<http://www.cmegroup.com/trading/interest-rates/us-treasury/ultra-t-bond.html>

The link to the **ultra** T-bond futures quotes is above. Both the ultra and the “standard” T-bond futures contract use a 6% T-bond as the reference contract that can be delivered on the delivery date. The buyer (long) will pay the futures price (A “160” quote means 160% of the futures contract par value of $100,000). Any T-bond with between 25 and 30 years can be delivered. Yesterday (Dec. 22, 2017) the interest rate on 30-yr. spot market T-bonds was 2.82.

1. $\_\_\_\_\_\_\_\_\_\_\_ What is the value today of a 30-yr year 100,000 (face value) T-bond that pays a 6% coupon (so 6,000 per year) and returns the initial principal of 100,000 in 30 years if discounted at 2.82%? An approximate answer (assuming annual payments of interest of 6,000 per year instead of 1500 per quarter) is given by (using an HP 10B) entering

30 for N, 2.82 for I/YR, 6000 for Pmt, 100,000 for FV, then solving for PV of **163,805**

1. Does your price from 1) above seem to be (more or less) consistent with the price quotes for the ultra bond futures for coming months?

The price calculated above is very close to the price quote for the March ultra T-bond futures contract.

1. & 4) Find the quotes on the “standard” T-bond futures contract and compare which has a higher price, the newer “ultra” T-bond futures contract or the 15-25 year contract? The ultra T-bond futures contract has a higher price. The explanation is that the 6% standard contract rate is well above the going market rate (2.82%) on long-term T-bonds. A new T-bond with a coupon of 2.82%, the going market rate, should sell for approximately par of $100,000, and an investor at this price would earn a 2.82% yield if she holds it to maturity. The ultra T-bond futures contract sells for more than the standard T-bond futures contract because the long-term (25 to 30 year) T-bond delivered to the buyer of an ultra contract will earn an above-market rate for 25-30 years. In contrast, the T-bond deliverable into the

Standard T-bond contract has 15-25 years remaining until maturity, so the investor earns an above-market rate for a shorter period of time relative to the ultra contract deliverable. The ultra is thus more valuable.

Arbitrage considerations.

1. \_\_\_\_\_\_\_If you buy the near (March) ultra contract at 162-24 (162 24/32 = 162.75) and short the Sept. at an estimated price of 160-24 (and you earn $3000 in the interim [where does that come from?]), what rate of return do you make (be careful to annualize the rate).

You lose 2 points ($2,000) by buying at 162,750 and selling at $160,750, but you earn $3,000 in interest, so net $1,000 (you also pay commissions of $1USD or so per contract (ignore this). Your rate of return is thus ($3,000 - $2,000)/$162,750 = .6144% for six months.

Annualized this is approximately .6144% x 2 six-month periods per year = 1.229%. Better still, accounting for compounding, take 1.006144 to the second power and subtract 1.00 to arrive at 1.232%. This return is slightly less than the six-month T-bill (risk-free) rate. But, this return is very close to the risk-free rate, suggesting that arbitrage is the primary determinant of the relationship between T-bond futures prices and T-bond spot prices.

1. Why don’t you earn something more than this? If you bought the bond purchased at 162.75 wouldn’t you expect to earn approximately 6/162.75 = 3.69% on an annualized basis? Explain! If you bought the bond at $162,750 and earned $6,000 in interest as you held it for a year, then you sold the bond at what you paid for it, you would earn $6,000/$162,750 = 3.69%. But buying the bond and holding it is much more risky than the arbitrage that locks in a sales price for it as you do when you go long the March contract and short the September contract. The less risky arbitrage buy March/Sell September earns less because it is less risky. It has a risky similar to owing a six-month T-bill.