversimplifying the staffing problem by neglecting to incorporate important external variables, such as English economic conditions, which heavily impact the financial service industry and client's ability to demand new projects. Susan and Team 11 are working to develop a new hiring model that maximizes analyst contribution to Casterbridge earnings and meets customer demand by accounting for a broader range of environmental factors.

Problem Resolution

Team 11 and Susan developed a hiring model optimizing analyst contribution to company earnings by considering seasonal variability, employee salary, economic conditions, a degree of randomness, and other factors on a monthly basis. Below, we describe Tom and Susan's modeling approaches in greater detail and use R to simulate how each would impact Casterbridge fiscally. Ultimately, Susan's flexible, December mixed hiring approach proves most profitable, with her optimal solution being to hire about ~67 analysts for an expected profit of ~$4,070,000. This method will optimize the distributions of Q in July and subject hiring in December to the changing variables including attrition rate, unexpected economic conditions and noise.

Simulation Starts Here

1. Creating constant terms and five matrices to capture simulated results from five different strategies.

```
rm(list = ls())

hist_anlst_demand <- c(105,95,75,70,70,110,105,90,65,80,90,120,105,95,75)
excess_cost <- 6000
shortfall_cost <- 3600
base_contribution <- 4000
offers_to_make <- seq(10, 110, 1)
offers_to_make_tom <- 98
result_mtx_fix <- matrix(NA, ncol = 101)
result_mtx_tom <- matrix(NA, ncol = 101)
result_mtx_flex <- matrix(NA, ncol = 101)
result_mtx_fix_d <- matrix(NA, ncol = 101)
result_mtx_flex_d <- matrix(NA, ncol = 101)
```

2. Substituting each different number of offers into the model to compute the contributions to earning. At each offer number, we run the simulation 1000 times with each time having a new set of distributions (normal distribution for unexpected economic growth and noises, and uniform distribution for retention rate and acceptance rate) generated by using a random number generator and then calculate the average contribution to earnings. By doing it this way, our simulation hopefully captures most, if not all, of the random factors causing uncertainties regarding contributions to expected earnings. Note that we calculate the contributions to earning on 15-months basis instead of 12-months basis for every strategy. By doing it this way, the 15-months basis facilitates the calculation when evaluating the December involved strategy. By using 15-months basis, the comparision between each different strategy will be fair (The simulation will take some time to run).

```
for (k in 1:1000) {

  total_earnings_fixed_start <- c()
  total_earnings_tom <- c()
  total_earnings_flex <- c()
  total_earnings_fix_d <- c()
```

```
  total_earnings_flex_d <- c()

  retention_rate_at_end_of_m <- c()
  noises <- c()
  unexpected_econ_grwth <- rnorm(1, 0, 0.05)            #Economic growth
  noises <- rnorm(15, 0, 0.1)
  retention_rate_at_end_of_m <- c(runif(2, 0.9, 1),
                                runif(3, 0.95, 1),
                                runif(1, 0.8, 1),
                                runif(3, 0.9, 1),
                                runif(1, 0.8, 1),
                                runif(4, 0.9, 1),
                                runif(1, 0.95, 1))

  for (i in 1:length(offers_to_make)) {

    analysts_at_start_of_m <- c()                      #Current available
analysts in firm
    analysts_at_start_of_m_tom <- c()
    analysts_at_start_of_m_flex <- c()
    analysts_at_start_of_m_fix_d <- c()
    analysts_at_start_of_m_flex_d <- c()
    offers_accepted <- rbinom(1, offers_to_make[i], 0.7)
    offers_accepted_tom <- rbinom(1, offers_to_make_tom, 0.7)
    offers_accepted_flex_july <- 0.5 * offers_accepted
    offers_accepted_flex_sep <- offers_accepted_flex_july * runif(1, 0.7, 1)

    new_anlst_arr_at_end_of_m <-
c(0,0,offers_accepted,0,0,0,0,0,0,0,0,0,0,0,0)          #Newly joinned
recruits
    new_anlst_arr_at_end_of_m_tom <-
c(0,0,offers_to_make_tom,0,0,0,0,0,0,0,0,0,0,0,0)
    new_anlst_arr_at_end_of_m_flex <-
c(0,0,offers_accepted_flex_july,0,offers_accepted_flex_sep,0,0,0,0,0,0,0,0,0,
0)

    for (j in 1:15) {
#Analysts at start of each month (Supply)
      if (j == 1) {
        analysts_at_start_of_m[j] <- 63
        analysts_at_start_of_m_tom[j] <- 63
        analysts_at_start_of_m_flex[j] <- 63
        analysts_at_start_of_m_fix_d[j] <- 63
        analysts_at_start_of_m_flex_d[j] <- 63
      } else {
        analysts_at_start_of_m[j] <- round(analysts_at_start_of_m[j-1] *
retention_rate_at_end_of_m[j-1]) +
          new_anlst_arr_at_end_of_m[j-1]
        analysts_at_start_of_m_tom[j] <- round(analysts_at_start_of_m_tom[j-
```

```
1] * retention_rate_at_end_of_m[j-1]) +
          new_anlst_arr_at_end_of_m_tom[j-1]
        analysts_at_start_of_m_flex[j] <-
round(analysts_at_start_of_m_flex[j-1] * retention_rate_at_end_of_m[j-1]) +
          new_anlst_arr_at_end_of_m_flex[j-1]
        analysts_at_start_of_m_fix_d[j] <-
round(analysts_at_start_of_m_fix_d[j-1] * retention_rate_at_end_of_m[j-1] +
          new_anlst_arr_at_end_of_m[j-1])      #Still using fixed strategy
arriving vector, so that we will know the shortfall between June and
December. Will need to update analysts_at_start_of_m_fix_d later.
        analysts_at_start_of_m_flex_d[j] <-
round(analysts_at_start_of_m_flex_d[j-1] * retention_rate_at_end_of_m[j-1] +
          new_anlst_arr_at_end_of_m_flex[j-1]) #Still using flex strategy
arriving vector, so that we will know the shortfall between June and
December. Will need to update analysts_at_start_of_m_flex_d later.
      }
    }
    actual_anlst_demand <- round(hist_anlst_demand * ((1 +
unexpected_econ_grwth) * (1 + noises)))

    short_falls <- pmax((actual_anlst_demand - analysts_at_start_of_m), 0)
#Fix strategy
    excesses <- pmax((analysts_at_start_of_m - actual_anlst_demand), 0)

    short_falls_tom <- pmax((actual_anlst_demand -
analysts_at_start_of_m_tom), 0)      #Tom's strategy
    excesses_tom <- pmax((analysts_at_start_of_m_tom - actual_anlst_demand),
0)

    short_falls_flex <- pmax((actual_anlst_demand -
analysts_at_start_of_m_flex), 0)    #Flex strategy
    excesses_flex <- pmax((analysts_at_start_of_m_flex -
actual_anlst_demand), 0)

    short_falls_fix_d <- pmax((actual_anlst_demand -
analysts_at_start_of_m_fix_d), 0)    #Temporary short_falls vector for Fixed-
December strategy, will need to update this later.

    short_falls_flex_d <- pmax((actual_anlst_demand -
analysts_at_start_of_m_flex_d), 0)  #Temporary short_falls vector for Flex-
December strategy, will need to update this later.

    demand_in_j_d <- round(mean(short_falls_fix_d[3:9]) / 0.7)
    offers_to_make_fix_d <- rbinom(1, demand_in_j_d, 0.7)
    new_anlst_arr_at_end_of_m_fix_d <-
c(0,0,offers_accepted,0,0,0,0,0,offers_to_make_fix_d,0,0,0,0,0,0)  #For Fix-
December strategy, planning offers for both June and December.

    demand_in_j_d_flex_d <- round(mean(short_falls_flex_d[3:9]) / 0.7)
```

```
    offers_to_make_flex_d <- rbinom(1, demand_in_j_d_flex_d, 0.7)
    new_anlst_arr_at_end_of_m_flex_d <-
c(0,0,offers_accepted_flex_july,0,offers_accepted_flex_sep,0,0,0,offers_to_ma
ke_flex_d,0,0,0,0,0,0)  #For Flex-December strategy, planning offers for Both
June and December (Flex).


    for (l in 1:15) {             #This loop computes strategies that
involving December hiring only!!!
      if (l == 1) {
        analysts_at_start_of_m_fix_d[l] <- 63
        analysts_at_start_of_m_flex_d[l] <- 63
      } else {
        analysts_at_start_of_m_fix_d[l] <-
round(analysts_at_start_of_m_fix_d[l-1] * retention_rate_at_end_of_m[l-1] +
          new_anlst_arr_at_end_of_m_fix_d[l-1])
        analysts_at_start_of_m_flex_d[l] <-
round(analysts_at_start_of_m_flex_d[l-1] * retention_rate_at_end_of_m[l-1] +
          new_anlst_arr_at_end_of_m_flex_d[l-1])
      }
    }

    short_falls_fix_d <- pmax((actual_anlst_demand -
analysts_at_start_of_m_fix_d), 0)    #This one is usable  (Fixed - December)
    excesses_fix_d <- pmax((analysts_at_start_of_m_fix_d -
actual_anlst_demand), 0)

    short_falls_flex_d <- pmax((actual_anlst_demand -
analysts_at_start_of_m_flex_d), 0)  #This one is usable  (Flex - December)
    excesses_flex_d <- pmax((analysts_at_start_of_m_flex_d -
actual_anlst_demand), 0)

    contr_to_earnings_fixed_start <- actual_anlst_demand * base_contribution
-        #Earnings for fix strategy
      (short_falls * shortfall_cost + excesses * excess_cost)

    contr_to_earnings_tom <- actual_anlst_demand * base_contribution -
#Earnings for Tom's strategy
      (short_falls_tom * shortfall_cost + excesses_tom * excess_cost)

    contr_to_earnings_flex <- actual_anlst_demand * base_contribution -
#Earnings for flex strategy
      (short_falls_flex * shortfall_cost + excesses_flex * excess_cost)

    contr_to_earnings_fix_d <- actual_anlst_demand * base_contribution -
#Earnings for Fix-December strategy
      (short_falls_fix_d * shortfall_cost + excesses_fix_d * excess_cost)

    contr_to_earnings_flex_d <- actual_anlst_demand * base_contribution -
```

```
#Earnings for Flex-December strategy
      (short_falls_flex_d * shortfall_cost + excesses_flex_d * excess_cost)

    total_earnings_fixed_start <- c(total_earnings_fixed_start,
sum(contr_to_earnings_fixed_start))
    total_earnings_tom <- c(total_earnings_tom, sum(contr_to_earnings_tom))
    total_earnings_flex <- c(total_earnings_flex,
sum(contr_to_earnings_flex))
    total_earnings_fix_d <- c(total_earnings_fix_d,
sum(contr_to_earnings_fix_d)-22000)     #Fixed-December
    total_earnings_flex_d <- c(total_earnings_flex_d,
sum(contr_to_earnings_flex_d)-22000)  #Flex-December
  }

  result_mtx_fix <-rbind(result_mtx_fix, total_earnings_fixed_start)
  result_mtx_tom <- rbind(result_mtx_tom, total_earnings_tom)
  result_mtx_flex <- rbind(result_mtx_flex, total_earnings_flex)
  result_mtx_fix_d <- rbind(result_mtx_fix_d, total_earnings_fix_d)
#Fixed-December
  result_mtx_flex_d <- rbind(result_mtx_flex_d, total_earnings_flex_d)
#Flex-December
}

result_mtx_fix <- result_mtx_fix[-1,]
result_mtx_tom <- result_mtx_tom[-1,]
result_mtx_flex <- result_mtx_flex[-1,]
result_mtx_fix_d <- result_mtx_fix_d[-1,]       #Fixed-December
result_mtx_flex_d <- result_mtx_flex_d[-1,]     #Flex-December

total_earnings_all_q_fixed <- c()
for (i in 1:ncol(result_mtx_fix)) {
  total_earnings_all_q_fixed[i] <- mean(result_mtx_fix[,i])
}

total_earnings_all_q_tom <- c()
for (i in 1:ncol(result_mtx_tom)) {
  total_earnings_all_q_tom[i] <- mean(result_mtx_tom[,i])
}

total_earnings_all_q_flex <- c()
for (i in 1:ncol(result_mtx_flex)) {
  total_earnings_all_q_flex[i] <- mean(result_mtx_flex[,i])
}

total_earnings_all_q_fix_d <- c()               #Fixed-December
for (i in 1:ncol(result_mtx_fix_d)) {
  total_earnings_all_q_fix_d[i] <- mean(result_mtx_fix_d[,i])
}
```

```
total_earnings_all_q_flex_d <- c()              #Flex-December
for (i in 1:ncol(result_mtx_flex_d)) {
  total_earnings_all_q_flex_d[i] <- mean(result_mtx_flex_d[,i])
}

expected_diff_fix_tom <-
total_earnings_all_q_fixed[which.max(total_earnings_all_q_fixed)] -
#Fix - Tom diff
  total_earnings_all_q_tom[sample(length(total_earnings_all_q_tom), 1,
replace = T)]
expected_diff_flex_fix <-
total_earnings_all_q_flex[which.max(total_earnings_all_q_flex)] -
#Flex - Fix diff
  total_earnings_all_q_fixed[which.max(total_earnings_all_q_fixed)]
expected_diff_flex_d_fix_d <-
total_earnings_all_q_flex_d[which.max(total_earnings_all_q_flex_d)] - #Flex-D
- Fix-D diff
  total_earnings_all_q_fix_d[which.max(total_earnings_all_q_fix_d)]
```

Part a:

Briefly, what does it mean to hire the "right" number of analysts? What is the objective in trying to decide the "right" number of analysts to hire?

Hiring the "right" number of analysts means minimizing the amount of time Casterbridge is unable to meet client demand due to lack of available employees–without having so many employees that they spend much of their time working idly. The objective is to hire the number of employees that maximizes overall contribution to earnings during the time frame presented.

Part b:

Briefly explain Tom Hardy's hiring strategy. What are the strengths and weaknesses of his approach?

Tom Hardy's hiring approach attempts to match the average annual demand for employees with the average number of employees that are currently employed. Tom assumes retention is a constant 95% (the average rate) and makes all his job offers at the same time in July.

Tom's strategy's simplicity is its primary strength. The simple formulation makes it easy for Casterbridge to calculate a number of analysts that will meet its annual needs. Making all of the offers in July also makes for a more straight-forward set-up.

Tom's approach has several weaknesses: firstly, it does not consider the high variability in analyst demand stemming from banker's desire to be out of the office during the summer and winter months. Secondly, Tom leaves himself especially exposed to an unlucky hiring round by making all his job offers to potential analysts at once. Thirdly, Tom's assumption that analyst retention holds at a constant 95% means Casterbridge will likely be understaffed during stressful times of year (when employees are more likely to quit) and overstaffed during lax work months (summer, winter banking breaks). Since his strategy doesn't take seasonality, the state of the economy or demand fluctuations into account, this strategy is somewhat too simple based on the number of assumptions being made that don't capture some of the important variabilities.

Part c:

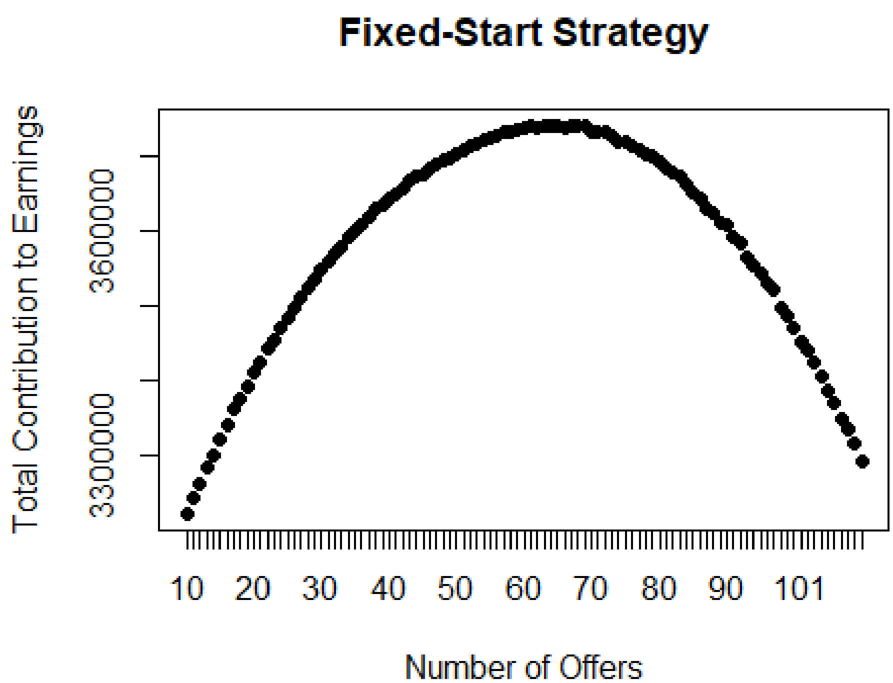
Prepare a two paragraph explanation of Susan Newson's basic approach to the analyst hiring decision. What are the strengths and weaknesses of her approach?

Susan's approach attempts to maximize the contribution to earnings of new hires by using historic data to model a dynamic monthly supply and demand of analysts. Additionally, Susan's approach incorporates unanticipated economic growth and a degree of random noise for any given month's demand. Susan's approach has a number of pros and cons. Susan's model has three primary advantages over Tom's. Firstly, Susan's model more accurately meets customer demand by considering seasonal variability. This reduces the problem of being overstaffed in the summer/winter and understaffed during crunch demand windows. Secondly, Susan's model operates on a monthly basis; this allows her to consider the possibility of hiring more than once per year, utilize multiple attrition rates, and incorporate a degree of economic/hiring randomness. Thirdly, Susan's objective function maximizes contribution to earnings as opposed to trying to meet customer demand. Although less intuitive, this allows for the possible scenario in which Casterbridge would make more money by leaving some customer demand on the table (perhaps this demand is an outlier).Overall, Susan's model takes into account the uncertainties that Tom's does not and makes fewer sweeping assumptions about the hiring process. Ultimately, Casterbridge cares about making money. Susan's model has a few shortcomings. Firstly, it is more difficult and less intuitive to use than Tom's. The high number of variables could make it more difficult to explain and implement this model throughout the company than Tom's more naive approach. Secondly, using historical data always poses some risk. Susan's model could be inaccurate if the five years that form the basis of her assumptions don't capture the larger trends in the analyst hiring process. For example, if Susan's sample data set covered 2006-2011, her data would be heavily skewed by the Economic Recession. Susan needs to incorporate more historical data as it becomes available to capture larger underlying economic trends, and month to month trends that appear overtime. Lastly, Susan ignored the possibility of variable analyst onboarding costs for a given month, which could impact profitability and the associated contribution that new analysts will provide in comparison to retained analysts with experience.

Part d:

Consider the "Fixed-Start" strategy of making offers to new graduates to start on July 1st. Which value of Q results in the greatest expected contribution to earnings? What is your optimal hiring strategy? Is your strategy more profitable or less profitable than Tom Hardy's strategy? What is the expected difference in contribution margin between the two?

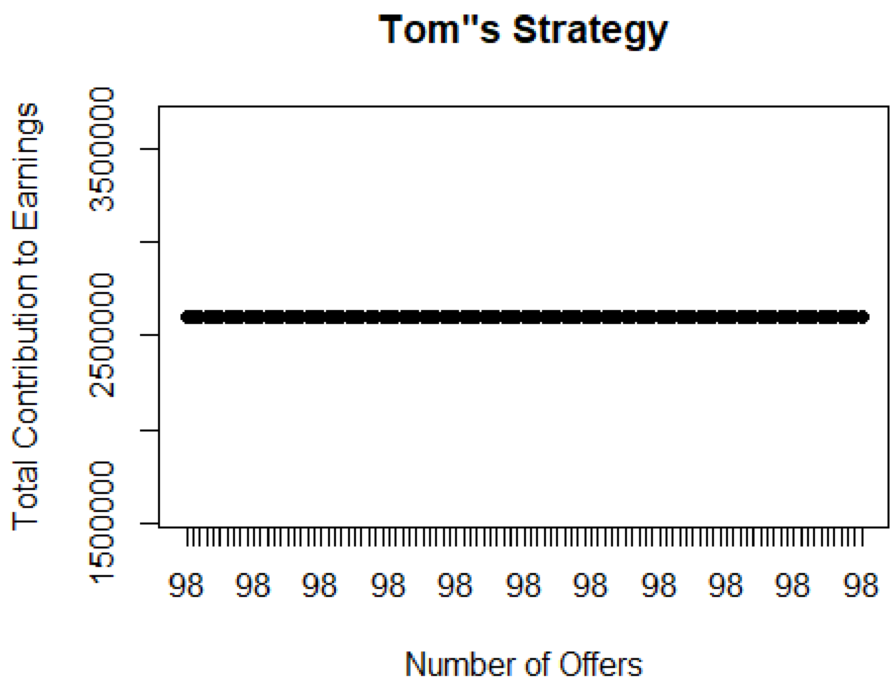
```
print(paste('Given the fixed starting month strategy, the maximum
contributions to earning:',

total_earnings_all_q_fixed[which.max(total_earnings_all_q_fixed)], 'is
achieved by giving',
            which.max(total_earnings_all_q_fixed)+9, 'offers.'))

## [1] "Given the fixed starting month strategy, the maximum contributions to
earning: 3739984.8 is achieved by giving 65 offers."

plot(total_earnings_all_q_fixed, xaxt = 'n', pch = 16, xlab = 'Number of
Offers', ylab = 'Total Contribution to Earnings', main = 'Fixed-Start
Strategy')       #Profit plot for fixed starting strategy
axis(1, at=1:101, labels=10:110)
```




```
print(paste('Given the strategy suggested by Tom, the contributions to
earning is constant:',
            total_earnings_all_q_tom[sample(length(total_earnings_all_q_tom),
1, replace = T)]))
```

```
## [1] "Given the strategy suggested by Tom, the contributions to earning is constant: 2603913.6"
```

```
plot(total_earnings_all_q_tom, xaxt = 'n', pch = 16, type = 'b', xlab = 'Number of Offers', ylab = 'Total Contribution to Earnings', main = 'Tom"s Strategy')          #Profit plot for Tom's strategy
axis(1, at=1:101, labels=rep(98, 101))
```




```
print(paste('The expected difference in earnings between the fixed-start and Tom"s strategy is:', expected_diff_fix_tom))
```

```
## [1] "The expected difference in earnings between the fixed-start and Tom\"s strategy is: 1136071.2"
```

After running the simulation with 1000 replications, we find that the optimal hiring strategy for the "fixed-start" is to hire Q~65 analysts for a total expected contribution margin of ~ $3,700,000. With Tom's strategy, we find that the optimal choice is to hire a constant 98 analysts for a contribution margin of ~ $2,600,000 (subject to the true attrition rate, which differs in each simulation, so that we compare both strategies under the same assumption based on the true attrition rate). The expected difference between the two strategies in contribution margin is about ~ $1,100,000. Thus, between Tom's strategy and the "fixed-start" strategy, the "fixed-start" strategy is more profitable.

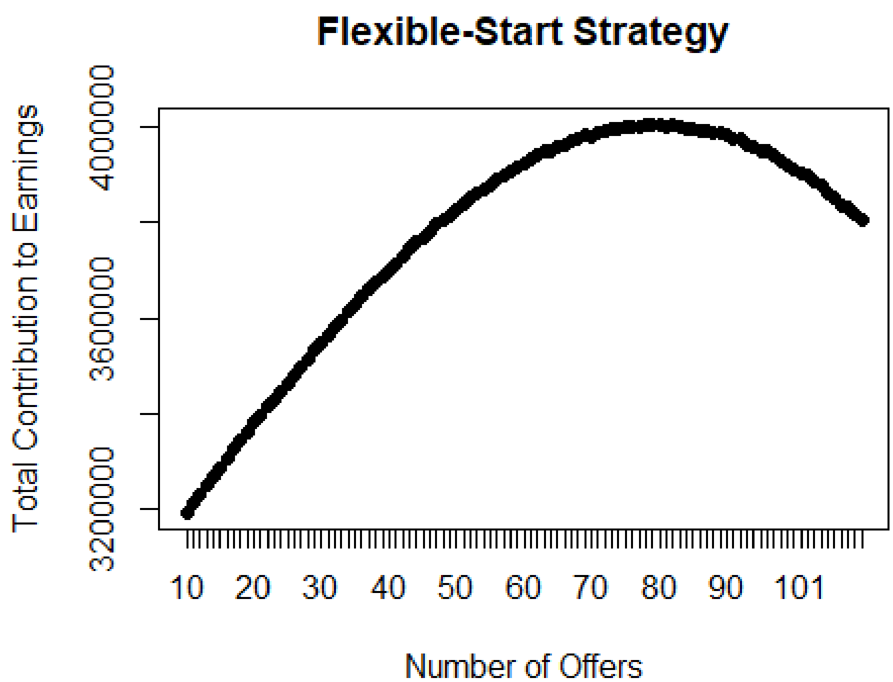
Part e:

Now consider the "flexible-start" strategy of making offers to new graduates to start on either July 1st or September 1st. Is the "flexible-start" strategy more profitable or less profitable than the fixed-start strategy? Why? What is the expected difference in earnings contribution between the two?

```
print(paste('Given the flexible starting month strategy, the maximum contributions to earning:',
            total_earnings_all_q_flex[which.max(total_earnings_all_q_flex)], 'is achieved by giving',
            which.max(total_earnings_all_q_flex)+9, 'offers.'))
```

```
## [1] "Given the flexible starting month strategy, the maximum contributions to earning: 4005121.3972385 is achieved by giving 79 offers."
```

```
plot(total_earnings_all_q_flex, xaxt = 'n', pch = 16, type = 'b', xlab = 'Number of Offers', ylab = 'Total Contribution to Earnings', main = 'Flexible-Start Strategy')        #Profit plot for flex strategy
axis(1, at=1:101, labels=10:110)
```




```
print(paste('The expected difference in earnings between the Flexible-Start and Fixed-Start strategy is:', expected_diff_flex_fix))
```

```
## [1] "The expected difference in earnings between the Flexible-Start and Fixed-Start strategy is: 265136.597238503"
```

The optimal value for the flexible-start strategy is around Q=81 analysts with an expected contribution margin of about ~ $4,004,000. This solution improves on the fixed-start strategy by about ~ $270,000.

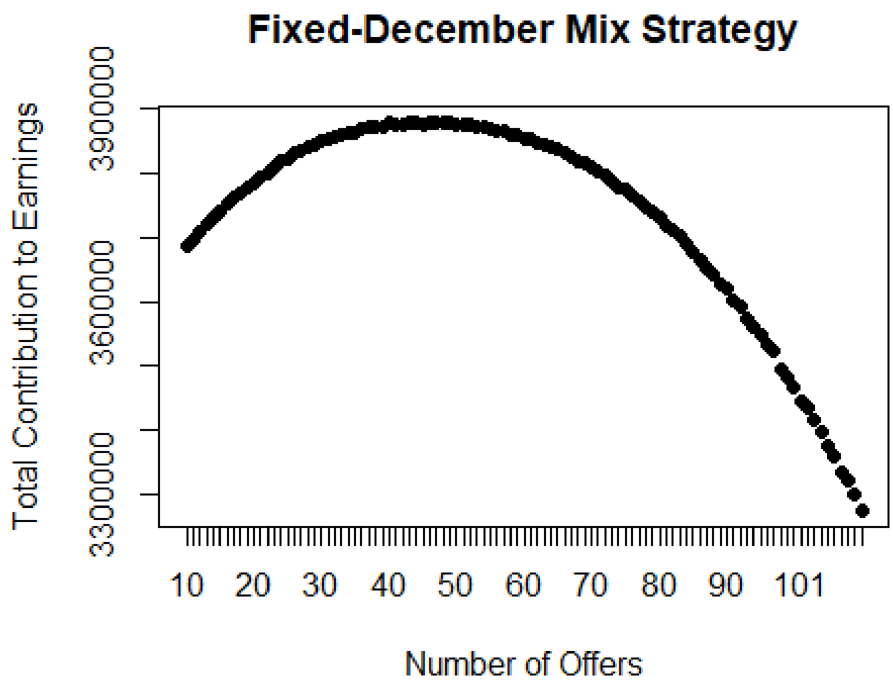
Part f:

Consider a more complicated strategy involving December recruiting. In December recruiting, offers are made in December for graduating students to start work on January 1st. This recruiting costs Casterbridge approximately $22,000 in fixed costs of visiting campuses, interviewing and arranging for call-backs. Is December recruiting worth the cost? Why or why not?

```
print(paste('Given the Fix-December mix strategy, the maximum contributions to earning:',

total_earnings_all_q_fix_d[which.max(total_earnings_all_q_fix_d)],
            'is achieved by giving', which.max(total_earnings_all_q_fix_d)+9,
            'offers in June and some number of offers in December. The actual number of offers for December should be determined by the sum of shortage from June through December after take the number of June offers into account.'))
```

```
## [1] "Given the Fix-December mix strategy, the maximum contributions to earning: 3879388.4 is achieved by giving 43 offers in June and some number of offers in December. The actual number of offers for December should be determined by the sum of shortage from June through December after take the number of June offers into account."
```

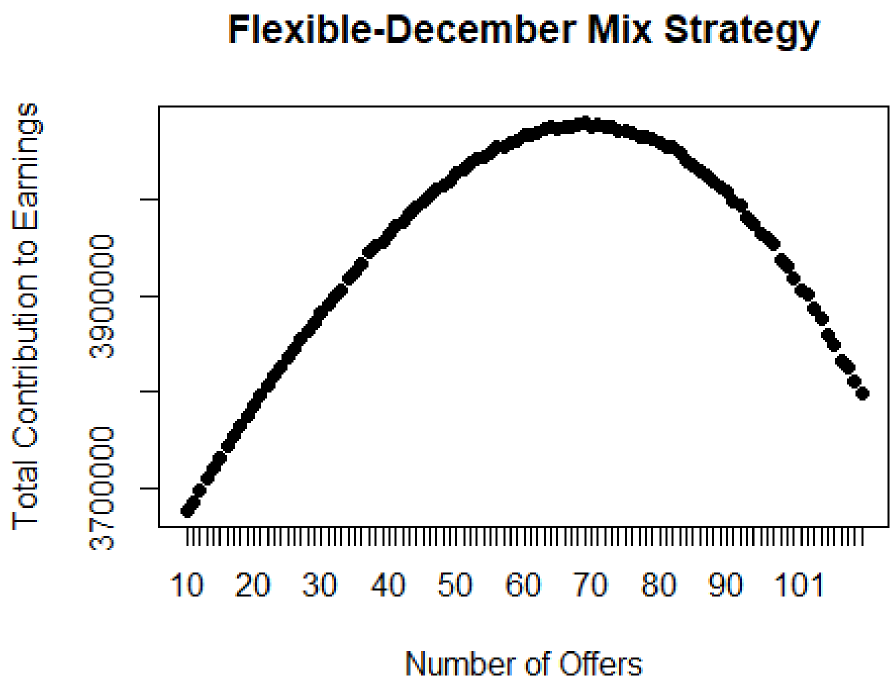
```
plot(total_earnings_all_q_fix_d, xaxt = 'n', pch = 16, type = 'b', xlab = 'Number of Offers', ylab = 'Total Contribution to Earnings', main = 'Fixed-December Mix Strategy')
axis(1, at=1:101, labels=10:110)
```




```
print(paste('Given the Flexible-December mix strategy, the maximum contributions to earning:',

total_earnings_all_q_flex_d[which.max(total_earnings_all_q_flex_d)],
            'is achieved by giving',
which.max(total_earnings_all_q_flex_d)+9,
            'offers in June and some number of offers in December. The actual number of offers for December should be determined by the sum of shortage from June through December after take the number of June offers into account.'))
```

```
## [1] "Given the Flexible-December mix strategy, the maximum contributions to earning: 4080239.6 is achieved by giving 69 offers in June and some number of offers in December. The actual number of offers for December should be determined by the sum of shortage from June through December after take the number of June offers into account."
```

```
plot(total_earnings_all_q_flex_d, xaxt = 'n', pch = 16, type = 'b', xlab = 'Number of Offers', ylab = 'Total Contribution to Earnings', main = 'Flexible-December Mix Strategy')
axis(1, at=1:101, labels=10:110)
```




```
print(paste('The expected difference in earnings between the Fixed-December
and Flexible-December strategy is:',
            expected_diff_flex_d_fix_d))

## [1] "The expected difference in earnings between the Fixed-December and
Flexible-December strategy is: 200851.2"
```

Final Conclusion:

```
final_table <-
t(as.matrix(data.frame(c(total_earnings_all_q_fixed[which.max(total_earnings_
all_q_fixed)], which.max(total_earnings_all_q_fixed)+9),
c(round(total_earnings_all_q_tom[sample(length(total_earnings_all_q_tom), 1,
replace = T)], 2), 98),
c(total_earnings_all_q_flex[which.max(total_earnings_all_q_flex)],
which.max(total_earnings_all_q_flex)+9),
c(total_earnings_all_q_fix_d[which.max(total_earnings_all_q_fix_d)],
which.max(total_earnings_all_q_fix_d)+9),
c(total_earnings_all_q_flex_d[which.max(total_earnings_all_q_flex_d)],
which.max(total_earnings_all_q_flex_d)+9))))
colnames(final_table) <- c('Expected_Profit',
'Number_of_Offers_to_Give_in_June')
rownames(final_table) <- c('Fixed-Starting', 'Tom"s Suggestion', 'Flexible-
Starting', 'Fixed-December mix', 'Flexible-December mix')
final_table

##                        Expected_Profit Number_of_Offers_to_Give_in_June
## Fixed-Starting                 3739985                               65
```

```
## Tom"s Suggestion              2603914                               98
## Flexible-Starting             4005121                               79
## Fixed-December mix            3879388                               43
## Flexible-December mix         4080240                               69
```

```r
print('By inspecting the table print-out, we can see that the Flexible-
December mix strategy would produce the highest contributions to earnings.
Therefore, the Flexible-December hiring strategy is suggested.')
```

```
## [1] "By inspecting the table print-out, we can see that the Flexible-
December mix strategy would produce the highest contributions to earnings.
Therefore, the Flexible-December hiring strategy is suggested."
```