Case 1
MFE 408: Fixed Income
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Group 9
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Arbitrage Case 1

To find the arbitrage opportunity, we need to find 2 treasury bonds, 1 treasury strip principle bond expiring on the same day.

Step 1:Create a replicated bond of the smaller coupon bond, using the strip coupon bond and the higher coupon bond.

Step 2: Compare the price of the replicated and actual bond, long the cheaper and short the expensive

We will illustrate with one example:

From the slides, we know that current Date: 9th Jan 2015 Bonds with Maturity Date: 11/15/22 Previous coupon payment: 11/15/2014

Treasurey strip: 86.15

Find clean price Coupon Bond A with rate 1.625: 98.57812 Coupon Bond B with rate 7.625: 143.0625

Find dirty price

```
bondAPrice <- 98.57812
bondARate <- 1.625

bondBPrice <- 143.0625
bondBRate <- 7.625

daysSincePayment <- as.numeric(as.Date('01/09/2015','%m/%d/%Y') - as.Date('11/15/2014','%m/%d/%Y'))
daysInBetweenPayments <- 182

dirty_priceA <- (daysSincePayment/daysInBetweenPayments) * (bondARate/2) + bondAPrice
dirty_priceB <- (daysSincePayment/daysInBetweenPayments) * (bondBRate/2) + bondBPrice
cat("Dirty price for A: ", dirty_priceA,"\n")
```

```
## Dirty price for A:  98.82366
```

```
cat("Dirty price for B: ", dirty_priceB)
```

```
## Dirty price for B:  144.2146
```

To generate a low coupon bond

$$a * 0 + (1 - a) * 7.625 = 1.625$$

```
a <- (7.626 -1.625) / 7.625
cat("a: ",a,"\n")
```

```
## a:  0.7870164
```

```
bondPrice <- a * 86.15 + (1-a) * dirty_priceB
cat("Bond price for the replicated bond is: ",bondPrice,"\n")
```

```
## Bond price for the replicated bond is:  98.51681
```

```r
cat("This price is lower than the dirty price for bond with coupon rate 1.625, which is ",dirty_priceA)
```

```
## This price is lower than the dirty price for bond with coupon rate 1.625, which is  98.82366
```

Hence, We long the replicated bond using 0 coupon and 7.625 coupon bond, and short actual 1.625 coupon bond to realize a profit of 0.31