

LAST NAME _____

FIRST NAME _____

For all questions, assume you can buy or short-sell fractions of bonds, and that default risk free zero-coupon bonds have a face value of €100.

Bond A is default risk free, pays annual coupons with a coupon rate of 10%, has a face value of €1 000, and has a maturity of 2 years. Default risk free zero-coupon bonds with maturity of one, two, and three years have respectively yields-to-maturity of 3%, 7%, and 10% per year.

1) What is the duration of Bond A?

- | | |
|-------------------------------------|-------------------------------------|
| <input type="checkbox"/> 2% | <input type="checkbox"/> 2.17 years |
| <input type="checkbox"/> 1.91 years | <input type="checkbox"/> 7% |
| <input type="checkbox"/> 2 years | |

2) The market price of bond A is €1 000. If there is an arbitrage opportunity, it involves:

- | |
|--|
| <input type="checkbox"/> buying bond A |
| <input type="checkbox"/> short-selling the 3-year zero |
| <input type="checkbox"/> buying some 1-year and 2-year zeros |
| <input type="checkbox"/> short-selling bond A |
| <input type="checkbox"/> there is no arbitrage opportunity |

3) What is the two-year forward rate starting in one year, $f_{t=1 \rightarrow t=3}$, in percentage per year?

- | |
|---------------------------------|
| <input type="checkbox"/> 6.79% |
| <input type="checkbox"/> 13.67% |
| <input type="checkbox"/> 29.22% |
| <input type="checkbox"/> 3.34% |

4) Bond B has a shorter duration than Bond A. When the yield curve makes a parallel shift upward, then:

- | |
|---|
| <input type="checkbox"/> Bond B's price increases and it increases more than Bond's A price |
| <input type="checkbox"/> Bond B's price increases and it increases less than Bond's A price |
| <input type="checkbox"/> Bond B's price decreases and it decreases more than Bond's A price |
| <input type="checkbox"/> Bond B's price decreases and it decreases less than Bond's A price |

5) Bond C is a fixed-rate coupon bond that currently trades at a price larger than its face value. Then Bond C's yield-to-maturity is larger than its coupon rate.

- | |
|--------------------------------------|
| <input type="checkbox"/> true |
| <input type="checkbox"/> false |
| <input type="checkbox"/> cannot tell |

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For all questions, assume you can buy or short-sell fractions of bonds, and that default risk-free zero-coupon bonds have a face value of €100.

Bond A is default risk-free, pays annual coupons with a coupon rate of 10%, has a face value of €1 000, and has a maturity of 2 years. Default risk-free zero-coupon bonds with maturity of one, two, and three years have respectively yields-to-maturity of 3%, 7%, and 10% per year.

1) What is the duration of Bond A?

Not a zero, so cannot be the maturity of 2 years, only one answer below 2 years

- | | |
|--|-------------------------------------|
| <input type="checkbox"/> 2% | <input type="checkbox"/> 2.17 years |
| <input checked="" type="checkbox"/> 1.91 years | <input type="checkbox"/> 7% |
| <input type="checkbox"/> 2 years | |

2) The market price of bond A is €1 000. Is there an arbitrage opportunity? If yes, it involves:

$$P = 100 / 1.03 + 1100 / 1.07^2 = 1057.87$$

Bond is cheap, so buy it, short-sell replicating portfolio

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|--|
| <input checked="" type="checkbox"/> buying bond A |
| <input type="checkbox"/> short-selling the 3-year zero |
| <input type="checkbox"/> buying some 1-year and 2-year zeros |
| <input type="checkbox"/> short-selling bond A |
| <input type="checkbox"/> there is no arbitrage opportunity |

3) What is the two-year forward rate starting in one year, $f_{t=1 \rightarrow t=3}$, in percentage per year?

$$f_{t=1 \rightarrow t=3} = \left(\frac{1.10^3}{1.03} \right)^{1/2} - 1 = 13.67\%$$

- | |
|--|
| <input type="checkbox"/> 6.79% |
| <input checked="" type="checkbox"/> 13.67% |
| <input type="checkbox"/> 29.22% |
| <input type="checkbox"/> 3.34% |

4) Bond B has a shorter (lower) duration than Bond A. When the yield curve makes a parallel shift upward, then:

r goes up, price goes down, B is less sensitive than A so its price goes down by less than A

- | |
|--|
| <input type="checkbox"/> Bond B's price increases and it increases more than Bond's A price |
| <input type="checkbox"/> Bond B's price increases and it increases less than Bond's A price |
| <input type="checkbox"/> Bond B's price decreases and it decreases more than Bond's A price |
| <input checked="" type="checkbox"/> Bond B's price decreases and it decreases less than Bond's A price |

5) Bond C is a fixed-rate coupon bond that currently trades at a price larger than its face value. Then Bond C's yield-to-maturity is larger than its coupon rate.

Bond is more attractive because its coupon rate is higher than yield-to-maturity -> price is higher than face value

- | |
|---|
| <input type="checkbox"/> true |
| <input checked="" type="checkbox"/> false |
| <input type="checkbox"/> cannot tell |