SP-Jan-18

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```
library(stringr)
library(tidyverse)
```

```
## -- Attaching packages --------------------------------------- tidyverse 1.3.2 --
## v ggplot2 3.4.0      v purrr   1.0.0
## v tibble  3.1.8      v dplyr   1.0.10
## v tidyr   1.2.1      v forcats 0.5.2
## v readr   2.1.3
## -- Conflicts ------------------------------------------ tidyverse_conflicts() --
## x dplyr::filter() masks stats::filter()
## x dplyr::lag()    masks stats::lag()
```

```
data<-read.csv(file = "A1_Bond_data.csv", header = T)
```

```
data_18 <- data %>%
  select(name, Coupon, days, c_since_days, c_next_days, Jan_18)

data_18<- data_18%>%
  mutate(dirty_price = ((c_since_days + 2)/365)*100*Coupon + Jan_18,
         FV=100 + 0.5*100*Coupon)
```

```
c_0 = 0.5*data_18$Coupon[1]*100
t_0 = (data_18$days[1] -2) /365
r_0 = (-log(data_18$dirty_price[1]/data_18$FV[1]))/t_0
print(r_0)
```

```
## [1] 0.0421923
```

```
c_0.5 = 0.5*data_18$Coupon[2]*100
t_sp = (data_18$c_next_days[2]-2) / 365
t_0.5 = (data_18$days[2]-2)/365
ct_0.5 = c_0.5*exp(-r_0*t_sp)
r_0.4 = -(log((data_18$dirty_price[2] - ct_0.5)/data_18$FV[2])/(t_0.5))
k=(r_0 - r_0.4)/(t_0 - t_0.5)
b = r_0 - k*t_0
r_0.5 = k*(t_0 + 0.5) + b
print(r_0.5)
```

```
## [1] 0.04375925
```

```
c_1 = 0.5*data_18$Coupon[3]*100
ct_1 = c_1*(exp(-r_0*t_0)+exp(-r_0.5*(t_0+0.5)))
r_1 = -(log((data_18$dirty_price[3] - ct_1)/data_18$FV[3])/(t_0+1))
print(r_1)
```

```
## [1] 0.04112721
```

```
c_1.5 = 0.5*data_18$Coupon[4]*100
ct_1.5 = c_1.5*(exp(-r_0*t_0)+exp(-r_0.5*(t_0+0.5))+exp(-r_1*(t_0+1)))
r_1.5 = -(log((data_18$dirty_price[4] - ct_1.5)/data_18$FV[4])/(t_0+1.5))
print(r_1.5)
```

```
## [1] 0.03665683
```

```
c_2 = 0.5*data_18$Coupon[5]*100
ct_2 = c_2*(exp(-r_0*t_0)+exp(-r_0.5*(t_0+0.5))+exp(-r_1*(t_0+1))+exp(-r_1.5*(t_0+1.5)))
r_2 = -(log((data_18$dirty_price[5] - ct_2)/data_18$FV[5])/(t_0+2))
print(r_2)
```

```
## [1] 0.03386514
```

```
c_2.5 = 0.5*data_18$Coupon[6]*100
ct_2.5 = c_2.5*(exp(-r_0*t_0)+exp(-r_0.5*(t_0+0.5))+exp(-r_1*(t_0+1))+exp(-r_1.5*(t_0+1.5))+exp(-r_2*(t
r_2.5 = -(log((data_18$dirty_price[6] - ct_2.5)/data_18$FV[6])/(t_0+2.5))
print(r_2.5)
```

```
## [1] 0.03275209
```

```
c_3 = 0.5*data_18$Coupon[7]*100
ct_3 = c_3*(exp(-r_0*t_0)+exp(-r_0.5*(t_0+0.5))+exp(-r_1*(t_0+1))+exp(-r_1.5*(t_0+1.5))+exp(-r_2*(t_0+2
r_3 = -(log((data_18$dirty_price[7] - ct_3)/data_18$FV[7])/(t_0+3))
print(r_3)
```

```
## [1] 0.03134473
```

```
c_3.5 = 0.5*data_18$Coupon[8]*100
ct_3.5 = c_3.5*(exp(-r_0*t_0)+exp(-r_0.5*(t_0+0.5))+exp(-r_1*(t_0+1))+exp(-r_1.5*(t_0+1.5))+exp(-r_2*(t
r_3.5 = -(log((data_18$dirty_price[8] - ct_3.5)/data_18$FV[8])/(t_0+3.5))
print(r_3.5)
```

```
## [1] 0.02957395
```

```
c_4 = 0.5*data_18$Coupon[9]*100
ct_4 = c_4*(exp(-r_0*t_0)+exp(-r_0.5*(t_0+0.5))+exp(-r_1*(t_0+1))+exp(-r_1.5*(t_0+1.5))+exp(-r_2*(t_0+2
r_4= -(log((data_18$dirty_price[9] - ct_4)/data_18$FV[9])/(t_0+4))
print(r_4)
```

```
## [1] 0.02845625
```

```
c_4.5 = 0.5*data_18$Coupon[10]*100
ct_4.5 = c_4.5*(exp(-r_0*t_0)+exp(-r_0.5*(t_0+0.5))+exp(-r_1*(t_0+1))+exp(-r_1.5*(t_0+1.5))+exp(-r_2*(t
r_4.5= -(log((data_18$dirty_price[10] - ct_4.5)/data_18$FV[10])/(t_0+4.5))
print(r_4.5)
```

```
## [1] 0.02773973
```

```
c_5 = 0.5*data_18$Coupon[11]*100
ct_5 = c_5*(exp(-r_0*t_0)+exp(-r_0.5*(t_0+0.5))+exp(-r_1*(t_0+1))+exp(-r_1.5*(t_0+1.5))+exp(-r_2*(t_0+2
r_5= -(log((data_18$dirty_price[11] - ct_5)/data_18$FV[11])/(t_0+5))
print(r_5)
```

```
## [1] 0.02732994
```