Financial Markets **Quiz 2**

HEC Paris

SOLUTION

Consider the following bonds

	Face (Par) value (in €)	Maturity	Frequency of coupon	Coupon rate	Yield to maturity (per year)	Price (in €) at t=0
Bond A	10,000	6 months	-	0%		9,900
Bond B	100	12 months	-	0%	2%	
Bond C	100	18 months	-	0%		97
Bond D	100	24 months	-	0%	3%	
Bond E	100	36 months	-	0%		92
Bond F	200	24 months	1 year	5%		

a) On the timeline write down the dates and cashflows of Bond F

@ t=12 months C=10 €

@ t=24 months C=10 € & N=200 €

b) What is the (annualized) 6-month interest rate r(0.5)?

$$r(0.5yrs) = r_{6mo.s} = \left(\frac{10{,}000}{9{,}900}\right)^{\frac{1}{0.5}} - 1 = 0.0203$$

- ❑ 2.03%
- ❑ 2.05%
- ❑ 3.03%
- ❑ 3.05%
- ❑ 5.00%

c) What is the current price of bond D?

$$P_0^D = \frac{100}{(1+0.03)^2} = 94.26$$

- ❑ € 90.12
- ❑ € 93.56
- ❑ € 94.26
- ❑ € 96.60
- ❑ € 98.04

d) What is the one-year forward rate between t=1 and t=2, i.e., r(1Y,2Y)?

$$r(1Y,2Y) = f_{1\to 2} = \frac{(1+0.03)^2}{(1+02)} - 1 = 0.0401$$

- ❑ 3.44%
- ❑ 4.01%
- ❑ 4.51%
- ❑ 5.44%
- ❑ 5.58%

e) Let G be a convertible zero-coupon bond with maturity 36 months and a face value of 100€ (and the same default risk as the other bonds in the table above). What can you say about the price of Bond G at t=0?

⇨ See course slides

- ❑ $P_G < 92$
- ❑ $P_G = 92$
- ❑ $P_G > 92$
- ❑ $P_G = 97$
- ❑ $P_G > P_F$

SOLUTION

Consider the following bonds

	Face (Par) value (in €)	Maturity	Frequency of coupon	Coupon rate	Yield to maturity (per year)	Price (in €) at t=0
Bond A	10,000	6 months	-	0%		9,900
Bond B	100	12 months	-	0%	2%	
Bond C	100	18 months	-	0%		97
Bond D	100	24 months	-	0%	3%	
Bond E	100	36 months	-	0%	3.5%	
Bond F	200	24 months	1 year	10%		

a) On the timeline write down the dates and cashflows of Bond F

@ t=12 months C=20 €

@ t=24 months C=20 € & N=200 €

b) What is the (annualized) 18-month interest rate, r(1.5)?

$$r(1.5yrs) = r_{18mo.s} = \left(\frac{100}{97}\right)^{\frac{1}{1.5}} - 1 = 0.0205$$

- ❑ 2.03%
- ❑ 2.05%
- ❑ 3.03%
- ❑ 3.05%
- ❑ 5.00%

c) What is the current price of bond B?

$$P_0^B = \frac{100}{(1+0.02)^1} = 98.04$$

- ❑ € 90.12
- ❑ € 93.56
- ❑ € 94.26
- ❑ € 96.60
- ❑ € 98.04

d) What is the one-year forward rate between t=2 and t=3, i.e., r(2Y,3Y)?

$$r(2Y,3Y) = f_{2\to 3} = \frac{(1+0.035)^3}{(1+0.03)^2} - 1 = 0.0451$$

- ❑ 3.44%
- ❑ 4.01%
- ❑ 4.51%
- ❑ 5.44%
- ❑ 5.58%

e) Let G be a callable bond with the same maturity, coupon, face value, frequency and default risk as Bond F. What can you say about the price of Bond G at t=0?

⇨ See course slides

- ❑ $P_G = 92$
- ❑ $P_G < P_F$
- ❑ $P_G = P_F$
- ❑ $P_G < 97$
- ❑ $P_G > P_F$

SOLUTION

Consider the following bonds:

	Face (Par) value (in €)	Maturity	Frequency of coupon	Coupon rate	Yield to maturity (per year)	Price (in €) at t=0
Bond A	10,000	6 months	-	0%		9,900
Bond B	100	12 months	-	0%	2%	
Bond C	100	18 months	-	0%		97
Bond D	100	24 months	-	0%	3%	
Bond E	100	36 months	-	0%		92
Bond F	200	24 months	1 year	5%		

a) On the timeline write down the dates and cashflows of Bond F

@ t=12 months C=10 €

@ t=24 months C=10 € & N=200 €

b) What is the (annualized) 36-month interest rate, r(3Y)?

$$r(1.5yrs) = r_{18mo.s} = \left(\frac{100}{92}\right)^{\frac{1}{3}} - 1 = 0.0282$$

- ❑ 1.92%
- ❑ 2.05%
- ❑ 2.82%
- ❑ 3.24%
- ❑ 4.51%

c) What is the current price of bond B?

$$P_0^B = \frac{100}{(1+0.02)^1} = 98.04$$

- ❑ 90.15
- ❑ 93.18
- ❑ 94.26
- ❑ 95.64
- ❑ 98.04

d) What is the yield to maturity of Bond F as of date t=0?

Bond F's yield to maturity (y) has to be r_2=2% < y < r_3=3% since:

$$P_0 = \frac{20}{(1+r_1)} + \frac{210}{(1+r_2)^2} = \frac{20}{(1+y)} + \frac{210}{(1+y)^2}$$

- ❑ 1.95%
- ❑ 2.00%
- ❑ 2.95%
- ❑ 3.00%
- ❑ 5.00%

e) Let G be a callable zero coupon bond with maturity of 36 months and a face value of 100€ (and the same default risk as the other bonds in the table above). What can you say about Bond G's price at t=0?

⇨ See course slides

- ❑ $P_G \leq 92$
- ❑ $P_G = P_F$
- ❑ $P_G > 92$
- ❑ $P_G = 97$
- ❑ $P_G > P_F$

Financial Markets **Quiz 2**

....

HEC Paris

SOLUTION

Consider the following bonds:

	Face (Par) value (in €)	Maturity	Frequency of coupon	Coupon rate	Yield to maturity (per year)	Price (in €) at t=0
Bond A	10,000	6 months	-	0%		9,900
Bond B	100	12 months	-	0%	2%	
Bond C	100	18 months	-	0%		97
Bond D	100	24 months	-	0%	3%	
Bond E	100	36 months	-	0%	3.5%	
Bond F	300	24 months	1 year	10%		

a) On the timeline write down the dates and cashflows of Bond F

@ t=12 months C=30 €

@ t=24 months C=30 € & N=300 €

b) What is the (annualized) 18-month interest rate r(1.5)?

$$r(1.5yrs) = r_{18mo.s} = \left(\frac{100}{97}\right)^{\frac{1}{1.5}} - 1 = 0.0205$$

- ❑ 1.92%
- ❑ 2.05%
- ❑ 2.82%
- ❑ 3.24%
- ❑ 4.51%

c) What is the current price of bond E?

$$P_0^E = \frac{100}{(1+0.035)^3} = 90.19$$

- ❑ 89.18
- ❑ 90.19
- ❑ 94.26
- ❑ 96.45
- ❑ 98.04

d) What is the yield to maturity of Bond F as of date t=0?

Bond F's yield to maturity (y) has to be $r_2=2\% < y < r_3=3\%$ since:

$$P_0 = \frac{30}{(1+r_1)} + \frac{330}{(1+r_2)^2} = \frac{30}{(1+y)} + \frac{330}{(1+y)^2}$$

- ❑ 1.95%
- ❑ 2.00%
- ❑ 2.95%
- ❑ 3.00%
- ❑ 10.00%

e) Let G be a convertible zero coupon bond with maturity of 18 months and a face value of 100€ (and the same default risk as the other bonds in the table above). What can you say about Bond G's price at t=0?

⇨ See course slides

- ❑ $P_G \leq 92$
- ❑ $P_G < 97$
- ❑ $P_G = 97$
- ❑ $P_G > 97$
- ❑ $P_G > P_F$