

Risk premium 风险溢价 低效 convexity

- Apply from the **second** year。 第一年不要
- Risk averse require risk premium
- N years require (n-1)*one year risk premium
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- 加上风险溢价后，**买入**价格降低。
- 但是第一年的回报还是不变的，因此还是用以前的算。
- 风险溢价是通过降低现值得到的。

假定

- 利率树：第一年利率 r_1 ，第二年是 r_2 和 r_3 。
- PV 现值 $PV = \frac{\left(\frac{1}{1+r_2} + \frac{1}{1+r_3}\right)}{1+r_1}$
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- 加上风险溢价 z (用到之后的年，除了第一年)
- 新的 PV 现值 $PV_z = \frac{\left(\frac{1}{1+r_2+z} + \frac{1}{1+r_3+z}\right)}{1+r_1}$
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- 第一年时的值 $PV_1 = 0.5 \times \left(\frac{1}{1+r_2} + \frac{1}{1+r_3}\right)$ (还是按照**真实利率**，不算 premium)
- 新的一年回报 $r = \frac{PV_1 - PV_z}{PV_z}$

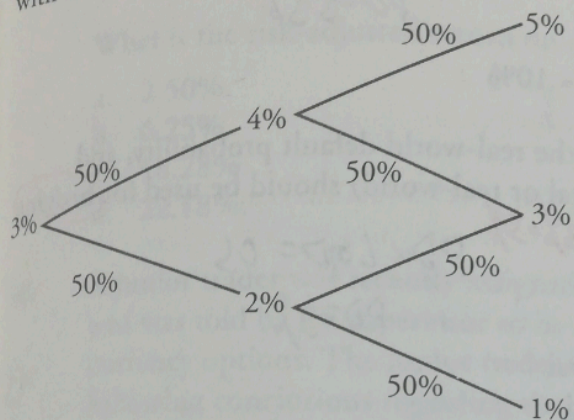
PV

- Use expected 1-year return (就是利率回报)

Expected 1-year rate: average interest rate at a year

Use the following information to answer Questions 23 and 24.

The following decision tree of expected 1-year rates is for a 2-year zero-coupon bond with a face value of \$1.



$$\frac{\left(\frac{1}{1+4.3\%} + \frac{1}{1+2.3\%} \right) \times 0.5}{1+3\%}$$

23. Suppose that investors are risk averse and require a risk premium of ^{23%}30 basis points for each year of interest rate risk. What is the price for a 2-year zero-coupon bond with a face value of \$1 using the expected 1-year returns in the decision tree?

A

- a. \$0.93995.
- b. \$0.95877.
- c. \$0.97752.
- d. \$0.98955.

24.

- Suppose that investors are risk averse and require a risk premium of 30 basis points for each year of interest rate risk. What is the investor's expected or required return for a 2-year zero-coupon bond with a face value of \$1 using the expected 1-year rates in the decision tree?

- a. 2.7%.
- b. 3.0%.
- c. 3.3%.
- d. 3.6%.

$$\frac{\left(\frac{1}{1.04} + \frac{1}{1.02} \right) - 0.93995}{0.93995} = 0.033 = 3.3\%$$

2 题: 也可以 $3\% + 30\text{bps} = 3.3\%$

$$\$0.93995 = \frac{[\$0.95877 + \$0.97752] / 2}{1.03}$$

(See Book 1, Topic 12)

24. c The price of a 2-year zero-coupon bond with a 30 basis point risk premium was calculated in the previous question as \$0.93995.

Next year, the price of the 2-year zero-coupon bond will either be \$0.96154 or \$0.98039, depending on whether the 1-year rate is either 4% or 2%, respectively. (These prices are calculated as: \$0.96154 = \$1 / 1.04 and \$0.98039 = \$1 / 1.02). Thus, the expected return for the next year of the 2-year zero-coupon bond is 3.3% calculated as follows:

$$\begin{aligned} \frac{\left[\frac{\$1}{1.04} + \frac{\$1}{1.02} \right] - \$0.93995}{\$0.93995} &= \frac{\frac{\$0.96154 + \$0.98039}{2} - \$0.93995}{\$0.93995} \\ &= \frac{\$0.97097 - \$0.93995}{\$0.93995} = 0.033 \end{aligned}$$

(See Book 1, Topic 12)

... and a payoff of 93.75 - 93