

Assignment3_Q3

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R Markdown

1.1 import data as data frame

```
df <- read_xlsx("Q3OptionData.xlsx", sheet="data") %>%  
  rename(., Expiry_Date=E, Strike=X, Open_Interest=OI, Underlying=S, Call_Put=CP, Bid=B, Ask=A) %>%  
  mutate(., Valuation=.$Open_Interest*(.$Bid+.$Ask)*0.5)  
kable(df, caption="Option Data")
```

Table 1: Option Data

Expiry_Date	Strike	Open_Interest	Underlying	Call_Put	Bid	Ask	Valuation
2018-12-14	930.0	0	1023.88	c	98.60	105.7	0.000
2018-12-14	940.0	0	1023.88	c	90.20	96.9	0.000
2018-12-14	950.0	0	1023.88	c	81.10	88.4	0.000
2018-12-14	960.0	0	1023.88	c	73.10	79.9	0.000
2018-12-14	970.0	0	1023.88	c	65.40	72.2	0.000
2018-12-14	980.0	0	1023.88	c	59.60	64.7	0.000
2018-12-14	987.5	0	1023.88	c	54.30	56.1	0.000
2018-12-14	990.0	0	1023.88	c	52.70	54.2	0.000
2018-12-14	992.5	0	1023.88	c	50.80	52.5	0.000
2018-12-14	995.0	0	1023.88	c	49.20	50.8	0.000
2018-12-14	997.5	0	1023.88	c	47.50	49.0	0.000
2018-12-14	1000.0	4	1023.88	c	45.90	47.5	186.800
2018-12-14	1002.5	1	1023.88	c	44.30	45.9	45.100
2018-12-14	1005.0	2	1023.88	c	42.40	44.3	86.700
2018-12-14	1007.5	2	1023.88	c	41.30	42.5	83.800
2018-12-14	1010.0	9	1023.88	c	39.80	41.3	364.950
2018-12-14	1012.5	2	1023.88	c	38.20	39.7	77.900
2018-12-14	1015.0	3	1023.88	c	36.80	38.1	112.350
2018-12-14	1017.5	2	1023.88	c	35.40	36.6	72.000
2018-12-14	1020.0	5	1023.88	c	34.00	35.5	173.750
2018-12-14	1022.5	3	1023.88	c	32.70	33.9	99.900
2018-12-14	1025.0	5	1023.88	c	31.20	32.4	159.000
2018-12-14	1027.5	0	1023.88	c	30.00	31.2	0.000
2018-12-14	1030.0	31	1023.88	c	28.70	29.8	906.750
2018-12-14	1032.5	3	1023.88	c	27.60	28.4	84.000
2018-12-14	1035.0	32	1023.88	c	26.30	27.2	856.000
2018-12-14	1037.5	1	1023.88	c	25.10	26.3	25.700
2018-12-14	1040.0	5	1023.88	c	24.00	25.0	122.500
2018-12-14	1042.5	2	1023.88	c	22.90	23.9	46.800
2018-12-14	1045.0	9	1023.88	c	21.80	22.9	201.150
2018-12-14	1047.5	10	1023.88	c	20.70	21.8	212.500
2018-12-14	1050.0	5	1023.88	c	19.70	20.9	101.500
2018-12-14	1052.5	4	1023.88	c	18.80	19.6	76.800
2018-12-14	1055.0	6	1023.88	c	17.80	18.7	109.500
2018-12-14	1057.5	4	1023.88	c	16.90	17.9	69.600

Expiry_Date	Strike	Open_Interest	Underlying	Call_Put	Bid	Ask	Valuation
2018-12-14	1060.0	6	1023.88	c	16.00	17.3	99.900
2018-12-14	1062.5	5	1023.88	c	15.30	16.2	78.750
2018-12-14	1065.0	12	1023.88	c	14.50	15.2	178.200
2018-12-14	1067.5	8	1023.88	c	13.60	14.5	112.400
2018-12-14	1070.0	8	1023.88	c	13.00	13.7	106.800
2018-12-14	1072.5	5	1023.88	c	12.30	13.0	63.250
2018-12-14	1075.0	3	1023.88	c	11.50	12.3	35.700
2018-12-14	1077.5	2	1023.88	c	10.90	11.7	22.600
2018-12-14	1080.0	19	1023.88	c	10.30	10.9	201.400
2018-12-14	1082.5	3	1023.88	c	9.70	10.4	30.150
2018-12-14	1085.0	4	1023.88	c	9.10	10.0	38.200
2018-12-14	1087.5	0	1023.88	c	7.70	10.3	0.000
2018-12-14	1090.0	27	1023.88	c	8.10	8.8	228.150
2018-12-14	1092.5	11	1023.88	c	7.60	8.3	87.450
2018-12-14	1095.0	5	1023.88	c	7.20	7.8	37.500
2018-12-14	1097.5	8	1023.88	c	6.80	7.4	56.800
2018-12-14	1100.0	58	1023.88	c	6.50	7.0	391.500
2018-12-14	1102.5	1	1023.88	c	6.00	6.6	6.300
2018-12-14	1105.0	4	1023.88	c	5.60	6.2	23.600
2018-12-14	1107.5	3	1023.88	c	5.20	5.8	16.500
2018-12-14	1110.0	21	1023.88	c	4.90	5.5	109.200
2018-12-14	1112.5	2	1023.88	c	4.40	5.3	9.700
2018-12-14	1115.0	0	1023.88	c	4.30	4.8	0.000
2018-12-14	1117.5	11	1023.88	c	2.95	4.6	41.525
2018-12-14	1120.0	31	1023.88	c	3.80	4.3	125.550
2018-12-14	1125.0	5	1023.88	c	3.30	3.8	17.750
2018-12-14	930.0	10	1023.88	p	6.20	6.7	64.500
2018-12-14	940.0	7	1023.88	p	7.30	8.2	54.250
2018-12-14	950.0	23	1023.88	p	8.50	9.8	210.450
2018-12-14	960.0	45	1023.88	p	10.40	11.6	495.000
2018-12-14	970.0	26	1023.88	p	12.70	13.6	341.900
2018-12-14	980.0	13	1023.88	p	15.10	15.8	200.850
2018-12-14	987.5	0	1023.88	p	17.10	18.1	0.000
2018-12-14	990.0	10	1023.88	p	17.70	19.0	183.500
2018-12-14	992.5	0	1023.88	p	18.60	19.7	0.000
2018-12-14	995.0	12	1023.88	p	19.60	20.3	239.400
2018-12-14	997.5	0	1023.88	p	20.00	21.2	0.000
2018-12-14	1000.0	61	1023.88	p	21.20	22.0	1317.600
2018-12-14	1002.5	19	1023.88	p	21.80	23.1	426.550
2018-12-14	1005.0	9	1023.88	p	22.70	23.8	209.250
2018-12-14	1007.5	1	1023.88	p	23.70	24.8	24.250
2018-12-14	1010.0	61	1023.88	p	25.00	25.7	1546.350
2018-12-14	1012.5	9	1023.88	p	25.80	26.8	236.700
2018-12-14	1015.0	19	1023.88	p	27.00	27.8	520.600
2018-12-14	1017.5	5	1023.88	p	27.80	28.8	141.500
2018-12-14	1020.0	53	1023.88	p	28.90	29.9	1558.200
2018-12-14	1022.5	1	1023.88	p	29.80	31.2	30.500
2018-12-14	1025.0	31	1023.88	p	30.90	32.3	979.600
2018-12-14	1027.5	2	1023.88	p	32.10	33.5	65.600
2018-12-14	1030.0	12	1023.88	p	33.60	34.7	409.800
2018-12-14	1032.5	0	1023.88	p	34.50	36.0	0.000
2018-12-14	1035.0	12	1023.88	p	36.00	37.2	439.200

Expiry_Date	Strike	Open_Interest	Underlying	Call_Put	Bid	Ask	Valuation
2018-12-14	1037.5	1	1023.88	p	37.40	38.5	37.950
2018-12-14	1040.0	5	1023.88	p	38.70	39.9	196.500
2018-12-14	1042.5	4	1023.88	p	40.00	41.4	162.800
2018-12-14	1045.0	16	1023.88	p	41.20	42.8	672.000
2018-12-14	1047.5	2	1023.88	p	43.10	44.2	87.300
2018-12-14	1050.0	21	1023.88	p	44.50	45.6	946.050
2018-12-14	1052.5	2	1023.88	p	45.90	47.4	93.300
2018-12-14	1055.0	42	1023.88	p	47.50	48.9	2024.400
2018-12-14	1057.5	4	1023.88	p	48.80	50.4	198.400
2018-12-14	1060.0	21	1023.88	p	51.10	52.1	1083.600
2018-12-14	1062.5	5	1023.88	p	51.40	54.2	264.000
2018-12-14	1065.0	24	1023.88	p	53.50	55.9	1312.800
2018-12-14	1067.5	2	1023.88	p	52.40	60.4	112.800
2018-12-14	1070.0	7	1023.88	p	54.20	60.7	402.150
2018-12-14	1072.5	1	1023.88	p	56.00	63.3	59.650
2018-12-14	1075.0	9	1023.88	p	57.80	65.3	553.950
2018-12-14	1077.5	10	1023.88	p	59.60	66.9	632.500
2018-12-14	1080.0	13	1023.88	p	61.50	68.9	847.600
2018-12-14	1082.5	3	1023.88	p	63.50	71.2	202.050
2018-12-14	1085.0	3	1023.88	p	65.40	73.4	208.200
2018-12-14	1087.5	0	1023.88	p	67.20	75.3	0.000
2018-12-14	1090.0	18	1023.88	p	69.40	77.2	1319.400
2018-12-14	1092.5	0	1023.88	p	71.40	79.2	0.000
2018-12-14	1095.0	0	1023.88	p	73.50	81.3	0.000
2018-12-14	1097.5	1	1023.88	p	78.50	80.2	79.350
2018-12-14	1100.0	20	1023.88	p	77.80	85.4	1632.000
2018-12-14	1102.5	0	1023.88	p	79.90	87.5	0.000
2018-12-14	1105.0	0	1023.88	p	81.70	89.6	0.000
2018-12-14	1107.5	0	1023.88	p	84.10	91.8	0.000
2018-12-14	1110.0	15	1023.88	p	86.20	93.6	1348.500
2018-12-14	1112.5	0	1023.88	p	88.50	96.2	0.000
2018-12-14	1115.0	2	1023.88	p	90.60	98.1	188.700
2018-12-14	1117.5	0	1023.88	p	92.90	100.6	0.000
2018-12-14	1120.0	13	1023.88	p	95.00	102.7	1285.050
2018-12-14	1125.0	1	1023.88	p	99.50	107.4	103.450

1.2 Count valuation

```
df2 <- group_by(df, Call_Put) %>% summarise(Valuation_Sum=sum(Valuation)) %>% rbind(., data.frame(Call_Put="c", Valuation_Sum=6393.925))
kable(df2, caption="Count Valuation")
```

Table 2: Count Valuation

Call_Put	Valuation_Sum
c	6393.925
p	25750.000
c&p	32143.925

1.3 In The Money Open Interest

```
df <- mutate(df, In_Money=ifelse(df$Call_Put=='c',ifelse(df$Strike < df$Underlying,"Y","N"),ifelse(df$S
df3 <- group_by(df,Call_Put) %>% dplyr::filter(In_Money == "Y") %>% summarise(OI_Sum=sum(Open_Interest))
kable(df3, caption="In The Money Open Interest")
```

Table 3: In The Money Open Interest

Call_Put	OI_Sum
c	33
p	322

1.4 Plot Volatility against Strike

```
df<- mutate(df,Volatility_Value=0)
for(i in c(1:nrow(df))){
  df[i,]$Volatility_Value = round(GBSVolatility(0.5*(df[i,]$Bid+df[i,]$Ask), df[i,]$Call_Put, df[i,]$Und
}

putVolatility <- dplyr::filter(df,Call_Put=='c' & Strike > Underlying) %>% select(., Strike, Volatility)
callVolatility <- dplyr::filter(df,Call_Put=='p' & Strike < Underlying) %>% select(., Strike, Volatility)

Strike_Vol <- bind_rows(callVolatility,putVolatility) %>% arrange(.,Strike)

ggplot(Strike_Vol,aes(x=Strike, y=Volatility_Value))+geom_line()
```

