Numerical Example in Valuing Zero Coupon Bonds

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	Year				
	0	1	3	5	10
Interest Rate					
a) 10%	1000.00	909.09	751.31	620.92	385.54
b) 7%	1000.00	934.58	816.30	712.99	508.35

NOTES:

1) Each entry in the table represents the value of a zero coupon bond with a face value of $1000. The number of years remaining to maturity is listed at the top and the interest rate is on the left (equal to either 10%or 7%).

2) Look at row (a) and compare the values as the bond moves through time and approaches maturity. The increase in value as the bond approaches maturity is called '**pull to par'**, i.e., the value of the zero increases to its face value of $1,000.00 (the face value is sometimes called 'par ' value, hence the term 'pull to par')

3) The increase in value of the zero between any two dates represents the interest earned assuming rates remain at the indicated level. For example, the value of a zero coupon bond will increase from $385.00 to $620.92 as the bond moves from 10 years to maturity to 5 years to maturity assuming interest rates remain at 10%.

4) Compare the value of the zero at 10 years to maturity when rates are 10% versus when they are 7%. Lower interest rates mean higher bond prices. This is true by the formula connecting P and r, meaning it is true by definition.

5) A decline in interest rates from 10% (.1000) to 7% (.0700) drives up the price of a 10 year zero from $385.54 to $508.35—an increase of 31.85%. This is an enormous jump in the price of a bond. This occurs because the drop in rates is enormous—equal to 300 basis point. A **basis point** is equal to .0001, or one hundredth of one percent, and the drop from .1000 to .0700 is .0300 (3% or 300 basis points). Interest rates on ten year bonds in the U.S. change by 5 or 10 basis points per day, while over a year they may vary by 100 or 200 basis points.

6) Compare the 31.85% price increase on the 10-year zero from (5) with the percentage price change of the 3-year zero when rates drop from 10% to 7%. The price of the 3-year zero increases by 8.65%. The lesson: longer maturity zeros have greater percentage price volatility than shorter maturity zeros for the same change in interest rates.