1, Jim purchases 2-years $1,000 par value bonds with a 9percent coupon rate paid annually and a 12 percent yield to maturity. Jim will hold the bonds until maturity. Thus, what is the bond current price?

N = 2 years
FV =1,000 C is less than discount factor P is less than FV
C = 0,09 p.a.
I = 0,12 p.a.

Price = PV of all future CFs

<u>Pattern of CFs</u>

time	0	1 year	2 year
CF	P=?	90	90 + 1000

$$P_0 = \sum_{i=1}^{2} \frac{CF_i}{(1+i)^i} = \frac{90}{(1+0{,}12)^1} + \frac{90+1000}{(1+0{,}12)^2}$$

$$P_0 = A * \frac{1-(1+i)^{-n}}{i} + \frac{FV}{(1+i)^n} = 90 * \frac{1-(1+0{,}12)^{-2}}{0{,}12} + \frac{1000}{(1+0{,}12)^2}$$

$$\boldsymbol{P_0 = 152{,}1046 + 797{,}1939 = 949{,}2985}$$

Or,

$$P_0 = \frac{90}{1+0{,}12} + \frac{90}{(1+0{,}12)^2} + \frac{1000}{(1+0{,}12)^2}$$

$$\boldsymbol{P_0 = 80{,}3571 + 71{,}7474 + 797{,}1939 = 949{,}2984}$$

2, A ten-year, inflation-indexed bond has a par value of $10,000 and a coupon rate of 5 percent. During the first six months since the bond was issued, the inflation rate changed about 2 percent. Based on this information, the coupon payment after six months will be $_____.

FV = 10,000
C = 0,05 – 0,025 p.s.
Inflation rate = 0,02 p.s.

Next FV =FV*(1+inflation rate)= 10,000*(1,02)=10,200
Coupon = 0,025*10,200 = 255
For a non= inflation protected security - coupon = 0,025 *10,000 = 250

3, A bond with a $1,000 par value has an 8 percent annual coupon rate. It will mature in 4 years, and annual coupon payments are made at the end of each year. Present annual yields on similar bonds are 6 percent. What should be the current price?

N = 4 years
FV =1,000
C = 0,08 p.a.
I = 0,06 p.a.

Price = PV of all future CFs

Pattern of CFs

time	0	1 year	2 year	3 year	4 year
CF	P=?	80	80	80	80 + 1000

$$P_0 = \sum_{i=1}^{4} \frac{CF_i}{(1+i)^i} = \frac{80}{(1+0{,}06)^1} + \frac{80}{(1+0{,}06)^2} + \frac{80}{(1+0{,}06)^3} + \frac{80+1000}{(1+0{,}06)^4}$$

$$P_0 = A * \frac{1-(1+i)^{-n}}{i} + \frac{FV}{(1+i)^n} = 80 * \frac{1-(1+0{,}06)^{-4}}{0{,}06} + \frac{1000}{(1+0{,}06)^4}$$

$$\boldsymbol{P_0 = 277{,}2084 + 792{,}094 = 1069{,}30}$$

4, A bond with a ten percent coupon rate bond pays interest semi-annually. Par value is $1,000. The bond has three years to maturity. The investors' required rate of return is 12 percent. What is the present value of the bond?

N = 3 years – 6 semi-annual periods
FV =1,000
C = 0,1 p.a. – 0,05 p.s.
I = 0,12 p.a. – 0,06 p.s.

Price = PV of all future CFs

Pattern of CFs

time	0	1 period	2 period	3 period	……	6 period
CF	P=?	50	50	50	…..	50 + 1000

$$P_0 = \sum_{i=1}^{6} \frac{CF_i}{(1+i)^i} = \frac{50}{(1+0{,}06)^1} + \frac{50}{(1+0{,}06)^2} + \frac{50}{(1+0{,}06)^3} + \cdots + \frac{50+1000}{(1+0{,}06)^6}$$

$$P_0 = A * \frac{1-(1+i)^{-n}}{i} + \frac{FV}{(1+i)^n} = 50 * \frac{1-(1+0{,}06)^{-6}}{0{,}06} + \frac{1000}{(1+0{,}06)^6}$$

$$\boldsymbol{P_0 = 245,8662 + 704,9605 = 950,8268}$$

5, Zero coupon bonds with a par value of $1,000,000 have a maturity of 10 years, and a required rate of return of 9 percent. What is the current price?

N = 10 years
FV =1.000.000
C = 0 p.a.
I = 0,09 p.a.

Price = PV of all future CFs

Pattern of CFs

time	0	1 year	2 year	3 year	……	10 year
CF	P=?	0	0	0	…..	1.000.000

$$P_0 = \sum_{i=1}^{10} \frac{CF_i}{(1+i)^i} = \frac{0}{(1+0{,}09)^1} + \frac{0}{(1+0{,}09)^2} + \frac{0}{(1+0{,}09)^3} + \cdots + \frac{0+1000000}{(1+0{,}09)^{10}}$$

$$P_0 = A * \frac{1-(1+i)^{-n}}{i} + \frac{FV}{(1+i)^n} = 0 * \frac{1-(1+0{,}09)^{-10}}{0{,}0} + \frac{1000000}{(1+0{,}09)^{10}}$$

$$\boldsymbol{P_0 = 0 + 422.410,8069 = 422.410,8069}$$

6, A bond with a 12 percent quarterly coupon rate has a yield to maturity of 16 percent. The bond has a par value of $1,000 and matures in 20 years. Based on this information, a fair price of this bond is $____.

N = 20 years – 80 quartes
FV =1.000
C = 0,12 p.a. – 0,03 p. q.
I = 0,16 p.a. – 0,04 p.q.

Price = PV of all future CFs

Pattern of CFs

time	0	1 period	2 period	3 period	......	80 period
CF	P=?	30	30	30	.....	30 +1.000

$$P_0 = \sum_{i=1}^{80} \frac{CF_i}{(1+i)^i} = \frac{30}{(1+0{,}04)^1} + \frac{30}{(1+0{,}04)^2} + \frac{30}{(1+0{,}04)^3} + \cdots + \frac{30+1000}{(1+0{,}04)^{80}}$$

$$P_0 = A * \frac{1-(1+i)^{-n}}{i} + \frac{FV}{(1+i)^n} = 30 * \frac{1-(1+0{,}04)^{-80}}{0{,}04} + \frac{1000}{(1+0{,}04)^{80}}$$

$$\boldsymbol{P_0 = 717,4618 + 43,384 = 760,8461}$$