

Figure 34.8: Treasury Bond Futures: Pricing And Arbitrage

$$F^* = (S - PVC) (1+r)^t$$

If $F > F^*$ If $F < F^*$

| Time | Action | Cashflows | Action | Cashflows |
|-------------|--|---|--|---|
| Now: | 1. Sell futures contract | 0 | 1. Buy futures contract | 0 |
| | 2. Borrow spot price of bond at riskfree r | S | 2. Sell short treasury bonds | S |
| | 3. Buy treasury bonds | -S | 3. Lend money at riskfree rate | -S |
| Till t: | 1. Collect coupons on bonds; Invest | $PVC(1+r)^t$ | 1. Collect on loan | $S(1+r)^t$ |
| | 2. Deliver the cheapest bond on contract | F | 2. Take delivery of futures contract | -F |
| | 3. Pay back loan | $-S(1+r)^t$ | 3. Return borrowed bonds; Pay foregone coupons w/interest | $-PVC(1+r)^t$ |
| NCF= | | $F - (S - PVC)(1+r)^t > 0$ | | $(S - PVC)(1+r)^t - F > 0$ |

Key inputs:

F* = Theoretical futures price

F = Actual futures price

S = Spot level of treasury bond

r = Riskless rate of interest (annualized)

t = Time to expiration on the futures contract

PVC = Present Value of Coupons on Bond during life of futures contract

Key assumptions

1. The investor can lend and borrow at the riskless rate.
2. There are no transactions costs associated with buying or selling short bonds.