SOLUTIONS ASSIGNMENT 4

While this assignment was grueling, the point was to develop an important skill — being able to uncover the treasury yield curve from coupon bond price data. If you can do this, you can price any certain cash flow, and hence any of the sorts of fixed income security that we have been discussing. In the context of the cougars you can evaluate if they are a "good buy", that is if they are priced high (low yield) or priced low (high yield) relative to the treasury coupon yield curve.

FYI: The first Custodial receipts were called TIGRS (Treasury Investment Growth Receipts) and were introduced by Merrill in '82. Next came CATS (Certificates of Accrual on Treasury Securities) by Salmon but in Jan '85 the treasury announced its STRIPS program: Separate trading of registered interest and principal of securities. The strips program effectively eliminated both the private issues (the Fed Banks act as custodians) and the feline acronyms.

I haven't attached my actual numbers to this, if you want to take a look, let me know.

a) The first part of the exercise is to find the deflator. Use the formula for the price of a t–bill to discount the series back 21 days. The deflator is 0.9953. If you multiply the original price series by this you get the adjusted price series. Then, use the new prices to calculate the adjusted yield. You can get this by using the formula if the bond comes due in t periods, then the annualized yield is:

$$2[(100/P)^{1/2t} - 1].$$

(This type of calculation is easy to do in EXCEL, just define a column with 1,2,3, etc. and use this to take the roots.)

b) All right, I wasn't ambitious enough to print this!

c) The first thing to do is to convert the prices to decimals. Then, form a coupon matrix, C. Suppose that you choose the first bond of the May 1984 maturity. It has an annual coupon of 9.25, suppose you next choose the 9.88 coupon bonds of November 1984 and the 9.88 bonds of May 85 and the 9.75 of November 85.... then your coupon matrix should look like:

9.25/2+100	0	0	0
9.88/2	9.88/2+100	0	0
9.88/2	9.88/2	9.88/2+100	0
9.75/2	9.75/2	9.75/2	9.75/2+100

You divide the coupon amount by two because these are annual coupon rates and the payments are semi–annual.

d) Once again NO GRAPHICS.

e) To calculate how much the coupon bond is worth sold as a COUGAR, I priced the coupon stream of 5.94 every six months using the adjusted COUGAR prices (this is what they are selling the coupon payments for). You can use the yields to value this cash flow or use the discount prices directly, that is take the adjusted prices of the cougars and calculate: 5.94 * (sum of all the COUGAR prices divided by 100) + 100* (the November 2003 COUGAR price). If you do this you get: 15.234*5.94 + 10.406=100.896. (The last term is the due to the face value of the bond). The current price of the treasury bond is 99.875, giving them a profit of 1.021 per 100 face value of the bond. This is not shabby considering the number of bonds that they converted into COUGARS.

All in all, examining the yield curve the short end COUGARS were cheap relative to the government coupon yield coupon so these were be a good buy. The purpose of the strip was to provide a vehicle for investors for a tax shelter. These investors were interested in the long end of the curve and these COUGARS were very expensive relative to treasury coupon prices.