Final: Short Answers

(May 11, 1998)

1. Definitions.

   (a) A cross-over investor is someone investing in a market that's not their primary focus; for example, a US bond fund investing some of its money in emerging market debt.

   (b) Reg 144A is a standard exemption from SEC registration for issues sold to institutional investors (Qualified Institutional Buyers).

   (c) Bond futures typically allow short positions to deliver any of a number of different bonds. People invariably choose the cheapest to deliver, computed after adjustment with conversion factors.

   (d) Bonds in default typically pay something less than face value. The payment per dollar of face value is the recovery rate.

   (e) In a CBO, a single purpose corporation issues high-rated debt to finance the purchase of a portfolio of lower-rated debt. The conversion from junk to high-grade debt is accomplished through diversification and overcollateralization (the portfolio is worth more than the high-grade debt).

2. Brady bonds.

   (a) Bradies originated in 1989 as a device to repackage nonperforming bank loans to sovereigns as securities.

   (b) This is just the yield-to-maturity:

$$\text{Price} = \frac{8}{1+y} + \frac{8}{(1+y)^2} + \frac{8}{(1+y)^3} + \frac{108}{(1+y)^4}.$$

   The price (93.140) is computed by applying treasury spot rates to the principal and sovereign spot rates to coupons. The answer is $y = 10.172\%$.

   (c) The stripped yield is the yield on the sovereign cash flows only, meaning we strip off the guaranteed principal:

$$\text{Price} = \frac{8}{1+y} + \frac{8}{(1+y)^2} + \frac{8}{(1+y)^3} + \frac{8}{(1+y)^4}.$$

   The price (23.582) is computed by applying sovereign spot rates to the coupons. The answer is $y = 13.435\%$. This calculation focuses on the cash flows subject to sovereign (credit) risk. Unlike the blended yield, it doesn't mix guaranteed and nonguaranteed cash flows together.

(d) Duration measures sensitivity to generalized movements in interest rates. The difficulty here is that sovereign and treasury rates do not move together: the spread between them varies and is a second source of risk.

3. FRA diavalo.

(a) The value in six months for a principal of 100 is

$$\frac{r/2}{1+r/2} \times 100 + \frac{100}{1+r/2} \;=\; \frac{1+r/2}{1+r/2} \times 100 \;=\; 100,$$

the same thing we noticed for FRNs. The value now is $d_1 \times 100$, where d_1 is the first discount factor.

(b) The fixed payment (again for a principal of 100) is worth $(1+C/2)\times 100$ in 12 months, and $d_2(1+C/2)\times 100$ now.

(c,d) The two sides are worth the same thing at the start:

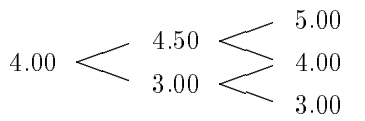
$$d_1 \times 100 \;=\; d_2(1+C/2)\times 100,$$

which gives us $1 + C/2 = d_1/d_2$. You might recognize C as the forward rate, 7.005% in this case.

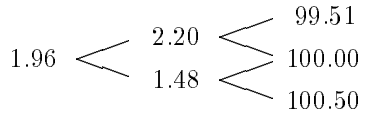
4. FRN with cap and floor.

(a) Firms often put caps on the rate of an FRN to limit their exposure to upward movements in the floating rate. They sell a floor to offset some of the cost of the cap.

(b) Given the cap and floor, interest payments are based on



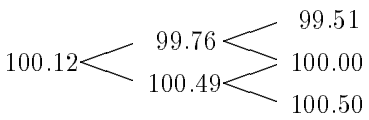
The cash flows are based on these rates plus principal, all discounted one period to put them into the tree:



For example,

$$\begin{aligned} 99.51 &= \frac{100(1+.05/2)}{1+.06/2} \\ 1.48 &= \frac{100(.03/2)}{1+.025/2} \end{aligned}$$

(c) The complete tree is



For the node with question marks,

$$\begin{aligned} q_u &= q_d = 0.5/(1+.025/2) = 0.4938 \\ 100.49 &= 1.48 + 0.4938 \times (100.00 + 100.50) \end{aligned}$$

a standard application of the fifty-fifty rule and the pricing formula.

(d) For a standard FRN (no cap or floor), the price-yield relation is relatively flat, indicating that the note has a short duration. Near the cap or floor the rate is fixed, so the duration is longer and the slope steeper. That gives the note a kind of a sideways Z shape: flat in the middle, steeper at high and low rates.