Regression Hedge

变化守恒原理

- TIPS: real interest, T-Bond: nominal interest
- DV01 Neutral hedge
  - $F_r \times DV01_r = F_n \times DV01_n$
- Regression Hedge
  - $F_r \times DV01_r \times \Delta y_r = F_n \times DV01_n \times \Delta y_n$

Question

- Short 100 million nominal bond, purchase 89.8 TIPS. Nominal yield change by 1.0274bp per bp change In real yield, find the new hedge?

Solution

- 把 face value, DV01 和 change in yield 按照产品分类

Items	Nominal	TIPS	Nominal/TIPS	Note
F	100m	89.8m		Based on **DV01** hedge
DV01	$DV01_n$	$DV01_r$	89.8/100=0.898	$\frac{DV01_n}{DV01_r} = 0.898$
Δy	Δy_n	Δy_r	1.0274	$\frac{\Delta y_n}{\Delta_r} = 1.0274$
New Face Value	100m (fixed)	X=100*(0.898*1.0274)		Based on **regression** hedge

- 计算 DV01，用第一个等式
  - $F_n \times DV01_n = F_r \times DV01_r$
  - $=> 100 \times DV01_n = 89.8 \times DV01_r$
  - $=> \frac{Dv01_n}{DV01_r} = 0.898$

- 算 change in yield，题目已知
  - $\frac{\Delta y_n}{\Delta_r} = 1.0274$
- 计算新的 TIPS（因为 TIPS 这是用来 hedge 的，考虑 regression 后需要调整）
  - 用第 2 个等式
    - $F_r \times DV01_r \times \Delta y_r = F_n \times DV01_n \times \Delta y_n$
  - => $F_r = F_n \times \frac{DV01_n}{DV01_r} \times \frac{\Delta y_n}{\Delta y_r} = 100 \times 0.898 \times 1.0274 = 92.26$
- 因此还需要买 92.26-89.8=2.46 的 TIPS